

Air Ministry  
METEOROLOGICAL OFFICE

# THE OBSERVATORIES' YEAR BOOK 1932

Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

Published by the authority of the  
METEOROLOGICAL COMMITTEE

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LONDON

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE

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 Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh 2  
 York Street, Manchester 1; 1, St. Andrew's Crescent, Cardiff  
 80, Chichester Street, Belfast  
 or through any Bookseller

1934

Price £2 2s. od. Net

*There also exists a  
 Geophysical Memoir No 80 1949  
 "Hourly ranges of the magnetic  
 elements, during the polar  
 year 1932-3, at the Observatories  
 of Lerwick and Eskdalemuir."  
 (Letter M21463 61 of 15/3/65)*

## PREFACE.

From 1908 to 1921, the serial statistical publications of the Meteorological Office were grouped together as though they were parts of one comprehensive book. This book, which was entitled "The British Meteorological and Magnetic Year Book," consisted of:—

Part I	..	..	..	..	The Weekly Weather Report.
Part II	..	..	..	..	The Monthly Weather Report.
Part III, Section I	..	..	..	..	Daily Readings at Meteorological stations of the First and Second Orders.
Section II	..	..	..	..	Geophysical Journal, Daily Values of Meteorological and Geophysical Elements.
Part IV, Section I	..	..	..	..	Hourly Values from Autographic Records, Meteorological Section.
Section II	..	..	..	..	Hourly Values from Autographic Records, Geophysical Section.
Part V	..	..	..	..	Réseau Mondial.

The data for the year 1922 and subsequent years are found in the following publications:—

New Publication from 1922.				Corresponding parts of the British Meteorological and Magnetic Year Book until the end of 1921.
The Weekly Weather Report	..	..	..	Part I.
The Monthly Weather Report	..	..	..	Part II.
The Observatories' Year Book	..	..	..	{ Part III, Section II. Part IV, Section I.* Part IV, Section II.
The Réseau Mondial	..	..	..	Part V.

It will be noticed that Part III, Section I, of the old publication is not included in the new issues. This part contained "Daily Readings at Meteorological Stations of the First and Second Orders," and it has been decided that as the Observatories' Year Book contains daily values of the meteorological elements for the principal first order stations and the Daily Weather Report contains daily values for these and about 40 other stations, it is not necessary to revive the issue of this section, which ceased with the data for 1921.

The present volume is the eleventh issue of the Observatories' Year Book. It contains geophysical data for Lerwick, Eskdalemuir, Cahirciveen and Richmond, meteorological data for Aberdeen, Eskdalemuir, Cahirciveen and Richmond, and in addition an aerological section giving the results of soundings of the upper atmosphere by means of registering balloons.

The table of mean annual values of magnetic data for observatories of the globe has been contributed by the Astronomer Royal. It will be found at the end of the Eskdalemuir section.

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\*Part IV, Section I, Hourly Values from Autographic Records, Meteorological Section, was discontinued after the data for 1913 had been published. The hourly values for the years 1914 to 1921 are, however, available in manuscript.

## TABLE OF CONTENTS.

TABLE		PAGE
	Preface .. .. .	2
	Table of Contents .. .. .	3
	Errata in previous volumes .. .. .	7
	List of Observatories, with Geographical Positions and Heights .. .. .	8
	Normal Values and Monthly Summaries .. .. .	8
	General Introduction to the Meteorological Tables .. .. .	9
<b>LERWICK OBSERVATORY.</b>		
	Introduction .. .. .	25
<b>ATMOSPHERIC ELECTRICITY.</b>		
<i>Potential Gradient.</i>		
1	Daily Values at 3h, 9h, 15h and 21h ; Monthly and Annual Means .. .. .	52
2	Diurnal Inequalities ( <i>oa</i> Days only) .. .. .	54
3	Diurnal Inequalities ( <i>1a</i> and <i>2a</i> Days only) .. .. .	54
4	Electrical Characters of each day and approximate Duration of Negative Potential Gradient .. .. .	55
<b>TERRESTRIAL MAGNETISM.</b>		
5-52	Hourly Values of Horizontal Force, Declination and Vertical Force ; Hourly, Daily and Monthly Means .. .. .	56
	Daily Extremes and Range ; Monthly Means .. .. .	57
	Magnetic Character Figures ; Daily Values and Monthly Means .. .. .	57
	Temperature in Magnet House ; Daily Observations and Monthly Means .. .. .	57
53-61	Diurnal Inequalities ; Horizontal Force, Declination and Vertical Force, Monthly, Annual and Seasonal Means for each hour .. .. .	80
62	Monthly, Annual and Seasonal Range of Mean Diurnal Inequalities .. .. .	83
63	Average Departure from Daily Mean .. .. .	83
64	Monthly Values of Non-Cyclic Change of Horizontal Force, Declination and Vertical Force .. .. .	83
65	Monthly Mean Values of the Squares of the Absolute Daily Ranges .. .. .	83
66	Mean Monthly and Annual Values of Magnetic Elements .. .. .	83
<b>AURORA.</b>		
67	Auroral Log .. .. .	84
68	General Auroral Table .. .. .	85
<b>ABERDEEN OBSERVATORY.</b>		
	Introduction .. .. .	88
<i>Pressure.</i>		
<b>METEOROLOGY.</b>		
69-80	Hourly Readings ; Hourly and Daily Means .. .. .	95
81	Annual Means of Hourly Values .. .. .	101
82	Monthly Means and Diurnal Inequalities .. .. .	101
83	Daily Extremes .. .. .	101
<i>Temperature.</i>		
84-95	Hourly Readings ; Hourly and Daily Means .. .. .	102
96	Annual Means of Hourly Values .. .. .	108
97	Monthly Means and Diurnal Inequalities .. .. .	108
98	Daily Extremes .. .. .	108

ABERDEEN OBSERVATORY—*continued.*

TABLE		PAGE
	<i>Humidity.</i>	
99-110	Hourly Values of Relative Humidity ; Hourly, Daily and Monthly Means of Relative Humidity and Vapour Pressure .. .. .	109
111	Annual Means of Hourly Values of Relative Humidity and Vapour Pressure ..	115
112	Monthly Means and Diurnal Inequalities of Relative Humidity .. ..	115
	<i>Rainfall.</i>	
113	Annual Totals of Hourly Values of Amount and Duration .. .. .	115
114	Notes on Rainfall for the Year .. .. .	115
115-126	Hourly Amounts ; Hourly, Daily and Monthly Totals of Amount and Duration	116
	<i>Sunshine.</i>	
127-138	Hourly Readings ; Hourly, Daily and Monthly Totals .. .. .	122
138	Annual Totals and Means of Hourly Readings .. .. .	127
	<i>Wind, Speed and Direction.</i>	
139-150	Hourly Readings ; Hourly, Daily, Monthly and Annual Means of Wind Speed ..	128
151	Highest Instantaneous Wind Speed recorded each Day by the Dines Tube Anemograph .. .. .	140
152	Distribution of Wind Speed ; Extreme Velocities .. .. .	140
	<i>Ground Temperature.</i>	
153	Daily Readings, Monthly and Annual Means .. .. .	141
	<i>Night Minimum Temperature on the grass.</i>	
154	Daily Readings, Monthly and Annual Means .. .. .	141
	<i>Diary of Cloud, Visibility and Weather.</i>	
155-166	Daily Observations .. .. .	142

## ESKDALEMUIR OBSERVATORY.

Introduction .. .. .	150
----------------------	-----

## METEOROLOGY.

	<i>Pressure.</i>	
167-181	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes .. ..	191
	<i>Temperature.</i>	
182-196	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes .. ..	198
	<i>Humidity.</i>	
197-210	Hourly Values of Relative Humidity ; Hourly, Daily and Monthly Means of Relative Humidity and Vapour Pressure ; Annual Means of Hourly Values of Relative Humidity and Vapour Pressure ; Monthly Means and Diurnal Inequalities of Relative Humidity .. .. .	205
	<i>Rainfall.</i>	
211-224	Annual Totals of Hourly Values—Amount and Duration ; Notes on Rainfall for the Year ; Hourly Amounts ; Hourly, Daily and Monthly Totals of Amount and Duration .. .. .	211
	<i>Sunshine.</i>	
225-236	Hourly Readings ; Hourly, Daily and Monthly Totals ; Annual Totals and Means of Hourly Readings .. .. .	218

ESKDALEMUIR OBSERVATORY—*continued.*

TABLE		PAGE
	<i>Solar Radiation.</i>	
225-236	Measurements of Radiation by Ångström Pyrheliometer .. .. .	218
	<i>Wind, Speed and Direction.</i>	
237-248	Hourly Readings ; Hourly, Daily, Monthly and Annual Means of Wind Speed ..	224
249	Highest Instantaneous Wind Speed recorded each day by the Dines Tube Anemograph .. .. .	236
250	Distribution of Wind Speed ; Extreme Velocities .. .. .	236
	<i>Ground Temperature.</i>	
251	Daily Readings, Monthly and Annual Means .. .. .	237
	<i>Night Minimum Temperature on the grass.</i>	
252	Daily Readings ; Monthly and Annual Means .. .. .	237
	<i>Diary of Cloud, Visibility and Weather.</i>	
253-264	Daily Observations .. .. .	238

ATMOSPHERIC ELECTRICITY.

*Potential Gradient.*

265	Daily Values at 3h, 9h, 15h and 21h ; Monthly and Annual Means .. ..	244
266	Diurnal Inequalities (oa Days only) .. .. .	246
267	Diurnal Inequalities (1a and 2a Days only) .. .. .	246
268	Electrical Character of each day and approximate Duration of Negative Potential Gradient .. .. .	247

TERRESTRIAL MAGNETISM.

269-316	<del>Hourly Values of North, West and Vertical Components ; Hourly, Daily and Monthly Means .. and .. monthly means .. .. .</del> <i>Hourly values of horizontal component, declination and vertical component; hourly, daily</i>	<del>248</del> <i>(errata)</i>
	Daily Extremes and Range ; Monthly Means .. .. .	249
	Magnetic Character Figures ; Daily Values and Monthly Means .. .. .	249
	Temperature in Magnet House ; Daily Observations and Monthly Means .. .. .	249
317-334	Diurnal Inequalities ; North, West and Vertical Components, Declination, Inclination, and Horizontal Force, Monthly, Annual and Seasonal Means for each hour .. ..	272
335	Diurnal Inequalities ; Monthly, Annual and Seasonal Range .. .. .	278
336	Monthly Values of Non-Cyclic Change of North, West and Vertical Components .. ..	278
337	Monthly Mean Values of the Squares of the Absolute Daily Ranges .. .. .	278
338	Mean Monthly and Annual Values of Magnetic Elements .. .. .	278
339-340	Harmonic Components of the Diurnal Inequality of Magnetic Force .. .. .	279
341-342	Mean Annual Values for Magnetic Observations of the Globe .. .. .	280

CAHIRCIVEEN (VALENTIA OBSERVATORY).

Introduction.	Table of Magnetic Results .. .. .	282
---------------	-----------------------------------	-----

METEOROLOGY.

*Pressure.*

343-357	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes ..	295
---------	---	-----

*Temperature.*

358-372	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes ..	302
---------	---	-----

*Humidity.*

373-386	Hourly Values of Relative Humidity ; Hourly, Daily and Monthly Means of Relative Humidity and Vapour Pressure ; Monthly Means and Diurnal Inequalities of Relative Humidity .. .. .	309
---------	---	-----

TABLE		PAGE
	CAHIRCIVEEN (VALENTIA OBSERVATORY)— <i>continued.</i>	
	<i>Rainfall.</i>	
387-400	Annual Totals of Hourly Values—Amount and Duration ; Notes on Rainfall for the Year ; Hourly Amounts ; Hourly, Daily and Monthly Totals of Amounts and Duration .. .. .	315
	<i>Sunshine.</i>	
401-412	Hourly Readings ; Hourly, Daily and Monthly Totals ; Annual Totals and Means of Hourly Readings .. .. .	322
	<i>Wind, Speed and Direction.</i>	
413-424	Hourly Readings ; Hourly, Daily, Monthly and Annual Means of Wind Speed..	328
425	Highest Instantaneous Wind Speed recorded each day by the Dines Tube Anemograph .. .. .	340
426	Distribution of Wind Speed ; Extreme Velocities .. .. .	340
	<i>Ground Temperature.</i>	
427	Daily Readings, Monthly and Annual Means .. .. .	341
	<i>Night Minimum Temperature on the grass.</i>	
428	Daily Readings, Monthly and Annual Means .. .. .	341
	<i>Diary of Cloud, Visibility and Weather.</i>	
429-440	Daily Observations .. .. .	342
	RICHMOND (KEW OBSERVATORY).	
	Introduction .. .. .	350
	METEOROLOGY.	
	<i>Pressure.</i>	
441-455	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes .. .. .	369
	<i>Temperature.</i>	
456-470	Hourly Readings ; Hourly and Daily Means ; Annual Means of Hourly Values ; Monthly Means and Diurnal Inequalities ; Daily Extremes .. .. .	376
	<i>Humidity.</i>	
471-484	Hourly Values of Relative Humidity ; Hourly, Daily and Monthly Means of Relative Humidity and Vapour Pressure ; Annual Means of Hourly Values of Relative Humidity and Vapour Pressure ; Monthly Means and Diurnal Inequalities of Relative Humidity .. .. .	383
	<i>Rainfall.</i>	
485-498	Annual Totals of Hourly Values—Amount and Duration ; Notes on Rainfall for the Year ; Hourly Amounts ; Hourly, Daily and Monthly Totals of Amount and Duration .. .. .	389
	<i>Sunshine.</i>	
499-510	Hourly Readings ; Hourly, Daily and Monthly Totals ; Annual Totals and Means of Hourly Readings .. .. .	396
	<i>Solar Radiation.</i>	
499-510	Measurements of Radiation by Ångström Pyrheliometer .. .. .	396
	<i>Wind, Speed and Direction.</i>	
511-522	Hourly Readings ; Hourly, Daily, Monthly and Annual Means of Wind Speed..	402
523	Highest Instantaneous Wind Speed recorded each day by the Dines Tube Anemograph .. .. .	414
524	Distribution of Wind Speed ; Extreme Velocities .. .. .	414
	<i>Ground Temperature.</i>	
525	Daily Readings, Monthly and Annual Means .. .. .	415
	<i>Night Minimum Temperature on the grass.</i>	
526	Daily Readings, Monthly and Annual Means .. .. .	415
	<i>Level of Underground Water.</i>	
527	Daily, Monthly and Annual Means ; Extremes for each Month .. .. .	415
	<i>Diary of Cloud, Visibility and Weather.</i>	
528-539	Daily Observations .. .. .	416

RICHMOND (KEW OBSERVATORY)—*continued.*

TABLE	ATMOSPHERIC ELECTRICITY.	PAGE
540	Absolute Observations of Conductivity, Air-Earth Current and of Ionic Charges; Daily Values and Monthly Means .. .. .	422
541	Electrical Character of each day and approximate Duration of Negative Potential Gradient .. .. . <i>Potential Gradient.</i>	423
542	Daily Values at 3h, 9h, 15h and 21h; Monthly and Annual Means .. ..	424
543	Diurnal Inequalities; Selected Quiet Days .. .. .	426
ATMOSPHERIC POLLUTION.		
<i>Results from Owens Atmospheric Pollution Recorder.</i>		
544	Monthly, Annual and Seasonal Means for each Hour .. .. .	426
545	Diurnal Inequalities .. .. .	426
SEISMOLOGY.		
546	Seismological Diary .. .. .	427
547	Microseisms .. .. .	435
AEROLOGICAL SECTION.		
	Introduction .. .. .	438
SOUNDINGS WITH REGISTERING BALLOONS.		
548	Dates of Upper Air Soundings, Particulars of Place of Fall of the Recording Instruments, Wind Data, and Principal Results of each Ascent .. .. .	442
549	Notes on the Pressure Distribution and on Peculiarities of the Individual Records ..	442
550	Heights, Temperatures and Relative Humidity corresponding with Isobaric Surfaces ..	445
551	Pressures, Temperatures and Relative Humidities at given Heights .. .. .	445
552	Lapse Rate of Temperature between given Heights .. .. .	445

ERRATA IN PREVIOUS VOLUMES.

*Year Book, 1924.*

P. 176. Table 219.—March 24th. N. component at 10h. *For 1049 read 1000.*

P. 177. Table 221.—March 2nd. V. component at 16h. *For 466 read 946.*

*Year Book, 1925.*

P. 182. Table 214.—January 24th. N. component at 15h. *For 0126 read 1026.*

LERWICK DECLINATION SEE ERRATA 1962 O.Y.B.

*Handwritten notes:*  
 1049  
 946  
 1026

## LIST OF OBSERVATORIES.

	Latitude.	Longitude.	G.M.T. of Local Mean Noon.	Height above M.S.L.
Lerwick, Shetland Isles .. .. .	60 8 N.	1 11 W.	h m 12 5	metres 81·7
Aberdeen .. .. .	57 10 N.	2 6 W.	12 8	111·4†
Eskdalemuir, Dumfries-shire .. ..	55 19 N.	3 12 W.	12 13	242·0
Valentia Observatory, Cahirciveen, Co. Kerry.	51 56 N.	10 15 W.	12 41	9·1
Kew Observatory, Richmond, Surrey ..	51 28 N.	0 19 W.	12 1	5·5

*Note.*—The height given is that of the site of the rain-gauge. The heights of other meteorological instruments are shown in the appropriate Tables.

† The site of the rain-gauge was altered on 1st June 1928.

## NORMAL VALUES AND MONTHLY SUMMARIES.

Monthly and annual normals of pressure, dry bulb temperature, and rainfall for each hour of the day and for the period of 45 years, 1871–1915, are published for the observatories, Aberdeen, Cahirciveen, Richmond and Falmouth in *Hourly Values from Autographic Records, 1917* (Part IV of the British Meteorological and Magnetic Year Book, 1917), and in previous volumes of that series. Corresponding normals of wind-speed and sunshine\* are published there for the same observatories and for the period of 35 years, 1881–1915, while corresponding normals of relative humidity are also published there for the period of 30 years, 1886–1915. For Eskdalemuir the same publication gives hourly averages for the months and for the year, referred to the period 1911–1915.

It should be noted, however, that the normal hourly values in the case of wind, rainfall and sunshine refer to periods of 60 minutes centred at exact hours G.M.T., and are therefore not directly comparable with the values printed in this volume which refer to periods of 60 minutes ended at exact hours G.M.T.

Summaries giving additional mean values and frequencies of occurrence of various meteorological phenomena will be found for all the observatories in *The Monthly Weather Report* and its Annual Summary. The latter also contains special summaries of the tabulations of the anemographs.

Monthly normal values of maximum, minimum and mean temperature, rainfall and sunshine for the period 1881–1915 are published in the *Book of Normals, Section I*, for Aberdeen, Cahirciveen, Richmond and Falmouth. *Section IV* of the same publication gives information regarding the range of variation of temperature and rainfall at the same observatories, and monthly frequencies of the normal numbers of days of hail, thunder, snow, snow-lying and ground frost. *Section VI* of the *Book of Normals* gives tables and isopleth diagrams showing the normal diurnal and seasonal variation of relative humidity at all the observatories for which data of relative humidity are included in this volume.

Monthly average values of maximum, minimum and mean temperature for 1901–1930 in the cases of Aberdeen, Cahirciveen and Richmond, and for the period 1910–1930 in the case of Eskdalemuir are published in *Averages of Temperature for the British Isles*.

\*The normals of hourly values of sunshine for Aberdeen for all months except February are incorrect, owing to an error in computation. The published values except February, should be increased by one-third.



## GENERAL INTRODUCTION TO THE METEOROLOGICAL TABLES.

The elements dealt with in the following meteorological tables for the Observatories at Aberdeen, Eskdalemuir, Cahirciveen and Richmond are :—barometric pressure, air temperature, humidity, rainfall, sunshine, wind speed and direction, minimum night temperature on the grass, temperature in the ground, cloud, visibility and weather, and in some cases solar radiation and level of underground water.

The positions of the Observatories and the heights of the sites are given on p. 8.

### NOTES ON THE INSTRUMENTS AND TABULATION OF THE RECORDS.

A detailed description of the barograph, thermograph, and Beckley rain-gauge used for obtaining the records of pressure, temperature, humidity, and rainfall is given in the *Reports* of the Meteorological Office for the years 1867 and 1869; for a description of other instruments in use reference may be made to the *Meteorological Observer's Handbook* and to the article on Meteorological Instruments in the *Dictionary of Applied Physics*, Vol. III. The following notes are supplementary and are given partly for reference and partly as containing information necessary for the interpretation of the tables.

**Barometer.**—The record of barometric pressure is obtained photographically from a mercurial barometer.

By means of a source of light, a condenser and an objective arranged as in the ordinary optical lantern, an image of the space above the mercury in the tube, reduced to very small width by means of a diaphragm, is projected upside down upon a sheet of photographic ("bromide") paper carried upon a cylinder which is rotated by means of clockwork and makes one revolution about its vertical axis in rather more than 48 hours. The image is in the form of a vertical line of light, the upper edge of which is defined by the position of the mercury in the barometer tube, while the lower edge is defined by a plate actuated by a zinc rod. The purpose of the zinc rod is to provide an automatic compensation for temperature changes, the arrangement being such that any shortening of the line of light due to a rise of temperature and consequent expansion of mercury in the tube is balanced by an equal lengthening due to movement of the plate carried on the zinc rod.

The barogram is, therefore, a continuous photograph of a narrow illuminated vertical line and appears as a horizontal ribbon, the depth of which is constantly varying with the rise or fall of the mercury in the tube of the barometer.

A time-scale is recorded upon the barogram by means of a shutter actuated by the clock. This shutter cuts off the light for the space of four minutes every two hours, thus producing interruptions which appear on the record as narrow white spaces corresponding with intervals of four minutes centred at the half hours 1h 30m, 2h 30m, etc. Until 1918 these time-breaks occurred at the even hours, 2h, 4h, 6h, etc., but it was found that when the edge of the record was not critically sharp owing to various causes, a systematic error was introduced when measuring the records, whereby the values at the even hours were slightly in excess of those at the odd hours where no time-break existed. From 1918 onwards the clock was so arranged that the time-breaks should occur half an hour before the even hours; by this means both even and odd hour-values are measured at points on the trace which are unaffected by any systematic difference.

Control readings of a standard barometer are taken three times a day by different observers. The control readings are first corrected for index error, temperature and gravity, and then compared with the corresponding readings of the barogram. The differences between the control readings and the corresponding tabulated values

are then found and a correction derived therefrom is applied to all the tabulated values. This correction, known as the "residual correction," is so applied as to run smoothly throughout the whole length of each record—a period of 48 hours—and alterations in the amount of the correction occur, where necessary, in steps not exceeding 0.1 millibar.\*

The scale value of the barograms is found from a comparison of a series of such standard and curve readings. The indications of a curve are converted into numerical values by measuring the ordinates with a tabulating instrument, graduated according to the ascertained scale value.

**Thermometers.**—The air temperature and humidity data at each Observatory are derived from records obtained photographically from two mercurial thermometers. One thermometer is used as a dry bulb and the other as a wet bulb thermometer.

Each thermometer has a large cylindrical bulb four inches long and a very long stem. The latter is bent twice at right angles to enable the bulb to be exposed outside the building in a louvred screen attached to the north wall of the Observatory.† The column of mercury in the vertical portion of the stem inside the building is broken at a convenient point by a small air space which moves up or down the stem with rise or fall of temperature. The record is obtained by passing a reflected beam of light through the air space and photographing its image upon a moving sheet of "bromide" paper in the same manner as described in the case of the barometer. A base line is traced on the paper by a pencil of light passing through a small aperture in the brass frame carrying the recording thermometer. The time-scale is automatically recorded upon the curves, a time-break occurring half an hour before each even hour.

Two large standard thermometers with very open scales graduated in degrees absolute and having bulbs similar to those of the thermograph are mounted in the screen side by side and close to the thermograph bulbs. One of the thermometers is arranged as a dry bulb, the other as a wet bulb. Control readings of these thermometers are made three times a day for comparison with the corresponding readings obtained from the thermograms.

The scale-value of the curves is found by a comparison of the readings of the standard thermometers, corrected for any errors they may have, with the corresponding measurements of the curves. The curves are measured by means of a plate of glass ruled with lines corresponding with the ascertained scale-value of the record, both for temperature and for time. The scale is graduated so as to read degrees vertically and hours horizontally.

Two alternative methods of reading the curves have been adopted.

- (a) At Richmond the scale is set by the base-line and after hourly readings have been obtained for the whole record comparisons are made with the control readings. The residual correction so determined (normally the same for the whole record of 48 hours) is applied to the tabulations.
- (b) At Aberdeen, Eskdalemuir and Cahirciveen, the practice is to adjust the glass scale so that the readings at the control hours on the trace are made to show general agreement with the corresponding eye-readings of the standard thermometers. The temperature equivalent of any part of the curve can then be read off. The base-line photographed on the record serves as a useful check.

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\* At Cahirciveen and Richmond the rule is to apply the same correction for the whole chart.

† At Eskdalemuir the screen stands in the open.

**Rainfall.**—This element is recorded by a Beckley self-registering rain-gauge, in which the rain as it falls is collected in a receiver supported on a float in a vessel of mercury. As the rain passes into the receiver, the float gradually sinks, carrying with it a pen which records its position upon a chart wrapped round a clock-driven cylinder. The displacement of the mercury by the float is arranged so as to give a uniform scale throughout. When five millimetres (two-tenths of an inch) of rain have entered the receiver a siphon comes into action, and, by discharging its contents, causes the float to rise till the pen is brought back to the zero line, from which the record begins again.

The collecting funnel of the Beckley rain-gauge has an area of approximately 100 square inches. Each gauge stands on level ground and its distance from every other object is greater than twice the height of the object. The height of the rim of the Beckley rain-gauge above the surface of the surrounding ground varies from 0.4 m. to 0.6 m. at the different observatories. Details are given at the head of the tables of hourly values. A check gauge with funnel 8 inches in diameter is installed near by.

The records obtained from the Beckley self-registering rain-gauge are, if necessary, subjected to a proportional correction whereby they are brought into agreement with the amount of rainfall as recorded by the check rain-gauge which is read twice daily at 7h. and 18h.

**Sunshine.**—The record of sunshine is obtained from a Campbell-Stokes recorder in which instrument the sun's rays are focussed through a 4-inch spherical lens of crown glass upon a strip of blue card, which is scorched, or burned right through, according to the intensity of the sun's rays. Three different patterns of card are used at different seasons of the year. The cards are exposed in a metal bowl, and the focussed image of the sun leaves its mark behind it as it travels along the surface of the card with the apparent motion of the sun through the heavens. The intensity of the burn is not measured, but the record is regarded as that of "bright" sunshine whenever the card has been distinctly scorched. When measuring the duration of sunshine which is represented by intermittent burns, an allowance is made for the extension of the trace by the charring of the card.

**Wind - Speed and Direction.**—The hourly values of wind-speed and direction for Eskdalemuir, Richmond and Cahirciveen which appear in this volume are derived from the records of Dines tube anemographs, a description of which will be found in the *Meteorological Observer's Handbook*. In the case of Aberdeen, where building operations have seriously impaired the exposure of the tube anemograph, data from the Robinson cup anemograph, adjusted as explained in the sectional introduction, have again been printed for 1932. At Eskdalemuir records of tube anemographs have always been used, but at the older observatories the data printed in volumes previous to that of 1926 were obtained from Robinson cup anemographs. At Richmond a new Dines tube anemograph, erected on the dome in the position formerly occupied by the Robinson cup anemograph, but with its vane 3 metres higher than the original height of the cups, has been brought into use from January 1st, 1931. At Cahirciveen (Valentia Observatory) a new Dines tube anemograph, with 1-inch connecting pipes, was brought into use as from January 1st, 1932. The new instrument was erected alongside the old instrument, and a comparison extending over the period May, 1931, to January, 1932, showed that the new instrument recorded higher velocities than the old. In hourly mean values the difference was nearly uniform and equal to .4 m/s or 1 mi/hr. In gust velocities the increase was approximately 12 per cent. of the velocity recorded by the old instrument. Particulars of the exposure of the instruments at each Observatory will be found in the sectional introductions.

The relation between the values of wind speed recorded by the cup and tube anemographs at the several observatories was briefly discussed in the General Introduction to the volume for 1926. The following table gives, for the various wind directions, the mean values of wind speed recorded by the tube anemographs, expressed as percentages of the corresponding values recorded by the cup anemographs:—

*Average values of the quantity  $100 \times \frac{\text{Speed by tube anemograph}}{\text{Speed by cup anemograph}}$   
at the three observatories, arranged according to the direction of the wind.*

North = 360°, East = 90°, South = 180°, West = 270°.

Wind Direction in degrees from North.	Aber- deen. (to 1929)	Cahir- civeen. (to 1931)	Richmond.		Wind Direction in degrees from North.	Aber- deen. (to 1929)	Cahir- civeen. (to 1931)	Richmond.	
			1926-30	1931				1926-30	1931
10	131	103	99	114	190	138	137	96	107
20	132	103	100	113	200	132	134	99	107
30	130	104	103	114	210	124	128	99	104
40	117	103	103	110	220	115	115	100	104
50	115	104	104	109	230	108	102	100	104
60	115	105	99	103	240	110	90	100	103
70	119	105	99	102	250	112	88	101	106
80	113	104	97	99	260	114	85	101	107
90	110	102	101	103	270	128	82	101	108
100	126	98	104	106	280	124	81	103	111
110	121	97	102	103	290	110	83	101	111
120	118	98	100	102	300	99	88	96	108
130	118	100	104	105	310	100	92	93	103
140	125	103	102	105	320	108	95	96	107
150	128	107	98	102	330	111	97	99	115
160	137	114	92	99	340	120	98	98	116
170	133	123	92	103	350	138	99	103	119
180	135	134	95	106	360	135	102	104	122

Details in regard to the comparison of the new and old tube anemographs at Richmond will be found in the sectional introduction for the year 1931.

**Minimum Night Temperature on the Grass.**—This is the temperature determined by a minimum thermometer exposed freely over the surface of the grass. The stem of the thermometer is enclosed in an outer glass jacket, but the spirit bulb is freely exposed to the air. The thermometer is supported on two small Y-shaped pieces of wood so that it lies horizontally, with its bulb about one or two inches above the ground, which is covered with short grass. When snow has fallen the thermometer is supported so as to lie just above the surface of the fallen snow, but not touching it.

The thermometer is laid out at 18h. each day, having been kept in an upright position, bulb downwards, inside the Stevenson Screen during the daytime, so that any spirit that may have condensed in the upper part of the stem may be able to run down and join the main spirit column.

**Earth Temperature.**—At each observatory the earth temperature is read daily at 9h at depths of 30 cm. and 122 cm. below the surface. For this purpose use is made of Symons' earth thermometers, in which the bulb is embedded in paraffin wax for the purpose of introducing sufficient "lag" to ensure that the reading will not change appreciably during the process of drawing up the thermometer in order to take the

reading. The thermometers are supported at the correct depth in steel tubes sunk into the ground. At Aberdeen discontinuities have occurred on several occasions in recent years owing to changes of site. (See sectional introduction).

#### NOTES ON THE TABLES.

**General.**—Interpolated values are printed within brackets, ( ). Maximum and minimum values are underlined.

**Standard of Time.**—The observations are referred to *Greenwich Mean Time* except as regards sunshine, for which element *local apparent time* is used.

**Units.**—In accordance with the practice introduced in 1911, as a consequence of certain resolutions of the Gassiot Committee of the Royal Society, the values in the tables are expressed throughout in units based upon the C.G.S. System: tables for conversion to other units are given in the *British Meteorological and Magnetic Year Book (Part IV)* for 1913 and are also to be found in the *Computer's Handbook*.

**Daily Mean Values.**—The daily means of pressure, temperature, and relative humidity are obtained by adding half the sum of the values for the initial and final midnights to the sum of the 23 intermediate hourly values and dividing by 24.

For wind speed the tabulated hourly values are means for periods of 60 minutes between the exact hours 0h and 1h, 1h and 2h, etc.† The daily mean is therefore obtained by dividing the sum of the 24 hourly values by 24.

In the preparation of the tables of diurnal inequalities for individual months and for the year, it is assumed that the difference of value between the means for the initial and final midnights, which may be termed, so far as the hourly variations are concerned, the non-cyclic variation, is equally distributed over the whole 24-hour period.

A note on the computation of the correction for non-cyclic charge will be found at the end of this Introduction.

**Annual Values.**—The mean values or totals for the whole year (given either in separate tables or at the end of the corresponding monthly tables), are computed as the means or sums of 365, in leap year 366, daily values.\* The annual values of pressure at sea level are computed from the annual means at station level and the annual means of air temperature; the annual values of vapour pressure are derived from the annual means of air temperature and relative humidity.

**Atmospheric Pressure.**—All pressures recorded in this volume are expressed in *millibars*, one millibar being equal to 1000 dynes per square centimetre. The following are the values of physical constants used in evaluating the data:—

Density of Mercury = 13.5955 grams per cc. at 0°C.

Intensity of Gravity at Sea Level (Lat. 45°) = 980.617 centimetres per second per second.

1 inch = 25.4000 millimetres.

Hence a pressure of 1000 millibars corresponds with a reading of 750.076 millimetres on a mercury barometer at temperature 0°C. in Lat. 45° and is equivalent to 29.5306 inches under standard conditions of temperature (mercury at freezing point, scale at 62° F.) in Lat. 45°.

The true pressure in millibars can only be obtained from the reading of a barometer after the latter has been suitably corrected for (a) index error, (b) temperature, and (c) gravity.

\* At Eskdalemuir the annual values for the years 1922 to 1926 were computed as the means or sums of 12 monthly values.

† See Note, p. 17

These corrections have been applied to the barometer readings in obtaining the pressure values published in this volume. The corrections for index error (including those for capillarity) are given in the certificates issued by the Kew Observatory or the National Physical Laboratory in respect of the standard barometers at each observatory. The corrections for temperature are equivalent to those published in the *International Meteorological Tables* (Gauthier-Villars, Paris, 1890). The correction for the variation of gravity from its standard value at sea level in latitude  $45^\circ$ , quoted above, is in accordance with the formula adopted in the *International Tables*, viz. :—

$$g_{z,\lambda}/g_{0,45^\circ} = (1 - 0.00259 \cos 2\lambda) (1 - 5z/4E)$$

where  $z$  = height of the station above M.S.L.  
 $E$  = earth's radius, both expressed in the same units,  
and  $\lambda$  = latitude of station.

Except at Eskdalemuir, the correction for the variation of gravity with height, contained in the second factor of the above equation, is insignificant.

Unless otherwise stated, all pressure values refer to the level of the observatory, as given in the headings of the tables. The reduction to sea level, wherever made, is effected by tables drawn up for each observatory in accordance with the following scheme :—

If  $p$  is pressure at station level, and  $P$  is pressure at sea level, the correction required to reduce  $p$  to sea level is  $P - p$  where

$$\log_e (P/p) = \bar{g}z (1 - 3\bar{w}/8\bar{p})/KT.$$

$z$  = height of station in centimetres.

$e$  = base of Napierian logarithms.

$K$  = gas constant for dry air =  $10^9/348.4$  C.G.S. units.\*

$T$  = mean absolute temperature of the air column between station level and mean sea level.

$\bar{w}$  = mean value of water vapour pressure in the column.

$\bar{g}$  = mean value of the acceleration of gravity in the air column. Even at Eskdalemuir, the highest station, the effect on the correction of the variation of gravity with height is, in this case, negligible, so that

$$g = 980.617 (1 - 0.00259 \cos 2\lambda).$$

The factor  $(1 - 3\bar{w}/8\bar{p})$  in the above formula is practically unity except at Eskdalemuir. Its value for that observatory was discussed in the Introduction to the Eskdalemuir section for the year 1928.

In the same way, the value of  $T$  at each observatory differs inappreciably from the value of air temperature at the observatory, except in the case of Eskdalemuir (see Introduction to Eskdalemuir section for details).

Hence at all observatories except Eskdalemuir, no corrections are applied for the effects of water vapour, or of change of air temperature in the column of air between the station and sea level.

The scheme for correcting barometer readings outlined above was introduced for Eskdalemuir at the beginning of 1927. For the other observatories, it has come into effect as from 1st January, 1928. The effects of the introduction of the scheme on the tabulated values are briefly referred to in the several introductions to the individual sections. Only at Eskdalemuir are they at all appreciable.

The tables contain values of pressure at exact hours obtained from the photographic barograms in the manner described on p. 9; also daily, monthly and annual means of hourly values, together with the monthly and annual means of diurnal inequalities. Monthly and annual means of the hourly values after reduction to mean sea level are also given.

\* This value depends on a coefficient of expansion of dry air of  $1/273$  and on the density of dry air at pressure 1013.23 mb. and temperature  $273^\circ\text{A}$ , viz.,  $1293.052 \text{ g/m}^3$ .

There is also a table showing the daily extremes of pressure, *i.e.*, the maximum and minimum values recorded during each day.

**Temperature.**—The scale on which temperatures are recorded is such that the freezing point of water under atmospheric pressure is  $273^{\circ}\text{A}$  precisely. Other temperatures differ by  $273\cdot0$  from readings on the Centigrade scale.

The scale approximates to the absolute scale defined by Lord Kelvin, on which the temperature of the freezing point is  $273\cdot1$  to the nearest tenth of a degree.\* Accordingly, to convert temperatures published in this volume to the Kelvin scale, a correction  $+0\cdot1$  is to be added to each reading.

As an alternative to the application of this correction modified values may be used for the constants which enter certain formulæ. For example:—At temperature  $t$  on the scale adopted in the Year Book, the radiation according to Stefan's Law† is

$$5\cdot709 \times 10^{-5} (t + 0\cdot1)^4 \text{erg}/(\text{cm.}^2 \text{sec.}) ; \text{ or } 5\cdot717 \times 10^{-5} t^4 \text{erg}/(\text{cm.}^2 \text{sec.})$$

In using the modified formulæ we are virtually adopting a scale of temperature with the degrees greater than those of the Centigrade scale, in the ratio of  $273\cdot1$  to  $273$ . This is the practice of the *Computer's Handbook* of the Meteorological Office.

The tables give the values of temperature at exact hours obtained from the photographic thermograms; also daily, monthly and annual means of hourly values, together with the monthly and annual means of diurnal inequalities. There is also a table showing the daily extremes of temperature.

**Humidity.**—When the temperature of the wet bulb is above  $273^{\circ}\text{A}$ , values of relative humidity at exact hours are deduced from the corresponding values of dry and wet bulb temperatures obtained from tabulations of the photographic thermographs, complete saturation being taken as 100. Until the end of the year 1925 the reduction was effected from tables based on Glaisher's hygrometric factors,‡ but from 1st January, 1926, tables have been employed which proceed from Regnault's formula

$$x = f - Ap (t - t'),$$

where  $x$  = vapour pressure under the conditions of observation.

$f$  = saturation vapour pressure at the temperature ( $t'$ ) of the wet bulb.

$p$  = pressure of the air.

$t$  = temperature of the dry bulb in absolute (Centigrade) degrees.

$t'$  = temperature of the wet bulb in the same units.

$A$  = a constant.

The tables used in this volume for determining the hourly values of relative humidity when the wet bulb is above the freezing point are *Jelineks Psychrometer-Tafeln* (6th edition, Leipzig, 1911).§

No allowance for variation of pressure  $p$  is made and the standard value used in Jelinek's tables, *i.e.*, 755 mm. of mercury (1006·57 mb.), is adhered to. Similarly no allowance is made in the adopted value of the constant "A" for the speed of the air flowing past the wet bulb, though it is well known that "A" is not independent of the ventilation. "A" is regarded as fixed and equal to 0·008. In view of the well-marked diurnal variation of wind-speed, the diurnal variation of humidity, derived in this manner, is subject to slight modification.

\* A. L. Day and R. B. Sosman, *Dictionary of Applied Physics*. Macmillan, London, 1922. Vol. I, p. 840.

† The constant 5·709 is the value which has been adopted by the International Research Council for publication in the "*International Critical Tables*."

‡ Glaisher's Hygrometric Tables, 7th edition, London, 1885.

§ These tables give values which are in almost exact agreement with those given by *Hygrometric Tables* published by the Meteorological Office in 1924 (M.O. 265) for general use at second and third order stations. The latter tables are not suited to the purposes of this Year Book, because in them temperature is expressed in Fahrenheit degrees, whereas the absolute Centigrade scale of temperature is used at the observatories.

When the wet bulb reading does not exceed  $273^{\circ}\text{A}$ , the above method of reduction is not followed, but values of relative humidity are derived from the record of the hair hygograph. To these values are applied appropriate corrections based on a comparison between the readings of the record of that instrument and the corresponding values of humidity computed from dry and wet bulb readings during neighbouring periods when the wet bulb readings exceeded  $273^{\circ}\text{A}$ .

The mean values of vapour pressure are computed by slide rule from a table\* of saturation vapour pressure over water, and the corresponding mean values of relative humidity and air temperature.

The normal hourly values of relative humidity for the period 1886–1915, published for certain Observatories in "Hourly Values from Autographic Records, 1917," were derived from tables based on Glaisher's factors. The application of the new tables to the normal hourly values of dry and wet-bulb temperature gives results for normal relative humidity which are only slightly different from those which have been published. At Kew Observatory in winter the difference is negligible; in July it does not exceed 1 per cent. at any hour, in October it does not exceed 2 per cent. at any hour. The effect is greatest in April, when the published normal values of average relative humidity are reduced by 3 per cent. at noon and at 16h. and by smaller amounts at other hours.

Of greater importance is the effect on the values of absolute minimum humidity. Under the old system, entries of relative humidity less than 30 per cent. seldom occurred; under the new system, entries less than 20 per cent. may occur not infrequently.

Tables are printed giving the values of relative humidity at exact hours together with daily, monthly and annual means of hourly values. Monthly and annual means of vapour pressure computed from the corresponding mean values of temperature and relative humidity, together with monthly and annual means of diurnal inequalities of relative humidity, are also given.

**Rainfall.**—Tables are given showing for the 60-minute intervals between exact hours† the amount of precipitation, expressed in millimetres, derived from the record of the Beckley gauge (see p. 11). Totals of amount are given for each day, and for each month; the latter totals referring both to the complete days of the month, and to each of the hours of the day. When zero rainfall is assigned to a particular hour, the entry appears as "...". Corresponding totals of durations of rainfall are also given, the duration being regarded as the number of hours during which rain falls at a rate of not less than 0.1 millimetre per hour. If slight precipitation, due to rain, snow, fog or dew, extends over some hours, and if the amounts collected in some or all of the hours are less than .1 mm., the fact is indicated by a succession of entries, each of which is enclosed within brackets, covering the period over which precipitation is known or believed to have occurred. In such cases entries of (.1) are allocated evenly among the hours concerned in such a way that their sum is equal to the aggregate fall during the period, and the remaining entries are (...), (\*), (=:) or (Δ) according as the precipitation took the form of rain, snow, fog or dew. Slight precipitation which takes other forms such as hail, sleet, hoar frost, glazed frost and rime is dealt with similarly. When it is impossible to determine the hourly amounts of precipitation, e.g., during snowfall or on occasions when the record has failed, the normal procedure is to consider each case

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\* The saturation vapour pressures used are those employed in the preparation of *Hygrometric Tables*. They are equivalent to those published by Scheel and Heuse in *Annalen der Physik*, 1910.

† For the years 1904 to 1920 it was the practice to tabulate rainfall for the periods of 60 minutes centred at the exact hours; the reversion to the method in use before 1904 occurred on 1st January, 1921.



on its merits, and to assign hourly values derived from estimates made by the observers as soon as possible after the event. Such values are also enclosed in brackets.

Annual totals of hourly amounts and duration and notes on special features of the rainfall of the year are also given.

**Sunshine.**—Tables are given showing for each of the 60-minute intervals between exact hours\* according to *local apparent time*, from sunrise to sunset, the duration of bright sunshine recorded by the Campbell-Stokes instrument. The sums and means of hourly amounts are also given. For each day is shown the total duration of bright sunshine, and also the percentage this represents of the "possible" duration for the day. The "possible" for each day is computed as the period of time beginning and ending at the instants when the centre of the sun is apparently on the horizon, due allowance being made for atmospheric refraction. Even on a clear day the sun, when at an altitude less than  $2\frac{1}{2}^{\circ}$  to  $3^{\circ}$  above the horizon, fails to make a scorch on the card of the Campbell-Stokes recorder.

A distinction is made in the tables between (a) sunshine not possible, and (b) sunshine possible but none recorded. If, in any hour, sunshine is not possible, the symbol "—" is used; if more than 3 minutes of "possible" sunshine falls in the 60-minute interval between exact hours according to local apparent time, and if no sunshine was recorded, the symbol "... " is printed.

The values for the months and for the year of percentage of possible duration of sunshine are obtained by comparing the total recorded sunshine for the period with the total "possible" sunshine for the period.

**Wind.**—Tables are printed giving the hourly values of wind speed and direction, together with the mean speed for each day, each hour, and for the month and year. Values of speed are expressed in metres per second (1 metre per second = 2.2369 miles per hour): those of direction are given in degrees from true north. The values of direction and speed† are averages for periods of sixty minutes, between the exact hours of Greenwich Mean Time. They are obtained by estimation from the records with the aid of a transparent scale, with engraved graduations corresponding with the velocity, direction and time scales of the record.

When the record shows that the vane is sticking and is not responding to the variations of the wind the readings of both direction and velocity are regarded as untrustworthy and are not tabulated, the symbol "... " being entered instead. In such cases the velocity is usually less than 1 m/s and the symbol "... " is regarded as equivalent to 0.5 m/s for the purpose of evaluating the daily mean velocity. In other cases of lost record, estimated values are entered within brackets wherever possible.

The daily values of the speed and time of occurrence of the maximum gust and the monthly distribution of wind are shown in other tables.

**Minimum Night Temperature on the Grass.**—Values are given for each day of the year together with monthly and annual mean values. The interval to which the reading refers is from 18h the previous day to 7h on the day to which it is entered.

**Diary of Cloud, Visibility and Weather.**—In these tables are given particulars of the cloud forms observed daily at 7h, 13h, and 18h, the total cloud amount observed at

\* Before 1st January, 1921, sunshine was tabulated for the periods of 60 minutes centred at exact hours.

† Before 1st May, 1915, it was the practice to take the direction at the exact hour whilst wind speed referred to 60 minute intervals centred at exact hours. Thereafter until 1st January, 1932, both wind speed and direction were tabulated for periods of 60 minutes centred at the exact hours. At a meeting on 17th December, 1931, the Gassiot Committee decided that hourly values of terrestrial magnetism, potential gradient and wind velocity and direction should be brought into accordance with the practice decided upon for Polar Year stations by the International Commission for the Polar Year 1932-1933, *viz.*, that hourly mean values should refer to periods of 60 minutes between exact hours of standard time. (See also Introduction to *Hourly Values from Autographic Records*, 1913, p. xv.)

7h, 9h, 13h, 15h, 18h, and 21h, the range of visibility at each of these six hours and the kind of precipitation when any was falling at those hours. There is also a column devoted to remarks on the weather of the day.

*Cloud Form.*—The observations of cloud form are made in accordance with the International classification, and the following abbreviations are used in the tables:—

Cirrus	..	..	..	..	..	..	Ci.
Cirro-Stratus	..	..	..	..	..	..	Ci-St.
Cirro-Cumulus	..	..	..	..	..	..	Ci-Cu.
Alto-Cumulus	..	..	..	..	..	..	A-Cu.
Alto-Stratus	..	..	..	..	..	..	A-St.
Strato-Cumulus	..	..	..	..	..	..	St-Cu.
Nimbus	..	..	..	..	..	..	Nb.
Cumulus	..	..	..	..	..	..	Cu.
Cumulo-Nimbus	..	..	..	..	..	..	Cu-Nb.
Stratus	..	..	..	..	..	..	St.
Stratus-cumuliformis	..	..	..	..	..	..	St-Cuf.
Fracto-(prefix, as in fracto-stratus)	..	..	..	..	..	..	Fr.
-lenticularis (affix, as in stratus-lenticularis)	..	..	..	..	..	..	-lent.
Mammato-cumulus..	..	..	..	..	..	..	M-Cu.

All the cloud forms noted by the observer at the time of observation are printed where space permits. When the number of forms is too great to allow of this, the predominating forms selected at the time of observation to give the best representation of the cloud canopy are printed. If high or medium cloud can be seen, one of the selected types is normally a high or medium cloud.

*Cloud Amount.*—The figure given for the amount of cloud denotes the proportion of the sky covered by cloud, the numerical scale running from 0, cloudless, to 10, completely overcast. The figure denotes the total cloudiness irrespective of form. In the case of fog through which it is impossible to discern the sun or stars the cloud amount is entered as 10, but if cloud can be seen through the fog, the form and amount of that cloud are entered in the usual way. If the sun or stars are visible through fog and if there is no evidence of cloud above the fog the amount is entered as 0.

*Visibility.*—Observations of the range of horizontal visibility made every day at 7h, 9h, 13h, 15h, 18h, and 21h, are printed in the diaries of cloud and weather.

As described in detail in the *Meteorological Observer's Handbook* (Ed. 1926), a series of selected objects, A, B, C..., as nearly as possible at the standard distances given in the table which follows, is used for this observation. The objects are selected so as to be readily seen and identified from specified observing points in daylight, when the air is clear. A variation up to 10 per cent. from the standard distances is considered admissible. Particulars of the objects in use at each observatory, together with a statement of their actual distances and bearings from the point of observation and notes on local peculiarities which affect the observations, will be found in the Introductions to the sections for the individual observatories.

The method of observing consists in determining which is the most distant of the selected objects that can be identified and entering the corresponding letter. In cases of uncertainty when the observer, though recognising the presence of an object, would be unable to identify its nature from the observations he is able to make *at the time*, the letter corresponding with the next nearer object is entered. If object A, the nearest of the selected objects cannot be identified, an entry X is made. At night the letters are used to denote as nearly as possible corresponding degrees of atmospheric obscurity.

SCHEME FOR OBSERVATIONS OF RANGE OF VISIBILITY AND OF FOG,  
MIST AND HAZE.

Indication Letter of Object.	Standard Distance of Object.	Verbal Description.	BEAUFORT LETTERS.	
			Detailed Scale.*	Contracted Scale.
(X)	Metres. —		8 f	} F
A	25	Dense fog	7 f	
B	50	Thick fog	6 f	
C	100		5 f	
D	200	Fog	4 f	} f
E	500	Moderate fog	3 f	
F	1,000	Mist, haze or very poor visibility	m or z	m or z.
G	2,000	Poor visibility	} m <sub>0</sub> or z <sub>0</sub>	m <sub>0</sub> or z <sub>0</sub>
H	4,000	Moderate visibility		
I	7,000			
J	10,000	Good visibility		
K	20,000	Very good visibility		
L	30,000			
M	50,000	Excellent visibility		

NOTE.—The grouping of the letters by the horizontal lines indicates the limits of the several figures of the International Telegraph Code for visibility, from 0 to 9, which grouping is also adopted in the tables of frequencies published in the *Monthly Weather Report*.

Small letters are used to indicate interpolations or extrapolations made in cases where it has not been possible to find suitable objects within 10 per cent. of the standard distances. In such cases the observer may use objects at other than the standard distances to guide his judgment. Particulars of such auxiliary objects will be found in the sectional introductions.

At Cahirciveen, visibility is recorded in both landward and seaward directions. The observations of visibility landwards are printed in the main tables. Particulars of occasions when visibility seawards differed from visibility landwards are set out in the Introduction to the Cahirciveen Section.

*Fog, Mist and Haze.*—The table of standard distances of visibility objects also summarizes the descriptions used in connection with the phenomena of fog, mist and haze, and relates them to the scale of visibility. It also contains the Beaufort letters used for these phenomena in the Remarks column of the diary. In this Year Book as in other publications of the Meteorological Office, statistics of fog, mist and haze are based solely on visibility observations. The term *fog* is restricted to occasions when the visibility is less than 1 kilometre (*i.e.*, object F not visible); the terms *mist* and *haze* to occasions when the visibility is greater than 1 kilometre,

\* Not used in this Year Book.

but less than 2 kilometres (*i.e.*, object "F" visible, but "G" not visible). The distinction between mist (m) and haze (z) is determined by the depression of the wet bulb. When the visibility is between the limits specified for mist or haze, haze is recorded when the depression of the wet bulb is more than 1°F; if the depression of the wet bulb does not exceed this limit, the term *mist* is used.

In volumes previous to 1926, occasions of haze, mist and fog were indicated by the International symbols for these phenomena, viz., ∞, ≡° and ≡ respectively, but the relation of these terms to the visibility scale was less rigorous. In order to indicate that a change in procedure has occurred in this matter, the three International symbols for haze, mist and fog are no longer used.

*Precipitation.*—Whenever precipitation is falling at one of the six hours of observation there is printed in the Diary of Cloud and Weather under the heading "Precipitation" the International weather symbol which indicates the kind of precipitation, in accordance with the list below.

*Remarks.*—For the purposes of the column headed "Remarks on the Weather of the Day," it is usual to consider the day as divided into three portions, viz., morning, afternoon and night, denoted by *a*, *p*, *n*, respectively, but it should be noted that no arrangements are made for regular eye observation of weather changes in the period 21h 30m to 6h 30m.

The entries in the remarks column consist very largely of international weather symbols and the letters of the Beaufort scale. These symbols and letters are as follows:—

*Beaufort Notation and International Weather Symbols.*

b	blue sky, whether with clear or hazy atmosphere.	r	● rain.
c	cloudy, <i>i.e.</i> , detached opening clouds.	←	ice crystals in the air.
o	overcast, <i>i.e.</i> , the whole sky covered with one impervious cloud.	s	* snow.
g	gloomy.	rs	* sleet.
u	ugly, threatening.	†	drift snow.
v	visibility, abnormal transparency of atmosphere.	⊗	snow lying. (More than half the surrounding country covered with snow.)
z	haze.*	h	▲ hail.
m	mist, light fog.*	△	soft hail.
f	fog.*	t	T thunder.
fe	wet fog, <i>i.e.</i> , fog which deposits water copiously on exposed surfaces.	l	< lightning.
w	dew.	tlr	⚡ thunderstorm.
x	hoar frost.	≡	gale.
v	rime.	q	squalls.
⌣	glazed frost.	⊙	☉ solar corona.
e	water deposited copiously on exposed surfaces, without rain falling.	⊕	☉ solar halo.
y	dry air. (Relative humidity less than 60 per cent.)	☾	☾ lunar corona.
p	passing showers.	☾	☾ lunar halo.
d	drizzling rain.	(	☾ rainbow.
		≡	☾ aurora.
		☾	☾ zodiacal light.
		☾	☾ mirage.

The letter *i* preceding a letter or symbol which denotes some form of precipitation indicates that the precipitation is of an "intermittent" or "occasional" character.

The letter *j* preceding a letter or symbol which denotes some form of precipitation indicates that the precipitation is within sight, though not actually falling at the station.

\* To indicate varying intensities of haze, mist and fog the notation shown in the last two columns of the table on p. 18 is used.

The figure 0 written after and above a symbol indicates slight, whilst the figure 2 indicates strong or heavy; thus  $\bullet^0$  slight rain,  $\bullet^2$  heavy rain. The figures 0 and 2 written after and below the letters of the Beaufort notation are also used with a similar significance, thus  $d_0$  stands for slight drizzle.

The letters b, c, o, g and u, are used to describe the general appearance of the sky. The use of the letters g and u is sufficiently clear from the definitions given above. o is used whenever the sky is completely overcast with a uniform layer of thick or heavy cloud; c is used to denote that there is some cloud present, but o is not appropriate; b denotes that there is some blue sky.\*

In order to meet difficulties which occur when there are only small quantities of cloud or blue sky present, c is not used unless the sky is more than a quarter covered, and b unless there is more than a quarter of the sky free from cloud. If there is more than a quarter of the sky covered with cloud and more than a quarter of the sky free from cloud b and c are both recorded.

The gale symbol  $\mu$  is normally used in this publication to indicate that the wind as recorded by the anemograph averaged at least 17.2 m/s for one or more "centred" hours. At Richmond (Kew Observatory) the symbol has been used with the word gust in brackets to indicate the occurrence of gusts reaching 17.2 m/s.

*Note on the Computation of the Correction for Non-cyclic change.*

The non-cyclic change is the average increase from one midnight to the next. If, as in the case of barometric pressure, curves are read at each hour G.M.T. and tabulated under the headings 0h, 1h...23h, 24h, and the means for each of the hours in a calendar month are taken out, the mean for 0h, will not in general be the same as the mean for 24h. Let  $x_n$  be the mean value corresponding to hour  $n$ ; then the non-cyclic change is represented by  $x_{24} - x_0$ . Let  $\bar{x}$  be the mean value for the whole 24 hours. In the case under consideration the value of  $\bar{x}$  is

$$\frac{1}{24} \left[ \frac{1}{2} (x_0 + x_{24}) + x_1 + x_2 + \dots + x_{23} \right]$$

$x_n - \bar{x}$  is the "diurnal inequality" at hour  $n$ . To apply a correction for non-cyclic change we assume that the non-cyclic change arises from a steady rise or fall, entering as a linear term. The correction applicable at hour  $n$  is therefore proportional to the time reckoned from 12h and takes the form:—

$$\frac{12 - n}{24} (x_{24} - x_0)$$

the corrected diurnal inequality having the value

$$x_n - \bar{x} + (12 - n) (x_{24} - x_0) / 24.$$

In the present volume the hourly values refer either to readings at the exact hour or to means for periods of 60 minutes between exact hours, *i.e.*, centering at the half hours. In the latter class of tabulations, the first hour of the day runs from 0h to 1h and the  $n^{\text{th}}$  hour from  $(n - 1)$  h to  $nh$ . For the calculation of non-cyclic change we assume that the value of the variable at midnight is represented to a close enough approximation by the mean of the values tabulated for the hours preceding and following midnight, thus the mean value for the first midnight is  $\frac{1}{2} (x_0 + x_1)$  and for the second midnight  $\frac{1}{2} (x_{24} + x_{25})$ , when  $x_0$  represents the value for the hour preceding the first midnight and  $x_{25}$  represents the value for the hour following the second midnight. The value of the non-cyclic change is therefore  $1/2 (x_{24} + x_{25} - x_0 - x_1)$ . Remembering that the interval from noon to the middle of a tabular hour is, in this class of tabulation, an odd number of half hours, we get as the expression for the diurnal inequality at the  $n^{\text{th}}$  hour, corrected for non-cyclic change

$$d_n = x_n - \bar{x} + (25 - 2n) (x_{24} + x_{25} - x_0 - x_1) / 96.$$

\* The present usage with regard to b, c and o dates from 1st Jan., 1926.

A correction in this form has been applied to the diurnal inequalities of terrestrial magnetism and atmospheric electricity printed in this volume.

It will be seen that the computation of the non-cyclic change (when derived from "all days"), requires a knowledge of the value for the first tabular hour in the following year. The values of wind velocity and terrestrial magnetism for the hour 0-1h on January 1st, 1933, have accordingly been appended to the appropriate tables.

M.O. 360  
(Lerwick)

Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

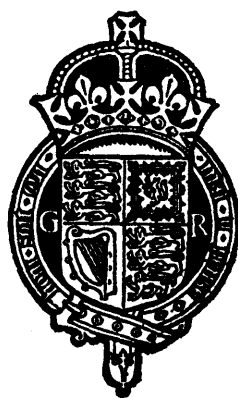
Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

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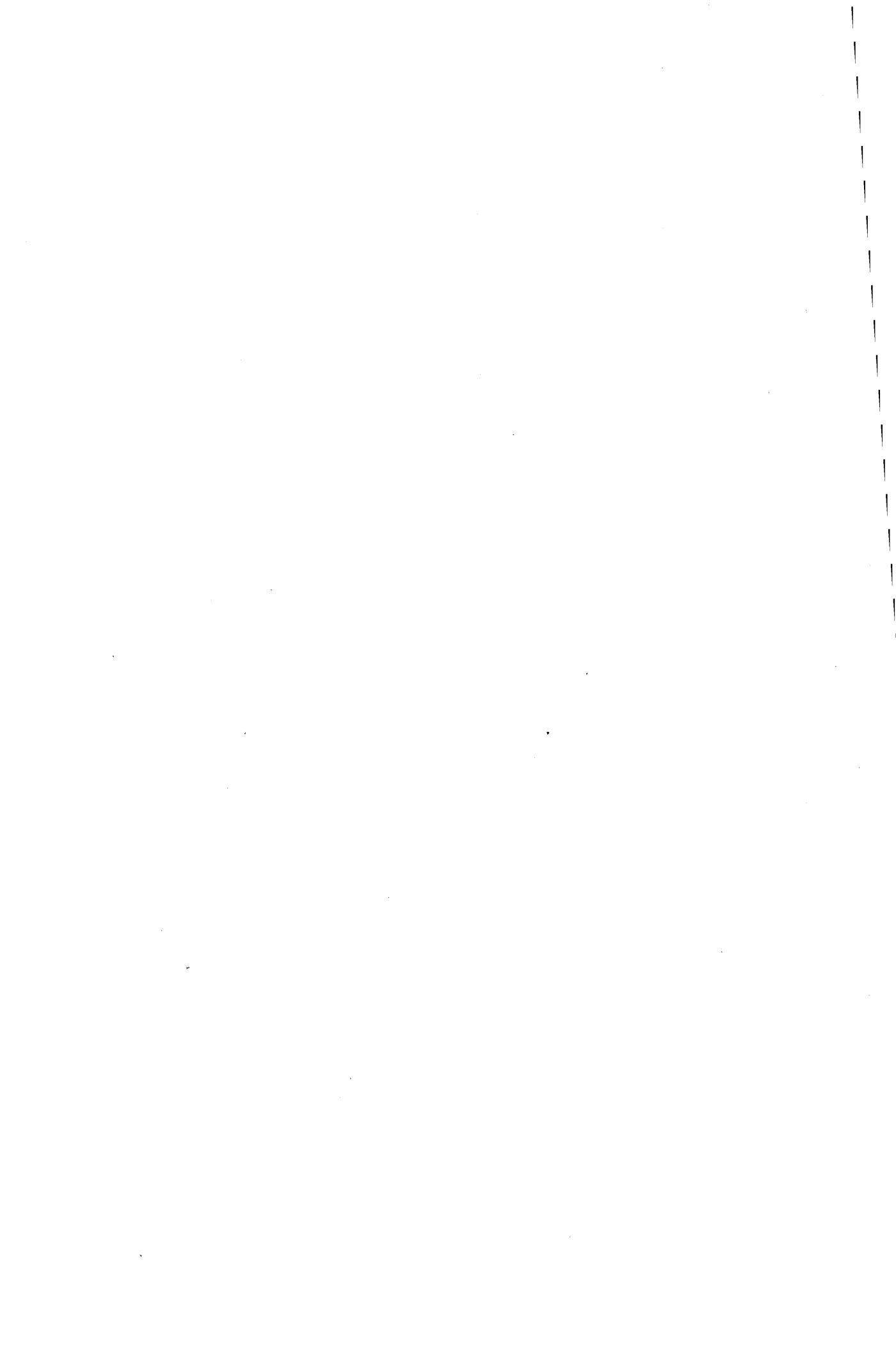
LERWICK

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Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE  
1934





### LERWICK OBSERVATORY.

Latitude..	..	..	..	..	..	60°	8'	N.
Longitude	..	..	..	..	..	1°	11'	W.
G.M.T. of Local Mean Noon	..	..	..	..	..	12h.	5m.	
Height of Site above Sea-level	..	..	..	..	..	From 80.5 metres		to 90.0 metres

### INTRODUCTION.

#### GENERAL REMARKS.

In 1919 the establishment of an observatory in the Shetlands was included in the programme of the Meteorological Office. A wireless station, built in 1913 by the Admiralty and transferred after the war to the Post Office, but used by that Department only in case of emergency, offered suitable accommodation in the way of offices and living quarters. It proved possible to make an arrangement under which the Air Ministry has the use of the station as an observatory.

The Observatory was opened on the 7th June, 1921, when the first instalment of the instrumental equipment arrived. Later on in the same year the construction of a magnetograph house and of huts for absolute magnetic and auroral observations was commenced. The magnetograph house is a heavy concrete structure with walls 2 feet 6 inches (76 cm.) thick, of internal dimensions 16 feet by 10 feet (4.9 m. x 3 m.), and after construction several months had to elapse before the thick concrete walls and roof could be thoroughly dried and the recording instruments placed in position. These instruments, which are described below, consist of magnetographs recording magnetic declination and horizontal and vertical force. More recently subsidiary magnetographs recording the same elements have been installed in one of the adjacent non-magnetic huts; the records obtained therefrom are used to cover lacunæ in the standard traces or for special investigations.

Other instruments installed at the Observatory included barometers, barograph, hygrograph, psychrometers, nephoscope, rain-gauges (ordinary and self-recording), sunshine recorder and Dines tube anemograph and, later, an electrograph; and in 1928 a Krogness auroral camera. But meteorological observations have been restricted, and the time of the somewhat limited staff available has been devoted chiefly to magnetic work, to some work in atmospheric electricity and latterly to auroral photography.

The site and the work in Atmospheric Electricity and Terrestrial Magnetism will now be described.

## SITE.

The Observatory is situated on a ridge of high ground about a mile and a half (2.4 km.) to the south-west of Lerwick and adjoins the main road between Lerwick and Scalloway. The site slopes upward from west-north-west to east-south-east, the average height above M.S.L. being about 280 feet (85 metres). The ground to the east and south-east rises slightly for about  $\frac{1}{4}$  mile (.4 km.) then slopes sharply down to the sea. In other directions there is a downward slope for about  $\frac{1}{4}$  mile extending to the Loch of Trebister on the south-west, Sandy Loch to north-west, and to the Burn of Sound to north-north-west; beyond these and distant about  $\frac{3}{4}$  mile (1.2 km.) from the Observatory are small hills—Munger Hill to the south is about 320 feet (97 metres) above M.S.L., Shurton Hill to west-north-west rises to 576 feet (176 metres), and Stony Hill to the north to about 400 feet (122 metres). In clear weather it is possible to see the Outer Skerries,  $25\frac{1}{2}$  miles (41 km.) north-east by north, and Sumburgh Head, 20 miles (32 km.) south by west; the horizon in other directions is limited to a few miles.

The average depth of soil in the vicinity is about a foot, and outcrops of sandstone occur in many places. The surrounding country is barren and desolate, the only vegetation being coarse grass, stunted heather, and moss, with occasional patches of bare black peat. The Observatory ground is of a very uneven nature, and, owing to lack of proper drainage, is frequently water-logged. Views of the station are shown and the arrangement of buildings and situation of instruments are set out on a site plan in "The Observatories' Year Book," 1928.

## ATMOSPHERIC ELECTRICITY.

**Notes on the Instruments.**—The records of potential gradient are obtained from a Benndorf electrograph (No. 108, by L. Castagna, Vienna) which since 1926 has been installed in the north-west corner of the Office Block. The site is divergent from the ideal for two reasons:—

(1) There is distortion of the equipotential surfaces by adjacent houses, wireless plant, etc.,

(2) It is a comparatively large distance (236 metres) away from the ground where absolute determinations are made.

Consideration of the variations of mean monthly values of the reduction factor shows that these disadvantages are less serious than might be anticipated.

The collector rod passes through a window in the north wall, and is situated 190 cm. from the corner of the building. The collector is 476 cm. above the ground and projects 123 cm. from the window. The collectors are of polonium deposited on a copper rod, about 4 cms. long by 0.5 cm. diameter; these are recoated periodically by arrangement with the Government Chemist, and a fresh collector is brought into use on the first day of each quarter. The collector is screwed into the smaller end of a tapered German silver tube, 76 cm. long, and of triangular cross section, which, in turn, is attached to a "Duralumin" tube, 89 cm. long and 1.3 cm. in diameter. The latter tube passes through a hole, 3.8 cm. diameter, in one end of a wooden box (dimensions 38 x 25 x 10 cm.), where it is supported horizontally between the ends

of two metal rods embedded in sulphur. A number of small 2-volt electric bulbs are kept burning inside the box in order to improve the insulation of the supports for the collector rod during wet weather, and a similar bulb is placed inside the case of the electrometer. The rod is connected to the base of the acid pot of the Benndorf electrometer by a fine wire. A detailed description of this instrument is to be found in "Phys. Zeit". 7 (1906), p. 98, whilst the general principle is described in Mathias' "Traité d'Electricité Atmosphérique et Tellurique," p. 54, and in Chauveau's "Electricité Atmosphérique," pp. 61-64.

The record consists of a series of dots made once a minute on a long roll of paper as it is unwound from a drum by clockwork, exact hours being indicated by dots near the edge of the sheet. Timing is taken from electric clock No. 1,031, governed by the Observatory standard, Shelton No. 35. The needle of the electrometer is earthed at least once daily, and a zero line is obtained by connecting up these earth marks; owing to the constancy of the perpendicular distance between the zero line and the line through the hour marks, further intermediate positions of the zero are easily obtained. The scale value has been about 25 volts per millimetre, which permits a range from + 1800 to - 1450 volts per metre in the open to be recorded.

Combined tests of the insulation of the system and scale value of the record are made daily, the procedure being to remove the collector and to charge the needle, which is connected to a Wulf electrometer. The rate of leak is obtained for a period of 4 minutes with a positive charge and for the same interval with a negative charge. Considering the climatic difficulties the behaviour of the instrument in the matter of insulation has been very satisfactory. The rate of leak has been in general small, the average during 1932 being such that the instrument would lose half its potential in 41 minutes. It has been found that the scale value remains reasonably steady and may, for all practical purposes, be taken as constant across the full width of the sheet. The factor by which the recorded potential must be multiplied for conversion into potential gradient in the open is obtained from absolute measurements above a levelled piece of ground near the old site of the electrograph (see site plan in "The Observatories' Year Book," 1928). An insulated wire, stretched horizontally between two stout wooden posts 121 cm. in height and 9.48 m. apart, carries at its centre a burning fuse exactly 1 metre above the ground. A Wulf electrometer, usually No. 5225 (Günther & Tegetmeyer, Brunswick), is connected to one end of the wire and twenty to thirty readings are obtained from the electrometer at half-minute intervals. The reduction factor is deduced from the mean of these values and the corresponding mean potential at the collector as recorded by the Benndorf electrograph. Smoothed monthly means of the factors so obtained are employed in reduction of the records. The calibration of the Wulf electrometers is checked periodically, using a Gambrell potentiometer and standard cells. There was no change in any essential part of the apparatus or in the observational technique throughout the year 1932.

Monthly scale values and exposure factors, together with data relating to rate of leak, are shown in the following table:—

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean Value of													
$-\frac{d}{dt} \log_e V. \dots$	·015	·015	·014	·016	·017	·020	·014	·021	·017	·014	·016	·021	·017
No. of days used in mean	28	21	24	21	22	24	25	23	20	17	14	12	251
Highest $-\frac{d}{dt} \log_e V. \dots$	·021	·023	·019	·021	·021	·031	·021	·027	·028	·021	·027	·027	
Lowest $-\frac{d}{dt} \log_e V. \dots$	·009	·009	·007	·009	·011	·011	·007	·014	·011	·010	·009	·014	
Scale Value (v/mm) ...	25·3	25·3	25·0	24·9	25·1	24·9	24·5	25·1	24·9	25·0	25·3	25·3	
Mean Exposure Factor ...	1·22	1·31	1·30	1·29	1·31	1·37	1·31	1·27	1·28	1·31	1·21	1·25	1·29
Applied Exposure Factor	1·27	1·29	1·29	1·30	1·32	1·34	1·31	1·28	1·29	1·28	1·25	1·24	
No. of Determinations of Exposure Factor ...	8	8	8	6	6	9	14	10	6	6	6	4	91

Tests of the rate of rise of potential of the Benndorf recorder with a polonium collector were made in September, 1930, and it was found that the potential rose from zero to half the final value in about 4 seconds. Sometimes when there is no wind the rate of rise of potential is very much slower and apparently nearly linear. If the instrument rises through a potential  $V$  and has a capacity  $C^*$  a quantity of electricity  $CV$  has to be given to the air in the neighbourhood of the collector, and in the absence of wind and the presence of fog this may hang about in the form of a heavily charged cloud for a considerable time before being dispersed. Fortunately these conditions are rare at Lerwick except in early summer.

If we assume the leaking and the charging to be exponential, i.e.,—

$$\text{If } \frac{dV}{dt} = -K_1 V$$

$$\text{and } \frac{d(V_0 - V)}{dt} = K_c (V_0 - V)$$

where  $K_1$  measures the rate of leak,  
 $K_c$  " " charging,

and  $V_0$  is the potential of the air near the collector,

then the potential finally acquired by the instrument is  $V_0 K_c / (K_1 + K_c)$ .

The ratio  $K_1/K_c$  is only about 1/750 so that there is no appreciable error in the readings from this cause.

In the years 1927 to 1929 though not in 1930 or 1931 the exposure factor was higher in summer than in winter. In 1932 the exposure factor was again

\* The capacity was measured in October, 1930, and found to be approximately 75 cms.

a little higher in summer than in winter, with a maximum in June. The vegetation in the vicinity of the site for the absolute observations changes very slightly throughout the year and the grass on the site itself is kept short. A larger contribution to the variations of the factor is probably made by a combination of effects due to peculiarities of the electrograph site and wind direction. In this connection the following table shows the mean values of the exposure factor for 1932 summarized according to wind direction:—

	Calm	N	NE	E	SE	S	SW	W	NW	1932
Mean Factor	1.31	1.26	1.35	1.25	1.18	1.32	1.28	1.33	1.27	1.29
No. of Observations	4	10	13	8	7	11	14	13	11	91

Relatively high values of the factor are associated with winds from north-east, south and west, for which directions the electrograph collector has a good exposure. The exposure in other directions is obstructed by adjacent buildings, and the depression of the factor depends upon the proximity of these obstructions to the collector. The lower factors, resulting from the higher potential of the collector when shielded from the wind, also follow from R. A. Watson's conclusion that potential gradient is inversely dependent upon wind speed. (Geophysical Memoir No. 38). Wind direction, however, appears to have no appreciable bearing upon the annual variation of factor discussed in the preceding paragraph.

On 28th June, 4th July, and 12th September, 1928, measurements were made of potential gradient above fairly smooth ground near sea level. The determinations on the two earlier dates were taken at the Point of Trebister, 2½ km. south-south-east of the Observatory, those on the third near the Sands of Sound, 1 km. to the east. In all, ten series of observations were obtained. The mean electrograph exposure factor computed therefrom works out at 1.36, a value in close agreement with the standard determinations.

#### IDENTIFICATION NUMBERS OF INSTRUMENTS USED IN 1932.

Benndorf electrograph (L. Castagna, Vienna) .. .. .	108
Wulf bifilar electrometer (Günther & Tegetmeyer, Brunswick) .. ..	5225
" " " " " "	2965

Review of Results—Days when there was a complete trace have been classified as follows by means of an electric character figure:—

- 0, denotes a day during which, from midnight to midnight, no negative potential was recorded.
- I, denotes a day with excursions to the negative not amounting in the aggregate to more than three hours.
- 2, denotes a day with negative potential amounting in the aggregate to more than three hours.

- a, denotes that the range of potential gradient in the open did not exceed 1,000 volts in any of 24 hourly periods of the day.
- b, denotes that this range was exceeded in at least one, but in fewer than six, of these periods.
- c, denotes that this range was exceeded in six or more of the hourly periods.

The character figures so assigned are given in Table 4.

In the Observatories' Year Book for 1928, for the first time, this table contained also details of the duration of negative potential for each day for which an estimate could reasonably be made. If the record failed when no precipitation fell it was assumed that the potential gradient remained positive; if, however, precipitation fell when part of the record was lacking no estimate was made except when the part of missing record was small enough and the conditions of precipitation sufficiently continuous to permit the interpolation of the gradient conditions from those obtaining before and after the break.

In the year 1932 there were 5.0 hours less negative potential gradient than in 1931, and seven fewer days on which negative gradients occurred. The daily mean duration of negative gradient was thus 1.53 hours, against 1.52 for 1931, 1.55 for 1930, 1.55 for 1929 and 1.63 for 1928. In each year the month-to-month variations of mean duration of negative gradient and of mean electric character figure show a close relationship to the variations in rainfall.

Curves are read by use of a mean value glass scale graduated in millimetres, the tabulated values being 60 minute means between exact hours G.M.T. The ordinates are converted into volts per metre in the open by multiplying by the product of the appropriate scale value and reduction factor. Values are assigned for the hours ending at 3h, 9h, 15h, and 21h, on all days, and for each hour on "a" days.

An indication of the characteristics of indeterminate potentials may be obtained from the tabulations, in which:—

1. Values prefixed by the symbols  $>$ ,  $<$ , indicate that for one or more periods during the hour potential passed beyond the range recorded by the electrograph.
2. z is marked against hours when the potential passed beyond the recorded range in both directions.

The values for the hours ending at 3h, 9h, 15h, and 21h are given in Table 1; estimated values, enclosed within brackets, are given in cases where the record was in some manner defective; a dash is entered against hours for which no value can be given with any degree of assurance. Two sets of mean values are given:— (a) The means of all positive values; hours when the trace passed off the top of the sheet are included in obtaining these means, the upper limit of registration being taken as the value for the period not recorded. (b) The means for all days on which all four hours were completely recorded or could be estimated.

In all months the general (a) mean from the four selected hours exceeds the (b) mean, the difference over the year as a whole amounting to 18 v/m. In five months the means from the Oa days are greater than the (a) means; over the year as a whole the Oa day mean is exactly the same as the (a) mean. The annual mean daily values derived in these three ways for the six years 1927-1932 during which the electrograph has been in the same position are:—

	Oa	(a)	(b)
1927 .. ..	213 v/m	179 v/m	160 v/m
1928 .. ..	166 v/m	156 v/m	134 v/m
1929 .. ..	162 v/m	161 v/m	133 v/m
1930 .. ..	181 v/m	175 v/m	158 v/m
1931 .. ..	161 v/m	163 v/m	147 v/m
1932 .. ..	159 v/m	159 v/m	141 v/m

It is a defect of the Benndorf recorder that even with such a high scale value as 25 v/mm the width of the sheet is frequently exceeded during oscillatory movements. In 1932 there were 92 days on which the electrometer needle went beyond the limits of registration on the positive side and 152 on the negative side; these occasions were mainly when precipitation was falling on the collector. The greatest number of extreme positive excursions were associated with snow or sleet showers and were almost invariably only momentary.

The following are the occasions of potential gradients (positive and negative) exceeding 1000 v/m persistent over periods of at least one hour, a specified hour defining the 60 minute interval ending at the exact hour G.M.T.:—

Positive. None.

Negative. March 25d 2h 30m— 5h 30m, 30d 16 h 0m—19h 30m. April 19d 21h, 29d 24h. Oct. 2d 5h, 13d 22h. Nov. 21d 19h and 20h, 22d 11h and 12h.

Occasions when the potential gradient was negative for prolonged periods with perhaps only a few temporary changes to positive were noted as follow:—

- (I) March 24d 23h 40m to 25d 9h 40m. Potential negative for all but about 12 minutes of this period. Mean gradient  $< -992$  v/m. Moderate rain throughout.
- (II) March 30d 11h 30m to 20h 15m. Potential negative for whole period. Mean gradient  $< -1315$  v/m. Heavy rain throughout.
- (III) April 29d 18h 0m to 30d 0h 30m. Potential negative for all except about seven minutes of this period. Mean gradient  $< -868$  v/m. Moderate rain throughout.
- (IV) September 22d 1h 15m to 9h 0m. Potential negative for all but about two minutes of this period. Mean gradient  $< -770$  v/m. Heavy rain throughout.
- (V) October 2d 0h 0m to 6h 30m. Potential negative for all but about two minutes of this period. Mean gradient  $> -506$  v/m.

- (VI) December 2d 2h 0m to 11h 15m. Potential negative for all but about 35 minutes of this period. Mean gradient  $< -634$  v/m. Moderate rain throughout.

Notable spells of high potential were:—

- (I) May 15d 20h to 16d 3h. Mean gradient 583 v/m. Haze.  
 (II) May 19d 13h to 23h. Mean gradient 592 v/m. Thick fog.  
 (III) July 1d 19h to 2d 2h. Mean gradient 546 v/m. Mist.  
 (IV) July 2d 17h to 23h. Mean gradient 687 v/m. Haze.  
 (V) July 3d 18h to 4d 2h. Mean gradient 620 v/m. Haze.  
 (VI) July 5d 2h to 24h. Mean gradient 639 v/m. Haze.  
 (VII) July 6d 5h to 11h. Mean gradient 652 v/m. Fog.  
 (VIII) July 31d 6h to 12h. Mean gradient 584 v/m. Thick fog.  
 (IX) August 13d 5h to 12h. Mean gradient 591 v/m. Fog.

There were 77 days on which there occurred apparent changes of potential gradient from the limit of the sheet on the positive side to the limit on the negative side, at least once within an interval of 60 minutes. If these changes were real and not due to charges given to the collector rod by precipitation, they connote a range exceeding 3250 v/m within an hour. Assuming that in Shetland the charge associated with rain may occasionally attain 10 E.S.U. per cc., it has been found that the gradient recorded may contain a contribution of not less than 50 volts arising from the charge given by the rain. In some of the hours the extreme reversal occurred at least twice within the period.

The diurnal inequalities for 0a days for the months, seasons, and year, are given in Table 2, together with mean values of the potential gradient and particulars of the non-cyclic change and the number of days used; the inequalities and other entries for the seasons and year are the means of the corresponding entries for the appropriate months. Similar data for the 1a and 2a days together are given in Table 3.

The annual mean diurnal variation for 0a days during 1932 has a well marked minimum at about 4h and a conspicuous maximum at 19h; secondary maxima and minima occur at about 10h and 11h respectively. This secondary oscillation however is a very small one, the year resembling, in this respect, 1929 rather than 1927, 1928, 1930 or 1931, in all of which the secondary oscillation was pronounced. In the separate mean variations for the seasons, the evening maximum occurs at 19h. in winter and 21h. in summer; while for the equinoctial months there are two equal maxima at 20h. and 22h. The inequalities for all 1a and 2a days, i.e. days on which no hour has a range exceeding 1000 v/m but on which negative potential gradients occurred, are naturally more irregular than the 0a day ones. The general form however is approximately the same, for the annual, winter and equinoctial curves, but in summer the minimum is at 14h. and the maximum at 23h; while a secondary oscillation only a little less than the main one has a maximum at 8h. and a minimum at 1h. In the 0a days inequalities the winter months show much the largest range, but in the curve for 1a and 2a days the range is slightly the greatest in equinoctial months. In all previous years except 1931 the equinoctial ranges have been much the greatest for both 0a, and 1a and 2a day, curves.



## TERRESTRIAL MAGNETISM.

## Notes on the Instruments.

The standard records of declination and horizontal force are obtained from the Munro magnetographs which were in use at Falmouth until 1912. The instruments had been stored for several years, but were afterwards reconditioned and tested at Kew before being installed at Lerwick in November, 1922.

A new vertical force instrument of the Watson quartz fibre type and supplied by the Cambridge Instrument Company was installed in the standard recording house at the end of November, 1929, and became the standard vertical force instrument from 1st January, 1930. A description of this type of instrument is given in "Terrestrial Magnetism", Vol. IX (1904), pp. 62-68.

The declination magnet has a unifilar suspension, and the torsion correction is negligible. The scale value is constant for all positions of the light dot on the sheet; throughout the year it was 1 mm. of ordinate to 1.93 minutes of arc. in the horizontal force instrument the magnet is maintained in a position approximately perpendicular to the magnetic meridian by torsion of the bifilar suspension. Copper damping plates are fitted to each instrument and the recording mechanism is similar to that used at Eskdalemuir. The arrangement of the instruments in the magnetograph house is shown in "The Observatories' Year Book," 1928.

A complete auxiliary magnetograph is maintained, the constituents being a Krogness H magnetograph, and locally constructed declination and vertical force instruments. The last mentioned has a quartz fibre suspension and generally resembles the Watson instrument. It was brought into use, in place of the Munro recorder previously used, in March 1932.

The auxiliary recorders arranged to function at a low sensitivity have proved their usefulness in supplying record during highly disturbed hours.

The chief instrumental difficulties encountered during the year were:-

- (a) A slight irregular drift in the case of the horizontal and vertical force instruments.
- (b) Irregular changes in declination base line values.

Monthly scale values have been assigned to the records by taking overlapping means, except when discontinuities occurred and special measures were required. The determinations in the case of H are made by Broun's method, the deflecting magnet being placed in the "broadside on" position and at a distance of 55.9 cm. from the recording magnets. A larger deflection distance would render the error due to inequality of the distribution coefficients for the H and D magnets less appreciable, but cannot be used owing to the restricted size of the magnetograph house. For standardisation of the vertical force magnetograph, the field is varied by passing known currents ( $\pm 40$ ,  $\pm 80$ ,  $\pm 120$  milliamps) through Helmholtz Gaugain coils fitted to the instrument. The scale value of H was maintained at approximately 6  $\gamma$ /mm. and that of V at about 8  $\gamma$ /mm.

The records of declination, horizontal force and vertical force have been tabulated hour by hour. The values are read off by means of graduated glass scales, a value being the mean reading for 60 minutes between exact hours G.M.T.

Base values for the records are obtained from the results of absolute observations, the determinations of horizontal force being taken at least twice weekly, those of dip and declination five or six times in each week. Horizontal force and declination are determined with the unifilar magnetometer on the centre pillar (No. 2) of the absolute hut, the azimuth of the fixed mark being taken as  $8^{\circ} 43' 2''$  east of south. Inclination is measured with the dip circle placed on the East pillar (No. 3), using  $3\frac{1}{2}$  inch needles. In the deflection experiment three distances, 25, 30 and 35 cm., are used for obtaining the distribution coefficients, the horizontal force being computed from the deflection at 25 cm. only.

Mean annual values of the P and Q correction have been derived from observations during the period March 1923 to the end of 1932. An accident caused some change to the magnet in March 1923, and values for earlier months have been discarded.

The values during these years are as follows:—

Year	P.	Q.	$\log_{10}(1 + P/25^2 + Q/25^4)$ .
1923 (March-December)	-2.398	-14.36	$\bar{1}.99831$
1924 ... ..	-1.236	-464.6	$\bar{1}.99862$
1925 ... ..	-1.165	-875.9	$\bar{1}.99821$
1926 ... ..	+1.225	-1711.2	$\bar{1}.99895$
1927 ... ..	+2.229	-2183.8	$\bar{1}.99912$
1928 ... ..	+0.223	-1395.6	$\bar{1}.99860$
1929 ... ..	-0.539	-968.5	$\bar{1}.99855$
1930 ... ..	-1.210	-837.1	$\bar{1}.99823$
1931 ... ..	-1.041	-895.3	$\bar{1}.99828$
1932 ... ..	+1.367	-1849.9	$\bar{1}.99889$

The mean value of  $\log_{10}(1 + P/25^2 + Q/25^4)$  employed in the reduction of all observations for 1932 was the mean of the values derived up to the end of 1931, namely,  $\bar{1}.99854$ . If the 1932 value is added, the mean for the total available period becomes  $\bar{1}.99858$ . The adoption of this latter value would raise all the hourly values, monthly means, etc., as given in the tables by  $0.7\gamma$  in the case of H and  $2.2\gamma$  in the case of V.

In October 1932 a Schuster-Smith portable magnetometer (No. L45434, by the Cambridge Instrument Co.) was installed on the West (No. 1) pillar of the absolute observation hut. The principle of this instrument is explained in the Dictionary of Applied Physics, Vol. 11, pp. 528-532.

The potentiometer, variable resistances, galvanometer, and a milliammeter used for rough current adjustments are all enclosed in a single box approximately 32 cm. by 30 cm. by 15 cm. The permanent magnets of the galvanometer and milliammeter are arranged so that their common external field is as small as possible; but it is still appreciable. For this reason the potentiometer is set up at the extreme Eastern end of the hut, about 240 cm. from the Dip circle, 380 cm. from the unifilar magnetometer and 520 cm. from the coils of the Schuster-Smith magnetometer. The field exerted by the permanent magnets at the dip circle is less than  $0.5\gamma$ .

Four observations are taken weekly. Each observation occupies less than ten minutes, and casual errors are considerably smaller than with the unifilar magnetometer. Base values for the horizontal force magnetograph, how-

ever, are about 20γ lower, as deduced from observations with this instrument, than when they are obtained with the unifilar magnetometer. It is not yet known to which instrument the error should be ascribed, but at present the unifilar is retained as standard. The base value curve obtained from the results of the Schuster-Smith magnetometer is, nevertheless, of great value for purposes of comparison with that obtained from the standard unifilar instrument.

In November and December 1932 the behaviour of the dip circle was unsatisfactory; and in determining base line values it was decided to reject entirely the results of observations made during these two months. After an adjustment made on 31st December the normal working of the instrument was restored. The base line values for the vertical force magnetograph over this period were obtained from the curve connecting up the September and October base line values with those of January 1933, with appropriate allowance for temperature changes; there was fortunately no other change in the behaviour of the magnetograph over the intervening period.

As stated in the general remarks, the walls of the magnetograph chamber are of concrete, 2 feet 6 inches in thickness. The diurnal variation of temperature within the chamber is, for most days of the year, negligibly small and no corrections for this diurnal variation have been applied to the diurnal inequalities or other data published in this volume. From the magnetograph house temperatures for each day given in the Tables, however, it will be noted that the day-to-day change of temperature is sometimes considerable. The average change day-to-day in degrees absolute over each of the twelve months of 1932 and for the year as a whole was as follows:-

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
0.44	0.27	0.24	0.39	0.30	0.23	0.17	0.24	0.42	0.43	0.37	0.35	0.32

There were 11 occasions on which the change reached or exceeded 1°A. These rapid fluctuations of temperature obviously add considerably to the problem of satisfactorily determining base line values in the cases of the horizontal and vertical force magnetographs. The temperature coefficients are known with fair accuracy, being taken to be 6.1γ per 1° A., in the case of the horizontal force magnetograph and -5γ per 1° A. in the case of the vertical force magnetograph.

As mentioned above, no attempt has been made to correct the diurnal inequalities for the very small and rather uncertain diurnal variation of temperature to which the chamber may be subject.

The results of the absolute determinations of D, I and H are summarized in the subjoined table, and the values of m, the moment of collimator magnet 3951A are also given. Considerations of space make it necessary to limit the observations printed to about two per week, but, as indicated above, absolute observations of some of the elements are made more frequently. For each set of absolute observations are shown the deduced base line values of H, D and V, and, in brackets, the adopted base line values. Thus, the entry 195 (200) under H signifies: deduced base line value 14,195, adopted base line value 14,200. The adopted values were obtained as described in the foregoing, and therefore the base line values corresponding to dates between those given in the table may be obtained by interpolation.





## AURORA.

From about September to April a watch for aurora is maintained, normally until about 23h G.M.T. each evening, and observations—as a rule at intervals of 15 to 20 minutes—are made of the northern horizon and of general meteorological conditions. The records form what is called the auroral log, a brief summary of which is given in Table 67. When any auroral display is observed, a second observer is called and detailed observations are maintained until the display subsides. These detailed observations have consisted in noting and making descriptions of the phenomena seen during the display, and have been supplemented whenever possible by photographs taken with the Krogness camera. The descriptive notes are entered in a second log reserved for records of actual auroral displays. Extracts from this latter log may be obtained by anyone requiring the detailed information.

Since August 1932 an observer at Urafirth, situated approximately 26 miles NNW of the Observatory, has been supplied with a second Krogness camera. On suitable occasions communication between the two stations has been established by telephone and simultaneous photographs of aurora have been taken with the two cameras.

A general auroral table for Scotland (Table 68) is also included. This table has been compiled from the records of all stations at which climatological observations or weather logs are maintained. The observers at these stations, whilst noting occasions of aurora which they may happen to observe, do not in general maintain a special watch.

## Notes on the Tables.

The hourly values of H, D and V, obtained as described above, appear in three of the four monthly tables. The variations in D, being expressed in minutes, may be readily converted to units of force ( $\gamma$ ) of the component perpendicular to the magnetic meridian by multiplying by a factor which for 1932 is approximately 4.22. The mean value for the day is computed according to the expression:—

$$x = (x_1 + x_2 + \dots + x_{24})/24.$$

The letters "Q" and "D", prefixed to dates, denote the five quiet and the five disturbed days as selected at De Bilt.

In the fourth table for each month are given:—

- (a) The values and times of the daily maximum and minimum and the values of the absolute daily range for each of the elements H, D and V.
- (b) The value of  $HR_H + VR_V$  for each day where  $R_H$  and  $R_V$  denote the absolute ranges in force for a calendar day of the horizontal and vertical components.
- (c) The daily magnetic character figures, assigned according to the international scheme wherein "0," "1," "2," respectively, denote quiet, moderately disturbed, and highly disturbed conditions.

(d) The daily values of temperature in the magnetic chamber.

Mean diurnal inequalities of H, D and V on all days and on international quiet and disturbed days are given, for the months, seasons and year, in Tables 53 to 61.

In calculating diurnal inequalities the non-cyclic change has been eliminated on the assumption that its time rate is linear. The values of the range of the mean diurnal inequalities of the several elements in the three categories of days are brought together in Table 62, and the values of the non-cyclic change are given in Table 64. The "Average Departures," or mean values of the inequality taken irrespectively of sign, throughout the 24 hours, are given in Table 63.

The mean values of  $HR_H + VR_V$  are summarized in Table 65.

In Table 66 appear for the months and year the mean values of N, W, V, D, I, H and Total Force T. The means of N, W, I and T are derived from the corresponding mean values of H, D and V, which are the means of hourly values on all days in the month or year.

Finally, in Tables 67 and 68 are given summaries of auroral observations obtained as already described.

#### Review of Results.

**Mean and Extreme Values of the Magnetic Elements, 1932.**— The mean values of the magnetic elements for the years 1931 and 1932 are given in Table 1. The values of H, D and V have been computed from the hourly values derived from the autographic records of all days, standardized by means of the absolute observations; those of N, W, I and T have been deduced from the values of H, D and V.

TABLE 1.

Year.	H.	D. (West)	I.	N.	W.	V.	T.
	γ	° ' "	° ' "	γ	γ	γ	γ
1931 ...	14517	13 59·6	72 42·3	14086	3510	46623	48830
1932 ...	14495	13 46·1	72 43·5	14078	3450	46608	48809

The decrease in westerly declination from 1931 to 1932 (13'·5) was greater than in the previous year (11'·6). The rates for the seven earlier years were 13'·8 for 1923-24, 13'·0 for 1924-25, 14'·9 for 1925-26, 12'·9 for 1926-27, 12'·8 for 1927-28, 13'·7 for 1928-29, and 12'·4 for 1929-30.

Mean values derived from (a) international quiet days and (b) international disturbed days are as follow:—(a) H, 14498γ; D, 13°46'·3; V, 46611γ; (b) H, 14487γ; D, 13°45'·5; V, 46602γ.

The extreme values of H, D and V recorded during 1932 are given in Table II.

TABLE II.

Element.	Maximum.		Minimum.		Absolute Annual Range.
	Value.	Date, 1932.	Value.	Date, 1932.	
Horizontal Force	15043 $\gamma$	d. h. m. May 29 16 41	13460 $\gamma$	d. h.m. May 30 4 45	1583 $\gamma$
Declination	15° 24'·5	May 30 3 42	11° 57'·0	May 30 4 40	3° 27'·5
Vertical Force	46955 $\gamma$	May 29 23 0	25756 $\gamma$	May 30 3 37	1199 $\gamma$

The range of 3° 27'·5 in declination is equivalent to a range of 875 $\gamma$  in the component of force perpendicular to the magnetic meridian. In the year 1931 smaller ranges were recorded in all three elements.

**Magnetic character of the year.** —The following table shows the mean sunspot numbers for recent years, together with the mean absolute daily range of declination, as a rough measure of magnetic activity:—

Year.	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
Mean Sunspot No.	5·8	16·7	44·3	63·9	69·0	76·8	64·2	38·9	20·9	11·2
Mean absolute daily range of D.	14'·9	15'·4	18'·1	25'·0	20'·0	21'·4	24'·3	28'·5	19'·2	21·3

During these ten years the sunspot numbers show a fairly regular rise and fall, with maximum in 1928; but the D ranges show maxima in 1926 and 1930, the latter the larger, although the sunspot number was comparatively small.

In the next table the magnetic conditions for individual months of the year 1932 are set out, together with the provisional sunspot numbers.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Provisional sunspot number ... ..	12·3	11·0	11·1	10·8	18·3	22·0	9·4	6·7	4·0	9·0	9·1	10·7
Mean absolute daily range of D ...	23·4	23·1	31·7	24·5	28·7	14·6	14·7	19·2	20·2	21·1	14·6	19·9
Mean $\frac{HR_H + VR_H}{10,000}$	488	549	1064	997	1007	408	366	694	708	611	324	512



The values of mean absolute daily range for the months and seasons of the year 1932 are given in Table IV, the ranges of declination in angle having, for convenience of comparison, been converted to units of force of the component perpendicular to the magnetic meridian. If comparison be made with the corresponding table in the Eskdalemuir Section it will be seen that in 1932 the ratios of the annual mean ranges of H, D and V at Lerwick to those at Eskdalemuir are 1.4, 1.2 and 2.5. The ratios of the mean daily ranges for the six years 1926-31 of Lerwick H to Eskdalemuir N, Lerwick D to Eskdalemuir W, and Lerwick V to Eskdalemuir V, are 1.4, 1.1 and 1.9; the greatest variation from year to year appears in the case of the vertical component; scarcely any variation appears in the ratio of the W or D component and a slight variation in the case of the H or N component.

TABLE III.

Month.	Magnetic Character Figures.			Mean Character Figures.		Mean Value of $\frac{HR_H + VR_V}{10,000}$		
	"0" days.	"1" days.	"2" days.	Lerwick.	Inter-national.	All days.	Q days.	D days.
1932.								
January	9	19	3	.81	.76	438	101	1086
February	8	18	3	.83	.76	549	134	1274
March	4	18	9	1.16	.95	1064	198	2273
April	2	24	4	1.07	.89	997	341	1792
May	4	22	5	1.03	.80	1007	224	2920
June	12	17	1	.63	.43	408	197	1037
July	13	18	0	.58	.49	366	178	751
August	11	17	3	.74	.67	694	177	2007
September	6	20	4	.93	.73	708	201	1840
October	5	23	3	.94	.73	611	193	1809
November	12	17	1	.63	.58	324	113	772
December	11	17	3	.74	.67	512	122	1666
Year, 1932	97	230	39	.84	.71	644	182	1602
Year, 1931	121	212	32	.75	.66	589	196	1394
Year, 1930	64	235	66	1.01	.83	1063	250	2515
Year, 1929	113	214	38	.80	.67			
Year, 1928	126	211	29	.74	.63			
Year, 1927	137	206	22	.68	.63			
Year, 1926	208	134	23	.50	.65			
Year, 1925	207	130	28	.51	.56			
Year, 1924	229	114	23	.44	.55			

TABLE IV.—ABSOLUTE DAILY RANGE. MEAN MONTHLY VALUES.

Month.	Mean Absolute Daily Range 1932.			Mean Daily Range expressed as Percentage of Yearly Mean. 1932.		
	H.	D.	V.	H.	D.	V.
	Y	Y	Y	%	%	%
January ..	76	99	81	72	110	76
February ..	77	98	94	73	109	89
March .. ..	177	134	173	169	149	163
April .. ..	156	103	169	149	114	159
May .. .. .	193	121	156	184	134	147
June .. .. .	82	62	62	78	69	58
July .. .. .	80	62	54	76	69	51
August .. ..	116	81	113	110	90	107
September ..	97	85	122	92	94	115
October .. ..	86	89	104	82	99	98
November .. .	46	62	55	44	69	52
December .. .	76	84	86	72	93	81
Winter .. ..	69	86	79	66	96	75
Equinox .. ..	129	103	142	123	114	134
Summer .. ..	118	81	96	112	90	91
Year .. .. .	105	90	106	—	—	—

The frequency distribution of absolute daily ranges recorded in 1932 is shown in Table V. A comparison with the corresponding figures for Eskdalemuir (Table V. on page 181) indicates that ranges in excess of 200 $\gamma$  are again much more frequent at Lerwick than at Eskdalemuir, even in the case of D ranges, of which the frequency distributions at the two places usually show less divergence. Apart from this it is notable that the ranges of maximum frequency at Lerwick fall in the intervals 50-59 $\gamma$  for H and D, and 20-29 $\gamma$  for V, that is, at much the same points as at Eskdalemuir, though V has many more ranges in excess of 200 $\gamma$  than have H and D.

TABLE V.—FREQUENCY DISTRIBUTION OF ABSOLUTE DAILY RANGE.

Range	Number of Cases, 1932.			Percentage Distribution.		
	H.	D.	V.	H.	D.	V.
Y						
0- 9 ..	0	0	0	0.0	0.0	0.0
10- 19 ..	11	3	31	3.0	0.8	8.5
20- 29 ..	24	7	50	6.6	1.9	13.7
30- 39 ..	22	20	35	6.0	5.5	9.6
40- 49 ..	41	52	24	11.2	14.2	6.6
50- 59 ..	54	60	18	14.8	16.4	4.9
60- 69 ..	38	49	25	10.4	13.4	6.8
70- 79 ..	30	24	23	8.2	6.6	6.3
80- 89 ..	30	30	16	8.2	8.2	4.4
90- 99 ..	14	15	15	3.8	4.1	4.1
100- 109 ..	11	15	17	3.0	4.1	4.6
110- 119 ..	2	9	11	0.5	2.5	3.0
120- 129 ..	12	14	7	3.3	3.8	1.9
130- 139 ..	7	12	5	1.9	3.3	1.4
140- 149 ..	6	9	5	1.6	2.5	1.4
150- 159 ..	4	5	6	1.1	1.4	1.6
160- 169 ..	6	7	5	1.6	1.9	1.4
170- 179 ..	4	4	3	1.1	1.1	0.8
180- 189 ..	4	6	6	1.1	1.6	1.6
190- 199 ..	5	3	5	1.4	0.8	1.4
200+ .. ..	41	22	59	11.2	6.0	16.1
Days omitted..	0	0	0	—	—	—

TABLE VI.— PRINCIPAL MAGNETIC DISTURBANCES RECORDED AT LERWICK, 1932.

Where the beginning of a disturbance has been marked by a "sudden commencement," the serial number is followed by an asterisk (\*), and the time entered in the second column is that of the sudden commencement, estimated to the nearest minute. In other cases, the exact hour nearest the time at which disturbance may be regarded as having begun is entered in the second column. To the tabulated values of maximum and minimum, the following have to be added:—H, 1400γ; D, 13°; V, 46000γ.

No.	From	To	Horizontal Force.					Declination.					Vertical Force.				
			Max.	Time.	Min.	Time.	Range.	Max.	Time.	Min.	Time.	Range.	Max.	Time.	Min.	Time.	Range.
	d. h. m.	d. h.	γ	d. h. m.	γ	d. h. m.	γ	'	d. h. m.	'	d. h. m.	'	γ	d. h. m.	γ	d. h. m.	γ
1	Jan. 1 14	Jan. 2 24	566	2 22 29	375	2 23 4	191	60.5	2 12 2	18.2	2 22 24	42.3	769	2 17 36	583	2 23 50	186
2	Jan. 7 20	Jan. 12 24	583	9 23 37	422	8 22 48	161	65.7	8 16 35	18.8	11 18 23	46.9	759	7 20 55	599	8 22 56	160
3	Jan. 25 10	Jan. 29 4	728	27 15 29	405	26 23 55	323	62.4	27 16 41	11.0	26 22 20	51.4	816	27 15 28	546	28 1 0	270
4*	Feb. 2 20 22	Feb. 5 24	586	4 20 15	304	4 2 12	282	70.9	4 2 23	21.1	4 16 48	49.8	761	3 16 14	472	3 22 48	289
5*	Feb. 7 19 50	Feb. 12 24	572	11 16 56	424	11 22 50	148	60.7	10 23 58 and 12 22 34	18.5	11 16 52	42.2	724	10 16 20	514	11 22 50	210
6	Feb. 22 8	Feb. 26 4	684	23 19 34	439	25 4 59	245	61.8	22 13 45	- 1.5	23 20 5	63.3	764	23 19 34	533	23 1 26	231
7	Mar. 2 10	Mar. 6 24	731	2 21 42	334	5 1 23	397	62.4	5 1 37	14.7	2 22 4	47.7	755	2 21 49	417	5 1 35	338
8	Mar. 7 10	Mar. 11 24	575	9 21 14	- 18	11 0 38	593	70.8	11 0 33	7.9	10 20 5	62.9	707	10 18 6	285	11 0 37	422
9	Mar. 17 16	Mar. 18 22	683	18 18 12	458	18 19 52	225	59.9	18 13 39	3.4	18 18 51	56.5	767	18 18 7	534	18 2 20	233
10	Mar. 20 23	Mar. 25 4	555	21 20 45	409	23 1 5	146	66.5	23 0 48	21.0	21 20 43	45.5	646	22 13 23	400	23 1 4	246
11*	Mar. 27 17 49	Apr. 10 24	827	28 19 10	180	28 20 40	647	87.1	28 19 33	12.0	29 20 25	75.1	781	28 18 50	309	31 0 33	472
12	Apr. 13 14	Apr. 19 24	622	13 16 46	260	13 21 35	362	65.5	13 20 44	15.4	13 21 14	50.1	774	13 17 10	456	13 22 4	318
13*	Apr. 22 5 29	Apr. 29 24	630	24 18 50	310	25 1 13	320	64.2	22 15 24	28.5	24 0 34	35.7	733	22 16 35	389	26 1 1	344
14	May 1 10	May 7 10	664	4 17 38	223	3 1 16	441	69.2	4 17 54	17.9	2 0 12	51.3	745	5 16 23	285	2 23 51	460
15*	May 10 0 5	May 11 22	565	11 18 42	464	11 0 19	101	55.9	11 12 46	35.8	11 0 34	20.1	638	11 15 57	426	11 0 40	212
16	May 13 2	May 17 2	586	15 18 31	389	16 4 42	197	57.6	16 4 49	33.1	13 19 7	24.5	643	15 12 49	498	16 5 15	145
17	May 23 12	May 23 24	573	23 19 48	465	23 9 25	108	58.6	23 13 53	26.9	23 22 0	31.7	659	23 20 37	498	23 22 22	161
18	May 29 11	May 31 24	1043	29 16 41	-540	30 4 45	1583	144.5	30 3 42	-63.0	30 4 40	207.5	955	29 23 0	-244	30 3 37	1199
19	June 7 4	June 12 24	586	8 15 16	369	9 2 48	217	58.0	7 15 5	27.7	8 20 25	30.3	672	9 20 5	358	9 0 30	314
20	June 20 10	June 23 8	621	20 16 46	452	20 10 54 and 22 5 44	169	61.0	20 17 10	37.0	22 3 33	24.0	691	20 18 7	555	21 23 56	136
21	July 5 12	July 10 24	604	5 17 55	418	6 7 2	186	59.3	5 14 5	37.6	10 4 40	21.7	688	6 14 47	515	7 0 5	173
22	Aug. 1 12	Aug. 4 20	579	2 15 17	338	4 0 14	241	61.2	2 2 0	23.9	3 21 3	37.3	725	1 17 54	437	4 0 10	288
23	Aug. 27 6	Aug. 31 4	654	27 17 54	-234	28 1 52	888	65.3	29 22 8	12.2	29 19 8	53.1	817	28 17 52	199	28 2 29	618
24*	Sep. 6 2 19	Sep. 9 24	658	6 15 49	348	9 2 47	310	58.7	6 15 46	24.7	8 4 50	34.0	844	6 14 25	374	8 4 7	470
25	Sep. 23 6	Sep. 27 24	671	23 17 51	358	27 1 3	313	61.2	25 15 25	15.1	23 19 50	46.1	792	24 15 45	405	25 2 0	387
26*	Oct. 14 17 46	Oct. 16 18	803	15 17 20	407	15 10 36	396	67.4	15 17 0	17.2	15 22 25	50.2	843	15 17 30	471	15 23 50	372
27	Oct. 20 10	Oct. 21 14	625	20 17 30	133	20 21 18	492	55.6	20 16 58	-14.1	21 1 39	69.7	786	20 17 47	267	21 1 54	519
28	Oct. 22 8	Oct. 24 24	532	23 19 44	432	24 13 5	100	51.7	23 14 37	14.5	23 17 3	37.2	730	23 17 1	528	22 20 37 and 23 0 52	202
29	Nov. 14 6	Nov. 17 22	532	17 20 46	382	16 22 31	150	59.8	16 6 15	7.7	16 18 11	52.1	721	16 17 27	483	16 23 42	238
30	Dec. 13 14	Dec. 17 24	772	14 17 22	86	16 1 15	686	68.5	14 17 49	- 9.8	16 1 24	78.3	927	14 17 15	369	16 1 11	558

"Diurnal Inequalities."—The mean diurnal inequalities for all days, international quiet and disturbed days, for the months, seasons and the year, are given in Tables 53-61, and the corresponding inequality ranges in Table 62. The inequalities of H, D and V for international quiet and disturbed days are shown graphically in Plate I, whilst in Plate II are given vector diagrams illustrating the diurnal variation of magnetic force in the horizontal, the prime vertical and the meridian planes respectively.

All days. The ranges of the annual mean inequalities of H and D are smaller than in any of the six previous years, but that of V is the same as in 1926 and greater than in any other year except 1930.

Quiet days. The H and D ranges for the year are smaller than in any of the six previous years. That of V is greater than in 1927, 1928 or 1929, but less than in 1926, 1930 and 1931.

In V, 1927, 1928 and 1929 had the smallest Q-day ranges, in the seasons as well as the years, 1930 considerably the largest; but in H and D the relation between the years is not so clear, 1927, 1928, and 1929 tending to have the largest ranges, 1931 and 1932 the smallest, with the disturbed years 1926 and 1930 intermediate.

Disturbed days. The range of the annual inequality of H is less than in any of the six previous years except 1931.

In D only 1927 has a smaller range.

In V the range is equal to that of 1926 and greater than in any other year except 1930.

The disturbed day ranges in all three elements are, as usual, greatest in the Equinox season.

A comparison of the records of Eskdalemuir and Lerwick shows that the declination inequalities at the two places for all, quiet and disturbed days are very similar in general appearance, although minor irregularities on the one set of values are not always reproduced on the other, or, if so, only with diminished amplitude. Differences are more obvious on the horizontal force curves even on quiet days; and become conspicuous in the disturbed day inequalities in H in some months. In the case of vertical force in some months the quiet day inequalities are very different from those at Eskdalemuir, and it will be seen from the table below that the range of the inequality varies from just over one half of the Eskdalemuir range in June to over twice the Eskdalemuir range in October.

Ratio of the Range of the Inequality at Lerwick to that at Eskdalemuir. (1932)

Type of Day.	Element.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
q	D	1.10	1.05	.94	.95	1.01	1.12	1.06	.99	.92	.95	1.09	1.12
d	D	1.17	1.23	1.22	1.12	1.31	1.04	.98	.99	.99	1.24	1.24	1.25
q	H	.89	1.02	.98	1.10	1.05	1.06	1.18	.95	1.04	.87	.82	.83
d	H	1.07	2.36	3.43	1.58	2.11	1.22	1.17	2.06	2.24	1.92	.78	2.64
q	V	.79	.95	1.32	1.31	1.07	.62	.66	.98	.98	2.20	1.36	1.67
d	V	2.37	2.40	1.34	2.39	1.83	2.69	2.02	2.17	2.15	2.33	2.03	2.39

# DIURNAL VARIATION OF THE MAGNETIC ELEMENTS

## LERWICK 1932

Quiet days -----

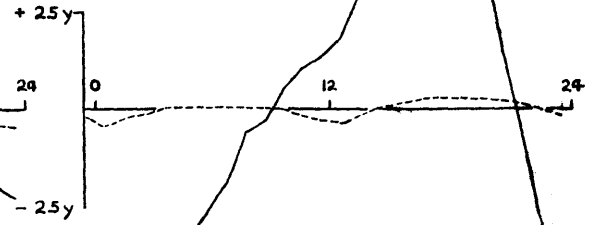
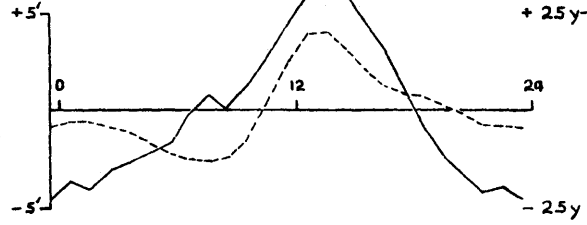
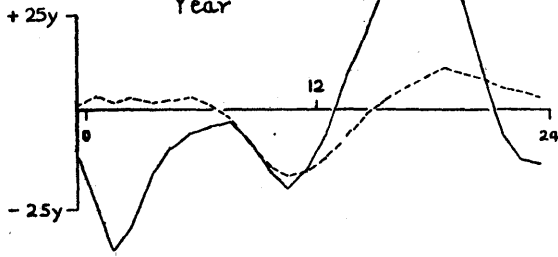
Disturbed days \_\_\_\_\_

Horizontal Force

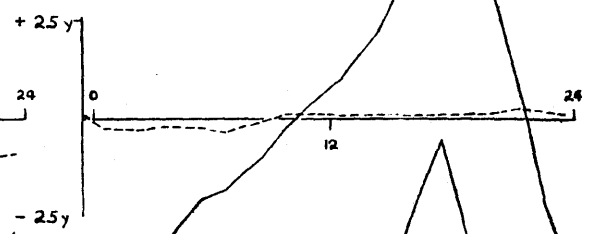
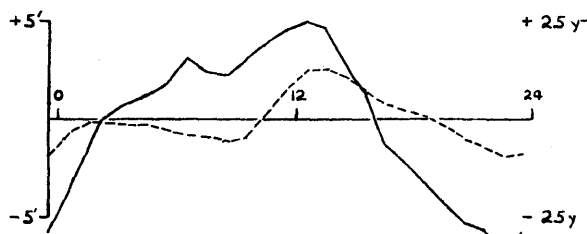
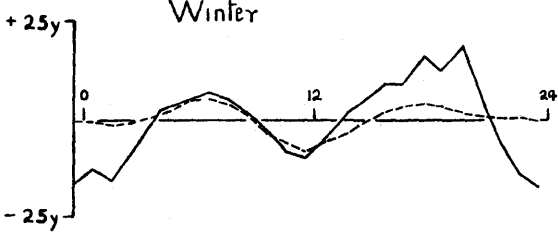
Declination

Vertical Force

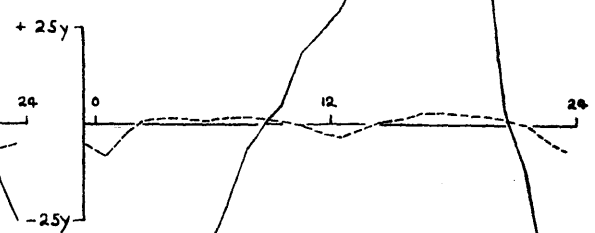
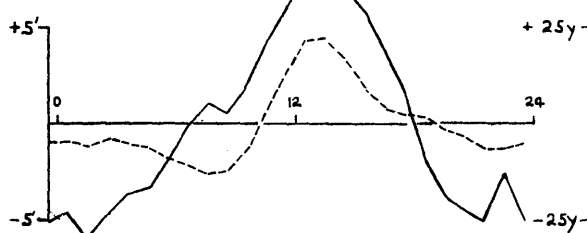
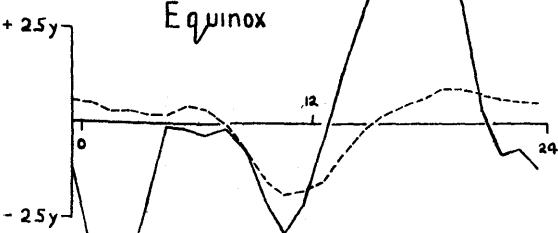
Year



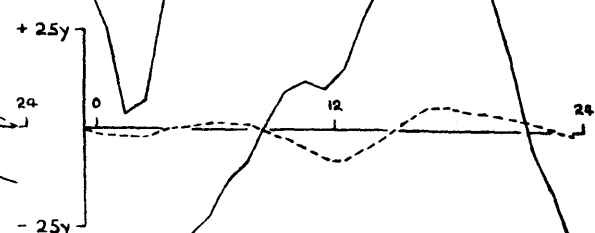
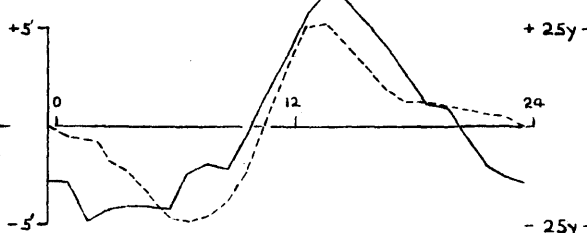
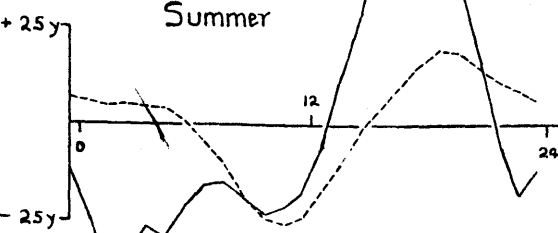
Winter



Equinox



Summer

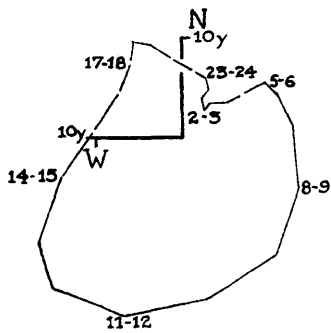


# VECTOR DIAGRAMS ILLUSTRATING DIURNAL VARIATION OF MAGNETIC FORCE LERWICK 1932

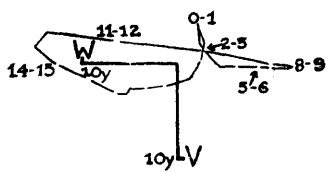
*Quiet days*

*Disturbed days*

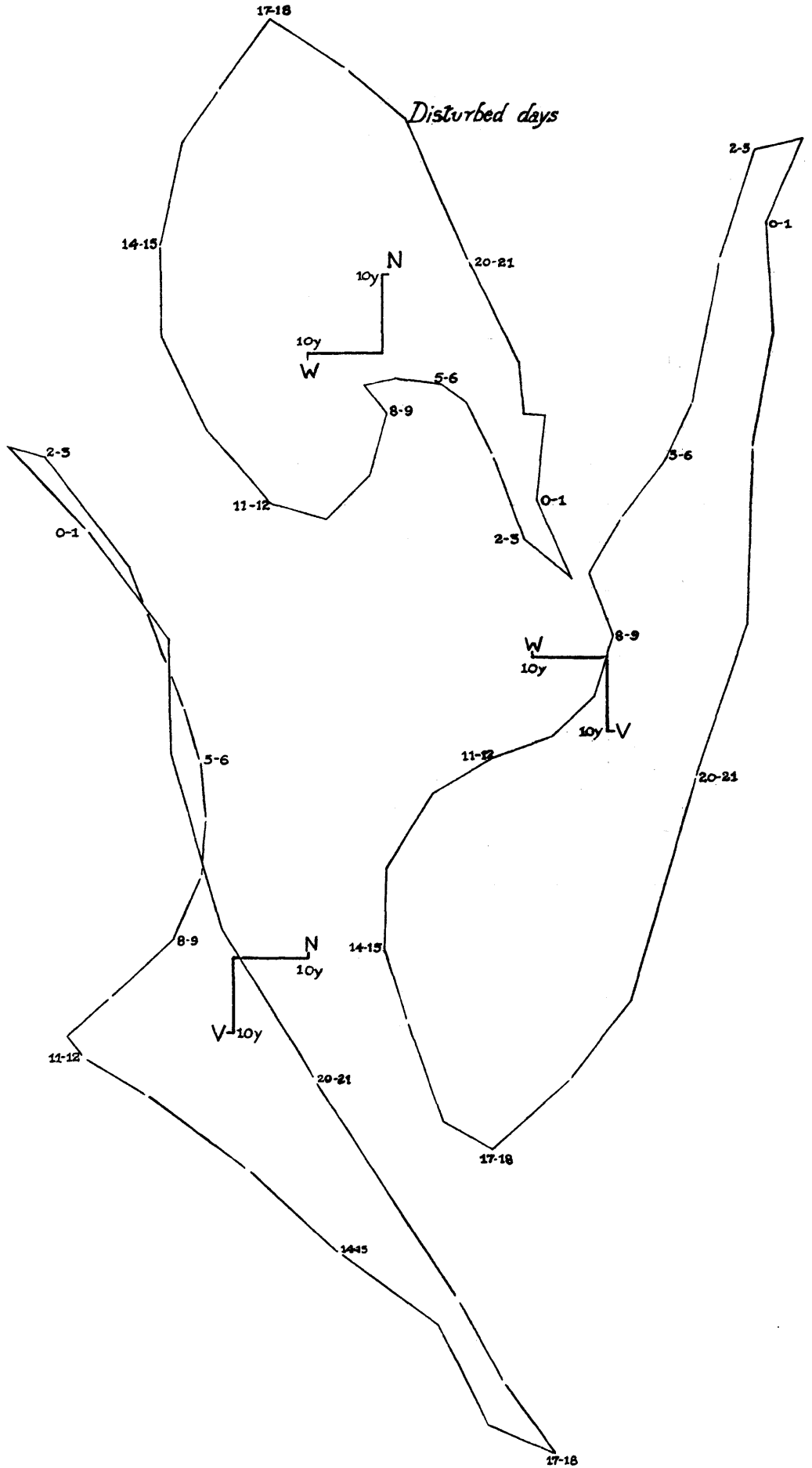
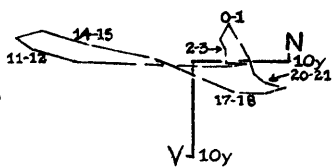
Horizontal  
Components



Prime  
Vertical  
Components



Meridian  
Components



"Magnetic Disturbances."—Particulars of the principal magnetic disturbances recorded at Lerwick during the year are given in Table VI. In the Eskdalemuir Section will be found a similar list which deals with the same disturbances as recorded at that Observatory. Within the limits of accuracy of measurement and registration, "sudden commencements" appear to occur simultaneously at the two Observatories.

#### Remarks on the Autographic Records, 1932.

January.—(Average character figure 0.74).

This was a fairly quiet month, the 27th being the only "2" day. There were, however, on many days fairly large bays in D during the afternoon and evening. The largest of these occurred on the 11th (37' deep), the 26th (38' deep), and the 27th (40' deep).

The first three days show frequent but generally small disturbance, although there was a "wave" in H, 191 $\gamma$  from crest to trough, between 22h and 24h on the 2nd. The second disturbed period (8th to 13th) also contains few large movements. The D bay mentioned above and a bay in H, 120 $\gamma$  deep, centred at 8d 22h 48m, were the most striking features.

A long quiet spell followed, but there was a further small outbreak between the 25th and 29th. The outstanding event was the sharp peak in H at 27d 15h 29m, 230 $\gamma$  high. This excursion occupied only 20 minutes. It was accompanied by a smaller peak in V (113 $\gamma$ ) and by the D bay mentioned above.

Aurora was seen from one or more places in Scotland on January 6, 7 and 25.

February.—(Average character figure 0.79).

This month was also fairly quiet, with the 3rd and 4th as the only "2" days.

All records were lively throughout the afternoon of the 3rd and the early morning of the 4th. The main feature of the H record was the usual night bay, 175 $\gamma$  deep, with its minimum at 4d 2h 12m. This was accompanied by a D hump 26' high and a fairly deep bay in V. A somewhat deeper V bay was centred at 3d 22h 48m and there was a fall in H of 180 $\gamma$  between 22h 19m and 22h 31m. The records were back to about normal by 4d 5h, but a long period of moderate disturbance followed, ending on the 15th.

The period of slight disturbance which lasted from the 18th to the 25th was remarkable only for one feature. This, in H, was a hump 187 $\gamma$  high with a maximum at 23d 19h 34m. The corresponding hump in V was 156 $\gamma$  high. In D there was a bay 1° in depth with a minimum at 20h 5m.

Aurora was observed from one or more places in Scotland on February 3, 4, 7, 8, 9, 10, 11, 12, 23, and 24. That of the 3rd, seen at Lerwick, was fairly active throughout the evening, and from 21h 35m to 21h 55m was in vigorous and continual movement, and showed brilliant red and green colours. During this period a rapid fall of V (to form the bay mentioned above) began.

March.—(Average character figure 1.13).

This, with eight "2" days, was a much more disturbed month.

Records were fairly quiet up to the evening of the 2nd, when, just after 18h, V began a rapid rise of about 140 $\gamma$ . At 21h 42m there was a peak in the H record 240 $\gamma$  high accompanied by a smaller peak in V and a 42' bay in D. Just after midnight there were bays in all traces, 152 $\gamma$  deep in V, 120 $\gamma$  in H and 10' in D.

Fairly active disturbance continued until the 12th. There were no more large peaks in any element (if we except one of 40' in D at 11d 0h 33m) but a number of considerable bays, all during the evening or night. The largest in H were: at 7d 23h 42m, 268 $\gamma$  deep: at 8d 2h 59m, 175 $\gamma$  deep: and at 11d 0h 38m, 460 $\gamma$  deep. These were accompanied by V bays, and throughout this period the diurnal ranges of V were large although, as usual with V, there were few rapid changes. The deepest bays in D were at 10d 20h 5m (46') and 9d 21h 10m (40' deep).

At 18d 18h 12m there was a sharp peak (150 $\gamma$  high) in H, with a smaller one in V and a 47' bay in D; but generally the middle of the month was fairly quiet.

The greatest disturbance of the month began on 28d. There was a small sudden commencement at 27d 17h 49m and another abrupt movement at 23h 40m. Each of these was followed by very small and rapid oscillations for some two hours, but no large movements occurred until the afternoon, when an irregular rise of H to a maximum of 14,827 $\gamma$  took place between 15h and 19h 10m, after which there were three sharply defined night bays, at 19h 33m, 20h 40m and 0h 24m. The second was the deepest with a minimum of 14,180 $\gamma$ . The V movements were very similar, but the three bays mentioned were accompanied in D by humps, respectively 38', 39' and 20' in height.

The next night was somewhat quieter, but on the night of 30th-31st there were a number of bays in H, much the deepest being the one at 0h 48m with a minimum of 14,110 $\gamma$ . The V movements generally resembled those of H, but no such similarity could be traced in the D record, which was, however, fairly excited and had a range of 50'. Moderate disturbance continued throughout the 31st.

Aurora was seen from one or more places in Scotland on March 2, 4, 6, 7, 8, 10, 11, 19, 28, 29, 30, 31.

April.—(Average character figure 1.07).

There were only two 0 days in the month. On the other hand there were no large disturbances, the four "2" days all being doubtful cases.

All records up to the 8th were fairly disturbed. Most of the H records showed bays in the early morning, of which the deepest was that at 2d 2h 46m (minimum 14,207 $\gamma$ ). There were corresponding bays in V, but no very large D movements, and none of the records shows any noteworthy upward displacement. After a short, fairly quiet interval there were some moderately large changes on the 13th. Humps in H and V, centred at about 16h 40m, were respectively 105 $\gamma$  and 176 $\gamma$  high, while in D only a few very small irregular movements occurred. Shortly after 21h all records show bays, 260 $\gamma$  deep in H, 160 $\gamma$  in V, 46' in D.



Small disturbance continued until the 19th, broke out again on the 22nd and continued until the 29th. The most disturbed records were those of 24th -25th. The afternoon of the 24th showed two small peaks in H at 15h 45m and 18h 50m, the second and higher with a maximum of 14,630 $\gamma$ . This latter was accompanied by a small V hump and a small bay in D. H and V had rather deep night bays with minima a little after 25d lh. The minimum value of H was 14,310 $\gamma$ , its range on the evening somewhat exceeding that of V. In D there were two small bays just before and just after midnight.

Aurora was seen from one or more places in Scotland on April 1, 2, 3, 4, 5, 6, 7, 10, 14, 16, 24, 25, 26. As seen from Lerwick that of April 4th was the most active. Between 23h 12m and 23h 30m especially, the changes of form were rapid and continuous. Bands of brilliant pink and green, curtains and "pulsating surfaces" of period about  $\frac{1}{10}$  to  $\frac{1}{4}$  of a second were observed at this time.

May.—(Average character figure 1.03).

A month of fairly frequent small disturbances and one short storm of exceptional violence.

There was a good double bay in H on the night of 2nd-3rd, the second and deeper part falling to 14,223 $\gamma$  (at lh 16m). This appears also on V though, as usual, the division into two parts is much less evident than in H. At about this time there was a "wave" in D, with a range of 34'.

The night of the 3rd was fairly quiet, but there was a peak in H at 4d 17h 38m with a maximum of 14,664 $\gamma$ . At this instant there occurred a fall in V, and a small V peak accompanied the H bay which followed (at 18h 0m). Moreover V showed two night bays of the usual form, with accompanying H humps. The main feature of the D record was a bold wave at 4d 18h, with a range of 44'.

Although small disturbances were common throughout the month, nothing calling for comment occurred until the great storm of 29th to 30th of which the records will be separately described:-

H. After a sharp rise of 220 $\gamma$  at 13h 30m the trace remained very high until 17h, never descending, even in lulls, below 14676 $\gamma$ . In this period there were three great peaks - at 14h 43m, 15h 38m and 16h 41m, the last and greatest with a maximum of 15,043 $\gamma$ . From 17h 30m there was a steep but fairly steady descent until 20h, between which hour and 30d 6h there occurred a series of very deep bays. No fewer than twelve of these passed the lower limit of registration of the standard recorder (13871 $\gamma$ ). There was a rapid recovery after 6h and the remainder of the month suffered only quite small disturbances. Many of the movements during this night were extraordinarily swift - one change of over 700 $\gamma$  occupied about four minutes.

V. The afternoon section was much quieter than in H. There was an initial rise of 160 $\gamma$  at 13h, but no trace of the three peaks of the H record. From 13h 30m the trace fell slowly and irregularly until 20h 30m. Centred at 23h there was a large peak (maximum 46,955 $\gamma$ ). This accompanies an H bay, although both before and after the two records generally increase and decrease together. The hours from 23h to 8h are occupied by a single deep bay instead of the multitude shown by H. Its outline was of course broken by frequent variations of shorter period, but with one exception these were relatively small. The exception was a peak of 660 $\gamma$  high at 4h 44m.

D. Just after noon there was a rise of a few minutes but no large movements occurred until 16h 50m, when there were rapid changes of +39', -85' and +56'. From 18h to 20h the record was quiet. Thereafter there were several deep bays ending with one at 2h 55m with a minimum of 12° 19'. Immediately after this came a rapid rise of 3° 5', and then a fall of 3° 28'. This latter fall ended at 4h 40m, and was followed by a quick recovery.

Aurora was seen from one or more places in Scotland on May 2 (vivid at Tiumpthead from 22h 10m till 3d 2h), 4, 5, 8.

June.—(Average character figure 0.63).

An exceptionally quiet month. The only "2" day, the 9th, was a very doubtful case.

The H record for 8th-9th shows a hump of 85 $\gamma$  centred at 15h 16m; and two night bays at 0h 22m and 2h 48m respectively 100 $\gamma$  and 140 $\gamma$  deep. All these features appear in V also. The bays were accompanied by small D humps 20' and 12' in height. The next two nights each show a small night bay in both H and V.

On the afternoon of the 20th all traces were rather high and a little excited. Apart from these occasions there was nothing in the month worthy of notice.

July.—(Average character figure 0.58). Another remarkably quiet month. Although the ranges on several days were tolerably large, movements were slow and consisted of a slight increase in the normal diurnal variation. The only important exceptions were:- (1) A sharp rise of 80 $\gamma$  in H beginning at 4d 14h 3m; (2) A hump about 53 $\gamma$  high in H with a maximum at 19d 22h 16m accompanied by a 36 $\gamma$  bay in V.

August.—(Average character figure 0.73).

This month contained several periods of mild disturbance and ended with a storm in which all elements had quite large ranges.

The first disturbed period ended on the 6th. The outstanding events were a peak in D 25' in height at 2d 2h 0m and a bay 160 $\gamma$  deep in H, 150 $\gamma$  in V, just after midnight on the night of 3-4d.

After this nothing remarkable happened until the 27th. The records began to show some liveliness shortly after midday and at 17h 54m there was a good peak in H (maximum 14654 $\gamma$ ) accompanied by a bay in D 23' deep. All elements show a fairly deep bay shortly after 22h, and another, much deeper in H and V, followed a little later. The H record reached its minimum (13766 $\gamma$ ) at 1h 52m, but the lowest value of V, 46199 $\gamma$ , was not reached until 2h 29m. D shows a 15' peak centred at 1h 50m followed by a 27' fall to a minimum at 2h 4m. The disturbance continued until the 30th. The main events of this period were:- a very sudden rise of 60 $\gamma$  in H just before 28d 16h; a sharp V peak, 103 $\gamma$  high, at 28d 17h 52m accompanied by one of 60 $\gamma$  in H and a small one in D, this last followed by a sharp fall of 27'; a 90 $\gamma$  hump in H at 29d 19h 9m, accompanying a 90 $\gamma$  fall in V and a D bay 37' deep; and a 22' hump in D at 29d 22h 8m at which moment there was a small H bay and a fairly deep one in V (minimum 46456 $\gamma$ )

Aurora was seen at one or more places in Scotland on August 3, 4, 18, 27 (at 23h 30m at Lerwick) and 28.

September.—(Average character figure 0.93).

The four "2" days in this month were all doubtful cases, although small disturbances were common.

There were many small movements during the first five days. A very small sudden commencement occurred at 6d 2h 19m. Then at about 6d 14h H rose by 136 $\gamma$ , remained high until 16h 45m, and then returned rapidly to normal. The rise was even larger in V (220 $\gamma$ ) but after the maximum, at 14h 25m, there was a slow and fairly steady fall lasting until 23h. D was somewhat excited without ever departing more than about 15' from normal.

No bay in H appeared on the night of 6d-7d but one with a minimum of 14351 $\gamma$  occurred at 8d 3h 45m, following a fairly quiet day. There was a corresponding bay in V, 206 $\gamma$  deep and a little later one in D 18' deep. Similar bays appeared on the next night also.

The next outbreak of importance began on the 23rd. In the afternoon there was a slow and irregular rise in H, ending in a sharp peak at 17h 51m with a maximum of 14671 $\gamma$ . The corresponding rise in V was small. After 18h both records fell slowly (although H showed one sharp upward swing of 90 $\gamma$  at 20h 31m). H and V were both low during most of the night, but H did not display the usual pronounced bay. Disturbance in D was greatest between 16h and 2h. In this period there were numerous bays, the largest about 25' deep.

The records of 24th-25th were more disturbed. In H there were three peaks in the afternoon and two bays at night. The second and largest H peak was accompanied by a good V hump 180 $\gamma$  high, but the other two H peaks, as well as the two H bays, were accompanied by V bays. The last of these was the deepest, with a minimum of 46405 $\gamma$  at 25d 2h 0m. The main D movements were opposed in direction to those in H, and the range of D during this afternoon and night was 40'.7.

The records of 25d to 26d are generally similar to those of the preceding day, H showing several afternoon peaks and night bays, none of them very large. V, on this occasion, followed H in all its main movements. The 26th was quieter, but there was a bay at about 27d 1h, in which H fell to 14358 $\gamma$  and V to 46419 $\gamma$ , accompanied by a 20' hump in D. Smaller disturbances persisted until the end of the month.

Aurora was seen from one or more places in Scotland on September 4, 6, 7, 8, 14, 19, 23, 24, 25, 26, 29 and 30.

October.—(Average character figure 0.94).

A quiet month apart from two quite short periods of moderate disturbance.

The first of these occurred on 15d after a sudden commencement at 14d 17h 46m. Between 4h and 8h H values were somewhat high and V values low. A little before noon both elements began a slow and fairly steady rise, but at 17h 20m there was a fine peak in H about 250 $\gamma$  high. There was no corres-

ponding peak on either of the other records. V movements indeed, apart from a little peak of about 100 $\gamma$  at 15h 23m, were always slow, although the range for the day was considerable. Mean values of D for the evening were low, and a number of rapid swings occurred; but none of the movements was at all large. H showed scarcely a trace of the night bay which usually forms part of large disturbances.

After another tolerably quiet period disturbance broke out again on the afternoon of 20d. The first movement was a rise in both H and V which began shortly after 16h and led to very flat-topped humps, H remaining quite close to a value 14605 $\gamma$  and V to 46766 $\gamma$  for about an hour. H showed a series of at least five separate night bays on the night of 20-21d, the first and deepest, at 21h 18m, having a minimum of 14133 $\gamma$ . The corresponding V bays were not in all cases clearly marked, although V values were very low during the night. The largest H bay and the big double one between 1h and 2h were accompanied by fair D bays. These were respectively 33' and 42' deep.

The storm was practically finished by 21d 10h, but small outbreaks were common for several days after. At 22d 20h there was a swift fall in V of 150 $\gamma$  during a period of small but rapid swings in D and H, and a 30' bay in D occurred at 23d 17h 3m accompanied by a sharp V peak 70 $\gamma$  high. Apart from these small movements the end of the month was fairly quiet.

Aurora was seen from one or more places in Scotland on October 3, 4, 20, 21, 22, 23, 24, 26, 27, 29.

November.—(Average character figure 0.70).

A quiet month with only one "2" day, and that one a doubtful case.

Between 4h and 8h on 1d there were a few slow waves in all traces. They were most noticeable in D where the range was 18'. After this the records were fairly quiet until the storm of 16d. In H the only large features were two bays centred at 3h 12m and 22h 31m, with minima respectively 14419 $\gamma$  and 14382 $\gamma$ . In V the disturbance began with a fall of 85 $\gamma$  between 16d 2h 50m and 3h 45m. Thereafter, although the normal diurnal variation was greatly augmented, there were no rapid changes. The D record was the most remarkable. The main period of disturbance was very clearly defined, beginning with a sharp fall of 30' at 14h 35m and ending with a rapid rise of 24' at 22h 35m. Outside these limits the trace was quiet; within them it was always low and showed many swings of fair size and rapidity.

The 17d records were at times rather excited, but show no large movements. On 18d a pair of small humps in H, respectively 45 $\gamma$  and 23 $\gamma$  high, appeared between 20h 30m and 22h. They were accompanied by a single V bay about 50 $\gamma$  deep and two D bays 13' and 10' deep. The rest of the month was quiet.

Aurora was seen from one or more places in Scotland on November 4 (glow at 19h 35m, ray structure between 20h 50m and 21h 5m), 5, 16, 22.

December.—(Average character figure 0.74).

Generally a quiet month but broken by one short period of moderate disturbance.

The first week of the month was very quiet, but there was a little activity on the 8th and 9th. A wave in D with a range of 20', centred at 8d 24h, and a V bay with a minimum of 46526γ at 9d 1h 15m, were the main features.

Disturbance began again shortly after 14d 16h. H and V both showed a large hump covering the period from 16h to 20h. This hump was 270γ high in H, 300γ in V. During the remainder of the night both elements remained very low and in addition H showed a well-marked night bay with a minimum of 14292γ at 21h 17m. The first D movement was a slow and irregular fall of 27' beginning at 16h, but this was followed by a sharp rise of 47' to a maximum at 17h 49m and then by a slow fall ending in a 35' bay accompanying that in H.

The majority of 15d was quite quiet, but just before 19h disturbance began again. After a small rise, H fell sharply - about 200γ - and remained very low until 2h. V movements were similar but slower. Between 16d 0h and 16d 2h H showed a series of three narrow bays respectively 220γ, 340γ and 70γ deep. The minima were at 0h 49m, 1h 15m and 1h 45m. In V there was an irregular fall of 230γ between 0h 23m and 1h 11m, followed by a fine peak 220γ high. The maximum of this occurred at 1h 18m, i.e. almost coincident with the H minimum. D rose 41' between 0h and 1h 10m, and then came a very narrow bay 75' deep. After 2h all the records were fairly steady. Small disturbances persisted for several days, the main events being a D hump at 17d 1h 2m, 19' high, and a D bay 31' deep at 17d 19h 24m.

From the 25th to the end of the month small disturbance was common, but there were no large movements.

Aurora was seen from one or more places in Scotland on December 1, 2, 8, 14, 15, 16, 23, 25, 28, 30.

POTENTIAL GRADIENT (reduced to level surface): VOLTS PER METRE.  
Mean values for periods of sixty minutes, ending at exact hours, Greenwich Mean Time.

1. Lerwick.

Day.	January. Factor 1.27.				February. Factor 1.29.				March. Factor 1.29.			
	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.
1	v/m. <-883	v/m. 80	v/m. 61	v/m. 116	v/m. 36	v/m. 62	v/m. 127	v/m. (130)	v/m. 23	v/m. 145	v/m. 158	v/m. 287
2	71	125	122	100	(65)	(81)	59	205	142	-19	165	275
3	67	266	260	173	143	205	121	95	103	97	126	145
4	151	132	138	247	68	101	81	49	129	216	126	249
5	119	189	19	119	88	62	130	140	52	Z ±	191	184
6	151	93	96	>417	254	222	196	271	194	Z ±	184	252
7	360	161	132	128	202	<-326	124	130	Z ±	181	229	417
8	144	125	119	154	81	114	111	124	194	231	242	203
9	100	138	132	-157	-163	95	<-261	140	158	197	226	184
10	199	321	254	286	33	65	95	65	74	68	152	81
11	180	144	106	135	65	95	108	98	65	100	126	132
12	164	93	183	189	65	130	81	111	-129	107	136	90
13	67	-360	61	Z ±	108	101	127	16	-32	58	132	103
14	Z ±	119	148	109	72	88	(98)	(65)	61	113	113	152
15	-161	228	138	132	(81)	98	111	160	94	97	139	142
16	58	173	202	196	104	<-68	95	88	(81)	(81)	(97)	107
17	61	122	138	205	49	108	192	238	36	129	97	226
18	103	125	177	132	121	163	199	336	-42	26	-3	142
19	125	132	103	299	36	137	130	199	74	97	152	426
20	67	106	148	125	156	127	65	163	132	139	107	100
21	93	128	286	106	65	156	264	316	48	81	161	100
22	48	116	196	183	218	215	192	238	52	58	129	78
23	119	161	119	177	-121	196	173	130	32	142	178	129
24	247	334	292	-507	121	134	173	153	94	197	255	262
25	96	96	273	>514	130	101	130	(130)	<-882	<-1331	<-517	242
26	(64)	93	128	96	(49)	65	98	124	184	203	165	191
27	67	100	189	151	68	179	121	261	136	158	197	32
28	87	128	154	157	127	163	173	205	178	136	132	110
29	35	<193	112	144	137	29	117	<-456	-78	129	233	436
30	93	128	183	141	---	---	---	---	90	-74	-927	19
31	96	125	100	90	---	---	---	---	<-646	1034	84	>807
(a)	115	149	154	179	102	122	132	156	101	164	158	203
(b)	109	156	161	122	87	127	134	161	73	114	108	169
Mean.	(a) 149 (b) 137				(a) 128 (b) 127				(a) 157 (b) 116			
Day.	April. Factor 1.30.				May. Factor 1.32.				June. Factor 1.34.			
	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.	2 - 3 h.	8 - 9 h.	14 - 15 h.	20 - 21 h.
1	v/m. Z ±	v/m. 84	v/m. 130	v/m. 181	v/m. 172	v/m. 199	v/m. 96	v/m. 79	v/m. 97	v/m. 154	v/m. 137	v/m. 160
2	94	120	123	62	33	79	89	122	97	110	134	124
3	130	152	Z ±	165	56	86	56	89	117	120	120	174
4	130	159	68	130	50	76	79	166	117	-53	97	124
5	94	-373	130	311	>348	<281	166	182	73	94	107	137
6	275	68	94	139	116	109	126	<149	104	117	177	210
7	-107	29	113	Z ±	Z ±	159	162	166	83	120	107	160
8	181	94	123	100	122	83	106	53	130	144	150	164
9	36	Z ±	<-181	87	119	106	66	165	114	124	107	117
10	65	123	97	133	96	175	Z ±	89	271	384	180	-257
11	>259	104	100	165	<-33	109	Z ±	182	384	247	207	47
12	87	62	178	94	159	136	152	-7	134	144	114	157
13	29	75	78	(97)	26	99	103	149	174	144	184	200
14	(81)	130	178	172	232	149	189	288	127	127	167	220
15	97	165	217	204	341	407	487	675	114	147	184	224
16	110	178	143	139	487	Z ±	126	391	167	217	327	234
17	94	<-117	97	68	285	142	116	258	170	240	167	167
18	62	75	143	65	159	119	185	182	100	(134)	187	194
19	58	120	162	<426	156	209	487	712	214	140	177	210
20	249	78	133	321	116	-199	281	172	157	184	217	247
21	110	126	133	130	99	66	116	152	164	207	257	104
22	32	97	-130	146	113	119	119	165	57	67	120	234
23	55	110	243	-65	142	129	146	136	(100)	144	83	284
24	97	113	62	>295	109	76	66	99	127	301	157	-27
25	68	Z ±	97	Z ±	<-66	126	116	152	157	147	110	120
26	>632	>797	Z ±	156	139	159	182	182	67	90	124	421
27	75	81	97	123	142	129	199	116	314	140	147	190
28	94	65	100	107	165	162	169	149	124	134	134	197
29	113	87	49	-528	162	192	165	136	134	167	254	224
30	42	29	104	275	94	189	149	165	114	127	187	591
31	---	---	---	---	119	99	109	116	---	---	---	---
(a)	123	128	123	155	156	144	159	195	143	159	161	201
(b)	104	77	115	108	138	125	163	188	143	152	161	178
Mean.	(a) 132 (b) 101				(a) 163 (b) 153				(a) 166 (b) 159			

Note:- The Potential Gradient is reckoned as positive if the potential increases upwards. For indeterminate potential gradient the notation Z is used.  
(a) Mean of all positive readings. (b) Mean from all complete days using both positive and negative readings.

1. Lerwick.

1932.

Day.	July. Factor 1.31.				August. Factor 1.28.				September. Factor 1.29.			
	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.
	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.
1	414	462	196	578	93	106	119	164	234	517	363	193
2	340	157	520	748	96	125	51	254	125	161	144	157
3	562	340	266	626	154	132	109	125	Z ±	138	161	<209
4	398	424	263	132	125	26	125	87	87	71	87	125
5	539	481	857	562	103	87	128	196	83	67	<-385	170
6	401	1024	347	632	170	356	-48	193	74	138	80	164
7	128	170	161	257	132	138	154	141	87	106	64	151
8	289	189	299	132	177	144	141	260	93	132	119	161
9	93	279	132	135	61	202	157	164	109	55	305	<-1075
10	128	221	257	202	151	180	234	421	-16	109	26	-96
11	157	189	151	157	453	167	186	-71	93	170	90	148
12	193	254	177	212	331	Z ±	Z ±	536	74	42	167	135
13	180	189	225	151	Z ±	642	241	100	67	106	35	100
14	106	144	135	189	125	189	151	228	-6	177	96	260
15	83	100	189	215	125	144	138	106	112	109	128	151
16	100	148	161	64	157	286	112	215	-109	67	128	144
17	77	106	55	151	-209	443	119	164	106	80	39	39
18	93	93	100	109	132	157	157	161	58	<16	74	135
19	161	228	125	215	100	106	132	132	-16	39	Z ±	151
20	125	119	186	202	112	164	-379	161	138	112	225	132
21	170	96	Z ±	151	122	125	148	202	96	125	148	-315
22	257	202	183	161	106	157	141	177	<-738	<-706	125	173
23	119	77	164	241	93	93	119	209	106	141	116	164
24	193	106	93	74	122	132	119	164	71	122	122	83
25	363	414	225	372	96	125	144	286	449	382	199	-74
26	241	193	67	260	138	196	151	151	116	93	128	112
27	196	266	138	254	100	61	299	183	61	<-55	77	164
28	215	189	138	254	157	315	161	440	67	132	183	254
29	308	177	144	231	103	167	138	167	122	215	138	311
30	266	154	154	-273	106	151	132	-674	196	225	173	157
31	-80	533	177	266	112	157	132	254	---	---	---	---
(a)	230	249	209	264	140	182	148	208	118	137	134	159
(b)	221	254	209	250	121	167	120	161	104	154	130	115
Mean.	(a) 238 (b) 233				(a) 169 (b) 142				(a) 137 (b) 126			
Day.	October. Factor 1.28.				November. Factor 1.25.				December. Factor 1.24.			
	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.	2 - 3h.	8 - 9h.	14 - 15h.	20 - 21h.
	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.
1	99	<-384	237	128	98	101	145	60	176	148	166	245
2	-416	125	74	147	218	<-616	123	142	-157	273	Z ±	176
3	74	29	112	64	95	104	104	-41	79	-60	Z ±	217
4	64	150	-35	154	60	66	136	161	75	82	110	151
5	64	93	<-128	-362	123	130	164	136	119	176	217	195
6	64	77	54	323	95	117	145	171	119	113	144	154
7	266	99	278	240	107	240	284	111	63	72	201	122
8	160	189	237	269	161	221	205	199	69	129	198	154
9	141	96	70	29	79	-32	218	133	6	192	170	129
10	80	86	125	138	63	142	167	325	72	126	151	135
11	93	154	131	208	123	382	307	221	113	122	151	-31
12	122	125	125	<-1072	133	117	149	174	104	126	157	170
13	-288	102	112	Z ±	73	123	155	186	79	(157)	232	135
14	93	189	90	166	107	177	82	199	138	154	471	467
15	106	70	163	195	92	126	158	186	327	-88	210	198
16	131	150	<-368	195	54	73	155	167	157	-94	283	242
17	74	96	90	83	130	73	133	272	195	19	210	91
18	45	86	118	93	104	174	-262	180	129	188	188	622
19	6	74	96	624	95	126	142	177	57	157	151	188
20	10	48	112	237	111	-16	133	155	(79)	(94)	160	-126
21	170	Z ±	138	>368	98	>95	117	>411	173	94	<-298	342
22	54	106	176	Z ±	158	117	47	190	295	286	254	201
23	70	80	128	122	<95	319	Z ±	126	235	333	405	217
24	58	67	42	109	98	136	234	>506	257	135	188	132
25	96	125	218	<32	63	>727	126	161	126	129	60	176
26	<-64	<128	240	182	<-506	174	177	130	141	110	82	63
27	>1040	Z ±	144	Z ±	32	<-126	209	107	-232	38	94	104
28	<-240	Z ±	128	149	66	149	126	218	47	22	157	239
29	74	109	Z ±	128	136	41	186	281	107	229	132	257
30	(64)	(112)	147	176	123	433	180	199	226	50	94	79
31	157	163	Z ±	189	---	---	---	---	97	79	132	135
(a)	129	108	138	164	103	180	161	196	133	137	185	198
(b)	58	101	113	178	104	138	142	177	121	117	185	174
Mean.	(a) 140 (b) 113				(a) 160 (b) 140				(a) 163 (b) 149			
				Annual Means.				(a)	133	155	155	191
								(b)	115	140	145	165
										(a) 159	(b) 141	

The Potential Gradient is reckoned as positive if the potential increases upwards. For indeterminate potential gradient the notation Z is used.  
 (a) Mean of all positive readings. (b) Mean from all complete days using both positive and negative readings.

POTENTIAL GRADIENT (reduced to level surface): DIURNAL INEQUALITIES (in volts per metre).

The departures from the mean of the day are adjusted for non-cyclic change.†

\* oa DAYS ONLY.

2. Lerwick.

1932.

Table with 27 columns: Month and Season, Hour 0-1, G.M.T. 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, † Non-cyclic Change, No. of Days Used, Mean Values. Rows include Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Year, Winter, Eqnx., Summer.

3. Lerwick.

\* 1a AND 2a DAYS ONLY.

1932.

Table with 27 columns: Month and Season, Hour 0-1, G.M.T. 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, † Non-cyclic Change, No. of Days Used, Mean Values. Rows include Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Year, Winter, Eqnx., Summer.

† See page 21

\* Note-for explanation of oa, 1a, and 2a Days, see page 55.



ELECTRICAL CHARACTER OF EACH DAY, AND APPROXIMATE DURATION OF NEGATIVE POTENTIAL GRADIENT.

4. Lerwick.

1932.

Day.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.	Duration of Char- tive acter. nega- tive pot. grad.
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
1	2b 6.1	(lb) ---	1b 1.3	1b 1.3	1a 1.6	Oa ...	1b 0.5	1a 0.1	1b 2.2	1b 1.3	1a 0.4	1b 2.3
2	1a 0.6	(1a) ---	1a 0.4	1b 1.1	Oa ...	Oa ...	Oa ...	1a 0.4	1b 0.3	2b 7.4	2b 3.5	2c 10.4
3	2a 4.6	Oa ...	1b 1.0	1b 1.3	1a 0.1	1a 1.2	Oa ...	1a 0.4	2c 3.4	1b 1.3	1a 0.9	2c 3.1
4	2b 3.3	1a 0.1	1a 0.3	1b 1.9	1b 1.2	1a 1.3	1a 0.4	1a 1.1	1b 0.9	1b 0.6	1b 2.8	1a 0.2
5	2b 3.3	Oa ...	1c 2.2	1b 2.0	1c 0.6	1a 1.0	Oa ...	1b 0.8	2b 4.5	2b 4.7	Oa ...	1b 0.3
6	1c 1.1	Oa ...	1c 0.9	2c 3.9	1b 0.6	Oa ...	1a 0.1	1b 2.4	1a 0.3	2b 4.1	Oa ...	Oa ...
7	1c 0.9	1b 1.3	1c 1.0	2c 6.1	1b 1.2	Oa ...	Oa ...	Oa ...	Oa ...	1a 0.2	Oa ...	1a 1.2
8	1a 0.1	1a 0.2	1b 1.4	1b 0.8	2b 3.1	Oa ...	Oa ...	1a 0.5	Oa ...	Oa ...	Oa ...	2b 3.1
9	2b 5.3	2c 3.5	1b 0.7	2b 3.7	1b 2.1	Oa ...	Oa ...	1a 0.2	1b 1.2	1b 0.8	1b 1.5	1b 1.5
10	1b 1.5	1a 1.6	1a 0.4	1b 0.5	2c 4.1	1a 2.6	Oa ...	Oa ...	2b 5.1	1a 1.3	1b 0.2	1b 0.7
11	1b 0.3	1a 0.7	1b 0.5	1c 2.2	1b 2.3	1b 2.4	1a 0.5	1b 0.7	1b 1.1	Oa ...	Oa ...	1b 1.3
12	1b 1.0	1a 1.2	1b 2.7	1c 1.4	2b 3.3	1a 0.5	Oa ...	2c 4.7	1a 0.8	2b 4.6	Oa ...	1a 0.5
13	2c 10.3	1b 1.0	1a 0.6	(1a) ---	1a 2.3	Oa ...	Oa ...	1b 2.3	1a 0.1	2b 6.4	Oa ...	(Oa) ...
14	1b 2.4	(1b) ---	1b 1.1	(1b) ---	Oa ...	Oa ...	Oa ...	Oa ...	1a 0.9	1b 2.4	1a 0.1	1a 0.5
15	2c 5.9	(1b) ---	1a 1.3	Oa 0.1	Oa ...	Oa ...	Oa ...	1a 1.8	1a 0.5	2b 3.2	Oa ...	1b 2.8
16	1a 1.9	1b 2.2	(1a) ---	Oa ...	1b 1.6	Oa ...	1a 1.3	1b 0.6	2a 3.8	1b 1.3	Oa ...	1b 2.0
17	1b 1.8	1b 1.5	1a 0.1	1b 0.8	1a 0.9	Oa ...	1b 1.5	1b 2.3	2b 3.1	1b 2.2	Oa ...	2b 4.0
18	1a 0.5	Oa ...	1a 3.0	1a 0.9	1a 1.3	Oa ...	1a 0.1	Oa ...	1b 2.6	1b ---	2b 4.7	1b 0.6
19	1b 0.9	1b 1.2	1b 0.2	2b 8.1	1b 2.0	Oa ...	(1a) ---	Oa ...	2c 3.5	2b 3.3	1b 1.2	(1a) ---
20	1b 0.6	1b 1.4	1a 0.3	2c 6.1	1b 2.9	Oa ...	Oa ...	1b 1.8	1c 1.1	2c 6.1	2b 4.1	(1a) 1.7
21	1b 1.2	1b 1.7	Oa ...	1a 0.3	1a 0.1	Oa ...	2c 3.7	Oa ...	2b 4.8	1c 2.2	2c 3.3	2b 3.7
22	1b 1.0	Oa ...	1b 0.8	1b 2.7	Oa ...	(1a) ---	1b 0.8	Oa ...	2b 9.1	1b 2.9	2c 6.3	1b 0.8
23	1b 1.5	1b 1.1	1a 1.1	2b 3.3	1b 1.0	(1a) ---	Oa ...	Oa ...	1a 0.1	1b 1.9	1c 2.0	1b 0.3
24	1b 1.5	Oa ...	1b 0.8	1b 0.8	2c 5.0	2b 4.1	1a 1.4	Oa ...	1b 2.5	1b 2.8	1c 1.5	1a 0.2
25	1c 0.9	(Oa) ...	2c 14.7	1c 1.7	1b 2.0	1b 1.2	1b 1.8	Oa ...	2b 5.3	1b 0.7	2c 3.2	Oa ...
26	Oa ...	(Oa) ...	Oa ...	1c 2.5	Oa ...	1a 1.5	1a 0.1	Oa ...	1b 1.9	1c 1.9	2b 7.7	1a 0.3
27	1a 0.1	1a 0.3	1a 0.3	1b 0.6	Oa ...	Oa ...	Oa ...	1a 1.1	1b 0.3	1c 1.5	1b 2.9	2b 5.7
28	Oa ...	Oa ...	2b 4.5	Oa ...	Oa ...	Oa ...	1b 0.4	Oa ...	1a 0.1	1c 1.4	1a 1.3	1b 2.4
29	1b 1.4	1b 3.0	1a 1.1	2b 9.4	Oa ...	Oa ...	Oa ...	Oa ...	Oa ...	(1c) ---	1b 2.6	Oa ...
30	1a 0.3	Oa ...	2c 12.9	2b 4.5	Oa ...	1a 0.1	1b 1.7	2b 4.1	1b 0.8	(1b) ---	1b 0.3	1a 1.2
31	1a 0.1	Oa ...	2c 3.8	Oa ...	Oa ...	Oa ...	2b 4.1	1a 0.4	Oa ...	1b 2.2	Oa ...	1a 0.2
Total	36 60.4	21 22.0	33 59.4	36 68.0	25 39.3	13 15.9	18 18.4	20 25.7	36 60.3	37 68.7	27 50.5	33 51.0
No. of days used.	31 31	29 25	31 30	30 28	31 31	30 28	31 30	31 31	30 30	31 28	30 30	31 30
Mean.	1.16 1.9	0.72 0.9	1.06 2.0	1.20 2.4	0.81 1.3	0.43 0.6	0.58 0.6	0.65 0.8	1.20 2.0	1.19 2.5	0.90 1.7	1.06 1.7

Annual Values :- Character Frequency  $\frac{0}{90}$   $\frac{1}{217}$   $\frac{2}{59}$   
 Mean Character Figure 0.92 (366 days)  
 Duration of negative pot. grad: Total 539.6 hrs.  
 No. of days 352  
 Mean 1.53

**Explanatory Note:-** The electrical character of the day is indicated by the figures 0, 1, or 2, according to the character of the trace of the electrograph as regards negative potential gradient. The explanation of these symbols is as follows:-

- 0. denotes a day during which from midnight to midnight no negative potential was recorded.
- 1. denotes a day with excursions to the negative not amounting in the aggregate to more than three hours.
- 2. denotes negative potential extending in the aggregate over three hours or more.
- a. denotes that within the 24 periods of 60 minutes for which an estimate of the mean potential gradient has to be made in the process of tabulation there was in no case a range of potential gradient in the open exceeding 1,000 volts
- b. denotes that a range of potential gradient in the open exceeding 1,000 volts was reached in at least one but in fewer than six of the 24 hourly periods referred to above.
- c. denotes that a range of 1,000 volts or more occurred in at least six of the 24 hourly periods.









TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

13. Lerwick. (H.)

14,000 Y. (.14 C.G.S. unit) +

March, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (1 Q to 31 D). Each cell contains a numerical value representing magnetic force. A 'Mean' row is at the bottom.

Handwritten note: 1032/031/01/500 13.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

14. Lerwick. (D.)

13° +

March, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (1 Q to 31 D). Each cell contains a numerical value representing magnetic declination. A 'Mean' row is at the bottom.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.



TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT. Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 17. Lerwick. (H.) 14,000 Y (.14 C.G.S. unit) +

April, 1932.

Table with 25 columns (0-1 to 23-24) and 30 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from approximately 460 to 520.

LE 13/1932 041 01/34513

MAGNETIC DECLINATION (WEST). Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 18. Lerwick. (D.) 13° +

April, 1932.

Table with 25 columns (0-1 to 23-24) and 30 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from approximately 46.0 to 52.0.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.













072

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

29. Lerwick. (H.)

14,000 γ (-14 C.G.S. unit) +

July, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic force data for Lerwick (H.) in July 1932.

071

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

30. Lerwick. (D.)

15° +

July, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic declination data for Lerwick (D.) in July 1932.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.



1932 / 082/01 38140

479

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 14,000 γ (· 14 C.G.S. unit) +

33. Lerwick. (H.)

August, 1932.

Table with 25 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic force data for Lerwick (H.) in August 1932. Includes handwritten numbers 32 and 565.

081

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

34. Lerwick. (D.)

13° +

August, 1932.

Table with 25 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic declination data for Lerwick (D.) in August 1932.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.



TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT. Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time, 46,000  $\gamma$  (-46 C.G.S. unit) +

35. Lerwick. (V.)

August, 1932.

Table with 23 columns (0-1 to Mean) and 32 rows (Day 1 to 31). Columns represent hourly magnetic force measurements, and rows represent individual days from 1 to 31. A 'Mean' row at the bottom shows average values for each column.

DAILY EXTREMES OF TERRESTRIAL MAGNETIC ELEMENTS: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

36. Lerwick.

August, 1932.

Complex table with 16 columns. Columns 1-3: Day (1-31). Columns 4-9: Horizontal Force (Maximum, Minimum, Range). Columns 10-15: Declination (Maximum, Minimum, Range). Columns 16-21: Vertical Force (Maximum, Minimum, Range). Column 22: HRH+VRv (10,000  $\gamma^2$ ). Column 23: Magnetic Character of Day (0-2). Column 24: Temperature in Magnet House (200+). Rows include days 1-31 and a 'Mean' row at the bottom.

§ For explanation see page 38. Q denotes an International Quiet Day, while D denotes a disturbed day used for the computation of tables 56-61.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 14,000 Y (+14 C.G.S. unit) +

September, 1932.

37. Lerwick. (H.)

Table with 24 columns (0-1 to 23-24) and 30 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from 470 to 506.

091

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 13° +

September, 1932.

38. Lerwick. (D.)

Table with 24 columns (0-1 to 23-24) and 30 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from 41.0 to 45.2.

0 denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.



TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT. Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time. 14,000 Y (-14 C.G.S. unit) +

41. Lerwick. (H.)

October, 1932.

Table with 25 columns (0-1 to 23-24) and 26 rows (Day 1 to Mean). Data represents magnetic force values for Lerwick (H.) in October 1932.

101

MAGNETIC DECLINATION (WEST)

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

13° +

October, 1932.

42. Lerwick. (D.)

Table with 25 columns (0-1 to 23-24) and 32 rows (Day 1 to Mean). Data represents magnetic declination values for Lerwick (D.) in October 1932.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.



TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

45. Lerwick. (H.)

14,000 γ (·14 C.G.S. unit) +

November, 1932.

Table with 23 columns (0-1 to Mean) and 31 rows (Day 1 to 30). Contains magnetic force data for Lerwick (H.) in November 1932.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

46. Lerwick. (D).

13° +

November, 1932.

Table with 23 columns (0-1 to Mean) and 31 rows (Day 1 to 30). Contains magnetic declination data for Lerwick (D) in November 1932.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT. Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 46,000 γ (-.46 C.G.S. unit) +

47. Lerwick. (V.)

November, 1932.

Table with 25 columns (Hour G.M.T., 0-1 to 23-24, Mean) and 31 rows (Day 1 D to 30). Values represent magnetic force in γ.

DAILY EXTREMES OF TERRESTRIAL MAGNETIC ELEMENTS:

MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

November, 1932.

48. Lerwick.

Table with 19 columns (Day, Horizontal Force, Declination, Vertical Force, HRn+VRn, Magnetic Character, Temperature) and 31 rows (Day 1 D to 30). Values represent magnetic extremes and temperature.

For explanation see page 36. Q denotes an "International Quiet Day," while D denotes a disturbed day used for the computation of tables 56-61.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

49. Lerwick. (H.)

14,000 Y (.14 C.G.S.unit) +

December, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic force data for Lerwick (H.) in December 1932.

486 at 0-lh. Jan.1st. 1933

Handwritten scribble and number 121

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time.

50. Lerwick. (D.)

13° +

December, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains magnetic declination data for Lerwick (D.) in December 1932.

34.9 at 0-lh. Jan.1st. 1933.

Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 56-61.











RANGE OF MEAN DIURNAL INEQUALITIES FOR THE MONTHS, YEAR AND SEASONS OF 1932										AVERAGE DEPARTURE.								
NOTE.- The ranges are those shown in Tables 53 to 61 in the preparation of which the non-cyclic change has been eliminated.																		
62. Lerwick. 1932.										63. Lerwick. 1932.								
	All Days.			Quiet Days.			Disturbed Days.			All Days.			Quiet Days.			Disturbed Days.		
	H.	D.	V.	H.	D.	V.	H.	D.	V.	H.	D.	V.	H.	D.	V.	H.	D.	V.
January	13.4	7.68	36.0	8.1	4.90	8.9	30.8	15.22	113.5	2.7	1.76	9.3	1.7	1.28	2.0	7.0	3.59	26.5
February	20.6	8.24	40.9	17.1	5.70	8.2	56.7	18.19	103.9	4.6	1.84	10.9	3.8	1.28	1.6	9.6	3.61	22.3
March	50.1	10.32	96.5	22.2	6.91	14.8	193.5	17.56	155.7	10.4	2.68	22.6	5.7	1.49	3.1	33.2	4.83	54.7
April	53.5	9.16	89.7	35.8	7.61	18.5	128.8	15.53	185.6	13.9	2.50	24.2	8.1	1.87	3.9	25.6	3.94	47.4
May	67.7	9.93	70.9	45.5	9.90	16.0	226.7	19.81	201.3	17.1	2.93	17.5	11.6	2.08	4.0	56.1	5.22	46.8
June	52.1	10.01	26.1	44.3	9.00	11.9	72.7	10.82	97.8	12.5	2.70	5.9	10.9	2.44	3.1	17.9	2.91	22.5
July	51.5	10.38	21.5	47.7	11.60	11.7	76.9	11.19	63.4	12.1	2.61	5.9	11.6	2.60	2.7	17.7	2.85	16.6
August	53.2	9.51	55.2	42.4	9.86	15.6	143.4	11.68	196.9	13.1	2.40	11.9	10.3	2.53	3.3	30.9	3.18	41.3
September	35.8	9.32	57.2	34.9	7.87	12.1	91.7	14.72	156.9	8.5	2.49	14.3	8.8	1.88	3.1	18.2	3.88	44.7
October	33.4	8.87	50.4	24.3	6.92	15.2	100.9	17.16	178.7	6.4	2.14	12.5	6.2	1.50	2.7	17.7	4.63	40.7
November	14.4	6.46	24.2	18.5	4.96	7.9	24.9	12.26	70.6	3.1	1.27	7.3	3.3	1.05	1.9	5.7	2.93	20.4
December	18.3	6.94	43.5	9.5	4.15	7.2	83.1	14.33	169.6	4.8	1.58	10.5	2.5	0.70	2.1	17.6	3.77	36.6
Year	34.6	7.30	48.6	27.5	6.73	7.2	80.8	11.14	131.2	7.9	2.09	12.3	6.5	1.59	1.6	18.4	3.08	33.9
Winter	14.9	6.76	33.3	13.2	4.50	5.1	36.1	11.91	100.8	3.6	1.51	9.4	2.6	1.00	1.5	8.4	3.10	26.2
Equinox	40.3	8.94	72.2	28.1	6.99	11.4	106.2	14.02	185.7	9.4	2.45	18.3	6.9	1.62	2.4	22.0	3.94	45.9
Summer	54.2	9.85	40.5	44.6	9.96	13.0	104.5	11.60	125.0	13.0	2.63	9.8	11.0	2.39	2.8	26.7	3.22	30.8

64. Lerwick. NON-CYCLIC CHANGE†. 1932.										65. Lerwick. MEAN VALUES OF HR <sub>H</sub> +VR <sub>V</sub> (Unit 10,000 <sup>r</sup> ) 1932.			
	All Days.			Quiet Days.			Disturbed Days.			HR <sub>H</sub>	VR <sub>V</sub>	Sum	Mean Character Figure
	H.	D.	V.	H.	D.	V.	H.	D.	V.				
January	+0.7	-0.03	+1.5	+1.3	-0.19	-1.2	-7.9	-1.05	-17.1	110	378	488	0.81
February	0.0	+0.12	-1.9	+3.4	+0.14	+1.5	-4.2	+0.08	-14.2	1111	438	549	0.83
March	-1.3	-0.16	-2.0	+2.0	+0.65	+8.2	-38.0	-1.03	-28.3	257	808	1064	1.16
April	+1.4	+0.03	+2.2	+9.5	+2.48	+24.7	-21.1	-4.41	-51.4	226	771	997	1.07
May	-0.2	-0.10	-0.4	+5.2	+0.14	+3.8	+2.5	-2.45	+16.4	280	727	1007	1.03
June	+0.3	+0.05	+0.4	+3.2	-0.02	+0.7	-2.4	+0.51	+5.7	119	239	408	0.63
July	0.0	-0.05	0.0	+2.8	+0.26	-1.8	-10.5	-0.63	-8.3	116	250	366	0.58
August	-0.5	-0.01	-0.2	+1.6	+0.15	-0.2	-20.6	+0.49	-80.7	169	526	694	0.74
September	0.0	-0.10	-1.0	+5.8	-0.05	-1.8	-7.4	+0.47	-6.6	141	567	708	0.93
October	+0.3	-0.02	+0.7	+3.3	-0.79	+4.9	-0.6	+0.69	+3.2	125	486	611	0.94
November	-0.3	-0.02	+0.8	+2.5	+0.64	+3.7	-4.7	-0.53	-3.6	67	257	324	0.63
December	+0.3	-0.11	+0.1	-0.6	+1.02	+2.1	-4.4	-1.38	-3.5	110	402	512	0.74
Year 1932	--	--	--	--	--	--	--	--	--	153	492	644	0.84

\* See page 38  
† See page

MEAN MONTHLY AND ANNUAL VALUES OF TERRESTRIAL MAGNETIC ELEMENTS.  
(All days except those noted in monthly tables).

66. Lerwick. 1932.									
Month.	North Component.	West Component.	Vertical Component.	Total Force.	Declination (West.)		Inclination (North.)		Horizontal Force.
	Y	Y	Y	Y	°	'	°	'	Y
January	14082	3478	46672	48874	13	52.3	72	44.1	14305
February	14079	3471	46629	48832	13	51.0	72	43.5	14301
March	14074	3464	46588	48791	13	49.7	72	43.1	14494
April	14074	3459	46590	48792	13	48.5	72	43.2	14493
May	14074	3453	46589	48791	13	47.2	72	43.3	14491
June	14084	3454	46601	48805	13	46.8	72	42.9	14502
July	14085	3451	46605	48809	13	46.0	72	43.0	14502
August	14081	3445	46603	48806	13	44.8	72	43.3	14496
September	14076	3438	46590	48791	13	43.5	72	43.5	14489
October	14074	3431	46594	48794	13	41.9	72	43.8	14487
November	14078	3428	46606	48806	13	41.2	72	43.8	14489
December	14074	3422	46623	48821	13	40.0	72	44.5	14484
Year 1932	14078	3450	46608	48809	13	46.1	72	43.3	14495

Date.	Month.	Date.	Month.	Date.	Month.	Date.	Month.
	<b>January.</b>		<b>March. (contd.)</b>		<b>September. (contd.)</b>		<b>November. (contd.)</b>
1 a ..	Cloudy, then fine	14 b ..	Fine, moonlight	11 a ..	Generally fine	6 a ..	Fine.
5 c ..	Cloudy after 17h 30m	15 b ..	Cloudy, moonlight	12 b ..	Cloudy, moonlight	9 c,b ..	Cloudy, moonlight
6 a ..	Generally fine.	17 b ..	Cloudy, moonlight	14 c,b ..	" "	10 a ..	Fine, moonlight
7 c ..	Overcast except for period 19h 30m - 20h 30m	19 b ..	Fine, moonlight	16 c,b ..	" "	11 b ..	Cloudy, moonlight
8 ☰	Faint glow until 19h 45m	20 b ..	Cloudy, moonlight	18 b ..	Fine, moonlight.	20 a ..	Fine
11 a ..	Generally fair.	25 c ..	Overcast until 20h	19 ☰	Cloudy. Rays seen once 21h 15m.	21 a ..	Fine
12 b ..	Rather cloudy.	26 b ..	Cloudy	23 ☰	Bright active aurora, first seen in twilight	22 a ..	Fine
13 b ..	Rather cloudy.	27 c ..	Overcast until 20h	26 ☰	Moderate aurora.	23 c ..	Fine until 20h.
15 a ..	Variable cloud.	28 ☰	Very cloudy. Bright patch seen 21h 50m and 22h 15m	27 c ..	Very cloudy, occasional breaks.	24 a ..	Rather cloudy.
16 c,b ..	Moonlight. Overcast until 19h.	29 ☰	Very cloudy. Glow seen 21h 15m.	29 ☰	Faint aurora 19h 50m onwards.	29 a ..	Cloudy.
23 b ..	Moonlight.	31 ☰	Cloudy. Glow visible after 21h 15m.	30 ☰	Faint Glow seen 20h.	30 a ..	Fine.
24 b ..	" Rather cloudy						
25 ☰	Glow seen at 18h 45m						
28 a ..	Rather cloudy.						
29 b ..	Rather cloudy.						
30 b ..	Rather cloudy.						
	<b>February.</b>		<b>April.</b>		<b>October.</b>		<b>December.</b>
1 b ..	Cloudy	1 ☰	Bright aurora throughout evening.	2 a ..	Fine	1 ☰	Faint aurora 18h 55m 21h 30m.
3 ☰	Bright active aurora 18h 10m - 23h 20m	2 b ..	Cloudy.	3 ☰	Cloudy, moderate aurora seen 21h and 21h 20m	2 ☰	Faint glow 18h, cloudy thereafter.
4 ☰	Bright glow throughout evening.	3 ☰	Glow 21h - 22h.	4 ☰	Cloudy, Glow from 18h onwards.	3 a ..	Variable cloud.
6 a ..	Fine	4 ☰	Bright active aurora throughout evening.	5 c,b ..	Very cloudy.	4 c,b ..	Rather cloudy.
7 ☰	Glow throughout evening	5 ☰	Cloudy. Bright aurora seen 21h 5m.	10 c,b ..	Very cloudy, moonlight	5 a ..	Fine, moonlight
8 ☰	HA seen 22h-22h 7m, Cloudy	6 ☰	Seen 21h 5m.	11 b ..	Cloudy, moonlight	6 a ..	" "
9 ☰	Fair, Glow seen once (18h 25m)	7 ☰	Cloudy. Glow seen 21h 30m	14 b ..	" "	7 c,b ..	Cloudy, moonlight
10 b ..	Cloudy	8 b ..	Glow throughout evening	17 a ..	Fine.	8 c,b ..	" "
11 ☰	Cloudy. Rays seen at 21h 15m	9 a ..	Very cloudy.	18 a ..	Fine.	9 a ..	Fine, moonlight
12 b ..	Cloudy.	10 ☰	Generally fine	19 a ..	Fine.	10 c,b ..	Cloudy, moonlight
13 b ..	Cloudy.	11 b ..	Faint glow 21h - 22h	20 ☰	Cloudy, moderate aurora throughout evening.	11 b ..	" "
14 b ..	Cloudy, moonlight	12 a ..	Cloudy	21 ☰	Moderate glow 19h 30m onwards.	12 b ..	" "
15 b ..	Fine, moonlight	14 ☰	Rather cloudy	22 ☰	Cloudy, glow seen 22h.	13 c,b ..	" "
19 b ..	Cloudy, moonlight	15 b ..	Cloudy. Active aurora seen 21h to 21h 30m.	23 ☰	Cloudy, occasional glimpses of moderate aurora.	14 c,b ..	" "
20 b ..	Cloudy, moonlight	16 b ..	21h to 21h 30m.	24 ☰	Faint glow throughout evening.	16 ☰	Cloudy, faint glow
22 b ..	Cloudy, moonlight	17 b ..	Fine, moonlight	25 a ..	Fine - rather cloudy	20 a ..	Fine
23 ☰	Cloudy. Bright arc seen once at 19h 20m	18 b ..	Rather cloudy, moonlight	26 ☰	Faint glow throughout evening.	22 a ..	Moderate glow 19h 45m - 21h 5m.
24 ☰	Cloudy. Bright arc seen once at 21h 45m	19 a ..	Cloudy, moonlight	27 ☰	Faint glow throughout evening.	28 ☰	Faint aurora after 21h 30m, Cloudy before 20h.
25 a ..	Fine	20 b ..	" "	28 a ..	Faint aurora throughout evening.	30 ☰	Faint glow 19h 45m 20h 30m.
27 a ..	Cloudy-fine.	21 b ..	" "	31 c ..	Fine.		
28 a ..	Fine.	22 b ..	" "		Fine after 19h 30m.		
29 c ..	Cloudy after 20h	23 b ..	" "				
	<b>March.</b>	24 b ..	" "				
1 a ..	Rather cloudy.	26 ☰	Rather cloudy. Glow seen at 21h.				
4 c ..	Overcast after 20h	27 ☰	Active aurora seen 23h 30m.				
5 ☰	Cloudy. Faint glow seen 19h 50m.						
6 ☰	Cloudy. Glow seen 20h 45m - 21h 20m						
7 ☰	Cloudy. Glow seen at 19h 20m and 21h 0m						
8 b ..	Cloudy.						
9 ☰	Glow after 20h 50m						
11 b ..	Cloudy						
13 b ..	Cloudy, moonlight						
			<b>September.</b>		<b>November.</b>		
		1 a ..	Fine.	4 ☰	Rather cloudy, moderate aurora 19h 35m - 21h 15m		
		2 a ..	Fine.				
		3 c ..	Cloudy after 21h 30m				
		4 ☰	Glow seen at 21h 30m				
		6 ☰	Faint arc 21h 50m onwards				
		7 ☰	Moderate aurora 21h 5m onwards.				
		8 ☰	Faint arc visible throughout evening.				

In the interests of brevity there have been omitted from the table above all dates on which the sky throughout the evening remained completely overcast and on which therefore, no opportunity arose of determining whether or not aurora occurred. The nights on which aurora was actually seen are indicated by the symbol ☰. The nights on which aurora was not seen, despite at least an occasional interval of more or less clear sky, are indicated by the symbol .. ; in the latter case also, remarks on the weather are added to assist the reader in judging how far the fact of no observation of aurora may be taken as indicating that there was not actual aurora. The letters a,b,c have the following significance.

- a = Aurora absent
- b = Bright aurora absent: faint one might have been missed (high cloud amounts and/or moonlight)
- c = Aurora absent when sky was clear, but observation impossible for considerable part of evening owing to cloud.
- c,b = Observation impossible for considerable part of evening: faint aurora might have been missed even during the remainder.

A full description is available of the auroral phenomena observed.

## 68. Other Scottish Stations.

1932.

Date.	Month.	Date.	Month.	Date.	Month.	Date.	Month.
	<b>January.</b>		<b>March. (contd.)</b>		<b>June.</b>		<b>October.</b>
6	G.C.; A. faint streamers extending up to about 45°.	19	A. 03.10., glow and rays, white, elevation 10° - 15°, moderate, faint.		Nil.	20	Wick; G.C.; A. arch. elevation 5°, yellow-green, 22.00 to 23.00.; Leuchars; Eskdalemuir, glow.; Dunnet Head, 20.30 to 03.00 on 21st.
7	D.; Braemar.	28	G.C.; Duntulm, bright.; A. 20.00 to 22.00., arch, glow, rays, moderate bright, elevation of arc 35°, rays. to zenith.; Inverness, 21.00 to 24.00.; Stornoway, N.E. to W.N.W.; Craibstone, 21.00, N.W., 10°-12° above horizon.			21	Stornoway.
25	Duntulm.		Duntulm, faint; Kirkwall. Eskdalemuir.		Nil.	22	Duntulm.
	<b>February.</b>	29	Duntulm, faint; Kirkwall. Eskdalemuir.	3	<b>August.</b>	23	Kirkwall, 20.00.; A. arch, 23.30.; Wick; Kirkwall, 20.00.; Tiumpthead, 20.30 to 23.45.
3	B.	30	Duntulm, faint; Kirkwall. Eskdalemuir.	4	A.	27	Kirkwall.
4	B.	31	G.C.; Eskdalemuir.	18	A.	29	Duntulm.
8	B.			27	D.		<b>November.</b>
10	Stornoway, 22.15.; Tiumpthead, 21.30 to 24.00		<b>April.</b>		Kirkwall; Tisee.; Arbroath; West Linton.; Paisley, beautiful display at 22.00.; Thackerston, streamers and curtain visible between 23.00 and 24.00 followed by glow, curtain remained in N.E. to E. quadrant.; Eskdalemuir. Fair Isle North, 22.00 to 22.45.	4	B.; Duntulm.
11	B.	1	D.; Stornoway; Dunnet Head, between 23.00 and 24.00.	28		5	B.
12	Tisee.	2	Wick.; Pentland Skerries, 02.30.			16	Duntulm.
	<b>March.</b>	3	D.; Wick; Pentland Skerries, 24.00		<b>September.</b>	22	G. C.
2	Tisee.; Tiumpthead, 19.30 to 24.00.	4	Wick; G.C.; B, 23.00				<b>December.</b>
4	D.; Wick.; Stornoway, 22.00.; Tisee.	7	G.C.; Duntulm.			1	B.
7	D.; G.C.; Auskerry, 22.00 to 03.00 on 8th.; Dunnet Head, between 21.00 and 24.00.; A, 21.00 to 24.00 arc 5° elevation, green-white, moderate to faint.; Eskdalemuir, glow.	16	B, 22.00.	6	Wick	8	B.
8	D.; Leuchars, 20.10 to 20.40.; Noss Head, 01.30 to 04.30.; Eskdalemuir, glow.	24	G. C.	7	Duntulm, bright.	14	B.; Stornoway.
10	Kirkwall; Craibstone, 21.00.; Leuchars, 20.30.; Eskdalemuir, glow.	25	B. 24.00.	14	Kettins.	15	B.; Stornoway. Wick, 23.00.; A, after 18.00, glow, arch low in N.N.W, yellowish white. Pentland Skerries, 00.30.; Kirkwall, 21.00.; Wick, 20.00.; G. C.
11	Stornoway, 21.50.; Inchkeith.	2		23	Craibstone.	16	Pentland Skerries, 00.30.; Kirkwall, 21.00.; Wick, 20.00.; G. C.
		4	<b>May.</b>	24	Auskerry, 22.00.; Tiumpthead, 20.00 to 24.00.; Eskdalemuir.	23	Wick, 23.00.
		5	B.; Stornoway.; Tiumpthead, vivid display from 22.00 to 02.00 of 3rd.	25	Eskdalemuir.	25	Pentland Skerries, 23.45, Wick, 24.00.
		8	A.	26	Pentland Skerries, 23.45.	28	Pentland Skerries, 22. 55.; Wick, 23.00.
			G. C.; A.	29	Duntulm.	30	Wick, 22.00.; G. C.; Stornoway.
			A.				

Note - For brevity, stations which figure frequently in the above Table are represented by their initials, viz, D- Deerness, B- Baltasound, A- Aberdeen, G.C.- Gordon Castle.





M.O. 360  
(Aberdeen)

Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

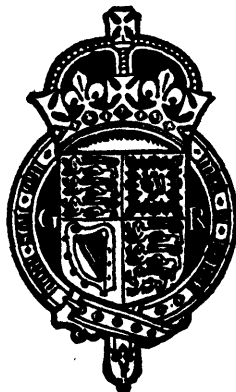
Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

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ABERDEEN

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Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE  
1934

## ABERDEEN OBSERVATORY.

Latitude .. .. .	57° 10' N.
Longitude .. .. .	2° 6' W.
G.M.T. of Local Mean Noon .. ..	12h. 8m.

### *Heights in metres above Sea-Level.*

Barometer .. .. .	26·0*
Rain-gauge.. .. .	11·4*
Robinson Cup Anemograph .. ..	36*
Dines Tube Anemograph.. .. .	21

### *Heights in metres above ground.*

Thermometer Bulbs, North Wall Screen	12·5
Sunshine Recorder .. .. .	20·7
Robinson Cup Anemograph .. ..	23
Dines Tube Anemograph .. .. .	13
Beckley Rain-gauge Rim .. .. .	0·6

## INTRODUCTION.

### SITE

The Observatory, which was established in 1868, is housed in the top floor of the Cromwell Tower of King's College in Old Aberdeen. The College lies on a plain gradually rising from the sea from which it is distant about 1 mile (1·6 km.). There are no serious irregularities of surface in the vicinity excepting the two river valleys of the Don and the Dee. To the north at a distance of about 1 km. the Don flows eastwards to the sea; the Dee flows into the sea at a distance of about 3 km. to the south-east of the College. Between the College and the sea is a golf course covered for the most part with grass. Westwards is the High Street of the Old Town and beyond this there is another street. Further west grass pasture extends for about one kilometre. Southward are some open spaces beyond which the modern town is reached. The enclosure in which the Stevenson screen, the Beckley and check rain-gauges and the grass minimum thermometer are exposed, had its position changed in 1928 on account of the extension of the College buildings. Its position was, in previous years, about 50 metres to the north-east of the Observatory, but from the 1st June, 1928 and onwards, the site has been a new one, also to the north-east of the Observatory, but at a distance of approximately 180 metres. The height of this "station" above M.S.L. is 11·4 metres. The "North-wall" screen in which the recording thermometers are exposed is erected on the wall outside the north window of the uppermost storey of the Observatory. The nature of the soil and sub-soil is loam and sand.

Plans showing the position of the Observatory relative to the City of Aberdeen, and the general arrangement of the College Buildings, and also photographs, are given in the volume for 1928. The enclosure shown is that on the new site. A view of the old site will be found in the Introduction to *The Observatories' Year Book*, 1923.

*Change of value adopted for height of Station above Mean Sea Level.*—There have been one or two changes lately in the values adopted for the height of the Station above Mean Sea Level. Prior to 1st January, 1925, the value for the station level was 14·0 m., and that for the height of the barometer cistern was 26·8 m. As from

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\* These values differ slightly from those given in former years. See note above.

1st January, 1925, however, following a careful redetermination of these heights, the values were altered to 13.4 m. for the station level, and 26.0 for the height of the barometer cistern. The change of site of the rain-gauge enclosure, referred to above, has further altered the value for the station level to 11.4 m. as from 1st June, 1928, but the height of the barometer cistern remains as before, viz. 26.0 m.

### METEOROLOGY.

The elements dealt with in the following tables are:—Atmospheric pressure, air temperature, humidity, rainfall, sunshine, wind speed and direction, earth temperature and minimum temperature on the grass, together with a diary of cloud and weather.

The instruments from which values of the above elements have been obtained and the methods of tabulating the records are described in the General Introduction to this volume. The following additional information refers especially to Aberdeen.

*Pressure and Temperature.*—The photo-barograph, standard Fortin barometer and thermograph are housed in the Observatory room. The pressure scale value of the photo-barogram is 1 mb. = 1.18 mm. on the paper, when the paper is at normal atmospheric humidity. In similar circumstances the time scale is 1 hour = 9.3 mm. The records of the photo-barograph are standardized by means of control readings taken from the standard barometer. Up to the end of 1928 this instrument was Fortin Standard Barometer M.O. 273, but from the 1st January, 1929, it has been replaced by Fortin Standard Barometer M.O. 1149. The N.P.L. certificate of this latter barometer shows a standard temperature varying from 286° A at 1,050 mb. to 287° A at 910 mb.; corresponding corrections have been applied to the control readings.

The recording thermometers are placed in the North-wall screen already referred to. The scale value of the wet bulb thermograph record is 1° absolute = 3.20 millimetres on the paper; for the dry bulb thermograph the scale value varies slightly with the temperature, but is approximately 1° absolute = 3.4 millimetres. The time scale is 1 hour = 9.23 millimetres. Reading of the photo-thermograms is done by means of glass measuring scales, the records being standardized by control readings from Standard Thermometers M.O. 1698 (dry bulb) and M.O. 1697 (wet bulb). These thermometers have corrections, varying at different parts of the scale, of between  $-0.1^{\circ}$  A and  $+0.2^{\circ}$  A; these corrections have been applied to the control readings. The heights of the barometer cisterns and of the bulbs of the thermometers are given at the top of the appropriate tables.

It may be here emphasized that the bulbs of the thermometers in the North-wall screen are at the considerable height of 12.5 metres above the ground, and that readings from these thermometers are exclusively used for this publication (except as noted below under *Humidity*) and for the corresponding summaries printed in the *Monthly Weather Report*.\*

*Rainfall.*—The recording instrument in use is Beckley rain-gauge No. 2 with an area of 101.1 square inches (653 cm<sup>2</sup>). The procedure adopted in tabulating the records is similar to that described in the General Introduction and calls for no comment. Control was by check gauge M.O. 266 during the year 1932.

*Humidity.*—On those occasions when the temperature of the wet bulb has been 273° A or under, the relative humidity has been obtained from the records of a hair hygograph. This instrument is accommodated inside the new large Stevenson screen at the new site. The hygograph is now 13.2 metres below the level of the thermograph bulbs in the North-wall screen, and in using its records an appropriate adjustment is made.

\* The temperatures for Aberdeen published in the *Daily Weather Report*, and summaries from them given in the *Weekly Weather Report*, are from different thermometers, viz., those in the Stevenson Screen, with their bulbs only 1.3 metres above the ground.

*Sunshine.*—The sunshine recorder (Campbell-Stokes type) is exposed on the small circular tower on the Observatory roof on which the Robinson cup anemograph is erected. It is rigidly held by lead flaps soldered to the lead roof. The actual diameter of the sunshine sphere is 4.02 inches, and the focal length 2.97 inches, these figures being slightly in excess of the standard values (diameter  $4.00 \pm .05$  inches, focal length  $2.95 \pm .01$  inches). The exposure is excellent; the only obstruction is a flagpole to the east, of angular diameter about  $1^\circ$ , which may obstruct 0.1 hr. record about 7h between April and September. This loss has been allowed for, whenever practicable, in tabulating the records. In computing the percentage duration of sunshine the actual possible values for each day of the year 1932 have been employed, a procedure similar to that adopted from 1926 onwards.

*Wind Speed and Direction.*—As it was not possible during the year to remove the pressure-tube anemograph to a satisfactory site, the values of wind speed for 1932 are tabulated from the records of the Robinson cup-anemograph, in continuance of the practice adopted from 1st July, 1930. The cup-anemograph values are corrected for the effect of exposure in accordance with the factors given in the Table on page 12 of the General Introduction. The cup-anemograph is mounted upon the roof of the Observatory building, its cups being at a height of 23 m. above the ground, and about 7 m. above the roof of the main tower of the building.

On the few occasions when the records of the cup-anemograph have been defective, the required values have been taken from the records of the pressure-tube instrument, and to these values appropriate exposure-factors have been applied. Values thus obtained are entered in italics, as are also the mean hourly values for the days in question.

In the tables showing "Highest instantaneous wind speed recorded each day by the Dines tube anemograph" (Table 151) and "Distribution of wind speed: extreme velocities as recorded by the Dines tube anemograph" (Table 152), the values entered for the *gusts* are those actually recorded by that instrument, but it must be remembered that these values are defective in that they are values recorded on a site whose exposure is known to have deteriorated considerably.

In Table 152 the values of distribution of wind speed for each month, and those of highest hourly wind are taken from the records of the Robinson cup-anemograph, corrected for the effect of exposure as explained above.

*Earth Temperature.*—Readings have been made at 9h G.M.T. of the earth temperature at nominal depths of one foot and four feet below the surface of the grass.

The thermometers and the method of exposure are of the standard type described in the *Meteorological Observer's Handbook*. The depths of the thermometer bulbs below the grass-covered surface of the ground are 30 and 122 cm.

The data published in the *Observatories' Year Book* 1922-1930 were the readings of an instrument with its bulb at a depth of 124 cm. This instrument, a description of which is given in the Year Book for 1930, p. 86, was of unorthodox type, and was situated in the College Gardens until the end of June 1928. It was then removed to the anemometer enclosure, Ladymill. From 1st January, 1930, the published data refer to new instruments of standard type which were in the anemometer enclosure at Ladymill until 8th June, 1932. They were then removed to the Athletic Ground site, where they were installed near the screen and rain-gauges. The results of a comparison between the new and old instruments at a nominal depth of 122 cm. at the Ladymill site will be found in the Year Book for 1931, pp. 86-87.

For the period 18th June, 1932, to 25th March, 1933, comparative readings are available from the new 122 cm. thermometer at the Athletic Ground and the old instrument at Ladymill. The results indicate that at 122 cm. depth the Athletic Ground is about  $1.5^\circ\text{A}$  to  $2^\circ\text{A}$  warmer than Ladymill during June, July and August, and about

1°A colder in November, December, January and February. Similar comparative observations are not available for the College Gardens site, but some idea of the differences between that site and Ladymill can be obtained by comparing the readings at Ladymill during the four years, June 1928 to May 1932, with those obtained for many years prior to June 1928, at the College Gardens. These indicate that Ladymill is warmer than the College Gardens from September to April and colder from May to August, the maximum differences being approximately +2°A and -1°A. The continuity of the earth temperature readings has thus been seriously affected by the changes of site, and it is necessary to mention in this connexion that the thermometers were transferred at the end of March 1933 to another fresh site.

*Minimum Temperature on the Grass.*—The grass minimum thermometer is exposed in the enclosure on two wooden pegs about 4 cm. above grass. It is set at 18h and read at 7h, the reading being entered to the day of observation. The thermometer in use is M.O. 17944/27, and its readings require no correction.

*Cloud.*—From the 1st January, 1931, the recording of cloud-forms at Aberdeen has been in conformity with the definitions laid down in "Instructions for Meteorological Telegraphy" M.O. 191/1 (1930).

The term *Nimbus* is therefore now confined to "the ragged low cloud of bad weather," and the use of the designation "*Nimbo-stratus*" has been discontinued.

*Visibility.*—In the subjoined table there is given a list of the objects used for the determination of the degree of visibility, together with their distances and bearings from the observation-point, which may be taken as the roof of the Observatory tower, the N.E. corner thereof being used for the nearer objects.

The range of visibility from the Observatory is somewhat limited by the high ground surrounding the city. From S.E. through S. to N. the distance of the visible horizon is between 2 and 4 miles (4 to 7 km.), but in the N.W. a higher hill, at a distance of 5 miles (8.5 km.), rises above the nearer ridges. To the N.N.E. however there is a clear view of the coast-line as far as Cruden Scaurs, where the coast consists of cliffs over 100 feet high, and is nearly 19 miles (30 km.) distant. From N.N.E. to S.E. there is only the sea-line as horizon, which from the height of the Observatory tower is about 10 miles (16 km.) distant.

Definite objects exist at standard distances from A to H, but from I to M there are no definite objects, though there are adequate identification marks for K and L. Owing, however, to these marks being on the sea-coast, and to the generally clearer visibility to the seaward side of the Observatory, it has been deemed advisable to employ small letter entries for all visibility distances that are not definitely landward estimates. The distances I and J are based upon estimates between other available distances. The 21h observations of weather and visibility are made as a rule not actually at the Observatory, but in the neighbourhood within a radius of one or two miles. Apart from that it has to be remarked that, during darkness when the usual fixed objects cannot be seen, the estimates depend upon personal judgment, and upon the degree of obscuration, and alteration in the colour, of the surrounding lights of the town.

## VISIBILITY OBJECTS AT ABERDEEN.

OBJECT.	DESCRIPTION.	DISTANCE.	BEARING.
A	Steam-pipe on Boiler house .. .. .	26 yards.	N.E.
B	Top of finial at East end of University Library roof ..	55 "	E.S.E.
C	Gate in North wall of Athletics ground .. .. .	110 "	E.N.E.
D	East wall of Athletics ground, and trees along it ..	218 "	E.
E	(i.) Ventilator tops on Sunnybank School .. .. .	550 "	S.W.
	(ii.) Pressure-tube Anemograph pole .. .. .	ca. 550 "	E.
F	Top of Kiln, Seaton Brickworks .. .. .	1,100 "	N.E.
G	(i.) Turret of Salvation Army Citadel .. .. .	1 $\frac{1}{2}$ miles.	S.S.E.
	(ii.) Coastguard watch-tower .. .. .	1 $\frac{1}{2}$ "	N.E.
H	(i.) Girdleness lighthouse-top .. .. .	2 $\frac{3}{4}$ "	S.E.
	(ii.) Springhill House .. .. .	2 $\frac{1}{2}$ "	W.
I (i)	No object. Estimate between Strabathie Hill (3 $\frac{1}{2}$ miles) and Brimmond Hill (5 $\frac{1}{4}$ miles).	(3 $\frac{1}{2}$ ")	N.N.E.
		(5 $\frac{1}{4}$ ")	N.W.
J (j)	No object. Estimate between Brimmond Hill (5 $\frac{1}{4}$ miles) and Sea horizon (10 miles).	(5 $\frac{1}{4}$ ")	N.W.
		(10 ")	E.
K (k)	Sand-patch, mouth of Ythan River .. .. .	12 $\frac{1}{2}$ "	N.N.E.
L (l)	Cruden Scaurs .. .. .	18 $\frac{3}{4}$ "	N.N.E.
M (m)	Cannot see so far. Used when "L" object shows clear detail and colour-differences.		

## IDENTIFICATION NUMBERS OF INSTRUMENTS USED IN 1932.

The following were the instruments actually in use during the year 1932:—

Standard Fortin Barometer .. .. .	M.O. 1149
"    Dry Bulb Thermometer .. .. .	M.O. 1698
"    Wet .. .. .	M.O. 1697
Recording Beckley Rain-gauge .. .. .	2
Control Rain-gauge .. .. .	M.O. 266
Glass for .. .. .	M.O. 1657
Hair Hygograph .. .. .	M.O. 154/27
Campbell-Stokes Sunshine Recorder .. .. .	M.O. 32
Robinson Cup Anemograph .. .. .	M.O. 50
Dines Tube .. .. .	M.O. 1011
Earth Thermometers .. .. .	M.O. 6, M.O. 11
Grass Minimum Thermometer .. .. .	M.O. 17944/27

## Review of Meteorological Results

*Pressure.*—Over the year pressure exceeded the normal by 0.8 mb. February, with an average pressure of 1034.4 mb., was a month of outstanding excess—nearly 24 mb. above the normal—while October, with an average pressure of 1000.7 mb. was slightly more than 10 mb below the normal. April and September showed defects of about 9 mb. and 7 mb. respectively, while August and December had excesses of about 6 mb. The range of pressure during the year was 74 mb.

The mean diurnal inequalities for the months, seasons and year have been analysed harmonically, with the results set out in the accompanying Table. The unit employed for the months is, as before, .01 mb., that for the seasons and the year is .001 mb., and the phase-angles are reduced to Local Mean Time. The average values of the various coefficients for the period 1871-1926, computed by Dr. A. Crichton Mitchell\*, are given for comparison.

\* Diurnal Variation of Pressure and Temperature at Aberdeen, 1871-1926, by A. Crichton Mitchell, D.Sc., Q.J.R. Met. Soc., 1929, p. 197.

The inequality is supposed to be given by the expression :—

$$c_1 \sin(15t^\circ + \alpha_1) + c_2 \sin(30t^\circ + \alpha_2) + \dots$$

$t$  being the time in hours since midnight.

HARMONIC COMPONENTS OF THE DIURNAL INEQUALITY OF ATMOSPHERIC PRESSURE—  
ABERDEEN, LONGITUDE 2° 6' W.

Values of  $c_n, \alpha_n$ , in the series  $\sum c_n \sin(15nt^\circ + \alpha_n)$ ,  $t$  being Local Mean Time reckoned in hours from midnight.

Month and Season.	$c_1$		$\alpha_1$		$c_2$		$\alpha_2$		$c_3$		$\alpha_3$		$c_4$		$\alpha_4$	
	1932	1871-1926	1932	1871-1926	1932	1871-1926	1932	1871-1926	1932	1871-1926	1932	1871-1926	1932	1871-1926	1932	1871-1926
	mb.	mb.	°	°	mb.	mb.	°	°	mb.	mb.	°	°	mb.	mb.	°	°
January ...	.45	.094	319	171	.24	.227	152	151	.18	.130	337	355	.11	.054	196	221
February ...	.07	.156	258	176	.24	.270	133	149	.10	.104	348	355	.03	.026	64	96
March ...	.22	.164	139	158	.27	.295	141	151	.07	.052	341	336	.04	.031	45	35
April ...	.28	.153	135	155	.25	.284	153	151	.04	.019	253	188	.05	.044	6	359
May ...	.08	.098	186	135	.18	.237	147	143	.04	.059	161	163	.01	.022	278	329
June ...	.16	.057	201	104	.19	.219	142	141	.06	.005	151	155	.03	.008	273	331
July ...	.22	.089	112	137	.18	.208	138	144	.06	.068	143	159	.04	.013	314	345
August ...	.09	.112	149	162	.29	.232	132	145	.05	.041	117	167	.04	.029	311	336
September ...	.19	.119	121	146	.25	.287	153	148	.03	.027	84	342	.07	.053	350	339
October ...	.47	.155	232	183	.25	.274	181	149	.05	.075	37	349	.05	.027	33	20
November ...	.44	.132	118	197	.20	.229	168	152	.14	.103	8	354	.02	.014	161	172
December ...	.26	.164	167	169	.29	.211	123	146	.16	.122	356	356	.04	.051	195	204
Arithmetic Mean ...	.24	—	—	—	.24	—	—	—	.08	—	—	—	.04	—	—	—
Year ...	.110	.116	162	163	.227	.247	146	149	.040	.030	3	0	.008	.009	339	340
Winter ...	.038	—	151	—	.232	—	142	—	.140	—	351	—	.037	—	180	—
Equinox ...	.190	—	170	—	.246	—	157	—	.024	—	354	—	.049	—	15	—
Summer ...	.107	—	153	—	.209	—	139	—	.051	—	143	—	.025	—	301	—

Note.—*Winter* comprises the four months January, February, November, December; *Equinox* the months March, April, September, October; and *Summer* May to August.

For the year the phase angles of all the four terms show a close approach to the average. The amplitude of the 24-hour term is almost equal to the average, that of the 12-hour term is somewhat less than the average, that of the 8-hour term is higher than the average, while that of the 6-hour term is almost equal to the average.

February, the month of highest average pressure, shows the smallest amplitude of the 24-hour term, while October, the month with lowest average pressure shows the highest amplitude of that term.

In the 12-hour term the spring maximum of amplitude is not so great as usual, while the autumn maximum, though of normal amplitude, occurs a month earlier than usual. The phase angles are less regular than usual, the largest departures from the averages occurring in October and December; while February and November also depart considerably from the normal.

The most marked feature in the 8-hour term is the strongly marked winter maximum. The change of the phase-angle in autumn is much less sharp than usual.

The 6-hour term conforms well to the normal throughout the year both in amplitude and phase-angle. The autumn maximum in amplitude is well marked.

*Temperature.*—The temperature over the year 1932 was 0.5°A above the normal. This was due chiefly to excesses in the winter months, January being 2.7°A, December 2.3°A, and February 1.7°A above the average. April was 1.3°A and October 1.0°A below normal. March was the coldest month of the year, though its average temperature was slightly above normal, and April was almost as cold as February. August, with an excess of 1.0°A was the warmest month of the year.

*Rainfall.*—The total rainfall for the year was 813 mm., which represents an excess of 65 mm. over the normal. The distribution of the rainfall throughout the year was very variable and, except in March, showed marked agreement with the pressure variations. February, with its very high pressure, had only 8 mm.—a deficiency of 44 mm. below the normal; October, with its very low pressure, had the large total of 169 mm., which was 93 mm. above the normal for that month. March, with 104 mm., an excess of 43 mm. over the normal—was the second wettest month, though its average pressure was a little higher than normal. With the exception of March and January, which latter month was almost normal in both pressure and rainfall, the months of excess pressure were months of deficient rainfall, while those of deficient pressure had excess rainfall.

*Relative Humidity.*—The present year resembles 1931 in respect of its high relative humidity, which exceeded the normal by over 2 per cent. The average value for the year was 82 per cent., whereas the normal value is 79·8 per cent. Every month had a relative humidity in excess of its normal value except June, whose value of 76·7 per cent. was 1·5 per cent. below the normal. Excesses of between 3 and 4 per cent. were shown in March, July, October and December, while May was 4·7 per cent. above normal. The year 1932 did not show any appreciable relation between the relative humidity and either the rainfall or the incidence of sunshine.

*Sunshine.*—The year 1932 was again a dull one, its average of 28 per cent. of the possible being only 1 per cent. higher than that of 1931, and, therefore, still 3 per cent. below the normal value. January, with 32 per cent. of the possible, had an excess of 11 per cent. over the normal, September with 36 per cent. was 4 per cent. above normal, and December with 19 per cent. had a small excess of 2 per cent. Of the other months, March with only 20 per cent. showed a loss of 12 per cent.; May, with 27 per cent., and July with 23 per cent., had deficits of 10 per cent. and 7 per cent. respectively. The high pressure of February was accompanied by much cloud, which caused a deficit of sunshine to the extent of 6 per cent. of the possible, while the wet month of October resulted in a loss of 5 per cent.

*Wind.*—The average wind velocity for the year was 4·3 m/s, which is exactly the same as that for the previous year. April, with 5·4 m/s, was the windiest month, and August with 3·1 m/s was the quietest month. There was thus a greater range from month to month than in 1931. Only one day of gale was recorded, and that was the 27th November.

*Aurora.*—Aurora was observed on 11 occasions, 7 in the earlier half of the year, 4 in the later half. Dates of occurrence will be found in the General Auroral Table.

*General.*—A dull and wet year with high relative humidity, but slightly warmer than normal. The winter months were markedly warmer than normal, spring and early summer were cool, late summer warm and autumn cool. Of the individual months, January was very warm and very bright; February warm, dull and very dry; March very dull and very wet; April windy, cool and wet; May dull; June dry; July dull and wet; August quiet, warm and rather dry; September wet but rather bright; October cool, dull and exceptionally wet; November dry; December warm, dry and rather bright.



PRESSURE.

Readings in millibars at exact hours, Greenwich Mean Time.

69. Aberdeen: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 26.0 metres.

January, 1932.

Table for Aberdeen in January 1932. Columns: Hour G. M. T., Station Level (1-31), Mean (Station Level), Mean (Sea Level). Rows: Day 1-31. Values in millibars.

70. Aberdeen: H<sub>b</sub> = 26.0 metres.

February, 1932.

Table for Aberdeen in February 1932. Columns: Hour G. M. T., Station Level (1-29), Mean (Station Level), Mean (Sea Level). Rows: Day 1-29. Values in millibars.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours. Greenwich Mean Time.

71. Aberdeen: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 26.0 metres.

March, 1932.

Table for Aberdeen in March 1932. Columns: Hour G.M.T., Station Level (1-25), Sea Level (1-25), Mean (Station Level), Mean (Sea Level). Rows: Days 1-31.

72. Aberdeen: H<sub>b</sub> = 26.0 metres.

April, 1932.

Table for Aberdeen in April 1932. Columns: Hour G.M.T., Station Level (1-25), Sea Level (1-25), Mean (Station Level), Mean (Sea Level). Rows: Days 1-30.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



75. Aberdeen: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 26.0 metres.

Table with 25 columns (1-24 hours, Mean) and 31 rows (Day 1-31). Columns 1-24 are labeled 'mb.' and 'Station Level'. Includes 'Mean (Station Level)' and 'Mean (Sea Level)' rows at the bottom.

76. Aberdeen: H<sub>b</sub> = 26.0 metres.

Table with 25 columns (1-24 hours, Mean) and 31 rows (Day 1-31). Columns 1-24 are labeled 'mb.' and 'Station Level'. Includes 'Mean (Station Level)' and 'Mean (Sea Level)' rows at the bottom.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

PRESSURE.

Readings in millibars at exact hours, Greenwich Mean Time.

77. Aberdeen: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 26.0 metres.

September, 1932.

Table for Aberdeen pressure readings in September 1932. Columns include Hour G.M.T., Station Level (1-24), and Mean (Station Level/Sea Level). Rows list hourly readings for days 1 through 30.

78. Aberdeen: H<sub>b</sub> = 26.0 metres.

October, 1932.

Table for Aberdeen pressure readings in October 1932. Columns include Hour G.M.T., Station Level (1-24), and Mean (Station Level/Sea Level). Rows list hourly readings for days 1 through 31.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

79. Aberdeen: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 26.0 metres.

Table with 25 columns (1-24) and 30 rows (Day 1-30). Includes 'Station Level' and 'Sea Level' mean values.

80. Aberdeen: H<sub>b</sub> = 26.0 metres.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea Level' mean values.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

84. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulb above ground) = 12.5 metres.

January, 1932.

Table with 24 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly readings in degrees absolute. Row 0 is labeled 'Hour G. M. T.'. Row 31 is labeled 'Mean'. The data shows temperature fluctuations between approximately 74.4 and 85.4 degrees absolute.

85. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

February, 1932.

Table with 24 columns (1-24) and 29 rows (Day 1-29). Columns 1-24 represent hourly readings in degrees absolute. Row 0 is labeled 'Day'. Row 29 is labeled 'Mean'. The data shows temperature fluctuations between approximately 74.4 and 85.4 degrees absolute.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.





TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

88. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulb above ground) = 12.5 metres.

May, 1932.

Table with 25 columns (1-24) and 1 Mean column. Rows represent hours of the day (1-31) and a Mean row. Each cell contains a temperature reading in degrees absolute.

89. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

June, 1932.

Table with 25 columns (1-24) and 1 Mean column. Rows represent hours of the day (1-30) and a Mean row. Each cell contains a temperature reading in degrees absolute.

NOTE:- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

90. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulb above ground) = 12.5 metres.

July, 1932.

Table with 24 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly readings from 1 AM to 24 AM. A 'Mean' row is at the bottom. Each cell contains a temperature value in degrees absolute.

91. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

August, 1932.

Table with 24 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly readings from 1 AM to 24 AM. A 'Mean' row is at the bottom. Each cell contains a temperature value in degrees absolute.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.





TEMPERATURE: ANNUAL MEANS OF HOURLY VALUES.

From readings in degrees absolute at exact hours, Greenwich Mean Time.

96. Aberdeen: North Wall Screen on Tower : H<sub>t</sub> 12.5 metres.

1932.

Table with 25 columns (Hour 1-24, Noon, Mean) and 12 rows (Jan-Dec, Year). Values are in degrees Celsius.

TEMPERATURE

RELATIVE HUMIDITY: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic changes.

97. Aberdeen: North Wall Screen on Tower : H<sub>t</sub> 12.5 metres.

1932.

Table with 25 columns (Month, Mean, Hour 1-24) and 12 rows (Jan-Dec, Year). Values are in degrees Celsius.

ABSOLUTE EXTREMES OF TEMPERATURE FOR EACH DAY.

Maximum and Minimum for the interval 0h. to 24h., Greenwich Mean Time.

98. Aberdeen:

North Wall Screen on Tower : H<sub>t</sub> 12.5 metres.

1932.

Table with 22 columns (Month, Day, Max, Min) and 31 rows (Days 1-31). Values are in degrees Celsius.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

† See page 21.



RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

101. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulbs above the ground) = 12.5 metres.

March, 1932.

Table with 25 columns (1-24) and 25 rows (1-24) for March 1932. Columns 1-24 represent hours of the day. Row 1 is labeled 'Day.' and contains values from 68 to 94. Row 25 is labeled 'Mean' and contains values from 85.2 to 81.9. A 'Vapour Pressure' column is on the far right with values from 5.7 to 7.1. A 'Vapour Pressure \*' row is at the bottom with values from 6.9 to 7.1.

102. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

April, 1932.

Table with 25 columns (1-24) and 25 rows (1-24) for April 1932. Columns 1-24 represent hours of the day. Row 1 is labeled '1' and contains values from 100 to 99. Row 25 is labeled 'Mean' and contains values from 85.0 to 79.3. A 'Vapour Pressure \*' row is at the bottom with values from 6.8 to 7.1. An 'Hour G. M. T.' row is at the very bottom with values from 1. to 24.

\* Computed from the mean temperatures and the mean relative humidity.

† Mean of the column.

‡ Mean of the row.





RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

105. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulbs above the ground) = 12.5 metres.

July, 1932.

Table for July 1932 showing relative humidity percentages (1-24 hours and Mean) and vapour pressure (mb.) for Aberdeen. Includes columns for hour, percentage values, and mean values.

106. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

August, 1932.

Table for August 1932 showing relative humidity percentages (1-24 hours and Mean) and vapour pressure (mb.) for Aberdeen. Includes columns for hour, percentage values, and mean values.

\* computed from the mean temperatures and the mean relative humidity.

† mean of the column.

‡ mean of the row.



RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

109. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> (height of thermometer bulbs above the ground) = 12.5 metres.

November, 1932.

Table 109: Relative Humidity data for Aberdeen in November 1932. Columns include Hour G.M.T., relative humidity percentages (1-24), Mean, and Vapour Pressure (mb.).

110. Aberdeen: North Wall Screen on Tower: h<sub>t</sub> = 12.5 metres.

December, 1932.

Table 110: Relative Humidity data for Aberdeen in December 1932. Columns include Hour G.M.T., relative humidity percentages (1-24), Mean, and Vapour Pressure (mb.).

\* Computed from the mean temperatures and the mean relative humidity.

† Mean of the column.

‡ Mean of the row.

HUMIDITY: ANNUAL MEANS FROM HOURLY VALUES.

For exact hours, Greenwich Mean Time.

111. Aberdeen: North Wall Screen on Tower:  $h_t$  (height of thermometer bulbs above the ground) = 12.5 metres.

1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10	11	Noon	13	14	15	16	17	18	19	20	21	22	23	24	Mean.
Relative Humidity.	85.8	86.3	86.6	86.8	86.6	86.2	85.1	83.5	81.1	79.4	77.3	76.2	75.2	75.2	76.0	77.0	78.3	80.3	81.3	82.7	83.9	84.9	85.9	85.9	82.0
Vapour Pressure in millibars*.	mb. 8.8	mb. 8.7	mb. 8.7	mb. 8.7	mb. 8.7	mb. 8.7	mb. 8.8	mb. 8.9	mb. 9.0	mb. 9.0	mb. 9.2	mb. 9.3	mb. 9.2	mb. 9.3	mb. 9.3	mb. 9.3	mb. 9.3	mb. 9.3	mb. 9.2	mb. 9.0	mb. 9.0	mb. 9.0	mb. 8.9	mb. 8.9	mb. 9.0

\*Computed from the mean temperature and mean relative humidity.

RELATIVE HUMIDITY: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change.†

112. Aberdeen: North Wall Screen on Tower:  $h_t$  = 12.5 metres.

1932.

Month	Mean	Hour 1.	G.M.T. 2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	13	14	15	16	17	18	19	20	21	22	23	24.
Jan.	83.2	+0.9	+1.9	+2.7	+0.9	+1.5	+2.9	+2.1	+3.2	+1.9	+1.2	+0.3	-1.9	-3.9	-2.8	-4.5	-2.4	-1.6	-1.1	-2.5	-2.1	-1.0	+0.5	+2.2	+1.5
Feb.	79.8	+3.6	+4.2	+4.3	+3.9	+3.0	+3.0	+3.1	+3.5	+1.2	-0.6	-4.0	-5.5	-7.4	-7.3	-7.6	-5.8	-4.1	+0.1	+1.3	+1.0	+2.0	+3.0	+2.9	+2.4
Mar.	81.9	+3.5	+3.7	+4.3	+5.5	+4.7	+5.8	+5.4	+3.3	+0.9	-0.5	-6.4	-6.9	-8.7	-8.0	-7.5	-6.4	-4.1	-1.2	-0.2	+1.3	+2.7	+2.7	+3.9	+3.6
Apr.	79.3	+5.7	+5.5	+6.4	+5.4	+5.6	+5.4	+4.3	+0.1	-4.3	-6.3	-7.0	-6.3	-7.6	-6.7	-5.5	-6.0	-5.7	-2.9	-0.6	+2.1	+3.0	+4.3	+5.5	+5.6
May.	83.5	+5.0	+4.9	+4.7	+4.7	+4.8	+3.7	+1.4	-0.5	-2.3	-3.4	-5.1	-5.2	-5.4	-5.0	-6.3	-6.2	-5.2	-3.2	-0.5	+1.5	+2.4	+4.1	+4.8	+6.2
June.	76.7	+7.1	+7.6	+7.8	+7.9	+7.1	+4.5	+2.2	-0.8	-4.5	-5.3	-6.7	-7.7	-7.2	-6.8	-6.3	-5.6	-4.7	-4.1	-3.1	-0.1	+2.4	+3.6	+5.7	+6.8
July.	82.1	+5.7	+5.4	+6.3	+6.4	+6.5	+4.9	+3.2	+1.1	-1.1	-2.8	-3.7	-5.7	-7.5	-7.5	-6.7	-6.0	-6.0	-5.1	-3.4	-1.0	+1.8	+4.4	+5.8	+5.2
Aug.	80.8	+6.0	+6.5	+5.9	+6.8	+7.0	+6.0	+2.5	-0.4	-3.6	-6.8	-8.3	-9.6	-9.6	-9.4	-6.3	-5.1	-3.1	-1.7	-0.9	+2.5	+3.7	+5.2	+6.6	+6.0
Sept.	81.9	+5.0	+7.1	+7.3	+7.3	+6.2	+5.2	+5.0	+3.0	-0.8	-5.2	-8.6	-9.6	-9.5	-11.2	-8.4	-7.1	-5.9	-0.8	+2.1	+2.5	+3.7	+3.2	+4.6	+4.8
Oct.	85.4	+3.3	+2.5	+2.0	+3.3	+3.4	+3.6	+2.4	+0.8	-1.4	-2.4	-3.6	-5.0	-6.3	-7.5	-5.4	-4.0	-1.9	+1.3	+1.2	+1.9	+2.6	+2.7	+3.0	+3.3
Nov.	83.4	+0.2	+1.5	+2.1	+3.1	+3.4	+3.7	+3.1	+3.0	+1.8	+0.8	-2.3	-4.6	-5.1	-5.1	-5.0	-3.3	-1.6	-1.1	-0.2	+0.5	+0.9	+1.1	+1.7	+1.5
Dec.	85.6	+0.1	+1.3	+1.7	+2.4	+2.8	+2.7	+2.6	+1.7	+1.4	+0.7	-0.8	-1.5	-2.4	-3.6	-2.5	-2.1	-0.9	-0.2	-0.9	-1.8	-0.7	0.0	+0.1	0.0
Year.	82.0	+3.8	+4.4	+4.6	+4.8	+4.7	+4.3	+3.1	+1.5	-0.9	-2.6	-4.7	-5.8	-6.7	-6.7	-6.0	-5.0	-3.7	-1.7	-0.6	+0.7	+2.0	+2.9	+3.9	+3.9

† See page 21.

RAINFALL: ANNUAL TOTALS OF HOURLY VALUES.

Amounts, in millimetres, durations, in hours, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

113. Aberdeen:  $H_t$  = 11.4 metres + 0.6 metres.

1932.

Hour G. M. T.	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to Noon	Noon to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24	0 to 24
Amount.	mm. 25.7	mm. 33.7	mm. 33.3	mm. 33.0	mm. 42.4	mm. 30.6	mm. 34.8	mm. 42.4	mm. 38.2	mm. 34.7	mm. 34.2	mm. 34.8	mm. 38.7	mm. 34.7	mm. 32.2	mm. 30.6	mm. 30.0	mm. 31.5	mm. 37.6	mm. 38.2	mm. 29.6	mm. 24.0	mm. 28.2	mm. 39.7	mm. 812.8
Duration.	hr. 36.6	hr. 33.7	hr. 39.6	hr. 41.6	hr. 40.9	hr. 39.2	hr. 41.0	hr. 40.4	hr. 38.9	hr. 28.1	hr. 28.4	hr. 23.3	hr. 26.4	hr. 23.4	hr. 25.7	hr. 25.0	hr. 27.7	hr. 30.8	hr. 33.9	hr. 33.0	hr. 31.4	hr. 34.4	hr. 33.7	hr. 32.3	hr. 789.4

114. Aberdeen:

NOTES ON RAINFALL.

1932.

Notable Falls of the Year. There was no fall during the year sufficient in quantity to call for special remark. The greatest intensities recorded were 5 mm. in 6 minutes during thunderstorms on June 26 and August 12, and 10 mm. in 12 minutes on the latter date.

Dry Periods. Jan. 22 - Feb. 7. 15 days with only a trace of rain.  
 Feb. 16 - 23. 8 days with 0.1 mm.  
 Feb. 26 - Mar. 5. 9 days with 0.2 mm.  
 June 9 - 23. 15 days with only a trace.  
 ( In the 26 days from May 31st to June 25th, only 2.8 mm. of rain fell).  
 Aug. 20 - 29. 10 days with 0.1 mm.

Wet Periods. Mar 21 -31. 11 days with 83 mm.  
 Sept. 7 - 11. 5 days with 48 mm.  
 Oct. 8 - 10 52 mm. in 3 days. Of this total 32 mm. fell on the 8th.  
 October was exceptionally wet, 169 mm. being recorded during that month.





Amounts in millimetres, for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

119. Aberdeen:  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 11.4 metres + 0.6 metres.

May, 1932.

Table for Aberdeen May 1932 showing rainfall in mm for each hour of the month. Includes a 'Day' column with symbols (dots, triangles, asterisks) and a 'Sum.' row. Total duration is 76.5 hours.

120. Aberdeen:  $H_r$  = 11.4 metres + 0.6 metres.

June, 1932.

Table for Aberdeen June 1932 showing rainfall in mm for each hour of the month. Includes a 'Sum.' row and a 'Total Duration' row. Total duration is 12.9 hours.



RAINFALL.

Amounts in millimetres, for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

121. Aberdeen: Hr (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) + hr (height of receiving surface above ground) = 11.4 metres + 0.6 metres.

July, 1932.

Table with 25 columns for hourly rainfall (0-1 to 23-24) and 2 columns for duration (0-24). Rows include Day (1-31), Sum., and Total Duration.

122. Aberdeen: Hr = 11.4 metres + 0.6 metres.

August, 1932.

Table with 25 columns for hourly rainfall (0-1 to 23-24) and 2 columns for duration (0-24). Rows include Day (1-31), Sum., and Total Duration. Includes some entries marked 'pp'.

Amounts in millimetres, for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

123. Aberdeen: H<sub>r</sub> (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) + h<sub>r</sub> (height of receiving surface above ground) = 11.4 metres + 0.6 metres. September, 1932.

Table for Aberdeen rainfall in September 1932. Columns include Hour (G.M.T.), 0-1 to 24, and Duration (0-24). Rows list days 1-30 and a summary row. Values are in mm. and hr. Summary: 89.6 mm, 59.4 hr.

124. Aberdeen: H<sub>r</sub> = 11.4 metres + 0.6 metres.

October, 1932.

Table for Aberdeen rainfall in October 1932. Columns include Hour (G.M.T.), 0-1 to 24, and Duration (0-24). Rows list days 1-31 and a summary row. Values are in mm. and hr. Summary: 146.1 mm, 146.1 hr.











For periods of sixty minutes, between the exact hours of Local Apparent Time.

135. Aberdeen:  $h_s$  (height of recorder above ground) = 20.7 metres.

September, 1932.

Hour. L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible	
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%
1	--	--	...	...	...	...	...	...	...	...	...	...	...	1.0	.1	...	...	...	1.1	8	
2	--	--	...	...	...	...	...	...	...	.1	.2	...	...	.1	...	...	...	0.4	3		
3	--	--	...	.1	...	...	.3	.5	.4	.4	.8	.9	.6	.8	.6	.2	...	5.5	40		
4	--	--	.2	.5	.5	.8	.9	.7	.7	.9	.8	.3	...	...	...	...	...	6.3	48		
5	--	--	...	...	...	...	.1	.1	...	...	...	...	...	...	...	...	...	0.2	1		
6	--	--	...	...	...	...	...	...	...	...	.1	.6	...	...	.1	...	...	0.8	6		
7	--	--	...	...	.1	.3	1.0	.5	...	...	.7	.3	.3	.3	...	...	...	3.5	26		
8	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	--	--	...	...	...	...	...	...	...	...	.5	.2	.4	.8	...	...	...	1.9	14		
10	--	--	...	...	...	...	.1	.1	.6	.6	.7	.5	.7	.1	.5	...	...	3.7	28		
11	--	--	...	...	.2	.1	.4	1.0	.8	.4	.7	.7	.8	.5	...	...	...	5.6	43		
12	--	--	...	.9	1.0	.9	.9	.7	1.0	.9	.9	.8	.9	.9	.8	...	...	10.6	82		
13	--	--	...	.5	.8	.2	.6	.4	...	...	...	...	...	...	...	...	...	3.0	23		
14	--	--	...	...	...	.8	.9	.9	.9	.6	.9	.9	.9	1.0	.7	...	...	8.5	66		
15	--	--	...	.8	1.0	1.0	1.0	1.0	1.0	.8	1.0	1.0	.3	.1	.1	...	...	9.1	71		
16	--	--	...	.6	.5	.3	.5	1.0	1.0	.4	...	.3	...	...	...	...	...	4.6	36		
17	--	--	...	...	...	...	.1	...	...	.4	.7	.2	...	...	...	...	...	1.4	11		
18	--	--	...	.2	...	.3	.7	1.0	1.0	1.0	1.0	1.0	.8	1.0	.7	...	...	8.7	70		
19	--	--	...	...	...	.1	...	.7	.8	.8	.8	.6	.5	.4	...	...	...	4.7	38		
20	--	--	...	.4	.9	.9	.7	1.0	.6	.9	.9	.5	.5	.1	...	...	...	7.4	60		
21	--	--	...	.3	.9	1.0	1.0	1.0	.9	.9	...	.8	.6	.1	...	...	...	7.5	61		
22	--	--	...	...	.5	.7	.9	1.0	.4	.9	1.0	.5	.1	...	...	...	...	6.0	49		
23	--	--	...	...	...	...	.3	.6	.1	.6	.2	.7	.5	.3	.1	...	...	3.4	26		
24	--	--	...	...	...	...	...	...	...	...	...	...	.1	.4	.1	...	...	0.6	5		
25	--	--	...	.2	.9	.9	1.0	.6	.4	...	.3	.7	.5	.4	...	...	...	5.9	49		
26	--	--	...	...	...	...	...	...	.1	.2	.7	.9	.9	.9	.3	...	...	4.0	34		
27	--	--	...	.2	.8	.9	.5	.4	.8	.6	1.0	.9	.7	.9	.2	...	...	7.9	67		
28	--	--	...	...	...	.1	.2	1.0	.9	.9	1.0	.7	.5	.3	...	...	...	5.6	48		
29	--	--	...	...	.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	.7	...	...	...	9.3	80		
30	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Sum.	--	--	0.2	4.7	8.5	10.9	12.7	15.4	13.7	13.2	15.9	15.0	11.4	11.1	4.3	0.2	--	--	127.2	--	
Mean.	--	--	.01	.16	.28	.36	.42	.51	.46	.44	.53	.50	.38	.37	.14	.01	--	--	4.57	36	

136. Aberdeen:  $h_s$  = 20.7 metres.

October, 1932.

1	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%
2	--	--	...	...	.6	1.0	.6	.5	.7	.7	.7	1.0	.6	.3	...	...	...	...	6.7	58		
3	--	--	...	...	.7	.9	1.0	.6	.3	...	.4	.3	.6	.8	.1	...	...	...	5.7	50		
4	--	--	...	...	.5	.9	1.0	.9	.7	.7	.9	.7	.7	.3	...	...	...	7.2	66			
5	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.1	19		
6	--	--	...	...	...	...	...	...	.1	...	...	...	...	...	...	...	...	...	0.1	1		
7	--	--	...	...	.2	.1	...	...	...	...	...	.2	.1	...	...	...	...	...	0.6	5		
8	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
9	--	--	...	...	...	...	.5	.2	.5	1.0	1.0	1.0	.7	.3	...	...	...	...	5.2	48		
10	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
11	--	--	...	...	...	.4	1.0	.7	1.0	1.0	1.0	.7	.4	.2	...	...	...	...	6.4	60		
12	--	--	...	...	.3	.7	...	...	...	...	...	.2	...	...	...	...	...	...	1.2	11		
13	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
14	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
15	--	--	...	...	...	...	.8	.5	.8	.1	1.0	.3	.2	...	...	...	...	...	1.6	15		
16	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.2	21		
17	--	--	...	...	...	...	...	...	.1	...	...	...	...	...	...	...	...	...	0.1	1		
18	--	--	...	...	.3	.9	.6	.5	.5	.3	.1	...	...	...	...	...	...	...	3.2	31		
19	--	--	...	...	...	...	.1	.1	1.0	.8	1.0	.6	.7	.1	...	...	...	...	4.4	44		
20	--	--	...	...	...	.4	1.0	1.0	1.0	1.0	1.0	.8	...	...	...	...	...	...	7.0	70		
21	--	--	...	...	...	...	.7	.7	.7	.9	1.0	1.0	1.0	.3	...	...	...	...	6.3	63		
22	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
23	--	--	...	...	...	...	.2	.5	1.0	.9	1.0	.7	.4	...	...	...	...	...	5.7	59		
24	--	--	...	...	...	...	.6	1.0	1.0	.5	...	...	...	.1	...	...	...	...	3.2	33		
25	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
26	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
27	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
28	--	--	...	...	...	...	.3	.9	.8	1.0	.6	1.0	.6	.1	...	...	...	...	5.3	57		
29	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	1		
30	--	--	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
31	--	--	...	...	...	...	.1	.1	.5	.7	.7	.6	.1	...	...	...	...	...	2.8	31		
Sum.	--	--	...	...	3.7	6.4	9.5	9.5	12.2	10.3	11.8	9.1	5.7	2.3	0.1	--	--	--	80.6	--		
Mean.	--	--	...	...	.12	.21	.31	.31	.32	.33	.38	.29	.18	.07	.00	--	--	--	2.60	25		
Hour. L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.		



DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

137. Aberdeen:  $h_s$  (height of recorder above ground) = 20.7 metres.

November, 1932.

Hour. L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.		
1	---	---	---	---	...	...	.4	...	...	...	...	...	...	...	---	---	---	---	0.4	7	
2	---	---	---	---	...	...	...	.1	...	...	.3	.4	.4	.3	---	---	---	---	1.5	4	
3	---	---	---	---	...	...	...	...	...	...	.1	.1	...	...	---	---	---	---	0.2	17	
4	---	---	---	---	...	...	...	...	...	...	...	...	.2	...	---	---	---	---	0.2	2	
5	---	---	---	---	...	...	.4	1.0	.8	.7	1.0	.9	1.0	.2	---	---	---	---	6.0	69	
6	---	---	---	---	...	...	...	.3	.7	.8	1.0	1.0	.5	...	---	---	---	---	4.3	49	
7	---	---	---	---	...	...	...	.9	1.0	1.0	1.0	1.0	...	...	---	---	---	---	4.9	57	
8	---	---	---	---	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
9	---	---	---	---	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
10	---	---	---	---	...	...	...	.7	.7	.8	.9	.4	.1	...	---	---	---	---	3.6	43	
11	---	---	---	---	...	...	.2	.9	.8	.7	.8	.7	...	...	---	---	---	---	4.1	49	
12	---	---	---	---	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
13	---	---	---	---	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
14	---	---	---	---	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
15	---	---	---	---	...	...	...	.3	...	...	...	...	...	---	---	---	---	---	0.3	4	
16	---	---	---	---	...	...	...	...	...	...	...	.1	...	---	---	---	---	---	0.1	1	
17	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	...	...	
18	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	...	...	
19	---	---	---	---	...	...	.9	1.0	1.0	1.0	1.0	1.0	.1	---	---	---	---	---	6.0	78	
20	---	---	---	---	...	...	...	...	...	...	...	.2	...	---	---	---	---	---	0.2	3	
21	---	---	---	---	...	...	.3	1.0	1.0	1.0	1.0	1.0	...	---	---	---	---	---	3.2	39	
22	---	---	---	---	...	...	...	...	...	...	...	.1	.8	...	---	---	---	---	0.4	5	
23	---	---	---	---	...	...	.6	1.0	1.0	1.0	1.0	.7	.1	---	---	---	---	---	5.4	72	
24	---	---	---	---	...	...	.6	1.0	1.0	1.0	1.0	1.0	...	---	---	---	---	---	5.6	78	
25	---	---	---	---	...	...	.7	.1	.1	...	...	...	...	---	---	---	---	---	0.9	12	
26	---	---	---	---	...	...	.8	1.0	1.0	.8	1.0	.3	...	---	---	---	---	---	4.9	67	
27	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	...	...	
28	---	---	---	---	...	...	.1	.1	...	...	...	...	...	---	---	---	---	---	0.2	3	
29	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	...	...	
30	---	---	---	---	...	...	...	...	.1	.2	.1	...	...	---	---	---	---	---	0.4	6	
Sum.	---	---	---	---	...	0.7	6.3	9.2	9.1	9.6	10.2	9.2	1.5	...	---	---	---	---	55.9	---	
Mean.	---	---	---	---	...	.02	.21	.31	.30	.32	.34	.31	.05	...	---	---	---	---	1.86	23	

138. Aberdeen:  $h_s$  = 20.7 metres.

December and Year 1932.

1	---	---	---	---	...	...	.7	1.0	1.0	1.0	1.0	.7	...	---	---	---	---	---	---	5.4	76
2	---	---	---	---	...	...	.4	1.0	1.0	1.0	1.0	.6	...	---	---	---	---	---	---	4.0	57
3	---	---	---	---	...	...	.6	.7	.7	.9	.6	.1	...	---	---	---	---	---	---	2.9	41
4	---	---	---	---	...	...	.2	...	...	...	...	...	...	---	---	---	---	---	---	0.2	3
5	---	---	---	---	...	...	.4	1.0	.7	1.0	1.0	.5	...	---	---	---	---	---	---	4.6	67
6	---	---	---	---	...	...	...	...	.1	.3	.8	.3	...	---	---	---	---	---	---	1.5	22
7	---	---	---	---	...	...	.6	.9	.5	.9	.2	...	...	---	---	---	---	---	---	3.1	46
8	---	---	---	---	...	...	.4	1.0	.8	.4	.5	...	...	---	---	---	---	---	---	3.1	46
9	---	---	---	---	...	...	.2	.3	...	.3	...	...	...	---	---	---	---	---	---	0.8	12
10	---	---	---	---	...	...	...	...	...	.1	...	...	...	---	---	---	---	---	---	0.1	1
11	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
12	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
13	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
14	---	---	---	---	...	...	.2	.2	...	...	.4	...	...	---	---	---	---	---	---	0.8	12
15	---	---	---	---	...	...	...	...	...	.6	1.0	.5	...	---	---	---	---	---	---	2.1	32
16	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
17	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
18	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
19	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
20	---	---	---	---	...	...	.2	...	...	...	...	...	...	---	---	---	---	---	---	0.2	3
21	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
22	---	---	---	---	...	...	.2	.3	...	.7	.8	...	...	---	---	---	---	---	---	2.0	30
23	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
24	---	---	---	---	...	...	.6	.9	...	.7	.1	...	...	---	---	---	---	---	---	2.3	35
25	---	---	---	---	...	...	.5	1.0	...	1.0	.9	...	...	---	---	---	---	---	---	3.4	52
26	---	---	---	---	...	...	.4	1.0	...	1.0	.4	...	...	---	---	---	---	---	---	2.8	42
27	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
28	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
29	---	---	---	---	...	...	...	...	...	.1	...	...	...	---	---	---	---	---	---	0.1	1
30	---	---	---	---	...	...	...	...	...	...	...	...	...	---	---	---	---	---	---	...	...
31	---	---	---	---	...	...	...	...	...	.1	...	...	.3	---	---	---	---	---	---	0.1	1
Sum.	---	---	---	---	...	...	2.7	7.1	8.2	10.1	8.7	2.7	...	---	---	---	---	---	---	39.5	---
Mean.	---	---	---	---	...	...	.09	.23	.26	.33	.28	.09	...	---	---	---	---	---	---	1.27	19
Annual Totals.	0.2	8.1	27.2	39.7	63.4	78.6	104.8	126.7	133.9	140.0	140.4	123.9	89.0	68.7	48.6	34.7	12.3	0.4	1240.6	---	
Annual Mean.	.00	.02	.07	.11	.17	.21	.29	.35	.37	.38	.33	.34	.24	.19	.13	.09	.03	.00	3.39	28	
Hour. L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	



Averages for periods of sixty minutes centred at the Half hours, Greenwich Mean Time.  
M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 13 metres + 23 metres.

January, 1932.

Table with 26 columns (12-13 to 23-24, Mean, Day) and 31 rows of wind speed data for January 1932.

February, 1932.

Table with 26 columns (12-13 to 23-24, Mean, Day) and 31 rows of wind speed data for February 1932.















Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in metres per second.  
147. Aberdeen: Robinson anemograph from July, 1930.\*  
H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above.

Table with columns: Hour, G. M. T., Day, 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12. Each interval contains wind speed data in m/s.

148. Aberdeen: H<sub>a</sub> = 13 metres + 23 metres.

Table with columns: Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12. Each interval contains wind speed data in m/s.

\* Values of wind speed adjusted as explained in Introduction, P.90.



Direction expressed in degrees from North (E = 90 , S = 180 , W = 270 , N = 360 ) : Speed in metres per second.  
149. Aberdeen: Robinson anemograph from July, 1930.\* H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Table with columns for Hour (G. M. T.), Day, and wind speed/direction for intervals 0-1 to 11-12. Includes a Mean row at the bottom.

150. Aberdeen: H<sub>a</sub> = 13 metres + 23 metres.

Table with columns for Day (1-31) and wind speed/direction for intervals 0-1 to 11-12. Includes Mean and Annual Mean rows.

170 10.5 at 0-1 h. 1st Jan. 1933.

\*Values of wind speed adjusted as explained in Introduction, P.90.

Averages for periods of sixty minutes centred at the Half hours. Greenwich Mean Time. M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 13 metres + 23 metres.

November, 1932.

Table with 14 columns representing time intervals (13-13 to 23-24), Mean, and Day. Each interval contains two rows of wind speed data in m/s.

December and Year 1932.

Table with 14 columns representing time intervals (290 to 150) and Mean. Each interval contains two rows of wind speed data in m/s.

170 10.5 at 0-1 h. 1st Jan. 1933.

151. Aberdeen: Ha = 8 metres + 13 metres

1932.

Table with 25 columns (Day, Jan.-Dec., Max. in a Gust., Time of Gust.) and 31 rows (Day 1-31). Contains wind speed data for Aberdeen.

\*See note in introduction p.90.

DISTRIBUTION OF WIND SPEED: EXTREME VELOCITIES AS RECORDED BY THE DINES TUBE AND ROBINSON CUP ANEMOGRAPHS.\*

152. Aberdeen: Ha = (8 metres + 13 metres. Tube Anemograph) / (13 metres + 23 metres. Cup Anemograph)

1932.

Table with 3 main sections: Month, Distribution of Wind Speed (7 sub-columns), and Extreme Velocities (4 sub-columns). Rows for months Jan-Dec and a Yearly total.







157. Aberdeen.

March, 1932.

Table for Aberdeen, March 1932. Columns include Day, Cloud Forms (7h, 13h, 15h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 and Mean Cloud Am't.

158. Aberdeen.

April, 1932.

Table for Aberdeen, April 1932. Columns include Day, Cloud Forms (7h, 13h, 15h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-30 and Mean Cloud Am't.



161. Aberdeen.

Table for July 1932, Aberdeen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Amt. row at the bottom.

162. Aberdeen.

Table for August 1932, Aberdeen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Amt. row at the bottom.

163. Aberdeen.

Table for September 1932, Aberdeen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Amount row at the bottom.

164. Aberdeen.

Table for October 1932, Aberdeen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Amount row at the bottom.

165. Aberdeen.

November. 1932.

Table for Aberdeen, November 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

166. Aberdeen.

December. 1932.

Table for Aberdeen, December 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes Mean Cloud Am't. and Mean Annual Cloud Am't. rows at the bottom.



Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

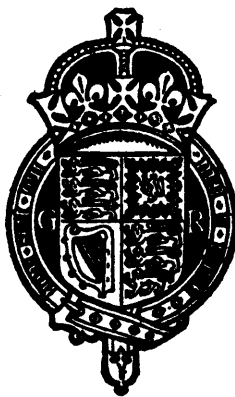
Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

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ESKDALEMUIR

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Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE  
1934

## ESKDALEMUIR OBSERVATORY.

Latitude	..	..	..	..	55° 19' N.
Longitude	..	..	..	..	3° 12' W.
G.M.T. of Local Mean Noon				..	12h. 13m.

## "Heights in metres above Sea-Level."

Barometer	..	..	..	..	237.3
Rain-gauge	..	..	..	..	242.0
Dines Tube Anemograph	..			..	250

## "Heights in metres above ground"

Thermometer Bulbs	..	..	..	..	0.9
Sunshine Recorder	..	..	..	..	1.5
Dines Tube Anemograph	..			..	15
Beckley Rain-gauge Rim	..			..	0.4

## INTRODUCTION.

## HISTORICAL.

Early in the twentieth century the increasing artificial magnetic disturbance at Kew Observatory, Richmond, due to the westward extension of the electric tramway system from London, made desirable the establishment of a magnetic observatory in a locality unlikely to be affected, at least for a number of years, by electric power or traction system. A committee of the Royal Society of London selected a site in the parish of Eskdalemuir, Dumfries-shire, for the new observatory. The nearest towns or industrial centres are Langholm and Lockerbie, distant approximately 16 and 18 miles (26 and 29 km.) by road, and there is no point of railroad within 9 miles (14km.) of the Observatory. Installation of the instrumental apparatus commenced in the summer of 1908, the Observatory at that time forming a part of the then recently established National Physical Laboratory.

Although the Observatory was established primarily in the interests of the study of terrestrial magnetism the field of geophysical work undertaken has been considerably wider and has included, almost from the beginning, meteorology, atmospheric electricity (mainly atmospheric potential gradient), and seismology. In the earliest years Milne, Wiechert, Omori, and Galitzin seismographs were in operation at Eskdalemuir, but seismological observations ceased in October, 1925, when the three-component installation of Galitzin seismographs was transferred to Kew Observatory. In 1910, when the majority of the various initial difficulties had been overcome, Eskdalemuir passed from the control of the National Physical Laboratory to that of the Meteorological Office. In consequence of this change the meteorological work assumed increased importance, and from the beginning of 1914 the Observatory has served as a telegraphic reporting station of the Meteorological Office.

Summaries of the results of observations made in 1909-10 were published in the Report of the Observatory Department of the National Physical Labora-



tory, 1909-10. The results for subsequent years are included in the publications mentioned in the Preface to the present volume.

#### SITE.

Eskdalemuir Observatory, some  $3\frac{1}{2}$  miles ( $5\frac{1}{2}$  kilometres) north-north-west of Eskdalemuir Parish Church in the county of Dumfries-shire, is situated on a rising shoulder of moorland which is bounded on the east by the road leading north to Ettrick and Selkirk, on the west by the small Davington Burn, and at the southern extremity by the small hamlet of Davington.

The hillside in the immediate vicinity of the Observatory slopes generally from the north-west to south-east. The mean height above sea level of the Observatory site is about 800 feet (244 metres). Cassock Hill, slightly more than a mile distant to the north-west is 1,205 feet (367 metres), while the bench mark at Davington School,  $\frac{1}{4}$  mile (0.4 km.) to south-east, is 699 feet (213 metres) above M.S.L. To the east the ground slopes fairly rapidly to the valley bottom, the level of the Ettrick road at a point about  $\frac{1}{4}$  mile (0.4 km.) east of the underground magnet house being 682 feet (208 metres). The River White Esk is rather less than  $\frac{1}{2}$  mile (0.8 km.) to the east. Immediately beyond the river, and almost due east of the Observatory, Dumfedling Hill rises to a height of nearly 1,200 feet (366 metres) above M.S.L. Some 4 or 5 miles (8 km.) to the north is a high ridge, following approximately the boundary between Dumfries-shire and Selkirkshire, the highest point of which is Ettrick Pen (north-north-west) 2,200 feet (670 metres) above M.S.L. Rather more than half a mile (0.8 km.) to the west, and beyond Davington Burn, the ground rises to 1,040 feet (317 m.), and reaches nearly 1,200 feet (366 m.) half a mile (0.8 km.) further on. To the south and south-south-east the Observatory commands a view of the White Esk Valley as far as Hart Manor, 4 miles ( $6\frac{1}{2}$  km.) distant, and beyond that the upper slope of Cauldkine Hill, about 10 miles (16 km.) distant, is visible. The surrounding country is bare and wild and there are but few trees to relieve the monotony of the grass-covered hills and moorland.

Within the Observatory grounds the soil is peaty and in many places is more or less boggy at all seasons. Some two feet, or less, below the surface a clay-like substance containing soft rock is encountered. The local geological formation is described as "rock of the Tarannon Llandoverly series traversed by igneous dykes."

Photographs, site plan, and a brief description of the Observatory will be found in the Introduction to "The Observatories' Year Book," 1928.

#### METEOROLOGY.

The elements dealt with in the following tables are:-Atmospheric pressure, air temperature, humidity, rainfall, sunshine, solar radiation, wind speed and direction, earth temperature and minimum temperature on the grass. There is also a diary of cloud and weather.

#### Notes on Instruments.

Brief descriptions of the recording instruments and of the methods of tabulating the records, with notes on the information contained in the Tables, are given in the General Introduction to the Tables. The following particulars, which refer specially to Eskdalemuir, are to be regarded as ampli-

fyng the information contained therein. References to full accounts of other instruments used at Eskdalemuir appear below.

The standard Fortin barometer was at the makers for repair until July 27th and the former standard Kew pattern mercury barometer was used as standard throughout the year. Its position was close to that of the Fortin barometer in the north-west ground floor room which has a small daily range of temperature.

To ascertain the effect on the Kew barometer of tapping it before taking readings, a comparison was instituted between the Kew and the Fortin barometers as soon as the latter was returned from repair. The barometers were read six times a day, and on alternate days the Kew barometer was tapped before reading, while on the other days it was not tapped. The mean differences for more than 300 observations were:

Kew - Fortin.

Kew barometer tapped .....	+0.09 <sub>6</sub> mb.
Kew barometer not tapped .....	+0.04 mb.

Thus the Kew barometer reads slightly higher than the Fortin, the mean effect of tapping the Kew barometer being to increase the difference by 0.05<sub>6</sub> mb. The magnitude of the tapping effect depends on the barometric tendency as is shown by the following analysis of the observations. The figures in brackets denote the numbers of readings.

	<u>Difference (Kew - Fortin).</u>		
	<u>Bar.rising.</u>	<u>Bar.steady.</u>	<u>Bar. falling.</u>
	mb.	mb.	mb.
Kew barometer tapped	+0.08(41)	+0.09(94)	+0.13(30)
Kew barometer not tapped	-0.02(34)	+0.06(90)	+0.09(15)
Difference(tapped-not tapped)	+0.10	+0.03	+0.04

As may be expected the Kew barometer lags behind the Fortin, the difference being greater when the barometer is rising than when it is falling. This may be accounted for by the meniscus of the mercury in the Kew barometer tending to flatten-out when the level is falling fairly rapidly.

The photographic mercurial barograph is situated in the east room of the underground magnet house. The daily range of temperature to which the instrument is subject is normally less than 0.05°C., the annual range being about 4°C. The scale value of the records is 1 millimetre on the paper = 0.85 millibar, and the time scale is 9.1 millimetres on the paper = 1 hour.

As in former years, records of pressure were also obtained from (a) a Dines float barograph<sup>1</sup>, and (b) a Richard barograph, pen recording, the records of which are changed weekly.

"Temperature."— The photographic thermograph and the standard mercurial thermometers, dry bulb and wet bulb, are situated in a wooden hut, provided with louvered sides and double roof, which is some 200 feet (60 m.) north-north-east of the main building. The installation is similar to that de-

<sup>1</sup> Q.J.R. Meteor. Soc., Vol. LV, pp. 37-53, 1929.

scribed on p.10, except that a special enclosure is provided inside the hut to accommodate the optical and photographic arrangements.

The scale values of the thermograph records are  $1^{\circ} \text{A.} = 3.064 \text{ mm.}$  and  $2.438 \text{ mm.}$  on the paper for the dry and wet bulb records respectively, while the time scale is  $1 \text{ hour} = 9.250 \text{ mm.}$

Auxiliary records of temperature are obtained from one or more instruments of the bimetallic type described in the "Meteorological Observers' Handbook". These instruments are situated in the hut which contains the photographic thermograph.

"Humidity."—In addition to the dry and wet bulb thermograph described above there is a Richard hair hygograph which is situated in the louvered hut.

As is stated in the General Introduction, the records from this instrument are utilised when the wet bulb reading does not exceed  $273^{\circ}\text{A.}$  On the records obtained in 1932 a change of 10 per cent. in relative humidity is represented by about 0.8 centimetre, the time scale being  $1 \text{ hour} = 11.4 \text{ mm.}$

"Rainfall."—The recording instrument is a Beckley self-registering rain-gauge, which is described on page 11. The time scale of the record is  $1 \text{ hour} = 9.24 \text{ millimetres}$  on the paper and the rain scale has a magnification of 3.35. The instrument has been in use at Eskdalemuir since 1908 and was originally installed at Fort William in July, 1890.

The conical part of the gauge funnel is surrounded by a cylindrical copper casing lined with asbestos on the inner side and of diameter equal to that of the funnel, viz. 11.27 inches (28.6 cm.). Within the enclosure so formed is a gas jet, and a flame of suitable dimensions is maintained, as circumstances dictate, to melt snow which may be collected.

The gauge is surrounded by a circular turf wall or dyke, the top of which is on a level with the rim of the gauge; the external and internal diameters of the dyke being 11.5 feet (3.5 m.) and 7 feet (2 m.) respectively.

A standard 8-inch (20.3 cm.) rain-gauge is situated some 24.5 feet (7.5 m.) to the east of the Beckley gauge and is surrounded by a turf dyke of similar dimensions. Readings of amounts of rain received in the 8-inch gauge are made at 7h and 18h G.M.T. It is customary to adjust the indications of the recording gauge to agree with the readings of the standard check gauge.

Until May 14 and again after November 8, 1928 auxiliary autographic records of precipitation were obtained by means of a Hellman-Fuess snow-gauge. In the former period the exposure of the instrument was as described on p.142 of "The Observatories' Year Book," 1927. Since then the gauge has been in a somewhat deeper pit 8 feet (2.4 m.) wide and almost due north of the 8-inch standard gauge, the pit being surrounded by a low wall of earth and turf—the top of the wall being approximately level with the rim of the gauge. The records so obtained are used only in the event of failure or uncertainty of the Beckley autographic record.

"Sunshine."—The record of sunshine is obtained from a Campbell-Stokes recorder described on p. 11.

The recorder is fixed on a stone pillar and has a reasonably free exposure,

the chief obstacles being hills to east and west. The elevation of hills between  $70^\circ$  and  $110^\circ$  east of south varies from  $2.5^\circ$  to  $5^\circ$ , while between  $50^\circ$  and  $135^\circ$  west of south the high ground varies in elevation from  $3^\circ$  to  $4.4^\circ$ , being generally about  $3.5^\circ$ . As sunshine can be recorded when the sun is  $3^\circ$  above the horizon only in the most favourable circumstances, it appears that the loss of record occasioned by the neighbouring high ground is of relatively small extent and is confined mainly to a possible defect of record at the beginning of the day during a few weeks centred about the equinoxes.

"Solar Radiation."—Measurements of the intensity of radiation received from the sun by a surface which is normal to the line drawn from the instrument to the sun are effected by means of an Ångström compensating pyrheliometer.<sup>1</sup> The intensity of radiation is expressed in milliwatts per square centimetre (lmw. per sq. cm. =  $0.01435$  gramme calorie per sq. cm. per minute). In addition, the value is given of the function  $(p/p_0) \sec Z$ , in which  $p$  is the barometric pressure at the observatory in millibars at the time of the observation,  $p_0$  is 1000 millibars, and  $Z$  is the zenith distance of the sun. This affords a measure of the mass of atmosphere which the solar radiation has had to penetrate before reaching the earth. Entries in the column headed "Sky" are intended to show the presence or absence of haze, mist or cloud in the direct path of the solar radiation recorded.

"Wind."—A Dines tube anemograph, furnished with direction recorder, is situated in the main building. The vane-head is 15 metres above a tangent plane to the slope of the hillside and approximately 7 metres above the general level of the roof of the building.

The anemograph vane in use throughout 1932 was introduced in August, 1925. It differs from that formerly in use in that the greatest dimension of the fin is vertical instead of horizontal, and that the cross-section of the fin is of aerofoil shape. A twin-lever direction recorder has been in use since June, 1925. In this instrument a pen is carried by each of two pivoted arms, upper and lower. A projection from each arm engages with a flange of a dual helix cut in a short cylinder (of vertical axis) which rotates with the vane, being connected thereto by a steel tube 1.5 cm. in external diameter.

Apart from the surrounding hills, the exposure of the vane-head is tolerably free in all directions save to the west where at a distance of some 130 feet (40 m.) is a rather large building, of which the height is somewhat greater than that of the main building. With winds from nearly due west the direction records show markedly greater turbulence than with other winds.

"Earth Temperature."—Readings have been made at 9h G.M.T. of the earth temperature at nominal depths of one foot and four feet below the surface of the grass lawn a few yards south of the thermometer hut. The thermometers and the method of exposure are of the standard type described in the "Meteor-

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<sup>1</sup>For descriptions see "The Observer's Handbook", 1921 ed., Meteorological Office, London; "Astrophysical Journal", Vol IX, 1899; "Actes de la société royale des Sciences d'Upsal", 1893; also "Geophysical Memoirs", No. 21 (1923), Meteorological Office, London.

Following some structural repairs to the observatory building, the pyrheliometer was re-erected in an embrasure of the tower in June 1930.

ological Observers' Handbook". The depths of the thermometer bulbs below the grass-covered surface of the ground are 30cm.(1 foot) and 122 cm. (4 feet). In December, 1930 two more thermometers, graduated in degrees absolute, were installed at 1 foot and 4 feet respectively alongside the other two thermometers graduated in degrees Fahrenheit, the former being retained as spares. The Fahrenheit pair were replaced as standards by the absolute pair at the beginning of 1931.

"Minimum Temperature on the Grass"—The thermometer used for readings of grass minimum temperature is of the spirit type with index, and when exposed, between 18h and 7h G.M.T., is supported at a height of one or two inches (4cm) above close-cropped grass a few metres from the louvred thermometer hut.

"Visibility".—The descriptions of the selected visibility objects, together with the distances and bearings from the point of observation, are given in the subjoined table. Auxiliary objects and guide criteria are given in brackets. Certain of the nearer objects may be identified by reference to the photographs and site plan. Unless otherwise stated, the distances and bearings are with reference to certain of the windows on the upper floor of the main building.

The situation of the Observatory and the nature of the immediate surroundings allow of only a very limited choice of objects. The objects A to D are situated mainly to the north, while the more distant objects are towards south to south-east, i.e., down valley. Four miles or so to the north of the Observatory the hills rise in places to rather more than 2,000 feet above sea level and at times visibility in this direction is distinctly less than towards south. On other occasions the hills to the north are visible, but nearer objects down the valley are invisible owing to valley mist. With the exception of the cottage at Finglandshiel, and Cauldkine Hill, the objects more distant than D are below the level of the Observatory. There are no objects at distances which approximate sufficiently closely to the standard distances for objects H, J, and K. When it is estimated that the range of visibility is such that objects at these standard distances would be visible the corresponding small letter entries are made in the Diary of Cloud and Weather. The estimates of visibility in the dark depend largely on the judgment of the observer. There are no lights other than those in the Observatory buildings and in two cottages within a radius of one mile.

VISIBILITY OBJECTS AT ESKDALEMUIR.

Object		Distance	Bearing
A	(i) White wooden post .. .. .	25 yards	NE.
	(ii) Twigs on trees nearest the boundary wall in front of the main building .. .. .	25 "	S.
	(iii) Small thermometer screen-viewed from steps facing the back entrance to the main building	26 "	NNE.
B	(i) Theodolite pillar .. .. .	55 "	N.
C	(ii) Chimney (or cowl) on the large thermometer screen .. .. .	60 "	NE.
D	Posts and shafts on underground magnetograph house .. .. .	107 "	N.
E	Standards on Observatory water reservoir .. .. .	217 "	NNW.
	(i) Church and Manse, Davington .. .. .	550 "	SE.
F	(ii) (Davington Farm House) .. .. .	470 "	SSE.
	(i) Chimneys at Burncleuch .. .. .	1180 "	SSE.
G	(ii) (Cottage at Finglandshiel) .. .. .	1550 "	NE.
	Trees at Garwaldwaterfoot .. .. .	2160 "	SSE.
H (h)	(Lower slope of Raeburn Hill) .. .. .	2 miles	SSE.
I	Hart Manor .. .. .	4 "	SSE.
J (j)	(Cauldkine Hill, 1,478 feet, near Westerkirk; not clearly visible) ..	10 1/2 "	SSE.
K (k)	(Cauldkine Hill, 1,478 feet, near Westerkirk; plainly visible) ..		
L (l)	No objects available.. .. .		
M (m)			

Note:—The descriptions of auxiliary objects and guide criteria are given in brackets.

## IDENTIFICATION NUMBERS OF INSTRUMENTS IN USE IN 1932.

Standard Barometer — (Kew pattern Barometer)	M.O.	1320
Standard Dry Bulb Thermometer .. .. .	M.O.	19123
Standard Wet Bulb Thermometer .. .. .	M.O.	1695
Hair Hygrograph .. .. .	M.O.	59
Recording Beckley Rain-gauge .. .. .		4
Control Rain-gauge .. .. .	M.O.	336/30
Control Rain-gauge, glass for .. .. .	M.O.	1568
Campbell-Stokes Sunshine Recorder .. .. .	M.O.	99
Angström compensating Pyrheliometer .. .. .		116
Dines Tube Anemograph .. .. .	M.O.	1032
Grass Minimum Thermometer .. .. .	M.O.	23002
Earth Thermometer, 1 Ft. .. .. .	M.O.	24009
" " 4 Ft. .. .. .	M.O.	4

## CORRECTIONS TO INSTRUMENTS IN USE IN 1932

The corrections to the instruments in use during 1932 are given below. In all cases the corrections are those given in the certificate of examination issued by the National Physical Laboratory. The corrections here given have been applied. The date on which each of the instruments mentioned was brought into use is given for purposes of reference.

Kew pattern Barometer, M.O. 1320, July 14, 1931.\*

at	920	940	960	980	1000	1020	1040	1060	mb.
	-0.4	-0.3	-0.2	-0.1	-0.1	-0.0	+0.1	+0.1	

attached thermometer: + 0.1 at 290° A.

Dry Bulb Thermometer, M.O. 19123. January 27th, 1919.

at	263	268	273	278	283	288	293	298	303°A.
	+0.2	+0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1

Wet Bulb Thermometer, M.O. 1695. May 17th, 1930.

at	253	263	273	283	293	303	313°A.
	0.0	0.0	-0.1	0.0	0.0	0.0	0.0

\* These corrections, if applied to readings of the barometer, would bring the readings into agreement with the atmospheric pressure, provided the instrument were at a temperature of 273°A. (0°C.) and in latitude 45°.

Grass Minimum Thermometer, M.O. 23002 at	253	263	273	283	293	303°A.
	-0.1	-0.1	0.0	0.0	0.0	-0.1

Earth Thermometer 1 Ft. M.O. 24009 - No corrections.  
4 Ft. M.O. 4, from 260 to 310°A., + 0.1.

## NOTE ON THE REDUCTION OF BAROMETER READINGS.

The Fortin barometer, M.O. 1716/27 by Casella, London, has been used as the standard since 1st January, 1929. Before this date a Kew pattern mercury barometer M.O. 1320 by J. Hicks, London, was the standard instrument from 16th December, 1913. The latter was re-introduced on July 14, 1931 when the Fortin barometer developed a leak and was sent away for repair. It remained in use throughout 1932.

1. "Reduction to Pressure at Station Level".—The corrections for index error (including those for capacity and capillarity) as given in the N.P.L. certificates are reproduced above. The corrections for temperature for the barometer are those given in the "International Meteorological Tables" as appropriate to a Fortin barometer. The adoption of such corrections for a Kew pattern barometer, although technically incorrect, would not lead to appreciable systematic error in actual practice. The table of corrections to the barometer readings on this account for various readings of the attached thermometer is as set out in "The Observatories' Year Book," 1928.

The corrections for the variation of gravity as obtained from the expression

$$g = 980.617 (1 - 0.00259 \cos 2\lambda) (1 - 5z/4E)$$

where  $\lambda$  = latitude

z = height of the station.

E = earth's radius

are as follow:-

at reading of	900	920	940	960	980	1000	1020	1040	mb.
Correction	+0.78	+0.80	+0.81	+0.83	+0.85	+0.87	+0.88	+0.90	mb.

2. "Reduction to Mean Sea Level".— The correction to reduce pressure at station level to pressure at sea level is calculated according to the usage of the "International Meteorological Tables" with certain minor modifications which are set out in "The Observatories' Year Book", 1928. In the same volume is given a copy of the Table actually in use.

## NOTES ON THE METEOROLOGICAL SUMMARIES.

The number of years for which meteorological results are available is insufficient as yet to yield a completely representative set of normal values. Although certain meteorological data are available for 1909 and 1910 it is

only since 1911 that the reductions have been made in accordance with an approximately uniform plan. In the following notes the normal or average values referred to are for the period 1911 to 1926, unless otherwise stated.

"Pressure".—As was the case throughout the British Isles the mean pressure for the year was above normal, the increase being 1.7 mb. Considerable deviation occurred among the individual months, and the increase was due chiefly to the decidedly high mean pressures of February, June and August. The extreme instantaneous values recorded were 1018.6 mb. on January 26, and 948.0 on January 6. The greatest and least mean daily values are 1017.6 mb. on January 26, and 952.2 on January 10. The largest value of the range during a calendar day is 30.8 on November 27. The mean value of the absolute daily range of pressure varies between 10.9 mb. in October, and 4.0 mb. in June. The annual mean value of the daily range is a little below normal.

"Pressure (Diurnal Variation)".—In the mean diurnal inequality for each month except January there are two maxima, in the late forenoon and usually an hour or two before midnight, and two minima, in the early forenoon and afternoon. In all months, except January, February and November, the night maximum of the representative inequalities for the years 1911-20 is the larger. In 1932 the principal maximum occurred at night in all months, except January, February, March and October. The principal minimum in the representative inequalities is in the afternoon except in February, March, August and November, but in 1932 the principal minimum falls in the early forenoon in April, July, August, September, October and December. Compared with the mean diurnal inequality for 1911-20 (<sup>1</sup>) the values of the mean inequality for the year 1932 are algebraically greater from 9h to 22h and less from 23h to 8h. In other words, relatively speaking, in 1932 the afternoon trough is diminished, while the forenoon and night crests and the early morning trough are enhanced.

The results of the harmonic analysis of the monthly and seasonal mean diurnal inequalities for 1932 are given in the accompanying table. For purposes of comparison the corresponding data (<sup>1</sup>) derived from the mean inequalities for the period 1911-20 are also given. In computing the Fourier coefficients for 1932 the unit employed was .001 mb. Although for 1932, as for recent years, the phase angles are given to the nearest 1°, this course is scarcely justified, at least for the third and fourth components, by the character of the data from which the harmonic coefficients for the months and seasons of a single year are computed. The phase angles  $\alpha_1$  etc. given in the table below refer to Local Mean Time, whereas in the corresponding tables for 1922 and 1923 the phase angles refer to Greenwich Mean Time.

As is usually the case the amplitude and phase of the 24-hour term fluctuate irregularly from month to month. The ratio of the mean of the twelve monthly values of  $c_1$  to the value of  $c_1$  for the year as a whole considerably exceeds unity.  $c_1$  is noticeably high for January, October and November, low for February and August. The value of  $c_2$  for the equinox is nearly equal to the corresponding normal, those for summer, winter and year being

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(<sup>1</sup>) "On the Diurnal Variation of Atmospheric Pressure at Eskdalemuir and Castle O'er, Dumfries-shire," by A. Crichton Mitchell, D.Sc., "Quarterly Journal of the Royal Meteorological Society. Vol. I, No. 210, April, 1924.



higher. The variation in the 8-hour term from month to month is fairly normal the amplitude being largest in winter months and least at the time of equinoctial phase transition.

HARMONIC COEFFICIENTS OF THE DIURNAL INEQUALITY OF ATMOSPHERIC

PRESSURE—ESKDALEMUIR, LONGITUDE 3° 12' W.

Values of  $c_n, a_n$  in the series  $c_n \sin(15nt + a_n)$ ,  $t$  being Local Mean Time reckoned in hours from midnight.

Month and Season	C <sub>1</sub>		C <sub>1</sub>		C <sub>2</sub>		C <sub>2</sub>		C <sub>3</sub>		C <sub>3</sub>		C <sub>4</sub>		C <sub>4</sub>	
	1932	1911-20	1932	1911-20	1932	1911-20	1932	1911-20	1932	1911-20	1932	1911-20	1932	1911-20	1932	1911-20
Jan. . . . .	mb. .50	mb. .094	° 315	° 346.4	mb. .28	mb. .235	° 139	° 151.6	mb. .11	mb. .125	° 5	° 345.3	mb. .08	mb. .046	° 210	° 213.9
Feb. . . . .	.06	.118	283	215.1	.33	.273	150	138.1	.12	.083	339	341.2	.03	.042	108	67.7
Mar. . . . .	.10	.128	62	186.3	.41	.304	154	145.3	.03	.053	12	335.0	.04	.051	18	24.5
Apr. . . . .	.18	.205	133	92.3	.25	.299	151	154.8	.03	.022	107	156.3	.06	.045	353	355.7
May. . . . .	.15	.225	68	52.7	.29	.270	153	147.4	.08	.075	159	160.1	.03	.035	319	330.1
June. . . . .	.15	.152	45	53.9	.26	.234	141	146.1	.08	.084	167	160.6	.03	.018	311	325.7
July. . . . .	.22	.171	125	69.4	.26	.211	145	141.2	.08	.077	139	155.8	.04	.023	318	300.0
Aug. . . . .	.04	.114	122	114.6	.32	.239	151	147.7	.04	.057	135	157.2	.07	.047	327	330.8
Sept. . . . .	.28	.121	124	87.7	.30	.313	147	151.6	.02	.012	82	110.7	.05	.050	337	344.7
Oct. . . . .	.43	.110	227	76.0	.29	.315	168	159.5	.08	.060	47	8.2	.04	.041	32	32.9
Nov. . . . .	.41	.125	116	183.5	.27	.242	168	168.1	.12	.101	356	9.2	.01	.015	58	146.2
Dec. . . . .	.26	.137	170	97.1	.24	.213	148	146.9	.12	.124	359	4.2	.05	.067	188	212.8
Arithmetic Mean	.23	.142	...	...	.29	.262	...	...	.08	.073	...	...	.04	.040	...	...
Year . . . . .	.068	.085	134	90.8	.288	.260	151	150.1	.030	.020	38	41.7	.017	.016	327	341.9
Winter . . . . .	.015	.038	187	165.4	.274	.236	151	150.9	.113	.106	355	355.5	.032	.023	187	189.1
Equinox . . . . .	.135	.108	166	103.9	.311	.306	155	152.8	.037	.021	56	4.4	.045	.044	2	8.9
Summer . . . . .	.116	.153	88	67.2	.279	.238	147	145.8	.069	.074	150	158.5	.040	.030	319	324.3

Note.—"Winter" comprises the four months January, February, November, December.

"Equinox" the months March, April, September, October.

"Summer" the months May to August.

"Temperature".—The mean temperature, 280.19°A. (44°·9F.) for the year 1932 is slightly higher than the normal value. The extreme temperatures recorded during the year were 298.7°A. (78°·3F.), on August 11 and 264.9°A. (17°·4F.), on January 26 and March 12. January 26 with mean daily temperature of 270.9°A. (28°·2F.) was the coldest day of the year. According to the mean daily temperature August 11 with 291.2°A. (64°·8F.) was the hottest day of the year. The minimum temperature was 273.0°A. (32°·0F.), or less, on 108 days, 66 being in the first four months of the year. There was only one "ice-day" i.e., a day with maximum temperature below 273.0°A.

The values of the absolute range of temperature within a calendar month vary between 24.8°A. (44°·6F.) in August and 13.5°A. (24°·3F.) in December.

"Humidity".—As is mentioned in the General Introduction, owing to a change in the hygrometric tables used the results from 1926 onward are not

strictly comparable with those of earlier years. Compared with the mean values for 1911-25 the chief departures of the values of mean relative humidity in 1932 are - 5 in April and June, and + 2 in January, July and December. The mean relative humidity 82.9 per cent., for the year, is less than that for the years 1911-25, whilst the mean vapour pressure, 8.4 mb. is slightly greater than the mean for the years 1922-31. The extreme daily mean values of relative humidity and vapour pressure were 98.5 per cent. on January 20 and 23, 51.8 per cent. on April 26, 17.2 mb. on July 9, 4.2 mb. on March 8. The lowest hourly reading of relative humidity was 29 per cent. on April 27 and June 16.

"Precipitation."—1932 was the second wettest year experienced since records commenced, the total amount of rainfall, 1811.4 mm. (71.31 in.), being 14.8 per cent. more than the mean for the period 1911-31. The most outstanding months were December with 339.5 mm. (13.37 in.) and January with 309.2 mm. (12.17 in.). The driest month was February with 4.6 mm. (0.18 in.) or 3 per cent. of normal. This was the driest month on record. The greatest amount recorded during a calendar day was 65.4 mm. (2.57 in.) on December 17. This fall exceeded the record of 63.8 mm. on November 3, 1931. There were 149 days on which either no precipitation was recorded or in amounts too small to be measured, precipitation amounting to 0.2 mm. or more was recorded on 217 days; to 1.0 mm. or more on 171 days; to 20.0 mm. or more on 24 days.

Snow or sleet fell on 57 days, but on no day from May 25 to October 9 inclusive. Observations of "snow lying" at 7h number 14, 5 of which were in March and 4 in April. There were no large falls of snow.

"Sunshine."—The year's total duration of bright sunshine, 1157.7 hr. represents 26 per cent. of the theoretically "possible" duration; whereas the average percentage of "possible" for the years 1911-31 is 26.8. As regards the percentage of "possible" February was the sunniest, and November and December the least sunny months of 1932. In all, there were 84 days without sunshine, 17 of these being in January, and 16 in December, and 80 days with 50 per cent. or more of the "possible" sunshine. The day with most sunshine was June 16, with 15.4 hr. January 30 with 7.9 hr. (94 per cent.) represents the highest value of the percentage of "possible" sunshine.

"Wind."—The mean speed for the year, 5.1 m/s (11.4 mi/hr) was equal to the normal. In comparison with the normal values for individual months the mean speeds for January and December exhibit the most considerable excess, and those for February and March the greatest relative deficiency. There were 72 hours of gale force (mean speed greater than 17.1 m/s), 42 being in January and 29 in December. The highest gust of the year, 31 m/s (70 mi/hr) occurred on January 13, the highest hourly speed, 21 m/s (47 mi/hr) on January 16, and highest mean daily speed, 17.9 m/s (40.0 mi/hr) on December 17. The quietest day was November 19, with a mean speed of 0.7 m/s.

The predominant direction of the wind was between south and south-west in the six months January, July, August, September, November and December, while in February, May and June it was northerly. February was conspicuous by a dearth of winds from a westerly direction. In March, April and October there was no outstanding wind direction.

"Grass Minimum Temperature".—There were 116 occasions of ground frost (i.e., grass minimum temperature not greater than 272.1°A. or 30°·4 F.), but none of these occurred between June 22 and August 24. The lowest grass min-

imum temperature was 262.1°A. (12°·4 F.) on February 15. The mean grass minimum temperature for each of the months February, March and April is less than 273.0°A. (32°·0 F.).

"Cloud and Weather".—(A) The mean amount of cloud observed at the six hours of observation is 7.6, which is about the normal. August has the largest mean amount, 8.6, and February has the smallest, 6.2. The largest mean amount for an observational hour is 9.0 at 7h in August; the least is 5.6 at 21h in February. For the year as a whole there was most cloud at 13h and least at 21h. In ten months the mean cloud amount was least at 21h, and in six months it was greatest at 7h. There were no days throughout the year on which no cloud was seen at the normal hours of observation. On 53 days the amount 10 was recorded at every hour of observation.

(B) Thunder was heard on 9 days, while there were observations of solar halo on 10 days, of lunar halo on 2 days, and of aurora or auroral glow on 11 days.

(C) The numbers of occasions on which the range of visibility was estimated to be (1) not greater than 500 metres (550 yards), corresponding with the entries X to E, and (2) at least 20 kilometres (12½ miles), corresponding with the entries k, l, m, are summarized below. The limitations to which the estimates of visibility are subject are mentioned on p. 155. It is to be noted that the group (1) above consists of the occasions which are held to merit the description as "fog, moderate, thick, or dense", while the entries k, l, m, denote "very good or excellent visibility".

There were fewer occasions of fog and more of estimates k, l, and m than in 1931. Fog was most frequent in January and December, but entirely absent (at the standard hours of observation) in April and June. There were 102 estimates of m, visibility 50 km. (31 mi) or more, distributed among 50 days. 57 of the occasions were associated with increasing barometric pressure, and 77 with winds from west-south-west through north to north-east.

		NUMBER OF OCCASIONS OF—													
		VISIBILITY X TO E						VISIBILITY k, l, m.							
1932		7h	9h	13h	15h	18h	21h	Total	7h	9h	13h	15h	18h	21h	Total
	Jan.	3	-	1	2	3	4	13	8	10	9	9	4	6	46
	Feb.	-	-	-	-	-	1	1	17	18	23	21	17	15	111
	Mar.	1	-	-	-	-	2	3	17	19	21	22	15	15	109
	Apr.	-	-	-	-	-	-	0	21	21	19	25	23	19	128
	May.	1	-	-	-	-	-	1	16	18	20	22	21	16	113
	June	-	-	-	-	-	-	0	19	23	23	26	26	21	138
	July	-	-	-	-	-	2	2	15	18	20	23	25	15	116
	Aug.	1	-	-	-	-	-	1	14	19	25	25	19	15	117
	Sept.	1	1	-	-	-	1	3	14	14	20	21	20	15	104
	Oct.	1	2	-	-	-	-	3	16	16	22	24	13	13	104
	Nov.	1	-	-	-	-	1	2	8	9	13	15	10	6	61
	Dec.	1	2	1	2	1	3	10	4	8	11	11	10	9	53
	Year	10	5	2	4	4	14	39	169	193	226	244	203	165	1200

## ATMOSPHERIC ELECTRICITY.

## Notes on the Instruments.

Autographic records of atmospheric electrical potential gradient were obtained by means of an electrograph of the Kelvin water-dropper type, the potential at the water-jet being registered by a Dolezalek quadrant electrometer. In all essential details the electrograph arrangements, the method of making scale tests and the method of reducing the autographic curve readings to potential gradient in the open were as described in "The Observatories' Year Book," 1928, pp. 160-161. Insulation tests were carried out each day, using an eye-reading method. The system was charged, and the fall in potential during a two minutes interval was measured by noting the change in position of the spot of light on a scale placed in front of the recording drum.

The scale value of the photographic record obtained by means of the Dolezalek electrometer used in conjunction with the water-dropper remained at about 2.2 volts per mm. until the end of September. Owing to readjustments to the electrometer, the scale value was reduced to about 2.07 volts per mm. from October 1 to the end of the year. The number of determinations of the reduction factor (i.e., the ratio of the potential at one metre above the ground in the open to the potential at the water-jet) was about six per month, each determination being based on fifteen or more readings (at intervals of half a minute) of the potential in the open. The values of the monthly reduction factor finally adopted for 1932 were obtained by a smoothing process, the adopted value for a given month being  $\frac{a + 2b + c}{4}$ , where a, b, c, are the unsmoothed monthly mean factors for the three successive months centred in the given month.

All determinations of scale value and reduction factor were obtained with a particular Wulf quartz-thread electrometer. This instrument was calibrated on a number of occasions during the year by means of a high tension battery, the potentials of which were measured by a potentiometer and standard cell. The calibration used for the determination of scale values of the electrograph and reduction factors throughout the year was the average of three calibrations, all in close agreement, made in February, March and April. According to the scale value adopted for the Wulf electrometer in 1932, the instrument was about 3 per cent. less sensitive than in 1931.

## IDENTIFICATION NUMBER OF INSTRUMENT USED IN 1932.

Wulf bifilar electrometer .. .. . 3040

## Notes on the Tables and Results.

As far as possible an electrical character figure is assigned to each day and values of potential gradient are assigned for 2-3h, 8-9h, 14-15h and 20-21h G.M.T. of all days, while values for all hours are assigned on days classified as 0a, 1a, or 2a. The character figures are given in Table 268, the significance of these symbols being as follows:—

0, denotes a day during which from midnight to midnight no negative potential was recorded.

- 1, denotes the existence of negative potential at one or more times during the same period, but with a total duration of less than three hours.
- 2, denotes negative potential extending in the aggregate over three hours or more during the same period.
  - a, denotes that within the 24 periods of 60 minutes for which an estimate of the mean potential gradient has to be made in the process of tabulation there was in no case a range of potential gradient in the open exceeding 1,000 volts per metre.
  - b, denotes that, during the same period, a range of 1,000 volts or more per metre was reached in one hour at least but in fewer than six hours.
  - c, denotes that, during the same period, a range of 1,000 volts or more per metre was reached in at least six hours.

Table 265 contains the values of electrical potential gradient at 2-3h, 8-9h, 14-15h and 20-21h G.M.T. daily commencing January 1, 1932; the value for a given hour represents the mean for the period of 60 minutes between exact hours, instead of centering at the exact hour, as has been done in previous years. Blanks indicate that the trace was in some way defective. If it is possible to assign an approximate value of the potential gradient on such days, this value is given in brackets. The reduction factors used in converting the potential at the water-jet to potential gradient in volts per metre, in the open, are also given.

In Table 266 are given, for 0a days, (1) the mean diurnal inequalities for the months, seasons and year, (2) particulars of the number of days and of the non-cyclic changes and (3) the corresponding mean values of potential gradient. The inequalities, or the mean values, for the year and seasons are the means of the inequalities or means respectively, for the appropriate months.

Corresponding data for 1a and 2a days combined appear in Table 267.

It should be noted that, in these tables, "Winter" denotes the four months January, February, November, December; "Equinox" the four months March, April, September, October; and "Summer" the four months May to August.

In addition to the electrical character for each day, Table 268 contains the daily, monthly and annual values of duration (in hours and tenths) of negative potential gradient. On 7 days of defective record when negative potential may have occurred dashes are entered; the sign of the gradient has been assumed positive during periods of defective record in which no precipitation was observed. If precipitation was recorded for less than an hour during such defective periods an approximate value of the duration of negative potential for that hour has been assigned, and the total for the day given in brackets. When, during highly oscillatory gradients, there was uncertainty as to the times of changes of sign, half of the total duration of

doubtful sign was accounted negative. The total duration of negative potential gradient in each month and the average daily duration are entered in the lower part of the table. For the 359 days of assignable duration of negative potential gradient the total number of hours was 809·8 as compared with 760·8 in 1931; an average of 2·26 hours per day, as against 2·13 hours per day in 1931.

Following the practice adopted in 1923 the mean values of potential gradient given in Table 265 are of two kinds, viz., (a) the mean of all the positive values of potential in the column and (b) the algebraic mean derived from all days on which all four hours were represented. The mean values for the month, as derived from the (a) and (b) values respectively, are shown in the last line, and the means for the year are given at the foot of the December table. It is to be expected that the mean derived from the values at 2-3h, 8-9h, 14-15h and 20-21h, on a sufficiently large number of days, will approximate closely to the mean value derived from all hourly values of all the days.

The (a) mean exceeds or is equal to the (b) mean in all months of the year, except January and February, and is exceeded by the mean value on Oa days, in all months. The general tendency is for the 1932 values to be lower than those of 1931, this being the case in seven months for both the (a) mean and the (b) mean.

Annual mean values for recent years, derived by giving equal weight to the twelve monthly means, of the (a) and the (b) means and of the means for Oa days are as follow:—

					Oa	(a)	(b)
					v/m.	v/m.	v/m.
1922	..	..	..	..	257	225	182
1923	..	..	..	..	278	235	159
1924	..	..	..	..	236	214	157
1925	..	..	..	..	284	243	209
1926	..	..	..	..	249	201	177
1927	..	..	..	..	259	223	193
1928	..	..	..	..	237	219	150
1929	..	..	..	..	276	240	216
1930	..	..	..	..	247	211	194
1931	..	..	..	..	243	205	197
1932	..	..	..	..	223	198	190

The highest value of the (a) mean occurs in March. The (b) mean is also high in March but the highest value is in February. The mean value of Oa days is highest in February, being 282 volts per metre.

Noteworthy occasions of high potential gradient were as follow:—

- (i) March 6d 20h 15m to 7d 1h 0m. High potential gradient occurred during slight drifting snow, but with a clear sky. The gradient

remained above 600 v/m and the upper limit of registration (900 v/m) was exceeded for about two hours. Previously the gradient had been high and oscillatory during snowfall.

- (ii) March 9d 19h 40m to 10d 1h 18m. With snow lying and a clear sky the potential gradient remained above 540 v/m, the upper limit of registration (950 v/m) being exceeded at times.
- (iii) May 7d 17h 10m to 18h 45m. During rain followed by snow the upper limit of registration (1120 v/m) was exceeded during practically the whole period.
- (iv) November 19d 21h 35m to 20d 1h 45m. This was a period of fog. The potential gradient remained above 600 v/m, the average for the entire period being about 850 v/m.
- (v) November 30d 19h 15m to 21h 55m. During fog the potential gradient remained above 720 v/m, and exceeded 1080 v/m for nearly two hours.
- (vi) December 13d 7h 20m to 17h 0m. With a partially clouded sky, fog developed towards the middle of the period. The potential gradient remained above 600 v/m, exceeding 1100 v/m at times.

The following were the noteworthy occasions of continuous negative potential gradient:—

- (i) January 15d 18h 45m to 16d 3h 35m. During a period of continuous rain the potential gradient remained negative, the lower limit of registration (-860 v/m) being exceeded for a considerable part of the time.
- (ii) October 21d 23h 55m to 22d 8h 45m. During considerable rain the lower limit of registration (-950 v/m) was exceeded for four hours.
- (iii) October 30d 16h 50m to 23h 40m. The lower limit of registration (-950 v/m) was continuously exceeded for over three hours. Rain fell continuously at first, becoming intermittent later.
- (iv) December 2d 1h 20m to 9h 5m. During a period of continuous rain the potential gradient remained below -950 v/m for an aggregate of 6 hours. The lower limit was exceeded continuously for a period of four hours twenty minutes.
- (v) December 16d 7h 25m to 18h 5m. Continuous moderate rain fell at first and became heavy later. The potential gradient remained below -970 v/m for nearly seven and a half hours.

On the following occasions long periods of negative potential gradient were broken by short excursions to the positive side:—

- (i) January 1d 0h 45m to 6h 55m. Sleet fell early in the period changing to rain. Except for one very short excursion to +220 v/m during the rain, the potential gradient was negative and for most of the time was less than -820 v/m, the lower limit of registration.

- (ii) January 2d 17h 25m to 3d 9h 30m. Rain fell continuously during this period and the potential gradient was negative throughout except for one momentary excursion to the positive side when the gradient reached +130 v/m. After 3d 9h 30m apart from several short periods of small positive potential gradient, negative potential gradient persisted until 16h 35m, rain falling continuously throughout.
- (iii) January 9d 13h 40m to 10d 0h 5m. Apart from a short excursion to the positive side lasting 8 minutes during which the highest potential gradient reached was only +30 v/m, the gradient was below -840 v/m for nearly the whole period. Sleet fell early in the period changing to continuous moderate rain, and later to continuous heavy rain.
- (iv) January 16d 18h 50m to 17d 4h 14m. Highly oscillatory for half an hour at the beginning the potential gradient remained negative with a mean value of about -800 v/m for nine hours, except for four brief excursions to the positive side. Continuous rain fell throughout.
- (v) March 22d 1h 30m to 11h 45m. Rain fell continuously throughout. The continuity of negative potential was broken by a period of about thirty minutes duration, during which several excursions were made to the positive side, in one of which the gradient exceeded +1180 v/m. For an aggregate time of six hours the potential gradient was less than -940.
- (vi) December 17d 16h 55m to 18d 3h 5m. This was a period of continuous negative potential gradient except for two short excursions to +50 v/m and +300 v/m respectively. Continuous rain fell throughout.

Although there are considerable irregularities in the mean diurnal inequalities of potential gradient on 0a days for individual months, the principal maximum is in the late evening in every case. The mean inequalities for the two seasons, winter and equinox, vary considerably from the normals for 1911-21. In the mean diurnal inequality for winter the chief feature is the increase in magnitude of the midday minimum, which is nearly equal to the principal early morning minimum. For the equinox the departure from normal consists of an increase in magnitude of both the early morning minimum and the late evening maximum. The summer inequality corresponds more nearly to normal, the minimum occurring at 13-14h and the maximum at 20-21h.

#### TERRESTRIAL MAGNETISM.

##### Notes on the Instruments.

The standard magnetographs,<sup>1</sup> which have been in regular use since 1909, are situated in the east chamber of the underground magnet house and until December 31, 1931 they were arranged so as to record changes of the three

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<sup>1</sup>For a general description of magnetograph arrangements see "A Dictionary of Applied Physics," Vol. II, Macmillan, London.



geographical components of terrestrial magnetic force, viz., the north component, N (or + X), west component, W (or - Y), and the vertically downward component, V (or + Z). From January 1, 1932, the instruments recording changes in the north component, N, and the west component, W, were altered so as to record changes in the horizontal component, H, and the magnetic declination, D, respectively.

The instruments for the north and west components were of the Adie bifilar type, in which torsion of the bifilar suspension, of fine tungsten or steel wire, is utilised to bring the magnets into an azimuth approximately perpendicular to the directions of the components whose changes they respectively record. The alteration to the north component instrument consisted in turning the torsion head of the suspension until the magnet was in the azimuth perpendicular to the magnetic meridian. The alteration to the west component instrument consisted in replacing the bifilar tungsten wire suspension with a unifilar suspension of eight strands of unspun silk. In each of these instruments the magnet is about 13.8 cm. in length and is suspended within a copper shell, or frame, of suitable dimensions to ensure that the movements of the magnet are sufficiently damped. To the magnet is rigidly attached a semi-circular plane mirror, immediately beneath which is a fixed mirror of similar form and dimensions. Each magnet and mirror system is contained within a brass cylindrical case, cemented on to a pier and surmounted by a tall bell-jar of glass. Light from a brightly illuminated slit passes through a collimator, is incident upon the two mirrors and after reflection passes along a wooden channel and thence, through a horizontal hemi-cylindrical lens, to photographic paper wound on a clock-driven cylinder. The hemi-cylindrical lens is set in the side of the case containing the recording drums, and matters are so arranged that the beams of light reflected from the two mirrors are brought to a focus by the lens which condenses the two vertical images to two sharply focussed dots on the paper. Hence the record obtained consists of two traces, the one straight and known as the base line, the other curved and representing the angular movements of the suspended magnet, and therefore the changes in the component of terrestrial magnetic force.

The standard instrument for the vertical component is a Watson multiple-magnet balance.<sup>2</sup> In this instrument the magnet system consists of eight magnetised steel rods, each 10 cm. long and 0.2 cm. in diameter, carried by an aluminium frame to the centre of which are attached the moving mirror and also the knife-edge, which bears upon an agate plane and about which the system balances. Copper damping plates and a temperature-compensating device are provided. The recording arrangements are similar to those described above, save that the hemi-cylindrical condensing lens and the recording drum are vertical.

One clock serves to operate the three drums and also makes the time marks at two-hourly intervals.

To the containing case of each instrument is fitted a drying tube containing calcium chloride.

A determination of the azimuth of the magnet of the horizontal component magnetograph is carried out each year by comparing the deflections pro-

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<sup>2</sup>Terrestrial Magnetism, Vol. VI.

duced by an auxiliary magnet with its axis (a) magnetic east-west and (b) inclined at a known small angle to this azimuth. Drift of the magnet system of the Watson balance has been compensated from time to time by adjusting the position of a small control magnet which is fixed vertically to the lower part of the pier on which the balance stands.

The azimuth lines in use in the east chamber are those which were determined in 1914 and of which particulars are given on p. 70 of "Hourly Values from Autographic Records, Geophysical Section," 1913.

The diurnal range of temperature in the east chamber of the magnet house is normally negligible. Temperature is ascertained daily at 9h 30m by the thermometers within the instrument cases. The daily values appear in Tables 272, 276, etc. ; the monthly means of the readings so obtained during 1932, together with the mean values for the years 1911-1931, were as follow:—

## EXCESS OF MEAN TEMPERATURE ABOVE 280°A.

Month.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean 1932	3.2	2.8	2.2	2.1	2.3	3.3	4.7	5.8	6.3	5.8	4.7	3.7
Mean 1911-31.	3.5	2.9	2.5	2.4	2.8	3.6	4.7	5.7	6.3	6.2	5.5	4.5

The annual range of temperature during 1932 was 4°·3 C., the mean range for the previous nineteen years being 4°·2C.

The constants of the standard magnetographs were as follow:—

	Horizontal	Declination	Vertical.
Time scale .. .. . 1 hour =	15.5 mm.	15.5 mm.	15.5 mm.
Time marks .. .. .	Every two hours, beginning at exact hour.		
Error of time mark .. .. .	Not more than $\pm 1$ min.		
Period of vibration, seconds ..	14.3	10.9	7.5
Logarithmic decrement <sup>1</sup> .. ..	.385	.626	-
Angular equivalent of 1 mm. on paper, radians .. .. .	.00032	.00029	.0003
Twist of bifilar suspension ..	33°	-	-
length of bifilar suspension			
Ratio	73	-	-
mean breadth of suspension			
Temperature coefficient, per 1° C.	-9 $\gamma$	-	+26 $\gamma$
Direction of marked pole .. ..	West.	North	-
Mean Azimuth of magnet .. ..	256	346	346°

<sup>1</sup> Log. decr. =  $\text{Log}e^{a_n} - \text{Log}e^{a_{n+1}}$ ; where  $a_n, a_{n+1}$  are the amplitudes of two successive swings on the same side of the zero position.

Determinations of scale value of the standard magnetographs are carried out at intervals of two weeks. The method adopted is that due to Broun. It consists essentially in measuring the photographically recorded deflection of the suspended or pivoted magnet produced by an auxiliary or test magnet situated at a known distance from the deflected magnet. Two sets of relative positions of the deflecting and deflected magnets are used. For the H and D instruments they may be termed the "end on" and "broadside on" positions, the magnet axes being in one plane. In the case of the V instrument the deflecting magnet is vertical; in one position the line joining its centre to that of the deflected magnet is collinear with the axis of the latter, but in the other position it is perpendicular thereto. On a given occasion deflections are produced with the test magnet first on one side of the deflected magnet and then, at the same distance, on the other side, two deflections being produced at each side by reversal of the test magnet. Thus four deflection dots are obtained on the record. The two sets of relative positions of the magnets are employed on alternate occasions. The distance between the deflected and deflecting magnets is 90 cm., and approximate values of the double deflections produced are 47 and 93 mm. for the H instrument, 45 and 89 mm. for the D, and 58 mm. for the V. In deducing the scale values the force producing the deflections on the H and V instruments is determined from the deflection on the D instrument of which the scale value is known from its dimensions. The advantage of the method lies in the fact that by using the same deflecting distance in all cases, the magnetic moment of the test magnet is eliminated.

In the following table are given the scale values, obtained by overlapping means, which were employed in reducing the curve readings for 1932.

SCALE VALUES OF THE MAGNETOGRAPHS ( $\gamma$  per mm. on the paper).

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Horizontal Force ..	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Vertical Force ..	4.27	4.29	4.28	4.27	4.26	4.25	4.25	4.25	4.25	†4.25 3.85	3.80	3.80
Declination ..	1 mm. = 1'.00, or 4.82 $\gamma$											

† 4.25 to 14-15 h on 24th October.  
3.85 from 10-11 h on 25th October.

In addition to the standard magnetographs there are in the west chamber of the underground magnet house auxiliary instruments of the Adie pattern (formerly the standard instruments at Kew Observatory) which also record changes in declination, D, horizontal force, H and vertically downward force, V. Declination records have been obtained since August, 1927, while the vertical force (Adie) and horizontal force records commenced in March and December, 1928. The general arrangements of these instruments are similar to those of the instruments in the east chamber. The declination magnet is suspended by a bundle of silk fibres (the torsion effect of which is negligible) and the scale value of the record is 1'.17 to 1 mm. The vertical force balance consists of a single magnet, of which the dimensions are approximately 13.5 cm. x 2 cm. x 0.2 cm. With the object of reducing loss of record during magnetic storms the scale values of the auxiliary H and V

records are arranged to be considerably greater than those of the standard H and V records. Thus, in 1932 the scale values of the Adie H and V records were approximately 10γ and 6γ per mm. respectively. Determinations of scale value are made by the method due to Broun. To facilitate the necessary adjustment, from time to time, of the azimuth of the horizontal force magnet, magnetic meridian lines (and lines perpendicular thereto) representing a sufficient range of values of declination were laid down in the west chamber in December, 1928, on the basis of simultaneous observations of declination in the chamber and in the east magnetic hut.

The routine absolute observations of the magnetic elements are made in the east magnetic hut; as a rule two complete sets of observations are made every week, but in 1932 a determination of declination was made on nearly every week-day. Declination and horizontal force were determined by means of the Kew pattern unifilar magnetometer (which was employed by Rücker and Thorpe in their magnetic surveys of the British Isles, 1886-1892) placed on Pier No. 5. Determinations of inclination (dip) are made by means of the Schulze inductor placed on Pier No. 6.

For a detailed description of the method of observation with the Kew pattern magnetometer reference should be made elsewhere.<sup>1</sup>

In determining declination four readings are taken, two with the magnet erect, two with the magnet inverted. A correction is applied to the mean of the observations for the observed torsion in the silk suspending fibre. The fixed mark is about one half-mile (0.8 km.) distant from Pier No. 5, and its bearing is taken as 8° 12' 30" west of south.

Determination of the horizontal intensity comprises observations of (a) the time of vibration of the collimator magnet, and (b) the deflection of a mirror magnet by the collimator magnet. Usually deflection observations are made for three distances of the collimator magnet, the order of the positions of the latter being: on east arm at 35 cm., 30 cm., 25 cm.; on west arm at 25 cm., 30 cm., 35 cm. Thus the mean times for the deflections at the three distances are very nearly, if not exactly, identical and the observations are concentrated at the 25 cm. distance. Commencing on April 28, 1931, deflections were observed at 25 cm. only, except on one occasion per month when deflections were observed at the three distances 35 cm., 30 cm., and 25 cm. By observing deflections at 25 cm. only the time of observation is reduced by about 16 minutes. The time interval between the mean times of the vibration and deflection experiments is usually about half an hour. The horizontal intensity, H, is calculated from  $H = \sqrt{mH_V \times H_R/m}$  where  $mH_V$  is obtained from the vibration experiment and  $H_R/m$  from the deflections made at the 25 cm. distance, m being the moment of the collimator magnet.  $H_R/m$  is corrected for the distribution of magnetism in the magnets. From the latter part of 1913 until the end of 1923 the value of this correction, viz.,  $\log_{10}(1 + P/25^2 + Q/25^4)$ , applied to the observations of a given month was a mean value derived from the observations obtained during the seven months including the given month as fourth of the seven. The monthly values so derived show considerable fluctuations, and it is improbable that P and Q actually varied to the extent implied. Commencing in 1924 the value of the correction used in reducing the horizontal intensity observations has been the mean

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<sup>1</sup> Dict. of Applied Physics, Vol. II, p. 532 or Stewart and Gee's "Practical Physics."

of the mean values for each of the years 1917-24, 1917-25, etc. The value employed for 1932 is .00542. The mean value of the logarithm for the years 1917-32 is .00544. If this value had been employed in 1932 instead of .00542, the published values of H and V would be increased by 0.4 and 1.0γ respectively. A variation of .00020 in the value of  $\log_{10}(1 + P/25^2 + Q/25^4)$  corresponds with a variation of about 4γ in the derived value of H.

The values of P, Q, and  $\log_{10}(1 + P/25^2 + Q/25^4)$  for individual years are as follow:—

Year.	P.	Q.	$\log_{10}(1 + P/25^2 + Q/25^4)$ .
1917	+ 6.862	+ 418.9	.00520
1918	+ 7.604	+ 68.6	.00533
1919	+ 9.126	- 603.5	.00563
1920	+ 8.224	- 216.6	.00544
1921	+ 7.978	+ 25.3	.00554
1922	+ 6.607	+ 513.1	.00513
1923	+ 6.371	+ 614.3	.00508
1924	+ 7.899	- 128.6	.00531
1925	+ 8.214	- 261.7	.00538
1926	+ 9.675	- 938.4	.00564
1927	+10.422	-1265.0	.00580
1928	+ 8.713	- 547.2	.00541
1929	+ 9.741	- 917.4	.00571
1930	+ 8.683	- 536.5	.00540
1931	+ 8.765	- 684.6	.00530
1932	+10.445	-1315.5	.00576

The Schulze inductor<sup>1</sup> consists essentially of a coil of insulated wire which can be rotated continuously and rapidly about an axis which coincides with a diameter of the coil. This axis is capable of rotation about a horizontal and vertical axis. The inclination and azimuth of the coil axis are read off on a vertical and a horizontal scale respectively. The windings of the coil are led off from a commutator to a Broca galvanometer. To effect a determination of magnetic inclination, the coil is then rotated steadily at the rate of about 360 revolutions per minute and the inclination of the axis of rotation is adjusted until the galvanometer deflection is the same in magnitude and sign whether the sense of rotation is positive or negative. In this position the rotation axis of the coil coincides with the direction of the earth's field and the inclination to the horizontal may be read off from the vertical circle. Two series of settings are made, one with the vertical circle facing east, the other with the circle facing west.

The base line values of the magnetograph records are deduced from the results of the absolute observations, any of the latter obtained during times of considerable disturbance being excluded.

<sup>1</sup>For descriptions of, and discussion of method of observation with, earth inductors see papers by—

H. Wild. Met. Zeit., 1895, p. 41.

O. Venske. Ber. über die Tät. des Preuss. Met. Inst. in 1924, p. 91 (and references given therein).

N.E. Dorsey. Terr. Mag., Vol. 18, p. 1, 1913.

In the case of horizontal force and declination, the equivalent value of the mean curve ordinate, corresponding to the period of observation, is subtracted from the observed value of the element to give the deduced base line value of the record. Similarly, by the combined use of the curve ordinates at the times of the inclination and horizontal force observations the value of H corresponding to the inclination observations is obtained and thence the base value for V. The base line values finally adopted are obtained from a curve drawn smoothly through points given by the deduced values, due allowance being made for discontinuities in the records

Some of the absolute determinations of D, I and H are summarized in the subjoined table, and the values of m, the moment of collimator magnet 60a, are also given. Considerations of space make it necessary to limit the observations printed to about two per week, but, as indicated above, absolute observations of some of the elements are made more frequently. For each set of absolute observations are shown the deduced base line values of H, D, and V and, in brackets, the adopted base line values. Thus, the entry 15823 (18) signifies:—deduced base line value 15823, adopted base line value 15818. The adopted values were obtained as described in the foregoing, and therefore the base line values corresponding to dates between those given in the table may be obtained by interpolation.

## ABSOLUTE DETERMINATIONS OF D, I AND H, AND BASE LINE VALUES OF H, D, AND V.

Eskdalemuir

1932.

Date	Declination			Inclination		Horizontal Force			Base Line Values (deduced and adopted).				
	Mean Time.	D.		Mean Time.	I.	Mean Time.	H.	m.	H.	D.	V.		
Jan. 8	h. m.	°	'	~	h. m.	°	'	h. m.	Y		16,000 Y +	13° 0' +	44,000 Y +
13	9 37	14	27	0	9 20	69	43.5	11 46	16586	906.1	*979 (77)	+43.5 (43.3)	759 (812)
15	9 31	14	27	40	9 15	69	43.8	12 22	16593	906.1	*993 (77)	+42.7 (43.3)	764 (828)
20	12 51	14	31	13	9 15	69	45.0	12 3	16570	905.4	*976 (77)	+43.5 (43.3)	826 (34)
22	14 47	14	32	35	9 26	69	45.8	14 22	16586	905.3	275 (70)	52.0 (52.2)	864 (52)
28	12 13	14	30	10	11 15	69	44.0	11 47	16573	905.7	272 (70)	52.2 (52.2)	785 (-)
29	14 5	14	35	5	14 24	69	45.9	-	-	-	-	52.8 (52.6)	738 (80)
	11 55	14	30	10	-	-	-	11 30	16546	905.4	259 (69)	52.6 (52.6)	-

\* From West Room instrument 15,000Y +  
 † From West Room instrument

ABSOLUTE DETERMINATIONS— continued.

Date	Declination			Inclination		Horizontal Force			Base Line Values (deduced and adopted)					
	Mean Time	D			Mean Time	I	Mean Time	H	m	H	D	V		
	h. m.	°	'	"	h. m.	°	'	h. m.	Y		16,000 Y +	13° 0' +	44,000 Y +	
Feb.	5	12 43	14	31	23	9 18	69	46·9	12 15	16548	905·4	265 (67)	52·4 (52·6)	816 (730)
	9	12 33	14	30	45	11 25	69	46·1	11 57	16535	906·3	263 (66)	52·4 (52·5)	719 (80)
	12	9 43	14	28	45	9 16	69	44·4	12 23	16541	905·2	254 (66)	52·5 (52·5)	719 (80)
	16	9 37	14	26	40	9 16	69	47·9	12 4	16568	905·5	267 (64)	52·6 (52·5)	836 (780)
	19	9 37	14	25	33	9 15	69	44·4	12 4	16468	905·7	261 (64)	52·6 (52·5)	787 (79)
	23	9 37	14	27	37	9 15	69	45·8	12 16	16590	905·2	265 (63)	52·7 (52·5)	782 (78)
	26	9 37	14	26	43	9 15	69	45·7	11 59	16555	905·8	262 (62)	52·7 (52·5)	808 (777)
Mar.	11	9 37	14	26	15	9 18	69	46·6	12 27	16563	906·5	264 (60)	53·0 (52·6)	762 (72)
	15	9 43	14	25	35	9 21	69	44·8	11 48	16566	905·2	259 (60)	53·0 (52·6)	759 (71)
	18	9 39	14	27	33	9 18	69	45·1	12 11	16561	906·1	264 (60)	52·2 (52·6)	809 (770)
	22	9 37	14	26	20	9 14	69	45·9	11 56	16566	905·3	264 (60)	53·1 (52·6)	775 (70)
	24	9 35	14	24	45	9 14	69	45·6	11 16	16542	905·2	243 (59)	52·7 (52·6)	751 (70)
	29	9 47	14	30	25	9 28	69	48·4	-	-	-	-	52·7 (52·7)	781 (72)
	31	12 21	14	36	37	-	-	-	11 30	16506	905·0	256 (59)	52·6 (52·7)	-
Apr.	6	12 27	14	34	15	-	-	-	11 21	16544	905·2	249 (59)	30·7 (30·6)	-
	8	9 33	14	24	47	9 13	69	47·5	11 11	16552	905·5	271 (59)	30·8 (30·6)	772 (75)
	13	9 37	14	22	40	9 15	69	44·3	14 11	16581	905·7	254 (59)	30·6 (30·7)	764 (77)
	15	9 37	14	23	35	9 18	69	45 9	11 43	16544	905·4	253 (59)	30·8 (30·7)	754 (78)
	19	8 29	14	23	0	8 8	69	45·9	10 39	16557	906·1	258 (59)	30·8 (30·8)	803 (781)
	22	8 35	14	24	0	8 9	69	45·6	10 39	16569	905·7	260 (59)	30·9 (30·8)	785 (82)
	27	8 41	14	25	55	8 17	69	47·2	10 46	16552	905·6	258 (59)	30·7 (30·7)	784 (84)
	29	8 41	14	25	0	8 21	69	46·4	10 35	16562	906·0	262 (59)	31·0 (30·7)	790 (85)
May	6	8 45	14	20	30	8 19	69	46·6	10 35	16538	906·3	269 (59)	30·8 (30·8)	779 (85)
	10	8 35	14	22	53	8 15	69	45·0	-	-	-	-	30·9 (30·7)	762 (85)
	11	10 51	14	27	27	-	-	-	10 26	16593	905·8	278 (60)	30·5 (30·7)	-
	13	8 37	14	21	33	8 17	69	46·1	11 20	16570	906·6	273 (60)	30·5 (30·7)	790 (84)
	17	8 43	14	27	0	8 23	69	47·1	10 49	16569	906·2	272 (60)	30·4 (30·0)	812 (784)
	20	8 37	14	21	10	8 21	69	47·0	11 27	16554	905·3	269 (60)	30·0 (30·0)	807 (784)
June	2	14 51	14	27	23	-	-	-	15 40	16579	905·0	260 (61)	29·2 (29·9)	-
	3	15 13	14	25	35	10 42	69	46·5	-	-	-	-	29·4 (29·9)	758 (80)
	8	11 9	14	22	10	13 36	69	46·4	11 43	16556	905·3	255 (62)	29·5 (29·9)	802 (777)
	14	13 33	14	27	55	-	-	-	11 0	16557	904·8	266 (62)	28·5 (29·9)	-
	15	10 28	14	22	17	12 47	69	45·0	-	-	-	-	29·0 (29·9)	725 (70)
	22	10 27	14	22	50	13 23	69	45·9	-	-	-	-	29·6 (29·8)	757 (63)
	24	14 7	14	28	52	14 42	69	44·4	-	-	-	-	29·1 (29·8)	756 (61)
	29	10 36	14	24	45	-	-	-	11 19	16565	905·1	267 (64)	28·6 (29·8)	-
July	7	14 22	14	28	27	-	-	-	15 39	16579	905·3	264 (66)	29·0 (29·7)	-
	14	8 33	14	19	15	8 16	69	44·8	10 49	16566	906·1	289 (67)	28·5 (29·7)	695 (730)
	19	8 39	14	20	55	8 21	69	45·3	-	-	-	-	29·8 (29·7)	687 (721)
	20	8 33	14	18	50	8 15	69	45·9	10 41	16552	905·4	273 (69)	32·8 (32·8)	721 (20)
	22	8 33	14	17	27	8 15	69	44·6	10 51	16539	905·5	266 (70)	32·8 (32·8)	703 (17)
	26	11 7	14	24	10	14 0	69	44·9	10 49	16547	905·0	265 (71)	33·0 (32·8)	713 (12)
	29	11 3	14	23	47	13 15	69	45·6	10 32	16547	905·8	281 (72)	32·5 (32·8)	713 (09)

## ABSOLUTE DETERMINATIONS-- continued.

Date	Declination			Inclination		Horizontal Force			Base Line Values (deduced and adopted)				
	Mean Time	D			Mean Time	I	Mean Time	H	m	H	D	V	
	h. m.	°	'	"	h. m.	°	'	h. m.	γ		16000 γ +	13° 0'+	44,000 γ +
Aug. 5	11 7	14	25	30	11 26	69	47.3	10 30	16524	905.6	289 (74)	32.2 (32.6)	718 (00)
10	9 5	14	19	43	8 47	69	46.0	11 51	16553	905.0	272 (75)	32.8 (32.6)	704 (695)
18	10 29	14	21	13	-	-	-	11 28	16547	905.1	273 (76)	31.6 (32.6)	-
23	13 59	14	27	45	-	-	-	14 25	16579	904.3	232 (77)	32.5 (32.6)	-
24	11 17	14	22	40	10 53	69	45.3	-	-	-	-	32.4 (32.6)	664 (77)
31	8 9	14	17	55	8 30	69	44.7	10 32	16554	906.2	294 (77)	32.8 (32.7)	619 (70)
Sept. 6	10 7	14	23	0	-	-	-	10 32	16539	905.2	266 (77)	33.0 (32.8)	-
7	8 17	14	20	10	8 37	69	45.3	-	-	-	-	33.2 (32.8)	631 (63)
9	8 23	14	18	30	-	-	-	11 1	16535	905.2	270 (77)	32.5 (32.8)	-
13	11 28	14	27	35	10 32	69	45.5	11 3	16559	906.1	283 (77)	32.6 (32.8)	689 (60)
16	11 53	14	28	35	8 20	69	45.0	11 28	16545	905.2	277 (77)	33.0 (32.8)	641 (60)
20	8 47	14	22	30	8 27	69	45.3	11 37	16542	905.9	273 (77)	32.7 (32.7)	589 (660)
23	8 49	14	21	25	8 30	69	45.5	11 2	16531	905.5	289 (77)	32.6 (32.7)	671 (60)
28	8 53	14	20	37	8 21	69	45.9	10 58	16558	905.9	275 (77)	32.6 (32.7)	723 (660)
30	8 35	14	20	25	8 15	69	44.8	10 23	16557	906.2	284 (76)	32.8 (32.7)	628 (60)
Oct. 7	9 37	14	17	50	9 21	69	44.9	12 26	16560	905.3	277 (75)	32.6 (32.6)	664 (60)
12	12 53	14	24	30	11 51	69	45.6	12 31	16562	906.4	278 (73)	32.6 (32.6)	692 (62)
14	9 37	14	17	40	9 11	69	44.5	11 35	16553	906.1	280 (73)	32.6 (32.6)	766 (663)
18	9 45	14	17	55	9 17	69	46.8	12 36	16538	905.1	264 (71)	32.7 (32.6)	728 (666)
21	9 39	14	21	13	9 19	69	48.1	12 5	16528	905.5	273 (70)	33.2 (32.6)	612 (68)
26	12 47	14	23	50	11 45	69	46.2	12 25	16535	905.6	269 (68)	32.7 (32.7)	695 (97)
28	9 47	14	18	10	9 17	69	45.4	12 27	16550	905.3	264 (67)	32.7 (32.7)	689 (702)
Nov. 2	12 43	14	23	0	10 42	69	44.5	11 32	16512	905.4	258 (65)	32.8 (32.7)	629 (713)
8	9 57	14	17	40	9 30	69	45.0	12 23	16546	904.8	258 (63)	32.5 (32.7)	694 (724)
11	9 47	14	17	47	9 15	69	45.8	11 51	16559	905.5	266 (63)	32.5 (32.7)	759 (30)
14	12 3	14	25	25	11 35	69	44.9	-	-	-	-	33.0 (32.7)	713 (34)
15	14 12	14	20	40	-	-	-	12 7	16541	905.5	259 (62)	32.8 (32.7)	-
16	-	-	-	-	13 0	69	46.9	-	-	-	-	-	762 (38)
18	9 47	14	19	20	9 16	69	45.5	11 43	16549	905.6	258 (62)	32.8 (32.7)	722 (40)
23	12 11	14	21	30	-	-	-	11 25	16560	905.9	262 (61)	32.6 (32.7)	-
25	12 57	14	20	30	12 43	69	45.9	12 3	16582	906.0	271 (61)	32.6 (32.7)	809 (749)
30	9 43	14	19	50	9 11	69	45.7	12 37	16575	906.3	263 (59)	32.7 (32.7)	782 (54)
Dec. 2	11 31	14	19	15	-	-	-	10 41	16560	905.6	261 (59)	32.0 (32.7)	-
7	12 25	14	21	50	11 7	69	46.1	11 38	16563	905.5	254 (57)	32.9 (32.7)	793 (61)
9	12 23	14	20	25	11 11	69	46.2	11 41	16541	905.4	257 (56)	32.6 (32.7)	739 (63)
13	15 27	14	23	45	14 53	69	46.3	-	-	-	-	32.4 (32.7)	796 (67)
14	11 41	14	23	10	-	-	-	11 5	16565	906.2	255 (53)	32.7 (32.7)	-
19	9 17	14	17	45	9 16	69	45.0	9 57	16556	906.1	247 (51)	32.5 (32.7)	735 (72)
20	9 33	14	18	30	9 15	69	45.8	-	-	-	-	33.6 (32.7)	778 (72)
23	12 53	14	21	25	12 9	69	44.7	12 33	16555	905.9	242 (49)	32.6 (32.7)	734 (74)
26	11 3	14	19	30	9 53	69	44.7	10 38	16550	905.3	239 (48)	32.6 (32.7)	752 (76)



The hourly readings are obtained from the magnetograms, standardized as described in the foregoing, by means of a ruled glass scale. The reading for any given hour G.M.T. is that ordinate estimated to be the mean reading for 60 minutes between exact hours. The product of this ordinate and the scale value is added to the adopted base line value, and the sum so obtained is the hourly value printed in the tables.

## IDENTIFICATION NUMBERS OF INSTRUMENTS IN USE IN 1932.

Unifilar Magnetometer, Kew pattern (with collimator magnet, 60a, and mirror magnet, 60c).	..	Elliott, No. 60.
Dip Inductor .. .. .	..	Schulze, No. 103.

## Notes on Tables.

The hourly values of H, D, and V, obtained as described above, appear in three of the four monthly tables. The mean value for the day is computed according to the expression

$$x = (x_1 + x_2 + \dots + x_{24}) / 24.$$

The letters "Q" and "D" denote the five quiet and the five most disturbed days as selected at De Bilt.

In the fourth table for each month are given :-

- (a) the values and times of the daily maximum and minimum and the values of the absolute daily range for each of the elements H, D and V.
- (b) the value of  $HR_H + VR_V$  for each day, where  $R_H$ ,  $R_V$  denote the absolute ranges for a calendar day of the horizontal and vertical components. (This measure of magnetic activity was adopted in 1932 by the International Commission for Terrestrial Magnetism and Atmospheric Electricity. In previous volumes of The Observatories' Year Book the values of the quantity  $R_N^2 + R_W^2 + R_V^2$  were used as a measure of activity).
- (c) the daily magnetic character figures, assigned according to the international scheme wherein "0", "1", "2", respectively, denote quiet, moderately disturbed, and highly disturbed conditions.
- (d) the daily values of temperature in the underground magnetograph chamber.

Mean diurnal inequalities of the components N, W, V, H, D, and I on all days and on international quiet and disturbed days are given, for the months,

seasons and year, in Tables 317 to 334. In calculating diurnal inequalities the non-cyclic change has been eliminated on the assumption that its time-rate is linear. The inequalities of N, W, and I have been computed from those of H, D, and V, by means of the formulæ:

$$\begin{aligned}\delta N &= \cos D. \delta H - \left( \frac{180 \times 60}{\pi} \right) H \sin D. \delta D \\ \delta W &= \sin D. \delta H + \left( \frac{180 \times 60}{\pi} \right) H \cos D. \delta D \\ \delta I &= \frac{180 \times 60}{\pi} \cos I \left( \frac{\delta V \cos I - \delta H \sin I}{H} \right)\end{aligned}$$

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in which  $\delta D$  and  $\delta I$  are expressed in minutes of arc, and where H, D, and I for any given month are the respective mean values for that month as published in Table 338. The values of the mean diurnal inequalities of the several elements on the three different types of day are brought together in Table 335, and the values of the non-cyclic change of H, D, and V are given in Table 336.

The results of harmonic analysis of the mean diurnal inequalities of N, W, and V for the months, seasons<sup>1</sup> and year are to be found in Tables 339 and 340, in which are given the values of  $a_n$ ,  $b_n$ ,  $c_n$ , and  $\alpha_n$ , in the two equivalent series  $\Sigma(a_n \cos 15nt^\circ + b_n \sin 15nt^\circ)$  and  $\Sigma c_n \sin(15nt^\circ + \alpha_n)$ . In the former series t is reckoned in hours from midnight G.M.T., whilst the published values of  $\alpha_n$  refer to Local Mean Time. The values of the harmonic coefficients have been computed from the inequalities as given in the tables and have been corrected, where necessary, on account of the fact that the hourly values are not instantaneous but mean values. The factors by which the coefficients have to be multiplied (vide Report of the British Association, 1883, p. 98) are 1.00286 for  $a_1$ ,  $b_1$ ,  $c_1$ ; 1.01152 for  $a_2$ ,  $b_2$ ,  $c_2$ ; 1.02617 for  $a_3$ ,  $b_3$ ,  $c_3$ ; and 1.04720 for  $a_4$ ,  $b_4$ ,  $c_4$ . The values were obtained to two decimal places and finally were rounded off to 0.1y.

The mean values of  $HR_H + VR_V$  are summarized in Table 337.

In Table 338 appear for the months and year the mean values of N, W, V, D, I, H and Total Force, T. The means of N, W, I and T are derived from the corresponding mean values of H, D and V, which are the means of hourly values on all days in the month or year. Tables 341 and 342 contain mean values of the magnetic elements for 1932 and recent years at a number of observatories.

#### Review of Results of Magnetic Observations.

"Mean and Extreme Values of the Magnetic Elements", 1932.—The mean values are given below in Table 1 along with the corresponding values for the previous year. The values of H, D, and V have been computed from the hourly values derived from the autographic records of all days, standardized by

<sup>1</sup>The seasons are defined for this purpose as follows:—"Winter," January, February, November, December; "Equinox," March, April, September, October; "Summer", May, June, July, August.

†See remarks on p. 175.

means of the absolute observations; those of N, W, I, and T have been deduced from the values of H, D, and V.

TABLE 1.

Year.	H.	D. (West).	I.	N.	W.	V.	T.
	γ	° ' "	° ' "	γ	γ	γ	γ
1931 ..	16583	14 34.8	69 43.7	16049	4174	44898	47863
1932 ..	16571	14 23.7	69 45.0	16050	4120	44916	47875

Westerly declination was on the average 11.1 less in 1932 than in 1931. The rate of decrease is practically the average rate of recent years. Between 1913 and 1920 the average rate of decrease was 9.35. As compared with the 1931 value horizontal force shows a fall of 12γ, which is less than the average annual rate of decrease between 1912 and 1927 (14.3γ). Practically no change in the average value of the north component has occurred since 1925, but as in recent years the west component decreased by some 60γ. Inclination has increased by 1.3. The values of vertical and total force have increased somewhat.

Mean values derived from (a) international quiet days and (b) international disturbed days are as follow: (a) H, 16574γ; D, 14° 23.7; N, 16054γ; W, 4120γ; V, 44918γ; (b) H, 16564γ; D, 14° 23.4; N, 16045γ; W, 4117γ; V, 44916γ.

The differences between the mean annual values of N, W, and V, derived from all, international quiet, and international disturbed days in the years 1926-32 inclusive, are given below, together with the mean differences for the years 1915-1925. In every year of the series quoted the mean value of N and of W on quiet days exceeded the mean value on all and on disturbed days. The only years in the period 1915-25, for which either the all or the disturbed day mean value of V exceeded the quiet day value were 1917, 1919, 1921.

	<u>Quiet day mean-All day mean.</u>			<u>Quiet day mean-Disturbed day mean</u>		
	N	W	V	N	W	V
	γ	γ	γ	γ	γ	γ
1932 ..	+3.5	+0.9	+1.9	+ 9.4	+3.9	+1.8
1931 ..	+2.5	+1.2	-0.5	+ 7.4	+3.1	-0.9
1930 ..	+7.0	+2.8	+1.6	+16.1	+5.6	+3.7
1929 ..	+3.8	+1.4	+0.2	+11.1	+2.8	+1.9
1928 ..	+4.5	+1.4	-1.6	+ 7.7	+2.6	-3.4
1927 ..	+2.9	+1.1	-0.3	+ 9.1	+2.4	-2.7
1926 ..	+4.8	+2.0	-0.7	+16.1	+5.7	-1.4
1915-1925	+2.7	+1.2	+0.7	+ 8.5	+3.3	+1.5

The resultant vector representing the average excess of the mean values on quiet days over the mean values on all days, for the years 1915-1925, has a magnitude of  $3\gamma$ ; its azimuth is  $336^\circ$ , measured from true north through east, and it is inclined at about  $77^\circ$  to the downwardly directed vertical. The vertical plane which contains this vector approximates very closely in azimuth to the vertical plane passing through Eskdalemuir and the pole (taken as  $78^\circ\text{N}$ ,  $68^\circ\text{W}$ ) of the axis of magnetization of the earth. (cf. S. Chapman, "On certain average characteristics of world-wide magnetic disturbance". Lond. Proc. Roy. Soc. Series A. Vol. 115, p.242).

The extreme values of H, D, and V actually recorded during 1932 are given in Table II.

TABLE II.

Component.	Maximum		Minimum		Absolute Annual Range
	Value	Date, 1932	Value	Date, 1932	
Horizontal Force	16820 $\gamma$	d h m May 29 16 49	16138 $\gamma$	d h m May 29 22 47	682 $\gamma$
Declination	14° 52'8	May 30 3 44	13° 47'6	Oct.20 21 17	1° 5'2
Vertical Force	45069 $\gamma$	May 29 16 45	44560 $\gamma$	May 30 3 50	509 $\gamma$

The range of  $1^\circ 5'2$  in declination is equivalent to a range of  $314\gamma$  in the component of force perpendicular to the magnetic meridian.

"Magnetic Character of the Year".—The Eskdalemuir practice of tabulating for each day the value of  $2R^2$  has been discontinued in favour of the now internationally-accepted formula for magnetic activity viz.,  $HR_H + VR_V$ . The magnetic character figures on the scale 0, 1, 2 which were assigned in accordance with the international scheme are summarized in Table III. This table contains also the monthly mean value of the international character figures, which for 1932 are based on the estimates made at 41 observatories, and the mean monthly values of  $HR_H + VR_V$  for all, international quiet (Q), and international disturbed (D) days.

The Eskdalemuir mean character figure for the year, like the international mean character figure, is less than for 1930. The mean sunspot numbers for the years 1923-32, are, in order, 5.8, 16.7, 44.3, 63.9, 69.0, 76.8, 64.2, 38.9, 20.9 and 11.2. Both the Eskdalemuir and the international mean character figures increased concurrently with the sunspot numbers up to 1926, but the concurrence since then has not been maintained.

The Eskdalemuir character figures and the mean values of  $HR_H + VR_V$  for all days suggest that October was the most disturbed month.

# DIURNAL VARIATION OF THE MAGNETIC ELEMENTS

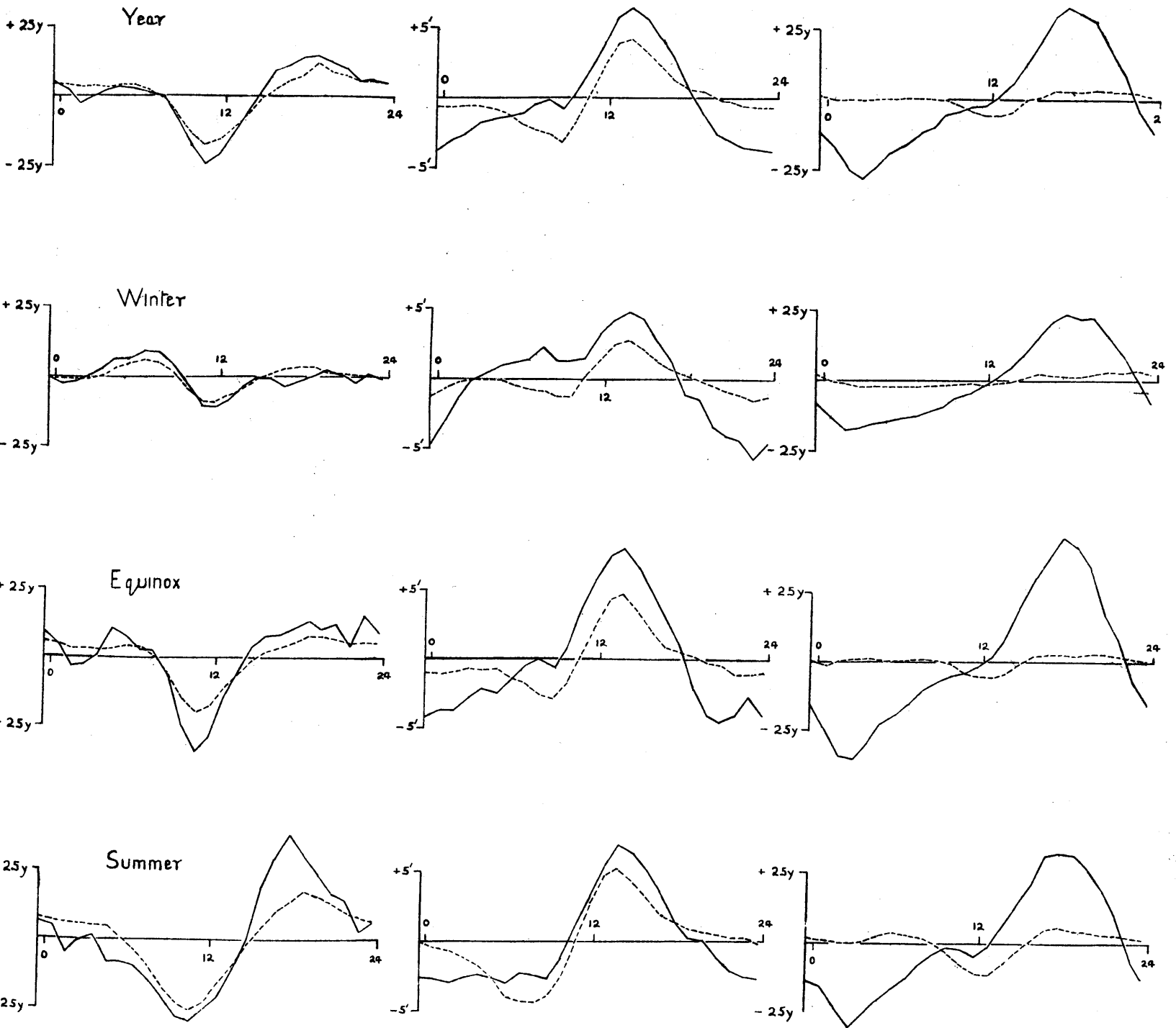
ESKDALEMUIR 1932

Quiet days ----- Disturbed days \_\_\_\_\_

Horizontal Force

Declination

Vertical Force

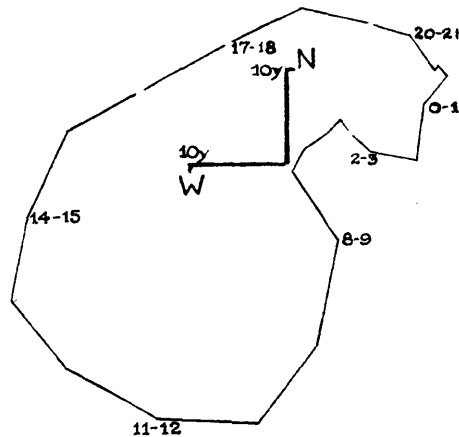
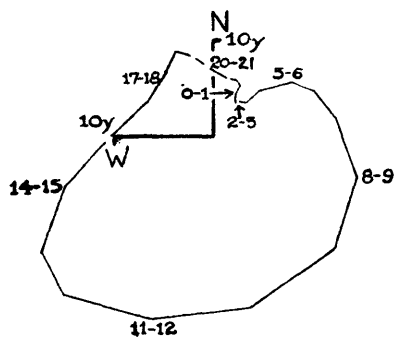


# VECTOR DIAGRAMS ILLUSTRATING DIURNAL VARIATION OF MAGNETIC FORCE ESKDALEMUIR 1932

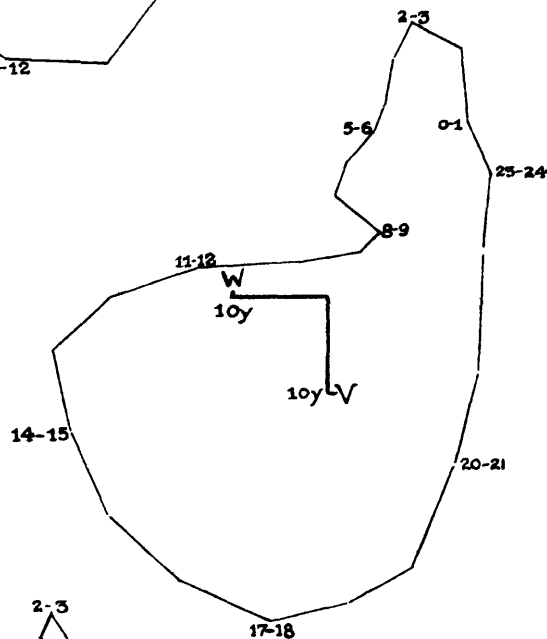
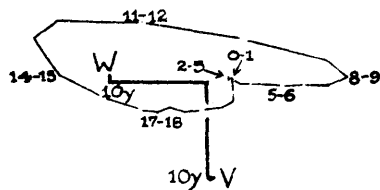
*Quiet days*

*Disturbed days*

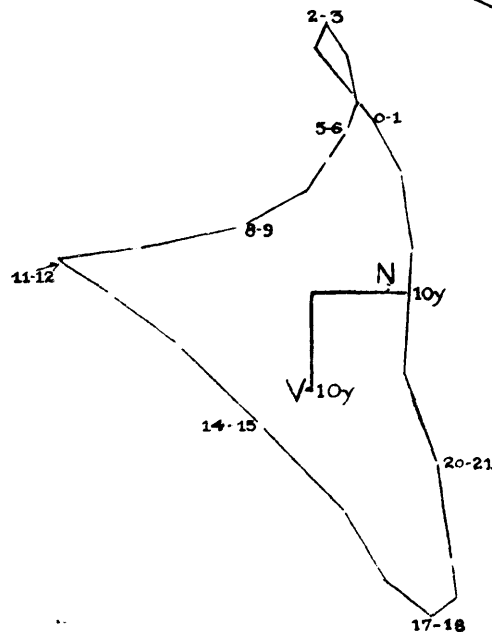
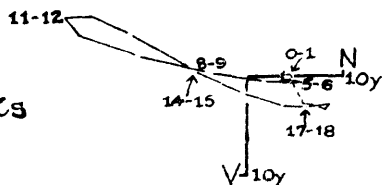
Horizontal  
Components



Prime  
Vertical  
Components



Meridian  
Components



In Table III the annual mean values are the means of the monthly values entered in the corresponding columns.

TABLE III.

Month.	Magnetic Character Figures. Number of			Mean Character Figure		Mean Value of $\frac{HR_H + VR_V^*}{10,000\gamma^2}$		
	"0" days	"1" days	"2" days	Eskdale-muir	Inter-national	All days	Q days	D days
1932								
January	10	18	3	0.77	0.76	256	66	528
February	8	18	3	0.83	0.76	262	100	576
March	6	18	7	1.03	0.95	464	133	925
April	6	22	2	0.87	0.89	469	189	734
May	8	20	3	0.84	0.80	519	187	1476
June	17	13	0	0.43	0.43	264	190	465
July	18	13	0	0.42	0.49	262	185	427
August	16	12	3	0.58	0.67	366	185	809
September	11	16	3	0.73	0.73	346	148	748
October	6	21	4	0.94	0.73	294	125	675
November	12	17	1	0.63	0.58	185	83	392
December	8	20	3	0.84	0.67	237	78	663
Year, 1932	126	208	32	0.74	0.71	327	139	701
Year, 1931	137	208	20	0.68	0.66	345	185	679
Year, 1930	94	230	41	0.85	0.83	556	195	1246
Year, 1929	118	213	34	0.75	0.67	-	-	-
Year, 1928	96	246	24	0.80	0.63	-	-	-
Year, 1927	95	231	39	0.85	0.63	-	-	-
Year, 1926	90	227	48	0.89	0.65	-	-	-
Year, 1925	145	191	29	0.69	0.56	-	-	-
Year, 1924	191	153	22	0.54	0.55	-	-	-
Year, 1923	235	111	19	0.41	0.48	-	-	-
Year, 1922	174	145	46	0.65	0.65	-	-	-

"Diurnal Inequalities".—The mean diurnal inequalities for all days, and international quiet and disturbed days, for the months, seasons and the year, are given in Tables 317-334, and the corresponding inequality ranges in Table 335.

The inequalities of H, D and V for international quiet and disturbed days are shown graphically in Plate III, while in Plate IV are given vector diagrams illustrating the diurnal variation of magnetic force in the horizontal, the prime vertical and the meridian planes.

The ranges of the annual mean inequalities of H and D for all days and for quiet and disturbed days are the smallest (or equal to the smallest) since

$$* NR_N + WR_W + VR_V$$

in 1930 and 1931  
10,000

1924. In V the ranges for all days and disturbed days are small, though greater than in 1931, while the Q-day range is the smallest ever recorded at Eskdalemuir.

The average values of the diurnal inequality ranges for the year and seasons for the period 1916-26 (not the values of the range of the representative mean diurnal inequalities for this period) are given below, along with the 1932 values expressed as a percentage of the average values. The units employed are ly for force and l' for declination. The mean sun-spot number for 1916-26 is 46.7; that for 1932 is 11.2.

The 1932 ranges are nearly all below the average. The high value for V on all days in the equinox is due to a few days in March and April which have large ranges in the hourly values but are not counted as D days.

		All days.					International quiet days.					International disturbed days				
		N.	W.	V.	H.	D.	H.	W.	V.	H.	D.	N.	W.	V.	H.	D.
		Year,	1916-26 ..	36.6	38.7	21.9	35.6	8.26	32.7	37.0	12.1	32.4	8.00	48.3	53.7	65.6
	1932 % ..	87	83	98	83	85	83	87	78	83	86	85	84	93	78	91
Winter,	1916-26 ..	22.1	27.7	15.9	18.3	6.31	19.0	19.4	5.2	15.9	4.42	30.1	49.5	53.8	27.5	10.50
	1932 % ..	88	100	94	96	98	87	94	98	91	94	74	97	76	74	100
Equinox,	1916-26 ..	41.5	44.2	27.2	39.0	9.57	37.8	42.0	13.1	37.2	9.04	56.0	65.3	82.0	55.4	13.76
	1932 % ..	88	82	113	83	89	76	84	74	73	84	99	82	97	89	90
Summer,	1916-26 ..	54.0	55.6	26.5	56.1	11.33	45.6	53.4	19.8	46.7	11.12	78.3	67.9	70.2	85.5	12.80
	1932 % ..	97	82	77	85	86	90	84	82	90	86	82	66	89	79	76

"Daily Range."—The values of mean absolute daily range for the months and seasons of the year, together with the corresponding means for 1916-26 are given in Table IV; the ranges are also expressed as percentages of the mean absolute daily range for the year.

TABLE IV.—ABSOLUTE DAILY RANGE. MEAN MONTHLY VALUES.

Month	Mean Absolute Daily Range.						Mean Daily Range expressed as Percentage of Yearly Mean.					
	1932			Mean 1916-26			1932			Mean 1916-26		
	H	D	V	N	W	V	H	D	V	N	W	V
January .. ..	Y	Y	Y	Y	Y	Y	%	%	%	%	%	%
February .. ..	69	83	34	69	73	39	85	106	77	80	88	81
March .. ..	69	83	37	69	76	38	85	106	84	80	92	80
April .. ..	99	110	67	95	94	57	122	141	152	110	113	119
May .. ..	107	91	65	98	88	54	132	117	148	114	106	113
June .. ..	124	90	70	102	88	59	153	115	159	119	106	123
July .. ..	74	61	31	92	85	46	91	78	70	107	102	96
August .. ..	78	61	29	86	82	43	96	78	66	100	99	90
September .. ..	91	81	48	98	88	55	112	104	109	114	106	115
October .. ..	79	78	48	100	92	63	98	100	109	116	111	131
November .. ..	73	76	39	94	93	57	90	97	89	109	112	119
December .. ..	51	53	23	62	66	34	63	68	52	72	80	71
	55	64	33	60	64	33	68	82	75	70	77	69
Winter .. ..	61	71	32	65	70	36	75	91	73	76	84	75
Equinox .. ..	89	89	55	97	92	58	110	114	125	113	111	121
Summer .. ..	92	73	45	95	86	51	114	94	102	110	104	106
Year .. ..	81	78	44	86	83	48	-	-	-	-	-	-



The mean daily ranges of H, D and V are slightly greater than the corresponding values for N, W and V for 1931, but smaller than those for any other year since 1925.

The frequency distribution of absolute daily ranges recorded in 1932 is shown in Table V, which also contains the percentage distribution for the period 1916-1926.

TABLE V.—FREQUENCY DISTRIBUTION OF ABSOLUTE DAILY RANGE

Range	Number of Cases 1932			Percentage Distribution					
				H	N	D	W	V	
Y	H.	D.	V.	1932	1916-26	1932	1916-26	1932	1916-26
0-9	0	0	19	0.0	0.0	0.0	0.0	5.2	6.3
10-19	9	2	66	2.5	1.7	0.5	0.9	18.0	20.2
20-29	19	13	105	5.2	4.9	3.6	4.5	28.7	24.8
30-39	25	21	49	6.8	7.8	5.8	7.5	13.4	14.3
40-49	37	49	30	10.1	9.9	13.4	10.6	8.2	8.1
50-59	52	69	23	14.2	12.2	18.9	12.0	6.3	4.8
60-69	40	50	16	11.0	12.9	13.7	13.1	4.4	4.2
70-79	31	36	9	8.5	10.3	9.9	12.4	2.5	3.1
80-89	31	29	9	8.5	8.1	7.9	8.6	2.5	2.3
90-99	29	17	9	7.9	6.5	4.6	7.5	2.5	2.1
100-109	27	13	5	7.4	5.3	3.6	4.7	1.4	1.1
110-119	12	9	5	3.3	4.0	2.5	3.5	1.4	1.2
120-129	5	15	6	1.4	3.5	4.1	2.7	1.6	0.8
130-139	15	10	4	4.1	2.6	2.7	2.2	1.1	0.8
140-149	3	5	4	0.8	1.7	1.4	2.2	1.1	0.5
150-159	12	4	1	3.3	1.3	1.1	1.2	0.3	0.7
160-169	4	6	2	1.1	1.2	1.6	0.9	0.5	0.5
170-179	7	7	0	1.9	0.8	1.9	1.0	0.0	0.4
180-189	3	4	1	0.8	0.6	1.1	0.7	0.3	0.5
190-199	1	4	0	0.3	0.5	1.1	0.6	0.0	0.3
200+	4	3	3	1.1	4.4	0.8	3.1	0.8	3.1
Days omitted	0	0	0	..	..	..	..	..	..



The intervals of maximum frequency in 1932 lie between 50 and 59 $\gamma$  for H and D, and 20-29 $\gamma$  for V. These are much the same as in recent years. In 1923, the year of the last sunspot minimum, the intervals were 40-49 $\gamma$  for N and W, 10-19 $\gamma$  for V.

On 31 days in 1932 the absolute range in either H or D was 160 $\gamma$  or more. The numbers of such days for N and W in the years 1915 to 1931 were, in order, 30, 47, 35, 56, 58, 36, 27, 32, 11, 10, 24, 46, 41, 48, 50, 88, 17. The frequency of occurrence in 1932 of ranges in excess of 199  $\gamma$  is conspicuously low. There were only two days on which the range in each of H, D, and V was 200 $\gamma$  or more as compared with 18 such days for N, W and V in 1926, seven in 1927, five in 1928, nine in 1929, 16 in 1930, and one in 1931.

"Irregular changes in Declination".—In connexion with the supply of declination data to mine surveyors it has been the practice to classify the hourly periods between the exact hours G.M.T. into four groups according to the range in declination within each period. The range limits, which were adopted in consultation with representative mine surveyors, are:— less than 5', between 5' and 15', between 15' and 30', and greater than 30'. This method of classification has been applied to the declination records obtained in the year 1932, and the actual frequencies of occurrence of hourly ranges in the last three of the four divisions mentioned are set out below. A range of 30' is equivalent to a change of 145 $\gamma$  in the component of horizontal force perpendicular to the magnetic meridian.

Number of cases per month

Range Interval ..	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
5' to 15' ..	93	104	150	135	88	25	30	71	89	74	53	70	982
15' to 30' ..	15	13	22	7	8	1	3	5	5	4	3	5	91
> 30' .. ..	0	2	3	1	3	0	0	0	0	0	0	0	9

Hourly Distribution. 1932  
Hour ending at (G.M.T.)

Range Interval	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
5' to 15'	66	69	56	51	28	23	15	17	17	14	13	19	13	13	23	29	54	47	76	68	70	66	66	69
15' to 30'	6	8	3	0	0	0	0	0	0	0	0	0	0	0	1	4	5	13	9	6	13	9	10	4
> 30' ..	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0	0

On the average quiet day the most conspicuous change in declination is that from the most easterly value at about 8h or 9h to the most westerly value at about 13h or 14h, the rate of change being greatest between 10h and 12h. The hourly range due to the regular diurnal variation at this time of day is less than 5', but doubtless it happens at times that the occurrence of slight disturbance results in the hourly range exceeding 5', whereas the occurrence of the same degree of irregularity at another hour of the day would not cause the hourly range to exceed 5'. Thus the figures given above for the range interval 5'-15' tend to exaggerate somewhat the incidence of irregular changes between 9h and 13h. The hourly distributions of the frequency of occurrence of ranges between 5' and 15' and between 15' and 30' exhibit the well known tendency for irregular changes to occur predominantly during the "night" hours—at least in Europe.

"Principal Magnetic Disturbances during" 1932.—Particulars of the principal magnetic disturbances recorded during the year are given in Table VI. Corresponding information for the same disturbances is given in the Lerwick Section. The magnetograms for the most highly disturbed days are not reproduced in this volume, but photographic copies may be obtained on application to the Director, Meteorological Office, Air Ministry, Kingsway, London, W.C.2.

### Remarks on Magnetic and Allied Phenomena, 1932.

January.—(Average character figure 0.77).

A quiet month, with no disturbance worthy of description. There was slight activity during at least part of each of the first 17 days, the most noticeable feature being frequent bays in D, about 15' in depth, between 18h and midnight, accompanied usually by slight humps in V and oscillations in H.

From 18th to 23rd inclusive conditions were quiet, but after this activity developed, and there was continuous minor disturbance from the morning of 25th till the end of 28th. Between 26d 21h and 27d 2h, and again between 27d 15h and 28d 3h, there were series of marked bays in D, the accompanying changes in H being rapid and irregular; and on 28d between 12 and 14h there occurred an irregular dip of 100 $\gamma$  in H.

February.—(Average character figure 0.83).

Similar to January in the average degree of disturbance. The most disturbed period was from 3d 12h to 4d 24h. During this time movements were mainly rapid and irregular, but the following may be mentioned: a peak of 120 $\gamma$  in H with maximum at 3d 22h 28m and a peak of 24' in D between 4d 1h and 3h, both accompanied by small dips in V; and a very sharp peak of 120 $\gamma$  in H at 4d 20h 21m. The afternoons of 3rd and 4th between about 13h and 18h showed remarkable similarity of movements.

There was continuous but decreasing activity until the end of the 15th, when conditions became calm.

Minor activity was renewed on the afternoon of 18th, and continued until about 26th, dying away during the last days of the month. A pronounced movement occurred in D on the evening of 23d. This consisted of a fall of 41' between 18h 46m and 20h 5m followed by a rapid rise till near 21h, and was accompanied by irregular fluctuations in H and a peak of 65 $\gamma$  in V.

March.—(Average character figure 1.03).

A rather more disturbed month than January or February, and without the very quiet periods found in winter months.

Activity began on the afternoon of 2nd and increased continually during the next seven days. From the afternoon of 9th until the early hours of 11th there was considerable disturbance, though the ranges were not very great. In H and D the fluctuations were irregular and the most notable feature of the disturbance (though a normal one) was the somewhat irregular fall of V from its maximum at 10d 17h 44m to its minimum at 11d 0h 51m (range 197 $\gamma$ ); the fall was very rapid after 0h and was followed by a rapid rise until about 1h 30m. During this 1½ hours after midnight there were also a sharp peak

of 30' in D, with maximum at 0h 33m, and a sharp minimum of H at 0h 38m. After this the disturbance was diminished, though minor activity continued.

The only movement to be mentioned during the next sixteen days occurred between 18h and 21h on 18th. D fell by 35' in two abrupt stages to a minimum at 18h 50m, recovered equally rapidly to a small peak at 19h 20m, and, after a small sharp drop, rose irregularly till soon after 21h. The corresponding movement in H was a hump of about 110γ, with maximum at 18h 56m, while in V there was a rapid rise of 40γ to a peak at 18h 16m, followed by a smooth but less rapid fall.

A relatively large disturbance (though one which would hardly be noticed in a disturbed year) developed on the afternoon of 28th, continued for the next three days and died away during the first week of April. There were many sharp peaks and dips of about 100γ in H and 20' in D, while the movements of V were of the usual disturbed day type, consisting of a gradual rise to a maximum at about 18h followed by an irregular fall to a minimum soon after midnight. The ranges for this storm were: H 236γ, V 239γ, D 40'1.

April.—(Average character figure 0.87).

Although the mean disturbance index is about equal to that for March, there were no disturbances so intense as either of those recorded in that month.

Activity was continuous throughout the first ten days. The rather large activity figure of the 2nd is due mainly to sharp minima in H and V about 3h. On 5th there was a sharp peak of 92γ in H, with maximum at 21h 6m. The very abrupt rise, which began at 21h 0m, was accompanied by a small drop in D and V.

Another sharp peak, of 130γ, occurred between 7d 23h 36m and 8d 0h 47m, the maximum being at 0h 4m. This was associated with a dip of some 60γ in V, from 22h 20m till 4h, and a fall of 20' in D between 23h 5m and 23h 58m. From the end of the 10th till the afternoon of 13th conditions were quiet, though very small fluctuations were never absent. Activity again increased on 13th and continued until the end of 18th, when another quiet period began. The afternoon of 13th was marked by a small hump in V between 16h and 18h, accompanied by rapid fluctuations in H. D fell by 26' between 20h 0m and 21h 0m, rose by 33' to a peak at 21h 52m, and then fell to near its normal value by 22h 20m; in this period there were also rapid fluctuations in H and an irregular drop in V.

The comparative quiet of 18d - 21d was interrupted by a very small movement in H and D at 22d 5h 29m. This was followed by small and rapid oscillations and a considerable disturbance developed during the succeeding days. 23d - 27d inclusive was the most disturbed period of the month, but the fluctuations in H and D were more irregular and less rapid than usual, and there is a noticeable absence of the very sharp peaks and dips which are usually found during disturbance. Ranges: H 172γ, V 124γ, D 27'5. It is perhaps worth remarking that the maxima of D and V occurred very soon after the beginning of the disturbance, viz. on the afternoon of 22nd.

There was continuous activity till the end of the month.

A sunspot group (maximum area 800 millionths of the sun's hemisphere)

crossed the central meridian at April 25.4d.\*

May.—(Average character figure 0.84).

During the first 28 days of the month the only disturbances were of a minor order. The following movements may be noted:

Between 1d 23h and 2d 2h there was a dip of some 20' in D, accompanied by a small oscillation in H, and a shallow trough in V (midnight to 4h). The following night was rather more disturbed from 2d 20h to 3d 4h; there were irregular fluctuations in H and D and a dip of roughly 130 $\gamma$  in V.

On the afternoon of 4th oscillations in H and D, with ranges of 165 $\gamma$  and 23', around 18h, marked the beginning of slight disturbance which lasted until about the end of 6th. Only very small movements in V accompanied these oscillations but a dip of some 40 $\gamma$  between 4d 20h and 22h coincided with a slight increase of activity in H and D.

After the 6th minor activity was continuous, with very rapid oscillations on many days, except for a quiet interval from 19d 1h to 21d 2h. A movement rather like a sudden commencement at 24d 23h 35m ushered in somewhat disturbed conditions which continued until by far the greatest storm of the year began at about 29d 11h. Disturbance increased rapidly during the afternoon, while H and V were increasing, and was very great from 15h to 18h. In this interval there were three large peaks in H, and numerous rapid oscillations in D, of which the greatest consisted of an abrupt fall of 47' to a minimum at 17h 19m, followed by an equally abrupt rise of 36'. From 18h to 22h conditions were less disturbed, all three elements falling irregularly. H and V began to fall abruptly at 22h 30m, reached sharp minima at about 23h, and rose by 360 $\gamma$  and 280 $\gamma$  in the next hour; both had sharp peaks at midnight and fell again rapidly afterwards. The fall in V was continued for more than three hours, and after violent oscillations, during which the minimum for the storm occurred, there was a rapid rise from about 5h till 10h on the 30th, the depth of the trough between midnight and 10h being of the order of 300 $\gamma$ . From midnight till 7h there were violent oscillations in H and D, the most notable being a very sharp dip of 250 $\gamma$  in H, with minimum at 4h 47m, and a rise in D of 51' between 3h 30m and 3h 44m, followed by a rapid but interrupted fall until 4h 42m. Ranges for the storm: H 682 $\gamma$ , D 1° 1.9', V 509 $\gamma$ .

The disturbance died away during the morning of 30th and conditions became quiet at the end of 31st.

June.—(Average character figure 0.43).

No disturbance worthy of description occurred in this month. The periods of greatest activity were: 7d 12h - 10d 24h, 20d 12-20h.

The following were the quietest periods: 1d 0h - 5d 6h, 15d 0 - 8h, 24d 22h.- 25d 6h.

July.—(Average character figure 0.42).

No large disturbance occurred in this month. Slight activity began on the afternoon of 4th, with a few rapid oscillations in H shortly before 14h. This died away during the early hours of 5th but was renewed in the afternoon, the most disturbed period being 17h - 22h, when there was a small hump

\* Nature, Vol. 131, p. 661.

in V. From 6h - 12h on 6th there were small and very rapid oscillations in all three elements.

On 16th between 11h and 15h there was a very irregular dip of some 80γ in H.

Mention may also be made of a small peak of 65γ in H on 19th between 22h 8m and 40m, the rise being very rapid, with many small oscillations superposed, the fall less rapid and more regular. Smaller movements of this type are frequent in the four hours preceding midnight and are seldom mentioned.

The following periods were very quiet: June 30d 20h - July 1d 10h; 2d 18h - 4d 4h; 12d 22h - 14d 8h; 23d 18h - 24d 8h; 28d 18h - 30d 12h.

August.— (Average character figure 0.58).

There was continuous minor disturbance from about 1d 12h till 4d 18h. A number of rapid fluctuations of moderate size took place, among which we may mention a peak of about 18' in D with maximum at 2d 2h, accompanied by a small dip in V, and an irregular dip of some 80γ in H between 3d 6h and 9h. A similar but larger dip in H (about 110γ) occurred between 5d 8h and 12h.

From 6th to 26th inclusive conditions were quiet, except for slight outbursts of activity on 12th and 22nd. From 11d 23h till 12d 6h D was some 10' below its undisturbed value, except for a hump of 15' between 2h 40m and 4h 40m; a hump of 60γ in H occurred between 3h 10m and 4h 50m. On the afternoon of 22nd between 17h and 20h there were several oscillations in H over a range of about 60γ and small fluctuations in D.

Disturbance gradually developed in the early hours of 27th and became more considerable soon after a small movement like a sudden commencement at 11h 30m. The first noteworthy movements began at 17h 20m, when D began to fall, reaching a minimum a few minutes before 18h. H rose simultaneously by 70γ to a maximum. Both returned irregularly to about their former values during the next hour, the dip in D being some 15' in depth.

A slightly larger dip in D (about 20') occurred between 22h and midnight and was associated with a small irregular hump in H and a shallow dip in V. Shortly after 1h V began to fall rapidly, reaching a minimum 150γ below its 1h value, at 2h 22m. The maximum at 1h 47m of a peak of 20' in D and the minimum at 1h 54m of a dip of 115γ in H occurred during the time when V was falling most rapidly. V rose smoothly until 5h.

During the morning of 28th there were irregular dips in H of 80γ between 5h and 7h and of 120γ between 8h and 10h. During the afternoon there was increasing agitation until 18h, but conditions became quieter after an abrupt rise of 110γ in H, a drop of 19' in D, and a small peak in V, a few minutes before this hour. Disturbance was renewed at 23h and continued with moderate intensity through the night and morning. During the afternoon of 29th conditions were very similar to those of 28th, the largest movements being a dip of 26' in D with minimum at 19h 5m, associated with a very rapid rise of 120γ in H to a sharp maximum at 19h 10m and a small peak in V. There were further oscillations during the night and some disturbance on the afternoon of 30th, three small peaks in H occurring between 16h and 21h. The disturbance died away during 31st. Ranges between 27th and 30th inclusive: H 249γ, D 44.3, V 263γ.

September.— (Average character figure 0.73).

There was slight activity on most of the first twenty-two days of the month, but the only movements requiring notice were a hump in V on 6th from 13h to 22h, reaching a maximum about 85γ above the undisturbed value, and a dip of some 60γ between 3h and 5h on 8th. Both of these were associated with agitation in H and D.

On the afternoon of 23rd after a dip in H between 8h and 10h there was moderate disturbance, V rising to a small peak at 18h and D making two dips of 18', shortly before 20h and 21h, the latter accompanied by a small peak in H. On the following afternoon (24th) disturbance was more intense. V rose rapidly to a maximum at 15h 47m, about 70γ above its value at 14h, afterwards falling smoothly. The minimum of a dip of 17' in D was simultaneous with the maximum of V, and another slightly smaller dip took place between 18h and 20h (minimum at 19h 19m). Between 19h 44m and 52m H rose by 105γ, afterwards falling irregularly till 20h 40m. During the rest of the night there were moderate fluctuations, which at about 25d 4h were succeeded by smaller and more rapid oscillations, as is usual. These continued until 14h, when disturbance again increased. The only noteworthy feature of the night of 25th-26th was an irregular hump of 100γ in H between 21h and 23h, accompanied by a small dip in V and a double peak of about 17' in D. The ranges for this storm were: H 175γ, D 36.2, V 176γ.

There was slight activity on the last five days of the month.

It is perhaps worth remarking that small peaks of 70γ in H, of the type referred to under July 19th, occurred at 29d 1h 15m and 30d 2h 52m, each accompanied by small fluctuations in D and a slight dip in V. These two movements are particularly well developed, but movements of this type took place every night from September 17 - 18 to October 6 - 7 inclusive.

October.— (Average character figure 0.94).

There was slight activity for the first 14 days of the month; this took place mainly in the afternoons, the hours from 2h till 10h being the most quiet, notably on 6th, 7th, 8th and 14th.

At 14d 17h 46m there was a small sudden commencement. Practically no increase of activity followed until about 15d 3h, when there was a slight increase in H which lasted till 8h. Activity increased in the afternoon, but the only noteworthy movement was a sharp maximum in V at 17h 25m. Conditions continued to be slightly disturbed until 19d 2h, with a noticeably quiet interval on 16th from 18h till nearly midnight.

Another disturbance occurred between 20d 10h and 21d 14h. During this period there was a rather symmetrical oscillation of V, with amplitude 90γ on each side of the undisturbed value and with maximum at 20d 18h and minimum at 21d 2h. D was below its normal value from 20d 18h till 21d 4h, and above from 5h till 10h. Between 20h and 22h there was a sharp dip of 125γ in H, with minimum at 21h 15m, accompanied by an oscillation of 29' in D from a peak at 20h 50m to a minimum at 21h 17m. The disturbance died away on the morning of 21st and conditions became quiet for a season.

Activity was renewed on 22nd, particularly between 19h and 22h, when there were rapid fluctuations in H and D over a range of 110γ and 14'. Further



slight activity occurred on the afternoon and evening of the next two days.

From 28d 10h till 29d 21h conditions were very quiet.

November.— (Average character figure 0.63).

The quietest month of the year, and without any disturbance worthy of detailed description.

A double hump of 14' occurred in D on 1st between 3h and 9h, accompanied by small fluctuations in H and a shallow dip in V.

The period of greatest activity was 14d 8h till 17d 22h. On the afternoon of the 16th V oscillated by about 90γ with maximum between 17h and 18h and minimum shortly before midnight. D fluctuated irregularly but was below its normal value between 14h 30m and 22h, while H oscillated about an approximately normal value.

A group of sunspots (maximum area 1000 millionths of the sun's hemisphere) crossed the central meridian at 16.2d.\*

From 21d 0h till 25d 4h conditions were very quiet.

A very small sudden commencement at 25d 5h 25m was followed by very small and rapid oscillations.

December.— (Average character figure 0.84).

There was activity of a very small order throughout the first thirteen days of the month, with occasional very quiet periods during the afternoon hours, notably on 3d, 5d, 7d and 12d.

Possibly associated with a group of sunspots (maximum area 500 millionths of the sun's hemisphere) which crossed the central meridian at 13.0d,\* a disturbance developed on the afternoon of 14th. The oscillations were rapid but only small before 16h, but the disturbance in H and D increased during a rapid rise of 110γ in V to a sharp maximum at 17h 25m. H was roughly 70γ below its undisturbed value from 14d 16h till 15d 3h, but there were two peaks of some 80γ at 17h 44m and 1h 0m. The maximum of D occurred at 14d 17h 51m, after a very rapid rise of 26' and was followed by an irregular fall of 39' to a minimum at 21h 20m. D was below its undisturbed value from 19h till 4h. V fell irregularly from its maximum to a rounded minimum at 15d 4h 10m.

Conditions were quiet from 4h till 18h on 15th. Disturbance was renewed about two hours later than on the previous day. The maximum of V at 19h 32m was less pronounced, but between 0h 23m and 1h 13m on 16th there was a rapid fall of 80γ, followed by a small sharp rise for 10 minutes and a gradual rise until 10h. H and D were again slightly below their normal values for several hours before midnight, and conspicuous oscillations occurred in both at about the time of the minimum of V. The oscillations in each case consisted of two peaks separated by a sharp minimum; in H the range was 184γ, the maxima at 0h 55m and 1h 33m and the minimum at 1h 19m, while in D the

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\* Nature, Vol. 131, p.661.

range was 21', the maxima at 1h 8m and 1h 44m and the minimum at 1h 26m, the oscillation in D being thus about 90° later in phase than that of H. The disturbance was then practically at an end.

The only movement which need be noted during the rest of the month is a dip of 22' in D on 17th, with minimum at 19h 21m.

From 20d 22h till 25d 6h conditions were very quiet.

Readings in millibars at exact hours, Greenwich Mean Time.

167. Eskdalemuir: H<sub>0</sub>

(height of barometer cistern above M.S.L.) = 237.3 metres.

January, 1932.

Table for January 1932 showing pressure readings at Eskdalemuir. Columns include Hour, G.M.T., Station Level (1-31), and Mean (Station Level). Rows show hourly pressure values in millibars.

168. Eskdalemuir: H<sub>0</sub> = 237.3 metres.

February, 1932.

Table for February 1932 showing pressure readings at Eskdalemuir. Columns include Hour, G.M.T., Station Level (1-31), and Mean (Station Level). Rows show hourly pressure values in millibars.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

169. Eskdalemuir: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 257.3 metres.

March, 1932.

Table for station 169, Eskdalemuir, March 1932. Columns include Hour, G.M.T., Station Level (1-24), Mean (Station Level), and Mean (Sea Level). Rows show hourly pressure readings in millibars.

170. Eskdalemuir: H<sub>b</sub> = 257.3 metres.

April, 1932.

Table for station 170, Eskdalemuir, April 1932. Columns include Hour, G.M.T., Station Level (1-24), Mean (Station Level), and Mean (Sea Level). Rows show hourly pressure readings in millibars.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.





Readings in millibars at exact hours, Greenwich Mean Time.

175. Eskdalemuir: H<sub>b</sub> (height of barometer cistern above M.S.L.) = 237.3 metres.

September, 1932.

Table for station 175, Eskdalemuir, September 1932. Columns include Hour, G.M.T., and 24 numbered columns for hourly readings, plus Mean (Station Level) and Mean (Sea Level) columns.

176. Eskdalemuir: H<sub>b</sub> = 237.3 metres.

October, 1932.

Table for station 176, Eskdalemuir, October 1932. Columns include Hour, G.M.T., and 24 numbered columns for hourly readings, plus Mean (Station Level) and Mean (Sea Level) columns.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however,

Readings in millibars at exact hours, Greenwich Mean Time.

177. Eskdalemuir:  $H_b$  (height of barometer cistern above M.S.L.) = 237.3 metres.

November, 1932.

Hour	G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean		
Station Level	Day	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.		
	1	984.6	984.4	983.7	983.1	982.3	982.0	981.2	980.4	979.3	978.9	978.6	978.3	977.9	977.8	978.3	978.6	979.6	980.5	981.1	981.1	981.1	980.9	980.8	980.5	980.7	980.7	
	2	980.5	980.0	979.6	979.3	979.0	978.0	978.0	978.7	979.3	979.9	980.5	980.4	980.4	980.6	980.5	980.7	980.8	981.1	981.8	982.0	982.2	982.2	982.2	982.4	982.4	980.4	
	Mean (Station Level)	987	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986	986
	Mean (Sea Level)	1016	1016	1015	1015	1015	1015	1015	1015	1015	1015	1015	1015	1015	1014	1014	1014	1015	1015	1015	1016	1016	1016	1016	1016	1016	1016	1015

178. Eskdalemuir:  $H_b$  = 237.3 metres.

December, 1932.

Hour	G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean		
Station Level		mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.	mb.		
	1	971.3	971.4	971.8	971.8	972.4	972.8	973.9	974.6	975.8	976.6	977.1	978.1	978.2	978.2	978.9	979.6	980.0	980.1	980.1	979.4	978.7	978.1	977.3	975.8	975.8	976.3	
	2	974.6	972.7	970.8	968.7	966.9	964.7	963.0	961.3	960.9	962.0	961.9	962.3	962.4	962.2	961.7	960.9	959.4	957.8	956.0	955.7	957.5	957.5	958.0	958.2	958.7	958.7	962.9
	Mean (Station Level)	985	985	985	984	984	984	984	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985
	Mean (Sea Level)	1014	1014	1014	1014	1013	1013	1013	1010	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



179. Eskdalemuir:  $H_p = 237.3$  metres.

197

1932.

Table with 23 columns (1-24) and 3 rows (Hour G.M.T., Station Level, Sea Level). Station level values range from 985.35 to 985.23. Sea level values range from 014.29 to 013.99.

180. Eskdalemuir:  $H_p = 237.3$  metres.

1932.

Table with 24 columns (Month, Mean, Hour 1-24) and 12 rows (Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec, Year). Monthly mean values range from 985.23 to 986.58.

ABSOLUTE EXTREMES OF PRESSURE AT STATION LEVEL FOR EACH DAY.

Maximum and Minimum for the interval 0h to 24h. Greenwich Mean Time.

181. Eskdalemuir:  $H_p = 237.3$  metres.

1932.

Large table with 24 columns (Month, Day) and 31 rows (Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec). Each day's data includes Max and Min values. Monthly means are listed at the bottom.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



TEMPERATURE.

199

184. Eskdalemuir: Louvred Hut: h<sub>t</sub> (height of thermometer bulb above ground) = 0.9 metres.

March, 1932.

Table with 25 columns (1-24 for hours, 25 for Mean) and 31 rows (Day 1-31). Columns 2-24 are labeled 1 through 24. Each cell contains a temperature reading in degrees absolute.

185. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

April, 1932.

Table with 25 columns (1-24 for hours, 25 for Mean) and 31 rows (Day 1-31). Columns 2-24 are labeled 1 through 24. Each cell contains a temperature reading in degrees absolute.

NOTE.- The initial 2 or 3. of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

Readings in degrees absolute at exact hours, Greenwich Mean Time.  
186. Eskdalemuir: Louvred Hut:  $h_t$  (height of thermometer bulb above ground) = 0.9 metres.

May, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31, Mean). Columns 1-24 represent hourly readings from 1 to 24. The 'Mean' column shows the average for each day. The 'Hour G. M. T.' column is at the bottom left.

187. Eskdalemuir: Louvred Hut:  $h_t$  = 0.9 metres.

June, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31, Mean). Columns 1-24 represent hourly readings from 1 to 24. The 'Mean' column shows the average for each day. The 'Hour G. M. T.' column is at the bottom left.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.



TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

190. Eskdalemuir: Louvred Hut: h<sub>t</sub> (height of thermometer bulb above ground) = 0.9 metres.

September, 1932.

Table with 25 columns (Hour G. M. T., 1-24, Mean) and 31 rows (Day 1-31). Contains temperature readings in degrees absolute for September 1932.

191. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

October, 1932.

Table with 25 columns (Day, Hour G. M. T., 1-24, Mean) and 31 rows (Day 1-31). Contains temperature readings in degrees absolute for October 1932.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degree absolute is printed 75.0.



From readings in degrees absolute at exact hours, Greenwich Mean Time.

194. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

Table with 25 columns (Hour 1-24, Noon, Mean) and 12 rows (Jan to Dec) showing hourly temperature readings in degrees Celsius.

TEMPERATURE: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change

195. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

Table with 25 columns (Month, Hour 1-24, Mean) and 12 rows (Jan to Dec) showing monthly mean temperatures and diurnal inequalities.

ABSOLUTE EXTREMES OF TEMPERATURE FOR EACH DAY.

Maximum and Minimum for the interval 0h to 24h, Greenwich Mean Time.

196. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

Large table with 24 columns (Month, Day) and 32 rows (Days 1-31) showing absolute maximum and minimum temperatures for each day.

NOTE.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.



RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

197. Eskdalemuir: Louvred Hut: h<sub>t</sub> (height of thermometer bulbs above ground) = 0.9 metres.

January, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour Pressure) and 31 rows (Day 1-31). Data represents relative humidity percentages and vapour pressure in mb.

198. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

February, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour Pressure) and 29 rows (Day 1-29). Data represents relative humidity percentages and vapour pressure in mb.

\* Computed from the mean temperatures and the mean relative humidities. † Mean of the column. ‡ Mean of the row. Values in brackets interpolated.





RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

203. Eskdalemuir: Louvred Hut: h = 0.9 metres.

July, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour \* Pressure) and 31 rows (Day 1-31). Contains relative humidity percentages and vapour pressure values.

204. Eskdalemuir: Louvred Hut: h = 0.9 metres.

August, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour \* Pressure) and 31 rows (Day 1-31). Contains relative humidity percentages and vapour pressure values.

\* Computed from the mean temperatures and the mean relative humidities. † Mean of the column. ‡ Mean of the row.

Percentages at exact hours, Greenwich Mean Time.

205. Eskdalemuir: Louvred Hut: h<sub>t</sub> (height of thermometer bulbs above ground) = 0.9 metres.

September, 1932.

Table with 24 columns (1-24) and 30 rows (Day 1-30). Columns 1-24 show relative humidity percentages. Column 25 is 'Mean'. Column 26 is 'Vapour \* Pressure'. Includes a 'Mean' row and a 'Vapour \* Pressure' row.

206. Eskdalemuir: Louvred Hut: h<sub>t</sub> = 0.9 metres.

October, 1932.

Table with 24 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 show relative humidity percentages. Column 25 is 'Mean'. Column 26 is 'Vapour \* Pressure'. Includes a 'Mean' row and a 'Vapour \* Pressure' row. A 'Hour G. M. T.' row is at the bottom.

\* Computed from the mean temperatures and the mean relative humidities. † Mean of the column. ‡ Mean of the row.



HUMIDITY: ANNUAL MEANS FROM HOURLY VALUES.

For exact hours, Greenwich Mean Time.

209. Eskdalemuir: (Louvred Hut)  $h_t = 0.9$  metres.

1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean
Relative Humidity	88.8	89.0	89.3	89.6	89.2	88.2	87.1	85.0	82.5	80.0	77.1	74.7	73.1	72.7	72.9	74.8	77.2	79.6	82.5	85.1	86.6	87.5	88.1	88.5	82.9
Vapour Pressure (in Millibars)*	8.0	8.0	7.9	7.9	7.9	8.0	8.1	8.3	8.5	8.7	8.8	8.8	8.8	8.8	8.8	8.7	8.6	8.6	8.5	8.4	8.2	8.1	8.1	8.1	8.4

Computed from the mean temperature and the mean relative humidity.

RELATIVE HUMIDITY: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures for the mean of the day are adjusted for non-cyclic changes.

210. Eskdalemuir: (Louvred Hut)  $h_t = 0.9$  metres.

1932.

	Mean	Hour. 1.	G.M.T. 2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
January	89.9	+ 0.9	+ 0.8	+ 1.7	+ 1.7	+ 2.0	+ 1.7	+ 2.0	+ 2.1	+ 1.1	+ 0.5	- 0.4	- 1.6	- 3.7	- 4.1	- 3.5	- 2.9	- 1.1	- 0.4	+ 0.8	+ 0.9	+ 0.2	+ 0.1	+ 0.7	+ 0.6
February	81.8	+ 4.5	+ 5.4	+ 6.6	+ 6.8	+ 7.0	+ 5.5	+ 6.6	+ 5.8	+ 3.9	+ 0.1	- 4.1	- 10.5	- 13.9	- 14.6	- 14.6	- 10.8	- 5.7	- 0.7	+ 1.4	+ 3.2	+ 3.8	+ 4.9	+ 4.6	+ 4.8
March	80.1	+ 6.4	+ 6.6	+ 6.8	+ 6.6	+ 7.2	+ 7.3	+ 6.7	+ 5.5	+ 2.8	- 4.4	- 8.3	- 10.2	- 12.5	- 10.7	- 9.5	- 9.7	- 7.2	- 4.5	- 0.4	+ 2.2	+ 3.6	+ 4.5	+ 5.3	+ 5.7
April	75.2	+ 8.8	+ 8.7	+ 8.2	+ 9.9	+ 9.7	+ 9.5	+ 8.1	+ 2.9	- 0.6	- 4.0	- 6.6	- 11.0	- 10.9	- 15.1	- 15.8	- 13.4	- 10.4	- 6.5	- 0.6	+ 2.3	+ 5.2	+ 5.6	+ 8.0	+ 8.0
May	78.7	+ 9.3	+ 8.8	+ 8.6	+ 8.2	+ 7.4	+ 6.4	+ 2.6	- 1.7	- 3.6	- 5.6	- 9.1	- 11.4	- 12.5	- 12.3	- 12.7	- 9.7	- 6.6	- 4.5	- 0.5	+ 5.7	+ 7.6	+ 8.2	+ 9.0	+ 8.4
June	72.8	+ 12.0	+ 13.3	+ 14.3	+ 14.2	+ 10.6	+ 6.7	+ 2.3	- 3.7	- 7.4	- 8.5	- 10.2	- 11.9	- 12.5	- 13.5	- 14.1	- 12.8	- 10.3	- 7.2	- 3.6	+ 2.4	+ 7.3	+ 9.7	+ 10.7	+ 12.1
July	84.2	+ 7.4	+ 7.5	+ 7.3	+ 8.2	+ 7.2	+ 5.5	+ 2.3	+ 0.8	- 1.8	- 4.3	- 5.6	- 7.0	- 8.7	- 9.3	- 9.5	- 8.3	- 8.3	- 6.0	- 2.9	+ 1.9	+ 4.5	+ 5.6	+ 6.2	+ 7.3
August	84.1	+ 7.7	+ 7.3	+ 7.2	+ 8.0	+ 7.6	+ 6.8	+ 5.7	+ 3.1	- 0.8	- 5.0	- 7.9	- 11.3	- 11.8	- 11.3	- 10.6	- 9.6	- 7.2	- 4.9	- 0.1	+ 3.6	+ 4.3	+ 5.8	+ 6.1	+ 7.3
September	84.5	+ 6.0	+ 6.7	+ 7.1	+ 7.3	+ 7.0	+ 7.0	+ 5.6	+ 3.5	- 2.1	- 4.3	- 8.2	- 10.1	- 11.9	- 11.7	- 11.6	- 7.9	- 5.2	- 1.7	+ 0.2	+ 2.7	+ 4.5	+ 5.7	+ 5.9	+ 5.8
October	85.5	+ 4.0	+ 4.0	+ 4.4	+ 4.7	+ 4.4	+ 5.3	+ 4.9	+ 3.0	+ 0.5	- 1.7	- 6.3	- 8.3	- 10.6	- 10.4	- 9.0	- 6.5	- 2.7	+ 0.8	+ 1.4	+ 1.7	+ 2.9	+ 4.5	+ 4.8	+ 4.4
November	87.2	+ 2.5	+ 2.4	+ 3.2	+ 3.0	+ 3.5	+ 2.3	+ 2.2	+ 2.4	+ 2.9	+ 1.8	- 1.4	- 2.8	- 5.3	- 6.0	- 5.6	- 3.6	- 1.6	- 2.2	- 0.8	- 0.4	+ 0.7	+ 0.9	+ 0.7	+ 1.2
December	90.0	+ 2.0	+ 2.6	+ 1.5	+ 2.2	+ 2.1	+ 0.3	+ 1.4	+ 2.1	+ 1.1	+ 1.1	- 1.2	- 2.8	- 3.6	- 3.9	- 3.5	- 2.3	- 1.7	- 1.3	+ 0.1	+ 0.4	+ 0.3	+ 0.1	+ 1.2	+ 1.8
Year	82.9	+ 5.9	+ 6.2	+ 6.4	+ 6.7	+ 6.3	+ 5.4	+ 4.2	+ 2.1	- 0.3	- 2.9	- 5.8	- 8.2	- 9.8	- 10.2	- 9.9	- 8.1	- 5.7	- 3.3	- 0.4	+ 2.2	+ 3.7	+ 4.6	+ 5.3	+ 5.6

RAINFALL: ANNUAL TOTALS OF HOURLY VALUES.

Amounts in millimetres; durations, in hours, for periods of sixty minutes between the exact hours, Greenwich Mean time.

211. Eskdalemuir:  $H_t = 242.0$  metres +  $0.4$  metres.

1932.

Hour G. M. T.	0 to 1.	1 to 2.	2 to 3.	3 to 4.	4 to 5.	5 to 6.	6 to 7.	7 to 8.	8 to 9.	9 to 10.	10 to 11.	11 to Noon	Noon to 13.	13 to 14.	14 to 15.	15 to 16.	16 to 17.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	0 to 24.
Amount	69.3	78.7	83.2	70.8	83.0	93.7	94.6	89.7	80.9	74.7	75.2	77.5	71.5	60.3	64.3	68.5	81.0	60.7	66.1	70.7	78.1	70.9	80.9	67.1	1811.4
Duration	54.4	54.0	58.4	64.7	63.6	61.8	61.9	53.9	48.5	41.4	38.7	47.7	47.9	39.9	40.0	39.6	40.5	44.8	46.7	48.0	50.3	51.7	51.3	47.5	1197.2

\*The totals and durations for individual months are printed in the tables on the following pages.

NOTES ON RAINFALL.

212. Eskdalemuir:

1932.

Rainfall Duration. - There were 140 days on which no duration of rainfall was registered. There were 50 days on which the duration of rainfall was registered as 0.1 hour to 1.0 hour, 21 days with 1.1 to 2.0 hours, 79 days with 2.1 to 6.0 hours, 54 days with 6.1 to 12.0 hours, and 22 days with more than 12 hours. The day with the greatest duration was December 17th, when the duration was 22.8 hours, the amount falling being 65.4 mm., the greatest daily fall since records were commenced in 1911.

Notable Falls of the Year.

- (a) The greatest amount in a 60-minute period was 14.1 mm., which was recorded between 16h and 17h, July 24th. There were no occasions on which 5 mm. of rain fell in 6 minutes. Falls of 5 mm. in less than one hour occurred on 25 days.
- (b) Details of the greatest continuous falls are as follows:-

Date	Amount.	Duration
January 2nd - 3rd	52	28.4
July 13th	57	7.7
October 8th	30	11.5
December 16th	60	15.5
December 16th - 17th	31	12.0
December 17th - 18th	68	33.6

From 3h. on 16th December to 13h. on 19th December 192 mm. fell.

Wet Periods.

- (a) There was one "rain spell" (i.e., period of fifteen or more consecutive days on each of which 0.2 mm. or more of rain fell), viz., January 1st to 24th.
- (b) There were no "wet spells" (i.e. periods of fifteen or more consecutive days on each of which 1.0 mm. or more of rain fell). The period January 1st to 21st failed to classify as a wet spell in having only 0.8 mm. on the 8th. and 0.2 mm. on the 11th.

Dry Periods.

- (a) There was one period of "absolute drought" (i.e. fifteen or more consecutive days on none of which 0.2 mm. or more of rain fell) viz., June 8th to 24th.
- (b) There were two periods of "partial drought" (i.e. twenty-nine or more consecutive days, the mean rainfall of which did not exceed 0.2 mm. per day), viz., January 25th to March 4th., and May 29th. to June 27th.









RAINFALL.

Amounts in millimetres, for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

219. Eskdalemuir:  $H_T$  (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) =  $h_T$  (height of receiving surface above ground) = 242.0 metres + 0.4 metres. July, 1932.

Table with 31 columns for hours (0-1 to 24) and rows for days (1-31) and summary rows (Sum, Total Duration). Columns contain rainfall amounts in mm and durations in hr.

220. Eskdalemuir:  $H_T$  = 242.0 metres + 0.4 metres.

August, 1932.

Table with 31 columns for hours (0-1 to 24) and rows for days (1-31) and summary rows (Sum, Total Duration). Columns contain rainfall amounts in mm and durations in hr.

RAINFALL.

Amounts in millimetres, for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

221. Eskdalemuir:  $H_r$  (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) =  $h_r$  (height of receiving surface above ground) = 242.0 metres + 0.4 metres. September, 1932.

Table for Eskdalemuir in September 1932. Columns include Hour (G.M.T.), rainfall in mm. for each hour (0-1 to 23-24), and Total Duration in hours. Rows list days from 1 to 30.

222. Eskdalemuir:  $H_r$  = 242.0 metres + 0.4 metres.

October, 1932.

Table for Eskdalemuir in October 1932. Columns include Hour (G.M.T.), rainfall in mm. for each hour (0-1 to 23-24), and Total Duration in hours. Rows list days from 1 to 31.



DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

225. Eskdalemuir: h<sub>s</sub> (height of recorder above ground) = 1.5 metres

January, 1932.

Table for station 225, Eskdalemuir, January 1932. Columns include Hour L. A. T. (3-4 to 20-21), Total for Day, Per cent. of Possible, and Radiation by Angstrom Pyrheliometer (Time G.M.T., Intensity, p/p sec. 2, Sky).

226. Eskdalemuir: h<sub>s</sub> = 1.5 metres

February, 1932.

Table for station 226, Eskdalemuir, February 1932. Columns include Hour L. A. T. (3-4 to 20-21), Total for Day, Per cent. of Possible, and Radiation by Angstrom Pyrheliometer (Time G.M.T., Intensity, p/p sec. 2, Sky).

\*Estimated - Frost on sunshine ball.







For periods of sixty minutes, between the exact hours of Local Apparent Time.

231. Eskdalemuir: h<sub>s</sub> (height of recorder above ground) = 1.5 metres

July, 1932.

Table for July 1932 showing hourly radiation data for Eskdalemuir. Columns include hour, radiation intensity in hr., total for day, and percentage of possible radiation. Includes a summary row for 'Sum.' and 'Mean.' and a note 'Radiation by Angström Pyrheliometer.' with sub-columns for Time, Intensity, P/P0, and Sky.

232. Eskdalemuir: h<sub>s</sub> = 1.5 metres

August, 1932.

Table for August 1932 showing hourly radiation data for Eskdalemuir. Similar to the July table, it includes hourly data, a summary row, and a mean row. Includes a note 'Radiation by Angström Pyrheliometer.' with sub-columns for Time, Intensity, P/P0, and Sky.



For periods of sixty minutes, between the exact hours of Local Apparent Time.

235. Eskdalemuir: h<sub>s</sub> (height of recorder above ground) = 1.5 metres

November, 1932.

Table with 23 columns: Hour L. A. T., 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, Total for Day, Per cent. of Possible, and Radiation by Angstrom Pyrheliometer (Time, Intensity, p/p, Sky).

236. Eskdalemuir: h<sub>s</sub> = 1.5 metres

December and Year, 1932.

Table with 23 columns: Hour L. A. T., 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, Total for Day, Per cent. of Possible, and Radiation by Angstrom Pyrheliometer (Time, Intensity, p/p, Sky).

WIND: DIRECTION AND SPEED.

Direction expressed in degrees from North (E-90°, S-180°, W-270° N-360°). Speed in metres per second.

H<sub>a</sub> (height of anemograph above M.S.L.) - Height of ground above

237. Eskdalemuir:

Table with 24 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 31 rows (Day 1-31). Each cell contains wind speed and direction data.

238. Eskdalemuir: H<sub>a</sub> = 235 metres + 15 metres.

Table with 24 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 29 rows (Day 1-29). Each cell contains wind speed and direction data.

\* Velocity record defective. † Mean for 30 days only, 2nd omitted.

Averages for periods of sixty minutes, centred at the Half hours. Greenwich Mean Time.

M.S.L. + h<sub>p</sub> (height of anemograph above ground) = 235 metres + 15 metres.

January, 1932.

Table for January 1932 showing wind direction and speed data for days 1 through 31. Columns represent days 12-13 to 23-24, with additional Mean and Day columns.

February, 1932.

Table for February 1932 showing wind direction and speed data for days 1 through 29. Columns represent days 12-13 to 23-24, with additional Mean and Day columns.

Direction expressed in degrees from North (E=90°, S=180°, W=270° N=260°). Speed in metres per second.

239. Eskdalemuir:

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Table with 24 columns (Hour G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 31 rows of hourly data for Eskdalemuir. Each cell contains two values: speed in m/s and direction in degrees.

240. Eskdalemuir: -H<sub>a</sub> = 235 metres + 15 metres.

Table with 24 columns (Hour G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 31 rows of hourly data for Eskdalemuir at a different height. Each cell contains two values: speed in m/s and direction in degrees.



Direction expressed in degrees from North (E=90°, S=180°, W=270° N=360°). Speed in metres per second. H<sub>a</sub> (height of anemograph above M.S.L.) - Height of ground above

241. Eskdalemuir:

Table with 13 columns for 1-hour intervals (0-1 to 11-12) and 2 rows per hour (Day and G. M. T.). Each cell contains wind direction and speed in degrees and m/s. Includes a 'Mean.' row at the bottom.

242. Eskdalemuir: H<sub>a</sub> - 235 metres + 15 metres.

Table with 13 columns for 1-hour intervals (0-1 to 11-12) and 2 rows per hour (Day and G. M. T.). Each cell contains wind direction and speed in degrees and m/s. Includes a 'Mean.' row at the bottom.





Direction expressed in degrees from North (E=90°, S=180°, W=270° N=360°). Speed in metres per second. H<sub>a</sub> (height of anemograph above M.S.L.) — Height of ground above

243. Eskdalemuir:

Table with 13 columns for wind direction intervals (0-1 to 11-12) and 31 rows for hours of the day. Each cell contains wind speed in m/s and direction in degrees. Includes a 'Mean.' row at the bottom.

244. Eskdalemuir: H<sub>a</sub> = 235 metres + 15 metres.

Table with 13 columns for wind direction intervals (0-1 to 11-12) and 31 rows for hours of the day. Each cell contains wind speed in m/s and direction in degrees. Includes a 'Mean.' row at the bottom.

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time. M.S.L. + h<sub>a</sub> (height of anemograph above ground) - 235 metres + 15 metres.

July, 1932.

Table with columns for time intervals (12-13, 13-14, ..., 23-24), wind speed in m/s, and day numbers. Includes a summary row at the bottom with values like 6.2, 6.2, 6.5, 6.1, 6.1, 5.8, 5.3, 4.6, 3.9, 3.7, 3.5, 5.1.

August, 1932.

Table with columns for time intervals (12-13, 13-14, ..., 23-24), wind speed in m/s, and day numbers. Includes a summary row at the bottom with values like 5.3, 5.5, 5.3, 5.1, 4.3, 3.7, 3.2, 3.1, 2.8, 2.9, 2.8, 3.8.





Direction expressed in degrees from North (E=90°, S=180° W=270° N=360°). Speed in metres per second.  
H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

247. Eskdalemuir:

Table with columns for Hour G. M. T., Day, and 12 intervals (0-1 to 11-12). Rows show wind speed data in m/s and mph for each interval and a mean row at the bottom.

248. Eskdalemuir: H<sub>a</sub> = 235 metres + 15 metres.

Table with columns for Hour G. M. T., Day, and 12 intervals (0-1 to 11-12). Rows show wind speed data in m/s and mph for each interval and a mean row at the bottom.

\*Record defective. † Mean for 26 days only; 4th, 5th, 7th, 9th, and 18th omitted. ‡ Mean for 358 days only.







Readings, in degrees absolute, at 9h Greenwich Mean Time.

251. Eskdalemuir.

1932.

Table with columns for months (Jan-Dec) and depths (30cm, 122cm). Rows show daily temperature readings. Includes a 'Mean.' row at the bottom and a 'Year.' summary row.

The initial 2 or 3 of the readings is omitted : i.e. 275.0 degrees absolute is written 75.0.

Year. 81.3 81.3

MINIMUM TEMPERATURE "ON THE GRASS" DURING THE INTERVAL 18h. TO 7h. G.M.T.

252. Eskdalemuir.

Readings in degrees absolute.

1932.

Table with columns for months (Jan-Dec) and rows for days (1-31). Shows minimum temperature readings on the grass. Includes a 'Mean.' row at the bottom.

Notes, - (1) The initial 2 or 3 of the readings is omitted, i.e., 275.0 is written 75.0. (2) The minimum refers to the interval from 18h. the previous day to 7h. on the day to which it is entered. (3) Annual Mean 275.4



255. Eskdalemuir.

March, 1932.

Table for station 255, Eskdalemuir, March 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

256. Eskdalemuir.

April, 1932.

Table for station 256, Eskdalemuir, April 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

257. Eskdalemuir.

May, 1932.

Table for station 257 (Eskdalemuir) in May 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

258. Eskdalemuir.

June, 1932.

Table for station 258 (Eskdalemuir) in June 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

259. Eskdalemuir.

July, 1932.

Table for July 1932 at Eskdalemuir. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 show various cloud types like St., Cu., and Ci. with corresponding amounts and weather notes.

260. Eskdalemuir.

August, 1932.

Table for August 1932 at Eskdalemuir. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 show various cloud types like St., Cu., and Ci. with corresponding amounts and weather notes.



263. Eskdalemuir.

November, 1932.

Table for station 263, Eskdalemuir, covering the month of November 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day.

264. Eskdalemuir.

December, 1932.

Table for station 264, Eskdalemuir, covering the month of December 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day.





POTENTIAL GRADIENT (reduced to level surface): VOLTS PER METRE.

Mean values for periods of sixty minutes, ending at the exact hours, Greenwich Mean Time

265. Eskdalemuir.

1932.

MONTH.	JULY. Factor. 6.17				AUGUST. Factor. 6.17				SEPTEMBER. Factor. 6.18				
	Hour.G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.
1	-515	165	140	250	255	110	40	120	110	Z-	Z-	Z-	160
2	125	150	165	180	155	295	70	200	215	100	100	100	145
3	265	185	130	210	295	90	85	265	150	Z-	Z-	Z-	210
4	Z+	295	Z+	90	170	195	-5	240	120	105	105	105	250
5	160	230	140	325	175	165	45	255	110	65	-25	-25	275
6	325	175	75	290	300	160	90	195	110	315	110	110	225
7	175	175	135	380	175	110	135	225	370	40	115	115	240
8	85	265	80	135	335	---	160	170	Z-	280	Z-	Z-	280
9	100	310	---	325	345	360	150	360	110	120	125	125	190
10	380	240	---	525	205	100	120	160	40	65	90	90	110
11	80	200	-20	-15	150	155	195	370	Z-	65	70	70	145
12	45	50	95	210	320	220	125	180	65	125	40	40	290
13	110	Z+	325	95	195	160	75	380	155	155	75	75	-40
14	75	80	165	180	65	95	155	335	100	145	145	145	495
15	95	105	185	250	275	130	115	195	220	275	120	120	190
16	85	350	105	105	210	445	110	315	140	230	180	180	185
17	85	155	Z+	-65	280	105	140	150	45	145	85	85	205
18	95	145	165	225	255	160	205	220	---	135	180	180	195
19	240	120	135	200	---	-30	130	185	80	145	205	205	300
20	---	220	85	135	470	245	130	65	315	215	155	155	455
21	100	55	5	270	-370	50	-80	-65	460	240	275	275	710
22	140	-25	115	165	45	160	130	140	95	180	225	225	350
23	80	100	145	250	110	105	110	400	495	380	95	95	255
24	---	---	Z-	Z+	495	295	180	175	105	190	55	55	Z+
25	Z+	175	125	210	515	290	140	160	215	150	Z-	Z-	385
26	250	65	Z+	95	85	80	135	245	165	Z-	215	215	235
27	-10	Z+	150	Z-	100	225	115	250	165	215	175	175	365
28	-805	55	-5	240	135	120	195	345	140	370	170	170	320
29	295	225	25	235	155	160	190	190	810	650	230	230	675
30	Z-	200	470	280	---	---	Z-	230	80	355	90	90	-195
31	240	Z-	140	Z-	115	180	165	245					
(a)	158	173	143	225	228	177	130	227	192	202	137	137	290
(b)	60	148	104	215	203	177	116	230	202	211	131	131	273
Mean.		(a) 175	(b) 132		(a) 191	(b) 181			(a) 205	(b) 204			
MONTH.	OCTOBER. Factor. 6.22				NOVEMBER. Factor. 6.29				DECEMBER. Factor. 6.31				
Hour.G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	
1	Z+	245	260	335	340	30	90	---	Z-	95	260	505	
2	Z-	125	195	315	---	90	60	170	Z-	Z-	135	110	
3	-75	90	195	390	135	85	100	125	Z-	Z-	165	355	
4	170	375	215	555	45	135	170	245	80	140	180	115	
5	315	320	160	0	195	245	180	340	-10	155	145	525	
6	35	105	-40	-205	210	145	290	265	160	180	265	175	
7	Z-	130	---	240	240	305	200	245	135	200	250	385	
8	-440	---	Z-	245	245	220	135	235	210	140	390	285	
9	280	290	80	295	90	200	90	365	290	115	Z-	180	
10	-50	140	Z-	115	115	275	365	470	105	90	60	Z-	
11	Z-	260	155	260	225	390	310	425	Z-	45	135	170	
12	320	210	Z-	115	245	35	70	110	15	155	495	270	
13	Z-	Z-	Z+	240	90	145	205	190	380	860	985	-165	
14	155	190	130	220	105	70	70	95	185	235	550	Z+	
15	90	155	195	215	50	70	95	-130	130	Z-	170	145	
16	115	65	75	110	80	60	150	145	130	Z-	Z-	235	
17	90	135	115	Z-	285	75	115	135	Z-	-125	Z-	Z-	
18	15	85	145	240	310	260	200	355	Z-	225	Z-	130	
19	175	155	355	290	150	330	285	565	Z-	Z-	-45	350	
20	155	Z-	155	435	505	375	Z+	350	-145	65	35	55	
21	105	355	260	310	365	375	90	170	340	310	105	345	
22	Z-	-245	Z-	245	40	Z-	Z-	210	75	165	165	-225	
23	95	Z-	Z-	335	---	235	Z+	210	-275	50	Z-	245	
24	180	345	110	515	115	Z+	185	45	80	260	115	320	
25	260	155	Z-	345	65	215	205	195	175	320	165	235	
26	25	325	Z+	Z-	Z-	Z-	Z+	Z-	150	265	275	390	
27	Z+	165	195	160	-5	50	190	620	265	375	355	630	
28	290	175	245	380	125	135	90	285	170	105	170	80	
29	155	Z+	Z+	25	95	105	-5	Z-	Z-	-60	---	---	
30	135	645	310	Z-	155	285	170	Z+	---	---	385	520	
31	Z+	160	165	70					140	245	375	Z-	
(a)	158	216	186	261	178	183	164	263	169	208	264	282	
(b)	142	208	163	255	160	182	172	260	139	246	273	228	
Mean.		(a) 205	(b) 192		(a) 197	(b) 193			(a) 231	(b) 221			
									(a)		(b)		
									181	183	171	256	
									164	185	164	249	
									(a) 198		(b) 190		

The Potential Gradient is reckoned as positive if the potential increases upwards. For indeterminate potential gradient the following notation is used:  
 Z+, Indeterminate, positive value; Z-, Indeterminate, negative value; Z±, Indeterminate in magnitude and sign.  
 (a) Mean of all positive readings. (b) Mean from all complete days using both positive and negative readings.

POTENTIAL GRADIENT (reduced to level surface): DIURNAL INEQUALITIES (in volts per metre).

The departures from the mean of the day are adjusted for non-cyclic change.†

266. Eskdalemuir.

\*0a Days Only.

1932.

MONTH AND SEASON.	Hour		G.M.T.		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Non Cyclic Change	No. of Days Used.	Mean Values.
	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24				
Jan.	v/m. -23	v/m. -30	v/m. -48	v/m. -72	v/m. -59	v/m. -58	v/m. -67	v/m. -36	v/m. -23	v/m. -5	v/m. -15	v/m. -1	v/m. +25	v/m. +36	v/m. +21	v/m. -9	v/m. +41	v/m. +58	v/m. +75	v/m. +59	v/m. +84	v/m. +50	v/m. +10	v/m. -10	v/m. +9	6	245	
Feb.	-15	-57	-66	-73	-66	-78	-75	-57	-46	-30	-36	-62	-66	-58	-30	+21	+53	+115	+111	+135	+143	+131	+90	+26	+8	15	282	
Mar.	+27	+13	+9	-1	+1	-13	-17	-40	-21	-64	-82	-90	-79	-71	-59	-42	-15	+27	+46	+94	+117	+127	+117	+33	-3	14	267	
Apr.	-5	+11	-4	-35	-15	-13	-3	-13	-21	-21	-3	-1	-4	-5	-15	-31	-17	-12	0	+31	+56	+47	+48	+16	-38	6	165	
May.	+46	+12	+12	+39	+51	+46	+32	+8	-24	-47	-60	-60	-67	-76	-60	-50	-40	-19	+11	+44	+94	+68	+8	+47	+2	8	205	
June.	+50	+44	+47	+31	+29	-1	-11	-29	-20	-39	-36	-35	-39	-42	-35	-29	-25	-19	-7	+35	+38	+19	+27	+51	-8	16	174	
July.	+1	-27	-25	-23	+11	+27	0	-46	-44	-24	-29	-24	-29	-48	-27	-21	-19	+7	+4	+72	+67	+86	+71	+33	+9	4	176	
Aug.	+9	+11	+32	+49	+26	+13	+35	+26	-4	-28	-58	-73	-72	-69	-61	-53	-38	-7	+18	+58	+55	+69	+32	+23	+11	11	197	
Sept.	-7	-27	-20	-55	-45	-50	-47	-16	-23	-34	-39	-47	-34	-41	-31	-38	-20	+20	+58	+108	+159	+126	+67	+41	+28	8	213	
Oct.	+3	-19	-5	+52	+3	-75	-62	-28	+18	-34	-50	-97	-52	-75	-90	-97	-44	+26	+63	+115	+132	+249	+103	-43	+35	3	266	
Nov.	-10	-19	-18	-17	-31	-38	-25	-17	-5	-16	-31	-52	-52	-57	-34	+14	+47	+57	+64	+73	+52	+61	+38	+10	+92	12	231	
Dec.	-25	-31	-45	-21	-35	+27	+21	+1	-5	-43	-59	-51	-60	-60	+5	+96	+74	+133	+77	-8	+8	-16	+23	-5	+96	3	261	
Year.	+4	-10	-11	-11	-11	-18	-18	-21	-18	-32	-41	-49	-44	-47	-35	-20	-0	+32	+43	+68	+84	+85	+53	+19	---	--	223	
Winter.	-18	-34	-44	-46	-48	-37	-37	-27	-20	-23	-35	-41	-38	-35	-9	+31	+54	+91	+82	+65	+72	+57	+40	+5	---	--	255	
Equinox.	+5	-5	-5	-10	-14	-38	-32	-24	-12	-38	-43	-59	-42	-48	-49	-52	-24	+15	+42	+87	+116	+137	+84	+12	---	--	228	
Summer.	+27	+10	+17	+24	+29	+21	+14	-10	-23	-35	-46	-48	-52	-59	-46	-38	-31	-9	+7	+52	+63	+61	+35	+39	---	--	188	

267. Eskdalemuir.

\*1a and 2a Days Only.

1932.

MONTH AND SEASON.	Hour.		G.M.T.		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Non Cyclic Change	No. of Days Used.	Mean Values.
	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24				
Jan.	-25	-23	-3	-1	-25	-10	+4	-10	-26	-25	-1	-5	+13	+44	+36	+39	+44	+65	+62	-13	-72	-26	-40	-12	-1	5	166	
Feb.	0	-17	-65	-50	-66	-78	-32	+9	-5	-29	-61	-66	-59	-54	-22	-32	+13	+127	+103	+112	+94	+42	+83	+58	+13	6	216	
Mar.	+9	+11	+139	-28	-13	-70	+70	+92	+39	-63	-131	-103	-52	-25	-64	+29	+40	+9	+88	+122	+58	+20	+46	+62	-122	2	193	
Apr.	+51	-31	+13	+8	+20	+13	-25	-5	+12	-16	-1	+11	-8	-21	-64	-78	-24	-84	-16	+47	+78	+56	+54	+15	+99	4	154	
May.	+24	+5	+3	-11	-8	+24	+16	+12	0	+15	-4	+3	-9	-16	-33	-54	-44	-47	+5	+40	+27	-16	+12	+40	+62	8	122	
June.	+56	+32	-8	+7	-8	-3	-29	-39	-43	-47	-42	-50	-63	-51	-38	-29	-13	+1	+11	+44	+91	+87	+58	+78	-13	7	143	
July.	+32	+35	+7	-8	+9	+23	+52	+110	+66	+43	-36	-59	-86	-115	-113	-55	-71	-48	-8	+9	+12	+74	+71	+50	-14	4	185	
Aug.	+63	+47	+22	-22	-11	-22	-46	-28	-1	-11	-19	-28	-62	-67	-92	-73	-62	-18	+24	+54	+55	+80	+92	+123	-11	7	173	
Sept.	+36	+15	+3	+1	-18	+18	+27	+12	-24	-22	-58	-24	-24	-26	-58	-54	-45	+16	-23	+32	+72	+47	+51	+51	-34	3	150	
Oct.	+25	-86	-74	-94	-49	-76	-102	-36	+31	+30	-9	-35	-39	-61	-39	-4	+4	+112	+165	+81	+50	+65	+68	+61	-72	5	206	
Nov.	+14	-10	-33	-40	-55	-88	-66	-18	-53	-47	-53	-39	-23	+1	-34	+26	-13	+68	+112	+133	+52	+53	+83	+16	-96	4	155	
Dec.	-40	+1	-85	-85	-75	-59	-39	-21	-8	+23	+5	-81	-25	+13	+57	+73	+45	+123	+87	+148	+73	-27	-49	-51	+3	5	222	
Year.	+20	-2	-30	-27	-25	-30	-15	+8	+2	-13	-31	-43	-36	-31	-39	-18	-11	+27	+51	+67	+49	+38	+44	+41	---	--	174	
Winter.	-13	-12	-47	-44	-55	-59	-33	-10	-23	-19	-27	-48	-23	+1	+9	+27	+22	+96	+91	+95	+37	+11	+19	+3	---	--	190	
Equinox.	+30	-23	-49	-28	-15	-38	-10	+19	+23	-18	-41	-46	-31	-33	-56	-27	-6	+13	+53	+71	+65	+47	+55	+47	---	--	176	
Summer.	+44	+30	+6	-9	-5	+5	-2	+14	+5	0	-25	-33	-55	-62	-69	-53	-47	-28	+8	+37	+46	+56	+58	+73	---	--	156	

† see page 21.

\*Note. For explanation of 0a and 2a Days, see page 162.

ELECTRICAL CHARACTER OF EACH DAY, AND APPROXIMATE DURATION OF  
NEGATIVE POTENTIAL GRADIENT.

268. Eskdalemuir.

1932.

MONTH.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	Day.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character
		Hours.		Hours.		Hours.		Hours.		Hours.		Hours.
1	2c	7.7	1a	0.5	0a	...	1a	2.0	0a	...	0a	...
2	2c	10.7	1a	0.4	0a	...	0a	...	2b	5.4	0a	...
3	2c	17.3	0a	...	0a	...	1b	0.9	0a	...	1a	0.6
4	(1b)	(2.4)	0a	...	0a	...	1a	0.3	1a	0.2	1a	0.1
5	2b	6.3	0a	...	2c	4.2	1b	0.9	1c	2.3	0a	...
6	2b	5.7	0a	...	2c	3.2	2b	8.7	1b	0.3	0a	...
7	1c	2.6	0a	...	2c	5.4	2c	3.2	1c	2.4	1a	0.4
8	1b	0.8	1a	0.6	0a	...	1a	0.3	1a	0.1	1a	0.6
9	2c	12.7	1a	0.2	0a	...	2c	15.5	0a	...	0a	...
10	2c	9.3	1b	0.6	1b	0.9	2c	4.4	0a	...	0a	...
11	0a	...	1b	1.6	1b	0.2	1c	1.8	1a	1.8	1a	0.4
12	1a	2.7	1b	0.1	0a	...	0a	...	2c	7.7	0a	...
13	2c	7.6	1b	1.6	0a	...	2b	3.6	1b	2.3	0a	...
14	2b	5.9	0a	...	0a	...	2c	10.8	1b	0.2	0a	...
15	2c	7.7	0a	...	0a	...	1b	1.7	1b	1.5	0a	...
16	2c	10.4	0a	...	0a	...	0a	...	2b	5.1	0a	...
17	2b	4.4	0a	...	1a	0.9	0a	...	0a	...	0a	...
18	0a	...	0a	...	0a	...	1a	0.6	2a	3.5	0a	...
19	1a	0.1	0a	...	2b	7.4	2b	4.3	2b	4.0	0a	...
20	1a	0.1	0a	...	2b	4.7	2c	3.1	1a	0.8	0a	...
21	(2c)	---	1b	0.3	2c	7.3	1b	2.5	0a	...	0a	...
22	(1b)	---	0a	...	2c	10.6	2c	3.8	1a	0.2	0a	...
23	(1a)	---	1a	0.2	1a	0.1	2c	4.5	1a	0.1	0a	...
24	2b	3.1	1b	2.5	2b	9.0	1a	0.4	1b	0.4	1a	0.1
25	1a	0.1	1b	2.4	0a	...	1a	0.2	1b	2.4	1a	0.1
26	0a	...	1a	0.2	0a	...	0a	...	1b	2.9	1a	0.1
27	0a	...	0a	...	2b	4.2	0a	...	1a	0.1	0a	...
28	0a	...	0a	...	2c	6.3	2c	7.1	2b	4.9	1c	2.4
29	1a	1.6	0a	...	2c	7.8	1b	2.8	2b	4.3	1a	0.1
30	0a	...	0a	...	2c	6.6	1b	2.8	0a	...	2a	3.9
31	1b	0.6			1b	2.6			0a	...		
Total	---	119.8	---	11.2	---	81.4	---	86.2	---	52.9	---	8.8
No. of days used.	---	28	---	29	---	31	---	30	---	31	---	30
Mean.	---	4.3	---	0.4	---	2.6	---	2.9	---	1.7	---	0.3

	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.	Character	Duration of Negative Pot. Grad.
		Hours.		Hours.		Hours.		Hours.		Hours.		Hours.
1	2b	4.0	1a	0.3	2c	7.9	1b	2.9	1b	2.6	2b	3.3
2	1b	2.2	1a	0.2	1a	1.9	2b	3.7	(2b)	---	2c	11.4
3	1b	1.3	0a	...	2c	3.3	1b	2.8	1b	1.6	2c	4.7
4	2c	5.8	1b	0.7	1a	0.8	0a	...	1a	0.4	1b	0.6
5	1a	0.4	1a	0.1	1a	0.6	1a	1.1	0a	...	1b	1.9
6	1a	0.1	1a	0.5	2b	3.9	2b	6.3	0a	...	1a	0.1
7	0a	...	0a	...	1b	1.6	2c	11.1	0a	...	1b	0.9
8	1a	0.2	1a	0.1	2c	7.6	2c	(13.6)	1a	0.9	0a	...
9	0a	...	0a	...	0a	...	0a	...	0a	...	2c	5.9
10	0a	...	1a	0.3	2b	5.1	2c	(6.9)	0a	...	2c	7.8
11	2b	3.8	1b	0.7	2c	6.8	2c	4.4	0a	...	2b	3.3
12	1a	2.7	1b	0.4	1a	0.4	2b	4.2	1a	0.6	1a	0.6
13	2c	3.8	1a	0.3	1b	2.7	2c	6.3	0a	...	1b	2.4
14	0a	...	1b	0.7	0a	...	1b	1.3	1a	0.1	2b	4.3
15	0a	...	0a	...	1a	0.1	1a	0.1	2b	3.2	2b	5.0
16	1a	0.1	0a	...	0a	...	1a	0.6	0a	...	2c	14.6
17	1b	2.1	0a	...	0a	...	2c	5.3	0a	...	2c	17.6
18	0a	...	0a	...	1a	0.1	1b	2.5	0a	...	2c	6.7
19	0a	...	(1a)	1.8	0a	...	1a	2.7	0a	...	2c	14.6
20	1a	0.1	1b	2.1	0a	...	1b	1.0	2b	3.1	2b	7.9
21	1a	0.5	2b	4.9	0a	...	1a	0.3	1b	0.8	2c	5.3
22	1b	0.8	0a	...	0a	...	2c	12.3	2c	8.5	2b	4.5
23	0a	...	0a	...	2b	3.1	2c	4.5	2c	4.3	2c	10.0
24	2b	4.7	0a	...	2b	3.2	1a	0.9	1c	1.8	1a	1.1
25	1b	1.0	1a	0.1	2c	3.9	2b	3.2	2b	3.5	0a	...
26	1b	1.7	0a	...	2b	3.9	2c	4.2	2c	9.5	0a	...
27	2c	7.0	1a	0.7	0a	...	2c	6.6	(2b)	---	1a	0.1
28	2b	3.6	0a	...	0a	...	0a	...	0a	...	1a	0.2
29	1a	1.0	0a	...	0a	...	2c	6.1	2b	7.2	(2b)	---
30	1b	0.9	1b	2.6	2b	5.8	2c	9.3	1b	1.1	(1a)	---
31	2b	3.3	0a	...			2b	4.2			2c	6.8
Total	---	51.1	---	16.5	---	62.7	---	128.4	---	49.2	---	141.6
No. of Days Used.	---	31	---	31	---	30	---	31	---	28	---	29
Mean.	---	1.7	---	0.5	---	2.1	---	4.1	---	1.8	---	4.9

Annual Values. Character Frequency ... 0 1 2  
 120 137 109  
 Duration ... Total. No. of Days. Mean.  
 809.8 359 2.26 hours







Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (+44 C.G.S. unit) +

275. Eskdalemuir. (V.)

February, 1932.

Table with 24 columns (Hour G. M. T., 0-1 to 23-24, Mean) and 29 rows (Day 1 to 29). Values range from 922 to 966.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

276. Eskdalemuir.

February, 1932.

Table with 13 columns (Day, Horizontal Force, Declination, Vertical Force, HRH+VRV, Magnetic Character, Temperature) and 29 rows (Day 1 to 29). Values range from 0 to 979.

\$ For explanation see page 176. Q denotes an International Quiet Day, while D denotes a disturbed day used for the computation of tables 323-334.

032

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 Y (-16 C.G.S. unit) +

277. Eskdalemuir.

March, 1932.

Table with 25 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean.) and 31 rows (Day 1-31). Values range from 534 to 610.

0.5 B 1932 031 01 BB140

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

278. Eskdalemuir.

14+

March, 1932.

Table with 25 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean.) and 31 rows (Day 1-31). Values range from 23.5 to 35.9.

308

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334f.



Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (.44 C.G.S. unit) +

279. Eskdalemuir.

March, 1932.

Table with 25 columns (Hour G.M.T., 0-1 to 23-24, Mean) and 31 rows (Day 1 Q to 31 D). Values represent magnetic force components in 44,000 Y units.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

280. Eskdalemuir.

March, 1932.

Table with 15 columns (Day, Horizontal Force, Declination, Vertical Force, HRH+VRV, Magnetic Character, Temperature) and 31 rows (Day 1 Q to 31 D). Values represent magnetic extremes and temperature in magnet house.

For explanation see page 175. Q denotes an International Quiet Day, while D denotes a disturbed day used for the computation of tables 323-334.

042

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 γ (+16 C.G.S. unit) +

281. Eskdalemuir.

April, 1932.

Table with 26 columns (Hour G.M.T., 0-1 to 23-24, Mean) and 31 rows (Day 1 to 30 Q). Data represents magnetic force values for Eskdalemuir.

041

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

282. Eskdalemuir.

14 +

April, 1932.

Table with 26 columns (Hour G.M.T., 0-1 to 23-24, Mean) and 31 rows (Day 1 to 30 Q). Data represents magnetic declination values for Eskdalemuir.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

043

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.

Mean Values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (-.44 C.G.S.unit) +

April, 1932.

283. Eskdalemuir.

Table with columns: Hour. G. M. T., Day., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean. Rows include days 1-30 and a Mean row.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

284. Eskdalemuir.

April, 1932.

Table with columns: Day., Horizontal Force (Maximum, Minimum, Range), Declination (Maximum, Minimum, Range), Vertical Force (Maximum, Minimum, Range), HRH+VRV, Magnetic Character of Day, Temperature in Magnet House. Rows include days 1-30 and a Mean row.

§ For explanation see p.175. Q denotes an International Quiet Day, while D denotes a disturbed day used for the Computation of Tables 323-334.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 Y (.16 C.G.S. unit) +

285. Eskdalemuir.

May, 1932.

Table with 24 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean.) and 31 rows (Day 1-31). Values range from 560 to 608.

05

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

286. Eskdalemuir.

14+

May, 1932.

Table with 24 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean.) and 31 rows (Day 1-31). Values range from 17.9 to 31.2.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (.44 C.G.S. unit) +

287. Eskdalemuir.

May, 1932.

Table with 25 columns (Hour G. M. T. 0-1 to 23-24, Mean) and 31 rows (Day 1 to 31). Columns contain magnetic force values in Y units.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

288. Eskdalemuir.

May, 1932.

Table with 13 columns (Day, Horizontal Force, Declination, Vertical Force, HRH+VRV, Magnetic Character, Temperature) and 31 rows (Day 1 to 31). Columns contain magnetic and temperature data.

§ For explanation see p. 175. Q denotes an International Quiet Day, while D denotes a disturbed day used for the computation of Tables 323-334.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 Y (-16 C.G.S. unit) +

289. Eskdalemuir.

June, 1932.

Table with 25 columns (0-1 to 25-24) and 30 rows (Day 1 to 30). Includes a 'Mean.' row at the bottom. Values range from 542 to 622.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 14+

290. Eskdalemuir.

June, 1932.

Table with 25 columns (0-1 to 25-24) and 30 rows (Day 1 to 30). Includes a 'Mean.' row at the bottom. Values range from 18.5 to 31.8.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

063

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.
Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.
44,000 Y (.44 C.G.S. unit) +

291. Eskdalemuir.

June, 1932.

Table with 25 columns representing hours from 0-1 to 23-24 and a Mean column. Rows represent days from 1 to 30, with letters Q, D, and Y indicating day types. Values are magnetic force readings in 44,000 Y units.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

292. Eskdalemuir.

June, 1932.

Table with 22 columns: Day, Horizontal Force (Maximum, Minimum, Range), Declination (Maximum, Minimum, Range), Vertical Force (Maximum, Minimum, Range), HR\_H + VK\_V (10,000 Y^2), Magnetic Character of Day (0-2), and Temperature in Magnet House (200 +). Rows represent days from 1 to 30, with letters Q, D, and Y indicating day types.

§ For explanation see p.175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time 16,000 Y (-16 C.G.S. unit) +

293. Eskdalemuir.

July, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (Day 1 to 31). Includes a 'Mean.' row at the bottom. Values range from 572 to 607.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

294. Eskdalemuir.

14°+

July, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (Day 1 to 31). Includes a 'Mean.' row at the bottom. Values range from 18.2 to 25.5.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.



070

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.  
44,000 Y (•44 C.G.S.unit) +

295. Eskdalemuir.

July, 1932.

Table with 24 columns (Hour G. M. T., 0-1, 1-2, ..., 23-24, Mean.) and 31 rows (Day 1 to 31). Contains magnetic force data for each hour.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

296. Eskdalemuir.

July, 1932.

Table with columns: Day, Terrestrial Magnetic Elements (Horizontal Force, Declination, Vertical Force), HRH+VRV (10,000 Y²), Magnetic Character of Day (0-2), and Temperature in Magnet House (200 + °A). Rows include days 1 to 31 and a summary row.

§ For explanation see p.175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT. Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 Y (-16 C.G.S. unit) +

297. Eskdalemuir.

August, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (Day 1 to Mean). Values range from 442 to 607.

140

MAGNETIC DECLINATION (WEST)

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 140

298. Eskdalemuir.

August, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (Day 1 to Mean). Values range from 14.0 to 25.7.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

083

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.

263

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (-44 C.G.S. unit) +

299. Eskdalemuir.

August, 1932.

Table with 25 columns (Hour, G. M. T., 0-1 to 23-24, Mean) and 31 rows (Day 1 to 31). Contains numerical data for magnetic force components.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

300. Eskdalemuir.

August, 1932.

Table with 15 columns (Day, Horizontal Force, Declination, Vertical Force, HRh+VRv, Magnetic Character, Temperature) and 31 rows (Day 1 to 31). Contains data for magnetic extremes and temperature.

§ For explanation see p.175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

092

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 16,000 γ (•16 C.G.S. unit) +

301. Eskdalemuir.

September, 1932.

Table with 24 columns (Hour G. M. T. 0-1 to 23-24) and 24 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from 542 to 588.

091

140

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 14 +

302. Eskdalemuir.

September, 1932.

Table with 24 columns (Hour G. M. T. 0-1 to 23-24) and 24 rows (Day 1 to 30). Includes a 'Mean' row at the bottom. Values range from 17.4 to 22.7.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

0 93

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT. Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (\*44 C.G.S. unit) +

303. Eskdalemuir.

September, 1932.

Table with 25 columns (Hour G. M. T. to Mean) and 30 rows (Day 1 to 30). Contains numerical data for magnetic force components.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

304. Eskdalemuir.

September, 1932.

Table with 15 columns (Day, Horizontal Force, Declination, Vertical Force, HRh+VRv, Magnetic Character, Temperature) and 30 rows (Day 1 to 30). Contains extreme values and character figures.

§ For explanation see p.175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

102

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

305. Eskdalemuir.

16,000 γ (.16 C.G.S. unit) +

October, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (Day 1 to Mean). Contains numerical data for the horizontal component of magnetic force at Eskdalemuir.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

306. Eskdalemuir.

14°+

October, 1932.

Table with 24 columns (0-1 to 23-24) and 32 rows (Day 1 to Mean). Contains numerical data for magnetic declination at Eskdalemuir.

Q denotes an International Quiet Day, while D denotes a disturbed day used for the computation of Tables 323-334.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (-44 C.G.S. unit) +

307. Eskdalemuir.

October, 1932.

Table with 25 columns (Hour, G. M. T., 0-1 to 23-24, Mean) and 32 rows (Day 1 to 31, Mean). Values range from 852 to 930.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

308. Eskdalemuir.

October, 1932.

Table with 13 main columns: Day, Horizontal Force (Maximum, Minimum, Range), Declination (Maximum, Minimum, Range), Vertical Force (Maximum, Minimum, Range), HRH+VRV (10,000 Y), Magnetic Character of Day, Temperature in Magnet House. Rows 1-31 and Mean.

For explanation see p.175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

TERRESTRIAL MAGNETIC FORCE: HORIZONTAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.  
16,000 γ (-16 C.G.S.unit) +

309. Eskdalemuir.

November, 1932.

Table with 24 columns (0-1 to 23-24) and 25 rows (1 D to 30). Each cell contains a numerical value representing magnetic force. A 'Mean.' row is at the bottom. Some values are underlined.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.  
14<sup>+</sup>

310. Eskdalemuir.

November, 1932.

Table with 24 columns (0-1 to 23-24) and 31 rows (1 D to 30). Each cell contains a numerical value representing magnetic declination. A 'Mean.' row is at the bottom. Some values are underlined.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.



113

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.

269

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 Y (+44 C.G.S. unit) +

311. Eskdalemuir.

November, 1932.

Table with 25 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean.) and 30 rows (Day, 1 D, 2, 3, 4, 5, 6 Q, 7, 8, 9 Q, 10 Q, 11, 12, 13, 14 D, 15 D, 16 D, 17 D, 18, 19, 20, 21, 22 Q, 23, 24 Q, 25, 26, 27, 28, 29, 30, Mean.).

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

312. Eskdalemuir.

November, 1932.

Table with 23 columns (Day, Horizontal Force, Declination, Vertical Force, HRH+VRV, Magnetic Character of Day, Temperature in Magnet House) and 30 rows (Day, 1 D, 2, 3, 4, 5, 6 Q, 7, 8, 9 Q, 10 Q, 11, 12, 13, 14 D, 15 D, 16 D, 17 D, 18, 19, 20, 21, 22 Q, 23, 24 Q, 25, 26, 27, 28, 29, 30, Mean., No. of Days Used.).

§ For explanation see p-175. Q denotes an "International Quiet Day", while D denotes a disturbed day used for the computation of Tables 323-334.

Mean values for periods of sixty minutes ending at the hours of Greenwich Mean Time  
16,000 γ (·16 C.G.S. unit) +

313. Eskdalemuir. (H.)

December, 1932.

Table with 25 columns (Hour, G. M. T., 0-1 to 23-24, Mean) and 32 rows (Day 1 to 31, Mean). Values range from 548 to 588.

558 at 0 - 1h. Jan.1. 1933.

MAGNETIC DECLINATION (WEST).

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time.

314. Eskdalemuir. (D.)

December, 1932.

Table with 25 columns (Hour, G. M. T., 0-1 to 23-24, Mean) and 32 rows (Day 1 to 31, Mean). Values range from 16.0 to 22.9.

15.7 at 0 - 1h. Jan.1. 1933.

Q denotes an "International Quiet Day", while D denotes a disturbed day, used for computation of tables 323-334.

123

TERRESTRIAL MAGNETIC FORCE: VERTICAL COMPONENT.

Mean values for periods of sixty minutes ending at the Hours of Greenwich Mean Time. 44,000 γ (-44 C.G.S.unit) +

315. Eskdalemuir. (V.)

December, 1932.

Table with 24 columns (Hour G. M. T. 0-1 to 23-24 and Mean) and 31 rows (Day 1 to 31). Contains magnetic force data for Eskdalemuir.

904 at 0 - lh. Jan.1. 1933.

DAILY EXTREMES OF EACH COMPONENT OF TERRESTRIAL MAGNETIC FORCE: MAGNETIC CHARACTER FIGURES: TEMPERATURE IN MAGNET HOUSE.

December, 1932.

316. Eskdalemuir.

Table with columns for Day, Horizontal Force, Declination, Vertical Force, HR+VR, Magnetic Character, and Temperature. Contains detailed magnetic and temperature data for Eskdalemuir.

For explanation see p.175. Q denotes an "International Quiet Day"; while D denotes a disturbed day used for the computation of Table. 323-334.







Departures from the mean of the day adjusted for non-cyclic change†.

Table for Station 326, Eskdalemuir, showing Declination (measured positive towards the West) for Quiet Days in 1932. Columns represent months from Jan to Dec, and rows represent hours from 0-1 to 23-24. Includes summary rows for Year, Winter, Equinox, and Summer.

INCLINATION (QUIET DAYS).

Table for Station 327, Eskdalemuir, showing Inclination for Quiet Days in 1932. Columns represent months from Jan to Dec, and rows represent hours from 0-1 to 23-24. Includes summary rows for Year, Winter, Equinox, and Summer.

HORIZONTAL FORCE (QUIET DAYS).

Table for Station 328, Eskdalemuir, showing Horizontal Force for Quiet Days in 1932. Columns represent months from Jan to Dec, and rows represent hours from 0-1 to 23-24. Includes summary rows for Year, Winter, Equinox, and Summer.

† See page 21.







NOTE.—The ranges are those shown in Tables 317 to 334, in the preparation of which the non-cyclic change has been eliminated.

335. Eskdalemuir.

1932.

Month and Season	"All" Days.			Quiet Days.			Disturbed Days.			"All" Days.			Quiet Days.			Disturbed Days.		
	N.	W.	V.	N.	W.	V.	N.	W.	V.	D.	I.	H.	D.	I.	H.	D.	I.	H.
January	16.6	31.3	15.8	11.6	20.3	11.3	36.6	58.9	47.8	6.92	1.12	14.8	4.46	0.82	9.1	13.03	2.34	28.9
February	25.0	31.1	18.9	20.2	24.7	8.6	30.4	70.9	43.2	7.13	1.56	22.4	5.45	1.08	16.8	14.79	1.54	24.0
March	32.8	40.6	41.3	26.2	33.1	11.2	69.1	68.4	116.3	9.29	1.83	26.6	7.39	1.39	22.7	14.38	3.25	56.4
April	48.9	41.7	39.3	33.0	37.9	14.1	82.9	66.1	77.6	8.54	2.74	48.0	8.03	2.02	32.7	13.87	5.56	81.5
May	53.0	47.5	35.2	42.4	46.4	14.9	96.3	78.2	110.1	9.93	3.11	54.1	9.77	2.70	43.3	15.08	4.80	107.5
June	43.7	46.5	21.3	38.6	36.2	19.2	52.6	56.8	36.4	9.40	2.62	45.6	8.02	2.48	41.7	10.41	3.39	59.7
July	45.9	44.7	19.9	42.5	50.2	17.6	61.8	48.3	31.4	9.73	2.79	46.9	10.94	2.34	40.3	11.45	3.95	65.7
August	46.3	47.9	26.4	41.6	49.4	15.9	74.0	48.2	90.6	9.75	2.72	46.1	10.00	2.79	44.5	11.79	4.34	69.7
September	38.6	37.1	24.9	34.4	39.5	12.3	51.4	64.4	72.9	8.86	2.13	33.1	8.55	1.98	33.6	14.86	3.30	40.9
October	35.9	33.2	22.0	30.0	32.8	6.9	52.9	63.7	76.7	7.96	2.25	31.6	7.31	1.98	27.8	13.85	4.06	52.7
November	20.6	23.1	12.6	24.7	18.9	5.8	36.1	45.3	34.7	5.62	1.35	18.6	4.53	1.58	22.6	9.89	2.32	32.0
December	17.3	27.8	18.2	13.1	16.3	4.3	22.8	57.4	71.1	5.82	1.40	15.8	3.69	0.74	11.4	11.42	2.82	31.5
Year	31.8	32.0	21.5	27.3	32.2	9.4	41.2	45.2	60.9	6.99	1.63	29.5	6.89	1.63	26.9	10.11	2.28	38.8
Winter	19.4	27.6	14.9	16.6	18.2	5.1	22.4	47.9	40.9	6.17	1.28	17.6	4.15	1.00	14.5	10.49	1.71	20.4
Equinox	36.5	36.3	30.6	28.8	35.4	9.7	55.2	53.8	79.4	8.52	2.14	33.5	7.58	1.68	27.2	12.38	3.47	49.4
Summer	46.8	45.5	20.4	40.9	44.8	16.3	63.8	45.1	62.2	9.70	2.76	47.9	9.58	2.54	42.2	9.69	3.65	66.6

NON-CYCLIC CHANGE†.

336. Eskdalemuir.

1932.

MEAN VALUES OF  $HR_H + VR_V$ .\*

337. Eskdalemuir.

(Unit 10,000 $\gamma$ \*)

1932.

Month	"All" Days			Quiet Days.			Disturbed Days.			$HR_H$	$VR_V$	Sum	Mean Character Figure.
	H.	D.	V.	H.	D.	V.	H.	D.	V.				
January	+0.1	+0.01	+2.1	+1.1	-0.13	-0.7	-4.5	-1.05	-4.8	114	141	256	0.77
February	+0.7	+0.05	-0.7	+3.5	+0.06	-0.5	-4.1	-0.15	-4.2	108	154	262	0.83
March	-0.7	-0.07	-0.7	+2.1	+0.68	+1.4	-11.9	+0.04	-13.4	164	300	464	1.03
April	+0.6	0.00	+1.0	+5.8	+1.86	+8.4	-10.4	-2.95	-17.7	177	291	469	0.87
May	-0.1	-0.06	+0.2	+5.1	+0.07	+1.6	-9.2	-1.64	+6.5	206	313	519	0.84
June	+0.1	+0.01	-0.6	+2.4	-0.18	-1.6	-3.0	+1.08	+1.1	123	141	264	0.42
July	+0.1	-0.06	-1.0	+3.9	+0.16	-1.5	-8.1	-0.65	-4.0	129	133	262	0.43
August	-0.5	-0.01	-0.7	+1.6	+0.14	-1.8	-9.2	+0.46	-6.7	150	216	366	0.58
September	-0.1	-0.07	-0.5	+4.7	-0.17	-1.4	-4.4	+0.46	-2.3	131	215	346	0.73
October	0.0	-0.03	+0.3	+1.7	-0.54	+3.3	-2.4	+0.57	+1.8	121	174	294	0.94
November	0.0	-0.01	+0.9	+2.7	+0.43	+0.7	-3.9	-0.37	-0.2	85	100	185	0.63
December	-0.1	-0.10	0.0	-1.5	+0.67	+1.2	-12.3	-0.99	-0.8	92	145	237	0.84
Year 1932	--	--	--	--	--	--	--	--	--	133	194	327	0.74

† See page 21.

\* See page 175.

MEAN MONTHLY AND ANNUAL VALUES OF TERRESTRIAL MAGNETIC ELEMENTS.

(All days)

338. Eskdalemuir.

errata 1964

1932.

Month	North - 19	West - 4	Vertical - 49	Total - 52	Declination (West)		Inclination (North)		Horizontal Force. - 19
January	16048	4142	44935	47894	14	28.4	69	45.3	16574
February	16047	4139	44952	47909	14	27.7	69	45.8	16572
March	16050	4134	44928	47888	14	26.7	69	45.1	16573
April	16051	4132	44933	47893	14	26.1	69	45.2	16574
May	16056	4128	44940	47900	14	25.1	69	45.1	16578
June	16059	4125	44943	47904	14	24.4	69	45.0	16581
July	16056	4121	44917	47878	14	23.7	69	44.6	16577
August	16052	4114	44894	47854	14	22.4	69	44.4	16571
September	16046	4108	44876	47835	14	21.5	69	44.5	16564
October	16045	4101	44869	47828	14	20.3	69	44.5	16561
November	16048	4097	44895	47853	14	19.3	69	45.0	16563
December	16048	4093	44912	47868	14	18.4	69	45.5	16561
Year 1932	16050	4120	44916	47875	14	23.7	69	45.0	16571





M.O. 360  
(Cahirciveen)

Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

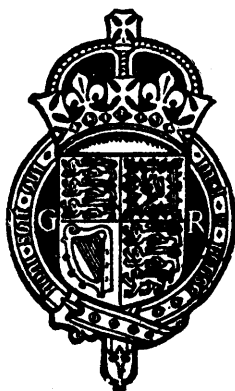
Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

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CAHIRCIVEEN (VALENTIA OBSERVATORY)

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Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE

1934

## CAHIRCIVEEN (VALENTIA OBSERVATORY).

Latitude	..	..	..	51° 56' N.
Longitude	..	..	..	10° 15' W.
G.M.T. of Local Mean Noon	..	..	..	12h 41m.

## "Heights in metres above Sea Level."

Barometer	..	..	..	13.7
Rain-gauge	..	..	..	9.1
Robinson Cup Anemograph	..	..	..	26
Dines Tube Anemograph	..	..	..	30

## "Heights in metres above Ground".

Thermometer Bulbs	..	..	..	1.3
Sunshine Recorder	..	..	..	12.8
Robinson Cup Anemograph	..	..	..	14
Dines Tube Anemograph	..	..	..	13
Beckley Rain-gauge Rim	..	..	..	0.5

## INTRODUCTION.

## SITE.

Valentia Observatory derives its name from the fact that it was originally established on Valentia Island in 1867. It was removed to the mainland in March, 1892, and now lies in a direct line between the old site on Valentia Island and the town of Cahirciveen, about  $2\frac{1}{2}$  miles (4 km.) north-east from the former, and three-quarters of a mile (1 km.) south-west of the latter. It is quite remote from any other buildings. The general character of the country surrounding the Observatory is hilly. The eastern bank of the Cahir river is about 150 metres to the westward, and in that direction there is no very high ground between the Observatory and the open sea, some  $3\frac{1}{2}$  miles (6 km.) away. To the north-west, however, are hills varying in height from 400 (120 m.) to 900 feet (275 m.), the highest being less than 3 miles (5 km.) distant. These are only separated by a narrow gully running in a N N W direction from other hills equally high, which stretch away to the northward: the nearest of these is but little more than a mile ( $1\frac{1}{2}$  km.) from the Observatory. Beyond the town of Cahirciveen to the north-east the river opens out considerably, and the country in this direction becomes an open boggy basin, rising by only a gentle gradient. Southward of this, however, it soon rises again, and at about a mile south-east of the Observatory it culminates in the hill Benteen upwards of 1,245 feet (380 m.) in height. Still further south it opens out once more to a distance of nearly 5 miles

(8 km.) from the Observatory, where there is a range of hills running east and west, and varying in height from from 400 (120 m.) to 1,300 feet (400 m.). To the south-west there is an opening to the sea, between Valentia Island and the mainland; and the circle of hills is completed by those on the island itself, the highest of which is about 800 feet (240 m.) high, and bears about west-south-west from the Observatory. Photographs of the Observatory building, together with a site plan, showing the disposition of the various instruments were reproduced in the introduction to the 1928 volume.

#### METEOROLOGY.

The elements dealt with in the following tables are: atmospheric pressure, air temperature, humidity, rainfall, sunshine, wind speed and direction, earth temperature, minimum temperature on the grass, together with a diary of cloud visibility and weather.

"Pressure and Temperature."—The photographic barograph and thermograph are installed in a room on the ground floor of the Observatory tower. The standard Fortin barometer, from which the control readings at 9h, 15h and 21h are taken, is mounted in the same room beside a window which faces the north-east. The stems of the dry and wet bulb thermometers pass out into the screen placed against the north wall of the tower. Close to the bulbs of these thermometers are the bulbs of the standard thermometers from which the control readings at 9h, 15h and 21h are taken.

"Rainfall."—The Beckley rain-gauge and the 8-inch (20.3 cm.) check gauge are placed in a railed-off enclosure about 40 metres to the north of the tower.

"Sunshine."—The recorder is cemented to a wooden rail on the roof of the tower. The exposure of the sunshine recorder is such that there is no appreciable loss of record due to obstructions in the months of May, June, July, and August. During the remainder of the year the hill Bente lying to the south-east cuts off early morning sunshine. The reduction in possible record, assuming that the recorder becomes sensitive to sunshine only when the sun is at an altitude of more than three degrees, is shown in the following table for the 1st and 15th of each month:—

Reduction in Possible Record in Tenths of an Hour.								
Month.	Jan.	Feb.	Mar.	Apr.	Sept.	Oct.	Nov.	Dec.
1st	hr. .5	hr. .5	hr. .7	hr. .5	hr. .3	hr. .7	hr. .5	hr. .6
15th	.6	.5	.7	.3	.5	.7	.5	.5

"Wind, Speed and Direction."—Up to 1925 measurements of wind speed and direction as given in tables 413-424, were obtained from the Robinson cup anemograph on the roof of the Observatory tower. From 1926 to 1931 measurements of wind speed and direction refer to records from an old pattern Dines tube anemograph. A comparison between the mean velocities as recorded by

this tube anemograph and the cup anemograph is given in the General Introduction. A new Dines tube anemograph with 1-inch connecting pipes, was brought into use as from January 1st 1932. The new instrument was erected alongside the old instrument with its head at the same height: a comparison extending over the period May, 1931, to January, 1932, showed that the new instrument recorded higher velocities than the old. In hourly mean values the difference was nearly uniform and equal to  $\cdot 4$  m/s or 1 mi/hr. In great velocities the increase was approximately 12 per cent of the velocity recorded by the old instrument.

The site of the pressure tube anemographs is in an open field, about 250 metres S E by E of the Observatory tower. About 1 mile ( $1\frac{1}{2}$  km.) to the south-east is the highest point (1,245 feet) of the hill Bente which extends for some little distance in a northerly and south-westerly direction. A description of the surrounding country has already been given.

In a few instances where records of the Dines tube anemograph have been defective, the required values have been obtained from the records of the cup anemograph, a suitable adjustment of such values having been made in accordance with the table in the General Introduction showing the effect of exposure on the two instruments. Values thus obtained are entered as interpolated values.

"Earth Temperature".—The thermometers are at depths of 30 cm. and 122 cm. below the grass covered surface of the ground. The site is well exposed. The thermometers are of the standard type described in the "Meteorological Observers' Handbook."

"Minimum Temperature on the Grass".—The grass minimum thermometer is of the type described in the General Introduction. It is exposed over short grass in the field enclosure. It is set at 18h and read at 7h on the succeeding day, the observation being entered to the day of reading.

"Visibility".—Lists of the objects used for visibility observations and their distances and bearings from the point of observation are given in the following tables.

LANDWARDS VISIBILITY OBJECTS AT VALENTIA OBSERVATORY.

Indication letter of object.	Standard distance of object.	Actual distance of object	Bearing of object in degrees from N.	Description of object.
A	Métres. 25	Metres. 25	350°	Gate near workshop.
B	50	50	345°	White post in fence of instrument enclosure.
C	100	100	125°	Hedge at S. end of veg- etable garden.
D	200	200	330°	Notice board on beach.
E	500	475	100°	Bungalow.



## LANDWARDS VISIBILITY OBJECTS AT VALENTIA OBSERVATORY (Contd.).

Indication letter of object.	Standard distance of object.	Actual distance of object	Bearing of object in degrees from N.	Description of object
F	Metres. 1,000	Metres. 1,100	50°	Parsonage.
G	2,000	1,910	55°	Wireless school.
Intermediate object.	-	3,500	20°	Top of Castlequin Mountain
h	4,000	-	-	No object available. (Top of Castlequin well visible.)
I	7,000	7,600	40°	Top of Knocknadober Mountain
J	10,000	10,000	220°	Kilkeaveragh Mountain.
Intermediate object	-	17,000	55°	Drung Hill.
k	20,000	-	-	No object available. (Drung Hill well visible.)
l	30,000	-	-	No object available.
m	50,000	-	-	No object available.

## SEAWARDS VISIBILITY OBJECTS AT VALENTIA OBSERVATORY.

F	1,000	1,000	235°	Farmhouse on skyline.
G	2,000	2,200	265°	Laght Point.
H	4,000	3,760	280°	Black Rock.
I	7,000	6,500	250°	Ridge between two hills on Valentia.
J	10,000	10,000	220°	Kilkeaveragh mountain.
k	20,000	-	-	No object available.
Intermediate objects	-	23,500	320°	Mount Eagle.
	-	25,500	325°	Croaghmarhin Mountain.
l	30,000	-	-	No object available. (Croaghmarhin well visible.)
m	50,000	-	-	No object available. (Croaghmarhin exceptionally visible.)

Two observations, one in a landwards direction, the other in a seawards direction, are made at each hour of observation. The position of the Observatory is such that a distinction between visibility landwards and seawards cannot be made when the range of visibility is less than 1,000 yards. Objects corresponding with the letters A to E have therefore been included in the table of landwards objects only. Kilkeaveragh Mountain is used as both a landwards and seawards object corresponding with J.

Entries of "l" and "m" for visibility in a landwards direction are made:-

(a) When Croaghmarhin Mountain (see table of seawards objects) is clearly visible and there is reason to believe that the range of visibility in a landwards direction is as good as, or nearly as good as, visibility seawards.

(b) When Croaghmarhin Mountain is invisible but there is reason to believe from the appearance of Drung Hill that the range of visibility landwards is greater than the range seawards and is sufficiently good to justify the entry made.

When the mountains used as objects at 3,500 metres and beyond are cloud capped the appropriate entries for the range of visibility are determined by the clearness or otherwise with which the lower parts of the mountains can be seen.

The Observatory is far removed from smoky industrial areas; the observations are therefore not much affected by smoke pollution of the atmosphere.

#### Notes on the Meteorological Summaries.

"The Weather of 1932".—The year was notable for a deficiency of sunshine especially in the summer months: from April to November sunshine was less than normal each month, the deficiency amounting to as much as 2·8 hours a day in July. January was unusually mild and February unusually dry. The year was less windy than usual but a record high velocity in a gust occurred on December 31st when 43 m/s (96 m.p.h.) was reached.

"Pressure".—No change in the values used for reducing pressure at station level to pressure at mean sea level was made at Valentia Observatory by the introduction in 1928 of the revised scheme as set out in the General Introduction.

Mean pressure for the year was one millibar above normal. Of the monthly mean pressures seven were higher and five lower than normal. The departures ranged from an excess of twenty millibars in February to a deficiency of four millibars in October.

Details of the Fourier analysis of the diurnal inequalities of pressure for the year are given in Table A, together with normal values referring to the period 1871-1915. The coefficients are given to the nearest ·001 mb. and the phase angles to the nearest 1° except for the third and fourth components in which case the values referring to the current year are taken to the nearest 5° only.

"Temperature".—Mean temperature for the year 1932 was 0·5°A (0·9°F.)

above normal. For the individual months January, with an excess of 2.3°A (4.2°F.) showed the greatest departure.

The harmonic analysis of the monthly and seasonal diurnal inequalities of temperature is given in Table B, together with normal values referring to the period 1871-1915. The coefficients are given to the nearest .001°A and the phase angles to the nearest 1° except for the third and fourth components in which case the values referring to the current year are taken to the nearest 5° only.

"Rainfall".—The total rainfall for the year was 12 per cent. below normal, the actual deficit being 169 millimetres. The month with the highest rainfall was December, with 210 millimetres, this amount being 24 per cent more than normal. The lowest monthly total was that for February, the 11 millimetres which fell during that month being 9 per cent. of the normal amount.

"Bright Sunshine".—The total amount of bright sunshine for the year 1932 was about 16 per cent. less than the normal. Three months only had more than average sunshine, the greatest excess being about 24 per cent. for December. The most notable deficiency was for July the total sunshine for this month being 45 per cent. of normal.

"Cloud and Weather".—The mean amount of cloud at all observation hours was 7.6. The most cloudy month was July, with mean cloud amount of 8.9. The month with least cloud was March with a mean of 6.3.

"Visibility".—The observations of visibility in tables 429-440 refer to visibility in a landwards direction. The observations, when the range of visibility seawards differs from the range landwards, are shown in the following table:-

Date	Hour	Visibility Landwards	Visibility Seawards
Jan. 5	18	J	k
" 18	15	J	k
" 19	13	J	k
" 24	15	J	l
Feb. 27	13	J	k
" 27	15	J	k
Mar. 20	9	J	I
" 21	18	J	I
" 24	9	J	k
Apr. 2	7	J	k
" 16	9	I	J
May 17	18	h	I
" 28	9	J	k
June 1	18	I	J
" 15	7	I	G
July 6	15	G	H
" 8	7	J	k
" 13	18	J	k
" 18	21	J	k
" 15	18	I	H
" 19	21	h	I
" 23	7	J	I
" 25	13	J	l
" 29	9	J	k
Aug. 2	15	J	I
" 2	18	J	k
" 7	15	k	J

Date	Hour	Visibility Landwards	Visibility Seawards
Aug. 8	13	J	k
" 8	15	J	l
" 12	9	I	J
" 16	7	h	G
" 16	13	G	F
" 16	15	G	E
" 16	18	J	E
" 17	13	J	G
" 17	18	I	H
" 28	13	I	k
" 28	15	I	J
Sept. 5	13	h	G
" 9	9	J	l
" 12	7	G	I
" 12	18	I	H
" 13	7	G	H
" 13	13	h	G
" 16	9	J	l
" 17	13	h	G
" 17	18	I	H
" 22	13	J	k
Oct. 7	15	J	k
Nov. 3	13	I	H
" 11	9	I	J
" 18	15	J	k
Dec. 27	9	J	k

IDENTIFICATION NUMBERS OF INSTRUMENTS IN USE 1932

Standard Fortin Barometer	M.O. 463	
Standard Dry Bulb Thermometer	M.O. 1701	Corrections Nil.
Standard Wet Bulb Thermometer	M.O. 1702	Corrections { 255°-266° + .2 267°-268° + .1° 269°-272° Nil. 273° and above, - .1°
Recording Beckley Rain-gauge	-	
Control Rain-gauge	M.O. 402	
Glass for Control Rain-gauge	M.O. 1504	
Campbell Stokes Sunshine Recorder	M.O. 5	
Robinson Cup Anemograph	Beck 46	
Dines Tube Anemograph	-	
Grass Minimum Thermometer	M.O. 18136/29	Corrections { 2.0°F. - .3° F. 12.0°F. - .2° F. 32.0°F. Nil. 52.0°F. Nil. 72.0°F. Nil.
Earth Thermometer 1 ft.	M.O. 9	Corrections { 260° A + .1° 280° A and above, Nil 273° A Nil.
Earth Thermometer 4 ft.	M.O. 24005	Corrections { 278° A - .1° A. 283° A and above, Nil

All thermometer corrections are applied before tabulation.

TABLE A.

"Diurnal Variation of Barometric Pressure Fourier Coefficients."

Cahiriveen (Valentia Observatory), Longitude 10° 15' W.

Values of  $c_n$   $x_n$  in the series  $Z_0 \sin(15nt + x_n)$ ,  $t$  being Local Mean Time reckoned in hours

from midnight.

Month or Season	c <sub>1</sub>		x <sub>1</sub>		c <sub>2</sub>		x <sub>2</sub>		c <sub>3</sub>		x <sub>3</sub>		c <sub>4</sub>		x <sub>4</sub>	
	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915
January .. ..	mb. .696	mb. .098	° 80	° 174	mb. .339	mb. .319	° 166	° 153	mb. .157	mb. .157	° 0	° 351	mb. .071	mb. .071	° 225	° 207
February .. ..	.162	.122	71	203	.410	.344	154	148	.128	.119	345	343	.032	.043	120	95
March .. ..	.115	.114	163	149	.357	.352	155	149	.068	.048	255	340	.044	.038	35	51
April .. ..	.090	.098	360	191	.362	.310	155	149	.059	.032	145	181	.041	.035	15	15
May .. ..	.055	.172	14	178	.225	.277	148	147	.083	.074	160	166	.020	.014	290	350
June .. ..	.041	.192	240	200	.256	.255	142	146	.083	.075	155	160	.031	.002	25	11
July .. ..	.271	.242	187	183	.296	.251	138	143	.053	.079	150	163	.015	.013	305	16
August .. ..	.192	.237	179	190	.280	.281	150	145	.079	.052	185	161	.058	.034	360	350
September ..	.255	.195	165	203	.408	.346	154	153	.020	.005	255	49	.041	.044	10	10
October .. ..	.046	.194	289	199	.167	.335	190	161	.053	.073	10	1	.018	.013	10	69
November ..	.186	.071	152	179	.347	.347	166	161	.101	.133	10	5	.030	.035	155	167
December ..	.359	.167	181	186	.347	.311	165	160	.102	.162	355	357	.048	.075	200	196
Arithmetic Mean	.206	.159	..	..	.316	.311	..	..	.082	.084	..	..	.037	.035	..	..
Year .. ..	.115	.150	138	189	.309	.307	156	151	.025	.034	15	3	.009	.004	10	83
Winter .. ..	.249	.112	111	187	.358	.329	162	156	.121	.142	360	355	.034	.043	190	181
Equinox .. ..	.065	.142	168	190	.316	.335	159	153	.018	.014	15	308	.035	.030	20	29
Summer .. ..	.110	.209	187	188	.263	.266	144	145	.072	.070	160	163	.029	.015	355	355

TABLE B.

## TEMPERATURE.

"Diurnal Variation of Barometric Pressure Fourier Coefficients."

Cahirciveen (Valentia Observatory), Longitude 10° 15' W.

Values of  $c_n$ ,  $x_n$  in the series  $\sum c_n \sin(15nt + x_n)$ ,  $t$  being local Mean Time reckoned in hours

from midnight.

Month or Season.	$c_1$		$x_1$		$c_2$		$x_2$		$c_3$		$x_3$		$c_4$		$x_4$	
	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915	1932	1871-1915
January .. ..	°A ·495	°A ·496	° 230	° 239	°A ·274	°A ·269	° 51	° 52	°A ·096	°A ·114	° 235	° 226	°A ·060	°A ·025	° 125	° 43
February .. ..	1·292	·820	230	235	·435	·377	35	53	·135	·085	215	231	·082	·032	170	203
March .. ..	1·519	1·351	236	234	·446	·420	42	59	·080	·036	110	335	·079	·091	180	215
April .. ..	1·615	1·806	237	239	·253	·369	93	70	·150	·143	35	43	·039	·063	290	240
May .. ..	1·663	2·126	240	241	·227	·194	124	99	·240	·246	65	57	·083	·031	320	315
June .. ..	2·481	2·072	246	242	·377	·117	161	91	·311	·206	50	60	·100	·022	345	15
July .. ..	1·152	1·873	241	242	·201	·163	70	68	·081	·197	70	55	·048	·033	350	23
August .. ..	1·556	1·780	242	242	·307	·304	92	67	·105	·168	20	48	·055	·032	250	250
September ..	1·290	1·607	240	241	·305	·468	77	69	·093	·071	315	23	·040	·102	215	233
October .. ..	1·173	1·131	244	241	·266	·424	65	67	·104	·076	295	278	·072	·071	250	239
November ..	·431	·716	246	239	·344	·354	65	63	·052	·120	260	253	·056	·022	155	105
December ..	·203	·446	270	234	·258	·272	54	57	·153	·103	230	240	·025	·032	80	60
Arithmetic Mean	1·239	1·352	..	..	·308	·311	..	..	·133	·130	..	..	·062	·044	..	..
Year .. ..	1·230	1·348	240	240	·251	·325	73	66	·040	·037	20	42	·015	·044	235	231
Winter .. ..	·583	·619	236	237	·319	·317	50	56	·106	·104	230	238	·043	·014	145	86
Equinox .. ..	1·396	1·472	239	239	·300	·419	65	66	·034	·054	340	9	·045	·081	225	228
Summer .. ..	1·704	1·963	243	242	·229	·191	117	78	·177	·203	55	56	·059	·013	325	306

NOTE.—The seasonal means are derived from the following grouping of months:—"Winter": January, February, November and December; "Equinox": March, April, September and October; "Summer": May to August, inclusive.

## TERRESTRIAL MAGNETISM.

## Notes on the Magnetic Observations for the year 1932.

Absolute observations of declination, horizontal force and inclination were made weekly at Valentia Observatory during the year 1932. The instruments in use were Dover unifilar, No. 139, with collimator magnet 139A and mirror magnet 139C, and Dover dip circle, No. 118. These instruments are the same as in previous years except that Dover dip circle No. 239 was used from May 1930 to October 1931. The mean times of observation were 10·22 for declination, 11·43 for horizontal force and 14·29 for inclination, all according to Greenwich Mean Time. In the individual observations the greatest departure from the mean time in any element was 5 minutes. The deflection of the mirror magnet was measured for two distances of the collimator magnet, namely, 30 cm. and 40 cm. The complete deflection observation consisted of eight readings of the mirror magnet. The distribution constant,  $P$ , used for 1932 was computed from the mean deflections for 30 cm. and 40 cm. for the seven years 1925-1931 inclusive. The mean  $P$  so obtained was 7·70. The moment of the collimator magnet has decreased at the rate of about 1 unit per annum.

The values of declination, horizontal force and inclination obtained in the absolute observations are given in detail in Table C, but in Table D the

mean monthly values are computed only from such of these absolute observations as were taken at times subsequently found, by reference to the Eskdalemuir magnetograph curves, to be free from serious disturbance. Observations in Table C taken at disturbed times, and not, therefore, utilised for mean values in Table D, are marked with an asterisk. The north, west and vertical components and the total force for each month and the year are computed from the corresponding mean values of the observed elements.

Westerly declination has diminished by 11.4 as compared with 1931. From 1930 to 1931 the decrease was 10.8 and in the previous 12 months 9.7. The average annual decrease for five year periods since 1910 is as follows:—

1910-15	1915-20	1920-25	1925-30	1927-32
8.2	9.2	11.1	11.0	10.8

The rate of the eastward movement of the magnetic needle increased slowly up to about 1927, but is now apparently decreasing again.

Northerly inclination decreased 0.2 from 1931 to 1932. Changes during the past few years have been irregular but, on the whole, it appears that inclination is diminishing at a slow rate.

Up to 1920 the mean annual values of horizontal force had shown a steady decline from year to year. In the years 1921 to 1924, 1927 and in 1931 the change was in the opposite direction, each year having a mean value higher than that of the preceding year.

The amount of annual change is shown in the following table:—

Period.	Annual Change.
1910-15	5Y decrease (mean value).
1915-20	6Y " (mean value).
1920-21	8Y increase.
1921-22	1Y "
1922-23	3Y "
1923-24	2Y "
1924-25	5Y decrease.
1925-26	14Y "
1926-27	2Y increase.
1927-28	11Y decrease.
1928-29	5Y "
1929-30	8Y "
1930-31	2Y increase
1931-32	6Y decrease.

The reversal of the annual change in horizontal force in certain years was not accompanied by a corresponding reversal in total force. The average annual decrease in total force for five year periods since 1910 is as follows:—

1910-15	1915-20	1920-25	1925-30	1927-32
49Y	33Y	32Y	20Y	20Y

The total force has continued to decrease, but at a rate which is apparently diminishing gradually. The individual changes from year to year as shown in Table D are somewhat irregular, but this may be due in considerable measure to instrumental uncertainties. The total force is computed from the horizontal force and the inclination, using the formula  $T = H \sec. I$ , so that

an error of  $0.1$  in  $I$  would give an error approximately  $4\gamma$  in  $T$  at Valentia. In addition, it is to be remembered that the secular change data for Valentia are obtained from absolute observations made at fixed hours at any of which the value obtained for an element may differ, by an amount which is not necessarily constant, from its true mean value for the day of observation. It is by no means improbable that owing to this and errors of observation, uncertainties to the extent of several tenths of a minute of arc may be introduced into the mean value of  $I$  for the year. For the average change over a series of years these possible errors are naturally much diminished and the average fall of  $33\gamma$  per annum in the total force obtained from the values in Table D is probably a close approximation to the true change. This continued decrease in the total force indicates that the rise in the value of the horizontal force observed in certain years was not a true increase in the magnetic field but merely a component increase arising from the fall in the inclination, which becomes proportionally more effective in the horizontal component as the actual inclination angle itself becomes smaller. The magnetic field in the Valentia district continues to become less year by year, therefore, although, without observations of inclination, the opposite would have appeared to be the case in some years.

TABLE C.

"Cahirciveen (Valentia Observatory). Absolute Magnetic Observations, 1932".

Latitude 51° 56' N. Longitude 10° 15' W.

Date	Westerly Declination	Horizontal Force	Northerly Inclination	Date	Westerly Declination	Horizontal Force	Northerly Inclination
	° ' "	γ	° ' "		° ' "	γ	° ' "
January 1 ..	17 13.6	17809	68 0.9	July 1 ..	17 5.1	17809	67 56.8
" 8 ..	17 13.5	17827	67 59.0	" 8 ..	17 4.5	17801*	67 58.3
" 15 ..	17 15.4	17818	67 58.9	" 15 ..	17 3.5	17817	67 56.9
" 22 ..	17 9.7	17827	67 58.3	" 22 ..	17 4.2	17805	67 57.9
" 29 ..	17 11.3	17807	67 59.1	" 29 ..	17 3.2	17823	67 57.7
February 5 ..	17 10.1	17815	67 59.5	August 5 ..	17 6.7	17794*	67 58.1
" 12 ..	17 10.6	—	67 59.7	" 12 ..	17 2.4	17817	67 56.5
" 19 ..	17 13.3	17815	67 57.7	" 19 ..	17 1.1	17809	67 58.2
" 26 ..	17 8.7	17809	67 59.4	" 26 ..	17 3.0	17814	67 59.0
March 4 ..	17 9.4	17785*	67 58.6	September 2 ..	17 5.6	17810	67 58.9
" 11 ..	17 10.2	17807	67 59.3	" 9 ..	17 4.5	17805	67 58.4
" 18 ..	17 9.4	17817*	67 59.2	" 16 ..	17 4.5	17804	67 58.3
" 24 ..	17 5.9	17810	67 57.7	" 23 ..	17 11.7*	17782	68 0.3
April 1 ..	17 7.7	17803	67 58.6	" 30 ..	17 2.9	17810	67 59.4
" 8 ..	17 7.3	17789	67 59.1	October 7 ..	17 0.7	17809	67 56.8
" 15 ..	17 5.8	17791*	67 58.1	" 14 ..	17 4.3	17803	67 58.3
" 22 ..	—	17812*	67 58.4	" 21 ..	17 5.1	17778	67 59.6
" 25 ..	17 7.4	—	—	" 28 ..	17 0.2	17809	67 58.2
" 29 ..	17 4.4	17805	67 58.6	November 4 ..	17 0.6	17807	67 57.9
May 6 ..	17 5.2	17784	67 59.5	" 11 ..	17 1.2	17814	67 58.6
" 13 ..	17 4.1	17802	67 58.3	" 18 ..	17 0.6	17814	67 59.6
" 20 ..	17 5.4	17808	67 58.1	" 25 ..	17 0.8	17829	67 57.8
" 27 ..	17 6.1	17812*	67 59.1	December 2 ..	17 0.2	17820	67 57.7
June 3 ..	17 6.3	17807	68 0.0	" 9 ..	17 2.3	17808	67 58.6
" 10 ..	17 4.4	17786*	67 59.2	" 16 ..	17 2.3	17803	67 58.5
" 17 ..	17 5.0	—	67 57.3	" 23 ..	17 2.3	17827	67 57.8
" 24 ..	17 2.8	17822	67 57.5	" 30 ..	16 59.6	17823	67 58.3

\* Disturbance at these times. Values not utilised in computing means given in Table D.



TABLE D.

## "Valentia Observatory, Cahirciveen."

Magnetic Data for the Year 1932

1932	Declination (West)	Inclination (North)	Horizon- tal Force	North	West	Vertical	Total
	° ' "	° ' "	Y	Y	Y	Y	Y
January ..	17 12.7	67 59.2	17818	17020	5272	44073	47539
February ..	17 10.7	67 59.1	17813	17018	5261	44054	47519
March .. ..	17 8.7	67 58.7	17809	17018	5250	44032	47497
April .. ..	17 6.5	67 58.6	17799	17011	5236	44002	47465
May .. ..	17 5.2	67 58.7	17798	17012	5229	44007	47468
June .. ..	17 4.6	67 58.5	17815	17030	5232	44039	47506
July .. ..	17 4.1	67 57.5	17813	17029	5228	43998	47467
August .. ..	17 3.3	67 57.9	17813	17030	5224	44014	47481
September ..	17 4.4	67 59.0	17802	17018	5226	44026	47489
October .. ..	17 2.6	67 58.2	17800	17018	5217	43991	47456
November ..	17 0.8	67 58.5	17816	17036	5213	44040	47507
December ..	17 1.3	67 58.2	17816	17035	5216	44028	47496
Year, 1932 ..	17 5.4	67 58.5	17809	17023	5234	44024	47490
Year, 1931 ..	17 16.8	67 58.7	17815	17011	5292	44048	47514
Year, 1930 ..	17 27.6	67 59.8	17813	16992	5345	44081	47546
Year, 1929 ..	17 37.3	67 59.6	17821	16985	5395	44093	47559
Year, 1928 ..	17 48.0	67 59.3	17826	16973	5449	44096	47563
Year, 1927 ..	17 59.5	67 59.2	17837	16965	5509	44119	47588
Year, 1926 ..	18 10.8	68 0.1	17835	16945	5565	44147	47612
Year, 1925 ..	18 22.4	68 0.0	17849	16939	5626	44177	47646
Year, 1920 ..	19 17.9	68 5.3	17840	16837	5896	44353	47806
Year, 1915 ..	20 3.8	68 7.9*	17869	16785	6130	44519*	47972*
Year, 1910 ..	20 44.6	68 13.0	17892	16732	6337	44771	48215

\* Mean of 11 months only.



Readings in millibars at exact hours, Greenwich Mean Time.

343. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

January, 1932.

Table with 24 columns (1-24) and 31 rows (1-31). Columns 1-12 are labeled 1-12, 13-24 are labeled 13-24, and the last is Mean. Rows 1-31 are labeled 1-31. Includes 'Station Level' and 'Mean (Station level)' and 'Mean (Sea level)' rows.

344. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

February, 1932.

Table with 24 columns (1-24) and 29 rows (1-29). Columns 1-12 are labeled 1-12, 13-24 are labeled 13-24, and the last is Mean. Rows 1-29 are labeled 1-29. Includes 'Station Level' and 'Mean (Station level)' and 'Mean (Sea level)' and 'Hour G.M.T.' rows.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

345. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

March, 1932.

Table with 26 columns (Hour, G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Includes station level and sea level mean values.

346. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

April, 1932.

Table with 26 columns (Hour, G.M.T., 1-24, Mean) and 30 rows (Day 1-30). Includes station level and sea level mean values.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

347. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

May, 1932.

Table with 25 columns (Hour, G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea level' mean values.

348. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

June, 1932.

Table with 25 columns (Day, 1-24, Mean) and 30 rows (Day 1-30). Includes 'Station Level' and 'Sea level' mean values.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

349. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

July, 1932.

Table with 26 columns (Hour G.M.T. 1-24, Mean) and 31 rows (Station Level 1-31, Mean Station level, Mean Sea level). Data includes millibar readings for each hour and level.

350. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

August, 1932.

Table with 26 columns (Hour G.M.T. 1-24, Mean) and 31 rows (Station Level 1-31, Mean Station level, Mean Sea level). Data includes millibar readings for each hour and level.

NOTE. - When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

351. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

September, 1932.

Table for station 351 showing hourly pressure readings from 1 to 30 for station level and sea level, with a vertical axis for station level.

352. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

October, 1932.

Table for station 352 showing hourly pressure readings from 1 to 31 for station level and sea level, with a vertical axis for station level.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

353. Cahirciveen (Valentia Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 13.7 metres.

November, 1932.

Table with 25 columns (Hour, G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea level' mean values.

354. Cahirciveen (Valentia Observatory): H<sub>b</sub> = 13.7 metres.

December, 1932.

Table with 25 columns (Hour, G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea level' mean values.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



From readings in millibars at exact hours, Greenwich Mean Time.

355. Cahirciveen (Valentia Observatory): H<sub>p</sub> = 13.7 metres.

1932.

Table with 25 columns: Hour G.M.T., 1-24, Mean. Rows include Station Level, Sea Level, and hourly pressure readings in mb.

PRESSURE AT STATION LEVEL: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change†

356. Cahirciveen (Valentia Observatory): H<sub>p</sub> = 13.7 metres.

1932.

Table with 25 columns: Month, Mean, Hour 1-24. Rows include monthly means and diurnal inequalities for Jan, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec, and Year.

ABSOLUTE EXTREMES OF PRESSURE AT STATION LEVEL FOR EACH DAY.

Maximum and minimum for the interval 0 h. to 24 h., Greenwich Mean Time.

357. Cahirciveen (Valentia Observatory): H<sub>p</sub> = 13.7 metres.

1932.

Table with columns: Month, Jan.-Dec., and rows for each day of the year (1-31) showing maximum and minimum pressure readings.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in degrees absolute at exact hours, Greenwich Mean Time.
358. Cahirciveen (Valentia Observatory): North Wall Screen: h\_t (height of thermometer bulbs above ground) = 1.3 metres.
January, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean) and 31 rows (Day 1-31). Columns 1-11 and 13-24 contain temperature readings in degrees absolute. Column 12 is labeled 'Noon' and column 25 is labeled 'Mean'. Each cell contains a numerical value representing the temperature for that hour and day.

359. Cahirciveen (Valentia Observatory): North Wall Screen: h\_t = 1.3 metres. February, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean) and 29 rows (Day 1-29). Columns 1-11 and 13-24 contain temperature readings in degrees absolute. Column 12 is labeled 'Noon' and column 25 is labeled 'Mean'. Each cell contains a numerical value representing the temperature for that hour and day.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

360. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres.

March, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31, Mean). Columns 1-24 represent hourly readings, and the last column is the Mean. Each cell contains a temperature value in degrees absolute.

361. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres.

April, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31, Mean). Columns 1-24 represent hourly readings, and the last column is the Mean. Each cell contains a temperature value in degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute in printed 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

362. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above ground) = 1.3 metres.

May, 1932.

Table with 25 columns (Hour G. M. T. 1-24, Mean) and 31 rows (Day 1-31). Each cell contains a temperature reading in degrees absolute.

363. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  = 1.3 metres.

June, 1932.

Table with 25 columns (Hour G. M. T. 1-24, Mean) and 31 rows (Day 1-31). Each cell contains a temperature reading in degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

364. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above ground) = 1.3 metres.

July, 1932.

Table with 25 columns (Hour G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Each cell contains two temperature readings in degrees absolute.

365. Cahirciveen (Valentia Observatory): North Wall Screen :  $h_t$  = 1.3 metres.

August, 1932.

Table with 25 columns (Hour G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Each cell contains two temperature readings in degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

366. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres. September, 1932.

Table with 25 columns (Hour G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Contains temperature readings in degrees absolute.

367. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres. October, 1932.

Table with 25 columns (Hour G.M.T., 1-24, Mean) and 31 rows (Day 1-31). Contains temperature readings in degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

368. Cahirciveen (Valentia Observatory):North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres.

November, 1932.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

Table for November 1932 showing hourly temperature readings in degrees absolute from 1. to 24. and Mean.

369. Cahirciveen (Valentia Observatory):North Wall Screen: h<sub>t</sub> = 1.3 metres.

December, 1932.

Table for December 1932 showing hourly temperature readings in degrees absolute from 1. to 24. and Mean.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

TEMPERATURE: ANNUAL MEANS OF HOURLY VALUES.

From readings in degrees absolute at exact hours, Greenwich Mean Time.

370. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres.

1932.

Table with 25 columns (1-24, Noon, 13-24, Mean) and 12 rows (Jan-Dec, Year) showing hourly temperature means and deviations from the mean.

TEMPERATURE: MONTHLY MEANS AND DIURNAL INEQUALITIES. The departures from the mean of the day are adjusted for non-cyclic change.

371. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres.

1932.

Table with 25 columns (Month, Mean, Hour 1-24) and 12 rows (Jan-Dec, Year) showing monthly means and diurnal inequalities.

ABSOLUTE EXTREMES OF TEMPERATURE FOR EACH DAY.

Maximum and minimum for the interval 0 h. to 24 h., Greenwich Mean Time.

372. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres.

1932.

Table with 25 columns (Month, Day, Max., Min.) and 31 rows (Days 1-31) showing absolute temperature extremes for each day.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is printed 75.0.

↑ see page



Percentages at exact hours, Greenwich Mean Time.

373. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres.

January, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour Pressure) and 31 rows (Day 1-31). Contains relative humidity percentages and vapour pressure values.

374. Cahirciveen (Valentia Observatory): North Wall Screen: h<sub>t</sub> = 1.3 metres.

February, 1932.

Table with 26 columns (Hour G. M. T., 1-24, Mean, Vapour Pressure) and 29 rows (Day 1-29). Contains relative humidity percentages and vapour pressure values.

\* Computed from the mean temperatures and the mean relative humidities.

† Mean of the column.

‡ Mean of the row.

Percentages at exact hours, Greenwich Mean Time.

375. Cahirciveen (Valentia Observatory): North Wall Screen : h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres.

March, 1932.

Table with 25 columns (1-24) and 1 column (Mean) for each hour of the day (1-31). Includes columns for Vapour Pressure and Mean. Rows are labeled with Day and Hour G. M. T.

376. Cahirciveen (Valentia Observatory): North Wall Screen : h<sub>t</sub> = 1.3 metres.

April, 1932.

Table with 25 columns (1-24) and 1 column (Mean) for each hour of the day (1-30). Includes columns for Vapour Pressure and Mean. Rows are labeled with Hour G. M. T.

\* Computed from the mean temperatures and the mean relative humidities

† Mean of the column.

‡ Mean of the row.

RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

377. Cahirciveen (Valentia Observatory): North Wall Screen :  $h_t$  (height of thermometer bulbs above ground) = 1.3 metres.

May, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
Day.	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mb.	
1	74	76	76	74	73	79	74	68	71	63	63	67	67	62	62	72	74	69	66	67	70	70	70	74	70.5	9.5	
2	74	76	78	85	81	83	84	81	75	56	70	70	73	76	81	77	76	83	84	83	91	93	92	93	79.3	10.5	
3	90	87	87	82	75	82	83	84	76	75	71	66	66	70	65	62	59	59	61	65	73	70	66	74	73.2	10.5	
4	73	79	75	85	83	85	83	55	57	56	51	51	51	50	50	51	53	67	66	69	78	83	76	74	67.2	9.2	
5	73	74	75	81	77	80	74	62	64	60	51	49	56	50	57	55	55	61	70	79	72	70	71	71	65.2	7.4	
6	71	73	82	83	78	84	71	78	67	60	53	60	57	62	57	68	61	61	67	71	69	73	71	72	68.7	7.3	
7	81	79	85	84	84	86	85	79	72	71	72	61	61	63	63	60	62	65	62	68	71	73	82	82	72.7	7.5	
8	84	83	89	89	88	88	84	82	62	61	53	55	53	58	61	62	70	70	72	79	84	73	75	74	73.1	7.2	
9	78	75	78	71	73	71	85	71	66	61	60	53	60	58	57	61	60	57	59	62	71	76	78	74	67.3	7.3	
10	80	84	86	88	87	87	84	83	72	69	60	65	64	65	63	79	79	79	81	89	92	92	94	92	79.4	8.9	
11	84	94	95	95	94	93	93	98	94	97	93	90	95	94	94	96	95	95	94	95	94	94	94	95	94	91.4	12.1
12	94	95	96	96	95	93	91	93	93	97	98	97	93	90	91	86	87	84	88	89	90	89	90	99	99	92.0	13.3
13	90	90	90	93	93	93	88	88	87	82	79	78	78	80	77	72	77	78	77	80	83	86	85	83	83	83.7	12.5
14	83	83	86	84	85	85	84	87	80	77	78	77	82	78	78	79	79	85	83	88	84	91	86	87	82.3	12.2	
15	92	89	87	87	87	84	86	76	78	71	72	78	81	80	91	80	87	88	83	81	87	93	93	89	84.1	11.9	
16	91	93	89	95	91	99	97	80	78	75	78	79	77	72	70	68	63	57	72	77	84	82	79	83	81.0	11.1	
17	86	84	84	79	79	78	76	68	64	62	67	67	76	80	78	80	82	86	85	86	89	89	90	90	79.5	11.7	
18	91	91	91	91	95	97	95	93	95	93	92	97	91	84	81	88	88	85	88	89	89	88	87	88	90.3	13.8	
19	87	87	89	95	95	97	94	88	89	89	90	88	93	95	89	82	85	89	92	93	95	94	91	94	90.6	13.4	
20	94	93	94	95	95	95	94	90	91	90	97	88	88	86	85	84	86	80	87	89	94	91	94	95	90.2	13.4	
21	90	89	90	89	84	88	78	75	71	67	61	64	67	71	69	63	78	78	83	87	85	90	90	91	79.4	12.1	
22	89	90	89	91	88	90	88	82	89	90	85	80	77	69	69	78	78	89	89	85	92	92	92	87	85.4	12.2	
23	89	83	87	87	77	75	75	73	67	75	65	71	74	80	83	88	78	87	81	75	74	74	70	74	77.9	10.4	
24	72	76	67	73	83	68	72	64	62	62	62	62	55	61	55	58	61	62	64	63	62	62	67	67	65.1	8.0	
25	73	73	80	71	71	71	65	55	62	58	60	67	56	53	64	72	63	65	76	76	81	81	75	73	68.3	7.3	
26	72	79	77	81	82	75	78	76	65	68	62	60	69	65	55	60	62	55	66	71	76	92	86	86	71.7	9.7	
27	85	87	91	91	92	89	79	74	68	74	66	73	72	67	77	80	78	75	76	84	85	81	73	68	79.0	9.8	
28	63	66	68	61	56	62	61	61	72	81	79	80	79	76	77	76	77	78	76	75	79	80	81	86	72.5	9.3	
29	87	92	85	87	90	89	87	87	89	87	89	87	84	78	57	70	75	80	75	71	75	76	87	87	82.5	10.3	
30	86	81	76	78	83	73	73	67	67	74	78	85	85	83	88	89	89	91	91	95	94	93	93	91	83.4	11.6	
31	94	92	92	88	89	89	86	88	89	87	86	87	88	84	78	76	77	77	78	78	83	81	81	80	84.7	12.5	
Mean	83.2	83.7	84.3	84.8	84.0	84.1	82.2	78.2	75.3	74.4	71.8	72.7	73.2	72.3	72.3	73.5	74.0	76.0	77.2	79.3	82.1	82.7	82.5	82.7	78.6	†10.5	
Vapour Pressure *	mb. 10.1	mb. 10.0	mb. 9.9	mb. 9.9	mb. 9.7	mb. 9.8	mb. 10.2	mb. 10.2	mb. 10.2	mb. 10.3	mb. 10.2	mb. 10.3	mb. 10.6	mb. 10.5	mb. 10.6	mb. 10.7	mb. 10.7	mb. 10.5	mb. 10.5	mb. 10.6	mb. 10.6	mb. 10.3	mb. 10.2	mb. 10.2	mb. 10.3	†	

378. Cahirciveen (Valentia Observatory): North Wall Screen :  $h_t$  = 1.3 metres.

June, 1932.

1	83	79	76	87	83	85	75	68	67	66	64	65	63	67	68	83	90	85	92	96	94	90	89	96	79.3	mb. 12.3
2	89	95	97	94	94	96	91	90	74	77	67	77	79	72	70	67	67	74	83	87	87	87	89	89	82.5	12.7
3	89	87	92	88	91	88	88	88	80	72	78	83	84	90	90	92	90	95	94	97	92	97	94	90	88.7	13.2
4	90	87	82	84	77	89	90	79	80	79	78	77	78	81	81	80	80	60	57	65	68	71	75	76	78.3	12.0
5	78	83	88	90	91	91	83	69	57	54	49	56	59	57	56	57	49	57	64	72	75	81	78	87	69.8	9.3
6	89	89	89	90	90	91	80	73	69	54	51	54	54	57	54	71	64	67	65	69	74	74	81	83	72.4	9.4
7	77	74	79	81	84	79	78	76	69	67	58	58	60	66	68	64	63	67	74	82	86	91	90	73.1	10.2	
8	91	91	91	91	91	91	89	82	76	71	74	72	62	70	74	75	74	80	90	88	89	97	93	93	83.1	12.0
9	94	96	95	94	95	95	94	91	96	97	96	96	96	94	94	95	95	90	93	97	97	90	92	90	94.3	14.0
10	86	95	90	89	89	90	90	90	83	85	78	70	71	71	71	70	74	71	71	84	86	89	83	92	82.0	12.8
11	92	93	93	93	93	92	83	75	68	67	63	69	71	64	61	63	56	74	78	82	84	88	89	91	78.4	11.9
12	87	89	89	91	93	91	91	84	79	72	75	73	79	80	79	78	78	77	78	87	87	85	80	77	82.7	13.3
13	83	80	87	80	87	86	79	72	68	69	71	68	76	73	73	68	70	74	77	75	85	83	88	90	77.3	13.5
14	91	91	91	93	93	94	89	80	81	80	82	80	82	80	75	72	72	79	80	85	83	88	90	89	84.2	15.9
15	90	91	93	92	92	92	89	88	88	90	88	82	89	85	77	96	89	88	88	88	88	91	95	88.9	15.6	
16	90	91	93	95	90	90	88	86	80	74	70	68	72	72	77	75	71	67	70	69	70	71	68	70	78.3	14.4
17	75	85	82	88	88	83	86	83	67	57	58	55	52	52	59	68	68	73	80	80	86	87	89	89	74.2	15.4
18	92	90	91	91	91	92	89	82	68	67	56															

Percentages at exact hours, Greenwich Mean Time.

379. Cahirciveen (Valentia Observatory): North Wall Screen : h<sub>t</sub> (height of thermometer bulbs above ground) = 1.3 metres.

July, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
Day.	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
1	95	91	97	91	95	95	91	91	89	81	84	87	80	83	77	67	70	68	71	75	69	78	78	77	77	82.5	mb.
2	77	76	77	78	83	77	76	76	70	69	69	65	67	75	72	77	88	89	81	90	94	89	90	90	90	78.7	14.0
3	89	89	90	91	95	91	97	98	97	98	96	96	96	94	97	98	99	98	99	96	93	92	94	96	96	94.8	16.9
4	98	98	97	91	96	98	91	91	87	91	90	88	81	81	86	84	82	83	82	83	88	91	88	89	89	89.1	15.3
5	93	93	91	90	90	90	89	85	84	78	80	80	78	80	78	78	89	89	89	91	90	90	91	91	91	86.5	14.3
6	91	94	95	95	93	96	92	85	85	90	86	86	89	91	94	94	96	90	88	86	87	88	89	89	89	90.4	14.5
7	89	89	88	93	93	92	95	90	85	87	83	81	84	83	87	84	86	88	91	97	93	90	88	98	98	89.1	15.5
8	97	96	96	94	93	93	93	93	91	91	91	90	89	90	85	90	92	91	92	97	96	94	95	94	94	92.7	17.3
9	95	93	98	98	97	94	96	96	95	92	92	90	88	88	88	87	83	82	89	93	90	89	91	90	91	91.5	17.8
10	90	89	91	90	91	90	90	95	96	96	96	91	92	88	87	84	82	81	78	82	88	88	90	90	90	89.0	15.5
11	92	93	94	91	88	88	85	78	77	77	78	74	69	68	71	75	76	74	78	73	77	77	75	80	79.7	13.4	
12	79	77	72	75	72	71	71	73	68	74	69	68	69	65	71	72	78	78	78	81	82	84	83	91	74.8	12.7	
13	90	96	97	95	95	94	89	91	90	82	75	79	82	74	80	85	86	84	87	80	86	90	96	98	98	87.4	16.0
14	90	90	90	89	90	90	91	90	90	92	87	87	82	84	82	84	81	81	79	83	83	83	85	90	90	86.5	14.9
15	90	90	93	94	92	90	90	85	85	78	77	86	87	85	86	89	91	96	94	91	92	97	96	94	94	89.4	14.9
16	91	92	91	90	89	87	84	77	78	78	77	77	79	82	79	74	77	74	73	75	76	78	77	81	80.9	13.5	
17	78	78	76	78	75	73	70	73	72	68	67	60	60	61	60	64	63	67	64	67	66	70	69	68	68.9	11.7	
18	68	68	73	75	76	78	80	87	90	90	90	89	91	90	83	91	90	90	91	92	95	92	90	97	85.1	13.2	
19	94	95	93	94	94	95	94	98	91	91	81	85	87	80	82	81	85	89	93	93	94	93	92	94	90.4	15.5	
20	98	96	94	81	89	81	79	81	79	77	79	73	70	79	79	77	79	82	81	80	86	78	79	79	81.8	13.8	
21	77	88	89	80	82	86	82	81	79	77	76	76	75	74	82	86	87	89	89	82	92	92	92	90	83.2	13.7	
22	90	91	91	87	90	90	92	86	86	81	77	81	79	75	75	74	69	68	77	80	78	78	78	80	81.6	13.9	
23	84	86	83	87	87	90	93	92	88	90	94	90	96	95	93	93	94	96	92	93	94	94	96	93	91.1	15.2	
24	96	97	97	94	94	94	96	92	94	90	90	94	91	90	93	86	89	89	86	79	81	78	89	88	90.4	15.5	
25	86	88	89	85	87	87	84	83	86	85	87	78	72	80	77	75	78	78	86	86	84	87	86	88	83.4	13.5	
26	87	85	88	88	85	84	87	75	77	77	90	88	82	79	80	77	77	76	78	82	84	87	87	90	82.9	13.8	
27	79	82	77	86	78	80	83	83	81	88	77	76	70	73	71	80	80	83	83	78	88	87	86	87	80.7	13.5	
28	90	90	97	93	91	97	96	92	96	98	99	92	94	90	90	89	89	92	93	97	96	93	94	91	93.2	16.2	
29	92	93	92	96	96	96	93	91	90	89	90	90	91	88	86	88	92	92	90	90	91	93	94	93	91.5	17.0	
30	91	91	94	94	96	96	94	91	97	92	90	89	85	88	82	87	82	84	85	86	89	94	91	92	90.0	16.4	
31	91	91	92	92	92	96	91	92	88	89	84	83	90	89	89	98	84	85	86	89	90	89	89	91	89.6	15.2	
Mean	88.7	89.2	89.7	88.9	89.2	89.0	88.2	86.8	85.9	85.0	83.9	82.9	82.1	82.0	82.0	82.8	83.7	84.1	84.6	85.4	86.8	87.2	88.0	89.0	86.0	†14.8	
Vapour Pressure *	mb. 14.5	mb. 14.4	mb. 14.4	mb. 14.2	mb. 14.2	mb. 14.3	mb. 14.5	mb. 14.6	mb. 14.7	mb. 15.0	mb. 15.1	mb. 15.2	mb. 15.1	mb. 15.4	mb. 15.3	mb. 15.3	mb. 15.0	mb. 14.7	mb. 14.7	mb. 14.6	mb. 14.5	mb. 14.4	mb. 14.5	mb. 14.5	mb. 14.7		

380. Cahirciveen (Valentia Observatory): North Wall Screen : h<sub>t</sub> = 1.3 metres.

August, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
1	89	90	90	86	82	75	80	68	76	68	66	59	62	74	64	66	67	68	70	73	78	86	86	84	84	75.4	mb.
2	89	89	89	93	89	86	91	68	94	96	98	98	93	91	89	89	88	91	90	90	88	91	88	81	90.8	12.5	
3	81	81	90	91	94	94	89	81	83	89	87	87	83	82	83	81	88	89	94	95	96	97	95	96	88.6	16.0	
4	94	92	96	92	91	92	92	96	96	95	98	97	97	96	97	96	97	92	92	96	96	98	98	98	95.1	17.6	
5	97	93	94	94	96	98	99	95	97	96	94	97	91	89	88	90	88	90	91	91	91	91	93	97	93.4	18.1	
6	92	96	93	94	93	97	92	92	91	92	95	95	89	85	86	83	84	85	88	92	88	94	93	93	91.0	16.9	
7	93	86	88	89	88	88	87	80	79	77	77	77	80	83	85	91	89	91	92	96	96	94	94	94	87.2	15.9	
8	94	94	94	94	94	94	94	89	86	85	82	82	86	85	83	80	82	88	86	90	94	91	89	93	89.2	17.2	
9	93	93	91	94	92	92	93	90	85	82	76	78	78	80	79	75	77	79	86	88	91	90	90	92	86.0	15.7	
10	91	92	91	92	96	97	92	96	95	93	92	91	89	91	94	91	89	87	86	87	86	77	70	87	89.8	17.4	
11	84	81	87	90	81	88	89	81	82	80	75	78	74	80	82	82	82	86	89	89	92	95	95	94	84.7	18.1	
12	95	94	96	96	95	96	98	91	91	89	88	83	79	76	75	73	75	78	77	80	91	90	89	93	87.0	15.5	
13	92	96	93	97	96	91	96	91	89	84	85	84	86	83	79	90	90	89	87	86	90	90	90	92	89.4	17.4	
14	93	93	92	91	92	95	92	89	86	87	79	80	74	76	79	80	78	80	76	80	83	81	87	82	84.6	16.3	
15	88	91	89	91	92	93	90	83	84	79	74	72	65	81	81	79	81	87	88	87	90	87	91	90	84.5	16.4	
16	93	97	96	94	91	93	91	96	97	98	93	98	92	94	91	91	90	95	94	91	93	95	95				

Percentages at exact hours, Greenwich Mean Time.

381. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above ground) = 1.3 metres.

September, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
Day.	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mb.	
1	95	93	93	95	91	91	92	92	91	92	90	88	86	89	90	90	90	95	94	94	94	95	95	95	95	92.1	19.2
2	95	95	96	96	97	97	98	98	98	96	91	90	90	90	96	97	98	92	97	93	97	93	93	94	94	94.9	19.5
3	89	80	84	82	74	73	69	75	80	68	67	68	64	66	63	62	63	67	67	71	73	74	68	61	71.3	12.6	
4	65	63	73	72	74	65	66	69	74	65	67	70	72	73	74	73	77	76	78	86	84	86	86	88	88	73.4	12.6
5	85	85	83	85	85	88	89	87	90	94	95	96	94	92	89	86	85	80	86	85	88	91	90	94	88.3	15.7	
6	91	93	92	95	95	98	96	90	83	84	78	76	77	77	72	79	70	73	76	77	78	80	76	80	83.0	14.2	
7	80	75	75	76	77	77	77	82	83	78	80	80	85	89	92	92	94	92	90	91	92	90	92	93	84.4	14.5	
8	91	88	88	87	88	90	91	88	80	85	84	96	92	82	82	85	82	88	83	87	85	82	81	82	86.4	14.3	
9	84	80	83	78	81	84	85	83	81	77	76	71	75	68	71	71	73	77	79	85	86	81	85	87	78.7	12.9	
10	82	86	88	87	86	83	81	74	76	70	71	69	70	78	71	75	80	78	81	83	78	84	88	88	78.7	13.6	
11	89	91	92	94	90	87	83	79	69	71	71	71	70	72	73	69	78	82	85	88	84	86	86	88	81.2	14.2	
12	89	89	89	88	89	96	95	95	92	95	96	95	95	91	92	95	97	97	96	95	95	93	94	95	93.3	17.3	
13	94	93	92	94	93	92	92	92	98	98	95	93	99	91	90	90	91	97	94	94	94	94	93	93	93.6	18.4	
14	93	93	93	94	96	94	97	97	96	92	95	91	95	96	94	93	90	95	91	95	95	93	96	96	94.1	18.5	
15	96	93	91	92	97	96	93	91	93	90	90	88	83	83	86	87	90	87	90	89	88	88	85	88	89.9	16.8	
16	89	89	90	89	92	89	89	87	82	85	81	82	73	81	84	89	89	90	93	89	92	91	91	98	87.5	17.0	
17	96	96	93	98	94	96	96	96	96	92	90	91	92	86	91	93	93	93	93	90	94	89	84	90	92.7	18.4	
18	92	87	77	77	79	81	81	85	90	89	87	81	67	76	85	76	85	79	81	76	83	82	79	80	81.7	11.8	
19	74	72	77	72	73	73	76	86	84	69	73	64	65	56	62	66	67	63	71	75	70	66	72	73	70.9	8.9	
20	72	72	71	71	71	63	65	69	72	71	63	61	61	57	57	56	56	65	65	71	68	65	62	65	71	65.7	7.6
21	63	59	69	72	71	71	72	73	65	64	64	65	66	59	58	61	59	63	69	72	73	73	68	71	66.7	8.6	
22	68	74	77	85	86	85	92	89	85	84	83	78	81	91	86	87	84	86	87	74	83	75	80	82	82.4	10.7	
23	78	83	86	86	75	79	84	70	68	65	70	86	76	79	78	74	78	77	84	81	87	89	87	91	79.4	10.1	
24	93	91	97	90	98	98	96	97	95	94	88	85	84	91	90	91	96	91	85	85	87	86	88	93	91.2	12.0	
25	79	80	77	75	76	76	85	83	84	83	89	78	70	75	74	73	70	74	63	64	65	69	71	84	75.9	10.3	
26	73	78	74	73	73	69	82	88	61	63	58	73	72	63	63	61	64	61	59	60	63	60	62	57	66.8	8.1	
27	64	63	63	66	67	62	64	68	67	68	64	56	60	58	56	61	58	65	62	69	74	76	81	79	65.0	8.4	
28	84	84	79	83	82	83	82	85	81	74	74	67	66	63	66	66	74	73	75	76	76	75	73	78	75.8	8.6	
29	76	84	87	89	86	82	83	82	74	70	67	69	68	69	74	65	66	67	74	74	74	79	85	86	76.1	9.0	
30	90	87	91	92	92	87	84	84	77	72	75	70	68	65	66	76	83	85	86	88	86	85	84	84	81.6	12.1	
Mean	83.6	83.2	84.0	84.4	84.3	83.5	84.5	83.8	82.2	79.9	79.1	78.3	77.2	76.9	77.5	77.8	79.2	80.3	81.2	81.5	82.9	82.2	82.3	84.6	81.4	+13.1	
Vapour Pressure *	mb. 12.4	mb. 12.3	mb. 12.3	mb. 12.3	mb. 12.3	mb. 12.2	mb. 12.4	mb. 12.6	mb. 12.9	mb. 13.0	mb. 13.2	mb. 13.2	mb. 13.3	mb. 13.3	mb. 13.1	mb. 13.2	mb. 13.2	mb. 12.9	mb. 12.7	mb. 12.7	mb. 12.4	mb. 12.3	mb. 12.5	mb. 12.7			

382. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  = 1.3 metres.

October, 1932.

1	84	83	75	65	61	66	69	68	62	56	55	55	55	53	54	52	51	55	62	62	71	66	69	74	63.7	mb. 8.2
2	84	84	73	70	75	87	89	88	82	76	73	71	72	68	71	73	68	75	76	76	79	81	73	75	76.6	10.3
3	75	72	72	68	71	68	66	69	75	66	67	63	59	53	55	53	57	63	73	74	75	84	85	83	58.4	9.1
4	85	84	85	85	88	85	82	89	87	77	69	75	75	72	74	76	75	82	79	75	76	74	80	79	79.6	8.6
5	85	85	85	86	86	86	86	86	77	77	76	79	77	76	70	78	81	87	88	90	89	92	91	88	83.2	10.6
6	94	97	99	98	97	96	96	89	90	86	85	85	83	79	83	79	83	82	91	91	93	91	93	93	89.6	12.9
7	94	91	91	93	93	90	88	85	89	89	90	90	89	92	90	88	77	76	77	86	79	81	83	91	87.2	12.3
8	84	76	83	79	77	88	91	88	91	81	76	68	68	66	66	68	73	80	72	75	74	70	75	77.0	9.9	
9	79	75	76	75	69	76	75	72	75	75	76	75	75	73	76	84	89	87	88	89	92	89	88	94	79.7	10.0
10	88	81	80	85	76	81	82	82	78	75	76	70	75	72	68	72	75	80	79	83	82	85	87	86	79.3	9.9
11	85	89	85	83	85	87	87	87	87	87	83	81	78	77	78	76	75	76	82	83	84	84	97	87	83.0	11.6
12	71	87	87	85	88	89	90	98	87	86	84	92	87	76	64	75	74	74	78	76	85	74	73	64	81.1	10.9
13	65	69	65	74	71	65	63	67	74	63	73	68	73	73	68	75	76	84	87	89	89	89	94	98	74.8	9.2
14	98	92	87	82	64	70	67	65	63	65	64	64	61	61	71	67	67	69	83	76	77	72	75	74	72.7	9.5
15	73	76	72	76	73	74	75	71	69	69	73	77	80	81	80	83	88	90	93	95	96	98	98	97	81.1	11.5
16	95	92	91	91	94	94	95	96	95	96	98	98	93	92	92	92	94	95	94	88	78	75	81	75	91.5	13.9
17	76	80	75	79	80	73	76	89	87	82	82	84	90	87	87	91	93	92	91	92	88	85	72	68	83.4	12.7
18	69	68	62	71	72	77	75	70	68	76	66	65	73	70	69	71	70	75	77	84	84	86	89	90	73.6	9.8
19	89	88	89	83	82	81	81	86	87	93	93	95	96	95	96	97	93	94	93	91	95	95	95	93	90.8	12.4
20	95	95	93	93	95	91	93	95	94	95	93	80	75	73	76	77	80	74	76	80	74	74	75	82	84.8	11.3
21	82	88	89	90	88	91	89	91	91	92	82	78	82	76	79	82	78	76	84	76	80	80	86	83	84.1	9.6
22	86	86	87	91	92	88	90	87	84	89	86	72	66	72	76	82	75	82	81	74	82	87	87	86	82.4	10.1
23	86	87	88	87	91	88	91	88	86	87	88	78	78	83	85	80	87	87	89	89	87	88	94	86.6	10.9	
24	97	96	96	95	91	89	88	88	83	86	80	81	88	89	85	85	83	87	87	85	86	87	88	88	88.0	12.4
25	88	88	87	87	90	92	95	93	95	94	98	96	94	94	94	96	94	95	91	91	91	91	90	89	92.1	13.3
26	89	83	86	84	82	86	80	81	83	79	77	77	77	74	68	70	77	75	78	80						

383. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above ground) = 1.3 metres.

November, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure
Day.																										
1	89	94	99	95	97	98	92	91	90	90	87	88	86	81	85	87	91	90	91	90	87	89	91	92	89.3	12.4
2	91	95	96	98	96	95	95	98	97	96	95	95	95	96	95	94	96	96	95	94	93	93	94	95	95.1	14.6
3	91	90	90	90	93	94	92	94	94	95	95	95	95	95	91	93	93	91	93	87	92	92	92	88	92.5	13.4
4	92	91	80	76	80	78	78	80	74	69	64	70	60	69	73	71	74	74	82	83	88	88	87	78	77.7	9.5
5	82	81	69	78	77	77	76	83	72	73	69	62	65	69	63	69	79	81	85	96	87	84	88	81	76.4	8.1
6	77	79	82	78	74	73	75	76	82	79	80	83	83	84	85	82	82	80	80	80	80	84	90	93	80.0	9.6
7	84	86	84	82	79	82	76	77	82	79	72	67	67	66	63	67	69	72	72	78	72	70	72	67	74.7	8.2
8	70	70	71	72	68	68	63	65	61	69	69	70	68	71	71	69	74	75	75	73	79	71	75	75	70.3	8.4
9	80	80	84	78	82	81	83	86	80	87	83	81	79	79	94	84	87	86	87	88	88	89	89	91	83.7	9.9
10	90	91	91	89	90	89	92	86	82	86	80	77	74	74	74	85	80	80	87	75	73	74	75	74	82.2	9.2
11	71	73	70	69	68	65	66	66	67	67	70	70	69	69	69	75	93	85	84	83	81	81	83	83	73.4	9.9
12	85	83	84	79	79	79	80	79	80	77	76	76	78	78	78	76	76	77	78	78	76	74	72	75	78.2	10.9
13	75	76	77	75	76	76	76	76	76	78	75	78	74	73	72	76	75	72	74	75	76	74	76	74	75.3	10.0
14	73	71	71	71	72	70	71	73	67	69	70	69	68	71	71	72	72	75	77	80	83	93	80	78	73.1	8.1
15	79	82	82	79	83	80	78	80	80	81	78	77	77	75	73	76	83	81	78	76	78	81	81	78	79.0	8.0
16	77	81	76	70	74	68	70	70	71	70	70	69	66	70	66	65	70	68	72	76	80	77	78	80	72.2	8.0
17	84	81	91	78	80	80	79	80	79	80	78	79	78	76	80	78	78	76	78	77	73	76	73	73	78.3	9.3
18	73	71	75	75	75	74	79	80	80	82	78	82	84	87	89	89	91	89	98	98	98	98	98	98	81.9	9.9
19	86	80	76	73	79	82	80	84	82	79	72	67	65	68	67	77	82	83	85	84	84	79	82	83	79.5	8.2
20	30	76	79	82	89	86	84	84	77	80	71	67	66	67	70	68	71	70	69	82	83	71	71	71	75.0	8.7
21	67	66	71	66	69	67	71	69	68	73	72	67	65	66	67	67	75	76	76	76	79	79	87	88	71.6	8.2
22	90	96	97	96	96	95	95	94	95	96	94	90	86	75	81	70	67	67	65	71	75	71	68	70	83.7	11.2
23	73	72	71	80	78	73	78	76	79	72	74	76	74	74	78	73	75	74	76	76	79	79	83	75	75.6	9.4
24	72	79	91	93	88	79	84	75	77	74	84	89	94	94	95	91	89	98	86	88	89	87	87	87	85.6	11.4
25	87	89	89	93	94	94	93	93	95	94	94	92	93	91	90	94	93	88	89	89	93	92	87	85	91.3	13.1
26	83	82	95	84	78	76	71	74	70	72	70	65	69	64	62	64	63	64	73	68	70	70	71	67	71.8	9.1
27	62	61	74	63	68	69	65	75	66	69	70	61	71	75	71	73	62	65	61	61	63	63	62	67	67.0	6.9
28	69	71	76	80	83	84	82	86	87	89	89	88	85	87	87	87	89	99	99	99	99	99	99	99	84.5	10.4
29	85	87	86	86	98	82	79	79	83	85	86	86	86	85	86	86	92	92	92	84	76	79	72	75	84.4	10.9
30	81	83	83	82	84	90	90	91	87	89	89	89	82	92	97	73	82	69	71	63	64	63	67	73	80.2	8.5
Mean	80.0	80.6	81.0	80.5	80.9	79.9	79.8	80.9	79.7	80.0	78.5	77.6	76.7	77.4	77.4	77.4	79.8	79.1	79.9	80.0	80.6	79.7	80.1	79.3	79.5	79.8
Vapour Pressure *	mb. 9.7	mb. 9.7	mb. 9.8	mb. 9.6	mb. 9.6	mb. 9.5	mb. 9.5	mb. 9.6	mb. 9.5	mb. 9.7	mb. 9.9	mb. 9.9	mb. 9.9	mb. 9.9	mb. 9.8	mb. 9.8	mb. 9.8	mb. 9.7	mb. 9.6	mb. 9.5	mb. 9.5	mb. 9.5	mb. 9.5	mb. 9.5	mb. 9.7	

384. Cahirciveen (Valentia Observatory): North Wall Screen:  $h_t$  = 1.3 metres.

December, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure
1	70	71	69	60	63	70	73	81	74	68	68	69	70	74	73	77	81	88	88	84	84	82	83	83	74.9	8.1
2	87	87	90	89	91	90	93	87	85	87	83	75	68	73	73	68	74	73	67	71	79	78	76	64	79.9	9.7
3	58	52	57	64	71	68	65	64	65	60	63	62	62	67	67	72	64	64	70	69	69	73	72	60	65.0	7.0
4	63	65	70	70	72	70	73	72	78	84	78	78	84	75	82	85	83	84	85	87	89	87	87	85	78.1	7.1
5	85	85	85	66	62	71	61	57	56	56	60	58	60	57	59	57	61	62	69	72	66	62	59	57	64.9	6.2
6	56	57	57	58	59	60	64	60	57	58	58	56	55	55	53	54	57	57	52	52	57	59	57	57	56.9	5.9
7	60	62	61	62	65	60	62	53	61	61	59	58	59	58	58	62	57	57	58	60	57	59	56	59	59.7	5.7
8	58	59	59	59	59	59	56	59	53	52	60	56	56	56	60	58	55	57	57	56	54	56	60	58	57.2	5.5
9	60	57	58	55	56	57	57	57	59	55	55	54	55	57	57	53	66	54	54	59	62	60	64	71	57.7	4.9
10	74	73	74	74	71	67	58	56	63	67	63	65	67	64	66	68	68	65	67	68	68	68	65	66	67.0	5.7
11	68	58	68	68	66	67	66	71	71	68	69	65	60	60	57	57	58	60	61	59	62	69	75	73	65.1	5.8
12	71	76	79	81	83	84	86	93	89	85	86	83	82	80	83	84	88	87	85	84	85	81	84	86	82.9	8.6
13	87	86	86	84	82	82	83	80	82	84	87	93	88	89	86	86	89	93	79	82	86	88	92	91	85.5	10.1
14	89	94	86	78	78	81	79	82	80	85	79	80	79	86	73	77	72	78	72	71	69	71	73	78	79.0	8.3
15	80	76	89	94	87	82	80	75	82	80	72	74	79	80	75	84	87	87	86	98	91	90	87	83	82.7	10.2
16	87	91	91	91	89	89	89	91	93	95	95	94	96	97	98	96	96	98	95	95	95	94	95	98	93.4	13.0
17	93	94	95	94	94	94	98	98	98	98	99	99	95	96	97	96	94	95	96	97	97	97	96	97	96.1	13.8
18	93	94	95	95	93	95	98	99	98	98	97	98	98	98	98	98	96	93	93	96	93	90	90	92	95.4	13.5
19	89	93	95	88	91	92	89	92	91	89	89	91	88	86	85	85	83	82	74	73	72	72	72	71	85.1	9.6
20	67	69	68	67	62	65	67	72	65	66	65	67	64	69	78	76	81	83	86	90	88	90	93	93	74.2	7.6
21	94	96	93	91	84	79	79	77	80	88	91	88	87	92	95	94	91	91	94	94	96	90	85	79	89.0	9.6
22	85	85	85	86	81	87	87	86	83	82	82	86	93	93	90	90	93	92	93	94	93	95	96	95	88.5	10.4
23	96	95	95	92	84	91	86	76	75	75	79	74	64	65	65	66	70	73	74	73	69	69	67	78.5	9.6	
24	63	64	66	73	74	74	77	83	83	86	83	84	94	84	85	85	87	88	88	87	88	87	87	85	80.7	10.1
25	87	88	87	84	83	86	84	86	84	84	83	81	78	78	75	76	74	73	76	79	81	80	82	84	81.4	10.2
26	84	83	84	86	84	83	78																			

HUMIDITY: ANNUAL MEANS FROM HOURLY VALUES.

For exact hours, Greenwich Mean Time.

385. Cahirciveen (Valentia Observatory): North Wall Screen :  $h_t = 1.3$  metres.

1932.

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean
Relative Humidity	81.9	82.3	82.3	82.6	82.5	82.7	82.3	80.7	79.8	78.8	77.0	75.7	75.1	75.1	75.1	75.7	76.6	77.7	78.9	79.8	80.9	81.1	81.1	81.8	79.5
Vapour Pressure in millibars *	10.1	10.1	10.1	10.1	10.0	10.1	10.2	10.3	10.4	10.6	10.7	10.7	10.7	10.8	10.7	10.7	10.7	10.6	10.5	10.4	10.4	10.3	10.2	10.2	10.4

\* Computed from the mean temperatures and mean relative humidity.

RELATIVE HUMIDITY: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change.†

386. Cahirciveen (Valentia Observatory): North Wall Screen :  $h_t = 1.3$  metres.

1932.

Month	Mean	Hour. G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
January	84.5	%	+0.9	+0.5	-1.3	-0.5	-1.1	0.0	-1.3	-0.2	+0.6	+2.2	+1.1	+0.3	-0.7	-0.5	-1.1	-0.6	+0.4	+0.2	+1.4	+0.4	-0.2	-0.7	-0.5	+0.7
February	69.3	%	+2.6	+2.8	+1.9	+3.2	+3.0	+5.3	+4.2	+2.0	+4.9	+3.4	-0.4	-3.1	-5.6	-6.2	-5.4	-6.2	-5.4	-2.0	-2.2	-0.8	+0.2	+2.0	+0.4	+1.4
March	73.5	%	+1.4	+4.5	+5.4	+4.4	+5.0	+5.2	+6.9	+4.4	+3.7	+0.6	-2.8	-6.5	-6.6	-6.7	-6.0	-6.2	-4.8	-3.7	-0.6	+0.2	-0.7	+0.8	+0.1	+2.0
April	74.5	%	+2.4	+3.3	+2.6	+4.6	+5.0	+4.4	+4.6	+1.1	-0.9	-1.4	-2.7	-4.6	-4.8	-5.1	-3.8	-4.1	-3.7	-3.7	-1.7	+0.5	+2.9	+2.7	+1.4	+1.0
May	78.6	%	+4.6	+5.0	+5.7	+6.2	+5.4	+5.5	+3.5	-0.4	-3.3	-4.2	-6.8	-5.9	-5.4	-6.3	-5.1	-4.6	-2.6	-1.4	+0.7	+3.5	+4.1	+4.0	+4.1	+4.1
June	81.4	%	+5.7	+6.8	+7.6	+7.7	+8.1	+7.9	+4.9	+0.7	-3.7	-5.6	-8.3	-8.6	-7.8	-7.3	-6.8	-5.7	-6.5	-4.5	-2.5	+0.7	+2.7	+4.2	+4.4	+5.9
July	86.0	%	+2.5	+3.1	+3.7	+2.8	+3.1	+2.9	+2.1	+0.7	-0.2	-1.0	-2.1	-3.2	-3.9	-4.0	-4.0	-3.2	-2.3	-2.0	-1.4	-0.6	+0.8	+1.2	+2.0	+3.0
August	86.2	%	+3.1	+2.9	+3.3	+4.3	+3.9	+4.2	+3.3	+1.0	-0.2	-1.9	-3.4	-4.1	-5.5	-4.3	-5.2	-4.4	-3.5	-2.1	-0.3	+0.3	+1.7	+1.7	+2.2	+3.0
September	81.4	%	+2.0	+1.6	+2.4	+2.8	+2.7	+2.0	+3.0	+2.3	+0.7	-1.5	-2.4	-3.2	-4.2	-4.5	-3.9	-3.5	-2.2	-1.0	-0.2	+0.2	+1.6	+0.9	+1.1	+3.3
October	80.0	%	+2.5	+1.6	+0.4	+0.6	+0.5	+1.4	+1.9	+1.9	+1.9	0.0	-0.9	-2.8	-3.3	-4.3	-4.5	-3.6	-2.7	-1.0	+1.4	+1.0	+1.9	+1.2	+2.2	+2.7
November	79.5	%	+0.2	+0.9	+1.3	+0.8	+1.2	+0.3	+0.2	+1.3	+0.1	+0.5	-1.0	-1.9	-2.7	-2.0	-1.9	-2.0	+0.4	-0.2	+0.7	+0.7	+1.4	+0.5	+1.0	+0.2
December	78.1	%	+0.5	+0.4	+1.1	+0.2	-0.1	+0.2	+0.1	0.0	+0.2	+0.7	-0.1	-1.3	-1.8	-1.6	-2.1	-1.3	+0.1	+0.5	-0.1	+0.9	+1.2	+1.3	+0.7	+0.3
Year	79.5	%	+2.4	+2.8	+2.8	+3.1	+3.0	+3.3	+2.8	+1.2	+0.3	-0.7	-2.5	-3.7	-4.4	-4.4	-4.3	-3.8	-2.9	-1.7	-0.6	+0.4	+1.4	+1.6	+1.6	+2.3

† see page

RAINFALL: ANNUAL TOTALS OF HOURLY VALUES.

Amounts. in millimetres ; durations in hours for periods of sixty minutes between the exact hours, Greenwich Mean Time.

387. Cahirciveen (Valentia Observatory):  $H_r$  ( height of receiving surface above M.S.L.) = H (height of station above M.S.L.) +  $h_t$  (height of receiving surface above ground) = 9.1 metres + 0.5 metre.

1932.

Hour. G.M.T.	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to Noon	Noon to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24	0 to 24.
Amount	mm. 36.4	mm. 41.3	mm. 43.1	mm. 38.1	mm. 41.2	mm. 42.2	mm. 51.4	mm. 48.8	mm. 53.1	mm. 57.9	mm. 50.2	mm. 57.3	mm. 49.8	mm. 55.2	mm. 42.7	mm. 57.4	mm. 66.4	mm. 59.2	mm. 62.8	mm. 52.2	mm. 59.3	mm. 51.9	mm. 58.7	mm. 63.3	mm. 1244.9
Duration	hr. 32.8	hr. 35.4	hr. 35.0	hr. 33.3	hr. 31.0	hr. 32.1	hr. 34.4	hr. 33.3	hr. 34.5	hr. 33.0	hr. 30.5	hr. 29.0	hr. 26.1	hr. 25.3	hr. 25.8	hr. 32.6	hr. 32.8	hr. 32.5	hr. 37.3	hr. 31.5	hr. 32.5	hr. 30.0	hr. 32.5	hr. 38.5	hr. 771.7

NOTES ON RAINFALL.

388. Cahirciveen (Valentia Observatory):

1932.

Notable Falls of the Year.-

Details of the greatest continuous falls are as follows:-

Date	Amount	Duration
January 12	31	hrs. 7.5
May 30-31	35	hrs. 14.5
August 20	25	hrs. 2.9
December 16	22	hrs. 7.6

There were no "noteworthy" falls in short periods.

The greatest fall in the year between one exact hour and the next was 10.2 mm. between 12h. and 13h. on January 12th.

Dry Periods.-

The longest period without rain was the 16 days from February 8th to 23rd ("absolute drought"): there were two periods of 11 days without rain, January 25th to February 4th and March 9th to 19th.

Wet Periods.-

There was a period of 21 days from January 4th to 24th on all of which rain fell and on only 3 days was the amount less than 1.0 mm.

During the 30 days October 6th to November 4th there was only one dry day and one day with 0.2 mm of rain.

RAINFALL.

Amounts in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

389. Cahirciveen (Valentia Observatory): H<sub>r</sub> (height of receiving surface above M.S.L.)=H (height of station above M.S.L.) + h<sub>r</sub> (height of receiving surface above ground) = 9.1 metres + 0.5 metre.

January, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration 0-24		
Day.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.	
1	...	...	...	...	...	1	2	...	2	2.2	4	3	...	...	...	...	...	...	...	...	...	...	...	...	...	4.1	3.3	
2	...	...	...	...	...	2	1.0	2.2	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5.2	2.5	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	2.7	1.8	1.8	1.8	1	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	9	2.3	1.0	6	7	4	1	...	1.3	1.0	6	5	1	1	...	...	...	1.0	9	...	12.2	9.4
6	...	...	...	1.2	1.0	...	8	2.8	1.4	2.0	2.7	5.2	2	6	2	...	...	...	...	...	2	...	...	...	...	19.1	8.1	
7	...	4	...	...	...	...	4	4	1.6	...	...	...	6	2	5	...	2	7	3	...	...	...	...	...	...	5.6	2.7	
8	...	5	...	...	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	1.6	...	...	...	...	...	1	...	...	...	7	4	...	...	...	...	...	1.9	1.3	
9	...	...	8	1.0	3	6	2.9	1.4	3.4	1.2	...	4	8	1.1	9	2	...	...	...	...	...	...	...	1.7	...	16.7	8.3	
10	5	5	...	...	1.2	1.4	...	4	...	...	...	...	...	...	...	...	...	8	5	...	4	3.1	3	3	...	9.4	3.1	
11	5	4	...	...	...	1	...	1.5	3	6	1.3	...	...	...	...	6	1	...	...	...	...	...	7	6	6.7	3.1		
12	...	...	...	3	...	...	...	...	2	4	7	1.8	10.2	8.7	7.3	1.7	5	2	1	3	2	1	...	4.0	36.7	10.9		
13	...	...	2	...	...	...	5	...	5	7	1.2	1	...	...	4	1	...	...	...	...	...	...	...	...	3.7	1.4		
14	...	6	1.0	1	...	1	2	1	...	...	...	3	...	7	1.2	8.0	6.2	6	1.6	2.7	3	...	...	...	23.7	5.4		
15	1.4	1.0	...	...	...	...	...	2	...	...	...	...	1.0	1.3	1	...	...	...	4	...	3	...	1	...	...	5.8	3.4	
16	...	...	...	1	...	...	1	1	8	1.5	...	...	...	2	...	...	...	2.5	3.8	1.9	...	2	1	...	11.3	3.9		
17	...	...	...	...	...	...	...	...	...	...	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	0.2	0.3		
18	1	...	2	2	...	1	3	...	...	...	...	...	1	...	...	1	2	...	...	...	...	...	...	...	...	1.3	2.8	
19	...	...	1	1	...	...	...	...	...	...	...	...	...	...	3	8	2	1	3	8	2.6	6	7	...	...	6.6	7.6	
20	6	5	...	1	...	...	...	...	...	...	...	...	...	4	2	5	1	...	...	...	...	...	...	...	...	2.4	3.4	
21	...	...	...	...	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	3	2	...	...	0.8	1.8	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	0.2	0.6	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	3	3	...	3	...	1.1	1.8	
24	...	...	...	...	2	3	1	2	2	...	1.1	2.2	6	2	...	...	...	...	...	...	...	...	...	...	...	5.1	4.2	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Sum.	3.1	3.9	2.3	3.1	2.8	3.9	8.8	10.4	9.6	9.3	6.7	12.1	17.0	16.6	12.1	11.6	9.6	5.6	7.8	6.6	2.7	8.8	5.0	6.8	186.2	92.0		
Total Duration.	hr. 1.2	hr. 1.4	hr. 1.2	hr. 2.9	hr. 2.2	hr. 3.7	hr. 4.7	hr. 5.1	hr. 5.3	hr. 5.3	hr. 4.2	hr. 4.8	hr. 4.6	hr. 5.5	hr. 4.9	hr. 4.1	hr. 5.6	hr. 4.3	hr. 3.7	hr. 3.4	hr. 3.4	hr. 3.7	hr. 3.3	hr. 3.5	hr. 92.0			

390. Cahirciveen (Valentia Observatory): H<sub>r</sub> = 9.1 metres + 0.5 metre.

February, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration		
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.2
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.1	5	1.3	2.9	2.6	8.4	4.2	
8	...	...	...	...	...	...	...	...	...	...	3	4	1.0	3	...	...	...	...	...	...	...	...	...	...	...	2.0	1.9	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	( $\frac{1}{2}$ )	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	3	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Sum .	0.3	...	0.5	...	0.1	0.1	...	...	...	0.4	0.4	1.0	0.3	...	...	...	...	...	...	...	1.1	0.5	1.3	2.9	2.6	11.5	7.4	
Total Duration	hr. 0.3	hr. ...	hr. 0.8	hr. ...	hr. 0.1	hr. 0.1	hr. ...	hr. ...	hr. ...	hr. 0.3	hr. 0.5	hr. 0.5	hr. 0.6	hr. ...	hr. ...	hr. ...	hr. ...	hr. ...	hr. ...	hr. ...	hr. 0.7	hr. 1.0	hr. 1.0	hr. 1.0	hr. 0.5	hr. 7.4		
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24			





RAINFALL.

Amounts in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

393. Cahirciveen (Valentia Observatory): H<sub>r</sub> (height of receiving surface above M.S.L.)=H (height of station above M.S.L.) + h<sub>r</sub> (height of receiving surface above ground) = 9.1 metres + 0.5 metre. May, 1932.

Table with 25 columns for hourly rainfall (0-1 to 23-24) and 2 columns for total rainfall and duration. Rows represent days from 1 to 31. Includes a 'Sum' row and a 'Total Duration' row.

394. Cahirciveen (Valentia Observatory): H<sub>r</sub> = 9.1 metres + 0.5 metre. June, 1932.

Table with 25 columns for hourly rainfall (0-1 to 23-24) and 2 columns for total rainfall and duration. Rows represent days from 1 to 30. Includes a 'Sum' row and a 'Total Duration' row.

RAINFALL.

Amounts in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

395. Cahirciveen (Valentia Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$   
(height of receiving surface above ground) = 9.1 metres + 0.5 metre.

July, 1932.

Table for Cahirciveen (Valentia Observatory) in July 1932. Columns include Hour (G. M. T.), rainfall amounts (0-1 to 24), and Total Duration. Rows list days from 1 to 31.

396. Cahirciveen (Valentia Observatory):  $H_r = 9.1$  metres +  $0.5$  metre.

August, 1932.

Table for Cahirciveen (Valentia Observatory) in August 1932. Columns include Hour (G. M. T.), rainfall amounts (0-1 to 24), and Total Duration. Rows list days from 1 to 31.

RAINFALL.

Amounts in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

397. Cahirciveen (Valentia Observatory): H<sub>r</sub> (height of receiving surface above M.S.L.)-H (height of station above M.S.L.) + h<sub>r</sub> (height of receiving surface above ground) = 9.1 metres + 0.5 metre. September, 1932.

Table with 25 columns for hourly intervals (0-1 to 24) and 25 rows for hourly intervals (1 to 30). Columns include 'Hour G. M. T.', 'mm.', and 'hr.'. Rows include 'Day.', 'Sum.', and 'Total Duration.'. Values are in millimeters and hours.

398. Cahirciveen (Valentia Observatory): H<sub>r</sub> = 9.1 metres + 0.5 metre.

October, 1932.

Table with 25 columns for hourly intervals (0-1 to 24) and 31 rows for hourly intervals (1 to 31). Columns include 'Hour G. M. T.', 'mm.', and 'hr.'. Rows include 'Sum.', 'Total Duration.', and 'Hour G. M. T.'. Values are in millimeters and hours.

RAINFALL.

321

Amounts in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

399. Cahirciveen (Valentia Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 9.1 metres + 0.5 metre. November, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Dura- tion 0-24	
Day.	mm.																								hr.		
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.4
2	1.1	1.0	..1	...	...	...	...	...	..5	2.4	..2	...	...	...	...	...	...	..1	...	...	...	...	...	..4	5.8	4.8	
3	..4	..3	...	...	...	..3	...	...	..1	..1	..2	..1	..1	..1	...	..2	..1	...	..2	..6	..7	..2	..3	..4	3.5	3.0	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..2	...	...	...	...	...	...	...	...	...	0.9	1.7	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..1	..8	1.1	..1	..1	...	...	..5	2.7	3.5	
12	...	..1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	0.3	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	..2	..4	..1	...	...	..1	...	...	...	...	...	...	0.8	2.1
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	..6	..7	..1	...	..7	..1	...	...	...	...	...	...	...	...	...	..3	...	...	...	...	...	2.5	1.5
21	...	...	...	...	...	...	..1	...	..2	..1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	1.5	..6	..1	...	..1	...	...	..1	...	1.2	..5	...	..2	...	...	...	...	...	...	...	...	..3	1.8	1.6	3.8	2.3	
23	...	...	..1	...	..6	...	..1	...	...	..1	..3	..3	...	..7	...	..3	...	...	..3	..1	...	...	...	...	2.9	1.2	
24	...	...	..2	..4	..3	...	...	...	...	...	...	...	..1	..1	...	...	...	...	...	...	..1	2.1	1.0	...	1.1	2.1	
25	...	...	...	..2	..1	...	..1	..1	..1	...	...	...	...	...	..1	..2	...	...	...	..1	2.1	1.0	...	...	4.1	3.7	
26	...	...	..3	..1	..5	..2	...	..9	...	..4	..2	...	...	...	...	...	...	...	...	..2	...	...	...	...	2.8	1.3	
27	...	..5	..7	..7	..6	...	...	...	..4	...	..1	..1	..7	..1	..2	..3	...	..4	...	...	...	...	...	...	4.8	1.7	
28	...	...	...	...	..3	...	..1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.4	0.4	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.2	3.3	1.5	..2	...	...	...	...	...	6.2	2.5	
30	...	...	...	...	...	..8	...	...	..2	...	...	..5	...	2.8	..4	..2	..2	..2	...	...	...	...	..1	...	5.4	2.0	
Sum.	3.0	2.5	1.5	1.4	3.1	2.0	0.5	1.1	2.2	4.4	1.5	1.0	1.1	4.0	1.2	1.0	1.8	4.8	2.9	1.8	3.0	1.5	2.4	3.1	52.6	43.5	
Total Duration.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.
	2.3	2.9	1.4	1.4	2.1	1.6	1.0	0.6	1.5	2.6	1.6	1.3	0.8	1.5	1.4	1.3	1.5	3.3	2.0	2.0	1.9	1.7	1.6	4.2	43.5		

400. Cahirciveen (Valentia Observatory):  $H_r$  = 9.1 metres + 0.5 metre. December, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Dura- tion 0-24	
Day.	mm.																								hr.		
1	..1	...	..4	...	...	..4	...	..6	...	...	...	...	...	...	...	...	...	..2	...	...	...	...	..3	...	mm.	2.0	0.7
2	1.2	2.2	2.3	2.0	1.8	1.1	2.2	..4	...	...	...	...	...	...	...	...	...	...	...	..3	..5	..2	...	...	14.2	8.1	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..7	..9	...	...	...	...	...	...	...	...	1.7	0.4	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	..7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	..2	..2	..5	..6	..2	..8	...	...	...	...	...	..1	...	...	..5	...	..1	...	..5	3.7	2.7	
13	...	...	..1	...	...	..4	...	..5	..1	..4	1.1	...	...	...	...	...	...	...	...	..1	..4	5.2	8.3	8.3	3.5	3.5	
14	..8	1.0	..6	..6	...	...	...	1.3	..2	1.7	...	...	...	..1	...	...	...	...	...	...	...	...	...	...	6.3	2.9	
15	..1	3.3	3.8	1.6	..1	...	..4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9.3	3.5	
16	...	...	...	...	..2	..8	..1	2.5	3.7	4.9	3.8	4.0	2.6	..3	..1	..6	..2	..5	2.4	2.7	6.7	6.2	1.3	..5	44.1	15.6	
17	..2	..5	..6	..9	..8	...	..1	...	..3	...	..2	...	..6	..1	..4	..5	..3	..2	..8	..7	..2	1.3	2.0	2.0	12.7	16.0	
18	1.3	..2	..1	..3	..2	...	...	..3	..1	..9	..5	..8	..2	..2	..5	..7	..2	1.2	..8	...	...	...	...	...	8.7	14.5	
19	...	...	..7	...	...	..5	...	..5	...	...	..3	..7	1.4	..1	..4	1.2	1.7	..1	..3	...	...	...	...	...	7.9	6.5	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..4	..1	0.5	0.7	0.7
21	..6	..1	...	...	...	...	...	...	...	..7	1.8	2.0	..9	..6	3.5	3.2	2.8	1.9	2.4	..9	1.5	..2	..5	..3	23.9	12.3	
22	..2	...	...	...	...	...	...	...	...	..4	..5	1.3	1.8	..5	2.0	3.0	2.5	2.1	1.4	1.3	..1	..2	..3	17.6	10.8	10.8	
23	..4	2.0	..7	..1	2.2	..1	...	...	...	..1	...	...	...	...	...	..4	..1	..5	...	...	...	..1	...	...	6.7	3.5	3.5
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..1	..6	1.8	3.9	1.5	..3	..3	8.5	5.9	
27	..2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.2	
28	...	...	...	...	...	...	...	...	..3	..9	..2	1.0	..2	...	...	..8	..2	...	...	...	..1	..5	...	...	4.2	3.3	
29	...	...	...	...	...	..2	..9	1.4	3.5	2.1	...	...	...	...	...	...	..6	...	...	...	...	...	...	...	8.7	3.9	
30	...	...	..9	...	..1	..3	...	1.0	...	...	..4	...	...	...	...	...	...	...	...	...	...	...	...	...	2.7	1.4	
31	...	...	...	1.8	2.3	2.6	2.3	2.5	...	...	...	...	...	...	...	...	..6	..1	..5	...	..5	1.4	..1	3.2	17.9	6.1	
Sum.	5.1	9.3	10.2	7.3	7.7	6.4	6.6	8.7	11.0	10.3	10.0	10.7	7.2	3.1	5.5	9.7	10.4	7.5	10.4	8.3	14.8	11.6	5.6	12.4	209.8	122.5	
Total Duration.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.
	4.3	5.5	5.4	5.4	4.8	4.9	4.2	4.9	5.2	5.1	4.6	7.0	5.5	3.7	4.4	6.1	6.1	5.6	6.4	4.7	4.8	4.5	4.6	4.8	122.5		
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24		

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

401. Cahirciveen (Valentia Observatory): H<sub>s</sub> (height of recorder above ground) = 12·8 metres.

January, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%	
1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·8	10
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·1	1
8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3·9	49
9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2·3	29
11	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2·0	25
12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1·4	17
14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·3	4
17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·2	2
19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2·2	26
21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·7	8
22	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·8	9
23	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·1	1
25	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<u>7·2</u>	<u>83</u>
26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
29	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
30	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	6·5	73
31	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
Sum.	---	---	---	---	---	0·8	4·1	5·1	4·7	<u>4·9</u>	4·4	2·7	1·8	---	---	---	---	---	---	28·5	---
Mean	---	---	---	---	---	·03	·13	·16	·15	<u>·15</u>	·14	·09	·06	---	---	---	---	---	---	0·92	11

402. Cahirciveen (Valentia Observatory): H<sub>s</sub> = 12·8 metres.

February, 1932.

Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%	
1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3·0	33
3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7·5	82
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·5	5
6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·2	2
7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·4	4
8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5·0	53
9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3·6	38
10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·0	42
11	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5·3	55
12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·2	43
13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·6	47
14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8·0	82
15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2·7	27
16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0·9	9
17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·0	40
18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<u>8·4</u>	<u>83</u>
20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·6	45
21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4·1	40
22	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
23	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2·4	23
25	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1·7	16
26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5·5	51
29	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	...	...
Sum.	---	---	---	---	---	0·4	8·9	10·6	<u>12·5</u>	11·1	9·5	10·2	8·2	7·5	1·7	---	---	---	---	---	80·6	---
Mean	---	---	---	---	---	·01	·31	·37	<u>·43</u>	·38	·33	·35	·28	·26	·06	---	---	---	---	---	2·78	29
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.		

For periods of sixty minutes, between the exact hours of Local Apparent Time.

403. Cahirciveen (Valentia Observatory): H<sub>s</sub> (height of recorder above ground) = 12.8 metres.

March, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.
1	---	---	---	...	...	.1	1.0	.3	.3	1.0	.7	.1	.3	.4	...	---	---	---	---	4.2	39
2	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...
3	---	---	---	...	...	.3	1.0	1.0	.7	1.0	.9	.5	.7	.8	---	---	---	---	7.9	72	
4	---	---	---	...	...	.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.6	...	---	---	---	9.0	82	
5	---	---	---	...	...	...	.3	.5	.1	...	...	.5	.5	...	...	---	---	---	1.9	17	
6	---	---	---	...	.1	.5	.5	.6	.3	.5	.7	.5	.4	...	---	---	---	---	4.1	37	
7	---	---	---	...	...	...	...	...	.6	.2	...	...	...	...	---	---	---	---	6.8	7	
8	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
9	---	---	---	...	...	.5	1.0	1.0	.7	.8	.9	.9	.5	.8	.1	---	---	---	7.2	64	
10	---	---	---	...	.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.2	---	---	---	9.9	87	
11	---	---	---	...	.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.7	.6	.2	---	---	---	9.2	81	
12	---	---	---	...	.2	.5	.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	---	---	---	8.2	71	
13	---	---	---	...	...	...	...	...	.8	.9	.9	.8	.8	.3	---	---	---	---	5.5	48	
14	---	---	---	...	.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	---	---	---	10.1	87	
15	---	---	---	...	.6	.8	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.1	---	---	---	9.4	80	
16	---	---	---	...	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.1	---	---	---	10.0	85	
17	---	---	---	...	.2	.9	1.0	1.0	1.0	1.0	1.0	1.0	.7	...	---	---	---	7.8	66		
18	---	---	---	...	...	...	...	...	...	...	...	...	.4	...	---	---	---	0.4	3		
19	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...		
20	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...		
21	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
22	---	---	...	.2	.8	.1	.4	.5	.6	.5	1.0	1.0	1.0	.9	...	---	---	---	7.0	57	
23	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	
24	---	---	...	...	...	...	...	...	...	...	...	.1	...	...	---	---	---	0.1	1		
25	---	---	...	...	...	...	...	...	...	...	...	.1	.2	...	...	---	---	0.3	2		
26	---	---	...	.2	.7	.3	.3	1.0	1.0	1.0	1.0	1.0	.9	...	---	---	---	7.4	59		
27	---	---	...	...	...	.9	.4	...	.3	.6	.6	1.0	.8	.3	.1	---	---	5.0	40		
28	---	---	...	...	...	...	.4	.5	.3	.4	.1	.2	.7	.2	...	---	---	2.8	22		
29	---	---	...	...	...	...	...	...	...	...	...	...	...	.4	.1	---	---	0.5	4		
30	---	---	...	...	...	.2	.6	.6	.9	.5	.8	.6	1.0	.4	.5	---	---	6.1	48		
31	---	---	...	...	.1	...	.3	...	.1	...	...	.4	.3	...	...	---	---	1.2	9		
Sum.	---	---	...	0.4	6.5	10.8	13.3	14.8	14.8	15.4	15.5	15.9	15.9	10.7	2.0	...	---	---	136.0		
Mean	---	---	...	.01	.21	.35	.43	.48	.48	.50	.50	.51	.51	.35	.06	...	---	---	4.39	37	

404. Cahirciveen (Valentia Observatory): H<sub>s</sub> = 12.8 metres.

April, 1932.

1	---	---	...	...	...	...	...	...	...	...	.1	.1	.1	.1	...	---	---	---	0.4	3
2	---	---	...	...	...	...	...	...	.1	.4	.4	.8	.8	.3	.6	...	---	---	3.4	26
3	---	---	...	...	.6	1.0	.5	...	.2	.6	.2	1.0	1.0	1.0	.5	---	---	6.6	51	
4	---	---	...	...	.7	1.0	1.0	1.0	.7	.6	.3	.5	...	.6	...	---	---	6.4	49	
5	---	---	...	.5	1.0	.5	...	...	.4	.4	.1	.1	.2	...	...	---	---	3.2	24	
6	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	...	...	
7	---	---	...	.1	.5	.5	.4	1.0	.9	.8	.9	.8	.5	.4	...	---	---	6.8	51	
8	---	---	...	.2	.4	.9	.5	1.0	.4	.5	.7	.2	...	...	---	---	---	4.8	36	
9	---	---	...	.1	.5	...	...	...	...	...	...	...	...	...	---	---	---	0.6	4	
10	---	---	...	.1	.1	.1	...	...	...	.2	.6	.6	.5	.7	.3	...	---	3.2	24	
11	---	---	...	.5	.8	.7	.8	.5	.4	.7	.8	.3	.6	.2	.3	...	---	6.6	49	
12	---	---	...	.6	1.0	.7	1.0	1.0	.4	.1	.6	1.0	.7	.7	.4	...	---	8.2	60	
13	---	---	...	...	...	...	...	...	...	...	...	...	...	...	.2	---	---	0.2	1	
14	---	---	...	.3	.7	.8	.4	.6	.6	1.0	1.0	.8	.9	...	.1	---	---	7.2	52	
15	---	---	.2	...	.2	...	.1	.4	.4	...	.5	.1	...	.9	...	---	---	2.8	20	
16	---	---	...	.8	.6	1.0	.9	.7	1.0	1.0	1.0	.7	.4	.6	.8	.4	---	9.9	71	
17	---	---	...	.1	...	.3	.7	.8	.2	1.0	1.0	.3	.4	.1	...	---	---	4.9	35	
18	---	---	.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.8	.8	1.0	1.0	1.0	.5	---	12.5	89	
19	---	---	...	.2	.4	.2	.9	.3	.2	.3	.5	.3	.3	.8	...	---	---	4.4	31	
20	---	...	.1	.4	.5	.8	.5	.2	1.0	.9	.7	.8	.7	.4	.7	...	---	7.7	55	
21	---	...	...	...	...	.8	1.0	1.0	.9	1.0	1.0	1.0	1.0	.8	.7	...	---	9.2	65	
22	---	...	...	...	...	.1	.6	.7	...	...	...	...	...	...	...	.1	---	1.5	11	
23	---	...	...	...	...	.3	.6	.2	.6	.5	.1	.5	.9	.8	.8	.2	---	6.0	42	
24	---	...	.3	.6	.6	.8	.7	.2	.4	.8	.9	.8	.2	.2	.2	...	---	6.7	47	
25	---	...	...	...	...	...	.2	...	...	...	...	...	...	...	...	.3	---	0.5	3	
26	---	...	...	1.0	.4	.3	.1	.6	1.0	1.0	1.0	1.0	.9	1.0	1.0	.6	---	9.9	68	
27	---	...	...	...	...	...	...	.1	...	...	...	...	...	...	...	---	---	0.1	1	
28	---	...	...	...	.9	.7	.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	---	11.2	77	
29	---	...	.9	1.0	.8	1.0	1.0	.9	.2	.2	.2	.2	...	...	...	---	---	6.4	43	
30	---	...	...	.3	.1	...	.7	.6	.6	.1	.2	.2	.3	...	...	---	---	3.1	21	
Sum.	---	...	1.9	8.6	10.8	13.1	14.3	13.6	12.5	13.8	15.0	14.3	13.4	11.1	9.6	2.4	...	---	154.4	---
Mean	---	...	.06	.29	.36	.44	.48	.45	.42	.46	.50	.48	.45	.37	.32	.08	...	---	5.15	37
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

405. Cahirciveen (Valentia Observatory):  $H_S$  (height of recorder above ground) = 12.8 metres.

May, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total For Day.	Per cent. of Possible.	
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%
1	..	..	.1	.1	..	.4	.2	.2	.6	.7	.3	.4	.6	.5	.2	...	...	..	4.3	29	
2	..	..	.6	1.0	1.0	1.0	1.0	.8	.9	1.0	1.0	1.0	1.0	.1	.4	.3	...	..	11.1	75	
3	..	..	...	...	...	.5	.2	.5	1.0	1.0	.5	1.0	1.0	1.0	1.0	.9	...	..	9.1	61	
4	..	..	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	...	..	13.8	92	
5	..	..	...	2	1.0	1.0	1.0	1.0	1.0	1.0	.8	.4	.3	.4	.3	.1	...	..	9.5	63	
6	..	..	...	.6	1.0	1.0	.9	1.0	.8	.9	.5	.3	.8	.9	1.0	.2	...	..	9.9	66	
7	..	..	...	.1	.6	.5	.4	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	...	..	9.8	65	
8	..	..	...	.2	...	...	...	...	...	...	...	1	.7	.1	...	...	...	..	1.1	7	
9	..	..	.1	.5	.9	1.0	1.0	1.0	1.0	.8	1.0	1.0	1.0	1.0	1.0	1.0	.2	...	12.5	82	
10	..	.3	1.0	.5	.8	.1	...	...	...	...	...	...	...	...	...	...	...	..	2.7	18	
11	..	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	1	
12	..	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	3.6	23	
13	..	..	.1	.2	.1	.1	.9	.9	.2	.1	.5	1.0	1.0	1.0	.3	...	...	..	6.4	41	
14	..	..	...	...	.5	.7	1.0	1.0	1.0	1.0	.8	.6	.6	.4	.1	...	...	..	7.7	50	
15	..	..	.5	1.0	1.0	1.0	1.0	.3	.2	...	...	.5	1.0	1.0	1.0	1.0	.1	...	9.6	62	
16	..	..	.8	1.0	1.0	1.0	.7	...	.2	1.0	.2	1.0	1.0	1.0	.8	.8	.3	...	10.8	69	
17	..	..	...	...	...	1.0	1.0	.1	...	...	...	...	...	...	...	...	...	..	2.1	13	
18	..	..	...	...	...	...	...	...	...	...	.2	.2	...	...	...	...	...	..	0.4	3	
19	..	..	...	...	...	...	...	...	.1	...	.1	...	.2	...	...	...	...	..	0.5	3	
20	..	..	...	...	...	...	...	...	...	...	...	.1	...	...	.4	.3	...	..	0.8	5	
21	..	..	...	...	...	.1	...	.4	1.0	.8	1.0	1.0	.8	1.0	1.0	.2	...	...	8.3	52	
22	..	..	...	...	...	...	...	.2	.8	.4	.1	...	...	...	...	...	...	..	1.5	9	
23	..	..	...	...	...	...	.3	...	...	...	...	1	.4	...	.3	...	...	..	1.1	7	
24	..	..	.9	.5	.9	.6	.4	.6	.9	.9	.2	.3	.1	.8	.8	.8	.2	...	8.7	54	
25	..	.3	.4	.6	.4	.5	.8	.2	.5	.3	.6	...	.2	.6	...	...	...	..	5.4	34	
26	..	..	.6	1.0	1.0	1.0	.2	.5	.5	.7	.6	.5	.4	.1	.6	.2	...	...	7.9	49	
27	..	.5	1.0	1.0	1.0	1.0	1.0	.4	.3	.5	.3	...	...	...	.6	.6	.1	...	8.3	52	
28	..	..	...	...	...	...	.3	...	...	...	...	...	...	...	.8	.7	...	...	1.8	11	
29	..	..	...	...	...	...	...	...	...	...	.1	1.0	.3	...	...	...	...	...	1.4	9	
30	..	.3	.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.7	4	
31	..	..	...	...	...	...	1	.1	...	...	...	...	...	...	...	...	...	...	0.2	1	
Sum.	...	1.4	7.6	10.3	12.7	13.2	13.7	11.7	12.9	12.7	10.8	13.5	14.3	12.5	13.1	9.5	1.1	...	171.0	--	
Mean	...	.05	.25	.33	.41	.43	.44	.38	.42	.41	.35	.44	.46	.40	.42	.31	.04	...	5.52	35	

406. Cahirciveen (Valentia Observatory):  $H_S$  = 12.8 metres.

June, 1932.

1	...	...	.2	1.0	1.0	1.0	1.0	.9	1.0	1.0	.7	1.0	1.0	.6	...	...	...	...	...	8.5	52	
2	...	...	.7	1.0	1.0	1.0	1.0	.8	1.0	1.0	1.0	1.0	1.0	.9	1.0	1.0	.1	...	...	13.5	83	
3	...	...	.1	1.0	1.0	1.0	1.0	.6	.7	...	...	...	.1	...	...	...	...	...	...	5.5	34	
4	...	...	*(.5)	(.4)	(.6)	(.6)	(.2)	(.2)	...	...	...	...	...	.2	.1	.7	.5	...	...	(4.0)*	(24)	
5	...	.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	1.0	1.0	.2	.9	1.0	1.0	.6	...	...	14.0	85	
6	...	...	...	...	...	...	.1	...	...	.1	...	...	...	.2	...	...	...	...	...	0.4	2	
7	...	.4	1.0	.8	...	.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.5	...	...	13.5	82	
8	...	.4	.9	.8	.9	1.0	1.0	1.0	1.0	1.0	1.0	.2	.1	...	...	...	...	...	...	9.3	56	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	.1	.8	.3	.4	.6	1.0	.1	...	...	...	...	...	...	3.3	20	
11	...	.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.7	...	...	15.3	93	
12	...	...	.1	1.0	1.0	1.0	.9	.2	...	...	...	.4	...	...	.2	...	...	...	...	4.8	29	
13	...	.8	.1	.9	1.0	1.0	1.0	.8	.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.5	...	...	13.9	84	
14	...	...	.1	.5	.7	.1	...	.2	...	.2	.4	.5	.9	.6	.3	...	...	...	...	4.5	27	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.7	...	...	0.7	4	
16	...	...	.4	.2	.5	.4	.4	.2	.3	.2	.4	.2	...	...	.2	...	...	...	...	3.4	20	
17	...	...	...	...	...	...	.5	.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.2	...	...	9.9	59	
18	...	...	.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	.2	...	.3	.5	1.0	.5	...	...	9.4	56	
19	...	.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	.1	...	.6	.1	...	...	12.1	73	
20	...	...	.3	.2	...	...	...	...	.5	.8	1.0	1.0	1.0	.7	.5	.6	...	...	...	6.6	40	
21	...	...	...	...	...	...	...	...	...	.2	1.0	...	.2	...	...	...	...	...	...	1.4	8	
22	...	...	...	...	...	...	...	.3	...	.8	.7	1.0	1.0	1.0	.4	...	...	...	...	5.6	34	
23	...	...	...	.1	.9	.9	1.0	1.0	.7	...	.4	1.0	1.0	1.0	1.0	1.0	.5	...	...	10.5	63	
24	...	...	...	...	.3	.1	.4	.4	.8	.5	...	...	.4	.4	.6	.6	...	...	...	4.5	27	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	.3	.2	.6	1.0	1.0	1.0	1.0	.8	1.0	1.0	1.0	1.0	1.0	.5	...	...	11.4	69	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	.7	.5	.2	.1	...	...	...	...	...	...	...	...	...	1.5	9	
Sum.	...	3.0	8.0	12.2	13.1	14.0	15.3	14.6	14.7	13.5	14.2	13.4	12.2	12.1	11.3	11.7	4.2	...	...	187.5	--	
Mean	...	.10	.27	.41	.44	.47	.51	.49	.49	.45	.47	.45	.41	.40	.38	.39	.14	...	...	6.25	38	
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day	Per cent. of Possible.		

\* Record for part of day lost owing to sphere having been displaced.



DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

407. Cahirciveen (Valentia Observatory): H<sub>s</sub> (height of recorder above ground) = 12·8 metres.

July, 1932.

Table with 21 columns for hours (3-4 to 20-21), a 'Total for Day' column, and a 'Per cent. of Possible.' column. Rows represent days of the month from 1 to 31, plus 'Sum.' and 'Mean' rows. Data entries are in hours (hr.) or minutes.

408. Cahirciveen (Valentia Observatory): H<sub>s</sub> = 12·8 metres.

August, 1932.

Table with 21 columns for hours (3-4 to 20-21), a 'Total for Day' column, and a 'Per cent. of Possible.' column. Rows represent days of the month from 1 to 31, plus 'Sum.' and 'Mean' rows. Data entries are in hours (hr.) or minutes.

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

409. Cahirciveen (Valentia Observatory): H<sub>s</sub> (height of recorder above ground) = 12.8 metres.

September, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.
Day.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.
1	---	---	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	0.1	1
2	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	---	---	...	...	3	1	2	4	6	9	9	6	9	1.0	2	...	...	...	7.0	52
4	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	---	---	...	...	...	...	...	...	...	...	...	7	1.0	1.0	3	...	...	...	3.0	23
6	---	---	...	...	4	1.0	1.0	1.0	1.0	6	1.0	6	9	1.0	2	...	...	...	8.7	65
7	---	---	...	...	2	9	1	1	...	...	...	...	...	...	1	...	...	...	1.4	11
8	---	---	...	...	2	2	2	...	...	...	...	...	...	...	...	...	...	...	0.6	5
9	---	---	...	...	1	4	2	4	4	1	8	9	...	...	...	...	...	...	6.3	25
10	---	---	...	...	7	7	1.0	3	8	1.0	3	7	8	4	2	...	...	...	3.9	53
11	---	---	...	2	5	1.0	1.0	1.0	1.0	8	8	1.0	9	1.0	3	...	...	...	9.5	73
12	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	---	---	...	...	...	...	...	3	...	...	...	2	7	...	...	...	...	...	1.2	9
15	---	---	...	...	...	3	1	...	...	...	...	...	...	...	...	...	...	...	0.4	3
16	---	---	...	...	4	9	7	2	6	4	...	...	4	1	...	...	...	...	3.7	29
17	---	---	...	...	4	3	...	...	2	1.0	3	...	...	...	...	...	...	...	2.2	18
18	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	---	---	...	3	5	9	7	9	1.0	8	1.0	4	8	...	...	...	...	...	7.3	59
20	---	---	...	...	...	4	1	...	...	...	3	2	1.0	1.0	3	...	...	...	3.3	27
21	---	---	...	2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9	1.0	4	...	...	...	10.5	85
22	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	---	---	...	1	8	1	2	...	1.0	1.0	6	9	8	6	5	...	...	...	6.6	54
24	---	---	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	0.9	7
25	---	---	...	...	4	7	6	...	7	5	4	6	3	5	...	...	...	...	4.7	39
26	---	---	...	...	...	8	7	7	4	4	4	8	7	4	...	...	...	...	5.3	44
27	---	---	...	...	4	9	8	5	9	1.0	1.0	1.0	9	1	...	...	...	...	7.5	63
28	---	---	...	...	5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	6	...	...	...	...	...	8.1	69
29	---	---	...	...	7	1.0	1.0	1.0	6	...	...	...	...	...	...	...	...	...	4.3	37
30	---	---	...	...	8	1.0	1.0	9	1.0	1.0	1.0	5	1	2	...	...	...	...	7.5	64
Sum.	---	---	...	1.3	8.8	12.9	12.7	9.8	12.6	11.5	10.5	11.2	11.2	9.0	2.5	...	...	...	114.0	...
Mean	---	---	...	.04	.29	.43	.42	.33	.42	.38	.35	.37	.37	.30	.08	...	...	...	3.80	30

410. Cahirciveen (Valentia Observatory): H<sub>s</sub> = 12.8 metres.

October, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.
1	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.
2	---	---	---	...	8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8	hr.	hr.	hr.	hr.	hr.	hr.
3	---	---	---	...	...	...	6	6	2	...	3	5	3	...	...	...	...	...	...	hr.
4	---	---	---	...	...	4	1.0	6	8	5	1.0	1.0	1.0	4	...	...	...	...	...	hr.
5	---	---	---	...	1	...	2	4	1.0	6	1.0	1.0	8	7	...	...	...	...	...	hr.
6	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	---	---	---	...	...	...	...	...	...	...	...	...	8	2	...	...	...	...	...	hr.
8	---	---	---	...	1	...	2	4	7	7	2	3	2	...	...	...	...	...	...	hr.
9	---	---	---	...	4	3	9	6	9	1.0	8	5	1	...	...	...	...	...	...	hr.
10	---	---	---	...	4	1.0	1.0	1.0	5	5	7	1.0	1.0	4	...	...	...	...	...	hr.
11	---	---	---	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	hr.
12	---	---	---	...	...	...	...	...	...	...	9	1.0	1.0	5	...	...	...	...	...	hr.
13	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
14	---	---	---	...	...	4	8	4	8	1.0	7	5	2	...	...	...	...	...	...	hr.
15	---	---	---	...	...	7	...	1	8	7	1.0	8	4	...	...	...	...	...	...	hr.
16	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
17	---	---	---	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	hr.
18	---	---	---	...	...	5	1	7	5	...	9	7	...	...	...	...	...	...	...	hr.
19	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
20	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
21	---	---	---	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
22	---	---	---	...	...	6	2	1.0	7	8	8	6	7	1	...	...	...	...	...	hr.
23	---	---	---	...	...	...	...	...	1	...	5	4	...	...	...	...	...	...	...	hr.
24	---	---	---	...	...	...	...	...	...	...	...	7	...	...	...	...	...	...	...	hr.
25	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
26	---	---	---	...	...	2	9	1.0	6	8	1.0	8	4	1	...	...	...	...	...	hr.
27	---	---	---	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	hr.
28	---	---	---	...	3	4	1	...	8	8	8	1.0	4	2	...	...	...	...	...	hr.
29	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
30	---	---	---	...	...	3	6	7	...	5	4	...	...	...	...	...	...	...	...	hr.
31	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	hr.
Sum.	---	---	---	...	1.8	5.6	7.6	8.9	10.1	8.9	12.0	11.8	9.8	3.4	...	...	...	...	...	hr.
Mean.	---	---	---	...	.06	.18	.25	.29	.33	.29	.39	.38	.32	.11	...	...	...	...	...	hr.
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day	Per cent. of Possible.

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

411. Cahirciveen (Valentia Observatory):H<sub>s</sub> (height of recorder above ground) = 12·8 metres.

November, 1932.

Table with 22 columns (Hour L. A. T., 3-4 to 20-21, Total for Day, Per cent. of Possible.) and 31 rows (Day 1 to 30, Sum, Mean).

412. Cahirciveen (Valentia Observatory):H<sub>s</sub> = 12·8 metres.

December and Year, 1932.

Table with 22 columns (hr. to hr., Total for Day, Per cent. of Possible.) and 32 rows (Days 1 to 31, Sum, Mean, Annual Total, Annual Mean, Hour L. A. T.).

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in Metres per second.

413. Cahirciveen (Valentia Observatory):

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 13 columns for hour intervals (0-1 to 11-12) and 2 rows per hour (Day and Mean). Data includes wind speed in m/s and direction in degrees.

414. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

Table with 13 columns for hour intervals (0-1 to 11-12) and 2 rows per hour (Day and Mean). Data includes wind speed in m/s and direction in degrees.

WIND : DIRECTION AND SPEED.

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.  
M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 17 metres + 13 metres.

January, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day			
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s			
230	8.9	230	9.0	230	8.9	230	8.5	225	8.9	230	9.5	225	9.2	225	9.2	225	9.5	230	9.5	230	9.4	225	10.8	225	10.8	8.7	1	
225	12.0	225	11.0	225	11.1	225	12.0	225	11.8	220	11.0	225	12.4	225	12.9	225	13.0	215	12.4	225	12.8	220	12.2	220	12.2	11.5	2	
210	12.4	210	11.8	210	11.6	206	10.9	205	10.5	205	10.0	205	10.0	205	10.0	205	10.1	205	10.2	205	10.8	200	10.8	200	10.8	11.5	3	
190	16.1	235	10.7	220	8.5	235	10.9	245	9.5	250	10.5	240	8.5	240	8.3	235	9.5	230	9.0	225	9.9	215	9.6	215	9.6	11.2	4	
(205)	(13.8)	210	12.6	(210)	(11.7)	(225)	(10.6)	(245)	(6.3)	225	4.2	210	3.9	230	4.1	215	3.5	225	4.0	215	4.1	210	3.6	210	3.6	10.0	5	
225	6.7	330	11.2	355	11.3	10	5.8	350	4.7	330	5.2	325	8.3	315	7.3	310	6.5	310	5.4	290	5.8	285	5.3	285	5.3	7.0	6	
---	(...)	265	2.5	290	2.5	320	(4.8)	330	5.9	10	3.2	---	---	140	1.5	---	---	50	1.2	50	1.4	40	1.9	40	1.9	3.2	7	
80	1.2	160	(2.1)	195	(3.2)	195	3.9	225	(4.8)	180	4.4	170	5.3	175	5.0	180	3.9	175	5.4	180	5.0	190	6.4	190	6.4	2.9	8	
210	13.0	220	11.3	210	10.7	(205)	(11.2)	(210)	(9.0)	(205)	(8.1)	(200)	(8.3)	(200)	(7.9)	(195)	(8.1)	190	8.7	195	9.0	200	10.2	200	10.2	11.0	9	
255	4.1	280	3.5	285	3.0	280	2.6	280	2.3	225	3.1	280	1.6	55	1.0	80	1.1	175	2.9	225	(3.2)	250	(5.0)	250	(5.0)	5.6	10	
280	6.1	290	4.9	300	4.8	325	3.0	50	2.0	290	3.1	245	3.3	240	3.0	280	2.8	210	2.3	170	1.6	100	1.6	100	1.6	5.1	11	
160	11.7	160	12.3	170	12.9	175	12.1	175	10.4	190	10.4	190	10.9	190	10.6	190	10.5	190	10.3	190	12.2	210	12.5	210	12.5	9.0	12	
230	13.0	235	15.3	260	15.8	265	14.9	270	15.4	270	14.3	255	11.3	260	8.8	240	9.1	240	9.7	230	9.1	220	9.4	220	9.4	12.6	13	
200	17.3	200	16.5	200	17.5	210	13.0	200	12.0	195	11.5	235	8.8	270	10.2	255	(8.6)	245	(9.5)	250	9.8	245	9.4	245	9.4	12.9	14	
195	9.9	195	12.7	205	14.8	205	16.3	205	15.8	205	16.3	205	14.9	210	14.7	210	15.2	210	15.8	210	14.7	210	14.7	210	14.7	11.8	15	
220	14.9	230	11.4	230	7.6	215	6.1	205	5.5	185	7.5	215	(10.0)	240	(10.3)	240	(12.9)	235	12.8	250	13.8	265	14.6	265	14.6	12.9	16	
195	(11.4)	190	(10.8)	190	(11.1)	195	(10.9)	200	(12.7)	205	12.8	205	12.8	200	11.9	195	12.5	200	13.2	200	13.9	200	14.2	200	14.2	9.6	17	
195	11.5	190	12.7	195	12.4	190	12.2	200	11.1	200	11.0	200	10.8	200	11.1	195	10.9	195	11.1	190	11.6	190	12.0	190	12.0	12.1	18	
185	9.9	180	9.8	180	9.9	185	10.0	185	9.3	195	8.5	195	7.7	195	7.3	(235)	(4.4)	(260)	(1.0)	---	(...)	(165)	(1.1)	---	(...)	8.8	19	
190	4.4	180	4.0	185	2.1	---	---	190	6.1	190	7.1	(185)	(7.0)	(180)	(7.0)	(175)	(7.2)	(185)	(8.1)	(190)	(8.5)	(190)	(7.8)	---	(...)	4.1	20	
185	5.9	195	5.1	195	3.9	170	4.6	180	4.7	175	4.0	170	4.5	175	4.0	270	3.9	230	2.3	---	---	---	---	---	---	4.8	21	
180	4.0	(180)	(5.6)	(175)	(6.6)	(175)	(6.2)	(175)	(7.0)	(180)	(6.9)	180	7.9	175	9.4	(175)	(9.2)	(180)	(8.1)	(175)	(8.6)	(180)	(9.0)	---	(...)	4.0	22	
170	8.0	170	8.6	165	8.9	160	7.3	165	7.8	175	6.0	175	6.0	165	7.1	175	6.9	170	6.7	165	7.7	170	7.0	170	7.0	8.5	23	
(200)	(6.8)	(210)	(2.7)	(200)	(1.3)	(210)	(1.0)	(205)	(1.2)	(250)	(1.9)	(335)	(5.3)	(360)	(6.4)	(10)	(6.5)	(15)	(5.6)	(5)	(5.8)	(10)	(4.3)	---	(...)	6.4	24	
90	4.2	100	2.5	95	1.5	95	1.2	110	3.2	105	4.8	100	4.5	105	4.9	100	5.6	95	6.2	90	6.2	105	6.3	105	6.3	3.7	25	
160	6.2	160	5.7	160	6.0	155	5.9	150	5.5	155	6.7	150	6.5	150	6.0	145	5.5	150	5.0	150	5.4	150	5.0	150	5.0	6.1	26	
150	5.6	160	5.9	160	6.0	160	4.5	150	4.6	150	4.5	150	4.4	140	3.9	150	4.6	150	5.0	145	4.8	150	4.7	150	4.7	4.9	27	
185	5.2	180	5.5	195	5.5	180	4.9	185	5.6	185	5.2	190	5.4	190	5.6	195	6.0	205	5.3	220	5.8	190	4.3	190	4.3	5.3	28	
210	4.9	225	3.7	210	3.2	190	2.4	175	2.6	160	3.1	165	3.2	160	2.4	55	1.3	55	1.5	55	1.5	55	1.5	55	1.5	3.8	29	
170	(1.0)	155	(2.7)	160	(2.6)	180	(1.3)	---	(...)	---	(...)	130	(1.3)	40	(1.9)	50	(1.6)	45	(1.7)	45	(1.5)	35	(1.4)	---	(...)	1.3	30	
---	---	---	---	---	---	---	---	---	---	60	1.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.6	31
---	8.1	---	7.9	---	7.7	---	7.1	---	7.0	---	7.0	---	6.9	---	6.9	---	6.8	---	6.8	---	6.9	---	7.0	---	---	7.4		

February, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day		
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s		
50	3.8	50	4.0	60	3.5	60	2.7	80	3.5	85	1.0	85	2.5	90	2.9	40	1.2	60	2.2	85	4.2	80	4.9	1.1	1		
105	3.4	110	2.2	230	1.8	235	1.0	---	---	220	1.7	185	2.2	---	---	60	1.0	---	---	90	1.5	120	1.0	3.1	2		
105	3.0	110	3.5	130	3.5	110	3.5	115	4.5	110	5.0	100	5.5	105	5.4	110	5.0	130	5.2	145	5.4	135	5.3	4.2	3		
155	6.5	160	7.2	165	6.4	165	5.9	160	4.2	150	5.1	145	5.9	125	3.7	105	3.1	100	3.3	105	3.7	95	4.0	5.3	4		
180	8.6	180	9.0	180	9.0	180	9.4	180	9.3	190	9.3	190	8.5	195	8.1	180	7.3	180	7.3	180	7.4	190	4.7	7.1	5		
115	7.7	120	8.0	130	8.2	120	7.9	110	7.2	85	4.9	70	5.0	60	3.4	85	3.9	85	4.6	75	4.0	110	5.8	4.8	6		
110	2.8	105	3.8	105	3.5	145	2.4	150	1.9	110	1.1	---	---	90	1.7	80	4.3	90	5.1	80	4.8	85	5.0	3.6	7		
60	6.0	70	6.9	70	6.5	80	4.7	90	5.0	95	5.2	100	4.7	95	4.6	100	4.8	85	4.5	90	4.7	90	4.9	4.7	8		
(65)	(7.5)	(75)	(8.6)	(80)	(8.2)	(120)	(8.4)	(90)	(7.6)	100	7.6	(95)	(9.1)	(90)	(8.4)	(75)	(8.3)	(70)	(8.5)	70	9.8	70	9.5	6.7	9		
65	8.1	70	8.9	70	9.5	60	9.5	60	7.2	65	5.5	75	4.8	70	5.7	60	6.1	(70)	(5.1)	(70)	(4.1)	(70)	(5.0)	8.0	10		
(80)	(6.5)	(60)	(6.4)	(55)	(6.8)	65	7.5	60	6.7	(60)	(3.6)	(65)	(2.7)	(85)	(2.3)	(90)	(3.4)	(80)	(1.9)	(55)	(2.3)	(75)	(2.8)	4.1	11		
(50)	(5.8)	50	5.6	35	4.0	40	6.3	50	7.1	50	6.0	50	6.9	70	5.2	60	5.0	50	6.5	65	2.9	70	2.6	3.9	12		
(60)	(7.5)	(55)	(8.0)	(50)	(7.5)	60	7.3	60	6.4	80	5.2	(85)	(5.2)	(90)	(4.9)	(60)	(2.4)	(50)	(3.1)	(60)	(2.8)	(70)	(2.7)	4.8	13		
(100)	(2.8)	70	2.2	135	2.2	190	1.5	---	---	140	1.1	105	1.0	---	---	55	1.0	50	2.0	80	3.7	85	4.5	1.5	14		
(160)	(3.2)	(155)	(3.4)	(135)	(2.2)	(100)	(1.9)	(135)	(3.0)	(130)	(2.8)	(130)	(2.8)	(85)	(2.3)	(100)	(4.7)	(95)	(5.0)	(95)	(4.8)	(90)	(5.0)	3.3	15		
(120)	(4.1)	(125)	(4.0)	(115)	(4.5)	(140)	(4.5)	(120)	(3.6)	(105)	(4.1)	(100)	(4.8)	(110)	(5.8)	(105)	(4.6)	(110)	(5.0)	(105)	(4.9)	(95)	(3.6)	4.7	16		
(80)	(3.8)	(90)	(4.5)	(95)	(4.6)	(105)	(4.7)	(105)	(4.7)	(110)	(4.6)	(95)	(3.6)	(110)	(5.3)	(100)	(5.7)	(85)	(2.2)	(340)	(1.0)	(360)	(1.1)	3.8	17		
(285)	(2.1)	(320)	(2.3)	(30)	(2.7)	(70)	(3.6)	(65)	(4.3)	(80)	(4.6)	(85)	(4.4)	(65)	(1.4)	(65)	(2.0)	(95)	(3.1)	(165)	(1.0)	---	(...)	2.3	18		
(110)	(1.3)	(115)	(1.4)	---	(...)	(75)	(3.6)	(85)	(4.0)	(90)	(2.8)	(100)	(1.2)	(100)	(1.8)	---	(...)	---	(...)	(110)	(1.0)	---	(...)	2.1	19		
85	1.3	120	1.4	---	---	50	3.7	45	4.3	50	3.0	70	1.5	60	2.2	---	---	---	---	---	---	---	---	---	2.0	20	
35	4.8	20	4.0	5	3.6																						

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in Metres per second.

415. Cahirciveen (Valentia Observatory):

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 22 columns for hourly intervals (0-1 to 11-12) and 31 rows for hours (1 to 31). Each cell contains wind speed and direction values. Includes a 'Mean.' row at the bottom.

416. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

Table with 22 columns for hourly intervals (0-1 to 11-12) and 31 rows for hours (1 to 31). Each cell contains wind speed and direction values. Includes a 'Mean.' row at the bottom and a 'Hour. G. M. T.' row at the very bottom.

WIND: DIRECTION AND SPEED.

331

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.
M.S.L. + h\_a (height of anemograph above ground) = 17 metres + 13 metres.

March, 1932.

Table with columns for dates (12-13 to 23-24), Mean, and Day. Rows contain numerical data representing wind speed and direction for each day.

April, 1932.

Table with columns for dates (12-13 to 23-24), Mean, and Day. Rows contain numerical data representing wind speed and direction for each day.

WIND: DIRECTION AND SPEED.

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in Metres per second.

417. Cahirciveen (Valentia Observatory):

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 13 columns for 1-hour intervals and 31 rows for each hour (1-31). Each interval has two columns for wind speed in 'o' and 'm/s'. A 'Mean' row is at the bottom.

418. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

Table with 13 columns for 1-hour intervals and 31 rows for each hour (1-31). Each interval has two columns for wind speed in 'o' and 'm/s'. A 'Mean' row is at the bottom.



Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 1.7 metres + 1.3 metres.

May, 1932.

Table with columns for time intervals (12-13 to 23-24), wind speed in degrees and m/s, and Mean/Day. Data for May 1932.

June, 1932.

Table with columns for time intervals (12-13 to 23-24), wind speed in degrees and m/s, and Mean/Day. Data for June 1932.

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in Metres per second.

419. Cahirciveen (Valentia Observatory):

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Hour. G.M.T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12	
Day.	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s
1	235	4.9	235	5.4	230	5.6	220	5.3	230	5.2	230	6.0	225	5.5	260	4.6	280	5.4	270	7.2	265	7.4	265	8.0
2	290	6.4	270	6.6	280	6.5	280	5.5	270	6.0	255	5.8	245	6.0	240	6.1	235	6.6	235	9.9	235	9.8	230	10.8
3	205	9.3	195	8.6	190	8.3	185	8.5	165	8.4	160	8.9	170	9.8	185	8.1	180	7.8	185	8.6	185	8.7	185	8.6
4	190	8.8	190	8.5	195	8.8	205	7.5	205	6.4	190	5.9	250	4.6	300	5.2	295	5.3	270	5.7	275	5.3	265	5.6
5	275	2.5	245	3.6	230	3.2	230	3.6	240	4.6	230	4.4	270	3.8	250	3.6	260	5.2	240	4.5	270	5.2	280	4.1
6	230	4.1	220	3.5	220	2.4	235	2.9	210	2.8	205	3.5	225	3.9	240	4.8	260	4.8	250	4.5	240	5.1	195	3.9
7	---	---	---	---	360	1.5	325	1.0	---	---	---	---	285	1.5	270	2.0	275	2.5	275	3.0	275	3.5	275	4.2
8	270	3.1	270	3.1	265	2.2	265	3.0	260	3.9	270	4.0	275	3.9	270	1.5	265	2.6	260	5.0	255	5.7	260	6.7
9	230	4.4	235	5.0	240	3.9	245	1.8	235	2.9	235	4.1	230	4.5	225	4.8	240	4.2	215	4.1	215	4.5	225	4.5
10	195	4.9	190	5.2	190	5.7	190	6.4	195	5.1	185	6.5	185	7.2	185	6.6	200	5.6	190	6.2	185	6.4	200	6.5
11	---	---	---	---	---	---	5	1.7	5	3.1	5	3.4	5	3.7	355	2.8	360	3.4	360	5.0	360	5.5	350	7.0
12	10	7.5	5	7.3	25	6.4	30	6.5	25	5.8	30	6.1	35	7.0	30	8.0	40	7.5	25	8.1	20	7.9	5	8.0
13	340	1.2	---	---	---	---	---	---	---	---	---	---	45	3.2	---	---	---	---	---	---	320	3.0	350	4.1
14	15	5.8	20	7.2	25	8.7	35	7.7	35	7.7	50	5.8	40	5.5	40	7.6	35	8.7	40	5.6	25	6.7	45	5.3
15	360	2.0	325	2.1	360	4.5	355	2.5	335	3.0	335	3.6	335	3.7	340	3.4	330	3.9	315	3.6	315	3.8	310	3.2
16	325	5.1	330	4.2	325	5.2	330	5.6	345	7.9	360	6.0	350	4.7	350	5.7	345	6.3	350	6.6	360	5.7	5	7.9
17	360	3.9	25	5.1	20	5.0	10	6.0	30	7.4	20	6.9	25	6.1	25	5.4	45	7.8	30	7.5	15	7.2	20	7.7
18	10	8.1	10	8.0	10	6.9	15	6.8	15	5.9	5	4.5	355	4.6	10	4.4	350	7.3	355	5.9	345	5.2	340	4.6
19	345	3.6	345	3.9	340	4.2	340	4.6	340	4.4	340	3.0	345	4.4	345	4.4	345	5.0	330	4.4	335	4.4	335	4.1
20	240	3.5	280	6.0	335	6.7	335	5.5	320	5.3	330	4.4	320	2.7	315	4.6	320	5.7	325	4.3	295	4.6	295	4.9
21	310	4.2	335	4.1	305	4.2	325	5.0	340	2.5	295	3.9	305	3.4	325	3.5	305	3.7	310	4.1	310	4.9	285	4.5
22	305	1.2	335	2.2	330	2.8	330	2.5	320	2.6	300	1.8	270	1.0	300	3.5	315	4.1	320	4.0	315	4.9	310	5.3
23	360	2.5	350	1.5	340	1.2	330	2.1	345	2.1	---	---	---	---	280	1.8	---	---	---	---	230	1.9	180	5.2
24	270	2.2	260	4.0	265	4.3	275	3.4	270	2.2	305	3.8	315	3.8	280	2.6	265	2.8	260	3.8	260	3.8	250	4.6
25	300	4.9	300	5.3	295	4.4	295	5.2	295	4.6	295	4.9	290	5.2	290	5.5	285	5.8	285	7.0	290	6.9	290	5.8
26	300	9.6	310	7.8	305	7.4	310	6.6	315	6.1	315	6.0	310	6.5	305	7.0	300	7.4	300	7.3	290	7.4	290	7.7
27	295	6.5	290	6.1	300	7.5	295	7.1	295	7.4	300	8.4	300	8.4	305	9.1	305	8.0	305	8.4	305	7.0	300	7.5
28	185	2.6	185	1.8	65	3.4	75	3.6	55	2.5	---	---	30	1.0	90	1.0	---	---	---	---	190	(1.9)	205	(2.5)
29	225	(6.2)	195	(5.6)	200	(5.9)	175	(7.4)	185	(8.4)	195	(8.3)	200	(7.7)	230	6.9	260	8.3	240	7.3	230	7.3	210	7.9
30	185	6.9	210	8.0	205	8.0	210	6.5	205	5.5	200	5.2	210	5.6	215	5.9	250	4.7	---	---	225	2.7	235	4.6
31	185	3.7	180	4.2	210	3.8	200	3.1	210	(3.6)	235	(4.0)	240	(4.6)	260	(5.2)	280	(5.3)	300	(5.9)	300	6.5	295	6.1
Mean.	---	4.5	---	4.7	---	4.8	---	4.7	---	4.7	---	4.6	---	4.6	---	4.7	---	5.1	---	5.2	---	5.6	---	5.9

420. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

Hour. G.M.T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12	
Day.	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s
1	345	5.5	350	6.9	350	6.8	360	7.1	15	6.2	315	6.2	360	6.7	360	7.0	360	6.4	355	9.7	360	7.8	350	8.0
2	---	---	80	1.5	55	1.9	95	1.3	170	2.7	165	6.1	175	6.5	200	6.3	175	7.6	180	7.3	195	7.8	250	6.1
3	330	2.5	320	3.0	340	1.2	---	---	285	2.4	265	1.5	260	1.1	275	1.5	275	2.4	275	3.8	270	3.2	270	4.5
4	265	4.9	265	5.1	265	3.6	270	4.8	270	4.6	260	5.4	265	5.1	270	4.6	275	3.8	275	3.8	275	4.8	275	4.1
5	265	2.1	255	2.6	---	---	245	1.0	230	1.0	230	1.2	195	1.9	215	1.8	230	2.6	220	2.0	200	3.2	240	3.3
6	175	6.4	170	7.1	185	8.6	190	8.7	185	8.6	195	8.1	190	8.1	205	8.1	205	9.4	210	9.3	220	9.1	230	8.4
7	---	---	---	---	215	1.3	215	1.6	210	1.3	200	1.3	190	1.0	190	1.9	170	3.4	180	4.0	180	5.4	175	6.5
8	190	5.1	195	5.1	220	4.0	195	2.9	180	3.5	170	4.1	175	3.6	175	3.8	190	3.5	195	4.0	215	4.4	235	5.2
9	105	2.0	---	---	65	1.0	55	1.8	---	---	---	---	---	---	230	1.3	215	1.8	235	2.1	245	1.0	275	3.2
10	180	4.4	195	5.1	180	4.4	175	4.7	170	5.5	190	5.8	200	7.2	190	6.8	185	6.5	190	5.0	170	6.3	185	5.6
11	165	4.4	155	7.3	125	6.0	135	2.1	145	4.1	150	4.3	165	3.8	155	4.6	130	5.9	90	8.4	100	6.8	105	6.0
12	---	---	315	1.0	---	---	290	1.9	315	3.1	320	6.5	320	6.5	315	7.6	325	8.2	315	8.0	310	6.3	305	5.8
13	180	7.7	190	6.8	210	6.8	195	4.8	180	4.8	210	3.8	190	3.0	175	3.2	170	3.4	170	3.4	200	3.5	220	4.3
14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	335	2.0	355	3.8	10	4.3	5	5.6
15	50	2.5	90	1.2	25	2.2	115	1.6	---	---	---	---	---	---	---	---	20	1.0	---	---	315	3.4	335	2.5
16	---	---	---	---	---	---	---	---	---	---	225	1.3	135	1.7	60	1.1	40	1.3	170	2.8	200	3.2	255	4.0
17	---	---	---	---	---	---	115	1.7	---	---	---	---	---	---	---	---	280	1.2	---	---	280	2.0	280	2.2
18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	320	3.7
19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20	60	10.0	70	6.9	60	3.8	90	3.6	---	---	70	1.7	70	8.8	75	9.9	65	8.9	60	10.4	45	9.5	60	9.9
21	50	7.0	60	7.3	65	6.6	65	5.6	10	2.1	65	2.0	90	5.5	110	3.4	115	1.7	85	2.9	105	3.0	50	1.3
22	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23	80	7.0	85	7.7	90	5.9	90	5.5	90	9.0	80	6.9	80	4.8	80	5.9	90	6.4	90	6.0	80	6.0	90	5.8
24	95	8.1	140	5.8	170	4.9	170	5.7	160	4.0	135	3.2	140	3.0	135	4.0	135	4.5	145	4.6	125	3.8	135	4.0
25	95	8.8	85	7.4	85	5.5	85	4.7	85	4.5	90	4.7	80	4.6	75	3.7	80	3.0	95	4.5	95	4.5	110	5.5
26	125	4.7	115	4.0	100	4.2	95	3.2	110	2.3	75	1.7	140	4.9	155	6.0	155	7.1	155	6.5	165	8.4	170	8.2
27	360	4.8	360	3.9	360	4.2	10	4.5	10	3.6	10													



Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in Metres per second.

421. Cahirciveen (Valentia Observatory):

H<sub>a</sub> (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Hour. G. M. T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12	
Day.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.
1	210	6·9	220	6·5	225	7·3	220	7·7	215	7·5	230	8·7	235	8·0	235	9·1	235	9·7	240	9·3	230	10·4	230	10·5
2	230	8·1	230	8·1	230	9·6	230	10·3	230	10·0	230	10·1	230	10·0	230	10·0	230	11·8	230	11·2	230	13·0	230	13·9
3	265	5·3	270	6·1	270	6·5	275	7·6	295	6·5	275	8·1	290	8·0	280	7·9	285	7·7	300	8·0	310	8·3	310	8·0
4	310	5·2	305	4·5	295	5·2	300	4·9	300	5·2	300	5·3	305	4·1	300	3·5	280	4·5	290	5·0	280	4·1	265	4·1
5	170	5·6	195	4·8	185	5·5	190	5·8	170	6·5	165	7·4	165	8·6	165	10·9	170	10·8	180	8·9	205	7·3	230	8·1
6	50	1·5	---	...	155	1·6	165	4·3	170	4·2	185	3·6	180	4·0	225	4·2	290	4·6	280	4·8	275	6·2	275	6·1
7	290	8·5	300	7·2	300	6·2	(300)	6·1	(295)	5·4	(295)	4·5	(290)	4·5	270	5·9	260	5·3	260	5·5	235	6·6	215	7·9
8	220	3·4	275	3·9	275	4·1	275	5·0	260	4·5	240	5·1	240	5·9	295	5·6	305	6·0	305	7·4	305	7·2	315	8·5
9	10	7·4	10	6·1	15	6·4	5	5·9	15	5·5	360	4·7	355	6·5	360	7·1	360	8·6	5	7·2	355	7·1	355	6·7
10	210	6·6	220	8·1	225	10·1	260	8·1	290	5·7	280	6·0	290	7·4	305	7·9	300	6·8	300	7·6	295	7·6	300	8·1
11	220	11·4	230	13·5	250	12·6	265	12·8	280	9·9	315	10·0	325	10·2	325	9·9	325	9·3	315	8·1	300	7·7	300	7·5
12	260	5·0	245	4·0	240	3·9	220	4·5	220	5·1	210	4·2	230	7·7	260	9·9	265	8·5	270	8·0	270	7·3	270	6·6
13	230	5·6	230	5·7	245	6·2	240	5·9	225	5·5	230	5·7	230	5·7	230	5·6	235	5·4	225	5·0	225	6·2	230	7·5
14	230	6·0	225	5·5	225	5·4	220	5·0	220	4·4	235	4·9	220	4·3	225	5·2	230	5·8	225	6·3	225	7·5	235	7·5
15	190	3·1	190	3·8	190	3·0	180	3·0	175	3·1	180	2·9	175	3·5	175	4·3	180	4·0	180	4·4	185	4·4	180	4·2
16	80	1·3	55	1·8	70	1·5	35	2·3	45	2·4	30	1·4	100	1·6	70	5·5	75	4·4	70	4·2	50	3·9	60	5·2
17	---	...	---	...	---	...	---	...	---	...	---	...	---	...	---	...	---	...	---	...	---	...	---	...
18	345	4·0	350	6·9	340	5·0	330	4·6	340	3·2	320	2·8	305	2·4	295	3·2	350	4·9	20	4·2	15	3·5	25	4·7
19	60	4·8	60	4·5	40	2·3	55	1·4	60	1·8	65	2·1	75	3·2	110	1·3	---	...	50	2·1	20	5·0	20	5·5
20	60	6·6	60	6·6	50	7·5	50	7·5	60	6·7	50	6·6	60	8·4	65	9·1	70	9·5	60	8·7	50	10·1	50	11·2
21	60	8·5	65	6·7	85	4·0	80	4·4	85	5·1	75	5·1	85	4·2	85	3·8	80	3·9	75	5·8	60	4·6	55	4·8
22	80	7·4	80	7·5	80	6·9	70	4·9	70	4·2	80	2·0	55	1·8	75	2·9	50	3·1	60	3·5	65	6·6	70	7·4
23	80	1·3	45	1·6	60	2·8	60	2·4	30	4·0	20	5·0	25	4·1	45	3·6	40	2·2	15	1·5	340	2·8	320	2·1
24	55	2·4	55	1·2	---	...	55	1·4	130	3·0	185	4·9	195	3·8	215	5·4	220	6·3	230	7·3	225	7·9	225	8·1
25	260	8·3	260	8·0	270	7·9	265	7·6	265	7·9	270	8·0	265	9·1	270	8·1	275	8·5	285	8·7	315	8·0	(325)	6·6
26	5	7·0	5	4·2	10	4·0	5	8·2	10	6·2	5	7·6	15	8·3	15	7·8	5	7·3	360	8·8	360	8·7	350	9·4
27	25	7·8	10	8·9	20	8·4	25	7·1	30	6·6	25	7·3	30	6·1	60	4·2	60	4·3	60	5·6	30	5·4	20	6·1
28	65	2·9	135	1·0	90	1·4	65	1·2	---	...	---	...	70	1·2	65	1·3	---	...	---	...	---	...	---	...
29	90	4·4	90	2·3	20	1·4	55	2·2	50	3·6	60	3·0	65	2·6	55	3·0	45	2·3	60	5·1	60	6·9	70	8·1
30	60	7·0	70	6·6	70	6·2	70	6·7	85	5·4	80	3·7	80	3·2	60	7·3	70	7·4	70	8·0	50	6·6	45	7·6
Mean	---	5·5	---	5·2	---	5·1	---	5·3	---	5·0	---	5·1	---	5·3	---	5·8	---	5·8	---	6·0	---	6·4	---	6·8

422. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

Day.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.	°	m/s.
1	35	9·4	40	12·4	30	11·5	35	13·6	40	11·4	45	10·0	30	11·3	30	11·2	40	11·6	35	11·0	45	10·9	35	11·7
2	150	1·4	---	...	---	...	320	4·8	315	4·7	310	4·8	295	5·4	300	5·8	325	5·3	335	8·0	335	8·2	330	8·4
3	360	3·1	355	3·1	345	4·4	335	6·0	335	6·6	340	6·6	330	5·1	340	7·3	355	6·8	355	7·1	350	9·0	360	8·9
4	115	1·9	110	1·7	60	2·8	60	2·4	70	1·7	65	1·7	60	2·5	---	...	---	...	---	...	190	1·6	180	3·6
5	---	...	50	1·9	75	1·8	---	...	---	...	65	1·2	50	2·3	55	1·8	50	2·1	55	2·2	55	1·0	170	2·7
6	170	3·6	175	3·2	175	2·5	180	3·3	195	3·6	190	4·7	195	5·1	200	5·5	220	6·7	215	6·6	220	8·2	235	8·4
7	225	5·8	210	5·5	215	7·2	215	7·6	205	7·1	210	8·1	205	8·4	210	10·3	215	10·9	205	10·8	210	13·3	210	13·7
8	265	5·7	270	7·8	265	7·2	275	7·4	270	3·9	285	3·2	200	2·8	345	1·3	---	...	270	4·7	270	3·5	310	4·3
9	305	5·4	310	5·0	320	4·9	320	5·0	320	5·0	325	4·7	310	5·0	305	5·9	305	5·1	310	4·1	280	4·3	270	5·5
10	40	2·6	65	3·5	70	4·4	65	1·0	50	3·2	45	4·0	35	3·8	35	3·5	10	2·8	20	1·7	340	3·2	335	5·4
11	330	1·8	335	2·4	340	2·5	325	2·8	330	1·9	330	1·2	320	1·3	330	1·4	---	...	330	1·2	---	...	320	1·2
12	---	...	---	...	---	...	75	1·1	---	...	---	...	---	...	---	...	120	1·0	210	2·9	275	5·8	330	7·2
13	300	10·2	300	10·7	295	10·8	300	11·0	300	9·7	295	9·8	300	10·0	295	10·1	305	8·9	300	8·7	295	9·0	300	7·5
14	30	3·5	25	2·1	5	4·8	360	5·5	350	10·0	350	9·5	350	10·0	350	11·2	350	9·9	350	10·2	350	10·7	345	10·5
15	350	8·9	350	7·7	355	7·6	355	6·9	345	5·7	335	6·4	335	4·8	315	4·0	305	4·2	300	3·0	300	3·9	290	4·6
16	310	6·5	320	5·1	310	4·8	300	4·3	285	2·5	290	2·3	260	1·4	260	1·3	---	...	180	2·8	205	4·0	250	5·0
17	325	7·5	320	6·3	320	6·1	325	5·3	300	5·7	315	3·5	305	4·5	290	1·4	270	1·6	210	3·2	210	4·4	210	6·7
18	300	10·1	300	10·7	305	11·6	300	11·5	315	10·8	330	11·2	340	10·9	340	9·0	330	7·5	335	7·1	330	6·9	325	7·5
19	55	1·6	50	1·6	---	...	150	4·1	150	5·7	150	6·9	150	8·0	160	8·7	160	10·1	165	9·6	165	10·2	170	11·7
20	210	4·7	220	5·0	235	5·2	235	5·2	225	4·5	235	5·2	245	5·9	270	4·2	260	1·4	---	...	245	1·2	275	2·4
21	75	5·0	50	1·2	40	1·0	155	1·0	---	...	55	1·1	---	...	20	1·2	20	1·0	---	...	---	...	---	...
22	35	2·1	60	1·0	---	...	---	...	135	1·0	175	1·6	140	1·4	230	3·6	240	3·5	235	3·7	220	4·3	260	6·9
23	210	6·2	180	5·2	210	3·5	190	3·2	200	2·9	---	...	---	...	145	1·2	170	3·1	175	3·4	165	3·5	170	3·7
24	125	2·7	230	7·0	260	8·8	260	8·5	265	8·2	270	9·2	275	9·4	275	9·1	280	8·8	285	9·0	295	10·6	295	9·5
25	145	1·4	180	3·0	185	3·7	185	4·6	185	4·5	180	6·6	180	7·0	180	6·5	185	7·3	185	8·0	180	8·1	220	6·0
26	265	9·1	275	9·5	280	9·3	280	8·7	290	8·3	280	8·6	300	8·1	300	7·9	295	7·2	300	7·6	295	7·6	295	7·9
27	280	7·3	275	9·1	290	7·3	290	6·5	265	6·2	240	5·3	245	7·4	215	5·9	215	8·5	260	7·8	210	3·7	35	

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 17 metres + 13 metres.

September, 1932.

Table with 24 columns (12-13 to 23-24) and 25 rows of wind speed data for September 1932. Each cell contains wind speed in m/s for two different heights.

October, 1932.

Table with 24 columns (12-13 to 23-24) and 25 rows of wind speed data for October 1932. Each cell contains wind speed in m/s for two different heights.

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°) : Speed in metres per second.

423. Cahirciveen (Valentia Observatory):

$H_a$  (height of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Hour. G. M. T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12			
Day.	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s
1	190	2.1	175	4.0	180	4.7	230	5.5	230	6.0	230	6.8	225	6.8	240	7.4	260	8.1	270	5.9	265	5.7	265	5.4		
2	205	9.7	205	9.7	230	10.4	235	9.8	235	7.9	235	8.1	225	8.1	225	6.6	205	7.1	205	6.9	210	9.6	210	9.4		
3	185	8.5	185	8.8	185	8.9	185	10.4	180	10.5	190	10.3	185	11.5	185	10.7	190	10.2	185	10.4	190	11.0	190	11.4		
4	290	5.1	340	6.7	355	8.9	15	8.7	20	8.6	30	5.5	15	6.0	10	4.9	5	5.9	360	7.5	350	8.4	355	7.6		
5	5	4.4	30	3.0	30	5.5	50	3.6	55	2.5	70	1.9	75	2.3	---	...	70	1.4	55	1.5	55	3.6	55	4.8		
6	45	2.9	75	3.1	90	3.9	90	3.1	90	7.0	80	7.8	75	6.2	80	4.8	355	2.6	75	3.1	85	4.1	110	7.8		
7	55	2.9	75	2.3	90	2.1	90	1.5	100	4.9	100	4.1	130	3.4	100	4.1	30	1.3	35	1.0	60	1.8	90	4.2		
8	80	6.1	85	5.1	90	4.5	85	4.5	90	4.7	85	4.6	95	5.8	105	6.8	115	6.3	120	4.8	95	5.2	120	4.5		
9	90	3.4	90	2.6	---	...	120	2.6	90	4.5	90	4.5	80	3.3	95	2.9	95	2.9	---	...	---	...	---	...		
10	70	1.2	75	1.7	60	2.7	75	1.1	55	3.0	70	1.5	60	1.5	60	3.1	50	1.8	95	3.1	110	4.7	130	5.6		
11	145	13.5	150	11.9	150	12.4	145	11.8	145	11.3	140	11.9	135	12.6	140	13.0	135	12.5	135	11.2	145	14.4	145	14.1		
12	145	9.4	145	9.3	140	8.0	110	7.0	105	8.4	110	7.6	110	7.6	110	9.1	105	10.4	110	9.2	110	9.9	115	11.2		
13	115	10.8	115	9.8	110	9.6	110	9.0	110	9.3	110	8.4	120	9.7	110	9.6	110	8.9	125	7.3	120	8.1	115	8.6		
14	105	5.1	95	4.4	80	2.3	85	2.6	90	2.7	85	2.0	80	1.9	90	2.0	95	3.0	90	4.4	80	4.7	60	3.1		
15	65	3.2	70	3.9	70	4.2	45	3.1	55	2.7	70	2.7	60	4.0	55	4.6	50	5.9	60	6.1	50	6.6	45	7.2		
16	70	6.5	65	6.4	70	4.6	65	5.1	70	5.9	90	7.7	85	7.0	80	6.5	85	5.9	90	6.0	90	6.2	100	5.6		
17	105	7.7	100	9.4	95	10.9	95	8.6	100	8.8	105	7.4	100	7.4	100	6.0	105	7.5	105	8.1	105	8.6	100	7.2		
18	85	5.1	90	6.5	100	7.1	105	6.9	100	6.1	90	4.9	85	4.5	75	4.7	75	4.3	70	5.0	270	1.9	340	1.1		
19	20	2.1	10	6.0	25	6.1	45	7.4	70	4.0	30	2.0	60	3.0	65	3.5	70	3.3	70	2.7	65	2.3	50	1.9		
20	200	5.8	210	8.0	210	8.2	210	8.3	220	9.2	245	10.0	300	5.8	290	4.2	290	3.8	305	5.4	305	5.3	295	4.9		
21	310	5.0	315	5.4	(315)	6.0	(310)	6.0	310	5.2	315	4.9	310	5.7	305	5.3	300	5.7	300	5.6	325	3.4	310	5.4		
22	230	9.0	235	8.1	245	9.5	250	10.0	250	9.7	250	10.2	255	10.3	250	10.6	250	12.7	260	14.2	265	11.8	280	9.2		
23	280	9.7	275	9.9	290	9.9	290	9.0	290	8.9	295	8.5	285	9.6	290	9.4	295	9.6	295	9.7	290	9.0	295	8.6		
24	295	7.5	285	6.6	290	7.2	320	6.4	315	5.2	295	6.1	290	6.0	300	7.5	295	6.5	295	6.5	280	4.7	265	6.0		
25	270	8.8	270	6.5	260	6.4	255	7.8	260	8.8	265	8.3	265	7.4	265	6.4	255	6.5	245	6.8	225	6.6	205	7.6		
26	230	10.3	225	11.5	230	12.2	245	10.2	255	10.9	265	9.8	260	11.1	260	11.0	265	11.1	265	11.2	270	11.7	270	12.8		
27	305	9.8	310	8.1	305	9.7	305	10.2	315	10.7	325	9.9	330	9.9	345	9.9	350	10.1	345	11.8	355	10.9	345	12.1		
28	300	4.6	280	4.6	270	6.3	265	5.0	260	5.4	265	5.7	275	5.2	305	2.7	285	3.0	275	2.0	245	1.8	260	2.8		
29	220	6.7	215	7.0	200	6.6	200	8.1	205	8.0	205	9.8	205	10.1	205	9.7	200	10.0	205	10.3	205	10.3	210	11.1		
30	290	2.9	255	2.8	205	3.0	170	2.3	---	...	180	2.7	60	1.8	125	2.5	175	5.4	175	5.7	190	5.0	190	5.3		
Mean.	---	6.3	---	6.4	---	6.7	---	6.5	---	6.7	---	6.5	---	6.5	---	6.3	---	6.5	---	6.5	---	6.6	---	6.9		

424. Cahirciveen (Valentia Observatory):  $H_a = 17$  metres +  $13$  metres.

1	330	6.8	245	6.2	250	7.5	340	8.5	335	7.5	340	6.6	335	6.8	355	4.2	10	2.0	330	2.9	315	4.0	330	4.2
2	215	10.8	215	11.5	220	11.9	225	13.0	230	14.4	235	13.8	260	10.5	285	8.3	310	(4.4)	310	(4.3)	305	4.0	300	4.6
3	310	7.7	310	7.5	305	7.6	300	7.2	300	6.9	300	7.9	315	7.2	315	7.4	305	7.0	310	7.3	300	7.4	310	7.5
4	360	5.9	360	4.7	360	3.5	5	4.2	5	3.4	15	3.1	30	1.9	25	2.7	60	1.5	---	...	60	1.1	---	...
5	70	2.4	50	2.3	75	1.9	110	3.5	95	3.5	90	3.5	90	4.5	90	5.1	90	5.1	85	5.2	80	4.7	90	4.1
6	85	9.1	85	10.1	90	8.9	80	9.9	80	9.4	90	9.8	85	9.7	80	9.9	80	9.8	70	9.6	85	9.2	85	9.7
7	55	5.7	45	5.1	45	6.7	50	7.8	35	6.9	25	8.2	35	7.6	50	6.3	75	8.6	55	7.4	30	9.4	20	9.9
8	100	4.9	100	5.6	90	7.6	90	7.4	90	8.4	90	7.5	100	6.6	100	6.8	90	7.1	90	7.4	110	9.6	105	7.0
9	90	4.5	90	5.7	100	7.7	95	8.4	95	8.5	85	8.5	80	8.4	80	8.6	70	8.5	70	7.9	80	9.1	90	8.6
10	35	2.9	55	3.8	50	4.9	55	5.8	50	5.3	60	4.8	50	4.1	75	7.4	70	6.2	55	5.2	50	6.1	60	6.6
11	55	9.7	55	9.8	60	10.8	60	9.5	60	8.9	60	10.0	60	8.1	65	9.1	65	10.8	70	12.7	70	11.8	70	10.3
12	25	3.2	20	2.2	40	2.2	65	3.7	60	2.7	55	3.8	65	3.5	70	4.4	65	6.3	360	1.9	70	6.6	80	10.1
13	145	5.7	140	7.3	140	7.5	140	7.9	140	7.0	135	7.6	140	7.2	135	9.5	140	8.7	140	9.2	145	8.5	175	7.7
14	225	6.2	270	2.0	325	2.9	330	2.9	310	5.0	315	6.2	320	4.9	320	3.8	345	2.7	335	2.1	305	5.5	340	5.7
15	190	13.9	195	14.2	195	15.5	205	14.7	230	9.5	240	8.6	245	9.9	245	8.8	240	9.3	240	9.2	250	9.5	245	8.5
16	190	13.3	190	14.1	195	13.5	195	14.0	205	14.5	200	14.1	205	15.4	210	16.4	210	16.3	210	16.1	210	15.0	210	13.6
17	205	17.6	210	16.7	205	15.0	205	13.5	205	12.8	200	12.0	195	11.6	195	12.1	200	12.4	195	12.6	180	13.9	195	13.6
18	205	9.6	210	14.2	210	13.1	210	12.8	215	11.6	210	10.0	195	8.5	195	9.6	190	9.6	190	12.1	190	12.7	185	13.0
19	205	5.6	185	4.5	195	3.9	175	4.5	160	4.5	155	4.8	75	1.3	---	...	---	...	75	1.6	55	1.0	80	2.0
20	10	9.3	15	7.8	10	8.0	10	7.6	10	7.9	10	8.6	25	7.4	30	7.8	30	6.0	25	7.2	25	7.1	35	6.0
21	---	...	---	...	170	3.6	185	4.0	190	5.1	170	6.7	160	8.6	165	10.0	165	10.8	170	11.3	170	11.5	170	12.5
22	200	5.4	195	5.5	185	4.6	185	4.7	180	5.5	180	5.5	175	5.7	160	7.7	155	9.9	155	11.8	150	13.0	150	14.3
23	185	12.7	180	13.2	180	14.8	180	14.1	190	13.5	205	10.6	215	10.4	220	10.7	220	10.4	215	9.5	210	10.2	220	11.9
24	275	9.8	275	9.1	265	8.6	255	7.1	260	8.1	255	8.3	240	6.2	220	5.1	215	5.7	205	6.0	205	6.5	210	7.6
25	205	10.4	200	9.7	195	8.7	195	8.9	190	9.2	185	9.5	185	9.5	180	9.8	180	10.0	180	10.2	180	10.9	180	10.8
26	170	10.6	180	10.8	180	9.8	180	9.5	180	9.3	185	8.1	180	9.0	180	7.7	180	9.0	180	8.6	180	9.5	185	8.8
27	190	4.0	350	5.0	360	6.2	5	4.2	360	5.0	360	5.0	20	3.9	360	5.0	360							

WIND : DIRECTION AND SPEED.

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 17 metres + 13 metres.

November, 1932.

Main data table for November 1932, showing wind speed and direction averages for 15-minute intervals across 16 stations. Includes columns for time intervals (e.g., 12-13, 13-14) and station heights.

December and Year, 1932.

Main data table for December and Year 1932, continuing the wind speed and direction averages for 15-minute intervals across 16 stations.

425. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

1932.

Day.	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.
1	m/s. 19	h. m. 23 25	m/s. 8	h. m. 22 25	m/s. 20	h. m. 13 40	m/s. 23	h. m. 15 35	m/s. 13	h. m. 9 10	m/s. 13	h. m. 1 40	m/s. 19	h. m. 13 40	m/s. 15	h. m. 9 25	m/s. 20	h. m. 13 00	m/s. 22	h. m. 3 55	m/s. 17	h. m. 22 25	m/s. 15	h. m. 24 00
2	22	21 25	9	3 20	14	19 55	19	19 20	8	14 40	6	12 55	18	15 50	13	17 35	26	13 40	14	9 50	21	20 30	23	5 25
3	22	12 50	8	7 15	18	12 30	19	3 20	13	7 45	8	12 00	19	15 35	9	14 25	18	13 00	14	11 10	24	17 15	21	13 25
4	31	12 50	12	22 20	10	4 40	17	3 35	11	14 35	10	18 05	15	2 25	9	0 45	12	2 20	8	12 30	16	14 30	11	0 20
5	26	7 50	13	10 25	19	17 20	15	13 55	15	19 50	9	11 40	13	13 45	10	21 55	18	7 55	7	11 55	11	2 30		
6	21	6 00	17	18 10	22	5 20	23	16 20	13	16 00	9	15 25	9	7 40	15	9 35	16	23 10	16	17 30	13	11 30	25	15 00
7	13	1 35	14	14 55	15	13 20	27	20 40	10	15 10	8	13 50	12	16 35	11	12 55	20	17 00	25	12 45	10	4 05	26	22 10
8	12	24 00	11	3 05	14	9 10	17	3 15	11	23 35	15	13 15	12	15 10	9	14 40	19	14 20	15	5 00	12	9 15	22	9 55
9	25	7 05	15	20 40	12	2 10	24	14 30	19	6 45	15	15 40	11	20 30	10	18 35	13	8 50	12	4 10	8	5 15	20	3 10
10	22	3 15	27	16 40	10	11 15	23	5 20	19	17 35	14	5 30	12	5 10	13	16 45	17	11 05	13	13 10	25	23 20	18	22 55
11	16	3 30	19	7 00	13	12 00	28	3 40	19	17 00	7	14 00	14	21 10	14	10 05	21	3 10	7	1 10	27	6 40	21	12 35
12	21	13 15	15	15 10	13	12 45	15	3 00	15	19 00	8	23 45	14	9 35	14	9 20	16	7 25	27	21 35	23	23 25	17	12 25
13	30	14 05	12	21 15	17	8 45	27	17 45	18	12 20	8	0 05	11	15 25	12	0 45	14	13 45	27	0 10	20	0 25	16	5 35
14	27	11 20	13	13 15	17	14 55	20	0 40	17	8 25	6	16 15	16	8 20	12	14 45	12	11 25	19	11 25	10	0 10	23	23 40
15	25	(17-30)	6	22 50	15	6 05	13	15 30	9	0 20	6	14 55	9	21 40	9	2 50	9	17 45	13	1 05	15	19 15	26	3 40
16	29	8 25	8	2 45	10	1 30	17	22 10	9	14 50	12	14 15	17	15 55	6	11 40	9	7 15	17	21 10	16	23 15	28	22 15
17	24	23 30	10	22 25	6	12 55	16	11 45	26	14 05	9	11 55	16	22 20	6	12 50	8	22 40	23	19 50	20	4 15	29	0 40
18	24	6 25	9	20 45	7	14 05	11	11 10	18	14 05	8	12 50	12	0 35	7	14 05	11	1 30	23	2 10	11	2 30	23	10 15
19	21	1 50	8	17 50	10	16 15	14	19 30	23	15 00	7	15 00	10	13 30	20	23 15	12	16 45	22	15 05	13	3 20	17	21 05
20	14	22 05	11	13 00	14	23 30	18	10 20	18	0 05	9	2 05	11	19 40	18	9 15	19	11 40	14	23 00	19	5 40	15	0 15
21	14	1 55	7	15 45	12	0 05	13	16 25	10	14 45	10	16 40	12	3 10	14	1 30	16	0 40	9	0 30	16	22 00	24	12 30
22	15	19 50	8	12 25	11	10 55	14	18 35	14	15 05	13	16 35	14	16 15	12	23 50	13	13 50	14	12 50	23	9 45	26	16 40
23	18	7 35	9	18 30	14	21 45	15	1 45	13	3 55	11	16 40	10	19 50	18	14 35	11	5 35	13	0 25	20	9 10	25	3 40
24	17	6 00	17	10 50	21	22 50	8	14 50	16	13 20	11	15 55	13	18 30	15	0 00	16	21 50	20	10 25	20	14 30	17	21 45
25	10	19 50	13	9 35	26	10 30	13	15 20	15	15 45	9	5 05	18	22 30	16	1 00	17	13 05	18	23 45	26	21 50	22	16 25
26	12	5 30	13	19 00	30	24 00	7	15 45	12	7 55	13	12 10	17	1 05	14	9 20	19	12 20	19	20 30	25	14 05	19	0 50
27	9	3 05	10	12 30	29	0 20	12	7 40	12	22 00	9	1 55	19	5 20	8	0 10	16	1 55	23	13 40	24	4 05	12	2 05
28	10	12 05	15	20 35	17	16 00	11	14 15	13	11 30	9	16 30	13	22 55	9	11 45	10	16 00	20	1 10	14	4 05	22	21 55
29	9	3 35	15	13 45	21	8 45	13	15 10	12	13 05	17	8 15	17	15 25	9	20 55	20	23 15	23	18 45	19	13 30	22	7 15
30	5	13 30	--	-- --	11	8 40	14	15 15	23	16 20	13	11 05	13	2 10	13	10 10	18	16 55	26	4 15	19	18 20	25	24 00
31	3	2 25	--	-- --	17	19 20	--	-- --	26	17 35	--	-- --	12	11 55	13	13 25	--	-- --	17	0 35	--	-- --	43	4 35

DISTRIBUTION OF WIND SPEED : EXTREME VELOCITIES AS RECORDED BY THE DINES TUBE ANEMOGRAPH.

426. Cahirciveen (Valentia Observatory): H<sub>a</sub> = 17 metres + 13 metres.

1932.

Month.	DISTRIBUTION OF WIND SPEED.									EXTREME VELOCITIES.					
	More than 17.1 m/s.		10.8 to 17.1 m/s.		5.5 to 10.7 m/s.	1.6 to 5.4 m/s.	Less than 1.6 m/s.	No Record.	Highest Hourly Wind.			Highest Gust.			
	Dates of Occurrence.	Duration.	No. of Days.	Duration.	Duration.	Duration.	Duration.	Duration.	Year from N.	Speed.	Mid Time.	Speed.	Date.		
Jan. ...	13, 14, 16,	5 hr.	17	194	269	191	85	0	200	17	14 15	31	4	12 50	
Feb. ...	--	0	0	0	160	426	110	0	70	10	11 7	27	10	16 40	
Mar. ...	--	0	6	33	314	327	70	0	150	17	23 26	30	26	24 00	
Apr. ...	--	0	8	60	348	239	73	0	255	15	6 17	28	11	3 40	
May ...	--	0	7	28	391	253	72	0	205	13	19 15	26	31	17 35	
June ...	--	0	0	0	157	315	248	0	180	10	29 13	17	29	8 15	
July ...	--	0	3	6	322	368	48	0	355	12	16 17	19	3	15 35	
Aug. ...	--	0	0	0	223	364	157	0	60	10	20 9	20	19	23 15	
Sept. ...	--	0	9	32	382	254	52	0	230	15	2 13	26	2	13 40	
Oct. ...	--	0	12	77	296	271	100	0	210	15	7 13	27	13	0 10	
Nov. ...	--	0	13	92	360	233	35	0	205	15	25 22	27	11	6 40	
Dec. ...	16, 17, 31,	7	17	140	401	167	29	0	155	22	31 6	43	31	4 35	
Year. ...	6 Days.	12	92	662	3623	3408	1079	0	155	22	Dec. 31 6	43	Dec. 31	4 35	



427. Cahirciveen (Valentia Observatory).

Readings, in degrees absolute, at 9h Greenwich Mean Time.

1932.

Day.	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm	30cm	122cm
	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A
1	80.3	82.2	81.0	82.0	77.5	80.5	81.0	81.7	84.0	82.6	86.0	84.6	89.4	87.8	89.1	87.9	90.1	88.9	85.3	86.6	82.7	84.7	81.2	83.3
2	80.5	82.1	81.0	82.0	77.2	80.4	81.0	81.8	84.2	82.9	86.4	84.7	89.1	87.6	88.9	87.9	90.3	88.9	84.6	86.4	83.7	84.5	81.3	83.2
3	82.9	82.1	80.5	82.0	77.0	80.3	80.9	81.8	84.9	82.9	87.5	84.7	88.8	87.5	89.0	87.9	90.0	88.8	84.9	86.5	84.5	84.5	81.2	83.1
4	83.0	82.0	80.1	82.0	77.0	80.2	80.5	81.7	84.9	83.0	87.4	84.9	88.8	87.6	89.7	87.9	89.2	88.9	84.4	86.2	84.4	84.6	80.6	83.1
5	82.6	82.4	80.2	82.0	78.0	80.1	80.7	81.7	85.0	83.2	86.9	85.0	89.0	87.6	89.9	87.8	89.1	88.8	84.2	86.2	83.4	84.6	79.6	83.0
6	83.0	82.6	80.1	81.9	78.6	80.1	81.2	81.7	84.2	83.2	86.9	85.0	89.1	87.5	90.2	87.9	89.1	88.8	85.1	86.1	82.1	84.6	79.5	83.0
7	82.2	82.6	80.4	81.9	78.8	80.1	81.2	81.8	84.0	83.4	86.9	85.1	88.9	87.5	90.6	88.0	89.0	88.5	85.3	86.0	82.6	84.6	79.1	82.7
8	81.2	82.6	80.5	81.9	79.8	80.1	80.9	81.8	84.0	83.3	87.4	85.1	89.3	87.5	90.8	88.0	88.7	88.3	84.9	86.0	82.2	84.4	79.0	82.6
9	80.3	82.6	80.1	81.9	80.5	80.1	81.8	81.6	83.6	83.4	88.0	85.2	89.6	87.5	90.6	88.1	88.2	88.3	84.5	86.0	82.2	84.2	78.8	82.4
10	81.0	82.5	79.5	81.9	79.9	80.2	81.9	81.8	83.9	83.4	87.0	85.2	90.1	87.5	91.0	88.2	88.6	88.3	84.3	86.0	82.2	84.3	78.1	82.1
11	80.7	82.4	78.1	81.8	79.0	80.6	81.0	81.8	84.0	83.4	87.5	85.6	89.1	87.5	91.0	88.2	88.8	88.3	84.3	85.9	82.1	84.0	78.0	82.1
12	80.1	82.2	77.5	81.6	78.2	80.5	80.5	81.8	84.5	83.4	88.4	85.6	89.3	87.7	91.0	88.3	88.9	88.2	85.0	85.8	82.9	84.1	78.2	82.0
13	81.0	82.2	77.5	81.2	78.0	80.5	81.5	81.7	85.0	83.4	88.2	85.9	89.5	87.7	90.6	88.5	89.0	88.1	84.6	85.7	82.2	84.0	79.5	81.8
14	80.8	82.1	77.1	81.1	78.0	80.5	81.3	81.9	85.3	83.5	89.4	85.9	89.8	87.6	91.0	88.5	89.2	88.1	84.0	85.6	82.8	83.9	80.1	81.8
15	80.2	82.0	77.2	81.1	78.5	80.5	81.5	81.8	85.6	83.7	89.8	86.0	89.3	87.7	90.9	88.8	89.8	88.1	84.0	85.6	82.2	84.0	80.0	81.8
16	81.0	82.0	77.5	81.0	79.3	80.4	81.9	81.9	85.6	83.8	89.2	86.2	89.2	87.7	91.4	88.6	90.0	88.2	84.7	85.6	81.7	84.0	81.0	81.8
17	81.1	82.0	77.5	80.9	79.4	80.4	81.3	81.9	85.6	83.9	89.6	86.3	89.0	87.8	91.6	88.7	90.0	88.2	85.0	85.5	81.8	83.9	82.4	82.0
18	82.0	82.0	78.0	80.7	79.4	80.4	81.1	82.0	85.7	84.0	90.6	86.6	88.6	87.7	91.8	88.8	89.9	88.2	84.8	85.4	81.8	83.8	83.0	82.0
19	82.5	82.0	77.7	80.7	80.0	80.5	81.4	81.9	86.0	84.0	90.5	86.8	88.8	87.7	92.2	88.9	88.2	88.2	84.6	85.4	82.0	83.8	83.0	82.1
20	82.6	82.0	77.3	80.6	80.1	80.6	81.9	81.9	86.0	84.1	90.9	86.8	89.5	87.8	92.3	89.0	87.1	88.2	84.8	85.4	81.6	83.7	81.9	82.3
21	82.5	82.1	77.9	80.4	81.0	80.6	81.8	82.0	86.4	84.2	91.0	87.0	89.4	87.8	90.1	89.0	85.8	88.4	84.5	85.5	81.2	83.6	81.0	82.4
22	82.3	82.1	78.2	80.4	81.7	80.8	82.4	82.0	86.9	84.2	90.6	87.1	89.4	87.7	90.3	89.1	86.0	88.0	84.1	85.4	81.9	83.5	80.9	82.4
23	82.2	82.1	78.6	80.4	81.6	80.9	82.4	82.0	86.2	84.3	90.2	87.1	89.6	87.8	90.5	89.0	85.4	87.9	83.9	85.3	82.2	83.4	81.6	82.2
24	82.2	82.1	79.1	80.4	81.9	81.0	82.0	82.0	85.6	84.5	90.1	87.1	89.5	87.9	90.5	89.0	85.6	87.6	84.3	85.3	82.0	83.2	81.1	82.2
25	81.8	82.4	79.0	80.5	82.0	81.1	82.7	82.1	85.0	84.5	90.1	87.4	89.1	87.8	90.6	89.0	85.9	87.5	84.2	85.2	82.9	83.2	81.3	82.2
26	80.9	82.1	78.8	80.6	81.8	81.2	82.7	82.3	84.6	84.6	90.0	87.5	89.0	87.9	90.6	89.0	85.2	87.3	84.7	85.1	83.1	83.2	81.6	82.2
27	80.9	82.3	78.8	80.5	82.0	81.2	83.6	82.2	85.0	84.4	89.6	87.5	88.9	87.9	90.4	89.0	84.9	87.2	84.0	85.1	82.0	83.2	81.8	82.3
28	80.9	82.2	78.6	80.5	81.7	81.5	83.4	82.2	85.5	84.5	89.6	87.5	88.7	87.9	90.3	89.0	84.6	87.0	83.0	85.1	81.1	83.5	81.0	82.3
29	80.9	82.1	77.6	80.5	81.6	81.6	84.1	82.5	85.3	84.5	90.1	87.5	89.2	87.8	90.1	89.0	84.7	87.0	82.3	85.0	81.0	83.4	82.0	82.1
30	80.9	82.1	---	---	81.5	81.6	83.9	82.5	85.2	84.5	89.6	87.6	89.3	87.8	90.2	89.0	84.8	86.8	82.6	85.0	82.0	83.4	81.0	82.3
31	80.9	82.1	---	---	81.9	81.6	---	---	85.6	84.6	---	---	89.4	87.8	89.6	89.0	---	---	82.3	84.8	---	---	80.4	82.3
Mean.	81.5	82.2	78.8	81.2	79.8	80.6	81.8	81.9	85.1	83.8	88.8	86.1	89.2	87.7	90.5	88.5	87.9	88.1	84.3	85.6	82.4	83.9	80.6	82.3

The initial 2 or 3 of the readings is omitted, i.e. 275.0 degrees absolute is written 75.0.

Year. 84.2 84.4

MINIMUM TEMPERATURE "ON THE GRASS" DURING THE INTERVAL 18h. to 7h. G.M.T.

428. Cahirciveen (Valentia Observatory).

Readings in degrees absolute.

1932.

Month.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Day.	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A
1	81.4	77.6	75.2	74.8	79.8	82.0	83.9	86.7	89.1	81.2	80.4	76.7
2	84.2	75.2	69.4	77.8	75.4	78.5	82.7	78.7	90.4	74.7	83.7	80.2
3	84.8	76.2	72.4	74.7	78.9	78.9	85.8	83.6	85.8	79.7	84.3	77.9
4	83.4	71.9	70.4	76.8	73.8	80.2	85.9	87.6	84.0	73.6	79.4	74.7
5	80.3	77.7	75.3	73.4	75.9	74.1	82.9	87.9	85.1	77.6	74.2	73.2
6	81.9	75.7	75.8	80.4	75.9	76.6	84.1	86.8	83.2	80.6	72.0	77.6
7	77.7	76.0	75.8	76.7	72.2	77.4	82.5	86.7	84.7	83.6	81.3	77.8
8	71.3	78.5	80.5	76.2	72.0	76.8	86.9	87.3	84.7	79.0	73.2	77.0
9	74.0	73.0	76.9	81.2	74.6	84.4	87.9	83.4	86.0	79.2	76.9	76.9
10	78.9	75.3	71.1	78.0	71.9	82.4	86.9	86.6	84.6	75.4	74.1	74.1
11	76.5	71.6	70.1	74.3	82.4	77.1	80.2	88.0	85.7	79.3	82.0	76.3
12	73.6	70.4	70.3	74.7	84.4	79.7	84.6	87.6	85.0	81.3	81.9	76.0
13	78.5	70.2	70.7	77.6	82.9	79.6	85.8	85.8	88.9	79.4	83.3	81.7
14	75.4	69.2	73.1	77.0	81.8	83.4	86.3	84.6	89.1	80.3	80.1	77.6
15	76.4	71.7	74.2	75.9	78.7	84.7	85.3	82.3	87.0	81.7	79.0	75.6
16	83.5	70.5	72.4	75.3	75.8	82.3	85.7	85.7	87.7	83.7	77.3	81.3
17	76.8	71.4	72.1	76.4	75.8	83.6	84.9	88.9	84.2	83.0	79.6	84.1
18	83.8	76.1	72.0	73.8	84.2	83.6	84.2	87.4	84.2	81.9	80.7	84.2
19	82.6	68.4	78.6	75.1	83.5	81.8	86.0	85.6	76.1	77.4	76.3	80.9
20	80.7	69.8	78.4	77.4	84.1	82.4	83.8	86.1	(79.1)	82.8	75.6	78.0
21	77.7	75.7	80.2	76.3	79.7	86.5	82.9	84.8	74.7	77.0	75.8	76.9
22	75.7	75.2	79.1	77.6	82.6	83.6	83.1	87.0	79.3	78.5	79.7	76.4
23	82.1	78.1	75.9	77.9	80.2	82.2	94.7	88.2	75.6	79.1	80.8	80.9
24	80.9	76.7	80.8	77.8	78.7	79.9	86.9	87.2	75.8	81.8	80.2	78.6
25	74.7	74.3	80.8	75.8	78.0	83.1	83.2	84.1	81.9	78.0	83.6	79.8
26	72.3	73.9	74.7	77.4	76.8	86.5	84.4	83.1	78.2	---	81.4	80.3
27	78.1	78.0	78.6	74.3	74.3	86.3	84.3	83.9	79.7	78.2	77.1	76.4
28	79.6	70.2	78.3	77.4	81.3	84.8	84.7	82.2	73.3	78.2	77.6	72.3
29	80.1	70.1	78.4	73.7	80.4	79.8	87.8	85.2	74.6	73.6	81.2	82.1
30	75.8	---	75.4	79.1	77.4	86.3	87.1	84.7	81.9	79.0	75.8	72.6
31	76.2	---	76.9	---	83.3	---	84.1	83.6	---	78.7	---	75.3
Mean.	78.7	73.7										

429. Cahirciveen (Valentia Observatory).

Day	Cloud Forms.			Cloud Amount (All Forms).					Visibility.					Precipitation.					Remarks on the Weather of the Day.				
	7h	13h	18h	7h	9h	13h	15h	18h	21h	7h	9h	13h	15h	18h	21h	7h	9h	13h		15h	18h	21h	
1	St.	St:St-Cu.	St:Nb.	10	10	9	10	10	10	h	h	J	h	h	G	●	●	...	●	d	d <sub>0</sub>	i <sup>0</sup> a and p : d p ● n.	
2	St:Nb.	St.	St.	10	10	10	10	10	10	J	I	h	J	J	h	...	...	...	...	...	...	d <sub>0</sub> d a : id <sub>0</sub> p : id <sub>0</sub> ● n.	
3	St.	St:Nb.	St:St-Cu.	10	10	9	9	10	10	J	J	J	J	J	J	...	...	...	...	...	...	o to bc a : c p : id <sub>0</sub> n.	
4	St.	St:Nb:A-St.	Cu.	10	10	10	9	2	3	J	J	J	k	k	k	...	...	...	...	...	...	id <sub>0</sub> to c a : ● to bc p : bc n.	
5	St:Nb.	St:Nb:St-Cu.	St:St-Cu.	10	10	10	10	9	10	J	I	h	J	k	k	...	...	...	...	...	...	Continuous ● to c a : i ● p and n.	
6	St:Nb.	St:Nb:St-Cu.	St:CuiSt-Cu.	10	10	9	9	4	7	J	J	k	l	l	l	...	...	...	...	...	...	● ● a : vi ● to bc p : p ● n.	
7	Cu:Nb:A-St.	St:St-Cu:A-St.	St:Nb.	10	9	9	8	9	4	k	l	l	l	l	l	...	...	...	...	...	...	i ● p ● a : p ● p and n.	
8	Cu:St-Cu.	Cu:St-Cu.	St:Nb:St-Cu:St-Cu.	3	5	4	7	7	3	l	m	m	l	l	l	...	...	...	...	...	...	p ● to bc a : p ● bc p : i ● to bc n.	
9	St:Nb.	St:Nb	St:Nb:St-Cu.	10	10	10	10	5	7	J	h	k	k	k	k	...	...	...	...	...	...	Continuous ● to c a : ● to p ● p : bc to p ● n.	
10	Cu:St-Cu	Cu:St-Cu:St-Cu:St-Cu:St-Cu:	Cu-Nb:Nb:St-Cu.	3	3	5	6	6	9	l	l	l	l	l	k	...	...	...	...	...	...	p ● to bc a : p ● p ● and n.	
11	Cu-Nb:Cu.	Cu:St-Cu:St-Cu.	Cu:Nb:St-Cu.	5	9	3	6	3	2	l	l	l	l	l	l	...	...	...	...	...	...	p ● p ● to c a : bc p : p ● to bc n.	
12	St-Cu:St-Cu.	St:Nb.	St:Nb.	9	10	10	10	10	10	J	I	h	J	J	J	...	...	...	...	...	...	p ● to c a : continuous ● to d <sub>0</sub> p : i ● ● n.	
13	Cu-Nb:Nb.	Cu-Nb:St-Cu:St-Cu:St-Cu:	Cu-Nb:St-Cu:St-Cu	8	4	6	7	5	4	k	l	l	l	l	l	...	...	...	...	...	...	p ● a : p ● q : p ● to bc n.	
14	St:St-Cu:A-St.	St:Nb:St-Cu.	St:Nb.	10	10	10	10	10	9	k	k	J	I	I	l	...	...	...	...	...	...	p ● q to c a : ● continuous ● p : K p ● n.	
15	Cu-Nb:St-Cu.	St:Nb:A-St	St:Nb.	4	5	10	10	10	10	l	l	I	J	J	h	...	...	...	...	...	...	p ● to bc a : i ● to c p and n.	
16	St.	St:St-Cu.	St:Nb:A-St.	10	10	7	9	10	6	J	I	k	k	I	l	...	...	...	...	...	...	d <sub>0</sub> ● to c a : c to ● p : p ● to bc q n.	
17	Cu:St-Cu.	St:Nb.	St:Nb.	2	10	10	10	9	1	J	h	J	I	J	J	...	...	...	...	...	...	p ● to b to i ● a : i ● p : i ● p ● n.	
18	St.	St:St-Cu.	St:St-Cu.	10	9	10	9	10	10	J	J	J	J	J	J	...	...	...	...	...	...	● to id <sub>0</sub> a : id <sub>0</sub> to c p : oid <sub>0</sub> n.	
19	St:St-Cu.	Cu:St-Cu.	St.	10	9	10	10	10	10	k	k	J	k	h	G	...	...	...	...	...	...	id <sub>0</sub> to c a : id <sub>0</sub> to ● p : continuous d ● to i ● n.	
20	St:St-Cu.	St:CuiSt-Cu:A-Cu.	St.	9	4	6	10	10	10	l	l	l	h	I	I	...	...	...	...	...	...	i ● to b a : bc to continuous d p : oid <sub>0</sub> n.	
21	St:St-Cu.	St:St-Cu.	St:St-Cu.	9	9	10	10	10	10	J	l	I	k	J	J	...	...	...	...	...	...	id <sub>0</sub> to p ● to c a : id to c p : id <sub>0</sub> i ● n.	
22	Cu:St-Cu:A-Cu.	St:CuiSt-Cu.	St:St-Cu.	3	8	7	9	10	10	l	l	k	l	J	J	...	...	...	...	...	...	bc to c a : c to id <sub>0</sub> p : id <sub>0</sub> i ● to c n.	
23	St:St-Cu:A-Cu.	St:St-Cu.	St:St-Cu.	9	9	10	10	10	10	l	l	k	k	J	I	...	...	...	...	...	...	c a : id <sub>0</sub> p : i ● id continuous d n.	
24	St:Nb.	St:Nb.	Cu.	10	9	10	9	5	3	I	k	k	J	l	l	...	...	...	...	...	...	p ● to c a : ● to i ● to bc p : c to bc n.	
25	Cu:St-Cu.	Ci.	Ci.	9	1	1	1	1	2	l	l	m	m	m	m	...	...	...	...	...	...	Fine : vy p.	
26	St-Cu.	St-Cu.	St-Cu.	9	9	9	9	7	8	l	l	l	l	l	l	...	...	...	...	...	...	Cloudy all day.	
27	St:St-Cu.	St-Cu.	St:St-Cu.	10	10	9	9	10	10	k	k	k	k	k	k	...	...	...	...	...	...	Cloudy to overcast all day.	
28	St:St-Cu.	St:St-Cu.	St:St-Cu.	10	9	10	10	10	10	k	k	k	k	k	k	...	...	...	...	...	...	Cloudy all day.	
29	St:St-Cu.	St:St-Cu.	Cu:St-Cu:St-Cu.	10	10	9	9	7	5	l	k	k	l	l	l	...	...	...	...	...	...	c a and p : c to bc n.	
30	St-Cu:A-Cu.	St-Cu.	St-Cu.	6	6	4	4	1	4	k	k	l	l	l	l	...	...	...	...	...	...	bc to c a : bc to b p : bc n.	
31	St-Cu.	St-Cu.	St-Cu.	10	9	9	9	9	9	l	l	l	l	l	l	...	...	...	...	...	...	bc to c a : c p and n.	
Mean Cloud Am't.				8.3	8.3	8.2	8.6	7.7	7.5														

430. Cahirciveen (Valentia Observatory).

Day	Cloud Forms.			Cloud Amount (All Forms).					Visibility.					Precipitation.					Remarks on the Weather of the Day.				
	7h	13h	18h	7h	9h	13h	15h	18h	21h	7h	9h	13h	15h	18h	21h	7h	9h	13h		15h	18h	21h	
1	St-Cu.	St-Cu.	St-Cu.	9	9	9	9	9	7	l	l	l	l	l	l	...	...	...	...	...	...	c a and p : c to bc n.	
2	St-Cu.	St-Cu.	St:St-Cu.	1	2	8	9	9	3	l	l	m	m	l	l	...	...	...	...	...	...	b ● to bc a : c p : c to bc n.	
3	St-Cu.	St:CuiA-Cu:St-Cu.	St:CuiCi.	5	5	6	7	7	3	l	l	l	l	l	l	...	...	...	...	...	...	bc a : bvy to c p : c to b n.	
4	St-Cu.	St:St-Cu.	St:St-Cu.	9	9	9	9	10	1	l	l	l	l	l	k	...	...	...	...	...	...	c a : p ● to c p : i ● n.	
5	St-Cu.	St-Cu.	Fr-Cu:St-Cu:St-Cu:	2	6	9	9	4	9	l	l	l	k	k	k	...	...	...	...	...	...	i ● to bc a : c ● p : c to bc n.	
6	Cu:St-Cu:A-Cu.	St:St-Cu.	St:St-Cu.	8	9	9	9	10	10	k	l	l	k	k	J	...	...	...	...	...	...	bc to c to p ● a : c p : ● ● i ● n.	
7	St:St-Cu.	Nb:St-Cu.	St:St-Cu.	9	9	9	6	7	9	k	k	k	l	l	k	...	...	...	...	...	...	i ● a : i ● to bc p : c n.	
8	St:St-Cu.	St-Cu.	St:St-Cu.	9	2	8	5	10	10	J	k	k	k	k	k	...	...	...	...	...	...	c to b a : bc to c p : c n.	
9	St-Cu.	St-Cu.	St:St-Cu.	4	5	6	9	10	10	l	l	l	l	l	l	...	...	...	...	...	...	c to bc a : bc to c p : c n.	
10	St:St-Cu.	Cu:St-Cu.	Cu.	10	4	6	9	1	1	k	k	l	l	l	l	...	...	...	...	...	...	c to b a : bc to i ● p : b n.	
11	St-Cu.	Cu:St-Cu:St-Cu.	St:St-Cu.	3	4	3	6	8	9	l	l	l	l	k	k	...	...	...	...	...	...	Fair a and p : bc to c n.	
12	St-Cu.	Cu:St-Cu.	St:St-Cu.	8	7	4	3	7	1	l	l	l	l	l	l	...	...	...	...	...	...	c to bc a : bc p : b to c n.	
13	St-Cu.	St-Cu.	St-Cu.	9	4	2	7	6	9	l	l	l	l	l	l	...	...	...	...	...	...	Fair : y p.	
14	St-Cu.	Cu:St-Cu.	Fr-Cu.	3	5	1	1	1	1	l	l	l	l	l	l	...	...	...	...	...	...	Fine : y p.	
15	St-Cu.	St-Cu.	St-Cu.	10	9	4	7	7	1	l	l	l	m	l	l	...	...	...	...	...	...	bc to c a : bc to cvy p : fine n.	
16	St-Cu.	St-Cu.	St-Cu.	9	9	9	10	1	0	l	m	m	m	l	l	...	...	...	...	...	...	b to cv a : cvy to b p : fine n.	
17	St-Cu.	Cu:St-Cu.	St-Cu.	9	10	7	6	5	8	l	l	k	k	k	k	...	...	...	...	...	...	b ● to c a : c to bc p : c n.	
18	St-Cu.	St-Cu.	St-Cu.	10	9	10	9	8	0	k	k	k	k	k	J	...	...	...	...	...	...	c to o a and p : c to b n.	
19	St-Cu:St-Cu.	A-Cu.	---	1	4	1	0	0	0	k	k	k	k	J	J	...	...	...	...	...	...	Fine : early a and n.	
20	St-Cu:St-Cu.	St-Cu.	St-Cu.	1	2	7	0	10	10	J	k	k	J	J	J	...	...	...	...	...	...	b ● to c a : bc to cvy p : fine n.	
21	St-Cu.	Cu:St-Cu.	Cu:St-Cu.	9	4	3	3	7	9	l	l	l	k	J	J	...	...	...	...	...	...	Fair all day.	
22	St-Cu.	St-Cu.	St-Cu.	10	10	10	10	10	10	k	k	k	k	k	k	...	...	...	...	...	...	Cloudy to overcast : y p.	
23	St-Cu.	St-Cu.	St:St-Cu.	9	9	9	9	10	10	k	k	l	l	l	l	...	...	...	...	...	...	Cloudy all day.	
24	Cu:St-Cu:A-Cu.	St:St-Cu.	St:St-Cu.	6	5	7	8	4	4	l	l	l	l	l	l	...	...	...	...	...	...	p ● to bc a : c to bc p : bc n.	
25	Cu:St-Cu.	St:St-Cu.	St:St-Cu.	4	9	9	8	7	3	k	k	k	k	l	l	...	...	...	...	...	...	Fair to cloudy : y p.	
26	St-Cu.	St-Cu.	St:St-Cu.	10	9	10	10	9	10	k	k	k	l	l	l	...	...	...	...	...	...	c to o all day.	
27	St-Cu.	St-Cu.	St-Cu.	10	10	9	10	9	10	k	k	J	J	k	k	...	...	...	...	...	...	c to o : y p.	
28	St-Cu.	Cu:St-Cu.	Fr-Cu.	2	8	9	4	1	0	J	J	k	k	l	l	...	...	...	...	...	...	b ● to c a : c to bc p : by n.	
29	St-Cu.	St:St-Cu.	St:St-Cu.	10	10	9	9	9	9	l	k	k	l	k	k	...	...	...	...	...	...	by to ci ● a : cy p : c n.	
Mean Cloud Am't.				5.95	5.8	7.06	6.9	6.85	6.1														
Day	7h	13h	18h	7h	9h	13h	15h	18h	21h	7h	9h	13h	15h	18h	21h</								

431. Cahirciveen (Valentia Observatory).

March, 1932.

Table for March 1932 at Cahirciveen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

432. Cahirciveen (Valentia Observatory).

April, 1932.

Table for April 1932 at Cahirciveen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

NOTE.—Visibility in these tables refers to a landwards direction; visibility seawards, when it differs from visibility landwards, is given on p 287.

433. Cahirciveen (Valentia Observatory).

Table with columns: Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), Remarks on the Weather of the Day. Rows 1-31 and Mean Cloud Amt.

434. Cahirciveen (Valentia Observatory).

Table with columns: Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), Remarks on the Weather of the Day. Rows 1-30 and Mean Cloud Amt.

NOTE.—Visibility in these tables refers to a landwards direction; visibility seawards, when it differs from visibility landwards, is given on p. 347

435. Cahirciveen (Valentia Observatory).

July, 1932.

Table for July 1932 at Cahirciveen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 show various cloud types like St:Nb:St-Cu and cloud amounts ranging from 8 to 10.

436. Cahirciveen (Valentia Observatory).

August, 1932.

Table for August 1932 at Cahirciveen. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 show various cloud types like St:Cu:St-Cu and cloud amounts ranging from 6 to 10.

NOTE.—Visibility in these tables refers to a landwards direction; visibility seawards, when it differs from visibility landwards, is given on p. 287

437. Cahirciveen (Valentia Observatory).

September, 1932.

Table for station 437, September 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-30 show various cloud types like St., Cu., and Fr. with corresponding amounts and remarks.

438. Cahirciveen (Valentia Observatory).

October, 1932.

Table for station 438, October 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Data rows 1-31 show various cloud types like St., Cu., and Fr. with corresponding amounts and remarks.

NOTE.—Visibility in these tables refers to a landwards direction; visibility seawards, when it differs from visibility landwards, is given on p. 287.

439. Cahirciveen (Valentia Observatory).

November, 1932.

Table for 439. Cahirciveen (Valentia Observatory) for November 1932. Columns include Day, Cloud Forms (7h, 13h, 16h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day.

440. Cahirciveen (Valentia Observatory).

December, 1932.

Table for 440. Cahirciveen (Valentia Observatory) for December 1932. Columns include Day, Cloud Forms (7h, 13h, 16h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day.

NOTE.—Visibility in these tables refers to a landwards direction; visibility seawards, when it differs from visibility landwards, is given on p. 287.





M.O. 360  
(Richmond)

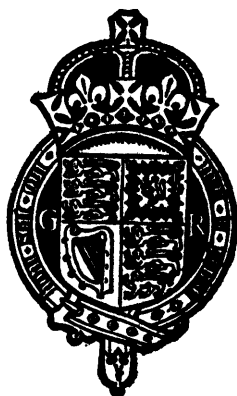
Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

RICHMOND (KEW OBSERVATORY)

Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE

1934

## RICHMOND (KEW OBSERVATORY).

Latitude..	..	..	..	..	..	51° 28' N.
Longitude	..	..	..	..	..	0° 19' W.
G.M.T. of Local Mean Noon	..	..	..	..	..	12h. 1m.

## "Heights in Metres above Sea Level."

Barometer	..	..	..	..	..	10.4
Raingauge Site	..	..	..	..	..	5.5
Dines Tube Anemograph	..	..	..	..	..	28

## "Heights in Metres above Ground"

Thermometer Bulbs	..	..	..	..	..	3.0
Sunshine Recorder	..	..	..	..	..	13.3
Dines Tube Anemograph	..	..	..	..	..	23
Beckley Raingauge Rim	..	..	..	..	..	0.53

## INTRODUCTION.

The Observatory was built in 1769 as the private observatory of King George III. Since 1842 it has been devoted to physics and meteorology. The meteorological records are continuous from 1854. The Observatory is in the Old Deer Park, Richmond (Surrey), about 10 miles (16 km.) to the west of the City of London. The Observatory stands on a low artificial mound whose level is about  $1\frac{1}{2}$  metres higher than that of the surrounding park. Round the Observatory a golf course has been laid out. The river Thames is distant about 300 metres on the north and west. Kew Gardens, which are extensively wooded, lie to the east-north-east, the nearest point of the Gardens being about 600 metres away. The town of Richmond, to the south-east, is about 1,100 metres distant. On the east side of the Park is the main road from Richmond to Kew; on the south side the railway from Richmond to Twickenham. An open area partly wooded, Syon Park, lies to the north-north-east across the river. Richmond Park is about  $1\frac{1}{2}$  miles ( $2\frac{1}{2}$  km.) to the south-east. General views of the Observatory building and the exposure lawn are to be found in the 1928 volume. The photographs were taken in 1925, but the only changes (before the end of 1932) which need be noted are the substitution of other experimental screens for the small marine screens which were being tested in 1925, the removal in 1929 of the hedge near the North Wall Screen and the

erection in place of the Robinson anemometer of the New Dines Anemometer with its vane 5.3 metres above the dome. For the early history of the Observatory reference may be made to papers by S.P. Rigaud\*, R.H. Scott †, C. Chree ‡, R.S. Whipple †† and O.J.R. Howarth ††.

#### METEOROLOGY.

The elements dealt with in the following tables are: atmospheric pressure, temperature, humidity, rainfall, sunshine, solar radiation, wind speed and direction, earth temperature, minimum temperature on the grass, level of underground water; there is also a diary of cloud and weather.

For brief descriptions of most of the instruments from which values of the above elements have been obtained and of the methods of tabulating the records, reference should be made to the General Introduction. The following notes supplement, where necessary, the information contained therein.

#### Notes on Instruments.

"Pressure."—The barograph is mounted in the basement of the Observatory, where the diurnal variation of temperature is very small. The normal position of the instrument has been in the north room occupied by the magnetographs. When the magnetographs were removed and the preparations for the installation of the seismographs were commenced, the barograph was placed in the photographic darkroom (June 16th, 1925). The instrument remained in that position until May 21st, 1928, when it was restored to its original site and electric lighting installed. The barograph magnifies barometric changes in the ratio 1.553:1, i.e., the change of ordinate equivalent to a change of 1 mm. in the height of the barometer is 1.553 mm. "Residual corrections," obtained from the control observations taken daily with the Newman barometer at 9h, 15h and 21h, are applied to the hourly measurements. The same correction is applied to all the readings on the same photographic sheet, i.e., generally for forty-eight hours. The individual entries published for the hours of the control observations may differ by .3mb from those observations. The Newman barometer is compared from time to time with the two large mercury barometers, which were set up in 1855 and 1860 respectively and are still recognised as standards. A zero correction is based on these comparisons. The correction + 0.2 mb. (+ .006 mercury inch) which has been applied for many years, remained in use. Comparisons are made on the assumption that the value of the acceleration due to gravity is  $g = 981.199 \text{ cm./sec}^2$ . This is the value given by pendulum observations.††† The departure from

\* The Observatory 1882, p.279

‡ The Record of the R. Soc., 1897.

† R.Soc.Proc., Vol.39 (1885) pp.37-86 †† Proc. of the Optical Convention, 1926

††† History of the British Association.

††† A comparison between the values of "g" at Cambridge and Kew Observatory was made during the year 1925 by Sir G.P. Lenox-Conyngham with the assistance of Mr. G. Manley. A similar comparison between Potsdam and Cambridge was made by Prof. Meinesz earlier in the year. These observations are in accord with those made at Kew and Potsdam by Putnam in 1900, from which the value stated above was derived. The value for Potsdam,  $g = 981.274$ , based on the observations of Kühnen and Fürtwangler, is adopted as the standard of reference. For the latitude of Kew Observatory,  $51^{\circ} 28'$ , the formula in the General Introduction gives  $g = 981.185$ .

the value given for the latitude by the formula quoted in the General Introduction is insignificant. On occasions when a loss of trace occurred, the missing hourly values were derived from the Dines Float Barograph.\* There were 7 hours in the year for which this was necessary.

"Temperature and Humidity."—The thermograph is mounted in the West Room on the first floor of the Observatory, the thermometer bulbs being exposed in the screen attached to the north wall of the building. This screen has single louvres and the bottom is open. There is an additional flat louvred screen which shields the main screen from direct sunshine when the sun is in the West and not too low. The height of the bottom of the bulbs of the recording thermometers above the bottom of the sides of the screen containing them is 30 cm. in summer, 33 cm. in winter. The height of the bulbs above the top of the artificial mound on which the Observatory stands is approximately 3 metres; the height above the lawn where the rain-gauge is situated is approximately 5 metres. The scale values of the photographic records are not identical for the dry- and wet-bulb curves. For the dry-bulb, tube No. 4 II was in use and the scale value was 1 mm.=0.3336; for the wet-bulb, the old Falmouth wet-bulb tube (no number) was in use and the scale value was 1 mm.=0.290a.

The control thermometers, which were graduated and mounted by Messrs. Negretti & Zambra in 1915, had been made and filled many years before and were therefore well seasoned. The National Physical Laboratory certificates dated 1916 give corrections to the nearest 0.05°C., the largest being 0.10°. The thermometers are tested each January in ice. According to tests made in January, 1932, there was no indication of any change of zero. The water for the wet-bulb thermometers used to be supplied from a small open tank inside the screen and it was customary to fill the tank to overflowing several times each day. In November, 1925, a tank was fitted outside the screen. A tube leads from this tank to two cups from which wicks are taken to the wet-bulbs. A further improvement was made in July, 1926, when a large inverted bottle was set up over the tank. Water flowing from this bottle keeps the level constant in the tank and the cups. The height of the apparatus is adjusted so that water drips slowly from the wet-bulbs. A bottleful of water lasts at least a week. It is found that the bottle survives severe frost.

Control eye-readings of the standard thermometers are taken daily at 9h, 15h and 21h. Residual corrections obtained from the control observations are applied to the hourly measurements of the curves. The same correction is applied to all the readings on the same photographic sheet, i.e., generally for forty-eight hours. The individual entries published for the hours of the control observations may differ by 0.3°A. from these observations. The larger departures refer to occasions when temperature is oscillating or changing rapidly.

In cases of loss of the dry-bulb record owing to the failure of the electric light or any other cause the readings of a thermograph in a second North Wall Screen are adopted. There were 5 hours in the year for which this was necessary.

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\* For descriptions of this instrument see "Observatories' Year Book," 1923 p. 94, and "London, Q. J. R. Meteor. Soc.," 55, 1929, p. 37.

When the wet-bulb trace is missing or defective, the missing values are derived from the dry-bulb trace and the records of a hair hygograph. The same procedure is always adopted when the wet-bulb reading is below 273°A. 410 hours had thus to be dealt with during the year. Humidity was determined from the dry and wet-bulb readings by the procedure described in the General Introduction to this Volume\*.

It may be noted that during 1932, as in previous years, the temperatures published for Kew Observatory in the Daily Weather Report and elsewhere also refer to the North Wall Screen. For the daily and weekly reports the readings of maximum and minimum thermometers exposed in that screen are utilised.

"Rainfall".—As from January, 1921, the standard raingauge for the Observatory has been an 8-inch gauge with the deep "Snowdon" funnel. The site is level and protected from wind, principally by hedges about 1½m. high and distant 11 metres to East and 17 metres to West. The readings of this standard gauge are at 7h and 18h. The hourly readings of the Beckley gauge are adjusted to give totals in agreement with the standard gauge.

"Sunshine".—The sunshine recorder is mounted on the south parapet of the roof. The same frame has been in use since 1880 and it is believed that the ball has not been changed. The ball is now somewhat yellow. The exposure is satisfactory. The greatest elevations of the sky line in the azimuths in which the sun can rise and set are 1° and 3° respectively.

"Solar Radiation".—Observations are made with an Ångström pyrheliometer, which measures the intensity of the direct radiation received from the sun by a surface which is normal to the sun's rays. The observations are made within half an hour of noon on all days except Sundays, provided that the sun is visible and not too much obscured by cloud, fog or thick haze. The conditions of the intervening atmosphere are indicated in Tables 499-510 in the column "sky". The amount of radiation is given in milliwatts per square centimetre in the column headed "total". For conversion to the unit more ordinarily employed abroad, the following relation may be used, lmw. per sq. cm. = 0.01435 gramme-calorie per sq. cm. per minute. The vertical component, i.e., the direct radiation received per square centimetre of a horizontal surface, is also given.

The Ångström instruments in use are by Rose, Stockholm. No. 24 was in use throughout the year. The ammeter is No. 68956, which was certified at the National Physical Laboratory in 1919.† The readings are evaluated according to Ångström's original instructions.†† To bring the readings into accordance with the scale adopted by the Smithsonian Institution, a correction of + 3.5 per cent. would be required.‡

\* Prior to 1926 the tables, based on Glaisher's factors, published in "The Computer's Handbook," M.O. 223, Sec. 1, 1916, were used.

† In view of the discovery by Marten ("Berlin. Ber. Meteor. Inst.," 1928, p. 64) that errors are likely to be caused by temperature changes produced in a microammeter when sunshine falls on it, it may be noted that the instrument used at Kew is always in shadow.

†† Report of the International Meteorological Committee, St. Petersburg, 1899, p. 57.

‡ R. E. Watson, "Geophysical Memoirs", No. 21, 1923.

"Wind Speed and Direction".—A new chapter in the record of the wind opened with the year 1931. From 1869 to the end of 1925 the velocity of the wind was estimated by means of the Robinson-Beckley cup anemograph mounted above the observatory dome. From the beginning of 1926 the Dines anemograph, already in use for some purposes, was adopted for the hourly tabulations. This anemograph, now known as the "old Dines anemograph," had its head at the same height as the Robinson cups. In 1929 the cup-anemograph was dismantled and a new Dines instrument was erected with the vane over the middle of the dome. This vane is three metres higher than that of the old Dines anemograph. There are other differences\* between the two instruments, the new one having larger tubes between the vane and the receiver and having below the head a shield designed to eliminate the effects of any lack of symmetry in the attachment of the tubes to the head. After comparisons lasting a year the new anemograph was brought into regular use on January 1st 1931. The following details refer to the two instruments.

	New.	Old.
Pattern .. ..	Mark II	
Suction holes ..	80 holes in 4 rows of 20. Diameter 2 mm.	80 holes in 4 rows of 20. Diameter 3 mm.
Connecting tubes ..	Length 8 m. Internal diameter 24mm.	Length 17 m. Internal diameter 12 mm.
Height of vane above lawn ..	23 m.	20 m.

There is a continuous belt of trees along the river about 300 metres away and other tall trees at shorter distances, but few of the trees have their summits above the level of the new vane.

As was anticipated, the mean velocity of the wind as recorded by the new anemometer at 23 metres above the ground is in excess of that recorded at 20 metres. The difference is about 9 per cent. Winds from various quarters are however affected differently as may be seen from a table published in the Introduction to the Year Book 1931.

"Earth Temperature."—The two thermometers in use were at 30 cm. and 122 cm. The ground in which the tubes for the thermometers are sunk is under grass. The soil is gravel. The site is well exposed. There are, however, three fruit trees about 9 metres to the east and 6 metres high. The bulb of the lower thermometer is 430 cm. above sea level. In some years the underground water surpasses this level. During 1932 the observations of temperature at 122 cm. were made with a thermometer which was suspended on alternate days in the ordinary iron tube and in a vulcanite tube. A note on the experiment has been published in the Meteorological Magazine (May, 1933)

"Minimum Temperature on the Grass."—The grass minimum thermometer is set at 18h and read at 7h on the succeeding day, the reading being assigned to

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\* The anemometer of the new type is described in the "Geophysical Memoirs" (No. 54, 1932) devoted to the Cardington researches on wind structure.

the day of reading.\* The thermometer is placed with the bulb about 25 mm. above the turf. The exposure is good, there being no obstruction within 76° from the zenith. The thermometer in use was M.O. 23007. This thermometer has a spherical bulb, diameter 17 mm.

Identification Numbers of Instruments in use in 1932.

Control Barometer	.. .. .	Newman 34
Control Dry Bulb Thermometer	.. .. .	Negretti & Zambra 173971
Control Wet Bulb Thermometer	.. .. .	Negretti & Zambra 173969
Control Raingauge (8-inch)	.. .. .	M.O. 1271
Measuring Glass for the Control Raingauge	.. .. .	M.O. 1615 & 1693
Campbell-Stokes Sunshine Recorder	.. .. .	M.O. 12
Dines Tube Anemograph Head	.. .. .	M.O. 1057
Dines Tube Anemograph Recorder	.. .. .	M.O. 1057
Earth Thermometer 1 ft.	.. .. .	M.O. 5
Earth Thermometer 4 ft.	.. .. .	"Swedish" (No number)
Grass Minimum Thermometer	.. .. .	M.O. 23007
(Dry Bulb	.. .. .	4 11
Photo-thermograph (Wet Bulb (Old Falmouth Wet Bulb)	.. .. .	No number
Photo barograph	.. .. .	"

Thermometer Corrections, 1932.

		173971. N.P.L. 1915.				173969. N.P.L. 1915				MO 5 N.P.L. 1913.		MO 23007 N.P.L. 1918	
		°A		°A		°A		°A		°A		°A	
Certified.		255	+0.20	285	-0.10	255	+0.15	285	0.10	260	+0.1	253	-0.1
		260	+ .15	290	- .10	260	+ .15	290	.10	273	.0	263	- .1
		265	+ .10	295	- .05	265	+ .10	295	.05	280	.0	273	.0
		270	+ .05	300	- .10	270	+ .10	300	.05	290	.0	283	.0
		273	- .05	305	- .05	273	.00	305	.05	300	.0	293	.0
		275	- .00	310	- .05	275	.00	310	.05	310	.0	303	.0
		280	- .05	-	-	280	- .05	-	-	-	-	-	-
Applied.	260)					260)						255)	
	270)	+0.1	-	-		270)	+0.1	-	-			268)	-0.1
	270.1)					270.1)				260)		268.1)	
	283.0)	0.0	-	-		283.0)	0.0	-	-	310)	0.0	303 )	0.0
283.1)					283.1)								
310.0)	-0.0	-	-		310.0)	-0.1	-	-					

\* The hour of the readings to be published in the "Observatories' Year Book" was changed from 9h. to 7h. as from January 1st, 1924.

### Notes on Meteorological Tables.

The year was notable for a deficiency of sunshine and for the high temperatures of January and August.

The lowest reading of the "grass minimum" thermometer was  $261.9^{\circ}\text{A}$  ( $12.0^{\circ}\text{F}$ ) on March 13th.

The lowest temperature in the North Wall Screen,  $267.2^{\circ}\text{A}$  ( $21.6^{\circ}\text{A}$ ) was recorded at 4h. on January 1st.

The maximum temperature in the same screen was  $306.8^{\circ}\text{A}$  ( $91.6^{\circ}\text{F}$ ) which occurred between 14h. and 15h. on August 19th.

The rainfall for the year was 8% below the normal. February, August, November and December were well below, while May and October were well above the normal.

The heaviest fall occurred on October 23rd., 30.9mm.

The total sunshine for the year, 1257 hours, was well below the normal, the deficit amounting to 221 hours. This being the lowest total since 1889.

May with 114 hours was the lowest since the records began, in 1880, and November of this year equalled the previous low record of 26 hours recorded in 1888.

The highest wind velocity recorded in a gust was 26 m/s. (57 mi/hr.) on March 30th.

"Diurnal Variation of Pressure and Temperature".— Harmonic Analysis. The first four harmonic components computed for each month are tabulated in Tables A and B.

The inequality is supposed to be given by the expression,  

$$c_1 \sin (15 t^{\circ} + \alpha_1) + c_2 \sin (30 t^{\circ} + \alpha_2) + \dots,$$
 t being the time in hours since midnight. The angles  $\alpha$  are the phases of the several sine-waves at midnight. The curves are tabulated according to Greenwich mean time but the phases in Table A have been reduced to local mean time. The difference in Longitude between Kew and Greenwich being only 19' the correction is hardly appreciable in the figures, which are rounded to the nearest degree.



TABLE A.

Diurnal Variation of Barometric Pressure. Fourier Coefficients.  $\Sigma c \sin (nt + \alpha)$ .  
Richmond (Kew Observatory), Longitude  $0^{\circ} 19' W$ . Local Mean Time.

1932	c1	$\alpha_1$	c2	$\alpha_2$	c3	$\alpha_3$	c4	$\alpha_4$
	mb.	%	mb.	%	mb.	%	mb.	%
January .. .. .	.462	289	.388	148	.173	350	.100	188
February .. .. .	.105	301	.372	146	.117	337	.027	89
March .. .. .	.325	350	.470	148	.081	342	.047	358
April .. .. .	.134	70	.379	145	.009	132	.053	325
May .. .. .	.149	110	.307	145	.073	151	.021	306
June .. .. .	.303	14	.342	144	.108	145	.020	302
July .. .. .	.404	39	.338	146	.065	147	.005	142
August .. .. .	.297	15	.371	139	.075	140	.053	297
September .. .. .	.372	45	.333	143	.022	109	.056	325
October .. .. .	.442	168	.301	162	.103	15	.014	349
November .. .. .	.308	26	.397	160	.121	355	.046	221
December .. .. .	.071	8	.374	146	.166	353	.069	192
Arithmetic Mean .. .. .	.281	—	.364	—	.093	—	.043	—
Year .. .. .	.142	21	.362	147	.040	13	.015	267
Winter .. .. .	.167	215	.381	150	.143	349	.050	189
Equinox .. .. .	.118	66	.369	149	.042	11	.041	337
Summer .. .. .	.250	33	.339	143	.080	145	.022	298

Note:— "Winter" comprises the four months, January, February, November, December,  
"Equinox" the months March, April, September, October, and "Summer" May to August

TABLE B.

Diurnal Variation of Temperature. Fourier Coefficients.  $\Sigma c \sin (nt + \alpha)$ .  
Richmond (Kew Observatory), Longitude  $0^{\circ} 19' W$ . Local Mean Time.

1932	c1	$\alpha_1$	c2	$\alpha_2$	c3	$\alpha_3$	c4	$\alpha_4$
	$^{\circ}A$	$^{\circ}$	$^{\circ}A$	$^{\circ}$	$^{\circ}A$	$^{\circ}$	$^{\circ}A$	$^{\circ}$
January .. .. .	1.270	212	.349	37	.154	220	.022	1
February .. .. .	1.379	205	.467	24	.113	223	.029	223
March .. .. .	2.993	219	.768	43	.111	293	.098	179
April .. .. .	2.469	230	.281	54	.166	34	.075	234
May .. .. .	2.838	229	.158	61	.236	30	.006	82
June .. .. .	3.991	222	.033	118	.323	339	.130	77
July .. .. .	3.210	226	.093	181	.213	207	.045	29
August .. .. .	4.066	223	.385	18	.293	16	.085	107
September .. .. .	2.699	229	.582	70	.172	9	.058	185
October .. .. .	1.790	234	.722	55	.116	283	.152	199
November .. .. .	1.165	221	.387	46	.134	246	.040	120
December .. .. .	1.069	226	.390	49	.194	207	.067	41
Arithmetic Mean .. .. .	2.412	—	.385	—	.185	—	.067	—
Year .. .. .	2.397	224	.357	47	.062	318	.027	145
Winter .. .. .	1.208	215	.392	38	.144	222	.017	63
Equinox .. .. .	2.477	227	.579	55	.097	346	.091	199
Summer .. .. .	3.522	224	.110	40	.149	359	.060	79

Note:— "Winter" comprises the four months, January, February, November, December  
"Equinox" the months March, April, September, October, and "Summer" May to August

"Level of Underground Water".—In Table 527 there is given for each day the mean height above sea level of the surface of the underground water. The level actually measured is the surface of water in a pipe which passes through the floor of the basement into the ground. The water level depends mainly on the state of the river Thames. The Observatory is close to Richmond lock, which is half-tidal, and the underground water is in summer a little below the level of low water above the lock (220 cm. above M.S.L). The effects of the spring and neap tides are conspicuous in the fluctuations of level in summer.

"Cloud Amount."—The mean cloud amounts for the six hours of observation are given month by month in the diary of cloud and weather. The following means are derived from these data:—

"Mean Amount of Cloud from Six Observation Hours."

Month	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Cloud	7.5	7.6	5.7	7.8	8.1	6.7	7.8	6.5	7.0	6.8	8.1	6.6	7.2

"Mean Amount of Cloud for the Year at the Six Observation Hours".

Hour ..	7h	9h	13h	15h	18h	21h
Cloud ..	7.1	7.5	7.9	7.7	6.9	6.1

"Visibility".—The objects used for the classification of visibility are enumerated below. The Observatory is on very low ground. The view is bounded on the south-east by Richmond Hill and on the west by the trees near the river. For object H a church tower seen through trees and with high ground behind it has to be used. There is no conspicuous object at the appropriate distance to serve as I, and interpolation is necessary. The object J is in London and is therefore more affected by atmospheric pollution than the other objects.

LIST OF OBJECTS.

Identification Letter.	Actual Object	View Point	Bearing	Actual Distance	Standard Distance
X	Verification House (Not Visible)	S.W. Corner of Observatory Bldg.	S.W.	25 metres	25 metres
A	Verification House .. ..	"	S.W.	25 "	25 "
B	17ft. Stevenson Screen .. ..	S.E. Corner of Observatory Bldg.	S.W.'S.	50 "	50 "
C	New Magnetic Hut .. ..	S.W. Corner of Observatory Bldg.	S.'W.	110 "	100 "
D	S.W. Tree .. ..	"	S.W.	200 "	200 "
E	Golf Club House .. ..	Observatory .. ..	S.E.'E.	500 "	500 "
F	Orange Tree Hotel .. ..	"	S.E.'E.	970 "	1,000 "
G	St. Matthias Church .. ..	"	S.'E.	1,900 "	2,000 "
H	South Ealing Church .. ..	"	"	4,000 "	4,000 "
i	Mortlake Chimney well visible...	"	N.'W.	3,500 "	7,000 "
J	Chelsea Chimneys not visible ..	"	E.	9,300 "	"
K	Chelsea Chimneys .. ..	"	E.	9,300 "	10,000 "
l	Surrey Hills .. ..	"	S.'E.	20,000 "	20,000 "
l	Surrey Hills well visible .. ..	"	S.'E.	>20,000 "	30,000 "
m	Surrey Hills, exceptionally visible. ....	"	S.'E.	>20,000 "	50,000 "

## ATMOSPHERIC ELECTRICITY.

In Atmospheric Electricity the systematic observations reported in the Year Book are devoted to potential gradient, air-earth current and conductivity. These three elements are observed each afternoon when conditions are favourable. In the case of potential gradient the continuous autographic records are also utilised.

"Potential Gradient, Conductivity and Air-Earth Current". Since 1909 the current flowing from air to earth has been estimated by the method developed by C.T.R. Wilson.\* Until the end of 1930 the observations incorporated in the Year Book were made with an electrometer set up on a tripod. The current received by a small plate mounted on the electrometer was measured, as well as the strength of the electric field over this plate. From these measurements the effective conductivity of the air was deduced and hence the strength of the current in the natural electric field.

It was always realised that this scheme was not entirely satisfactory. The construction of an underground laboratory has facilitated an improvement. The current which is now measured is that flowing into a plate which is flush with the roof of the laboratory and nearly at ground level. The plate is supported from below on a stand which carries a Lindemann electrometer and a variable condenser or "compensator". The cover for the plate is mounted on a long handle which can be manipulated from below. A detailed description of the installation has been published in a Geophysical Memoir† prepared by Mr. F.J. Scrase. The electrometer is calibrated once a month by means of Weston standard cells. Since the beginning of 1932 absolute measurements on fine afternoons at 14h 30m of potential gradient, air-earth current and conductivity have all been made with this apparatus.

The potential gradient,  $F$ , is given in volts per centimetre by the formula.

$$F = 4\pi(9 \times 10^{11}) Cv/A,$$

where  $C$  is the capacity, in farads, of the system (when shielded),  $v$  the voltage acquired by the test plate after being exposed to the field, earthed and then shielded, and  $A$  is the area of the plate. Since the capacity is  $6.00 \times 10^{-11}$  farads and the diameter of the plate is 20.8 cm., the formula reduces to

$$F = 2.00v.$$

The mean strength of the electric field is derived from five observations made at intervals of about 6 minutes.

The air-earth current is given in amperes per square centimetre by the formula

$$i = C\delta v/At = 590 \times 10^{-18} \delta v$$

where  $\delta v$  is the voltage acquired by the plate in  $t$  seconds and  $t = 300$ . For obtaining the mean value of the current four observations, each lasting five minutes, are averaged. The observations of the current are sandwiched between the observations of the field strength and from the two mean values  $i$  and  $F$  the conductivity  $\lambda_+$  is deduced. No observations are made during rain

\* Cambridge Proc. Phil. Soc., 13, 1906, p. 184.

† London Meteor. Off., Geophys. Mem. No.60, 1934.

nor when the potential gradient is negative.

The use of the test plate at ground level introduces a discontinuity in the series of observations. Revised mean values for the period up to 1931 have been published in Mr. Scrase's memoir. In 1932 the mean value of the current for the year, allowing equal weight to each month is  $110 \times 10^{-18}$  amp. cm.<sup>-2</sup> This is somewhat higher than the corresponding values for other years, the mean value for the period 1912 to 1931 being  $98 \times 10^{-11}$  amp. cm.<sup>-2</sup> The mean value of the conductivity for the year is  $37 \times 10^{-18}$  ohm.<sup>-1</sup> cm.<sup>-1</sup> whilst the mean of corresponding values for the period 1912 to 1931 is  $36 \times 10^{-18}$  ohm.<sup>-1</sup> cm.<sup>-1</sup>

"Potential Gradient."—Two changes in the system by which potential gradient is estimated were made in 1932.

The Kelvin electrograph, which has been housed since 1915 in a low building known as the Clinical House provides a record of the electrical potential at a point not far from the wall of the building. By the application of a factor the potential gradient at a specified site is deduced.

Up to Feb. 10th., 1932 the point at which the potential was measured was where the jet from a water dropper broke into spray. On that date a radio-active collector was substituted for the water dropper. The collector is 1.21m from the window and 1.87m above ground level. A collector freshly coated with polonium is now installed every six months. The adoption of the radio-active collector in place of the water dropper eliminates the risk of failure of the apparatus owing to frost.

The second change of practice was in the system adopted for standardization. Previously the absolute observations were made at a site in the Observatory garden, the potential at points one metre and two metres above the ground being determined with the aid of a lighted fuse carried by a long insulated rod and connected to an electrostatic voltmeter.

As from the beginning of 1932 the electrograph has been standardized by means of the observations of the field strength over the test plate of the Wilson apparatus at the underground laboratory. Experiments have shewn that the potential gradient found in this way is, to a very close approximation, equal to that found by measuring the potential at a height of one metre in the open part of the grounds.

Owing to this change of practice there is a discontinuity in the published record of potential gradient. Amended values of the monthly and annual means of potential gradient for earlier years have been published in Mr. Scrase's memoir. The amended figures represent more closely the potential gradient in the open. The correction to be applied is 12 per cent.

The control observations are now taken at 14h. 30m. From the observations the factor is derived by which the potential gradient recorded by the electrograph must be multiplied to obtain the potential gradient in the open.

The mean factor for the period from Feb. 10th., when the radio-active collector was introduced, to the end of the year was 2.68. The equivalent height of the collector of the electrograph may be estimated by dividing one metre by this factor, i.e., the collector was on the average at the same potential as a point 37.3 cm. above ground in the paddock.

On the few occasions when the electrograph in the Clinical House was out of action the values of potential gradient were derived from a subsidiary electrograph in the New Magnetic Hut.

The data appearing in Table 541 include the electrical character figure assigned to each day from the consideration of the electrograms. Of the character figures, 0 denotes the absence of negative potential, 1 implies the existence of negative potential at one or more times during the day but with a total duration of less than 3 hours, while 2 implies the existence of negative potential with a total duration of 3 hours or more. As a negative potential gradient hardly ever occurs except when rain is in the neighbourhood, character 0 occurs on dry days and character 2 on days with continuous rainfall. The present criteria for character figures were adopted as from the beginning of 1914. Correcting for missing days, the average frequency of character figures 0, 1, and 2 during the years 1914-1931 inclusive were 186: 138: 41. The corresponding figures for 1932 are 195: 132: 39.

In accordance with a resolution of the International Union for Geodesy and Geophysics (Section for Terrestrial Magnetism and Atmospheric Electricity: Prague Meeting 1927) tabulations of the duration of negative potential gradient have been included in the Year Book since 1928. The total duration of negative gradient is given for each day for which the electrographic record is satisfactory.

Table 542 contains daily data derived from measurements of the electrograms. They represent means for the 60-minute intervals ending at 3h, 9h, 15h and 21h G.M.T. respectively. On occasions when the trace was defective, either through failure of insulation or some other cause, values of potential gradient have been omitted. The electrograph is intended to record the potential gradient of fine weather and the limits are approximately -1500 and +2000 volts per metre. In showers and thunderstorms gradients of 10000 volts per metre or more may occur. These are, of course, beyond the range of the instrument. Even when the curve does not go beyond the limits of the chart the changes may be so rapid that no satisfactory estimate is possible of the mean value of the ordinate. All such occurrences are indicated by the letter z. If there is no doubt as to the sign of the hourly mean value, though a numerical measure is unobtainable, the sign is indicated by a + or a - attached to the z. The symbol  $z \pm$  indicates that there were oscillations on both sides of the zero line, and that the sign of the mean value was uncertain.

The extreme hourly values in Table 542 are 1805 v/m at 9h on Feb. 7th and -1285 at 21h on April 16th. The former value is representative of foggy conditions; on this occasion fog developed after 21h on the 6th after a fine evening and continued until about 14h on the 7th, the potential gradient exceeding 1000 v/m from 5h to 13h on the 7th. The extreme negative gradient was associated with light rain and mist. The gradient was negative from 17h on the 16th until 1h on the 17th., and was highly negative from 20h until 24h.

At the foot of each section of Table 542 there are two sets of mean values. These are obtained according to different rules. The (a) mean is the arithmetic mean of all the positive potential gradients in the column. The (b) mean is the algebraic mean of all the entries which remain in the column after those have been eliminated which refer to days in which at least one of the four hourly values is indeterminate. The last line gives the mean value for each month as derived from the (a) and (b) means for the four hours.

The diurnal inequalities and the mean monthly and annual values in Table 543 are based on the curves of certain quiet days selected from those entirely free from negative potential gradient. Other objects aimed at in the selection of the days are freedom from large irregular movements, absence of indications of inferior insulation in the electrograph and the avoidance, so far as possible, of large non-cyclic changes. With one exception the quiet days numbered 10 in each month; but to complete that number in October it was necessary to include four 24-hour periods which did not commence at midnight. In April nine quiet days only were obtainable, three of which were composite days. Except in this case the non-cyclic change is given explicitly in Table 543, so that anyone who may desire to reproduce the figures as they were before the non-cyclic correction was applied can easily do so.

All the inequalities shew a well marked double oscillation with minima in the early morning and early afternoon, maxima in the late morning as well as in the evening. The diurnal inequalities for the whole year shew the higher maximum at 2h., the lower minimum at 4h. This is not the case in every year. The following list gives the annual mean potential gradient for selected quiet days together with the hours of the extremes and the range of the inequality for each year from 1910. The correction of 12 per cent has been applied to the means and ranges of all years from 1910 to 1931.

KEW OBSERVATORY POTENTIAL GRADIENT (REFERRED TO PADDOCK) 1910-1932.

Year	Mean v/m	Range v/m	Max. hr.	Min. hr.	Year	Mean v/m	Range v/m	Max. hr.	Min. hr.	Year	Mean v/m	Range v/m	Max. hr.	Min. hr.
1910	347	155	20	4	1918	388	156	20	2	1926	313	132	20	4
1911	337	172	9	4	1919	371	139	8	4	1927	353	144	19	3
1912	336	167	9	4	1920	353	137	9	3	1928	334	139	9	3
1913	375	179	19	3,4	1921	315	148	20	3,4	1929	379	153	9	4
1914	386	189	20	3	1922	356	161	20	4	1930	373	183	9	3
1915	397	194	19	5	1923	356	179	9	4	1931	379	171	20	4
1916	411	169	20	4	1924	368	149	20	4	1932	391	173	21	4
1917	397	172	20	4	1925	365	144	19	3					

### ATMOSPHERIC POLLUTION.

The Owens atmospheric pollution recorder or air filter No. 1\* is situated in the Clinical House, and the level of the intake is about 1½m. above that of the adjacent ground. The weight of the pollution is not obtained directly but is deduced from shade numbers 0, 1, 2, etc., assigned to the deposit left on the filter paper through which the air is drawn. The equivalents of the shade numbers are allotted in accordance with the results of an invest-

\* A description of the instrument is given in the "Report of the Advisory Committee for Atmospheric Pollution", 4th Report, 1917-1918, p. 20.

igation carried out for the Atmospheric Pollution Committee by Mr. J.G. Clark† When the normal volume of air, 2 litres, is aspirated (it is drawn through a hole 3.2 mm. in diameter) shade number 1 answers to 0.32 milligrams per cubic metre. The Owens apparatus was designed in the first place for dealing with the air of cities, and the amount of pollution at the Observatory is usually so small that the shade recorded when the 2 litres are aspirated is either 0 or 1.

Preliminary experiments with a spare recorder having justified the assumption that increasing the volume of air would increase the shade number in proportion, an auxiliary tank was brought into use at the beginning of July, 1928. With this tank in operation each spot on the filter paper corresponds with 6.4 litres of air. The unit shade is therefore equivalent to  $0.1 \text{ mg/m}^3$ . When fog prevails the auxiliary tank is put out of action and the unit shade reverts to the value  $0.32 \text{ mg/m}^3$ .

Special attention is now paid to the maintenance of consistency in the standard of shades. Each new scale of shades is compared directly with the standard preserved by Dr. Owens. New scales of shades were taken into use on the following dates:-

June 7, 1925; July 1, 1926; (retrospectively) January 1, 1928; August 1, 1930; January 1, 1931; and June 1, 1931.

During 1932 the highest estimate of pollution was  $3.5 \text{ mg/m}^3$ , this value occurring on March 14th from 10h to 11h. There were 39 days on which the pollution reached  $1.0 \text{ mg/m}^3$ ; the number of hours credited with  $1.0 \text{ mg/m}^3$  or more being 209. The months in which these days and hours occurred are given in the accompanying table.

	days	hours
Jan.	10	47
Feb.	8	47
Mar.	9	51
Oct.	2	5
Nov.	6	37
Dec.	4	22
Year	39	209

Table 544 gives for each month mean hourly values derived from all the days for which complete records were obtained. There were 357 such days in the year. The highest and lowest of these hourly values are in heavy type.

Table 545 gives diurnal inequalities derived from the data in Table 544 after the application of non-cyclic corrections. The principal reason for computing the diurnal inequalities was to facilitate comparison with the corresponding diurnal variations in barometric pressure and in the potential gradient of atmospheric electricity.

The mean values computed for recent years are given in the following table, together with the means for successive pairs of months. The unit is  $1 \text{ mg/m}^3$ .

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†"Report of the Advisory Committee for Atmospheric Pollution," 3rd Report, 1916-1917, p. 20

	1926	1927	1928	1929	1930	1931	1932
Jan.-Feb. ..	.29	.25	.22	.40	.18	.24	.32
Mar.-Apr. ..	.30	.10	.18	.27	.13	.15	.26
May-June ..	.08	.07	.09	.05	.05	.06	.09
July-Aug. ..	.07	.05	.05	.06	.07	.07	.05
Sept.-Oct. ..	.19	.17	.15	.10	.13	.25	.15
Nov.-Dec. ..	.26	.21	.25	.21	.29	.33	.29
Year	.20	.14	.15	.18	.14	.18	.19

The nature of the diurnal variation is most easily recognised in Table 545. There is always a well defined minimum during the night and another in the early afternoon. The first maximum of the day usually occurs about 9h and the second one follows about 12 hours later. This double oscillation is apparently due to two causes, the variation in human activity in producing pollution and the variation in the wind which disperses it. In 1932 the principal maximum was in the evening from February to May and from October to December; in the forenoon in the remaining months. The principal minimum occurred in the afternoon from May to August; in the early morning in the remaining months. Curves illustrating the diurnal variation of atmospheric pollution will be found in the Annual Reports of the Advisory Committee on Atmospheric Pollution and in a paper by Dr. Whipple on the relation between Atmospheric Pollution and Potential Gradient.†

#### SEISMOLOGY.

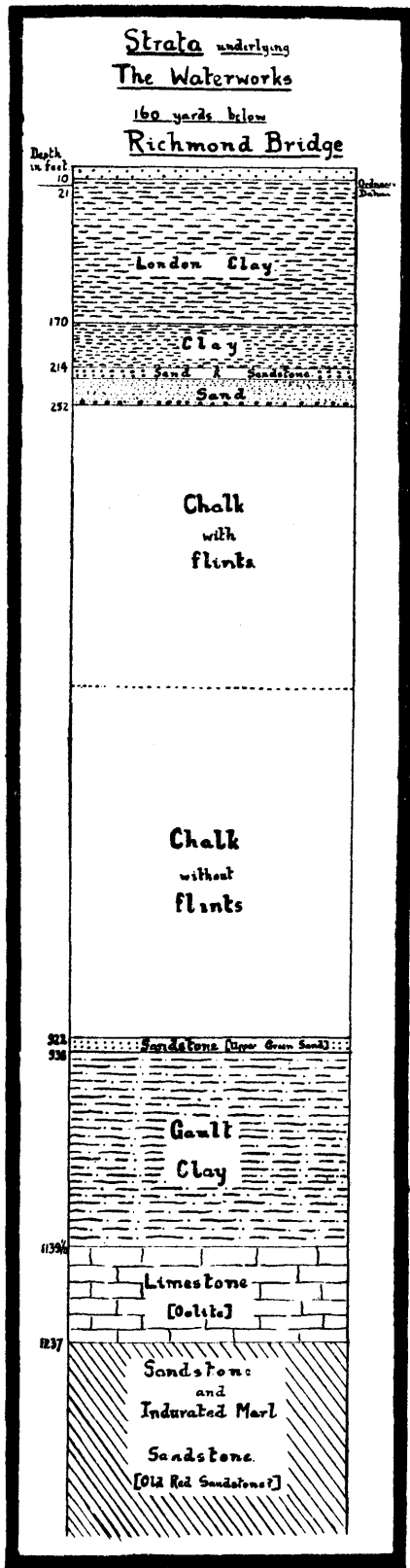
**Notes on Instruments.**—The seismographs, three Galitzin pendulums with galvanometric registration, were transferred from Eskdalemuir Observatory during the latter part of 1925 and have been in regular operation since the beginning of 1926. Earth movements in the north, east and vertical directions are recorded. The pendulums, which are in the old magnetograph room, are mounted on a massive concrete pillar, separated from the floor. The galvanometers and recording apparatus are accommodated on slate slabs in the old seismograph room, which housed the Milne instrument until it was put out of action on June 17th, 1925. To eliminate temperature variation as far as possible, the windows of the pendulum room are provided with triple glass and also shielded by louvered screens from direct sunshine which might fall on them morning and evening. The annual range of temperature variation is about 10°C. and the mean daily range about 0.2°C. To diminish the sensitivity of the vertical pendulum to temperature changes the steel controlling spring was replaced in May, 1928, by one made of elinvar, an alloy which has a temperature coefficient of elasticity about one-tenth that of steel\*. A detailed report on the behaviour of the spring has been published in a paper† by F.J. Scrase. The difficulties usually associated with the operation of the vertical pendulum have been greatly diminished.

† London, Roy. Met. Soc., Q.J., Vol. 55 (1929) No. 231.

\* Y. Dammann. "Contribution à l'étude des propriétés élastiques de l'élinvar. Son utilisation dans les séismographes," "Publ. Bur.Cent.Seis. Int., Strasbourg," Ser. A, Fasc. No. 5, 1927, pp. 122-129.

† "London, Inst. Physics, J. Sci. Instr.," 6, 1929, p. 385.





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The concrete pillar rests on gravel. The underlying geological strata are shown in the diagram on this page. The diagram is based on the results obtained\* in sinking a well near Richmond Bridge. The Richmond boring terminated at a depth of 440 metres in Old Red Sandstone. At Stonebridge Park, 8 km. to the north, a boring was carried down† to a depth of 600 metres, the last 280 metres being in Old Red Sandstone. There is no information as to deeper strata near Richmond. It may be noted, however, that the sandstone beds dip at about 30° and that a boring at Little Missenden, Bucks, entered Silurian rocks at a depth of 370 metres with no evidence of the presence of Old Red Sandstone.

For detailed description of the Galitzin seismograph and for particulars of interpretation of the records, reference may be made to Fürst B Galitzin's "Vorlesungen über Seismometrie" (Leipzig, 1914), or to G.W. Walker's "Modern Seismology" (London, 1913). ††

Timing is controlled by a half-seconds clock (Morrison 8587) which is rated daily by comparison with the Greenwich wireless time-signal relayed from Daventry. Time breaks are made electro-magnetically every minute and seismometric readings can be determined to the nearest second.

The free periods of the Galvanometers ( $T_1$ ), were determined in November, 1925, and were found to have suffered very little change since the original determinations at Eskdalemuir were made. The lengths of the simple equivalent pendulums(1) are assumed to have remained unaltered.

The values of the other constants which are used for deriving the scale values were re-determined in September 1932. In the case of the horizontal instruments it was found that the magnifications agreed closely with those obtained from the previous tests in October 1931. Some adjustments to the vertical pendulum were carried out on September 7th.

The table given below summarises the values of the constants.  $T$  is the free period of the pendulum,  $\mu$  is a damping coefficient which van-

\* "London. J. Geol. Soc"., 40, 1884, 41, 1885, p.523.

† Records of London Wells, "Mem. Geol. Surv. Eng., London", 1913.

†† The graphical method adopted at Kew for determining the constants of the pendulums is explained in a memoir by F. J. Scrase, "Geophysical Memoirs",

ishes when the free movement of the pendulum is just aperiodic,  $A$  is the length of the beam of light from the galvanometer mirror to the recording drum (usually about 1100 mm), and  $k$  is the "transmission" factor. The fac-

tor  $\frac{kAT}{4\pi l}$  determines the magnification for regular earth movements with a period equal to that of the pendulum.

Component	$l$	$T$	1932	$T$	$\mu^2$	$\frac{kA}{\pi l}$	$\frac{kAT}{4\pi l}$
	mm.	sec.		sec.		sec. <sup>-1</sup>	
N	118	24.68	Jan. 1 to Sept. 6	25.0	+0.01	46.2	289
			Sept. 6 to Dec. 31	25.1	0.00	47.2	296
E	118	24.80	Jan. 1 to Sept. 5	24.9	+0.02	44.0	274
			Sept. 5 to Dec. 31	25.1	+0.01	43.4	272
Z	360	13.04	Jan. 1 to Sept. 7	12.6	+0.02	114	359
			Sept. 7 to Dec. 31	12.8	+0.07	109	349

In windy weather the seismographs, especially the horizontal components, are affected by slow oscillations, which are attributed to the tilting of the ground, the movement being conveyed through the foundations of the Observatory. On occasions the reading of an earthquake record is rendered very difficult, if not impossible, by these irregular disturbances.

**Notes on Tables.**—The "Seismological Diary", Table 546, contains the particulars of the earthquakes recorded at the Observatory. The notation employed is as follows:—

P is the normal first phase (longitudinal waves). Special cases of P occur when the waves are reflected from ( $P_cP$ ) or penetrate ( $P'$ ) the earth's central core.

$PR_1, PR_2 \dots$  are longitudinal waves reflected once, twice . . . near the earth's surface.

S is the normal second phase (transverse waves).  $S_cP_cS$  is a special case of S in which the waves penetrate the central core and pass through it as longitudinal vibrations.

PS and PPS are waves which suffer a change or changes from longitudinal to transverse oscillation or vice versa, on reflection near the surface.

$SR_1, SR_2 \dots$  are transverse waves reflected once, twice . . . near the surface.

For the supplementary reflected waves from deep focus earthquakes the notation used is that introduced by F.J. Scrase. London, Proc. Roy. Soc., A. 132 (1931).

L indicates long waves (surface waves).

i is the sudden commencement of a phase. e means a gradual or indistinct commencement. These letters are used as prefixes to the phase symbols, but where the character of the phase is not assignable the letters are used as independent symbols. When the commencement of a phase is moderately clear the prefixes are not used.

The suffixes N, E, Z indicate that the estimates refer to the records from the north-south, east-west and vertical seismographs respectively. The absence of all these suffixes indicates that the estimates refer to all three records.

All times entered against the above phases are the times of arrival of the phases at the station.  $m_1, m_2 \dots$  are successive prominent maxima of sinusoidal waves occurring in the preliminary phases.  $M_1, M_2 \dots$  are successive prominent maxima occurring during the principal or surface phase.

The period is the duration of a double oscillation (to and fro movement).

$A_N, A_E, A_Z$  are the amplitudes, in microns ( $=0.001$  mm.), of the components of the true displacement of the ground from the position of rest. Displacements to the north, east and upwards are regarded as being positive. When successive positive and negative displacements have the same magnitude the time of occurrence is given for the positive one. When no sign is given the measurement refers to a long group of waves the amplitudes of which are the same.

The following formulae, due to Galitzin, are employed for computing the times of the maxima and the amplitudes of sinusoidal waves:—

(1) Lag of the displacement shown by the galvanometer after the maximum displacement of the ground

$$\tau + \tau_1 = \frac{T_p}{2\pi} \left[ \tan^{-1} \frac{2u(1-\mu^2)^{\frac{1}{2}}}{u^2-1} + \tan^{-1} \frac{2u_1}{u_1^2-1} + \frac{\pi}{2} \right]$$

each inverse tangent being taken as between 0 and  $\pi$

(2) Magnification of record=

$$\frac{kA T_p}{\pi \ell} \cdot \frac{1}{(1+u^2)(1+u_1^2) \{1-\mu^2 f(u)\}^{\frac{1}{2}}}$$

where  $T_p$  is the period of the earth wave considered,

$$u = \frac{T_p}{T}, \quad u_1 = \frac{T_p}{T_1}, \quad \text{and } f(u) = \left[ \frac{2u}{1+u^2} \right]^2.$$

$\Delta$  is the distance in kilometres of the epicentre measured along the arc of a great circle. For earthquakes located within 10,000 km. of Kew the distance is generally derived from the interval between P. and S. by the tables, due to Zeissig, given in Klotz's "Seismological Tables" (Publication of the Dominion Observatory, Ottawa, Vol. III, No. 2). For greater distances other phases are considered and  $\Delta$  is obtained from the travel curves given by Gutenberg.\* The azimuth of the epicentre ( $0^\circ$  to  $360^\circ$ ) is measured from north through east. When an estimation of the azimuth is possible, it is used, together with  $\Delta$ , for provisional determination of the co-ordinates of the epicentre. The co-ordinates given in the Diary have generally been received at a later date; the authorities for these determinations are inserted in brackets. Here the letters J.S.A. signify the Jesuit Seismological Association of America, and U.S.C.G.S., the United States Coast and Geodetic Survey.

Brackets enclosing figures or phase symbols indicate that the information is uncertain.

The total number of shocks recorded during the year was 246. The phases being sufficiently well defined, estimates of the epicentral distances were obtained for 57 shocks, whilst in 8 cases the records of the initial impulses were sufficiently sharp to allow of computations of azimuth and so of estimates of the co-ordinates of the epicentres. There were 8 earthquakes which produced a disturbance at the observatory with an amplitude exceeding 0.1 mm. in a horizontal component. These earthquakes originated in Celebes (May 14th.), in the Pacific Ocean south of Fiji (May 26th), in Mexico (June 3rd. and 18th), in Greece (September 26th and 29th), in Nevada (December 21st.) and in China (December 25h).

For comparison the statistics for all the years in which the Galitzin seismographs have been in operation at Kew Observatory are given:—

YEAR	Shocks recorded.	Epicentral distances.	Azimuths. estimated	Shocks exceeding 0.1 mm.
1926	306	55	—	10
1927	314	76	6	9
1928	339	97	19	18
1929	320	74	6	12
1930	301	56	6	8
1931	274	53	11	16
1932	246	57	8	8

\* Handbuch der Geophysik, Berlin, 1929, p. 212.

"Microseisms".—In Table 547 are given the amplitude (A) and period ( $T_p$ ) of the microseisms shown by the north component seismograph on each day at 0h, 6h, 12h, and 18h. On a few occasions (less than 2 per cent. of the total number) when the north component record was not available measurements of the east component record have been included. The group of waves of greatest amplitude occurring in the 30 minutes centring at the hour in question is selected, and the amplitude tabulated is the mean obtained from the three largest complete waves in that group. The period is derived from a measurement made on the same group\*. The total time, to the nearest second, for a number of complete consecutive waves is measured, the number of waves being chosen so that the time is between 23 and 30 seconds. The period is then derived from the following division table:—

Number of Waves	Time interval in seconds.							
	30	29	28	27	26	25	24	23
3	10	9.7	9.3	9.0	8.7	8.3	8.0	7.7
4	7.5	7.3	7.0	6.7	6.5	6.3		
5	6	5.8	5.6	5.4	5.2			
6	5	4.8	4.7	4.5				
7	4.3	4.1	4.0	3.9				
8	3.7	3.6	3.5					
9	3.3	3.2	3.1					
10	3.0	2.9	2.8					
11	2.7	2.6						
12	2.5							

In computing the mean period occasions of zero amplitude are omitted. The mean values of amplitude and period for each month of 1932 and for the year, together with the corresponding mean values for the period 1926 to 1932, are given below:—

MICROSEISMS—MONTHLY AND ANNUAL MEANS.

1926 to 1931	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Amplitude ( $\mu$ ) .. ..	2.3	1.8	1.4	0.9	0.5	0.5	0.4	0.6	0.7	1.1	1.9	2.1	1.2
Period (sec.) .. ..	6.5	6.2	5.8	5.4	4.8	4.6	4.3	4.4	5.0	5.4	6.0	6.4	5.4
1932													
Amplitude ( $\mu$ ) .. ..	2.3	0.5	1.4	1.2	0.3	0.1	0.2	0.0	0.8	1.0	1.3	2.0	0.9
Period (sec.) .. ..	6.5	5.9	5.9	6.0	4.7	5.0	4.6	5.4	5.1	5.4	6.1	6.5	5.6

The means for the several hours are as follows:—

MICROSEISMS—MEANS AT SPECIFIED HOURS.

1926 to 1931	0h.	6h.	12h.	18h.
Amplitude ( $\mu$ ) .. ..		1.20	1.19	1.15
Period (sec.) .. ..		5.41	5.41	5.37
1932				
Amplitude ( $\mu$ ) .. ..		0.94	0.95	0.94
Period (sec.) .. ..		5.55	5.64	5.59

These figures indicate that there is no regular diurnal variation in amplitude or period of the microseisms recorded at Kew Observatory.†

\* F.J.W. Whipple and F.J. Scrase, "On the Frequency of Microseisms of Different Periods at Eskdalemuir and at Kew," "London, Mon. Not. R.Astr.Soc.Geophys. Supp." 2, No. 2, 1928.

† F.J.W. Whipple and A.W. Lee, "Studies in Microseisms," "London, Mon. Not. R. Astr. Soc. Geophys. Supp." 2, No. 7, 1931.

Readings in millibars at exact hours, Greenwich Mean Time.

441. Richmond (Kew Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 10.4 metres.

January, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31). Columns 1-12 are labeled 'Station Level' and columns 13-24 are labeled 'Sea Level'. Each cell contains a numerical value representing barometric pressure in millibars.

442. Richmond (Kew Observatory): H<sub>b</sub> = 10.4 metres.

February, 1932.

Table with 25 columns (1-24, Mean) and 29 rows (Day 1-29). Columns 1-12 are labeled 'Station Level' and columns 13-24 are labeled 'Sea Level'. Each cell contains a numerical value representing barometric pressure in millibars.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time. (height of barometer cistern above M.S.L.) = 10.4 metres.

March, 1932.

443. Richmond (Kew Observatory): H<sub>b</sub>

Table with 26 columns (1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Mean (Sea Level)' rows. Data values are in millibars.

444. Richmond (Kew Observatory): H<sub>b</sub> = 10.4 metres.

April, 1932.

Table with 26 columns (1-24, Mean) and 30 rows (Day 1-30). Includes 'Station Level' and 'Mean (Sea Level)' rows. Data values are in millibars.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

445. Richmond (Kew Observatory):  $H_b$  (height of barometer cistern above M.S.L.) = 10.4 metres.

May, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31). Columns 1-12 are labeled 'Station Level' and columns 13-24 are labeled 'Sea Level'. Data is presented in millibars (mb.) format.

446. Richmond (Kew Observatory):  $H_b$  = 10.4 metres.

June, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31). Columns 1-12 are labeled 'Station Level' and columns 13-24 are labeled 'Sea Level'. Data is presented in millibars (mb.) format.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.

447. Richmond (New Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 10.4 metres.

July, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly readings in millibars. Column 25 is the Mean. Rows 1-10 are labeled 'Station Level' and rows 11-31 are labeled 'Sea Level'. Includes mean values for both levels.

448. Richmond (Kew Observatory): H<sub>b</sub> = 10.4 metres.

August, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly readings in millibars. Column 25 is the Mean. Rows 1-10 are labeled 'Station Level' and rows 11-31 are labeled 'Sea Level'. Includes mean values for both levels.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.



449. Richmond (Kew Observatory): H<sub>b</sub> (height of barometer cistern above M.S.L.) = 10.4 metres.

September, 1932.

Table with 25 columns (Hour G. M. T., 1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' indicator and monthly means for 1912 and 1913.

450. Richmond (Kew Observatory): H<sub>b</sub> = 10.4 metres.

October, 1932.

Table with 25 columns (Day, 1-24, Mean) and 31 rows (Day 1-31). Includes 'Station Level' indicator and monthly means for 1905 and 1906.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

Readings in millibars at exact hours, Greenwich Mean Time.  
(height of barometer cistern above M.S.L.) = 10.4 metres.

451. Richmond (Kew Observatory):  $H_b$

November, 1932.

Table with 25 columns (1-24 for hours, 25 for Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea Level' mean values.

452. Richmond (Kew Observatory):  $H_b$  = 10.4 metres.

December, 1932.

Table with 25 columns (1-24 for hours, 25 for Mean) and 31 rows (Day 1-31). Includes 'Station Level' and 'Sea Level' mean values.

NOTE.- When pressure exceeds 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 mb. is written 005.6. This rule does not, however, apply to monthly means.

ANNUAL MEANS FROM HOURLY VALUES.

From readings in millibars at exact hours, Greenwich Mean Time.

453. Richmond (Kew Observatory): H<sub>0</sub> = 10.4 metres.

1932.

Table with 25 columns (Hour G.M.T., 1-24, Mean) and 3 rows (Station Level, Sea Level). Data includes hourly pressure readings in millibars.

PRESSURE AT STATION LEVEL: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change

454. Richmond (Kew Observatory): H<sub>0</sub> = 10.4 metres.

1932.

Table with 25 columns (Month, Mean, Hour 1-24) and 12 rows (Jan to Dec, Year). Shows monthly means and diurnal inequalities.

↑ see page

ABSOLUTE EXTREMES OF PRESSURE AT STATION LEVEL FOR EACH DAY.

Maximum and Minimum for the interval 0h. to 24h., Greenwich Mean Time.

455. Richmond (Kew Observatory): H<sub>0</sub> = 10.4 metres.

1932.

Large table with 25 columns (Month, Day, Max., Min.) and 31 rows (Days 1-31, Mean, Year). Shows absolute extremes of pressure for each day.

Note.- When pressure 1000 mb. the leading figure 1 is not printed, i.e., 1005.6 is written 005.6 is written 005.6. This rule does not, however, apply to monthly means.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

456. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulb above the ground) = 3.0 metres.

January, 1932.

Table with 25 columns (Hour G. M. T., 1-24, Mean) and 31 rows (Day 1-31). Contains temperature readings in degrees absolute for Richmond (Kew Observatory) in January 1932.

457. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

February, 1932.

Table with 25 columns (Day, Hour G. M. T., 1-24, Mean) and 29 rows (Day 1-29). Contains temperature readings in degrees absolute for Richmond (Kew Observatory) in February 1932.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

458. Richmond (Kew Observatory): North Wall Screen:  $h_t$  (height of thermometer bulb above the ground) = 3.0 metres.

March, 1932.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	
Day.	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	
1	74.7	74.4	74.6	74.5	74.6	74.7	74.4	74.6	75.2	75.4	77.1	77.9	77.9	78.2	77.9	77.2	76.8	76.6	76.0	75.7	75.3	74.9	74.0	73.7	73.8	
2	75.7	75.3	72.8	73.0	72.0	72.0	71.5	71.8	72.7	74.0	75.2	78.0	80.2	81.0	80.9	80.4	79.5	78.2	76.9	75.9	75.3	75.3	74.8	74.3	75.5	
3	73.4	72.9	72.8	72.8	72.6	72.5	72.4	72.7	74.0	74.9	76.7	78.5	79.9	80.5	80.8	80.5	79.7	78.8	77.5	76.8	76.1	75.5	74.8	73.8	75.9	
4	73.6	73.9	74.4	75.0	74.9	75.6	75.9	75.8	76.5	77.1	77.5	77.9	78.0	78.5	79.3	78.5	78.5	78.0	77.9	77.8	77.5	77.3	77.0	77.0	76.6	76.7
5	76.5	75.8	74.0	73.0	72.8	73.0	73.4	73.7	74.6	76.2	77.2	78.2	79.5	80.3	80.2	80.1	79.9	79.4	78.5	78.3	78.1	78.0	78.2	77.9	76.9	
6	77.6	77.9	77.1	76.0	75.4	7.7	74.2	74.8	76.7	78.2	79.5	80.4	81.3	81.0	81.1	81.6	80.8	79.5	78.3	78.0	77.6	77.8	77.3	76.4	78.1	
7	76.6	76.4	75.3	74.9	74.3	73.5	73.4	74.5	76.9	79.0	80.1	81.2	81.7	82.5	81.9	81.8	79.9	79.8	79.7	79.3	79.8	80.6	80.8	80.9	78.4	
8	81.2	81.2	81.1	81.1	81.0	81.2	81.3	78.4	78.0	78.2	78.6	78.7	79.0	79.2	79.1	79.0	77.8	77.6	77.3	77.1	77.0	76.8	76.6	76.2	79.0	
9	75.5	74.6	74.5	74.2	73.7	73.2	73.3	74.0	75.2	75.8	78.2	78.5	78.9	80.0	79.2	79.0	78.6	78.3	76.8	76.1	75.1	74.5	74.0	73.6	76.1	
10	73.0	71.9	72.0	70.1	69.7	69.9	70.0	71.0	72.2	73.0	75.7	77.8	78.0	78.8	78.6	78.2	76.1	76.1	75.7	75.0	74.5	74.7	75.0	74.9	74.2	
11	74.2	73.8	73.6	73.2	72.9	72.2	72.8	73.2	74.0	75.1	76.5	77.2	78.2	78.0	79.0	78.4	78.2	76.8	75.3	74.8	73.8	73.1	72.6	72.1	75.0	
12	71.9	71.4	71.0	71.1	70.7	69.3	69.8	71.0	72.4	73.1	73.7	74.3	75.0	75.6	76.0	76.1	76.0	75.4	74.5	73.5	71.8	71.9	71.3	71.0	72.9	
13	70.4	69.5	69.5	69.3	69.3	68.8	69.2	70.1	71.6	74.6	76.9	78.5	77.8	78.4	78.4	78.0	76.7	75.4	74.2	73.6	73.0	72.9	72.2	71.4	73.3	
14	70.9	70.6	70.2	69.6	69.5	68.9	69.9	70.4	72.1	73.3	74.6	80.1	82.0	82.6	82.8	82.6	81.8	80.6	79.4	78.3	78.2	77.3	76.2	76.2	75.7	
15	75.5	74.7	74.3	76.6	75.5	76.7	76.9	77.0	77.7	78.3	79.0	80.3	80.3	80.2	80.3	80.6	80.2	79.0	77.8	76.5	75.5	75.5	75.0	74.0	77.5	
16	73.7	73.8	74.3	74.0	74.2	74.0	74.4	74.8	75.2	75.6	76.7	79.5	81.7	82.6	83.0	82.3	81.3	79.6	77.7	77.0	75.8	75.5	74.8	74.2	76.9	
17	73.5	73.4	73.1	73.8	74.0	74.3	74.4	75.0	77.3	78.0	79.6	79.5	79.7	80.0	80.5	80.5	80.0	79.6	78.5	77.5	76.7	76.8	77.0	76.0	77.0	
18	75.7	75.6	74.6	73.7	73.7	74.2	74.3	76.0	77.3	78.2	78.9	79.5	79.5	80.1	80.0	80.2	80.1	79.9	78.7	77.5	75.4	74.5	73.4	72.5	76.9	
19	72.3	71.6	71.8	71.3	71.0	71.0	70.5	72.7	75.0	78.1	80.4	80.6	81.9	83.2	83.3	83.1	82.6	81.8	81.1	80.5	80.0	79.6	79.0	78.9	77.4	
20	78.7	78.4	78.1	77.7	77.4	76.0	76.0	77.3	79.3	80.4	81.7	82.5	83.6	84.5	84.9	84.9	84.1	83.0	81.9	81.0	80.3	79.7	79.1	78.4	80.4	
21	77.9	77.4	76.7	76.6	76.0	76.3	76.9	78.3	79.8	81.7	83.3	84.0	84.5	84.5	84.0	83.5	83.3	83.0	82.6	82.0	81.5	81.3	81.1	80.9	80.7	
22	80.8	80.5	80.4	80.3	80.2	80.1	80.2	80.8	81.3	81.0	81.2	81.1	81.6	81.7	81.5	81.5	81.0	81.0	80.0	78.3	78.3	77.0	75.8	75.0	80.2	
23	75.0	75.1	75.2	75.1	74.0	74.4	74.5	76.0	77.9	80.0	82.0	82.8	82.7	82.5	81.8	82.0	81.3	81.7	80.5	79.4	79.2	77.5	77.5	75.9	73.5	
24	77.5	77.5	77.4	76.9	76.8	76.8	76.7	76.6	77.9	79.1	81.0	82.4	83.7	84.0	83.6	83.4	83.4	82.0	80.1	78.7	77.7	76.6	75.2	76.5	79.2	
25	75.0	74.4	74.5	74.0	74.3	74.0	75.1	77.7	79.2	80.3	81.5	82.7	83.2	83.5	83.6	82.9	82.1	81.0	80.4	80.0	79.4	78.9	78.1	78.1	78.9	
26	78.5	78.3	77.9	77.3	76.5	76.5	77.0	77.9	78.3	80.4	82.0	82.8	83.1	83.4	83.3	82.0	81.5	81.0	80.8	81.0	81.0	80.9	80.8	80.7	80.1	
27	80.9	80.7	80.3	80.1	79.9	79.6	79.5	79.0	80.2	81.7	82.0	82.5	83.1	83.0	81.6	81.5	81.5	81.6	82.0	82.0	81.9	81.8	80.5	80.0	81.1	
28	78.7	79.3	79.0	79.3	79.9	80.5	80.8	81.8	82.7	84.0	84.3	84.7	85.3	84.9	84.2	84.3	84.0	83.0	81.6	80.7	80.6	80.9	80.9	80.5	81.9	
29	79.8	79.9	80.4	80.7	80.2	79.8	80.3	81.6	82.6	83.6	83.7	83.0	82.5	82.0	82.5	83.3	84.2	83.4	83.1	83.0	83.2	83.2	83.1	83.0	82.1	
30	82.5	82.5	82.7	82.5	82.1	81.7	81.3	81.8	82.6	83.3	84.5	85.3	84.5	84.4	85.1	84.6	85.1	83.7	82.4	81.3	80.9	81.0	81.0	80.6	82.9	
31	80.6	80.5	80.8	80.6	80.6	80.9	81.4	82.4	83.5	83.4	83.6	84.7	85.5	85.6	85.3	85.0	83.2	82.7	82.4	82.2	80.6	79.1	78.5	78.1	82.1	
Mean	76.1	75.8	75.6	75.4	75.2	<u>75.1</u>	75.2	75.9	77.1	78.3	79.4	80.5	81.1	<u>81.4</u>	81.4	81.1	80.7	79.9	79.0	78.4	77.8	77.4	77.0	76.5	78.0	

459. Richmond (Kew Observatory): North Wall Screen:  $h_t$  = 3.0 metres.

April, 1932.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean
Day.	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A	°A
1	77.8	77.7	77.4	77.3	77.1	76.8	76.8	77.1	78.0	78.9	79.9	80.6	81.9	81.7	80.5	80.9	80.6	80.0	79.0	78.6	78.7	78.3	77.7	77.6	78.8
2	78.4	78.8	79.1	79.5	79.4	79.6	79.7	80.0	81.0	81.4	81.8	82.5	83.5	83.9	83.5	81.4	80.2	80.0	79.3	79.1	78.8	78.3	77.8	78.0	80.2
3	77.5	77.4	77.5	77.7	77.8	78.0	78.4	78.9	79.8	81.0	81.4	80.5	81.4	81.3	82.8	81.5	82.3	81.5	81.0	80.5	79.8	79.9	79.7	78.8	79.8
4	79.3	79.7	79.4	79.3	79.3	79.2	79.6	80.5	81.0	80.7	81.9	83.3	83.2	83.5	83.6	84.4	83.5	82.8	81.2	80.0	79.4	78.8	78.5	78.3	80.9
5	78.0	77.5	77.3	77.8	77.8	77.7	78.1	78.5	79.0	80.0	81.0	81.9	82.6	83.0	83.6	83.6	83.6	82.6	81.9	81.0	80.8	80.4	79.5	79.1	80.2
6	79.3	79.3	79.3	79.7	79.8	79.7	80.5	81.1	81.8	83.1	83.5	83.7	84.4	84.5	84.0	84.0	84.1	83.9	83.8	83.5	83.2	83.3	83.0	82.6	82.3
7	82.2	81.8	81.6	81.3	80.6	80.3	78.8	80.0	80.4	81.6	82.1	82.3	82.5	82.0	81.6	80.7	81.7	80.9	79.0	78.5	78.5	78.7	78.5	78.6	80.7
8	78.3	78.5	78.6	78.7	78.8	78.6	79.3	79.5	80.8	81.8	82.7	83.4	80.0	81.4	83.4	83.0	81.6	81.7	80.3	79.4	78.8	78.0	77.5	76.6	80.1
9	76.2	75.8	75.3	75.2	76.3	77.6	78.9	79.9	81.0	81.7	83.3	84.4	85.4	85.8	85.2	84.8	84.6	84.8	84.0	83.3	83.0	83.3	83.0	83.4	81.4
10	83.0	83.3	83.3	83.4	83.4	83.9	82.0	82.0	82.6	82.7	81.9	81.3	80.9	80.0	80.4	80.3	80.0	80.0	79.5	79.5	79.5	79.5	78.0	7	

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

460. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulb above the ground) = 3.0 metres.

May, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly temperature readings in degrees absolute. Column 25 is the Mean. The data shows a typical diurnal cycle with temperatures ranging from approximately 75.0 to 92.0 degrees absolute.

461. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

June, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 represent hourly temperature readings in degrees absolute. Column 25 is the Mean. The data shows a typical diurnal cycle with temperatures ranging from approximately 78.0 to 95.0 degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute in written 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

462. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulb above the ground) = 5.0 metres.

July, 1932.

Table with columns: Hour G. M. T., Day, 1-24, Mean. Rows: 1-31. Data values in degrees absolute.

463. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 5.0 metres.

August, 1932.

Table with columns: Day, Hour G. M. T., 1-24, Mean. Rows: 1-31. Data values in degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

TEMPERATURE.

Readings in degrees absolute at exact hours, Greenwich Mean Time.

464. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulb above the ground) = 3.0 metres.

September, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-30, Mean). Columns 1-24 represent hourly readings from 1 AM to 24 AM. The Mean row shows the average for each hour. Values range from approximately 83.0 to 93.0 degrees absolute.

465. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

October, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-30, Mean). Columns 1-24 represent hourly readings from 1 AM to 24 AM. The Mean row shows the average for each hour. Values range from approximately 77.0 to 88.0 degrees absolute.

NOTE. - The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.



Readings in degrees absolute at exact hours, Greenwich Mean Time.

466. Richmond (Kew Observatory): North Wall Screen:  $h_t$  (height of thermometer bulb above the ground) = 3.0 metres.

November, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31). Columns 1-12 are labeled 'Hour G. M. T.', columns 13-24 are labeled '13.' through '24.', and the last column is 'Mean'. Each cell contains a temperature reading in degrees absolute.

467. Richmond (Kew Observatory): North Wall Screen:  $h_t$  = 3.0 metres.

December, 1932.

Table with 25 columns (1-24, Mean) and 31 rows (Day 1-31). Columns 1-12 are labeled 'Hour G. M. T.', columns 13-24 are labeled '13.' through '24.', and the last column is 'Mean'. Each cell contains a temperature reading in degrees absolute.

Note.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

TEMPERATURE: ANNUAL MEANS OF HOURLY VALUES.

From readings in degrees absolute at exact hours, Greenwich Mean Time.

468. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

1932.

Table with 25 columns (Hour 1 to Mean) and 1 row of data for 1932. Values range from 81.58 to 83.88.

TEMPERATURE: MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-periodic change.†

469. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

1932.

Table with 25 columns (Month, Mean, Hour 1 to 24) and 12 rows of data for months Jan to Dec. Values range from 277.37 to 290.10.

ABSOLUTE EXTREMES OF TEMPERATURE FOR EACH DAY.

Maximum and Minimum for the interval 0h. to 24h., Greenwich Mean Time.

470. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

1932.

Large table with 12 columns (Month) and 25 rows (Day). Each cell contains Max. and Min. temperature values. Values range from 75.0 to 85.5.

Note.- The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

† See page.

Year ... 86.7 79.7

Percentages at exact hours, Greenwich Mean Time.

471. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above the ground) = 3.0 metres.

January, 1932.

Table with 25 columns (1-24) and 25 rows (Day 1-31). Columns 1-24 show relative humidity percentages. Column 25 is Mean. Column 26 is Vapour Pressure (mb.).

472. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

February, 1932.

Table with 25 columns (1-24) and 25 rows (Day 1-29). Columns 1-24 show relative humidity percentages. Column 25 is Mean. Column 26 is Vapour Pressure (mb.).

\* Computed from the mean temperature and mean relative humidity.

† Mean of the column.

‡ Mean of the row.

RELATIVE HUMIDITY.

Percentages at exact hours, Greenwich Mean Time.

473. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above the ground) = 3.0 metres.

March, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-31). Columns 1-24 show relative humidity percentages. Column 25 shows Vapour Pressure in mb. Includes a Mean row and a Vapour Pressure row.

474. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

April, 1932.

Table with 25 columns (1-24) and 31 rows (Day 1-30). Columns 1-24 show relative humidity percentages. Column 25 shows Vapour Pressure in mb. Includes a Mean row and a Vapour Pressure row.

\* Computed from the mean temperature and mean relative humidity. † Mean of the column. ‡ Mean of the row.

Percentages at exact hours, Greenwich Mean Time.

475. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> (height of thermometer bulbs above the ground) = 3.0 metres.

May, 1932.

Table with 25 columns (1-24) and 25 rows (1-24). Columns 1-24 represent hours of the day. Row 1 is labeled 'Day.' and contains percentage values. Row 25 is labeled 'Mean' and contains mean values. A 'Vapour \* Pressure' row is at the bottom with values in 'mb.' units.

476. Richmond (Kew Observatory): North Wall Screen: h<sub>t</sub> = 3.0 metres.

June, 1932.

Table with 25 columns (1-24) and 25 rows (1-24). Columns 1-24 represent hours of the day. Row 1 is labeled 'Day.' and contains percentage values. Row 25 is labeled 'Mean' and contains mean values. A 'Vapour \* Pressure' row is at the bottom with values in 'mb.' units.

\* Computed from the mean temperature and mean relative humidity. † Mean of the column. ‡ Mean of the row.

477. Richmond (Kew Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above the ground) = 3.0 metres.

July, 1932.

Table with 25 columns (1-24) and 25 rows (1-24). Columns 1-24 represent hours of the day. Row 1 is 'Day'. Row 24 is 'Mean'. Row 25 is 'Vapour \* Pressure'. Values are percentages of relative humidity.

478. Richmond (Kew Observatory): North Wall Screen:  $h_t$  = 3.0 metres.

August, 1932.

Table with 25 columns (1-24) and 25 rows (1-24). Columns 1-24 represent hours of the day. Row 1 is 'Day'. Row 24 is 'Mean'. Row 25 is 'Vapour \* Pressure'. Values are percentages of relative humidity.

\* Computed from the mean temperature and mean relative humidity. † Mean of the column. ‡ Mean of the row.

Percentages at exact hours, Greenwich Mean Time.

479. Richmond (Kew Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above the ground) = 3.0 metres.

September, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour* Pressure	
1	92	90	93	95	96	96	91	86	81	73	64	61	62	77	81	81	84	87	92	92	96	94	91	87	85.1	14.7	
2	85	86	85	86	88	88	87	85	81	79	74	73	70	74	78	76	80	86	85	85	83	83	82	82	81.8	19.2	
3	85	86	87	89	89	92	95	95	95	94	89	91	80	73	73	65	63	69	74	74	75	72	75	79	81.7	15.8	
4	82	80	84	88	91	88	82	75	67	57	52	50	50	52	54	56	59	65	72	79	85	89	89	91	72.1	11.2	
5	92	94	96	96	98	97	94	88	77	69	68	65	64	63	68	75	76	90	95	96	96	97	92	96	85.1	13.3	
6	96	98	98	97	96	97	95	96	93	87	84	81	77	75	80	87	89	88	91	90	88	92	92	92	90.0	17.7	
7	95	95	97	95	96	95	94	89	74	68	63	63	61	63	89	84	74	74	85	91	90	96	96	94	84.2	14.1	
8	91	93	94	92	88	87	86	83	79	76	74	78	78	87	82	82	90	89	83	86	91	85	87	89	85.5	15.3	
9	89	93	97	97	97	98	96	95	87	81	78	70	65	57	62	66	63	70	81	87	92	95	96	97	83.5	15.4	
10	98	98	98	97	98	97	94	91	84	82	77	81	80	76	73	76	77	80	85	88	85	90	91	89	87.0	14.7	
11	86	89	89	88	87	83	82	77	83	86	88	82	55	50	46	55	57	64	63	65	66	75	80	82	74.2	12.8	
12	82	85	89	87	90	90	81	76	66	64	62	65	74	79	79	82	87	90	91	92	94	97	96	96	82.8	13.5	
13	95	92	91	97	93	94	91	93	97	96	94	93	87	84	78	79	79	83	85	88	88	90	91	89.5	16.9		
14	90	91	90	91	92	94	89	83	78	66	68	68	60	61	63	64	64	68	84	87	93	94	94	96	80.2	18.0	
15	96	96	97	98	99	99	96	93	87	74	71	71	69	72	66	61	66	68	74	74	75	81	83	86	81.5	17.3	
16	87	92	96	97	96	96	92	90	86	82	78	72	64	64	64	66	70	72	80	83	89	93	96	98	83.2	17.1	
17	95	98	100	98	99	99	99	98	96	93	84	77	74	67	60	62	67	78	88	91	94	92	95	96	87.5	16.7	
18	94	95	92	90	92	91	89	88	82	80	82	81	77	85	87	92	92	96	97	96	96	95	89	91	89.7	16.1	
19	93	90	87	88	93	89	89	87	78	70	69	66	66	66	73	77	76	79	80	85	83	80	84	80	80.3	11.3	
20	95	96	96	94	93	92	92	87	91	87	82	85	87	94	93	89	82	78	77	78	75	75	75	73	86.4	11.3	
21	72	74	74	76	85	88	82	75	70	60	54	58	50	47	46	45	49	60	67	67	70	72	71	73	66.0	8.5	
22	75	77	80	79	79	81	83	75	70	64	58	54	59	57	75	83	89	93	96	97	98	100	99	99	79.5	10.2	
23	100	99	100	100	99	100	98	96	95	97	94	89	95	91	97	99	97	94	94	92	93	96	96	96	96	96.2	12.5
24	92	100	99	99	100	100	96	93	85	84	82	79	78	76	69	59	67	77	79	86	86	89	91	92	85.8	11.3	
25	89	86	89	90	89	87	86	91	93	87	80	74	74	69	73	73	88	87	89	89	86	86	88	89	84.7	13.1	
26	90	91	93	96	96	96	96	91	79	70	65	59	54	56	48	52	56	68	79	78	87	91	90	87	77.9	10.0	
27	90	96	96	96	91	90	88	79	75	73	65	63	66	63	60	67	65	73	76	74	76	80	85	85	78.2	9.4	
28	86	85	84	83	84	88	88	86	78	71	65	65	66	65	56	64	71	72	75	75	75	76	76	80	75.7	9.7	
29	83	83	85	91	89	89	89	88	82	71	72	71	79	77	82	84	83	85	86	87	88	95	97	96	84.3	13.1	
30	98	97	98	98	99	100	98	93	88	78	69	63	64	66	76	75	80	86	90	88	91	95	94	93	86.6	13.4	
Mean	89.8	90.8	91.8	92.4	92.7	92.7	90.6	87.4	82.6	77.3	73.5	71.6	69.5	69.5	71.0	72.5	74.7	78.9	83.1	84.5	86.2	88.2	88.7	89.3	82.9		
Vapour * Pressure	mb. 13.1	mb. 13.0	mb. 12.8	mb. 12.7	mb. 12.7	mb. 12.8	mb. 13.1	mb. 13.4	mb. 13.6	mb. 13.6	mb. 13.6	mb. 13.8	mb. 13.7	mb. 13.6	mb. 13.8	mb. 14.0	mb. 14.1	mb. 14.2	mb. 14.0	mb. 13.9	mb. 13.8	mb. 13.6	mb. 13.4	mb. 13.3	mb. 13.5	mb. 13.8	

480. Richmond (Kew Observatory): North Wall Screen:  $h_t$  = 3.0 metres.

October, 1932.

1	89	89	88	86	89	92	91	86	82	77	71	69	87	90	89	92	88	88	88	89	91	93	93	90	87.0	12.0
2	96	97	97	93	97	93	95	97	89	81	55	68	66	64	63	61	87	91	88	88	86	86	85	86	84.2	9.1
3	88	87	91	90	91	94	94	91	86	81	79	72	73	68	68	69	89	92	87	89	93	90	93	94	86.0	9.1
4	91	90	89	93	92	90	95	90	84	77	64	60	54	50	51	50	59	72	88	94	93	96	96	94	79.7	8.2
5	93	94	92	94	95	97	97	91	88	80	63	59	63	63	63	63	70	80	87	93	92	91	93	91	83.0	9.1
6	93	95	100	98	96	100	100	96	94	82	69	71	61	62	55	53	65	70	82	86	88	88	84	84	82.3	9.1
7	83	83	83	85	89	92	90	87	87	85	75	73	69	70	71	77	85	87	81	78	74	71	73	76	80.3	11.9
8	76	75	74	73	77	77	81	89	86	89	93	93	92	90	86	82	88	92	93	95	98	96	96	96	86.5	11.1
9	96	99	100	99	96	96	96	92	92	87	81	80	80	80	78	84	83	93	96	95	93	92	94	94	90.7	10.6
10	91	93	100	97	97	98	100	97	98	86	84	74	74	68	59	64	72	79	89	92	91	91	89	96	87.0	9.2
11	96	100	100	100	99	99	100	99	96	98	92	84	82	80	91	94	92	89	98	96	91	92	94	96	94.1	11.3
12	95	96	98	95	96	96	98	98	95	91	92	87	84	78	70	72	82	87	88	89	93	94	96	94	90.2	11.7
13	91	92	94	93	89	81	76	75	82	67	65	65	68	65	61	63	65	79	79	83	84	88	90	78.1	9.8	
14	90	93	94	93	86	99	100	88	96	91	82	62	58	60	50	62	71	76	83	76	79	78	82	86	81.1	8.8
15	84	83	84	84	77	71	77	74	71	64	63	63	60	61	60	64	66	72	76	81	81	86	86	91	74.0	9.2
16	93	95	95	96	99	96	98	94	95	78	73	71	76	67	66	65	76	82	87	87	91	89	89	90	85.4	11.4
17	89	83	81	78	72	71	71	68	63	61	59	57	56	57	57	56	74	76	76	81	81	82	81	84	71.5	10.5
18	90	87	86	89	73	62	63	64	65	62	59	55	61	56	56	54	60	68	68	71	73	79	79	82	69.3	9.5
19	85	87	90	88	91	92	92	96	87	82	76	71	65	62	69	72	74	78	80	89	92	92	91	91	82.8	9.2
20	94	95	97	98	98	99	97	97	96	94	90	87	88	86	90	97	97	98	97	95	97	100	100	100	95.1	14.0
21	99	99	99	96	93	96	97	91	86	81	76	72	77	85	96	97	94	93	92	90	86	84	84	85	89.8	15.3
22	85	83	84	87	85	85	85	81	81	79	80	79	83	84	92	82	73	77	83	83	86	88	91	94	83.5	12.8
23	96	96	96	95	93	95	93	95	89	89	92	95	95	85	94	97	99	100	95	98	99	98	98	94	94.8	11.5
24	94	99	99	100	100	100	100	99	95	93	95	92	94	99	98	94	92	86	87	91	96	96	98	94	93.5	10.7
25	100	96	99	97	96	98	100	100	96	93	89	87	82	81	83	79	77	81	84	87	90	95	96	98	90.9	10.2
26	98	96	96	94	97	90	85	86	87	77	71	68	69	79	81	76	78	77	82	83	88	91	92	93	84.9	11.9
27	93	91	91	93	91	96	96	96	88	90	8															

481. Richmond (Kew Observatory): North Wall Screen:  $h_t$  (height of thermometer bulbs above the ground) = 3.0 metres.

November, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
Day.	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mb.	
1	97	98	98	100	100	98	96	100	100	98	94	91	84	86	94	96	96	95	97	96	98	98	95	95	95	95.8	9.0
2	99	98	96	95	95	96	93	93	92	88	89	85	89	86	88	91	93	93	93	93	95	91	91	94	94	92.3	12.4
3	93	93	96	96	91	87	87	87	84	82	82	85	81	85	81	86	85	89	92	92	94	96	99	96	97	89.1	12.4
4	92	90	89	89	89	90	90	88	85	85	85	83	83	79	82	85	87	89	90	94	92	91	88	87	86	87.8	12.1
5	89	92	93	91	89	88	87	88	86	76	73	72	84	72	71	65	63	63	66	63	68	69	70	81	81	77.2	9.0
6	83	83	82	82	78	74	77	78	71	73	69	71	66	66	66	67	67	69	73	74	71	71	71	74	74	73.3	7.7
7	76	77	78	82	85	87	86	84	78	71	69	63	65	66	66	63	62	65	67	66	73	77	72	76	77	73.0	7.8
8	77	85	82	84	84	92	96	89	90	83	74	72	73	70	70	74	80	82	84	84	85	85	86	87	86	81.8	8.1
9	88	90	88	91	90	93	94	93	91	96	91	88	88	81	77	80	81	87	94	98	100	94	100	100	90	90.3	8.2
10	100	98	96	98	96	98	98	98	96	96	94	87	79	74	72	76	76	74	73	77	81	80	80	80	80	87.0	7.9
11	79	81	81	80	81	86	87	83	83	78	73	75	74	74	76	79	80	83	81	84	88	95	91	98	98	81.7	8.9
12	92	96	98	98	98	96	96	98	98	98	93	88	89	89	88	92	88	88	91	88	88	84	84	84	84	92.0	10.0
13	79	83	80	78	81	81	73	74	76	74	72	73	73	76	72	75	72	79	84	86	87	88	86	81	87	78.5	8.1
14	83	85	87	90	93	93	94	94	94	96	96	97	96	96	96	94	94	91	93	91	91	90	90	90	90	92.0	8.6
15	93	95	95	95	97	90	92	89	89	94	80	74	69	69	71	76	84	88	89	83	86	88	88	88	88	86.2	8.5
16	87	93	92	89	89	88	85	83	83	78	77	74	73	71	66	67	72	68	72	71	75	73	75	75	75	79.0	8.5
17	85	87	88	84	81	80	81	86	86	76	70	71	74	79	83	79	81	80	84	85	87	93	93	93	93	82.4	7.5
18	93	96	100	98	97	97	97	98	95	93	93	93	92	92	90	92	92	92	92	93	93	93	93	93	93	94.0	7.5
19	97	98	97	98	97	98	98	98	96	94	96	93	97	97	99	97	99	97	99	99	100	99	99	100	99	97.5	8.6
20	99	97	97	99	99	100	99	97	96	91	88	88	90	94	94	96	94	94	94	94	94	93	94	96	96	95.0	9.1
21	98	98	100	100	98	96	97	97	94	87	81	79	67	67	65	73	81	86	92	93	93	95	91	93	93	88.4	8.2
22	98	96	98	96	100	94	98	95	94	89	88	91	91	93	95	95	94	94	93	94	89	70	80	77	77	92.1	9.2
23	75	81	86	86	83	82	86	83	86	80	75	68	82	78	64	68	72	81	77	86	81	79	83	87	87	79.3	8.3
24	87	87	89	83	83	86	86	87	88	86	73	71	68	70	68	63	65	69	70	78	81	83	96	98	98	79.6	8.1
25	95	92	94	92	96	89	87	86	85	83	82	83	82	83	85	83	86	83	86	85	88	91	93	90	90	87.6	12.0
26	90	87	88	84	82	83	89	93	93	93	89	82	80	76	74	72	71	76	74	76	76	78	73	73	73	81.7	10.8
27	76	78	77	77	75	79	79	77	76	70	65	57	59	60	74	74	81	80	87	69	70	67	71	76	76	73.0	7.1
28	69	64	62	64	62	54	67	74	85	76	80	82	81	81	83	82	90	92	95	91	95	94	96	98	98	79.4	6.3
29	96	96	95	94	96	96	96	97	98	97	97	90	89	86	86	89	91	93	92	89	92	88	87	87	88	92.6	8.4
30	91	93	93	93	92	92	92	93	92	84	83	81	80	77	78	82	86	89	90	88	91	90	91	88	88	87.8	9.6
Mean	86.5	89.6	89.8	89.5	89.2	88.8	89.5	89.4	88.7	85.7	82.5	80.3	79.6	79.2	79.3	80.3	82.1	83.7	85.3	85.4	86.5	86.2	86.9	87.8	85.6		
Vapour Pressure	mb. 8.7	mb. 3.7	mb. 6.7	mb. 6.6	mb. 8.6	mb. 8.5	mb. 8.6	mb. 8.7	mb. 8.8	mb. 8.9	mb. 9.0	mb. 9.0	mb. 9.0	mb. 9.1	mb. 9.0	mb. 9.0	mb. 9.0	mb. 9.0	mb. 9.1	mb. 8.9	mb. 8.9	mb. 8.8	mb. 8.7	mb. 8.8	mb. 8.8	8.9	

482. Richmond (Kew Observatory): North Wall Screen:  $h_t$  = 3.0 metres.

December, 1932.

Hour G. M. T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Mean	Vapour Pressure	
1	90	89	91	93	94	96	94	98	98	98	91	79	73	73	73	77	76	86	90	85	90	91	89	91	91	87.7	8.6
2	92	86	92	93	93	92	85	87	88	81	79	83	70	93	93	93	96	96	95	95	95	95	94	91	91	91.2	8.2
3	86	81	90	91	93	91	91	90	88	86	78	69	67	60	62	76	80	84	85	87	87	88	93	93	93	82.9	7.8
4	93	89	93	91	91	88	85	87	85	77	74	74	72	69	70	75	84	87	87	88	94	93	94	100	94	84.9	6.8
5	100	100	100	100	100	100	98	98	96	96	95	97	90	89	84	89	92	92	93	93	95	88	90	91	91	94.6	6.9
6	91	94	98	96	98	96	96	96	94	90	84	80	78	75	76	82	82	88	85	85	87	89	93	93	93	88.5	6.7
7	92	92	90	89	90	80	77	73	77	69	65	64	65	66	69	73	75	78	80	79	82	87	91	91	91	79.0	5.9
8	83	80	80	76	80	77	73	76	78	79	70	68	63	59	60	58	69	67	62	55	56	57	60	69	60	69.0	5.5
9	62	59	61	62	62	67	69	68	64	64	51	54	58	59	54	55	55	56	57	57	61	59	58	61	59	59.7	4.5
10	62	59	59	60	62	60	60	58	55	63	67	69	58	58	61	62	66	64	66	66	62	67	67	67	67	62.3	4.7
11	69	69	74	74	74	71	68	69	69	75	78	84	85	85	85	84	84	83	83	87	87	90	87	83	78	78.7	5.6
12	85	85	85	87	83	83	82	87	84	82	80	74	77	78	78	76	85	85	90	87	90	91	95	94	91	84.1	6.6
13	96	94	96	96	94	97	97	100	98	98	99	100	96	94	92	92	92	92	94	100	100	100	99	98	96	96.3	8.7
14	98	96	95	96	99	98	96	96	96	96	94	96	88	86	83	88	90	97	97	97	99	96	99	98	98	94.8	10.1
15	96	97	97	96	98	96	93	93	94	92	89	86	84	79	84	86	89	92	96	94	98	99	98	98	98	92.7	9.9
16	99	100	100	99	96	96	93	91	88	92	92	92	92	92	89	89	91	93	91	96	93						



For exact hours, Greenwich Mean Time.

483. Richmond (Kew Observatory): North Wall Screen:  $h_t = 3.0$  metres.

1932.

Hour G. M. T.	1	2	3	4	5	6	7	8	9	10	11	Noon.	13	14	15	16	17	18	19	20	21	22	23	24	Mean
Relative Humidity.	87.8	88.7	89.2	89.4	89.2	88.4	86.7	84.4	81.3	77.3	73.5	70.5	68.8	67.9	67.6	69.0	70.9	73.7	76.9	79.7	82.2	84.0	85.6	86.8	80.0
Vapour Pressure in Millibars.*	mb. 9.8	mb. 9.7	mb. 9.7	mb. 9.6	mb. 9.6	mb. 9.6	mb. 9.7	mb. 9.8	mb. 10.0	mb. 10.0	mb. 10.0	mb. 10.0	mb. 10.1	mb. 10.1	mb. 10.0	mb. 10.1	mb. 10.2	mb. 10.2	mb. 10.2	mb. 10.2	mb. 10.1	mb. 10.1	mb. 10.0	mb. 9.9	mb. 10.0

\* Computed from the mean temperature and mean relative humidity.

RELATIVE HUMIDITY : MONTHLY MEANS AND DIURNAL INEQUALITIES.

The departures from the mean of the day are adjusted for non-cyclic change. †

484. Richmond (Kew Observatory): North Wall Screen:  $h_t = 3.0$  metres.

1932.

Month.	Mean.	Hour 1	G.M.T. 2	3	4	5	6	7	8	9	10	11	Noon	13	14	15	16	17	18	19	20	21	22	23	24
Jan.	88.0	+2.4	+3.8	+3.5	+3.7	+3.2	+2.9	+3.1	+2.5	+2.3	+1.0	-1.6	-2.7	-4.3	-5.4	-5.9	-4.8	-3.0	-2.7	-1.5	-1.5	-0.2	+1.6	+2.3	+1.4
Feb.	78.1	+5.9	+5.1	+4.9	+5.4	+5.8	+5.9	+5.8	+5.5	+4.7	+1.6	-1.2	-5.3	-8.4	-10.3	-12.0	-10.0	-7.1	-4.3	-2.1	+0.1	+0.4	+2.0	+3.3	+4.5
Mar.	75.1	+9.1	+10.2	+10.7	+11.4	+11.9	+12.5	+12.4	+10.3	+4.4	-1.2	-8.7	-14.0	-17.1	-18.1	-17.9	-15.4	-12.3	-7.3	-2.7	-0.1	+2.9	+4.7	+6.2	+8.0
Apr.	75.6	+10.3	+10.6	+11.3	+10.9	+10.6	+10.5	+8.4	+4.5	+0.2	-3.8	-8.0	-11.1	-12.2	-12.6	-14.7	-13.3	-11.3	-8.5	-3.8	-0.6	+2.3	+5.5	+6.3	+8.9
May.	79.4	+10.4	+12.1	+12.3	+12.9	+12.9	+10.8	+7.3	+3.7	-1.0	-5.7	-9.0	-11.5	-14.2	-13.9	-14.1	-13.6	-12.9	-9.0	-4.7	+0.2	+3.7	+5.8	+8.9	+9.2
June.	70.2	+13.3	+15.5	+16.9	+18.0	+16.4	+12.3	+7.5	+3.4	-1.0	-5.6	-10.0	-13.4	-14.5	-15.5	-15.7	-15.1	-14.6	-12.1	-8.3	-3.7	+1.6	+5.6	+8.0	+11.0
July.	76.9	+11.2	+12.0	+12.8	+13.3	+12.7	+10.6	+6.6	+1.9	-2.2	-6.1	-8.5	-10.2	-11.2	-12.5	-12.8	-12.2	-11.9	-10.4	-6.7	-1.5	+2.5	+4.9	+8.1	+9.6
Aug.	76.1	+12.4	+13.9	+13.8	+14.2	+14.5	+13.3	+10.2	+6.1	+1.9	-3.6	-8.2	-12.6	-15.8	-17.4	-18.6	-18.1	-16.6	-13.6	-7.8	+0.1	+4.5	+6.4	+9.4	+11.7
Sept.	82.9	+6.9	+8.0	+9.0	+9.5	+9.9	+9.9	+7.7	+4.5	-0.3	-5.6	-9.4	-11.3	-13.4	-13.4	-11.9	-10.4	-8.2	-4.0	+0.1	+1.6	+3.3	+5.3	+5.8	+6.4
Oct.	84.4	+6.1	+6.3	+7.1	+6.6	+5.9	+5.8	+6.0	+4.3	+2.1	-2.7	-7.6	-10.8	-10.8	-11.4	-11.5	-9.7	-5.3	-1.5	+0.8	+2.1	+3.3	+4.1	+5.0	+5.6
Nov.	85.6	+2.8	+3.9	+4.2	+3.9	+3.6	+3.2	+3.9	+3.8	+3.1	+0.1	-3.1	-5.3	-5.9	-6.4	-6.3	-5.2	-3.4	-1.8	-0.2	-0.1	+1.0	+0.7	+1.4	+2.3
Dec.	87.1	+3.2	+2.8	+3.4	+3.4	+3.4	+2.9	+2.1	+2.5	+2.1	+0.1	-2.5	-4.9	-6.5	-7.9	-7.2	-4.2	-1.9	-0.1	+0.3	+0.5	+1.4	+1.7	+2.2	+3.1
Year.	80.0	+7.8	+8.7	+9.2	+9.4	+9.2	+8.4	+6.7	+4.4	+1.4	-2.6	-6.5	-9.4	-11.2	-12.1	-12.4	-11.0	-9.0	-6.3	-3.1	-0.3	+2.2	+4.0	+5.6	+6.8

† See page 21

RAINFALL : ANNUAL TOTALS OF HOURLY VALUES.

Amounts, in millimetres ; durations, in hours for periods of sixty minutes between the exact hours, Greenwich Mean Time.

485. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_t$  (height of receiving surface above ground) = 5.5 metres + 0.53 metres. 1932.

Hour G. M. T.	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to Noon	Noon to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to 21	21 to 22	22 to 23	23 to 24	0 to 24
Amount.	mm. 16.1	mm. 22.0	mm. 20.0	mm. 22.7	mm. 16.9	mm. 17.6	mm. 17.0	mm. 19.3	mm. 17.2	mm. 13.6	mm. 29.5	mm. 25.8	mm. 26.2	mm. 27.3	mm. 30.1	mm. 30.1	mm. 24.8	mm. 25.1	mm. 41.3	mm. 21.6	mm. 23.7	mm. 25.8	mm. 22.5	mm. 22.7	mm. 558.9
Duration.	hr. 20.7	hr. 18.5	hr. 17.8	hr. 19.3	hr. 17.4	hr. 14.7	hr. 16.0	hr. 14.8	hr. 14.5	hr. 13.3	hr. 19.5	hr. 18.3	hr. 18.1	hr. 18.1	hr. 21.6	hr. 20.2	hr. 22.6	hr. 17.9	hr. 16.3	hr. 16.0	hr. 16.8	hr. 19.9	hr. 21.6	hr. 21.7	hr. 435.6

NOTES ON RAINFALL.

486. Richmond (Kew Observatory).

1932.

Dry Periods.

The following definitions are adopted by "The British Rainfall Organisation."  
 An "absolute drought" is a period of at least 15 consecutive days to none of which is credited 0.2 mm. of rain or more.  
 A "partial drought" is a period of at least 29 consecutive days, the mean daily rainfall of which does not exceed 0.2 mm.  
 A "dry spell" is a period of at least 15 consecutive days to none of which is credited 1.0 mm. or more.

In 1932 "absolute droughts" occurred from Jan. 23rd. - Feb. 9th and from June 12th. - June 29th.  
 "Partial droughts" Jan. 14th. - March 7th. and May 31st. - June 29th.  
 "Dry Spells", Jan. 18th. - Feb. 23rd., June 6th. - 29th. and December 3rd. - 21st.

Wet Periods.

The following definitions are adopted by "The British Rainfall Organisation."  
 A "Rain Spell" is a period of at least 15 consecutive days to each of which is credited 0.2 mm. of rain or more.  
 A "Wet Spell" is a period of at least 15 consecutive days to each of which is credited 1.0 mm. or more.  
 No "Rain Spells" or "Wet Spells" occurred in 1932.

Rainfall Duration.

Hours	0.1-1.0	1.1-2.0	2.1-6.0	6.1-12	12
Number of Days.	55	35	58	14	2

Continuous Falls.

The fall of the longest duration was 16mm. in 1lh. 24m. on October 20th.

Heavy Falls in Short Periods.

The only noteworthy fall of the year occurred on September 18th, when 5mm. fell in 6 minutes.

Amounts, in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

487. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 5.5 metres + 0.53 metres.

January, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Dura- tion 0-24		
Day.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.	
1									3	1	1								3	7	(...)	(.1)	.1	.1	1.8	3.3		
2		.1																2							0.3	0.6		
3																												
4																									2	0.2	0.5	
5																								6	1.1	1.7	1.9	
6		.4		.1		.1						1.0	.6	.2	.7	2.4	1.6		5.3	.1	.4	2.0			14.9	8.2		
7																												
8																												
9																						.1	.1	.3	.3	0.8	2.9	
10		.3	.3	.5	.7	.4	.2	.4		.1		.4	.7	1.7	1.1	.6	.6	.1	1.2	.7	.3	.3	.2		.1	10.9	17.0	
11		2.0									.2	.7					.2	.2								3.4	2.3	
12		(P)	(P)	(P)	(.1)	(P)	(P)																			0.1		
13				.2			.1	.3	.1	.2	.3	1.0						.2								2.4	3.6	
14																												
15			.1	.3	.6																					1.0	1.1	
16																												
17		.2	.1	.3	1.9																					2.5	1.8	
18																												
19																												
20																												
21		(L)	(L)	(.1)	(L)	(L)																				0.1		
22									.2	.6		.1														0.9	1.1	
23																												
24																												
25																												
26																												
27																												
28																												
29																												
30																												
31																												
Sum.	3.0	0.5	1.5	3.2	0.6	0.3	0.8	0.3	1.2	0.6	2.2	1.8	2.3	1.3	1.3	3.0	2.1	1.6	<u>6.3</u>	1.1	0.8	2.4	1.2	1.6	41.0	44.3		
Total Duration	hr. 2.6	hr. 1.8	hr. 2.2	hr. 2.4	hr. 0.9	hr. 0.7	hr. 1.6	hr. 0.5	hr. 2.4	hr. 1.5	hr. 2.4	hr. 2.1	hr. 2.0	hr. 1.6	hr. 2.0	hr. 1.9	hr. 1.9	hr. 1.9	hr. 2.1	hr. 1.4	hr. 1.4	hr. 2.0	hr. <u>2.7</u>	hr. 2.3	hr. 44.3			

488. Richmond (Kew Observatory):  $H_r$  = 5.5 metres + 0.53 metres.

February, 1932.

Day	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.	
1																											
2																											
3																											
4																											
5																	.4										
6																											
7																											
8																											
9																											
10											(*)	(.1)	.1												0.2	1.7	
11																											
12																											
13																											
14																											
15			.4		.3	.1																				0.8	1.1
16						.1	.1																			0.2	0.5
17																											
18																											
19																											
20																											
21																											
22											.1															0.1	0.1
23																											
24				.6	.3	.3		.4	.9		.2	.2						.1								3.0	3.2
25																											
26																											
27																											
28																											
29																											
Sum.			0.4	0.6	0.6	0.5	0.1	0.4	<u>1.0</u>		0.3	0.3						0.1								4.3	6.6
Total Duration	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	6.6
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24		

Amounts, in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

489. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 5.5 metres + 0.53 metres. March, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration 0-24				
Day.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.			
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
2	...	...	(.1)	(.1)	(.1)	(.1)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	...			
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
6	...	...	.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	0.2		
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.4	.1	...	...	...	...	...	...	...	0.5	1.3		
8	...	...	...	...	...	...	...	1.5	.6	.4	.8	.4	.2	.1	...	...	...	.6	.4	...	.1	...	...	...	...	...	5.1	7.2		
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(.1)	(.1)	(.1)	...	...		
11	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	...		
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	.3	.2	.3	.7	1.2	.8	.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	.1	.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sum.	0.6	0.2	0.5	0.8	1.6	1.1	1.0	1.5	0.6	1.1	2.6	2.7	3.0	1.7	1.0	2.4	2.6	1.5	1.1	0.6	1.9	2.0	0.6	...	...	32.7	34.5			
Total Duration.	hr. 1.0	hr. 0.6	hr. 0.6	hr. 1.3	hr. 1.3	hr. 1.5	hr. 1.1	hr. 0.7	hr. 1.0	hr. 1.7	hr. 2.1	hr. 2.1	hr. 2.4	hr. 1.7	hr. 1.4	hr. 2.5	hr. 4.2	hr. 2.3	hr. 1.3	hr. 0.4	hr. 0.9	hr. 1.4	hr. 1.0	hr. ...	hr. 34.5	hr. 34.5				

490. Richmond (Kew Observatory):  $H_r = 5.5$  metres +  $0.53$  metres.

April, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration 0-24					
Day.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.				
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sum.	2.9	2.4	1.4	2.3	0.6	1.6	3.9	1.9	0.4	0.5	1.8	2.4	4.8	5.9	1.5	0.4	1.7	1.3	1.5	0.2	1.0	2.8	3.6	3.9	56.7	51.6					
Total Duration.	hr. 3.8	hr. 3.5	hr. 1.7	hr. 2.0	hr. 1.1	hr. 2.3	hr. 3.1	hr. 3.4	hr. 1.5	hr. 0.9	hr. 1.9	hr. 2.2	hr. 1.9	hr. 3.3	hr. 0.5	hr. 0.4	hr. 1.5	hr. 2.0	hr. 1.8	hr. 1.0	hr. 1.2	hr. 2.3	hr. 3.4	hr. 4.9	hr. 51.6	hr. 51.6					
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17														



RAINFALL.

393

Amounts, in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

493. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 5.5 metres + 0.53 metres.

July, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration 0-24		
Day.	mm. (1.0)	mm. (1.5)	mm. (.2)	mm. (4.0)	mm. (4.1)	mm. (4.1)	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr. 14.9	
1																										5.5		
2																												
3																												
4																												
5											.3	2.0	.9	.1							.1					3.4	2.3	
6																												
7																												
8																												
9																												
10																												
11																												
12																												
13																												
14															.9												0.9	0.2
15																												
16																												
17																												
18								.9	1.7	.1											(.9)	(.1)				0.1	0.2	
19																											2.7	1.4
20																												
21																												0.1
22																4.1	1.1		.2								5.4	1.3
23																												
24											.1																	
25	.5	.1	.3	.1			.2	1.1	3.1	3.4	2.5	1.3	2.7	2.8	2.0	.3					.4	.6	1.4	.7	.3	3.7	4.7	
26								.6			.4																1.4	1.0
27												.3	.3			.5	.2										1.3	0.7
28											(.9)	(.1)	.1				.5	.2									0.9	1.4
29					.1											.6											0.7	0.3
30																												
31									.2	.2	.1	.1	.2									.6	.2				1.6	1.8
Sum.	1.5	1.6	0.5	4.1	4.2	4.1	1.1	3.4	3.4	4.0	7.5	3.4	4.2	3.2	3.3	5.5	2.2	0.2	0.5	1.0	0.9	1.4	0.7	0.3	62.2	33.5		
Total Duration	hr. 1.9	hr. 1.3	hr. 1.0	hr. 1.2	hr. 1.2	hr. 1.0	hr. 0.7	hr. 2.3	hr. 2.0	hr. 1.8	hr. 2.7	hr. 2.7	hr. 2.0	hr. 1.3	hr. 1.5	hr. 1.1	hr. 2.2	hr. 0.3	hr. 0.6	hr. 0.6	hr. 1.2	hr. 1.0	hr. 1.0	hr. 0.9	hr. 33.5			

494. Richmond (Kew Observatory):  $H_r = 5.5$  metres +  $0.53$  metres.

August, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration			
1											2.0	.2															hr. 9.7		
2														2.3	1.7							2.7	.8				hr. 3.0		
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													
13													.3														3.2	1.1	
14																													
15																													
16																													
17																													
18																													
19																													
20																													
21																											3.3	0.3	
22		1.8	(1.5)																								4.4	0.6	
23																													
24																													
25																													
26																													
27																													
28																													
29																													
30									.2	.1	.7													1.4	2.2	1.2	.3	5.1	2.7
31																											1.0	1.1	
Sum.		1.8	1.5	4.4	2.0		1.1	0.1		0.7	2.0	0.2	0.3	2.3	1.7							4.1	3.0	1.7	2.7	29.6	9.4		
Total Duration	hr.	hr. 0.1	hr. 0.4	hr. 0.6	hr. 0.5	hr.	hr. 0.6	hr. 0.1	hr.	hr. 0.6	hr. 0.2	hr. 0.2	hr. 0.2	hr. 0.8	hr. 1.0	hr.	hr.	hr.	hr.	hr.	hr.	hr. 0.6	hr. 1.3	hr. 1.2	hr. 1.0	hr. 9.4			
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24				

Amounts, in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

495. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) =  $H$  (height of station above M.S.L.) +  $h_r$  (height of receiving surface above ground) = 5.5 metres + 0.53 metres. September, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration 0-24	
Day.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-1	0-4
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	7	(3.5)	(3.6)	(1.3)	2.1	2.2	1.3	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	2	1	2	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	(...)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-1	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-2	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-4	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-2	
19	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23.5	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-7	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0-7	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	3	P	P	P	(.1)	P	(P)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Sum.	0.5	0.2	...	0.1	0.7	0.3	0.9	5.0	4.9	1.3	2.1	2.3	1.6	2.0	4.1	5.3	2.3	1.7	16.4	1.3	2.4	1.3	1.4	0.9	59.0	32.3	
Total Duration.	hr. 0.6	hr. 0.1	hr. 0.1	hr. 0.2	hr. 0.6	hr. 0.3	hr. 1.2	hr. 1.7	hr. 2.3	hr. 1.0	hr. 1.0	hr. 1.2	hr. 1.4	hr. 1.8	hr. 2.9	hr. 2.7	hr. 1.7	hr. 1.6	hr. 1.9	hr. 1.5	hr. 1.7	hr. 2.5	hr. 1.6	hr. 0.7	hr. 32.3		

496. Richmond (Kew Observatory):  $H_r$  = 5.5 metres + 0.53 metres.

October, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Duration	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.1	1.3	.7	.3	...	...	...	...	...	...	...	...	3.4
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.9
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.7
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.4
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.6
10	...	...	5	2.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.1
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	7	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10.6
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.7
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.6
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	6	2	4	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sum.	4.2	6.6	8.1	1.8	2.0	4.5	4.0	4.3	2.3	1.2	4.1	2.5	1.1	3.3	10.0	6.7	9.5	15.6	4.7	5.4	6.4	5.2	6.4	7.1	127.0	84.2	
Total Duration.	hr. 5.0	hr. 5.3	hr. 3.7	hr. 3.0	hr. 2.3	hr. 2.1	hr. 2.8	hr. 2.3	hr. 1.6	hr. 1.3	hr. 3.3	hr. 2.0	hr. 1.7	hr. 3.0	hr. 5.3	hr. 5.0	hr. 6.2	hr. 5.7	hr. 2.5	hr. 3.4	hr. 3.5	hr. 3.1	hr. 4.5	hr. 5.6	hr. 84.2		
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24		

Amounts, in millimetres, for periods of sixty minutes between the exact hours, Greenwich Mean Time.

497. Richmond (Kew Observatory):  $H_r$  (height of receiving surface above M.S.L.) = H (height of station above M.S.L.) + h (height of receiving surface above ground) = 5.5 metres + 0.53 metres.

November, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	Dura- tion 0-24		
Day-1	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	hr.	
1	...	...	...	...	...	...	(...)	...	...	...	...	...	...	...	...	...	...	...	...	...	(...)	(...)	(...)	(...)	(...)	0.8	0.8	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.6	0.7	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.7	...	...	...	...	...	1.9	1.3
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	.1	.1	.1	.1	.1	.1	(...)	(...)	...	.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.5	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.7	4.0	
14	...	(...)	(.1)	...	(...)	(.1)	.1	.1	.2	.2	.2	.2	.1	...	.1	.1	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.5	5.4	
16	...	(...)	(.1)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	0.4	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	.6	.1	.3	.3	.2	...	.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.1	3.9	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.4	1.1	
21	.4	2.0	.4	(...)	(...)	(.1)	(...)	(...)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.9	2.2	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.2	5.4	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.6	0.1	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.3	1.6	
25	.1	...	.3	.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.5	1.1	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	(...)	(.1)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(.1)	.4	.7	.4	...	...	...	...	...	...	1.6	2.5	
29	(...)	(.1)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	0.1	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.2	5.2	
Sum.	1.2	2.3	1.3	0.5	0.3	0.3	0.7	0.1	0.2	0.3	0.5	0.3	1.6	1.2	2.5	2.8	1.5	0.9	0.7	2.1	1.1	0.8	1.7	0.8	25.7	36.2		
Total Duration	hr. 2.6	hr. 1.8	hr. 2.9	hr. 1.6	hr. 1.7	hr. 0.7	hr. 1.1	hr. 0.4	hr. 0.4	hr. 0.8	hr. 1.0	hr. 1.0	hr. 2.2	hr. 1.0	hr. 1.9	hr. 2.1	hr. 1.7	hr. 1.7	hr. 1.6	hr. 1.7	hr. 1.3	hr. 1.8	hr. 1.6	hr. 1.6	hr. 36.2			

498. Richmond (Kew Observatory):  $H_r$  = 5.5 metres + 0.53 metres.

December, 1932.

Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24	hr.		
1	.1	.1	.1	.4	.2	.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.6	3.4	
2	(...)	(...)	(...)	(.1)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	2.6	5.4	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.5	0.8	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	(...)	(...)	(.1)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	0.1	0.1	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.2	1.5
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.9	3.3
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	0.1	0.2	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	0.2
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	(...)	(...)	(...)	(.1)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	(...)	0.4	0.7	
Sum.	0.1	0.1	0.2	0.6	0.3	1.2	0.7	...	0.1	0.2	...	0.7	0.4	0.6	1.0	1.1	0.4	0.3	0.3	1.5	0.9	0.2	0.3	0.4	11.6	18.4		
Total Duration	hr. 0.3	hr. 0.2	hr. 0.4	hr. 1.0	hr. 0.6	hr. 1.4	hr. 1.0	...	hr. ...	hr. 0.3	...	hr. 1.2	hr. 1.0	hr. 1.1	hr. 2.0	hr. 1.5	hr. 1.0	hr. 0.8	hr. 0.6	hr. 1.1	hr. 1.2	hr. 0.5	hr. 0.5	hr. 0.7	hr. 18.4			
Hour G. M. T.	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-24			

Note.- For Annual Totals, see table 485





DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

501. Richmond (Kew Observatory):  $h_g$  (Height of recorder above ground) = 13.3 metres.

March, 1932.

Hour L. A. T.																					Total for Day.	Per cent. of Possible.	Radiation at Noon. Ångstrom Pyrheliometer.		
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Sky	Total mw/cm <sup>2</sup>			Vertical mw/cm <sup>2</sup>		
Day. 1	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.2	66	Hazy	37	19	
2	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.6	33	...	...	...	
3	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.5	23	...	...	...	
4	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.2	11	...	...	...	
6	---	---	---	...	1.0	1.0	1.0	1.0	1.0	.9	.6	.4	.8	.5	...	---	---	---	8.2	73	...	...	...		
7	---	---	---	...	.7	1.0	1.0	1.0	1.0	1.0	.7	...	...	...	...	---	---	---	6.4	57	...	...	...		
8	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...		
9	---	---	---	...	...	1.0	1.0	.9	.3	.3	.5	.3	...	...	---	---	---	---	4.3	38	...	...	...		
10	---	---	---	...	...	.4	1.0	.4	.6	.7	.4	...	...	...	---	---	---	---	3.5	31	...	...	...		
11	---	---	---	...	.2	.2	.9	1.0	1.0	.7	.5	.9	.3	.4	...	---	---	---	6.1	53	...	...	...		
12	---	---	---	...	.2	.9	1.0	1.0	1.0	1.0	1.0	1.0	.6	...	---	---	---	---	8.7	75	...	...	...		
13	---	---	---	...	.9	1.0	.7	.9	.9	...	...	...	...	...	---	---	---	---	4.4	38	...	...	...		
14	---	---	---	...	...	...	...	...	...	.7	1.0	1.0	.9	...	---	---	---	---	4.6	39	...	...	...		
15	---	---	---	...	...	...	...	...	...	.3	...	...	.5	1.0	...	---	---	---	1.8	15	...	...	...		
16	---	---	---	...	...	...	...	.6	1.0	1.0	1.0	1.0	1.0	.2	...	---	---	---	5.8	49	...	...	...		
17	---	---	---	...	.1	.2	...	.2	...	...	...	...	...	...	---	---	---	---	0.5	4	...	...	...		
18	---	---	---	...	.4	.4	...	...	...	...	...	...	...	...	---	---	---	---	0.8	7	...	...	...		
19	---	---	---	...	.7	1.0	1.0	.1	...	.2	.9	.8	.1	...	---	---	---	---	4.8	40	...	...	...		
20	---	---	---	...	.3	.7	.5	.4	1.0	1.0	.9	.9	1.0	.2	...	---	---	---	6.9	57	...	...	...		
21	---	---	---	...	...	...	.4	.1	...	.1	...	...	...	...	...	---	---	---	0.6	5	...	...	...		
22	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...		
23	---	---	---	...	...	.5	1.0	1.0	1.0	.2	...	...	...	...	...	---	---	---	3.7	30	...	...	...		
24	---	---	---	...	...	.1	.6	1.0	1.0	1.0	1.0	.3	.2	...	...	---	---	---	5.2	42	...	...	...		
25	---	---	---	...	.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.3	...	---	---	---	<u>9.8</u>	<u>79</u>	...	...	...		
26	---	---	---	...	.2	.8	.6	.7	.1	.2	...	...	...	...	...	---	---	---	2.6	21	...	...	...		
27	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	...	...	...		
28	---	---	---	...	.1	.3	.6	.9	.9	.6	.8	.3	.7	.3	.6	.3	...	---	6.4	51	...	...	...		
29	---	---	---	...	.3	1.0	1.0	.8	...	...	...	...	...	...	---	---	---	---	3.1	24	...	...	...		
30	---	---	---	...	...	.4	.6	.9	.9	.3	.6	.8	.1	.7	...	---	---	---	5.3	42	...	...	...		
31	---	---	---	...	...	.2	.6	.4	.4	.3	.6	.4	...	...	...	---	---	---	2.9	23	...	...	...		
Sum.	---	---	...	1.6	8.3	13.2	15.8	15.1	15.8	14.1	13.5	12.1	8.2	2.9	0.3	...	---	---	120.9	--	---	---	---		
Mean	---	---	...	.05	.27	.43	.51	.49	.51	.45	.44	.39	.26	.09	.01	...	---	---	3.90	33	---	---	---		

502. Richmond (Kew Observatory):  $h_g$  = 13.3 metres.

April, 1932.

Hour L. A. T.																					Total for Day.	Per cent. of Possible.	Radiation at Noon. Ångstrom Pyrheliometer.		
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Sky	Total mw/cm <sup>2</sup>			Vertical mw/cm <sup>2</sup>		
1	---	---	...	...	...	...	...	.3	.1	.3	.5	...	...	...	...	...	...	...	1.2	9	...	...	...		
2	---	---	...	...	...	...	...	1.0	1.0	.9	.9	1.0	.1	...	...	...	...	---	4.9	38	...	...	...		
3	---	---	...	...	...	...	...	...	...	...	...	...	.1	.3	...	...	...	---	0.4	3	...	...	...		
4	---	---	...	...	...	...	...	...	...	.1	.8	.7	.3	.1	.8	.1	.7	...	3.6	28	...	...	...		
5	---	---	...	...	...	...	...	.4	1.0	1.0	1.0	1.0	.8	.5	.4	...	---	7.2	55	...	...	...			
6	---	---	...	...	...	...	...	...	...	...	...	...	.1	...	...	...	---	---	0.1	1	...	...	...		
7	---	---	...	...	...	...	...	.9	.9	.8	.8	.7	1.0	.3	.8	.6	.6	---	7.9	59	...	...	...		
8	---	---	...	...	...	...	...	.7	.4	.9	.8	.7	1.0	.3	.8	.6	.6	---	7.6	57	...	...	...		
9	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	0.4	3	...	...	...		
10	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	...	...	...	...	...		
11	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	1.3	10	...	...	...		
12	---	---	...	.1	1.0	1.0	1.0	.9	1.0	1.0	.9	.6	.6	.1	.1	...	---	---	8.9	65	Clear	82	60		
13	---	---	...	.1	1.0	1.0	1.0	.9	.9	.9	.9	.6	.5	...	.1	.3	...	---	8.2	60	Clear	79	58		
14	---	---	...	...	...	...	...	...	...	.2	.1	...	...	.6	.1	.6	...	---	1.6	12	...	...	...		
15	---	---	...	...	...	...	...	...	...	...	...	.1	.3	.3	.8	.8	...	---	2.4	17	...	...	...		
16	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	...	...	...	...	...		
17	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	...	...	...	...	...		
18	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	4.8	34	...	...	...		
19	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	0.1	1	...	...	...		
20	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	2.2	16	...	...	...		
21	---	...	.2	1.0	1.0	.9	1.0	.4	.8	.3	.8	.8	.6	.4	...	...	---	---	8.2	58	...	...	...		
22	---	...	.2	.9	.9	.2	1.0	.9	1.0	.8	.4	.8	1.0	.9	.7	.4	...	---	<u>10.1</u>	<u>71</u>	...	...	...		
23	---	...	...	...	...	...	...	.2	.9	.8	1.0	1.0	1.0	.6	.7	.4	...	---	7.6	53	...	...	...		
24	---	...	...	1.0	.6	.4	.5	.6	.5	.2	.5	.3	.2	.2	...	...	---	---	5.0	35	...	...	...		
25	---	...	...	.7	1.0	1.0	1.0	1.0	.2	.2	.1	.1	...	...	...	...	---	---	5.3	37	...	...	...		
26	---	...	.1	.8	1.0	1.0	1.0	.5	.2	.2	.1	.1	...	.3	.4	...	---	---	5.7	39	...	...	...		
27	---	...	...	...	...	...	...	.1	.3	...	...	...	...	.9	.5	...	---	---	2.0	14	...	...	...		
28	---	...	...	...	...	...	...	...	...	...	...	...	...	.9	.1	...	---	---	1.5	10	...	...	...		
29	---	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	2.0	14	...	...	...		
30	---	...	...	.4	.4	...	.3	.9	.6	.9	.8	.2	.3	.5	.5	.3	...	---	6.6	45	...	...	...		
Sum.	---	...	2.2	9.0	8.9	9.5	11.7	10.9	12.0	10.9	7.8	9.6	10.3	7.3	5.6	1.1	...	---	116.8	--	---	---	---		
Mean	---	...	.07	.30	.30	.32	.39	.36	.40	.36	.26	.32	.34	.24	.19	.04	...	---	3.89	28	---	---	---		
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible	Radiation at Noon. Ångstrom Pyrheliometer.				

503. Richmond (Kew Observatory):  $h_s$  (Height of recorder above ground) = 13.3 metres.

May, 1932.

Hour L. A. T.																					Total for Day.	Per cent. of Possible.	Radiation at Noon. Angstrom Pyrheliometer.		
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Sky.	Total.			Vertical.		
Day-1	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%		$mw/cm^2$	$mw/cm^2$
1	...	...	...	6	1.0	0.8	0.2	0.9	0.1	...	...	...	0.4	0.6	...	...	...	...	...	...	4.6	31	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.3	2	...	...	...
5	...	...	3	2	7	2	1	...	1	8	5	2	9	4	2	7	...	...	...	5.3	35	...	...	...	
6	...	...	1	3	...	...	...	3	...	...	2	6	1	3	...	...	...	...	...	1.9	13	...	...	...	
7	...	...	...	...	...	1	7	9	3	8	...	5	3	1.0	3	...	...	...	...	4.9	32	...	...	...	
8	...	...	7	1.0	1.0	9	1.0	1.0	1.0	1.0	5	3	...	...	...	...	...	...	...	8.4	55	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	6	1.0	1.0	1.0	8	8	7	9	8	5	4	4	...	...	...	...	...	8.9	58	...	...	...	
11	...	...	...	...	...	...	...	...	3	8	5	1	...	...	...	...	...	...	...	1.7	11	...	...	...	
12	...	...	...	...	...	...	1	1	1	...	...	2	...	8	8	1	...	...	...	2.2	14	...	...	...	
13	...	...	...	...	4	4	...	...	...	...	...	...	...	...	...	...	...	...	...	0.8	5	...	...	...	
14	...	...	...	...	7	3	8	4	8	9	7	8	2	...	...	...	...	...	...	6.4	41	...	...	...	
15	...	...	...	...	...	...	...	1	5	...	...	...	...	...	...	...	...	...	...	0.6	4	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	3	3	...	...	...	...	...	...	0.6	4	...	...	...	
17	...	...	...	2	9	8	8	7	1.0	9	1.0	1.0	1.0	1.0	1.0	1.0	4	...	11.7	75	Clear	74	62		
18	...	...	2	1.0	1.0	8	1.0	7	...	...	1	...	...	...	...	...	...	...	...	4.8	31	Clear	73	62	
19	...	...	...	...	2	9	1.0	1.0	1.0	1.0	1.0	9	9	7	9	8	2	...	10.5	67	Clear	77	65		
20	...	...	...	...	...	...	...	...	4	8	9	7	4	1	...	...	...	...	...	3.3	21	...	...	...	
21	...	...	...	...	8	7	9	1.0	1.0	3	1	...	...	...	...	...	...	...	...	4.8	30	Clear	69	59	
22	...	...	...	...	...	2	7	9	5	2	7	7	7	6	...	...	...	...	...	5.2	33	...	...	...	
23	...	...	...	...	1	1	2	...	...	2	...	4	5	4	...	...	...	...	...	2.3	14	...	...	...	
24	...	...	...	...	1	...	...	1	...	1	...	1	...	...	6	3	1	...	...	1.4	9	...	...	...	
25	...	...	9	1.0	6	2	3	1	...	...	...	...	...	...	...	1	...	...	...	3.2	20	...	...	...	
26	...	...	3	1.0	1.0	8	8	8	6	2	8	1	3	...	3	6	...	...	...	7.6	47	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	2	5	...	...	...	...	...	...	...	...	...	...	...	...	...	0.7	4	...	...	...	
29	...	...	...	...	...	...	4	...	1	2	3	7	7	6	3	1	...	...	...	3.4	21	...	...	...	
30	...	...	...	...	1	...	1	4	7	...	...	...	...	4	1	7	...	...	...	2.5	15	...	...	...	
31	...	...	...	...	9	1.0	1.0	1.0	7	2	3	7	3	1	...	...	...	...	...	6.2	38	...	...	...	
Sum.	...	...	3.1	6.3	9.6	10.1	10.8	11.5	8.7	9.3	8.5	8.6	8.0	9.0	5.6	4.4	0.7	...	...	114.2	--	--	--	--	
Mean.	...	...	10	20	31	33	35	37	28	30	27	28	26	29	18	14	02	...	...	3.68	24	--	--	--	

504. Richmond (Kew Observatory):  $h_s$  = 13.3 metres.

June, 1932.

Hour L. A. T.																					Total for Day.	Per cent. of Possible.	Radiation at Noon. Angstrom Pyrheliometer.		
	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Sky.	Total.			Vertical.		
1	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	%		$mw/cm^2$	$mw/cm^2$
1	...	...	...	...	...	...	...	...	...	1	1	1	9	1.0	3	3	...	...	...	...	2.7	17	...	...	...
2	...	...	...	...	...	...	7	9	9	8	9	9	1.0	8	5	...	...	...	...	...	8.1	50	...	...	...
3	...	...	...	...	...	...	...	...	1.0	1.0	6	2	1	...	...	...	...	...	...	...	2.9	18	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	7	6	...	...	...	1.4	9	...	...	...
6	...	...	...	9	9	8	7	7	6	6	3	...	4	7	1.0	3	...	...	...	...	7.9	48	...	...	...
7	...	...	...	6	1.0	1.0	9	9	8	7	9	9	2	4	5	3	...	...	...	...	8.2	50	...	...	...
8	...	...	...	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	0.3	2	...	...	...
9	...	...	3	1.0	8	1	1.0	8	8	7	1.0	7	1	1.0	1.0	1.0	4	...	...	...	10.7	65	...	...	...
10	...	...	2	1.0	1.0	1.0	1.0	1.0	1.0	9	8	1.0	9	9	9	5	2	...	...	...	12.3	75	...	...	...
11	...	...	...	...	...	5	3	5	1	...	1	1	2	...	5	5	...	...	...	...	2.8	17	...	...	...
12	...	...	1	3	1.0	7	6	9	9	8	...	2	1.0	8	3	1	...	...	...	...	8.7	53	...	...	...
13	...	...	1.0	1.0	1.0	4	6	1	1	6	8	9	1.0	1.0	1.0	1.0	2	...	...	...	10.7	65	...	...	...
14	...	...	1	9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	6	...	...	...	14.6	88	...	...	...
15	...	...	...	2	4	9	8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	4	...	...	...	...	10.7	65	Clear	82	72
16	...	...	...	...	...	2	1.0	1.0	1.0	1.0	1.0	9	9	8	7	4	8	2	...	...	8.9	54	Hazy	63	56
17	...	...	6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	6	1.0	1.0	1.0	3	...	...	...	14.5	88	Clear	77	68
18	...	...	7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9	9	1.0	1.0	...	...	...	...	13.5	81	Hazy	74	65
19	...	...	...	7	9	9	8	8	5	...	...	...	...	...	...	...	...	...	...	...	4.6	28	...	...	...
20	...	...	2	8	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.2	7	...	...	...
21	...	...	...	...	...	...	...	...	...	...	3	7	8	7	3	...	2	...	...	...	3.0	18	...	...	...
22	...	...	...	...	...	4	8	9	1.0	9	9	9	9	1.0	1.0	5	...	...	...	...	8.3	50	Hazy	50	44
23	...	...	4	1.0	1.0	1.0	1.0	1.0	1.0	7	8	3	5	2	9	1	...	...	...	...	9.9	60	...	...	...
24	...	...	...	...	2	...	...	...	...	...	...	...	...	1	3	...	...	...	...	...	0.7	4	...	...	...
25	...	...	...	1	...	7	7	4	6	6	7	4	9	3	...	...	...	...	...	...	5.4	33	...	...	...
26	...	...	7	8	...	3	1.0	7	1	2	2	4	9	8	2	4	...	...	...	...	6.7	40	...	...	...
27	...	...	5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	...	...	...	13.5	82	...	...	...
28	...	...	4	1	4	2	6	7	7	9	8	1	5	9	8	3	...	...	...	...	7.6	46	...	...	...
29	...	...	3	9	8	9	6	2	1.0	8	1.0	9	9	9	1.0	9	5	...	...	...	10.7	65	...	...	...
30	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	0.1	1	...	...	...
Sum.	...	1.0	6.9	13.5	13.2	14.3	17.2	17.6	16.9	16.1	15.7	14.6	16.2	17.2	16.5	11.6	2.1	...	...	...	210.6	--	--	--	--
Mean.	...	03	23	45	44	48	57	59	56	54	52	49	54	57	55	39	07	...	...	...	7.02	43	--	--	--
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21			Total for Day.	Per cent. of Possible	Sky.	Total.	Vertical.
Radiation at Noon. Angstrom Pyrheliometer.																									

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

505. Richmond (Kew Observatory):  $h_s$  (Height of recorder above ground) = 13.3 metres.

July, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day	Per cent. of Possible.	Radiation at Noon. Angstrom Pyrheliometer.		
																					Sky.	Total. mm/cm <sup>2</sup>	Vertical. mm/cm <sup>2</sup>
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.1	43	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.1	25	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.9	42	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12.6	77	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.4	2	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9.6	59	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.3	26	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10.0	61	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.8	48	Hazy	71	62
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12.7	78	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.2	38	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.1	7	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.3	2	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8.3	51	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.2	14	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.8	5	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	1	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9.4	59	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.2	45	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.7	30	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.5	3	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.0	19	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.2	46	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.8	31	Clear	85	70
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.1	1	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.3	2	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.5	23	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.9	32	...	...	...
Sum.	...	0.8	5.5	8.6	11.4	14.0	13.4	9.2	10.8	10.4	10.3	10.5	9.9	10.2	9.0	5.3	0.8	...	140.1	--	--	--	--
Mean	...	.03	.18	.28	.37	.45	.43	.30	.35	.34	.33	.34	.32	.33	.29	.17	.03	...	4.52	28	--	--	--

506. Richmond (Kew Observatory):  $h_s$  = 13.3 metres.

August, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day	Per cent. of Possible.	Radiation at Noon. Angstrom Pyrheliometer.		
																					Sky.	Total. mm/cm <sup>2</sup>	Vertical. mm/cm <sup>2</sup>
1	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	4.7	31	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.2	8	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.2	41	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5.4	36	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.6	44	Clear	85	69
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7.9	52	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10.2	68	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8.2	55	Clear	81	66
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8.6	58	Hazy	79	64
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11.9	80	Hazy	85	69
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12.4	84	Hazy	77	62
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5.1	35	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11.2	76	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.1	8	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.9	6	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5.8	40	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10.3	71	Hazy	59	47
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9.5	66	Hazy	58	46
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10.9	76	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6.6	46	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.7	19	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	1	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5.0	35	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.4	24	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8.2	59	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.3	24	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8.0	58	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.4	32	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.2	31	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.4	25	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9.0	66	...	...	...
Sum.	...	...	1.0	5.0	10.0	14.2	15.4	17.8	19.0	19.0	18.9	16.6	16.7	17.8	15.8	9.0	0.3	...	196.5	--	--	--	--
Mean	...	...	.03	.16	.32	.46	.50	.57	.61	.61	.61	.54	.54	.57	.51	.29	.01	...	6.34	44	--	--	--
Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day	Per cent. of Possible.	Sky.	Total. mm/cm <sup>2</sup>	Vertical. mm/cm <sup>2</sup>

DURATION OF BRIGHT SUNSHINE.

For periods of sixty minutes, between the exact hours of Local Apparent Time.

507. Richmond (Kew Observatory):  $h_s = 13.3$  metres. (Height of recorder above ground) = 13.3 metres.

September, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	Radiation at Noon- Angstrom Pyrheliometer.		
	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.			Sky.	Total. mw/cm <sup>2</sup>	Vertical. mw/cm <sup>2</sup>
1	---	---	---	.7	.9	.8	1.0	.4	...	...	...	...	...	...	...	---	---	---	3.8	28	...	...	...
2	---	---	...	...	...	.1	.5	.2	.5	.6	.1	...	...	.1	...	---	---	---	2.1	16	...	...	...
3	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	0.1	1	...	...	...
4	---	---	...	.9	1.0	1.0	1.0	1.0	.5	.7	.3	.1	...	...	...	---	---	---	6.5	49	...	...	...
5	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...
6	---	---	...	...	...	...	...	...	.2	.7	.1	...	...	...	...	---	---	---	1.0	8	...	...	...
7	---	---	...	.7	1.0	.7	.8	1.0	.7	.8	.3	...	.5	.8	1.0	.1	---	---	8.4	64	...	...	...
8	---	---	...	...	...	.1	...	...	...	...	...	...	...	...	...	---	---	---	0.1	1	...	...	...
9	---	---	...	...	...	...	...	.7	1.0	.7	1.0	.8	...	.9	.8	...	---	---	6.8	52	...	...	...
10	---	---	...	...	...	...	...	...	...	...	...	...	...	.3	.1	...	---	---	0.6	5	...	...	...
11	---	---	...	...	...	...	...	...	...	.3	.6	1.0	.9	1.0	.8	...	---	---	4.6	36	...	...	...
12	---	---	...	.8	1.0	.9	.8	.8	...	...	...	...	...	...	...	---	---	---	4.3	34	...	...	...
13	---	---	...	...	...	...	...	...	...	...	.1	.1	.1	.3	...	---	---	---	0.6	5	...	...	...
14	---	---	...	.6	1.0	1.0	1.0	.4	.4	.7	.9	.5	.7	.4	...	---	---	---	8.5	67	...	...	...
15	---	---	...	...	.3	.6	.6	...	...	...	...	.4	1.0	.5	...	---	---	---	3.4	27	...	...	...
16	---	---	...	...	...	...	.9	1.0	1.0	1.0	.6	...	...	...	...	---	---	---	3.5	28	...	...	...
17	---	---	...	...	...	...	1.0	.8	.7	1.0	.9	.6	.1	...	...	---	---	---	5.1	41	...	...	...
18	---	---	...	...	...	.5	.2	...	...	...	...	...	...	...	...	---	---	---	0.7	6	...	...	...
19	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...
20	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...
21	---	---	...	.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.8	...	...	---	---	9.9	81	Clear	61	39
22	---	---	...	...	.2	.2	...	...	...	...	...	...	...	...	...	---	---	---	0.4	3	...	...	...
23	---	---	...	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...
24	---	---	...	...	...	...	...	...	...	...	...	.1	.9	.9	...	---	---	---	1.9	16	...	...	...
25	---	---	...	...	...	...	...	.9	.8	.2	.1	.8	.4	...	...	---	---	---	3.2	27	...	...	...
26	---	---	...	...	.9	1.0	1.0	1.0	1.0	1.0	.9	1.0	1.0	1.0	.4	---	---	---	10.2	86	Clear	77	47
27	---	---	...	...	...	.1	.6	.4	.1	...	...	.4	.6	.8	...	---	---	---	3.0	25	...	...	...
28	---	---	...	...	.7	1.0	1.0	1.0	.8	.5	.3	.4	.6	.1	...	---	---	---	6.4	54	...	...	...
29	---	---	...	...	...	...	...	.4	.1	.4	.1	...	...	...	...	---	---	---	1.0	9	...	...	...
30	---	---	...	...	.3	1.0	1.0	1.0	.8	.5	.1	.2	.3	...	...	---	---	---	6.5	56	...	...	...
Sum.	---	---	...	4.1	9.0	10.2	11.5	11.9	9.6	10.1	7.3	7.8	8.9	8.3	3.8	0.1	---	---	102.6	--	--	--	--
Mean	---	---	...	.14	.30	.34	.38	.40	.32	.34	.24	.26	.30	.28	.13	.00	---	---	3.42	27	--	--	--

508. Richmond (Kew Observatory):  $h_s = 13.3$  metres.

October, 1932.

Hour L. A. T.	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total for Day.	Per cent. of Possible.	Radiation at Noon- Angstrom Pyrheliometer.		
	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.	hr.			Sky.	Total. mw/cm <sup>2</sup>	Vertical. mw/cm <sup>2</sup>
1	---	---	---	...	.2	.8	1.0	1.0	.7	.5	...	...	...	...	...	---	---	---	4.2	36	...	...	...
2	---	---	---	...	.8	.8	1.0	1.0	.7	...	.9	.6	.8	.2	...	---	---	---	6.8	59	...	...	...
3	---	---	---	...	...	...	...	...	...	...	.3	.5	...	...	...	---	---	---	0.8	7	...	...	...
4	---	---	---	...	.8	1.0	1.0	1.0	1.0	1.0	.9	1.0	.9	...	---	---	---	9.6	84	Hazy	62	35	
5	---	---	---	...	.5	1.0	1.0	1.0	1.0	.6	...	...	...	...	---	---	---	5.1	45	...	...	...	
6	---	---	---	...	.9	1.0	1.0	1.0	.1	1.0	.5	.4	1.0	.7	...	---	---	---	7.6	67	Clear	61	34
7	---	---	---	...	...	...	...	...	.2	.6	.2	.7	.2	...	...	---	---	---	1.9	17	...	...	...
8	---	---	---	...	...	...	...	...	...	...	...	...	.3	...	...	---	---	---	0.3	3	...	...	...
9	---	---	---	...	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...
10	---	---	---	...	...	...	.6	1.0	1.0	.9	.9	.8	.5	...	---	---	---	6.5	59	Clear	65	34	
11	---	---	---	...	...	...	...	...	...	...	.1	...	...	...	---	---	---	0.1	1	...	...	...	
12	---	---	---	...	...	...	...	...	...	.7	1.0	.9	1.0	.3	...	---	---	---	3.9	36	...	...	...
13	---	---	---	...	...	...	.3	.1	.2	.1	1.0	.8	.6	.8	...	---	---	---	3.9	36	...	...	...
14	---	---	---	...	...	...	...	.2	.9	.5	.4	.9	.3	.3	...	---	---	---	3.5	33	Clear	76	45
15	---	---	---	...	...	.4	.7	1.0	.8	.5	.1	.6	.2	.1	...	---	---	---	4.4	41	...	...	...
16	---	---	---	...	...	.2	.1	.5	.1	...	...	.3	.1	.1	...	---	---	---	1.4	13	...	...	...
17	---	---	---	...	...	.2	1.0	.5	.7	.7	.2	.1	1.0	.5	...	---	---	---	4.9	47	...	...	...
18	---	---	---	...	.7	1.0	.9	.6	.6	.7	.9	.6	.8	.4	...	---	---	---	7.2	69	...	...	...
19	---	---	---	...	.3	1.0	1.0	1.0	1.0	.4	.5	...	...	...	---	---	---	5.2	50	...	...	...	
20	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	---	...	...	...	...	...
21	---	---	---	...	.1	1.0	1.0	1.0	.2	...	...	...	...	...	---	---	---	3.3	32	...	...	...	
22	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	0.2	2	...	...	...	
23	---	---	---	...	...	.4	.7	.1	...	...	...	...	...	...	---	---	---	1.2	12	...	...	...	
24	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...	
25	---	---	---	...	...	1.0	.9	.9	.3	...	...	...	...	...	---	---	---	3.1	31	...	...	...	
26	---	---	---	...	.2	.1	.6	.7	1.0	.2	.1	.1	.5	.1	---	---	---	3.6	36	...	...	...	
27	---	---	---	...	...	...	...	...	.1	.5	1.0	.7	.9	...	---	---	---	3.2	32	...	...	...	
28	---	---	---	...	...	...	.1	.1	...	...	...	...	...	...	---	---	---	0.2	2	...	...	...	
29	---	---	---	...	.1	1.0	.7	...	...	...	...	...	...	...	---	---	---	1.8	18	...	...	...	
30	---	---	---	...	...	...	...	...	...	...	...	...	...	...	---	---	---	...	...	...	...	...	
31	---	---	---	...	...	...	.6	.7	.3	.4	...	.1	.5	...	---	---	---	2.6	27	...	...	...	
Sum.	---	---	---	...	5.0	11.2	13.6	13.3	10.9	9.3	9.1	9.0	10.1	5.0	...	---	---	---	96.5	--	--	--	--
Mean	---	---	---	...	.16	.36	.44	.43	.35	.30	.29	.29	.33	.16	...	---	---	---	3.11	29	--	--	--



Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

511. Richmond (Kew Observatory):

H<sub>a</sub> (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 13 columns for hour intervals (0-1 to 11-12) and 2 rows per hour (Day and Mean). Each cell contains wind speed in m/s. Includes a 'Mean.' row at the bottom.

512. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

Table with 13 columns for hour intervals (0-1 to 11-12) and 2 rows per hour (Day and Mean). Each cell contains wind speed in m/s. Includes a 'Mean.' row at the bottom.

Averages for periods of sixty minutes, centred at Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 5 metres + 25 metres.

January, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day	
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	m/s		
215	6.4	215	5.6	225	5.4	220	5.0	220	5.5	225	5.8	225	5.8	225	5.1	235	5.6	245	5.9	255	5.0	265	5.0	265	4.0	1
250	7.1	255	6.0	245	6.5	250	6.5	245	6.3	250	6.1	245	5.7	260	5.9	260	6.5	260	6.0	255	5.9	255	6.9	260	6.0	2
260	8.4	260	7.5	265	7.5	265	7.2	265	7.0	265	7.8	260	7.8	265	8.0	265	7.5	260	7.5	260	6.5	260	7.0	260	7.6	3
230	7.1	235	6.4	230	6.7	225	7.5	220	7.4	220	7.2	220	8.5	205	9.5	205	9.2	200	8.0	205	9.0	240	7.4	240	6.6	4
225	8.9	220	10.2	220	9.7	220	9.6	220	9.6	220	9.6	220	11.0	220	12.1	215	10.7	215	10.8	215	10.6	215	10.5	215	8.0	5
220	11.7	220	12.2	220	11.9	220	11.1	220	11.4	230	11.8	250	12.3	250	9.5	250	8.2	255	6.8	285	5.2	270	4.3	<u>2.5</u>	6	
235	2.3	260	2.9	260	3.2	280	1.3	240	1.4	225	2.0	230	2.5	240	2.5	230	1.9	230	1.4	230	0.6	220	1.2	220	2.9	7
240	1.5	250	1.4	270	1.1	280	1.6	290	0.8	255	(0.1)	215	(0.3)	200	2.0	210	1.6	225	1.0	215	1.4	225	0.9	1.2	8	
185	5.5	180	5.1	180	5.9	180	6.9	180	8.1	175	8.2	180	8.6	180	9.0	185	9.3	190	9.9	190	10.0	190	10.5	4.3	9	
180	8.0	180	8.9	175	8.9	175	8.9	170	8.2	180	10.0	185	9.9	190	9.7	190	7.9	195	5.6	195	5.2	195	4.9	9.3	10	
200	5.0	195	5.0	190	4.2	180	3.0	185	3.5	185	4.0	195	3.6	200	3.0	205	2.5	205	1.0	210	0.9	205	1.1	3.9	11	
200	4.6	210	5.2	205	5.9	195	5.0	190	4.9	180	5.4	180	6.0	180	7.0	185	7.2	190	7.1	185	7.2	185	7.6	4.2	12	
230	6.8	230	6.7	220	5.5	215	7.1	220	7.4	220	7.6	220	7.8	225	6.9	240	6.5	235	5.1	235	5.2	240	5.2	7.8	13	
200	8.5	200	9.0	195	7.5	200	6.5	185	6.0	185	6.0	186	6.7	185	5.9	185	8.0	190	9.0	195	9.0	190	9.9	6.7	14	
235	(5.6)	240	5.8	235	5.2	225	4.8	200	4.6	200	4.3	200	4.1	200	5.4	205	6.2	195	5.0	190	3.6	195	4.1	6.2	15	
210	8.5	210	9.4	210	9.2	210	8.9	210	10.0	205	9.6	200	9.8	205	9.9	200	9.7	205	9.9	205	9.8	195	9.5	8.2	16	
245	5.0	250	4.8	250	5.0	240	4.9	225	4.0	210	3.6	205	3.8	200	3.9	205	3.9	205	4.1	215	4.1	225	6.0	6.0	17	
220	4.8	225	5.9	225	5.5	225	5.0	220	4.7	210	4.5	205	4.5	200	4.6	190	3.9	200	3.5	215	4.5	225	4.6	5.6	18	
250	2.5	250	2.7	250	2.0	250	(1.0)	260	(1.0)	50	(0.5)	185	(0.8)	185	(1.0)	190	(1.0)	185	(0.5)	360	(0.1)	---	0.0	1.9	19	
185	1.3	170	2.0	170	2.3	140	1.4	155	0.9	175	3.5	200	1.7	205	0.5	180	0.6	235	0.5	190	0.5	155	0.5	<u>1.0</u>	20	
180	1.6	195	2.4	175	2.5	195	3.5	200	2.8	190	1.5	210	2.3	200	0.6	195	1.0	170	1.4	210	2.0	195	1.5	1.1	21	
220	2.5	230	3.7	215	2.5	190	1.6	175	1.5	180	1.5	210	1.0	170	1.4	135	0.3	140	0.2	175	0.2	---	0.0	1.9	22	
140	2.0	135	1.7	155	2.0	160	1.6	160	1.8	135	2.0	115	3.0	105	2.1	100	2.0	95	3.0	85	4.5	85	3.9	1.7	23	
175	4.5	180	3.5	185	3.6	185	3.5	185	3.7	180	2.9	180	3.5	190	2.5	235	1.5	295	0.5	270	0.1	190	1.1	2.9	24	
225	1.2	255	1.0	225	1.0	205	1.1	220	0.5	255	0.4	10	2.1	35	2.5	15	2.3	15	3.0	20	3.6	35	2.6	1.2	25	
35	3.4	40	3.0	65	3.3	90	5.2	80	4.2	85	3.7	80	4.5	75	3.5	90	3.1	100	2.6	95	3.4	95	3.5	3.3	26	
115	4.5	90	4.0	90	3.5	85	3.9	105	2.7	100	2.2	80	3.8	100	2.7	85	3.6	85	3.9	110	3.5	115	3.0	3.6	27	
245	(1.7)	270	2.1	360	0.9	150	0.1	260	0.6	240	2.0	230	3.1	240	3.0	265	2.4	260	2.0	260	2.1	265	2.8	2.0	28	
225	3.5	225	3.8	225	4.2	235	3.5	235	2.9	230	2.9	230	2.5	225	3.0	225	2.5	230	2.0	225	2.1	225	1.6	2.7	29	
250	1.0	245	0.5	320	0.7	10	2.6	25	3.0	40	3.7	50	2.2	35	2.7	50	2.6	10	2.0	360	2.1	10	1.9	1.4	30	
5	2.4	360	1.5	340	1.4	360	2.1	15	2.0	15	3.0	10	2.3	20	2.4	10	2.5	20	1.8	355	1.4	315	1.0	1.6	31	
---	4.8	---	4.9	---	4.7	---	4.6	---	4.5	---	4.6	---	<u>4.9</u>	---	4.8	---	4.6	---	4.2	---	4.2	---	4.2	4.3		

February, 1932.

260	1.5	280	1.3	270	0.3	210	0.8	195	1.4	200	1.5	205	1.3	210	1.4	230	0.9	225	0.9	255	0.7	290	0.5	1.3	1
360	3.5	10	4.1	15	3.7	5	3.5	5	2.4	325	1.4	315	1.3	310	1.9	315	1.7	320	2.5	320	2.7	340	2.5	2.5	2
215	1.4	220	1.9	230	2.6	250	2.6	260	1.7	290	0.5	300	0.3	235	0.4	210	0.9	220	0.5	230	0.2	210	0.6	1.2	3
260	1.0	240	0.5	315	0.1	20	2.1	10	1.0	5	0.5	310	0.2	235	0.9	250	1.5	240	0.5	220	1.0	210	0.6	<u>0.6</u>	4
25	2.5	30	2.0	30	3.4	20	2.5	5	3.1	360	2.9	360	2.9	20	2.8	30	2.6	35	2.5	45	2.8	45	2.8	2.7	5
75	3.2	85	3.5	65	3.8	70	8.0	80	3.1	115	3.6	95	3.1	95	3.4	95	2.6	55	1.1	25	1.3	335	0.9	2.8	6
240	1.0	230	0.9	260	0.6	15	1.3	20	2.0	20	3.1	25	2.6	20	2.5	360	1.3	310	0.5	325	1.0	345	1.4	1.1	7
265	2.4	265	2.4	330	2.1	335	2.6	330	1.7	320	1.7	305	2.6	300	2.1	310	2.5	335	2.8	325	2.6	330	3.3	1.9	8
40	8.0	45	8.0	40	8.0	45	6.4	35	5.8	45	5.9	50	7.2	50	7.3	50	7.1	35	5.2	20	4.5	25	4.9	6.0	9
60	9.1	55	10.7	55	11.5	50	11.6	50	9.9	50	10.2	50	10.4	55	8.9	55	8.0	55	8.9	55	9.9	60	9.6	9.3	10
50	6.4	40	6.5	50	6.0	60	6.4	45	5.5	40	4.6	35	4.8	30	5.2	20	4.3	10	3.1	10	3.0	5	4.1	6.2	11
65	9.5	80	8.2	70	9.2	75	7.7	65	7.5	55	6.5	50	5.3	30	4.8	30	4.7	35	4.2	30	4.0	30	3.5	5.8	12
360	2.5	360	(3.9)	5	(3.9)	360	(3.3)	5	(2.3)	5	(1.9)	5	(1.9)	5	(0.9)	345	(1.4)	360	(2.4)	5	(2.4)	10	(2.3)	2.2	13
40	6.1	50	6.6	30	5.5	40	5.2	15	4.1	360	3.8	10	5.1	15	4.4	10	4.1	5	4.1	360	4.4	360	4.9	4.1	14
360	4.2	5	5.0	5	5.6	360	4.0	360	4.0	10	3.6	360	3.0	360	2.8	355	2.9	350	2.5	345	3.0	340	2.5	3.6	15
40	4.6	30	4.9	40	5.1	50	4.1	30	3.2	25	3.0	20	3.3	20	3.1	30	2.6	30	2.6	20	2.6	5	1.8	3.3	16
35	4.0	50	5.3	50	4.8	50	4.9	45	4.5	50	5.0	65	5.1	60	5.0	75	5.1	75	5.0	80	6.2	85	6.9	3.8	17
75	4.0	70	4.0	90	5.1	90	5.2	80	4.3	80	4.7	75	4.5	75	4.7	80	4.1	60	3.0	55	2.5	35	2.6	3.7	18
45	6.7	50	6.7	55	7.0	55	5.5	40	5.2	30	4.4	25	3.8	20	3.5	20	4.4	20	4.1	20	3.4	5	3.2	4.0	19
50	7.4	50	7.5	45	7.0	30	6.5	30	6.7	25	5.4	20	4.6	20	4.9	30	4.6	25	3.4	5	3.0	5	3.0	5.3	20
335	3.1	335	(5.4)	330	(5.7)	305	(4.1)	295	(3.8)	285	(3.5)	285	(3.4)	280	(1.8)	310	(3.5)	315	(5.7)	305	(3.5)	305	(2.4)	3.2	21
360	5.4	10	6.1	355	6.3	355	5.5	350	3.9	350	3.0	360	3.3	360	3.0	355	2.5	350	2.0	340	2.1	335	2.0	3.2	22
5	4.9	5	4.9	5	4.6	5	5.0	360	3.3	355	3.5	335	3.0	320	2.2	285	2.0	280	1.8	305	2.9	310	3.5	3.2	23
50	7.9	50	7.4	55	6.6	50	6.8	40	7.5	35	7.0	65	6.6	55	6.0	60	6.9	70	6.5	60	6.6				

Directions expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

513. Richmond (Kew Observatory):

H<sub>a</sub> (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with columns: Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12. Rows include Day (1-31) and Mean values.

514. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

Table with columns: Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12. Rows include Day (1-31) and Mean values.



Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. +  $h_2$  (height of anemograph above ground) = 5 metres + 23 metres.

March, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s		
75	10.9	85	10.9	75	10.4	80	9.9	75	10.2	75	8.7	65	6.8	60	6.7	55	5.0	50	4.5	35	3.4	40	3.5	7.9	1
85	3.5	90	4.1	90	3.6	95	3.4	90	4.2	90	4.1	90	3.9	95	2.5	85	2.5	70	2.8	70	2.2	90	1.9	2.7	2
40	5.2	35	5.3	30	4.6	30	4.4	20	4.0	20	4.0	20	5.1	30	5.0	35	4.1	30	3.6	15	3.4	10	2.4	3.5	3
20	5.2	15	5.5	25	6.0	25	5.1	30	4.6	25	5.1	20	3.9	30	3.9	20	2.5	20	3.0	30	3.9	15	2.0	3.9	4
(215)	5.1	(220)	4.9	(230)	5.2	(245)	5.1	(250)	5.1	(245)	4.8	(225)	3.9	(225)	5.2	(220)	5.4	(220)	6.2	(220)	6.0	(230)	5.7	3.3	5
(280)	7.6	(280)	6.7	(280)	5.9	(280)	6.2	(265)	5.8	(265)	5.4	(255)	3.8	(250)	4.0	(240)	4.0	(245)	5.0	(255)	5.6	(250)	4.3	4.8	6
(290)	6.4	(280)	6.4	(265)	6.1	(255)	6.1	(250)	6.5	(245)	6.5	(240)	5.6	(235)	5.7	(235)	6.7	(240)	7.6	(245)	7.7	(250)	7.0	5.3	7
(300)	3.2	(305)	3.5	(295)	3.1	(270)	3.4	(300)	3.5	(300)	3.3	(265)	2.4	(245)	2.0	(245)	2.0	(235)	2.6	(240)	1.5	(270)	1.0	4.3	8
40	4.4	45	3.7	30	3.7	40	4.7	55	4.3	30	4.7	35	5.0	60	3.6	40	1.8	10	1.3	5	2.0	345	1.0	3.0	9
310	4.6	305	4.5	295	4.3	285	3.3	270	4.5	260	2.0	310	3.6	290	2.5	250	1.5	255	0.6	285	1.4	285	1.7	2.3	10
360	3.7	360	4.3	360	5.2	15	5.1	15	5.0	35	5.6	55	6.5	65	7.6	50	7.7	45	6.8	45	5.6	35	5.0	3.7	11
60	4.9	60	4.6	50	3.5	40	2.9	30	2.5	5	2.7	20	2.1	30	1.0	180	0.5	210	1.1	280	0.1	---	0.0	3.6	12
90	1.3	10	1.8	5	1.5	350	0.5	360	1.0	100	0.9	100	1.4	100	1.3	90	1.3	85	0.5	60	0.5	355	0.8	<u>0.8</u>	13
90	4.6	85	4.7	90	4.8	95	3.6	90	3.8	95	3.3	95	3.6	75	4.0	70	3.4	65	2.0	35	1.0	40	0.8	2.1	14
80	6.2	85	6.6	85	5.8	85	7.2	85	6.2	85	5.9	85	6.6	75	6.5	80	6.0	65	4.4	50	4.0	35	3.0	4.7	15
45	5.1	50	5.0	65	5.5	80	5.5	85	5.5	85	5.4	105	4.2	85	5.0	75	6.8	65	4.8	55	6.2	50	5.2	4.8	16
45	6.8	40	6.5	30	6.9	25	6.9	20	7.2	30	6.7	25	6.3	30	6.4	15	4.7	10	4.1	30	6.2	15	4.7	5.6	17
10	5.0	360	4.8	355	4.9	360	4.9	10	4.5	360	5.0	340	2.0	335	1.7	335	1.5	340	1.6	325	0.4	325	0.5	3.2	18
270	2.8	265	4.1	265	3.8	270	3.7	295	3.4	315	2.4	340	2.5	330	1.3	290	0.9	260	1.3	255	0.7	240	1.4	1.8	19
270	2.6	290	1.8	275	1.7	265	2.4	260	2.8	265	2.2	260	1.7	265	1.5	250	1.5	260	1.4	235	0.9	215	1.7	1.6	20
240	4.0	245	4.1	230	4.7	235	3.8	215	2.8	190	3.3	190	3.3	205	3.7	215	4.0	220	3.0	190	2.1	185	2.0	2.8	21
165	4.0	185	4.1	185	3.4	205	2.7	230	2.0	240	1.2	240	1.1	240	0.6	265	0.5	315	0.7	310	0.8	245	0.9	2.0	22
320	2.4	310	3.3	345	3.2	10	1.1	170	0.9	210	0.8	160	1.3	165	2.4	190	1.0	115	1.3	95	0.6	90	0.7	1.3	23
150	3.4	180	2.2	180	2.4	255	2.3	210	2.5	195	3.0	195	2.2	180	2.2	160	2.9	140	0.9	145	1.2	165	4.1	2.3	24
150	7.7	140	8.1	135	7.8	130	7.8	125	7.5	120	5.4	115	5.7	110	5.8	110	5.2	95	5.0	90	5.0	90	5.0	5.2	25
75	6.9	70	6.8	75	6.2	125	4.1	145	2.1	125	0.8	80	0.9	95	1.9	105	1.8	135	2.0	120	1.5	115	1.0	4.8	26
180	7.7	185	8.1	175	8.7	170	8.4	155	8.1	155	8.4	175	9.3	180	9.8	180	7.5	190	8.1	200	10.2	220	10.0	6.7	27
215	10.5	220	10.6	215	10.8	210	10.1	215	10.1	215	8.6	210	6.7	210	6.3	210	5.2	210	6.1	205	6.3	195	4.1	8.3	28
205	7.7	200	7.1	195	6.9	205	7.4	215	8.7	215	9.3	210	8.6	215	9.3	215	9.5	210	9.5	205	9.4	200	10.0	7.4	29
230	9.3	240	7.9	230	9.0	215	8.9	220	8.9	220	7.7	220	6.7	210	6.1	195	4.7	195	5.1	210	5.8	210	5.2	<u>8.6</u>	30
215	6.8	215	7.4	215	7.2	270	4.1	245	3.0	220	3.5	245	1.9	270	2.0	310	3.5	10	6.2	15	6.5	20	6.4	5.1	31
---	<u>5.5</u>	---	5.5	---	5.4	---	5.0	---	4.9	---	4.5	---	4.1	---	4.0	---	3.7	---	3.6	---	3.6	---	3.3	4.1	

April, 1932.

°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	Mean	Day
180	3.1	200	3.1	245	2.7	230	3.7	220	4.6	215	6.1	210	5.5	210	5.2	210	5.2	200	6.5	200	7.6	200	7.6	200	7.5	4.5	1								
270	6.3	255	4.7	235	4.1	210	4.5	205	4.5	205	3.2	190	2.1	200	1.5	190	1.6	195	1.6	200	0.4	190	1.7	190	1.7	4.4	2								
300	0.4	185	0.4	150	1.7	240	0.8	360	0.1	170	0.5	165	0.2	155	0.3	110	0.2	135	0.3	160	0.2	90	0.6	<u>0.8</u>	3	3	3								
240	5.5	245	4.3	245	4.3	230	4.9	380	5.0	275	4.4	285	3.5	285	2.7	285	1.6	315	0.3	5	3.0	5	5.2	3.5	4	4									
360	6.3	345	6.4	350	6.0	325	5.5	315	5.7	290	5.3	290	4.1	275	2.9	270	3.2	290	5.3	265	5.1	255	4.0	5.4	5	5									
255	9.8	255	9.9	260	10.0	255	8.4	250	7.6	250	8.2	250	8.0	245	7.5	245	8.5	240	8.9	235	9.0	235	8.3	7.1	6										
270	10.7	265	10.2	260	11.6	260	10.9	265	10.8	265	10.7	265	10.7	265	7.8	265	6.5	270	7.5	270	8.0	270	8.2	<u>9.1</u>	7										
300	7.0	285	6.5	290	8.4	315	8.4	310	7.5	315	6.7	310	5.3	290	2.5	280	2.4	270	1.8	245	1.9	240	2.3	6.6	8										
220	8.5	225	8.0	210	10.1	210	9.5	215	8.5	220	9.3	220	9.8	220	9.4	220	8.6	220	8.0	220	8.7	220	9.0	7.0	9										
240	7.6	245	8.4	230	8.4	225	7.3	220	8.4	215	8.1	215	7.8	215	7.5	220	6.7	225	5.9	260	5.8	260	3.3	8.4	10										
260	3.7	295	4.4	315	9.0	315	10.5	310	5.5	290	4.5	305	5.7	290	5.0	280	5.3	290	5.8	285	4.5	275	3.2	4.7	11										
335	7.2	330	6.9	340	7.2	330	5.9	325	6.1	30	4.9	15	3.1	15	4.2	10	3.4	315	1.8	275	2.4	295	2.9	5.1	12										
305	3.1	295	2.8	285	2.6	270	3.6	260	3.2	220	3.4	215	5.1	215	5.2	205	4.4	205	4.1	200	4.3	220	5.3	3.1	13										
180	3.7	170	5.1	160	5.0	185	5.6	205	3.6	185	4.7	155	3.0	155	2.5	160	3.4	175	3.5	160	4.2	145	3.5	5.3	14										
95	6.8	90	8.5	90	10.9	85	11.4	85	10.9	80	9.5	65	9.3	65	9.4	55	8.0	50	7.4	45	6.7	45	6.8	6.3	15										
35	7.3	45	7.2	45	6.3	45	7.1	45	6.2	50	7.0	45	6.1	45	5.3	40	5.3	35	4.8	35	5.2	30	4.9	6.8	16										
40	7.8	40	7.1	40	7.1	40	7.3	45	7.8	45	7.4	40	8.0	45	8.2	40	8.6	30	7.6	40	7.5	35	7.1	6.9	17										
20	6.9	30	5.4	25	6.4	25	7.5	25	6.8	20	7.5	25	6.8	20	6.4	15	5.0	15	3.9	10	3.5	10	3.2	1.1	18										
290	3.7	285	3.0	280	2.8	275	2.7	285	4.0	280	2.9	265	2.2	235	2.3	215	2.7	225	3.0	225	3.1	225	3.9	2.6	19										
235	7.5	230	6.3	215	6.7	220	7.5	210	7.5	215	6.0	215	6.7	215	5.8	215	5.7	215	3.7	210	3.8	215	3.6	5.9	20										
215	10.2	205	9.4	210	9.3	210	9.6	215	10.0	245	6.8	240	5.8	210	5.0	220	4.6	230	3.8	235	3.3	250	3.9	6.1	21										
230	4.5	245	4.3	260	4.0	260	4.4	255	4.1	260	2.5	260	2.5	225	3.1	225	4.0	230	3.5	230	3.3	225	3.7	3.3	22										
285	6.3	280	5.9	275	6.5	285	6.6																												

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

515. Richmond (Kew Observatory):

H<sub>a</sub> (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 24 columns for wind speed intervals (0-1 to 11-12) and 24 rows for hours of the day (1-24), plus a mean row. Each cell contains two values: degrees and m/s.

516. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

Table with 24 columns for wind speed intervals (0-1 to 11-12) and 24 rows for hours of the day (1-24), plus a mean row. Each cell contains two values: degrees and m/s.

WIND : DIRECTION AND SPEED.

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 5 metres + 23 metres.

May, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	m/s	
70	5.0	75	4.9	115	4.0	105	3.7	90	4.6	95	3.7	95	5.4	75	3.5	20	1.4	15	1.4	325	1.9	310	1.2	3.1	1
250	5.7	240	6.2	245	5.7	240	5.8	240	3.4	240	3.1	265	3.2	275	3.6	270	3.2	265	3.0	265	4.0	265	3.5	4.2	2
10	6.1	15	6.5	15	7.5	20	8.9	20	8.0	20	8.2	20	8.7	20	9.4	15	8.5	15	9.2	15	8.4	15	7.8	6.0	3
15	7.4	20	7.3	15	7.4	15	6.7	15	7.5	15	6.7	20	6.3	15	6.6	15	5.2	10	4.9	360	3.4	340	2.8	7.0	4
355	6.4	5	7.2	355	5.1	355	5.7	10	4.8	350	5.5	350	3.2	310	1.8	295	1.4	310	1.7	315	2.5	325	2.6	4.3	5
345	2.7	355	3.8	335	3.0	335	4.5	335	3.0	25	4.8	15	2.0	20	1.8	10	1.5	5	1.6	340	1.2	310	0.7	2.3	6
220	1.5	280	1.7	250	2.7	270	2.6	250	2.6	230	5.0	230	7.8	225	4.4	280	1.3	240	2.5	220	2.0	205	1.7	1.9	7
230	4.0	230	3.6	225	3.3	225	3.0	220	5.6	210	3.5	210	2.1	195	2.6	185	3.0	180	2.2	130	0.5	75	0.7	2.6	8
340	5.6	330	5.7	310	5.5	290	4.8	290	4.8	285	4.9	295	4.2	305	3.6	285	2.5	280	3.0	280	3.0	265	2.1	3.8	9
270	4.9	270	5.3	280	4.9	275	5.1	280	4.4	280	3.7	275	3.9	285	3.9	250	2.9	230	3.2	225	3.0	225	3.1	3.1	10
280	5.3	275	5.4	275	5.2	270	3.6	240	3.3	235	4.3	220	4.6	215	4.9	220	4.8	220	4.5	220	4.5	215	5.2	3.7	11
215	10.0	220	10.0	225	10.1	220	10.0	225	9.9	235	9.4	220	6.6	225	6.9	220	6.6	210	5.7	205	5.8	205	5.0	7.3	12
205	8.0	215	7.4	220	9.4	230	7.9	235	7.0	230	5.7	240	4.5	240	3.6	225	3.5	225	2.9	235	2.8	240	3.0	5.6	13
155	1.4	160	1.7	105	2.1	145	2.3	130	2.7	130	2.9	95	4.8	85	4.5	75	4.0	70	4.1	80	4.6	80	5.0	2.6	14
25	2.5	70	1.4	350	1.5	305	0.8	320	2.2	355	2.1	70	1.7	70	2.1	100	1.5	100	1.7	105	1.8	105	0.6	2.5	15
215	2.5	210	3.0	255	2.0	265	2.0	260	2.1	275	1.6	250	1.3	230	0.8	205	0.2	255	2.6	270	2.4	260	1.9	2.2	16
260	3.9	245	4.5	255	4.3	240	4.4	230	4.5	230	5.1	235	5.4	230	4.1	220	2.7	210	2.8	215	2.6	205	1.4	3.0	17
195	6.4	190	6.4	195	6.5	190	6.2	210	5.8	190	5.2	190	4.1	200	4.0	225	3.5	235	0.6	205	0.7	195	2.2	3.5	18
205	6.6	210	6.5	215	6.6	210	6.0	195	5.4	190	5.5	190	4.8	190	3.3	180	1.2	210	1.6	225	2.3	215	3.3	3.6	19
190	5.2	205	4.8	200	5.8	190	5.0	190	6.4	185	4.4	185	3.6	185	2.4	175	1.7	70	0.8	60	0.9	325	1.8	2.8	20
195	5.4	235	5.8	270	4.2	255	3.3	265	3.1	290	2.5	320	2.0	310	2.0	305	2.0	295	1.4	285	1.9	275	2.4	3.4	21
290	4.9	270	3.4	255	6.5	275	4.9	285	4.9	240	5.2	235	4.7	270	4.5	270	4.7	265	4.3	245	4.3	245	2.7	5.0	22
275	1.4	220	2.8	200	4.1	195	3.3	210	3.9	230	4.6	245	3.9	360	2.6	25	1.1	15	2.6	35	3.8	25	4.5	3.1	23
20	7.1	15	7.0	20	6.0	20	6.9	15	6.8	15	6.8	10	6.4	15	5.9	15	3.5	15	3.0	360	2.0	340	1.6	5.8	24
345	4.4	335	3.2	355	4.5	355	4.8	355	4.3	350	3.6	350	3.0	340	2.8	330	1.3	330	0.9	330	0.5	295	0.3	3.1	25
20	4.5	25	3.4	20	4.5	20	3.6	10	4.1	10	4.6	15	4.2	10	3.6	5	2.0	335	1.5	325	1.5	335	1.8	2.2	26
295	1.7	265	2.5	265	2.6	265	1.4	260	2.0	260	2.3	265	1.7	255	1.7	250	1.8	220	2.3	225	2.0	235	1.8	2.0	27
280	0.8	215	2.1	205	5.2	210	4.5	230	2.7	225	2.0	230	1.7	220	1.9	215	2.9	210	3.0	205	3.0	210	3.1	2.1	28
185	6.1	190	6.5	180	6.4	185	6.2	190	5.9	180	5.9	175	5.0	160	4.0	165	3.9	165	3.6	155	3.1	160	2.9	4.1	29
190	2.8	205	1.5	275	2.3	325	2.1	355	2.2	255	0.7	250	1.7	240	1.4	215	0.7	225	1.1	225	2.3	225	1.6	1.7	30
125	0.7	60	1.4	170	2.5	10	1.2	50	0.7	240	0.7	190	4.0	190	2.0	190	0.5	---	0.0	30	0.1	65	0.5	1.0	31
---	4.5	---	4.6	---	4.9	---	4.6	---	4.5	---	4.3	---	4.1	---	3.6	---	2.7	---	2.7	---	2.7	---	2.5	3.5	

June, 1932.

30	4.3	25	4.5	15	4.2	15	5.0	15	4.4	15	4.7	15	4.9	35	3.1	50	1.0	40	1.5	50	1.9	65	1.9	3.2	1
45	5.8	45	5.0	40	4.8	40	4.7	35	4.0	65	4.0	65	3.3	20	4.6	20	3.6	30	3.3	15	4.4	15	5.0	4.3	2
55	4.9	40	5.3	60	5.5	40	6.5	80	5.7	95	5.8	80	5.4	50	6.2	50	5.9	45	6.2	60	5.3	60	4.8	5.1	3
45	4.9	55	4.0	45	4.6	65	4.0	65	3.9	50	3.3	60	3.6	80	4.3	60	3.0	50	1.5	20	2.6	10	1.8	4.3	4
40	5.6	60	5.0	85	4.0	45	5.4	75	4.9	85	5.1	65	3.9	45	2.9	20	4.2	20	4.9	15	4.9	10	2.9	4.2	5
10	6.6	10	5.4	360	4.4	360	4.0	10	4.7	25	3.0	15	2.2	10	0.6	---	0.0	---	0.0	195	0.3	195	0.7	3.5	6
325	4.9	315	4.0	320	4.8	320	4.3	325	3.8	310	4.1	310	3.0	280	1.6	265	1.2	260	1.5	275	1.6	290	1.0	2.4	7
290	4.5	290	4.9	285	4.7	290	5.0	285	4.0	290	3.5	290	2.1	275	1.3	250	1.6	245	1.5	245	1.7	235	1.2	2.7	8
255	2.6	250	3.7	235	3.7	205	5.2	220	4.9	245	4.1	235	3.0	210	3.3	195	1.4	195	2.0	200	1.4	200	0.5	2.4	9
125	4.8	125	5.3	130	5.5	150	6.0	145	5.5	140	5.0	130	3.1	110	2.5	90	4.0	75	4.8	65	4.5	65	4.0	2.8	10
185	5.9	185	5.4	195	5.0	205	5.0	210	4.1	195	4.0	205	4.8	195	4.9	210	3.6	190	2.7	205	2.7	220	3.2	3.6	11
130	1.4	165	1.2	120	0.9	340	1.5	340	1.1	15	1.3	20	3.2	40	3.9	45	3.0	45	2.0	25	0.1	15	0.3	1.6	12
30	6.9	30	7.1	30	7.0	30	7.3	35	7.0	40	7.1	40	6.9	40	6.8	40	6.8	35	7.5	35	7.8	35	7.1	6.2	13
55	7.0	35	7.3	30	7.5	35	8.5	30	8.5	35	7.9	35	8.6	35	7.5	35	6.6	30	5.7	30	4.9	20	5.0	6.8	14
25	7.4	20	7.3	20	6.5	25	6.9	20	7.2	15	6.8	20	6.6	20	6.5	20	6.0	15	5.4	15	5.2	15	4.7	6.3	15
45	5.4	50	5.8	50	5.8	65	5.7	80	5.9	85	5.9	85	5.7	80	5.7	55	4.6	65	6.5	65	5.2	50	4.9	5.1	16
20	4.6	40	3.8	85	4.4	80	5.0	80	5.2	90	5.5	90	6.3	90	5.8	100	4.0	90	4.4	90	5.1	85	2.0	4.2	17
20	5.3	20	4.4	20	4.3	25	5.5	30	6.0	30	6.2	30	5.8	35	6.0										

Directions expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

## 517. Richmond (Kew Observatory):

 $H_a$  (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926

Hour. G. M. T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12	
	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s
1	175	6.9	180	9.0	180	9.1	185	8.6	180	8.9	180	7.7	300	6.7	210	6.9	235	5.5	285	5.5	250	7.0	245	7.7
2	220	5.0	225	4.1	230	3.5	240	4.0	250	3.5	250	4.0	265	4.4	275	3.9	270	5.0	275	4.9	275	5.2	275	5.3
3	220	1.7	220	1.7	225	2.4	215	1.7	205	2.5	210	3.2	200	3.6	225	4.3	210	5.0	220	5.5	210	6.5	200	6.2
4	160	2.5	115	1.1	140	1.7	160	1.2	175	2.5	180	4.4	180	4.4	185	4.2	190	6.2	190	7.8	185	7.8	190	7.2
5	215	0.7	240	0.5	---	0.0	25	0.2	280	0.9	260	0.9	265	1.6	310	1.6	350	1.2	360	0.6	285	2.5	280	1.3
6	240	1.7	250	1.7	250	2.4	260	2.3	255	1.9	255	2.4	265	3.0	275	2.2	265	3.2	245	3.8	250	4.8	245	4.5
7	220	2.0	215	2.5	215	2.2	225	2.1	230	1.9	235	1.5	260	2.5	275	2.0	285	2.0	260	2.8	270	3.2	240	1.8
8	235	1.5	235	1.0	230	1.2	225	1.1	225	1.2	240	1.7	255	1.6	240	1.7	270	1.4	265	1.8	260	2.0	230	3.0
9	220	1.6	225	1.7	235	2.5	230	2.6	235	3.0	255	2.2	265	1.4	280	1.2	315	0.5	305	0.5	260	1.5	265	1.8
10	230	0.5	230	0.1	230	0.2	225	0.1	---	0.0	---	0.0	---	0.0	190	0.1	205	0.3	195	1.5	200	2.0	180	3.1
11	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	60	0.7	80	1.2	130	2.3	125	1.4	155	1.6
12	20	0.7	10	0.1	---	0.0	330	0.4	360	0.9	10	0.3	20	0.5	5	0.9	345	2.0	5	2.0	345	2.2	335	2.0
13	360	1.8	5	2.5	10	1.0	20	3.5	20	2.9	20	2.1	15	2.5	20	2.1	30	1.5	25	2.0	30	2.8	85	2.5
14	215	2.5	240	1.7	255	2.2	240	1.1	360	0.2	185	1.3	195	1.2	225	1.2	235	1.2	235	1.6	245	2.6	265	3.2
15	20	4.3	15	4.6	15	3.7	20	3.3	15	4.2	20	2.8	5	3.7	10	2.3	330	1.6	340	2.6	350	2.4	5	3.2
16	---	0.0	260	0.3	220	0.7	225	0.3	240	0.1	255	0.3	20	0.3	45	0.5	40	0.5	15	0.8	350	1.2	360	0.5
17	45	4.9	25	4.1	20	3.8	10	4.5	10	4.2	5	4.3	10	5.0	10	6.3	10	7.0	10	7.0	10	7.0	10	6.6
18	305	2.1	310	2.0	305	2.1	315	3.0	330	4.7	330	4.9	335	5.0	335	4.2	340	4.0	360	5.7	5	5.2	10	5.6
19	315	1.2	295	0.9	270	0.7	235	1.4	240	1.5	230	2.0	245	2.0	265	2.0	275	2.8	275	3.5	290	3.5	260	3.6
20	230	0.1	205	0.5	220	0.8	235	0.9	235	0.5	230	0.1	215	0.5	205	0.8	240	0.7	210	1.4	220	2.7	265	2.1
21	325	2.9	315	2.3	310	1.3	270	0.3	235	0.8	240	1.4	265	1.3	290	1.5	270	1.2	280	2.4	275	3.0	285	2.7
22	300	0.1	275	0.5	280	0.4	290	0.6	270	0.2	250	0.7	260	1.0	250	2.0	255	2.9	240	4.0	230	4.6	235	5.1
23	320	2.0	320	1.8	330	1.9	355	3.0	360	2.2	360	4.0	360	2.8	5	5.0	355	4.5	5	5.0	360	4.5	355	3.5
24	215	1.7	200	1.9	190	1.0	195	1.5	190	1.5	195	1.8	195	3.5	195	3.7	195	5.4	195	6.9	190	5.2	195	6.2
25	200	3.3	205	2.5	205	3.0	205	3.0	200	3.1	205	2.5	210	2.9	205	2.4	170	0.8	120	1.5	200	4.2	220	4.5
26	240	3.5	225	3.0	225	2.6	225	3.6	220	3.6	220	4.1	220	5.3	225	6.0	225	5.9	240	6.1	240	6.4	245	6.8
27	225	5.5	225	5.0	220	5.0	225	5.0	225	5.0	220	4.8	220	5.3	230	6.1	235	6.2	235	6.9	235	6.5	235	7.5
28	230	4.4	230	3.9	230	4.7	230	4.6	225	4.4	230	3.8	230	4.0	225	5.9	225	6.6	220	7.1	210	6.5	200	7.0
29	230	5.5	220	5.6	220	5.2	225	5.5	225	5.6	225	5.8	230	6.4	230	7.1	230	7.1	230	7.0	230	8.5	230	6.9
30	225	5.8	225	5.0	220	5.4	220	5.5	220	5.2	220	4.9	220	4.9	220	4.2	215	6.5	230	5.3	215	5.5	215	4.4
31	220	2.5	230	1.0	200	0.3	200	1.7	200	3.8	195	4.1	190	4.2	190	4.3	180	4.8	190	4.9	210	6.0	215	6.5
Mean.	---	2.5	---	2.3	---	<u>2.3</u>	---	2.5	---	2.6	---	2.7	---	3.0	---	3.1	---	3.4	---	3.9	---	4.3	---	4.3

518. Richmond (Kew Observatory):  $H_a = 5$  metres + 23 metres.

Hour. G. M. T.	0 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 7		7 - 8		8 - 9		9 - 10		10 - 11		11 - 12	
	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s
1	230	2.7	215	2.8	215	4.4	210	4.0	220	4.0	220	4.0	225	3.7	220	4.4	230	4.8	225	5.0	225	4.3	235	4.3
2	25	4.0	30	3.5	25	2.3	25	2.9	20	1.7	350	1.1	355	1.5	350	1.6	355	0.8	170	0.6	290	1.0	320	2.6
3	240	2.4	235	2.0	230	1.9	235	1.8	240	2.2	235	2.0	240	3.0	240	2.2	255	2.0	270	2.1	300	2.4	280	1.0
4	265	1.5	245	1.4	235	1.5	235	2.1	220	2.2	225	2.9	225	3.5	240	3.0	245	3.5	245	3.8	230	4.5	240	5.5
5	240	1.5	230	1.0	225	1.6	235	2.1	235	2.1	230	2.5	230	3.1	230	3.2	265	3.0	270	3.5	290	4.0	280	4.2
6	230	2.0	235	1.9	240	2.2	245	1.7	240	1.8	250	2.0	275	2.9	250	3.0	250	3.5	240	3.6	255	5.5	270	5.1
7	275	2.7	270	2.5	240	2.1	235	1.5	245	0.4	255	0.6	275	1.7	315	2.2	320	2.3	320	2.5	305	1.7	335	2.3
8	190	(0.7)	205	(1.5)	230	(1.7)	230	(1.2)	220	(2.3)	255	(0.5)	235	(2.5)	220	4.2	220	4.3	230	4.8	205	3.7	230	4.0
9	235	0.3	235	0.9	245	0.9	250	0.8	260	0.6	260	0.5	270	0.5	290	1.0	280	2.0	275	1.9	255	1.6	275	1.6
10	220	0.2	220	0.2	240	0.1	245	0.2	220	0.1	---	0.0	---	0.0	310	0.2	205	1.0	165	4.6	200	4.7	195	5.0
11	---	0.0	110	0.5	100	0.9	---	0.0	---	0.0	40	0.1	60	0.2	75	1.8	85	2.5	100	2.2	110	2.4	145	4.8
12	80	0.1	60	0.1	330	0.5	210	0.1	40	0.6	255	2.7	290	2.2	110	0.2	210	1.5	235	3.5	200	2.1	210	4.8
13	210	3.0	215	2.6	225	3.2	240	3.5	220	3.6	225	2.9	240	3.2	235	3.6	230	4.1	245	3.0	240	4.2	245	4.5
14	200	0.5	275	0.3	310	0.5	10	0.2	80	0.1	150	0.2	320	0.3	20	0.5	80	2.4	80	2.5	70	3.0	90	4.5
15	40	5.0	40	5.0	30	6.4	20	6.5	20	5.5	40	5.0	50	5.1	35	5.5	40	5.5	40	5.5	35	5.1	25	5.4
16	20	3.6	20	3.5	15	3.7	15	3.5	10	3.2	15	3.4	15	3.3	15	3.2	15	3.4	20	2.9	40	2.0	360	2.9
17	30	0.1	160	0.1	200	0.1	210	0.5	180	0.6	215	0.3	210	1.1	240	1.3	255	1.9	265	2.5	245	3.4	230	3.5
18	225	0.5	245	0.2	265	0.1	235	0.3	---	0.0	270	0.1	240	0.2	265	0.1	260	0.1	5	0.2	230	0.5	295	0.8
19	85	3.5	85	3.0	50	0.3	---	0.0	95	0.5	20	0.5	235	0.2	200	0.6	180	2.3	190	3.0	205	3.5	190	4.9
20	5	0.2	25	0.1	45	0.6	45	2.0	75	2.5	15	1.5	20	3.9	50	5.0	50	4.7	65	3.1	60	2.6	125	2.0
21	300	2.9	360	0.6	30	3.0	55	3.4	50	3.3	25	0.9	50	0.1	80	0.3	175	1.1	245	3.5	245	4.0	235	4.8
22	240	2.2	230	1.8	240	2.0	10	3.2	20	3.5	35	4.4	30	3.5	35	3.6	25	4.0	20	4.3	20	3.7	20	4.1
23	30	5.0	25	4.0	30	3.5	30	3.5	40	4.0	40	4.9	40	4.9	45	5.4	40	5.8	35	4.9	30	4.6	35	4.0
24	65	4.8	40	3.3	40	3.3	55	3.5	50	3.8	45	4.6	40	4.3	35	4.3	30	4.1	45	4.5	50	3.3	55	3.6
25	55	5.4	65	5.0	50	4.4	50	5.0	45	4.1														



Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

519. Richmond (Kew Observatory):

H<sub>a</sub> (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with columns for Hour (G. M. T.), Day, and wind speed intervals (0-1 to 11-12) in m/s. Includes a 'Mean' row at the bottom.

520. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

Table with columns for Hour (G. M. T.) and wind speed intervals (0-1 to 11-12) in m/s. Includes a 'Mean' row at the bottom.

Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. +  $h_a$  (height of anemograph above ground) = 5 metres + 23 metres.

September, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	m/s	
235	6.4	230	6.0	225	6.2	220	6.8	220	6.2	220	6.4	220	6.3	215	6.4	225	6.5	225	5.9	225	6.1	230	6.1	4.4	1
250	8.1	245	7.6	245	7.3	240	7.7	230	9.0	230	8.9	225	8.6	230	8.0	230	6.5	230	9.5	230	9.4	230	9.6	7.3	2
255	6.4	250	6.5	250	6.6	255	5.5	260	6.4	245	5.5	250	5.2	260	4.1	265	3.3	275	3.5	265	3.5	270	3.4	6.5	3
290	4.8	280	4.9	280	4.4	280	5.0	270	4.4	270	3.8	270	2.4	265	1.8	245	1.5	250	1.7	230	1.5	220	1.6	3.1	4
210	5.4	210	5.8	200	6.0	215	5.9	215	4.8	220	5.9	200	2.5	180	2.7	190	2.9	190	3.4	190	4.2	185	4.5	3.4	5
220	9.3	225	9.5	220	8.9	215	7.8	215	7.3	210	7.1	220	7.0	240	5.6	250	4.9	245	3.1	240	2.7	240	3.1	5.4	6
240	5.1	220	4.9	265	4.2	200	3.5	210	5.3	220	5.2	220	4.1	210	3.3	215	3.8	205	2.9	205	2.5	210	4.2	3.8	7
190	8.7	180	8.0	185	7.5	185	8.0	185	7.5	180	7.5	180	7.6	180	5.9	180	6.0	175	6.0	190	5.4	200	4.9	6.3	8
230	1.6	195	1.9	210	2.8	215	4.4	220	4.2	195	4.0	195	3.3	190	2.5	205	2.2	200	2.0	195	2.2	200	1.5	2.2	9
220	7.5	220	7.5	230	6.7	230	8.5	230	7.6	230	5.4	220	5.2	230	4.0	240	4.0	230	3.7	220	3.0	230	4.0	4.8	10
285	9.2	290	8.7	290	8.6	290	8.3	285	6.5	270	6.0	270	6.0	265	5.9	265	5.7	260	5.0	265	3.8	265	3.1	7.2	11
250	6.1	240	5.3	245	4.0	240	4.5	220	5.0	220	4.4	235	3.4	245	2.4	255	0.9	240	0.8	270	0.7	310	0.6	3.9	12
260	3.2	260	3.5	255	3.5	260	3.2	260	4.0	255	3.4	255	3.4	235	3.3	245	4.8	260	3.8	260	4.3	235	2.4	2.2	13
330	3.5	320	3.8	320	3.0	350	2.6	240	2.3	330	1.2	330	0.3	340	0.2	320	0.1	330	0.1	---	0.0	220	0.2	2.5	14
20	0.8	10	1.7	10	1.2	70	2.2	65	1.8	90	2.0	85	1.9	85	2.3	80	2.7	75	1.9	90	1.9	85	1.7	1.0	15
75	5.0	75	5.2	85	4.1	85	3.9	90	3.0	100	3.6	100	4.5	85	2.3	110	1.4	220	0.4	15	0.3	25	0.1	3.0	16
250	2.1	240	2.5	270	2.6	270	3.2	255	2.7	275	1.2	305	0.3	245	0.3	215	0.7	235	1.4	230	1.3	215	2.0	1.1	17
220	4.8	220	3.9	225	3.2	225	2.8	225	2.8	240	0.5	325	2.9	10	1.9	320	0.9	330	0.9	350	2.9	345	1.7	2.7	18
350	3.2	350	4.0	345	2.7	330	1.0	330	1.2	340	1.0	350	1.0	350	0.4	360	0.2	25	0.3	25	0.5	10	1.4	1.2	19
40	4.4	50	4.3	50	4.4	50	4.3	50	4.5	45	4.9	50	5.0	50	5.1	55	5.4	55	5.0	50	4.2	45	4.5	3.2	20
50	5.4	60	5.9	75	5.8	60	5.5	70	4.9	90	4.1	95	4.5	95	4.4	85	3.9	90	3.4	80	3.0	50	3.0	4.5	21
100	4.9	100	6.2	95	7.5	90	6.5	100	4.6	85	3.5	65	2.1	70	1.5	65	1.0	20	0.5	345	1.5	355	1.8	3.7	22
5	3.0	20	3.5	15	3.5	10	3.8	360	4.5	15	4.0	10	3.1	15	3.0	15	2.4	10	3.1	20	1.4	10	1.5	2.5	23
340	3.5	335	3.1	310	2.6	290	3.8	270	3.4	235	2.2	230	3.5	215	2.1	210	3.3	225	5.3	210	4.7	205	4.4	3.0	24
230	6.9	215	6.9	210	7.1	205	7.1	230	6.1	230	3.6	215	5.1	220	5.6	220	5.5	220	5.3	220	4.6	215	4.0	5.7	25
260	4.8	255	3.9	255	4.3	270	3.8	275	3.5	270	1.8	260	1.4	250	1.8	260	1.9	255	0.7	250	0.7	260	1.2	2.5	26
20	7.1	10	6.9	20	6.6	15	7.5	20	7.3	15	7.2	10	5.3	15	6.5	10	6.5	10	6.2	10	5.3	10	6.0	4.9	27
75	6.9	70	6.4	65	6.0	80	7.1	65	6.8	60	7.0	60	6.6	55	6.0	60	5.7	50	5.5	50	5.5	45	5.5	5.7	28
80	10.7	85	12.4	80	10.4	85	9.0	85	8.4	85	7.1	90	6.5	95	5.3	110	3.7	110	2.5	115	1.4	145	2.5	6.5	29
180	6.1	185	6.0	195	5.5	205	4.2	195	4.0	180	2.7	155	2.1	180	4.5	200	5.4	200	4.2	190	3.1	190	4.3	3.9	30
---	5.5	---	5.5	---	5.2	---	5.3	---	5.0	---	4.4	---	4.0	---	3.6	---	3.5	---	3.3	---	3.0	---	3.2	3.9	

October, 1932.

290	7.3	315	3.5	350	6.0	350	4.5	345	4.1	325	2.4	310	2.1	315	2.0	295	1.3	270	0.9	295	0.7	325	1.6	4.3	1
265	6.9	270	7.0	280	6.8	280	6.8	300	6.6	270	3.2	265	3.0	265	3.7	260	3.4	270	3.9	280	3.0	285	2.6	4.0	2
280	2.3	310	2.8	305	2.3	290	4.5	275	2.3	300	(1.7)	325	(2.5)	355	3.6	330	2.0	345	2.6	360	2.0	355	1.5	2.2	3
360	2.7	350	2.5	315	2.1	330	2.4	335	2.0	330	1.0	270	0.2	260	0.3	220	0.9	215	1.2	225	1.6	220	0.7	1.2	4
270	3.6	250	2.2	270	2.2	255	1.6	260	1.7	230	1.5	230	1.7	220	0.7	210	1.5	205	1.8	215	0.9	230	2.0	1.4	5
205	6.1	215	6.4	210	6.8	210	6.2	200	4.9	190	3.2	180	2.8	175	2.5	180	1.9	175	2.5	180	2.5	180	2.8	2.6	6
195	7.4	200	7.7	200	7.4	200	6.0	195	6.3	190	5.5	185	5.0	185	5.5	180	5.5	180	5.9	180	5.9	170	5.8	5.2	7
195	6.9	215	5.7	215	4.1	200	3.2	190	1.5	175	1.8	170	2.3	175	2.2	185	2.1	185	1.8	200	2.5	195	1.2	5.0	8
345	3.0	330	1.7	305	2.2	295	2.8	315	1.7	260	1.0	220	1.5	220	2.1	235	2.0	230	2.3	225	2.4	230	1.7	1.7	9
235	2.6	260	1.8	260	2.3	240	3.2	245	2.8	235	2.1	215	2.1	220	1.7	210	2.8	215	3.6	220	3.8	220	4.6	1.9	10
255	3.3	245	3.9	270	2.9	270	1.4	305	2.3	275	3.6	250	2.0	235	2.8	260	2.4	265	2.6	260	2.6	255	1.9	2.9	11
245	1.0	255	0.5	225	2.6	230	4.4	215	3.1	200	2.9	200	4.1	200	2.8	195	4.1	190	4.4	195	4.4	205	6.0	2.5	12
245	7.0	245	6.7	255	6.7	255	7.1	255	7.3	245	6.2	245	5.3	240	5.1	245	5.1	240	5.0	235	4.5	240	3.8	6.2	13
315	4.8	295	4.4	290	5.5	285	5.0	275	4.0	280	3.7	250	2.5	255	3.7	255	4.4	260	4.8	265	5.0	275	5.7	3.3	14
320	6.7	320	5.2	320	5.4	305	4.1	310	3.7	295	3.6	285	2.3	275	2.4	265	2.5	260	2.3	245	2.8	245	2.4	4.3	15
310	3.2	295	4.4	295	3.9	295	3.8	290	2.6	250	1.5	215	1.8	240	4.0	235	3.8	225	5.0	235	4.4	265	4.9	3.7	16
310	6.2	305	5.4	310	4.4	300	3.5	260	1.7	220	2.6	230	3.6	235	4.0	235	4.3	230	5.4	225	6.1	230	7.0	5.0	17
310	8.1	315	7.6	310	5.9	305	5.4	300	4.8	285	2.5	275	2.4	265	2.7	275	3.0	265	3.0	270	3.1	275	2.6	6.5	18
250	3.1	235	4.0	245	3.7	240	4.4	220	4.3	210	4.2	210	3.6	215	3.7	200	2.8	200	3.8	215	4.6	210	5.9	2.9	19
235	4.6	250	3.6	250	2.2	205	2.2	195	2.1	205	1.8	265	1.0	335	1.8	5	1.6	115	1.1	20	1.1	175	1.1	4.0	20
240	5.2	250	4.1	225	2.0	210	1.3	220	4.7	225	7.4	225	8.5	220	9.3	220	9.4	220	8.9	220	9.5	220	8.9	7.0	21
210	10.1	215	9.8	245	7.8	265	5.8	265	5.6	265	5.1	245	3.6	245	3.1	235	3.0	225	2.8	220	1.3	180	0.7	6.7	22
200	7.1	285	6.9	240	5.6	230	3.6	210	2.3	280	1.4	5	4.0	330	1.3	250	1.3	270	2.2	275	3.3	275	3.1	3.6	23
235	1.0	155	0.2	195	0.2	280	0.7	315	1.6	325	2.0	330	1.7	305	2.2	290	2.0	295	1.6	290	2.0	290	2.6		

WIND : DIRECTION AND SPEED.

Direction expressed in degrees from North (E = 90°, S = 180°, W = 270°, N = 360°). Speed in metres per second.

521. Richmond (Kew Observatory):

H<sub>a</sub> (height of vane of anemograph above M.S.L.) = Height of ground above

Dines Anemograph from Jan., 1926.

Table with 23 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 31 rows (Day 1-31, Mean, Annual Mean). Each cell contains wind speed data in m/s.

522. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

Table with 23 columns (Hour, G. M. T., 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12) and 31 rows (Day 1-31, Mean, Annual Mean). Each cell contains wind speed data in m/s.



Averages for periods of sixty minutes, centred at the Half hours, Greenwich Mean Time.

M.S.L. + h<sub>a</sub> (height of anemograph above ground) = 5 metres + 23 metres.

November, 1932.

12 - 13		13 - 14		14 - 15		15 - 16		16 - 17		17 - 18		18 - 19		19 - 20		20 - 21		21 - 22		22 - 23		23 - 24		Mean	Day
°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	°	m/s	m/s	
205	2.8	230	4.5	225	4.0	215	2.3	220	2.9	230	3.4	235	3.0	240	2.9	235	3.2	245	2.3	235	2.8	230	3.5	1.8	1
240	5.8	240	5.0	240	5.4	240	5.0	225	5.0	230	5.4	230	5.9	230	5.8	230	5.0	235	5.3	235	5.2	235	5.3	4.7	2
225	6.4	220	5.8	215	5.3	215	5.5	210	4.9	210	4.5	215	3.6	215	2.8	225	2.8	220	1.6	205	0.7	215	2.5	4.5	3
190	6.0	190	5.9	210	7.0	215	6.6	210	6.5	205	5.0	210	5.5	285	5.0	355	6.2	5	5.2	360	3.8	10	2.7	4.7	4
45	5.7	35	5.3	40	5.6	40	5.9	50	5.6	50	4.8	65	5.5	60	4.9	55	4.2	55	4.5	55	3.7	25	2.3	4.5	5
85	5.1	90	5.7	90	7.0	90	7.1	90	6.9	90	6.2	90	5.2	100	4.1	110	5.0	110	5.2	95	4.8	90	4.2	3.9	6
85	8.6	80	7.8	85	7.4	75	7.5	75	6.8	70	6.6	60	5.6	70	5.4	60	5.0	40	3.4	40	3.5	80	4.9	5.6	7
350	2.0	5	2.8	10	2.3	5	2.7	340	2.0	335	2.0	330	1.0	300	0.7	300	1.0	280	1.0	295	1.3	280	1.1	1.4	8
170	0.7	200	1.6	195	0.7	180	0.3	185	0.5	300	0.1	360	0.1	---	0.0	50	0.1	350	0.2	320	0.1	280	0.1	0.6	9
360	1.5	15	2.5	40	3.0	40	3.4	45	4.2	50	4.0	50	4.0	45	4.1	50	2.9	35	2.5	40	3.0	55	2.8	1.7	10
90	8.4	85	8.3	80	7.7	80	6.6	75	5.9	50	4.6	55	4.7	65	5.6	65	4.8	65	4.8	80	4.9	90	4.2	5.1	11
105	4.0	95	5.0	95	3.9	110	3.0	60	3.5	65	2.5	70	2.6	85	4.2	90	4.6	90	5.4	90	6.0	85	6.5	3.6	12
75	9.6	80	8.8	80	8.9	70	8.3	70	9.7	65	8.3	55	6.5	60	6.2	45	5.0	35	5.1	(40)	5.2	(45)	5.0	8.0	13
20	2.4	30	2.8	35	3.2	35	3.8	40	3.7	40	2.8	40	2.9	50	3.2	70	4.2	60	3.2	50	2.5	40	2.5	3.2	14
125	3.0	95	2.2	80	2.6	45	1.5	45	2.3	60	0.8	50	2.2	60	3.6	70	4.4	80	6.2	80	4.9	80	4.8	2.6	15
70	5.0	80	5.0	70	5.0	65	5.9	65	6.8	60	5.5	60	4.9	55	5.1	55	5.1	(40)	4.1	35	4.0	45	3.9	4.8	16
75	5.8	80	5.1	90	4.2	115	4.1	110	4.0	110	3.9	120	4.6	110	4.2	(115)	(4.1)	115	(3.5)	(115)	(2.5)	(115)	(2.5)	4.0	17
125	3.0	115	2.8	100	3.7	90	4.5	100	4.2	110	3.0	110	3.2	115	3.6	115	3.0	95	2.7	95	3.2	75	2.6	3.2	18
15	2.8	15	3.3	25	2.5	30	2.9	35	3.0	20	2.9	25	2.8	20	2.1	15	2.3	15	2.4	5	1.1	330	1.7	2.5	19
240	2.4	230	2.5	220	3.0	210	2.6	210	2.7	215	3.1	205	3.1	205	3.0	210	4.0	220	3.2	210	3.3	215	2.6	2.4	20
295	4.8	305	3.6	305	3.8	285	3.2	270	2.6	260	2.0	240	2.1	230	2.1	235	2.2	225	2.2	225	2.4	215	2.3	2.5	21
205	9.2	210	9.9	210	8.2	215	7.3	220	6.9	230	5.7	250	3.9	250	3.1	260	3.6	280	4.8	280	4.0	270	3.9	5.0	22
285	6.2	275	3.7	265	5.1	280	6.0	255	3.0	245	2.8	255	4.0	250	3.2	250	4.5	250	4.8	245	4.8	230	3.0	4.6	23
245	5.8	260	6.7	260	4.4	285	6.1	285	5.4	270	4.9	285	4.2	255	3.4	240	4.0	235	4.6	220	5.4	225	5.2	4.8	24
260	5.0	260	5.8	250	4.3	255	4.9	250	5.0	250	4.6	250	6.2	250	6.2	240	4.1	230	3.8	220	4.8	220	5.8	5.6	25
235	7.4	245	7.7	245	7.6	235	6.5	240	6.8	230	6.2	240	8.0	240	7.6	240	7.0	235	5.8	240	7.0	245	8.5	7.9	26
270	8.4	275	7.5	270	7.6	265	6.8	275	7.0	300	6.7	330	5.1	330	5.6	320	5.6	330	5.6	320	5.4	320	5.2	6.3	27
230	1.9	225	2.2	230	1.8	260	1.1	225	1.3	200	1.5	210	1.6	220	1.5	215	2.0	225	1.8	215	1.9	220	1.6	2.5	28
215	4.7	200	4.6	210	4.4	215	4.0	205	4.3	200	4.3	200	5.5	205	5.7	205	5.2	200	5.2	200	(6.4)	200	(7.0)	3.2	29
200	9.6	195	9.5	205	10.7	200	10.2	200	9.5	205	9.4	205	9.0	200	8.4	200	7.4	200	7.5	200	8.3	200	7.5	8.5	30
---	5.1	---	5.1	---	5.0	---	4.9	---	4.8	---	4.3	---	4.2	---	4.1	---	4.1	---	3.9	---	3.9	---	3.9	4.1	

December and Year, 1932.

325	4.8	320	3.5	310	4.4	310	2.8	300	2.4	270	1.5	235	1.0	250	1.1	250	2.0	215	1.4	240	1.3	235	0.7	3.3	1
210	7.4	210	8.4	205	8.1	215	8.0	220	8.0	220	7.0	220	6.1	220	5.6	220	5.9	220	5.5	225	5.0	230	4.8	5.0	2
265	4.5	260	4.3	280	4.6	240	4.4	235	4.4	235	4.5	235	4.3	235	5.0	235	5.0	220	4.3	230	4.6	225	4.8	4.1	3
305	4.0	310	4.2	305	5.0	300	3.7	280	1.5	260	1.6	265	2.0	250	1.8	235	1.6	220	1.5	205	1.9	220	1.0	2.7	4
215	0.8	235	0.9	220	1.1	225	1.0	215	0.3	215	0.6	225	0.6	265	0.3	310	0.1	20	2.2	30	3.3	30	2.2	0.8	5
45	5.7	50	6.1	40	6.0	40	4.7	35	4.4	30	2.9	30	2.4	25	4.0	20	2.8	20	3.3	15	2.1	10	2.0	2.7	6
45	6.4	40	7.1	40	6.8	40	6.0	35	4.8	30	5.0	30	6.0	35	6.1	40	5.2	45	4.7	45	4.8	50	2.5	4.8	7
85	8.0	75	8.1	75	9.5	75	9.8	50	6.6	50	8.0	55	8.0	55	7.7	60	8.5	70	9.8	70	10.5	70	9.3	6.5	8
60	8.4	65	8.5	60	10.0	55	9.9	55	8.6	55	8.3	55	8.1	45	7.7	55	7.2	45	6.7	50	7.2	55	7.8	7.4	9
60	10.3	60	11.0	55	10.2	55	10.4	55	9.5	55	9.4	55	10.5	60	10.5	70	10.9	60	11.7	55	10.9	55	8.5	9.2	10
65	8.5	65	8.5	65	8.5	75	9.0	75	9.5	80	8.0	85	7.7	80	8.2	80	7.9	75	7.9	75	7.5	70	6.9	8.7	11
65	4.7	55	4.3	60	4.2	65	5.0	55	3.4	60	3.0	70	4.2	75	3.3	55	1.7	20	1.8	15	1.5	10	0.8	4.1	12
100	1.8	140	2.3	130	2.9	130	2.4	150	3.6	150	2.9	160	2.0	180	1.0	140	0.6	160	3.8	165	4.3	165	4.6	1.9	13
220	2.0	215	2.4	200	2.5	185	2.0	185	1.4	170	1.6	180	2.3	175	3.0	190	3.7	175	3.0	175	2.2	170	3.4	2.9	14
210	8.0	220	8.1	225	7.0	230	5.5	225	5.5	210	4.8	220	4.5	225	2.5	190	2.6	200	2.9	205	1.8	220	1.4	4.9	15
205	7.3	205	7.6	205	6.6	205	6.7	200	5.6	195	5.8	200	5.0	205	5.8	205	4.6	220	2.2	190	0.7	190	3.0	4.6	16
200	6.8	190	6.8	195	5.6	185	3.5	180	4.3	180	4.5	195	4.3	200	6.4	200	8.7	200	9.6	200	8.5	200	8.7	5.5	17
205	9.1	200	8.3	200	6.5	200	6.5	195	5.0	190	5.0	190	6.5	190	5.0	190	5.9	180	7.3	185	7.2	185	8.6	7.3	18
185	5.3	175	5.8	180	5.2	160	4.2	150	4.6	165	5.2	170	5.6	170	5.3	170	4.5	160	3.3	160	3.6	160	2.9	4.9	19
190	3.8	185	2.3	175	3.8	160	4.2	150	3.7	145	2.5	95	0.9	90	0.9	90	2.2	110	2.1	145	3.6	160	4.8	2.8	20
200	6.2	205	3.7	210	4.9	200	3.0	170	2.4	165	3.3	170	4.5	165	2.8	150	1.8	155	2.1	165	2.2	170	3.9	4.2	21
235	4.3	240	5.0	230	4.6	210	3.6	195	4.3	185	4.8	185	3.6	185	4.5	190	5.1	195	6.0	195	6.2	195	6.3	4.6	22
175	7.7	175	6.7	175	6.1	175	5.2	170	4.9	170	4.9	235	1.5	245	1.5	265	1.7	220	1.3	235	1.1	235	1.3	2.5	24
280	3.9	285	4.0	270	2.3	270	2.6	245	2.1	235	1.8	235	1.5	245	1.5	265	1.7	220	1.3	235	1.1	235	1.3	2.5	24
270	1.2	280	1.5	275	1.5	295	2.5	290	1.6	295	1.3	15	0.4	90	0.1	340	0.3	290	1.1	290	1.2	305	1.5	1.4	25
190	0.6	240																							

523. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

1932.

Day.	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.	Max. in a Gust.	Time of Gust.
1	13	11 40	5	7 50	19	13 25	16	21 10	9	18 50	10	14 10	19	2 0	12	14 0	13	15 10	16	11 00	9	13 5	16	2 20
2	16	10 40	10	9 25	6	13 25	15	10 20	13	13 30	12	18 55	14	16 5	9	18 25	19	21 40	18	16 20	13	14 25	16	13 45
3	13	7 0	7	14 50	10	19 0	5	10 30	19	22 50	13	15 50	15	13 40	12	15 30	18	0 50	13	15 20	16	7 10	13	1 0
4	19	19 55	4	15 50	11	14 20	12	11 45	21	1 15	11	4 40	18	14 15	13	15 45	11	16 55	10	13 50	15	15 55	10	15 0
5	21	22 30	9	9 35	12	22 45	14	11 50	17	13 55	11	8 35	7	10 15	11	14 50	14	14 40	9	12 30	13	4 15	7	22 45
6	24	18 50	9	10 5	14	12 50	21	14 40	13	17 30	15	11 40	13	17 55	14	14 30	17	13 10	13	14 55	14	15 25	13	14 40
7	10	10 0	6	17 40	17	22 55	22	18 45	14	18 25	13	11 50	10	12 30	8	0 0	12	10 35	17	13 20	15	10 40	15	14 40
8	5	6 50	9	23 40	16	2 0	23	16 35	10	16 55	12	14 15	9	15 35	9	12 45	18	11 15	19	11 25	7	0 10	19	22 5
9	21	23 40	17	11 10	10	10 40	19	14 5	13	14 40	10	15 30	7	14 5	5	14 10	9	17 0	8	15 25	5	12 50	19	15 30
10	22	1 50	24	16 15	11	16 25	21	2 25	12	13 15	11	15 0	9	13 5	10	11 45	16	15 10	10	23 30	8	17 5	22	20 40
11	13	9 25	17	2 45	15	19 20	23	15 5	12	13 25	14	11 50	9	12 25	11	14 25	22	9 20	10	17 30	15	10 20	21	8 25
12	18	21 20	17	12 35	12	8 50	16	8 10	19	14 20	7	19 20	7	11 10	14	14 40	14	12 50	11	23 10	12	23 20	11	0 55
13	19	5 15	9	12 0	4	12 20	11	23 20	17	14 0	15	21 50	13	15 40	11	17 55	9	20 10	21	9 55	19	9 20	8	21 45
14	20	23 20	13	12 5	8	12 55	17	7 50	9	23 5	16	18 45	10	20 35	11	21 30	13	10 0	13	21 40	9	0 30	10	2 25
15	21	3 25	13	14 45	11	15 35	17	15 10	8	0 50	15	11 0	8	1 50	13	16 10	5	20 25	18	10 15	12	21 35	16	13 25
16	20	22 5	10	11 50	12	21 55	18	8 45	8	9 5	13	21 20	12	22 50	7	4 25	9	12 20	12	23 45	14	16 35	15	13 35
17	19	3 25	12	13 40	15	13 15	16	20 15	11	13 25	10	18 25	16	14 15	11	12 0	6	16 20	16	12 45	11	10 10	18	20 35
18	15	4 15	10	0 15	11	12 5	15	18 30	16	10 45	12	20 30	15	14 25	9	21 35	10	18 35	21	4 35	8	16 30	17	21 20
19	9	0 5	13	14 25	9	14 45	8	12 5	13	12 55	12	7 25	12	16 10	10	15 0	8	13 30	13	23 50	6	16 25	15	0 5
20	6	17 35	15	11 40	7	12 5	19	12 30	13	11 10	10	14 50	13	16 55	13	23 25	10	20 25	15	2 5	8	20 50	10	22 45
21	8	15 5	10	13 40	9	14 55	18	12 45	13	11 35	11	13 50	11	13 0	13	15 20	11	12 20	18	8 40	9	12 20	13	10 5
22	10	10 40	14	11 0	9	8 20	12	14 50	16	8 5	9	12 55	13	15 15	14	20 10	14	9 40	20	10 50	18	12 15	14	23 5
23	7	22 10	12	15 20	8	15 20	13	16 50	9	23 30	10	16 30	12	10 50	11	9 55	8	16 50	15	13 20	17	15 5	18	12 0
24	10	11 0	17	12 35	8	23 35	7	10 10	15	13 35	12	21 35	15	11 50	12	20 15	11	21 40	7	0 50	17	13 20	10	12 35
25	7	22 55	15	2 50	14	13 50	11	17 5	12	12 35	13	10 45	11	12 20	14	12 20	16	3 45	15	21 15	14	6 25	5	3 30
26	9	15 5	9	23 10	13	7 40	15	17 10	10	14 20	11	11 5	17	17 5	10	0 45	9	14 50	17	11 15	18	6 15	6	23 55
27	9	9 35	17	22 35	22	24 0	12	15 30	7	10 40	13	17 25	19	12 25	6	13 40	19	14 45	9	12 40	18	11 45	10	13 50
28	9	19 20	22	4 35	22	0 0	14	15 50	11	14 45	17	14 15	15	11 25	6	20 25	14	16 45	17	16 30	15	2 40	11	12 20
29	8	13 55	21	3 20	18	23 55	13	11 50	13	13 45	14	16 25	17	10 30	12	13 40	19	13 30	20	20 0	13	23 30	13	19 50
30	7	17 5	--	--	26	4 25	17	12 55	7	11 25	17	14 30	12	10 15	17	13 10	13	20 30	20	14 30	20	14 45	14	10 45
31	6	18 5	--	--	14	11 15	--	--	9	18 5	--	--	16	13 35	15	11 55	--	--	18	10 20	--	--	16	20 15

DISTRIBUTION OF WIND SPEED: EXTREME VELOCITIES AS RECORDED BY THE DINES TUBE ANEMOGRAPH.

524. Richmond (Kew Observatory): H<sub>a</sub> = 5 metres + 23 metres.

1932.

Month.	DISTRIBUTION OF WIND SPEED.								EXTREME VELOCITIES.						
	More than 17.1 m/s.		10.8 to 17.1 m/s.		5.5 to 10.7 m/s.	1.6 to 5.4 m/s.	Less than 1.6 m/s.	No Record.	Highest Hourly Wind.			Highest Gust.			
	Dates of Occurrence.	Duration.	No of Days.	Duration.	Duration.	Duration.	Duration.	Duration.	Year from N.	Speed.	Mid Time.	Speed.	Date.		
Jan.	...	...	--	0	3	16	233	335	160	0	250	12	6 18 30	24	6 18 50
Feb.	...	...	--	0	3	19	158	406	113	0	65	12	28 15 30	24	10 16 15
Mar.	...	...	--	0	3	9	201	378	156	0	190	12	30 3 30	26	30 4 25
Apr.	...	...	--	0	3	11	294	370	45	0	215	12	10 5 30	23	11 15 5
May	...	...	--	0	0	0	122	468	154	0	225	10	12 14 30	21	4 1 15
June	...	...	--	0	0	0	144	453	123	0	225	9	28 13 30	17	30 14 30
July	...	...	--	0	1	1	151	417	175	0	220	11	1 14 30	19	1 2 0
Aug.	...	...	--	0	0	0	73	460	211	0	85	8	25 12 30	17	30 13 10
Sept.	...	...	--	0	2	2	196	371	151	0	85	12	29 11 30	22	11 9 20
Oct.	...	...	--	0	1	1	193	425	125	0	210	11	29 19 30	21	18 4 35
Nov.	...	...	--	0	0	0	183	439	98	0	205	11	30 14 30	20	30 14 45
Dec.	...	...	--	0	2	7	208	414	115	0	60	12	10 21 30	22	10 20 40
Year.	...	...	--	0	18	66	2156	4936	1626	0	190 215 88	12	Mar.30 3 30 Apr.10 5 30 Sep.29 11 30	26	Mar.30 4 25

525. Richmond (Kew Observatory). Readings in degrees absolute at 9h., Greenwich Mean Time.

1932.

Table with columns for Month, Day, and temperature readings at depths of 30cm and 122cm for each month from Jan. to Dec.

The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

MINIMUM TEMPERATURE "ON THE GRASS" DURING THE INTERVAL 18h. to 7h. G.M.T.

Readings in degrees absolute.

526. Richmond (Kew Observatory). 1932.

Table showing minimum temperatures on the grass for each month from Jan. to Dec., with readings in degrees absolute.

HEIGHT IN CM. ABOVE M.S.L. OF SURFACE OF UNDERGROUND WATER.

Daily Means and Extremes for Months.

527. Richmond (Kew Observatory). 1932.

Table showing height in cm. above M.S.L. of surface of underground water, with columns for Month, Day, and daily means and extremes for each month.

The initial 2 or 3 of the readings is omitted, i.e., 275.0 degrees absolute is written 75.0.

Note.- The minimum refers to the interval from 18h. the previous day to 7h. on the day to which it is entered.

Annual Mean = 194 cms.

Extremes for the months:- Jan., 215, 176; Feb., 207, 182; Mar., 183, 164.; April, 186, 166; May, 246, 180; June, 246, 193; July, 193, 173; August, 179, 167; Sept., 173, 164; Oct., 199, 161; Nov., 306, 193; Dec., 305, 206.

528. Richmond (Kew Observatory).

Table for Richmond (Kew Observatory) in January 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

529. Richmond (Kew Observatory).

Table for Richmond (Kew Observatory) in February 1932. Columns include Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

NOTE. - Observations are not taken at 15h. on Sundays, Good Friday and Christmas Day.

\* Mean of 26 days.

† Mean of 26 days.

530. Richmond (Kew Observatory).

March, 1932.

Table for March 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

531. Richmond (Kew Observatory).

April, 1932.

Table for April 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

\* Mean of 27 days.

† Mean of 26 days.

532. Richmond (Kew Observatory).

Day	Cloud Forms.			Cloud Amount (All Forms).					Visibility.					Precipitation.					Remarks on the Weather of the Day.									
	7h	13h	18h	7h	9h	13h	15h	18h	21h	7h	9h	13h	15h	18h	21h	7h	9h	13h		15h	18h	21h						
1	Ci-St.	St-Cu:A-St:St-Ci-St.	St:St-Cu:A-Cu.	6	9	9	--	9	10	G	F	G	-	G	G	...	...	...	...	...	...	...	...	m a : ●° T late p : ●° n.				
2	St:St-Cu.	St-Cu:A-St:St-Ci.	Nb:A-St.	10	10	9	10	10	10	I	J	K	J	G	G	...	...	...	...	...	...	...	...	●° a : ●° late p and early n.				
3	St:A-St.	St:Nb.	St.	10	10	10	10	10	10	G	i	H	H	G	i	...	...	...	...	...	...	...	...	●° late a : ●° (gusts) p and n.				
4	St:St-Cu.	St:St-Cu:A-St.	St-Cu.	10	10	10	10	9	9	i	i	i	i	i	i	...	...	...	...	...	...	...	...	(gusts) early a.				
5	Cu:St-Cu.	Cu:St-Cu.	Cu:A-St:A-Cu.	8	9	8	6	7	7	J	H	J	J	J	i	...	...	...	...	...	...	...	...	p ●° late a : ●° late p.				
6	St:St-Cu:A-Cu.	St-Cu:A-Cu:A-St.	Cu:C-Nb.	8	10	9	8	10	10	G	H	i	J	G	G	...	...	...	...	...	...	...	...	p ●° late p.				
7	St-Cu.	Cu:St-Cu:A-Cu.	Cu.	9	9	8	5	9	3	G	H	J	J	J	G	...	...	...	...	...	...	...	...	●° early n.				
8	Cu:St-Cu.	Cu.	Cu:A-Cu.	1	4	7	--	9	0	J	K	K	-	i	G	...	...	...	...	...	...	...	...	p early a.				
9	Nb.	Nb.	Cu:A-St:St-Ci.	10	10	10	10	9	0	G	H	H	G	G	G	...	...	...	...	...	...	...	...	●° a and p.				
10	Ci-Cu.	Cu:A-Cu.	St-Cu:A-St.	1	6	8	8	10	0	G	J	K	J	J	J	...	...	...	...	...	...	...	...	p early a : p ●° late a.				
11	Nb.	Cu:St-Ci.	Cu:Nb:A-St.	10	10	9	10	10	10	F	H	J	J	J	J	...	...	...	...	...	...	...	...	m ●° early a : ⊕ late a : ●° late p				
12	St:St-Cu:A-St.	Cu:St-Cu:A-Cu.	Cu:St-Cu:A-Cu.	10	9	9	7	10	10	J	J	J	K	K	i	...	...	...	...	...	...	...	...	(gusts) a and p.				
13	St:Nb:A-St.	A-St.	St-Cu.	10	9	10	10	10	6	K	J	K	K	J	J	...	...	...	...	...	...	...	...	●° a and p.				
14	St.	Cu.	Cu:A-Cu:St-Ci.	10	8	7	7	9	10	i	i	K	K	K	G	...	...	...	...	...	...	...	...	p early a.				
15	St.	St.	Nb:A-Cu.	10	10	10	--	9	9	G	E	E	-	G	F	...	...	...	...	...	...	...	...	●° f a : f ●° p : ●° K m n.				
16	St:A-St.	Nb:A-Cu.	Cu:C-Nb.	10	10	10	9	7	9	G	G	J	J	J	G	...	...	...	...	...	...	...	...	●° a : p ●° p ●° p : ●° early n.				
17	Cu:St-Cu.	Cu.	---	8	5	6	4	0	0	G	i	K	L	L	J	...	...	...	...	...	...	...	...	p early a : ●° early n.				
18	A-Cu:St-Ci:St-Ci-Cu.	A-St:A-Cu.	Nb:St-Cu:A-Cu.	6	8	9	10	9	9	K	K	K	L	L	K	...	...	...	...	...	...	...	...	p early a.				
19	St:St-Cu.	A-Cu:A-St:St-Ci.	Cu:St-Cu.	9	6	7	7	6	3	J	K	L	L	L	J	...	...	...	...	...	...	...	...	p ●° late p : K p ●° early n.				
20	St-Cu:A-St:A-Cu.	Cu:A-Cu:St-Ci-Cu.	Cu-Nb:Fr-Cu.	9	10	9	8	9	8	G	i	K	L	L	L	...	...	...	...	...	...	...	...	...	p ●° late p and n.			
21	St:St-Cu:A-Cu.	Cu.	Nb.	8	8	8	10	10	10	G	J	J	H	H	G	...	...	...	...	...	...	...	...	...	●° early a : p ●° T late p : p ●° early n.			
22	Cu-Nb:St-Cu:A-St.	Cu:C-Nb:A-Cu.	Cu-Nb:A-Cu:St-Ci.	10	9	8	--	7	9	J	J	K	-	K	K	...	...	...	...	...	...	...	...	...	●° early a and early n.			
23	Cu:A-St:St-Ci-St.	Cu:St-Cu:A-St.	Cu-Nb:A-Cu:St-Ci.	8	10	9	8	7	9	J	J	K	J	J	G	...	...	...	...	...	...	...	...	...	●° early a.			
24	Cu:St-Cu:A-Cu.	St-Cu.	Cu:A-Cu:St-Ci.	9	10	9	10	6	5	J	J	J	J	J	J	...	...	...	...	...	...	...	...	...	...	p ●° late p.		
25	Cu:St-Cu.	Cu:St-Cu.	St-Cu:A-Cu.	3	9	10	10	8	9	G	J	J	H	J	i	...	...	...	...	...	...	...	...	...	p ●° early a.			
26	---	Cu:St-Cu:A-St.	St-Cu:St-Ci.	0	6	9	9	3	0	F	H	J	i	i	G	...	...	...	...	...	...	...	...	...	...	...	m early a.	
27	St:St-Cu:A-Cu.	St:A-St.	St:A-St.	10	10	10	10	10	10	G	H	H	i	i	H	...	...	...	...	...	...	...	...	...	...	...	●° a : ●° p and n.	
28	St:St-Cu.	Cu:St-Cu:A-St.	St:St-Cu:A-St.	10	9	9	9	10	10	H	H	i	G	G	G	...	...	...	...	...	...	...	...	...	...	...	●° a and p : ●° early n.	
29	St-Cu:A-St.	Cu-Nb:St-Cu:A-Cu.	Cu:St-Cu:St-Ci.	10	9	9	--	7	7	i	i	J	-	L	J	...	...	...	...	...	...	...	...	...	...	...	...	●° a.
30	St:St-Cu:A-Cu.	Cu:C-Nb:A-Cu.	St:St-Cu:A-Cu.	9	9	9	9	7	2	i	K	K	J	K	G	...	...	...	...	...	...	...	...	...	...	...	...	●° early a.
31	Cu:St-Cu.	Cu:St-Cu.	Cu:C-Nb:St-Cu.	7	1	9	7	9	10	G	H	J	K	K	i	...	...	...	...	...	...	...	...	...	...	...	...	f and a early a.
Mean Cloud Am't.				8.0	8.5	8.8	8.6	8.1	6.9																			

533. Richmond (Kew Observatory).

Day	Cloud Forms.			Cloud Amount (All Forms).					Visibility.					Precipitation.					Remarks on the Weather of the Day.																			
	7h	13h	18h	7h	9h	13h	15h	18h	21h	7h	9h	13h	15h	18h	21h	7h	9h	13h		15h	18h	21h																
1	St.	A-Cu:A-St.	St-Cu:A-Cu.	10	10	9	7	8	10	G	H	i	H	J	G	...	...	...	...	...	...	...	...	...	...	...	...	...	...	●° early p and n.								
2	St.	Cu:St-Cu.	Cu.	10	9	8	6	3	9	G	H	i	i	J	i	...	...	...	...	...	...	...	...	...	...	...	...	...	...	p ●° K early n.								
3	St.	St-Cu:A-St:A-Cu.	St:St-Cu.	10	10	9	10	10	10	G	i	i	i	G	i	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...							
4	Cu:St-Cu:A-St.	A-St.	St-Cu.	10	10	10	10	10	10	J	i	i	i	G	G	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...						
5	Cu:St-Cu.	Cu:C-Nb:St-Cu.	St-Cu:St:A-Cu.	8	9	9	--	8	6	J	J	i	-	G	i	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...						
6	Cu:St-Cu:A-Cu.	Cu:St-Cu:A-Cu.	Cu:St-Cu.	6	9	9	8	2	9	J	K	J	J	J	G	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...						
7	St-Cu.	Cu:St-Cu:A-Cu.	Cu:St-Cu:A-Cu.	9	2	9	8	8	6	G	J	J	K	K	i	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...					
8	Cu:St-Cu:A-Cu.	Cu:St-Cu:A-Cu.	St-Cu:A-Cu.	9	10	10	10	9	9	J	K	K	J	K	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...				
9	Cu:St-Cu:A-Cu.	Cu:St-Cu.	Cu:St-Cu:St-Ci.	3	8	8	8	2	3	i	J	K	K	K	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...				
10	Cu:St-Cu.	Cu.	Cu:St-Cu:St-Ci.	2	6	7	9	7	1	G	J	J	K	K	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
11	St:St-Cu:A-St.	St-Cu.	Cu:A-Cu.	10	8	9	9	8	9	F	G	J	J	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
12	Cu:A-Cu:St-Ci-St.	Cu:A-Cu:St-Ci.	St-Cu:A-Cu.	2	7	7	-	7	6	J	J	K	-	J	i	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
13	St-Cu:St-Ci-St.	St-Cu.	Fr-Cu.	3	9	9	7	2	1	H	H	H	H	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
14	Cu.	---	---	1	0	0	0	1	1	i	i	J	K	K	K	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
15	St:St-Cu.	Fr-Cu:St-Ci.	Cu.	9	8	7	5	6	9	J	J	J	J	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	St.	Cu:St-Cu.	Cu.	10	9	8	8	1	0	G	H	J	J	K	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	---	Cu.	---	0	0	1	7	0	1	J	J	J	J	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	---	Ci.	Cu:St-Cu:St-Ci-Cu.	0	0	1	5	2	1	i	i	i	i	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	St-Cu:St-Ci.	St-Cu.	Cu:St-Cu:A-Cu.	8	3	9	--	10	10	J	K	K	-	K	K	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	Cu:St-Cu:A-Cu.	St-Cu:A-Cu:A-St.	St-Cu.	8	10	10	10	10	9	J	J	J	J	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	St-Cu.	Cu:St-Cu:A-Cu.	St-Cu:A-Cu.	9	10	10	7	8	7	J	J	J	J	J	J	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	St-Cu.	Cu:St-Cu.	Cu:St-Cu:A-Cu.	9	9	8	7	4	2	J	J	J	K	J	J	...</																						

534. Richmond (Kew Observatory).

July, 1932.

Table for July 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

535. Richmond (Kew Observatory).

August, 1932.

Table for August 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes a Mean Cloud Am't. row at the bottom.

\* Mean of 26 days.

† Mean of 27 days.





538. Richmond (Kew Observatory).

November, 1932.

Table for November 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes mean cloud amount and annual cloud amount.

539. Richmond (Kew Observatory).

December, 1932.

Table for December 1932 with columns for Day, Cloud Forms (7h, 13h, 18h), Cloud Amount (7h-21h), Visibility (7h-21h), Precipitation (7h-21h), and Remarks on the Weather of the Day. Includes mean cloud amount and annual cloud amount.

\* Mean of 26 days.

† Mean of 27 days.

540. Richmond (Kew Observatory).

Month.	January.			February.			March.			April.			May.			June.		
Day	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>
	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.85	28	109
2	...	...	...	6.95	15	102	...	...	...	...	...	...	1.15	62	70	3.80	37	148
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3.95	31	181
4	...	...	...	11.20	9	102	...	...	...	2.30	32	75	3.70	32	118	...	...	...
5	...	...	...	6.20	19	121	...	...	...	2.60	39	102	3.15	26	83	...	...	...
6	...	...	...	...	...	...	...	...	...	2.35	56	130	3.10	31	97	3.05	44	133
7	4.65	12	55	...	...	...	2.55	32	81	3.45	73	251	...	...	...	2.25	63	142
8	7.75	4	34	5.80	9	51	...	...	...	4.25	50	212	...	...	...	1.30	42	56
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.35	64	87
10	...	...	...	...	...	...	3.35	23	75	...	...	...	1.85	48	90	1.45	72	105
11	9.75	17	168	...	...	...	3.25	37	120	...	...	...	...	...	...	...	...	...
12	5.55	19	106	...	...	...	...	...	...	1.80	47	84	2.45	67	164	...	...	...
13	4.15	17	70	...	...	...	...	...	...	...	...	...	...	...	...	4.50	42	189
14	3.80	25	94	...	...	...	5.95	17	100	...	...	...	...	...	...	3.70	43	161
15	3.70	29	106	4.25	24	102	6.20	17	108	5.55	28	156	...	...	...	3.00	44	132
16	...	...	...	4.55	30	136	5.80	20	114	...	...	...	...	...	...	2.85	54	154
17	5.50	15	82	6.80	15	99	...	...	...	...	...	...	1.90	74	141	3.00	33	98
18	3.95	18	72	7.30	14	102	2.85	29	84	...	...	...	...	...	...	...	...	...
19	...	...	...	6.55	16	102	...	...	...	3.30	19	62	2.40	73	176	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	2.75	72	199	1.80	50	90
21	...	...	...	...	...	...	...	...	...	3.20	45	146	...	...	...	2.25	63	141
22	...	...	...	...	...	...	...	...	...	2.25	48	107	...	...	...	2.00	60	118
23	...	...	...	5.45	18	99	...	...	...	...	...	...	...	...	...	3.70	24	89
24	...	...	...	6.50	32	207	3.25	32	103	...	...	...	3.75	35	131	1.70	33	56
25	...	...	...	5.20	23	117	...	...	...	1.70	42	72	...	...	...	...	...	...
26	8.30	6	50	...	...	...	...	...	...	2.45	39	94	2.80	43	122	...	...	...
27	7.50	9	71	...	...	...	...	...	...	2.90	37	110	...	...	...	1.55	71	110
28	4.90	18	87	...	...	...	...	...	...	3.00	46	138	...	...	...	1.90	74	140
29	...	...	...	6.20	23	141	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	---	---	---	3.80	46	175	...	...	...	...	...	...	1.45	74	106
31	...	...	...	---	---	---	3.90	36	141	---	---	---	1.70	62	105	---	---	---
Mean.	5.80	16	83	6.40	19	114	4.10	29	110	2.95	43	124	2.55	52	125	2.60	50	118
No. of Days Used.	12	12	12	13	13	13	10	10	10	14	14	14	12	12	12	21	21	21
Month.	July.			August.			September.			October.			November.			December.		
Day.	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>	F	$\lambda$ X 10 <sup>18</sup>	$i$ X 10 <sup>18</sup>
	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2	Volt. cm.-1	ohm.-1 cm.-1	amp. cm.-2
1	1.95	96	189	...	...	...	...	...	...	...	...	...	...	...	...	5.80	15	86
2	...	...	...	1.45	62	90	...	...	...	...	...	...	2.25	30	67	...	...	...
3	...	...	...	1.90	63	119	...	...	...	...	...	...	3.90	31	119	...	...	...
4	1.90	66	127	1.60	65	103	...	...	...	3.05	42	127	2.70	36	99	...	...	...
5	...	...	...	1.55	53	81	...	...	...	3.45	24	84	...	...	...	...	...	...
6	1.35	65	88	...	...	...	2.65	58	154	2.50	52	129	...	...	...	...	...	...
7	2.35	74	173	...	...	...	...	...	...	2.30	43	99	7.10	13	93	6.80	10	71
8	1.60	63	100	1.75	61	107	...	...	...	...	...	...	4.55	21	96	7.55	18	133
9	...	...	...	...	...	...	2.10	73	152	...	...	...	5.90	16	94	5.90	19	114
10	...	...	...	...	...	...	...	...	...	3.40	36	121	7.50	8	62	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	1.75	50	89	2.20	75	165	2.30	46	105	2.90	32	94	...	...	...	7.50	8	59
13	...	...	...	...	...	...	2.60	42	109	3.05	28	84	...	...	...	4.40	12	51
14	2.00	68	137	...	...	...	2.10	57	120	3.15	28	89	...	...	...	6.20	13	79
15	...	...	...	2.55	58	149	4.70	25	116	...	...	...	6.40	14	91	3.60	23	84
16	...	...	...	3.85	35	133	3.80	32	123	...	...	...	6.30	13	79	5.10	19	97
17	...	...	...	2.00	78	157	...	...	...	3.60	28	101	5.70	17	97	...	...	...
18	2.40	46	111	2.50	61	154	...	...	...	2.95	26	77	4.40	11	48	...	...	...
19	1.60	65	106	2.80	83	232	2.10	35	74	2.70	26	70	...	...	...	4.30	33	141
20	1.90	62	118	...	...	...	...	...	...	4.20	25	106	...	...	...	...	...	...
21	...	...	...	...	...	...	4.60	35	159	...	...	...	4.90	19	94	4.60	24	109
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.50	19	87
23	...	...	...	3.60	45	161	...	...	...	...	...	...	3.70	15	55	5.25	25	133
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	3.30	42	139	...	...	...	4.15	16	65	3.65	17	64	...	...	...
26	...	...	...	2.50	51	127	3.35	45	151	3.40	30	103	...	...	...	...	...	...
27	...	...	...	...	...	...	4.65	33	155	4.00	22	89	...	...	...	...	...	...
28	1.95	42	83	...	...	...	6.20	27	165	...	...	...	4.85	9	41	3.55	19	66
29	...	...	...	1.65	64	105	3.60	29	103	...	...	...	4.55	12	54	...	...	...
30	...	...	...	1.60	79	127	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	2.20	51	113	---	---	---	3.70	26	98	---	---	---	...	...	...
Mean.	1.90	63	120	2.30	60	133	3.45	41	130	3.25	31	96	4.95	18	80	5.65	18	92
No. of Days Used.	11	11	11	17	17	17	13	13	13	17	17	17	16	16	16	15	15	15
The Year.	Mean. . . . .			3.75	37	110							No. of Days Used. . . . .			171	171	171

541. Richmond (Kew Observatory). ELECTRICAL CHARACTER OF EACH DAY, AND APPROXIMATE DURATION OF NEGATIVE POTENTIAL GRADIENT.

MONTH.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
Day.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.
		Hours.		Hours.		Hours.		Hours.		Hours.		Hours.
1	1	1.2	0	...	0	...	1	1.8	1	2.8	0	...
2	0	...	0	...	0	...	2	3.5	2	6.3	1	0.5
3	0	...	0	...	0	...	2	7.3	2	3.4	0	...
4	0	...	1	1.4	0	...	1	0.2	0	...	1	2.2
5	1	0.3	0	...	1	0.4	0	...	1	1.2	1	1.3
6	2	6.2	0	...	1	0.1	1	0.8	1	0.1	0	...
7	0	...	0	...	1	1.6	2	4.2	2	3.1	0	...
8	0	...	0	...	2	8.0	1	0.9	0	...	0	...
9	2	4.2	1	0.2	0	...	1	0.1	2	7.8	0	...
10	2	20.8	2	5.3	2	3.5	2	5.4	1	0.6	0	...
11	2	3.2	0	...	1	0.2	1	1.4	2	3.5	1	0.9
12	0	...	1	0.1	0	...	1	1.5	0	...	1	0.1
13	1	0.8	0	...	0	...	1	1.0	1	0.2	0	...
14	0	...	0	...	0	...	2	8.0	0	...	0	...
15	1	1.6	1	0.4	0	...	1	0.1	1	1.8	0	...
16	0	...	1	0.4	0	...	2	12.2	1	2.3	0	...
17	1	1.6	0	...	0	...	1	1.4	0	...	0	...
18	0	...	0	...	0	...	0	...	0	...	0	...
19	0	...	0	...	0	...	0	...	0	...	0	...
20	0	...	1	0.3	0	...	1	2.4	1	2.7	0	...
21	0	...	0	...	0	...	1	1.3	2	(3.3)	0	...
22	0	...	1	0.5	2	5.3	0	...	2	(4.0)	0	...
23	0	...	0	...	1	1.5	1	0.6	1	2.4	0	...
24	0	...	1	0.7	0	...	0	...	0	...	0	...
25	0	...	0	...	0	...	0	...	0	...	0	...
26	0	...	0	...	2	3.3	1	1.3	0	...	0	...
27	0	...	0	...	2	3.5	1	0.9	2	8.7	0	...
28	0	...	0	...	1	1.0	1	2.3	2	4.3	0	...
29	0	...	0	...	2	3.5	1	0.2	1	(0.3)	0	...
30	0	...	---	---	2	7.2	1	1.0	2	5.2	1	1.0
31	0	...	---	---	1	2.0	---	---	0	...	---	---
Total	---	39.9	---	9.3	---	41.1	---	59.8	---	64.0	---	6.0
No. of Days Used.	---	31	---	29	---	31	---	30	---	31	---	30
Mean.	---	1.3	---	0.3	---	1.3	---	2.0	---	2.1	---	0.2

Month.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Day.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.	Character	Duration Negative Pot. Grad.
		Hours.		Hours.		Hours.		Hours.		Hours.		Hours.
1	2	3.7	1	2.8	0	...	1	2.0	0	...	2	3.1
2	0	...	1	0.3	0	...	1	0.9	1	0.3	1	1.7
3	0	...	0	...	2	5.0	1	0.4	1	0.3	0	...
4	0	...	0	...	0	...	0	...	1	0.1	0	...
5	1	1.6	0	...	0	...	0	...	0	...	0	...
6	0	...	0	...	1	0.3	0	...	0	...	0	...
7	1	2.4	1	0.1	1	1.0	0	...	0	...	0	...
8	0	...	0	...	0	...	2	5.9	0	...	0	...
9	1	0.1	0	...	0	...	1	1.6	0	...	0	...
10	0	...	0	...	1	0.3	1	1.3	0	...	0	...
11	1	1.3	0	...	0	...	2	5.4	1	0.2	1	0.7
12	0	...	1	2.5	0	...	1	0.4	0	...	0	...
13	1	0.8	0	...	0	...	1	0.9	0	...	0	...
14	0	...	0	...	1	0.5	2	3.6	0	...	1	0.1
15	1	0.4	0	...	0	...	1	0.8	0	...	1	0.3
16	0	...	1	0.1	0	...	0	...	0	...	0	...
17	1	0.8	0	...	0	...	0	...	1	0.1	0	...
18	1	0.9	0	...	1	2.7	1	0.1	0	...	0	...
19	0	...	1	0.1	0	...	1	0.5	1	0.8	0	...
20	0	...	1	1.4	0	...	1	1.2	1	0.5	0	...
21	1	1.0	1	0.5	0	...	1	2.1	1	1.6	0	...
22	1	1.3	1	0.6	1	1.2	1	0.2	2	3.4	1	1.9
23	0	...	0	...	1	0.7	2	7.9	1	0.6	1	1.5
24	1	0.7	0	...	0	...	1	0.8	1	0.1	0	...
25	2	5.7	0	...	1	0.2	1	0.6	0	...	0	...
26	1	1.7	1	0.1	0	...	1	1.6	0	...	1	0.1
27	1	2.5	1	0.2	0	...	2	3.8	1	2.7	0	...
28	1	0.3	0	...	0	...	2	7.2	0	...	0	...
29	1	0.2	1	1.1	1	0.7	1	2.1	0	...	0	...
30	0	...	0	...	1	0.8	1	0.6	1	1.2	1	2.9
31	1	0.4	0	...	---	---	1	0.3	---	---	1	0.6
Total	---	25.8	---	9.8	---	13.4	---	52.2	---	11.9	---	12.9
No. of Days Used.	---	31	---	31	---	30	---	31	---	30	---	31
Mean.	---	0.8	---	0.3	---	0.4	---	1.7	---	0.4	---	0.4

Annual Values :- Character Frequency 0 1 2 Duration Total No. of Days. Mean.  
195 132 39 346.1 366 0.95

POTENTIAL GRADIENT (reduced to level surface, Paddock Site): VOLTS PER METRE.  
KELVIN ELECTROGRAPH STANDARDIZED BY WILSON READINGS, UNDERGROUND LABORATORY.  
Mean Values for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

1932.

542. Richmond (Kew Observatory).

Month.	JANUARY. Factor. 2.47.				FEBRUARY. Factor. 2.49. 2.69.				MARCH. Factor. 2.68.							
	Hour G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.			
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.			
1	550	-175	575	425	525	765	680	590	490	665	840	815	815			
2	75	185	250	300	705	730	715	625	650	760	895	950	950			
3	85	110	235	185	540	665	290	705	595	800	815	865	865			
4	85	385	300	250	-200	1240	1105	665	705	690	585	960	960			
5	175	475	350	200	525	565	730	865	665	490	255	705	705			
6	125	200	-125	250	475	790	715	840	270	650	Z+	625	625			
7	225	660	485	695	780	1805	740	715	405	760	255	675	675			
8	600	1045	635	400	475	475	655	450	245	Z-	310	380	380			
9	Z+	Z+	-75	-185	225	550	640	655	705	920	800	855	855			
10	-250	-150	-200	Z-	190	Z+	Z+	-95	650	1085	380	190	190			
11	-150	525	400	760	280	620	515	720	570	745	325	635	635			
12	635	795	575	450	380	705	515	870	500	730	665	880	880			
13	75	150	410	435	760	885	570	655	555	720	435	460	460			
14	275	835	400	360	380	490	355	515	380	540	730	895	895			
15	-125	425	375	400	Z+	705	395	545	625	585	595	705	705			
16	125	225	160	225	545	395	490	1035	595	675	595	555	555			
17	-25	210	400	575	750	995	760	910	555	815	650	865	865			
18	100	335	485	625	545	815	735	870	515	675	350	785	785			
19	200	535	425	410	790	995	680	625	420	770	215	395	395			
20	435	475	375	550	490	845	625	910	245	435	205	270	270			
21	510	610	660	785	610	1115	380	515	150	395	175	490	490			
22	535	510	625	600	515	490	165	680	205	255	-445	840	840			
23	685	585	645	945	365	655	560	655	785	1005	880	570	570			
24	550	525	410	460	420	245	790	680	325	585	340	570	570			
25	585	870	910	810	420	790	545	900	325	310	310	530	530			
26	350	685	895	885	490	800	885	610	300	745	650	285	285			
27	385	770	745	685	325	680	610	625	175	215	325	-285	-285			
28	300	460	550	460	220	380	505	490	215	270	310	595	595			
29	235	350	575	735	300	530	640	720	205	340	-15	310	310			
30	795	910	525	500	---	---	---	---	Z-	40	350	585	585			
31	735	525	435	560	---	---	---	---	215	405	405	690	690			
Means (a)	363	513	493	514	482	740	607	701	441	603	487	631	631			
(b)	315	489	472	514	468	741	615	707	454	621	447	609	609			
Mean for day.	(a) 471				(b) 447				(a) 541				(b) 533			
Month.	APRIL. Factor 2.62.				MAY. Factor 2.68.				JUNE. Factor 2.67.							
Hour G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.				
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.				
1	345	770	170	385	435	555	Z+	Z+	245	635	390	380				
2	210	280	225	740	-205	165	110	165	160	515	405	380				
3	555	0	25	425	110	215	435	325	270	420	420	390				
4	Z+	425	200	690	135	405	380	435	95	430	460	-65				
5	250	545	265	585	380	420	Z+	460	120	295	285	540				
6	210	360	240	210	325	490	325	350	405	350	285	190				
7	105	250	Z+	410	285	460	165	Z+	245	325	205	380				
8	145	320	450	465	435	270	120	490	285	380	205	335				
9	545	250	225	360	530	-950	Z+	435	175	350	135	255				
10	65	160	-25	400	445	675	175	500	365	445	160	515				
11	320	360	Z+	475	300	255	205	365	295	310	150	270				
12	280	385	170	65	135	325	255	340	245	270	110	215				
13	240	530	200	425	110	475	270	490	175	475	405	445				
14	170	-400	Z+	345	165	310	205	540	325	595	380	485				
15	610	515	530	515	205	-150	340	270	310	485	325	245				
16	450	170	-170	-1285	15	215	150	175	135	230	310	475				
17	185	265	200	305	245	365	190	555	390	635	310	335				
18	240	740	475	650	460	380	300	230	160	405	310	270				
19	280	370	305	610	230	285	215	380	325	215	175	365				
20	240	320	Z+	Z+	350	445	285	405	190	270	295	325				
21	345	330	Z+	740	270	365	55	0	245	255	270	445				
22	385	475	210	585	---	175	Z+	270	365	420	230	160				
23	370	160	200	545	95	255	270	-15	205	540	380	160				
24	160	210	210	360	40	555	325	490	160	270	190	310				
25	265	675	160	545	380	405	270	445	160	255	150	335				
26	160	330	225	370	365	730	285	405	270	245	135	215				
27	240	665	265	305	405	Z-	135	-255	160	285	160	270				
28	-610	265	305	515	55	255	Z+	490	160	190	190	230				
29	280	280	240	625	230	245	215	340	175	295	135	310				
30	185	320	240	Z+	-135	300	205	325	110	150	---	205				
31	---	---	---	---	350	460	190	175	---	---	---	---				
Means (a)	280	370	249	469	267	373	234	365	231	365	261	325				
(b)	255	379	222	378	211	352	241	341	235	372	261	316				
Mean for day.	(a) 342				(b) 309				(a) 295				(b) 296			

Note.- The Potential Gradient is reckoned as positive if the potential increases upwards. For indeterminate potential gradient the following notation is used: Z+, Indeterminate, positive value; Z-, Indeterminate, negative value; Z±, Indeterminate in magnitude and sign.  
(a) Mean from all positive readings.  
(b) Mean from all complete days, using both positive and negative readings.

POTENTIAL GRADIENT (reduced to level surface, Paddock Site): VOLTS PER METRE.  
 KELVIN ELECTROGRAPH STANDARDIZED BY WILSON READINGS, UNDERGROUND LABORATORY.  
 Mean Values for periods of sixty minutes, between the exact hours, Greenwich Mean Time.

542. Richmond (Kew Observatory).

Month.	JULY. Factor 2.71				AUGUST. Factor $\frac{2.73}{2.56}$				SEPTEMBER. Factor 2.70										
	Hour G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.						
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.						
1	180	40	190	315	280	195	Z+	Z-	270	445	160	160							
2	165	300	135	495	150	385	140	220	110	205	95	295							
3	315	235	135	395	260	290	195	375	80	-620	295	430							
4	135	330	180	330	220	315	165	440	215	335	160	390							
5	245	410	135	55	375	275	165	330	230	500	190	245							
6	70	395	135	220	330	275	165	360	150	120	205	270							
7	290	300	245	355	165	180	140	345	205	350	-405	525							
8	190	345	165	180	250	375	180	205	190	230	190	150							
9	125	300	135	135	140	510	220	220	190	405	215	350							
10	125	290	135	275	55	440	205	315	215	365	150	310							
11	150	440	Z+	245	260	635	140	290	135	80	175	325							
12	55	385	190	190	Z+	315	205	275	160	380	135	230							
13	25	355	110	300	220	305	140	330	80	---	215	215							
14	205	245	190	190	110	305	205	260	120	310	215	230							
15	110	220	150	135	180	260	250	415	120	295	445	380							
16	110	275	180	330	125	360	385	125	95	380	380	350							
17	135	135	40	150	140	375	195	360	110	95	120	135							
18	205	275	245	355	260	415	260	525	80	110	215	-160							
19	150	410	165	245	220	440	250	150	120	515	285	460							
20	220	290	205	205	345	440	165	250	270	475	525	580							
21	220	395	150	220	Z+	235	140	235	270	755	475	770							
22	165	330	55	575	95	550	330	290	445	500	160	295							
23	260	345	190	70	275	470	330	305	205	430	420	445							
24	150	135	135	220	250	605	275	430	460	595	335	715							
25	110	260	-245	220	235	440	315	330	175	325	365	605							
26	135	535	Z-	Z+	165	305	280	130	295	660	310	540							
27	205	275	-410	345	155	395	165	100	325	500	405	485							
28	165	245	150	235	165	335	90	305	335	700	580	690							
29	165	275	95	220	140	305	155	Z+	285	580	380	335							
30	135	300	165	330	115	305	205	Z0	160	460	270	310							
31	235	370	235	125	230	305	245	220	---	---	---	---							
Means (a)	166	305	157	255	202	366	210	288	203	396	278	387							
(b)	168	292	124	256	203	381	215	291	208	361	257	374							
Mean For Day.	(a) 221				(b) 210				(a) 267				(b) 273						
													(a) 316		(b) 300				
Month.	OCTOBER. Factor 2.64.				NOVEMBER. Factor 2.67.				DECEMBER. Factor 2.69										
	Hour G.M.T.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.	2-3h.	8-9h.	14-15h.	20-21h.						
Day.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.	v/m.						
1	---	290	Z+	685	385	695	415	445	-65	445	590	795							
2	275	555	250	635	360	440	240	375	510	660	-175	350							
3	290	580	290	475	55	255	345	480	150	540	455	565							
4	450	580	265	490	255	320	345	135	310	455	415	430							
5	460	605	395	475	215	535	535	585	365	455	805	550							
6	450	450	225	500	535	560	375	480	540	645	755	755							
7	200	265	210	315	305	545	625	655	565	835	725	700							
8	185	-265	275	685	400	360	425	400	485	740	780	675							
9	-145	460	330	435	335	360	535	415	280	590	550	780							
10	410	900	315	530	455	255	800	695	310	630	565	525							
11	65	-315	Z+	240	415	625	505	545	310	295	365	375							
12	170	475	275	290	160	200	440	425	485	605	820	715							
13	-55	120	290	490	145	320	465	455	645	590	430	455							
14	305	Z-	330	540	160	560	680	615	160	510	565	405							
15	160	435	330	540	600	665	640	535	270	215	365	485							
16	275	290	315	435	215	520	655	710	455	470	470	590							
17	130	330	355	370	305	505	545	375	375	405	445	365							
18	80	290	275	570	440	560	495	455	175	200	430	510							
19	345	580	315	185	200	425	425	360	240	455	430	580							
20	160	225	475	820	145	105	215	320	215	335	405	485							
21	-130	290	490	185	-95	335	465	425	295	350	455	540							
22	105	145	55	595	440	535	-425	480	295	455	430	470							
23	315	240	0	200	265	400	360	585	240	375	510	150							
24	265	555	80	385	320	465	255	505	430	605	470	455							
25	385	555	410	240	120	375	335	385	485	915	550	590							
26	80	120	Z+	475	135	185	295	415	470	565	365	200							
27	265	435	385	Z+	145	305	-55	415	160	405	510	390							
28	0	450	Z-	885	280	760	495	400	135	430	365	455							
29	450	845	660	Z-	400	520	600	360	280	270	310	405							
30	185	275	250	210	105	225	65	160	135	295	-65	805							
31	105	225	385	675	---	---	---	---	675	780	415	335							
Means (a)	243	413	305	467	286	431	442	452	348	501	508	512							
(b)	211	382	286	447	273	431	397	452	335	501	468	512							
Mean For Day.	(a) 357				(b) 331				(a) 403				(b) 388						
													(a) 467		(b) 454				
										Annual Means (a)		293		448		353		447	
										(b)		278		442		334		433	
										(a)		385		(b)		372			

Note.- The Potential Gradient is reckoned as positive if the potential increases upwards. For indeterminate potential gradient the following notation is used: Z+, Indeterminate, positive value; Z-, Indeterminate, negative value; Z±, Indeterminate in magnitude and sign.  
 (a) Mean from all positive readings.  
 (b) Mean from all complete days, using both positive and negative readings.

The departures from the mean of the day are adjusted for non-cyclic change.†

SELECTED QUIET DAYS.

543. Richmond (Kew Observatory).

1932.

Table with 25 columns (Month and Season, Hour 0-1, G.M.T. 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Non Cyclic Change, Mean Values) and 13 rows (Jan. to Dec., Year, Winter, Eqnx., Summer).

AIR POLLUTION : HOURLY MEANS FOR EACH MONTH (milligrams per cubic metre).

COMPLETE DAYS ONLY.

544. Richmond (Kew Observatory).

1932.

Table with 25 columns (Month and Season, Hour 0-1, G.M.T. 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Mean, No. of Days Used) and 13 rows (Jan. to Dec., Year, Winter, Eqnx. Spring, Autumn, Summer).

AIR POLLUTION : DIURNAL INEQUALITIES (milligrams per cubic metre).

The departures from the mean of the day are adjusted for non-cyclic change.†

545. Richmond (Kew Observatory).

1932.

Table with 25 columns (Month and Season, Hour 0-1, G.M.T. 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, 18-19, 19-20, 20-21, 21-22, 22-23, 23-24, Non Cyclic Change, Range) and 13 rows (Jan. to Dec., Year, Winter, Eqnx., Summer).



Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.	Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.	
				An.	As	Az.							An.	As	Az.			
Mar. 10	ez eL F	h. m. s. 5 45 6 32 7 45	...	μ	μ	μ	km.						μ	μ	μ	km.	Compression. In minute break.	
14	eLNE eLz F	4 44 49 5 10	...	...	...	...	...						...	...	...	2250	Atlantic Ocean. 56° N., 34° W. (Stuttgart).	
14/15	iP ize eSe eE L M <sub>1</sub> M <sub>2</sub> F	22 54 19 54 25 23 3 44 4 31 15 18 36 25 5 0 10	...	...	...	...	8100	Northern Columbia. 10° N., 72° W. (J.S.A.).	18	eL F	12 0 15	...	...	...	...	...		
15	iPz eLNE eLz M F	4 51 26 5 23 5 30 37 39 6 0	...	...	...	...	...	Felt in Guam. 12.6° N., 146.3° E. (Manila).	22	e F	5 50 6 15	...	...	...	...	...	Lower California. 26° N., 112° W. (J.S.A.).	
18	e(S)NE eL F	5 40 14 53 6 30	...	...	...	...	...	Indian Ocean. 13° S., 66° E. (Tananarive).	24	eL M F	6 45 59 24 7 15	...	...	...	...	...	Chile. 25° S., 70° W. (J.S.A.).	
19	ePR <sub>1</sub> eSPz eLNE M eLz F	11 18 24 27 38 54 55 31 56 13 35	...	...	...	...	...	Felt in Guam. 16.5° N., 149° E. (Manila).	26	e eL M F	8 39 44 47 17 9 10	...	...	...	...	...	Aleutian Islands. 52° N., 177° W. (Stuttgart).	
20	eL F	0 5 55	...	...	...	...	...		29	e eLNE eLz F	18 59 19 3 10 40	...	...	...	...	...	South Atlantic Ocean. 3° S., 20° W. (Stuttgart).	
26	iPzN iPSN eSR <sub>1ZE</sub> LE LN M <sub>1</sub> Lz M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> eLz F	0 9 11 18 37 22 11 25 25 30 3 30 13 31 31 6 33 43 36 22 38 14 2 30 3 0	...	...	...	...	(7100)	Confused by micro- seisms. Alaska. 61° N., 151° W. (J.S.A.).	30	ePz eL F	1 16 10 31 55	...	...	...	...	...	Felt in Southern France. 42.5° N., 6° W. (Strasbourg).	
26	e eLNE eLz M F	10 21 46 56 11 7 14 12 15	...	...	...	...	...	Confused by micro- seisms. Banda Sea. 4° S., 120° E. (Kōti).	May 1	e F	2 47 45 53	...	...	...	...	...		
28	e F	1 37 45	...	...	...	...	...		3	e eL F	0 8 21 40	...	...	...	...	...		
Apr. 3	eNE eL M F	21 23 23 3 11 42 40	...	...	...	...	...	Kermadec Islands. 33° S., 177° W. (Strasbourg).	14	eL F	3 55 4 5	...	...	...	...	...		
4	ez eNE ine en ee eLNE eLz F	19 34 38 46 39 12 41 46 42 3 20 1 8 35	...	...	...	...	...	South of Hatidyo Island. Focal depth about 300 km. (Kōti). 30° N., 141° E. (Pasadena).	14	eP iPR <sub>1z</sub> iPR <sub>2z</sub> iScPcS <sub>N</sub> iScPcS <sub>N</sub> i(S) <sub>N</sub> i(S) <sub>N</sub> iPS <sub>Nz</sub> iSPz ine ie iSR <sub>1</sub> iSR <sub>2</sub> ine iz LQ LR M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> M <sub>6</sub> M <sub>7</sub> M <sub>8</sub> F	13 25 38 30 16 32 53 36 6 36 14 37 52 37 58 39 34 39 40 41 22 44 46 46 5 51 17 53 37 53 45 58 6 6-8 7 24 13 10 15 40 17 16 2 22 59 23 11 23 18 17 30	...	...	...	...	...	(12000)	Compression. Destructive in Celebes. 1° N., 127° E. (Strasbourg).
6	e F	9 57 10 10	...	...	...	...	...		18	eL F	20 4 35	...	...	...	...	...		
8	e F	13 20 30	...	...	...	...	...		21	iPz iPcPz ePR <sub>1z</sub> iS <sub>z</sub> eSR <sub>1z</sub> eSR <sub>2z</sub> LN Lz M <sub>1</sub> M <sub>2</sub> M <sub>3</sub>	10 22 3 22 26 25 3 31 49 37 20 40 27 43 46 47 34 49 26 49 31	...	...	...	...	...	8520	Amplitudes of iP as read in mm.:— N. E. Z. 0.0 +1.7 +3.0 giving azimuth about west.
13	ez LNE Lz M F	0 14 (53) 57 1 0 2 11 35	...	...	...	...	...	Solomon Islands. 5° S., 152° E. (Manila).	21	eL F	20 4 35	...	...	...	...	...	Destructive in Cen- tral America. 13° N., 88° W. (U.S.C.G.S.).	





Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.	Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.
				An.	Ae.	Az.							An.	Ae.	Az.		
June 11	ez eL F	h. m. s. 8 42 43 9 1 40	...	μ	μ	μ	km.		June 21	e F	h. m. s. 7 57 8 15	...	μ	μ	μ	km.	Very small.
11	ez eL F	17 18 54 18 35	...	...	...	...	...		21/22	e F	23 49 0 10	...	...	...	...	...	
12	e F	23 34 50	...	...	...	...	...		22	ePNz eL F	0 48 41 1 20 50	...	...	...	...	...	
13	ez eLNF eLz M <sub>1</sub> M <sub>2</sub> F	21 11 44 51 57 24 57 27 22 35	...	...	...	...	...		22	ePz iz iz iz iSE SR <sub>1</sub> E iSR <sub>2</sub> E LN LEz M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> F	13 11 56 12 31 12 47 13 42 22 28 28 54 32 53 37 39 41 18 43 21 43 32 48 22 50 24 16 10	...	...	...	...	9430	Destructive in Mexico. 19° N., 104° W. (U.S.C.G.S.).
14	iPz iPcPz iPR <sub>1</sub> iScPcSNE iSNE LNE Lz M F	6 12 48 13 18 16 34 23 16 23 55 45 48 57 34 7 30	...	...	...	...	10200	Japan. (Strasbourg).					...	...	...	...	
14	e eL F	12 10 15 45	...	...	...	...	...		23	e F	2 32 20 4 20	...	...	...	...	...	Very small.
16	iPz iPcPz iScPcSE eSNE LNE Lz F	1 31 52 32 11 42 18 42 40 2 9 17 45	...	...	...	...	9770	Indian Ocean. 1.5° N., 93.5° E. (U.R.S.S.).		25	e F	12 30 40	...	...	...	...	
18	e F	1 3 10	...	...	...	...	...		26	eP eSE eL F	19 31 18 41 (12) 59 20 55	...	...	...	...	8670	Kurile Islands. 48° N., 151° E. (J.S.A.).
18	e F	2 19 35	...	...	...	...	...		29	ez e(S)NE ez eL M F	2 33 39 59 40 12 42 44 22 3 10	...	...	...	...	...	Mediterranean Sea. 35° N., 27° E. (U.R.S.S.).
18	eP iPcP iNZ iPR <sub>1</sub> iSE iPSNZ iE iSR <sub>1</sub> NE iSR <sub>2</sub> E L M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> F	10 24 34 25 0 25 55 28 21 35 25 35 55 40 25 41 49 44 53 49 11 1-3† 1 27 1 47 3 59 4 21 6 34 15 15	...	...	...	...	9850	Amplitudes of iPcP as read in mm.:— N. E. Z. -1.7 +6.1 +15 giving azimuth about 286°. Destructive in Mexico. 19° N., 104° W. (U.S.C.G.S.).		29	eez eN eL M F	18 43 29 46 57 58 19 3 52 45	...	...	...	...	Japan. 40° N., 142.5° E. (U.R.S.S.).
18	e F	22 14 23 10	...	...	...	...	...		July 2	e F	3 12 35	...	...	...	...	...	
20	ez eL F	4 7 36 5 3 55	...	...	...	...	...		2	ez F	12 26 30	...	...	...	...	...	Very small.
20	e F	6 38 7 20	...	...	...	...	...		3	e F	18 16 25	...	...	...	...	...	
20	ePz eL F	9 38 16 10 5 50	...	...	...	...	...	Pacific Ocean off Ore- gon. 44° N., 126° W. (J.S.A.).	5	ez F	10 54 11 0	...	...	...	...	...	
20	eL F	20 20 35	...	...	...	...	...		5	e F	11 49 12 20	...	...	...	...	...	
21	e eL F	4 57 5 20 40	...	...	...	...	...		7	eP eSNE eSR <sub>1</sub> NE eSR <sub>2</sub> NE LNE Lz M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> F	16 28 10 38 10 43 20 46 56 48 53 55 43 56 11 59 56 17 2 6 2 32 5 52 19 35	...	...	...	...	8800	Lower California. 28° N., 113.5° W. (J.S.A.).



Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.	Date.	Phase.	Time. G.M.T.	Period	Amplitudes.			Δ	Remarks.
				An.	Ae.	Az.							An.	Ae.	Az.		
Aug. 14	e F	h. m. s. 12 46 13 35	...	μ	μ	μ	km.										
15	eze F	4 39 5 0	...	...	...	...	...										
15	e F	15 30 50	...	...	...	...	...										
16	e F	22 25 35	...	...	...	...	...									Very small.	
17	eL F	9 26 10 0	...	...	...	...	...										
18	e F	20 49 21 15	...	...	...	...	...										
19	e F	3 53 4 5	...	...	...	...	...										
19	e F	18 30 50	...	...	...	...	...									Very small.	
20	e F	17 3 25	...	...	...	...	...										
21	iPz ePR <sub>1</sub> eSNE eL M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	4 28 31 32. 2 38 59 58 5 12 20 12 46 12 51 7 5	...	...	...	...	9350	Compression. Formosa. 22.5° N., 119° E. (U.R.S.S.).									
22	ePz eLNE eLz M <sub>1</sub> M <sub>2</sub> F	11 24 47 54 58 12 4 8 4 19 50	...	...	...	...	(8800)	Yellow Sea. 36.5° N., 123.0° E. (U.R.S.S.).									
24	e F	4 23 5 5	...	...	...	...	...	Very small.									
24	eLNE eLz F	12 56 13 3 45	...	...	...	...	...										
25	e F	8 40 9 25	...	...	...	...	...	Pacific Ocean off Mexico. 18° N., 106° W. (J.S.A.).									
28	e F	11 40 12 0	...	...	...	...	...	Very small.									
Sept. 3	e e(S)NE LNE Lz M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	12 12 21 30 37 44 44 44 53 21 58 1 13 20	...	...	...	...	...	Sea of Japan. 42° N., 138° E. (Stuttgart).									
5	e F	3 51 4 10	...	...	...	...	...										
5	—	— — —	...	...	...	...	...	9h 39m to 15h 9m									
6	—	— — —	...	...	...	...	...	8h 32m to 15h 56m									
7	—	— — —	...	...	...	...	...	9h 6m to 14h 52m									
8	iPze eSe eSR <sub>1</sub> e eSR <sub>2</sub> e eLNE eLz M <sub>1</sub> M <sub>2</sub> F	1 53 41 2 4 5 10 10 13 36 21 26 31 9 31 11 3 5	...	...	...	...	9270	Pacific Ocean off Mexico. 18° N., 105° W. (J.S.A.).									
Sept. 8	e F	7 44 8 25	...	...	...	...	...										
9	e eLNE eLz F	13 58 14 33 41 16 5	...	...	...	...	...									Celebes. 6° S., 122.5 E. (U.R.S.S.).	
11	e F	14 38 15 5	...	...	...	...	...	Very small.								Disturbed by wind and microseisms.	
12	—	— — —	...	...	...	...	...									9h 25m to 11h 56m no records.	
14	e F	9 16 30	...	...	...	...	...										
15	e eLNE eLz F	11 38 12 3 9 50	...	...	...	...	...									Felt in Mindanao (Manila). 6.5° N., 122.0° E. (U.R.S.S.).	
15	e eLNE eLz M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	14 15 15 9 14 30 27 38 42 47 30 16 55	...	...	...	...	...									Destructive around Gisborne and Hawke's Bay, New Zealand. 41.5° S., 176° W. (U.R.S.S.).	
18	e F	14 47 55	...	...	...	...	...	Very small.									
23	iP epPz iS iSPNE eNE L F	14 33 39 34 49 43 5 43 29 54 1 — — — 16 15	...	...	...	...	...										
25	e F	23 1 20	...	...	...	...	...										
26	eP iP i iS i Lz LN M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> M <sub>5</sub> M <sub>6</sub> F	19 25 18 25 22 25 38 29 4 29 23 30 42 30 56 31 10 32 15 18 34 3 20 34 9 15 34 12 15 36 23 13 36 26 16 — — —	...	...	...	...	...										Amplitudes in mm.:— N. E. Z. — 1.0 + 2.2 — 2.2 + 7.3 — 14.3 + 9 + 15.8 — 33.2 — Azimuth = 114° ± 2° giving epicentre near 40° N., 24° E. Destructive in Chalcidice Peninsula, Greece.
26	iP eSNE eSz L M F	21 31 32 35 16 35 24 37.6 38 31 23 10	...	...	...	...	...									Overlapped by next shock. Repetition of preceding shock.	
27/28	—	20h to 8h	...	...	...	...	...									Numerous small disturbances, probably further repetitions. Repetition from the Greek epicentres.	
28	eP eS eL M <sub>1</sub> M <sub>2</sub> F	16 56 42 17 0 22 2 3 25 4 34 45	...	...	...	...	...										
29	eP iP i iS eL M <sub>1</sub>	4 1 52 1 55 1 59 5 32 6 8 30	...	...	...	...	...									Amplitudes in mm.:— N. E. Z. — 0.5 + 0.9 — 1 + 2.2 — 3.9 + 5 — 4.2 + 6.9 — 1.2	

546. Richmond (Kew Observatory).

Lat. 51° 28' N. Long. 0° 19' W. Height above M.S.L. 5 metres.

1932.

Date.	Phase.	Time. G.M.T.		Period	Amplitudes.			Δ	Remarks.	Date.	Phase.	Time. G.M.T.		Period	Amplitudes.			Δ	Remarks.
					An.	Ae.	Az.								An.	Ae.	Az.		
Sept. 29	M <sub>2</sub> M <sub>3</sub> F	h. m. s. 9 3 9 50	s. 12 8	μ 40	μ	μ +42	km.	Azimuth = 118° ± 2°, giving epicentre near 40° N., 23° E. Felt in Salonica.	Oct. 17	e F	h. m. s. 14 37 15 10	s.	μ	μ	μ	km.			
29	e F	7 2 15	...	...	...	...	...		23	ez eL F	13 45 51 14 10	...	...	...	...	...			
29	e F	12 12 35	...	...	...	...	...		23	eL <sub>NE</sub> eL <sub>Z</sub> M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	22 10 17 24 27 24 58 26 10 45	...	...	...	...	...			
29	e F	14 34 50	...	...	...	...	...		29	ePR <sub>1Z</sub> eS <sub>NE</sub> e(SR <sub>1</sub> ) <sub>NE</sub> L <sub>NE</sub> L <sub>Z</sub> M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	11 19 (45) 25 4 28 44 34 38 38 1 41 43 41 45 12 10	...	...	...	...	...	...		
29	eP eS <sub>NE</sub> eL <sub>NE</sub> eL <sub>Z</sub> M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	17 58 40 18 8 42 22 31 29 25 39 42 40 5 19 55	...	...	...	...	8830	Kurile Islands. 47° N., 154° E. (J.S.A.).	30	iP <sub>Z</sub> ePR <sub>2</sub> eL M F	20 58 26 21 3 4 7 52 22 25 40 22 15	...	...	...	...	...	8130	Compression. Alaska Region. 54° N., 155° W. (J.S.A.).	
29	e F	21 55 58	...	...	...	...	...	Further repetitions from the Greek epicentres.	Nov. 1†	eP <sub>NE</sub> eS <sub>NE</sub> L <sub>NE</sub> M F	16 24 6 27 38 29 (47) 31 0 50	...	...	...	...	...	2100	Destructive in Greece.	
30	e eL F	6 21 15 24 35	...	...	...	...	...		2†	e(PS) <sub>E</sub> e(SR <sub>1</sub> ) <sub>NE</sub> eL F	11 33 51 39 44 54 12 40	...	...	...	...	...	...	Disturbed by wind. Pacific Ocean, 23° S., 111° W. (J.S.A.).	
30	e F	7 41 44	...	...	...	...	...		3†	eL <sub>NE</sub> F	20 33 21 5	...	...	...	...	...	...	†No. "Z" record, Nov. 1 <sup>d</sup> to 11 <sup>d</sup> .	
30	e F	7 48 51	...	...	...	...	...		6†	eNF F	17 12 20	...	...	...	...	...	...		
Oct. 1	e F	13 47 50	...	...	...	...	...		9†	eNF F	19 10 25	...	...	...	...	...	...		
2	eP <sub>ZE</sub> ePR <sub>1ZE</sub> eS <sub>E</sub> iPS <sub>E</sub> iPPS <sub>E</sub> eSR <sub>1</sub> eSR <sub>2NE</sub> eL M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	3 11 12 14 (0) 21 38 22 4 22 22 26 16 29 56 32 40 55 43 3 43 9 5 20	...	...	...	...	9310	Pacific Ocean off Central America. 10.9° N., 86.5° W. (J.S.A.).	13	iP iPP eS <sub>PZN</sub> iPR <sub>1Z</sub> iS iE iZE iNE eSR <sub>1N</sub> eE eZ <sub>N</sub> eE eN eE F	4 58 24 59 37 5 0 11 1 28 7 50 8 6 8 26 9 21 12 50 18 12 18 32 18 52 22 36 26 18 29 4 30	...	...	...	...	...	8600*	Dilatation. Focus about 250 km. below normal. Sea of Japan. 43.4° N., 137° E. (J.S.A.) *Distance and focal depth from diagrams by F. J. Scrase. L waves poorly de- veloped.	
9	e F	6 35 45	...	...	...	...	...	Repetition, Greece.	11	e F	19 45 20 5	...	...	...	...	...	...		
9	eL <sub>NE</sub> M eL <sub>Z</sub> F	13 33 38 29 40 14 0	...	...	...	...	...		12	e F	3 10 20	...	...	...	...	...	...		
11	e F	19 45 20 5	...	...	...	...	...	Gulf of California. 25° N., 110.5° W. (J.S.A.).	12	e F	20 30 35	...	...	...	...	...	...		
12	e F	20 30 35	...	...	...	...	...	Very small.	12	e F	22 32 38	...	...	...	...	...	...		
15	e F	22 32 38	...	...	...	...	...	Repetition, Greece.	15	e F	22 32 38	...	...	...	...	...	...		
16	iP <sub>ZN</sub> iS <sub>E</sub> iE iE eSR <sub>1N</sub> eSR <sub>2NE</sub> eL M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> M <sub>4</sub> eL <sub>3</sub> F	12 19 31 28 58 29 12 29 52 33 37 43 46 43 51 16 51 32 52 15 14 44 15 0	...	...	...	...	8150	Compression. Azimuth about North. Alaska. 54° N., 158° W. (U.S.C.G.S.). Via Antipodes.	17	iP <sub>ZE</sub> eS eL <sub>NE</sub> eL <sub>Z</sub> M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	6 15 25 25 43 45 48 52 55 53 2 53 7 7 30	...	...	...	...	...	...	9150	Pacific Ocean off Mexico. 18° N., 104° W. (J.S.A.).



Derived from readings for the period of thirty minutes centring at the exact hours, Greenwich Mean Time.

547. Richmond (Kew Observatory).

1932.

Table with columns for Month (January, February, March) and Hour.G.M.T. (Oh., 6h., 12h., 18h.). Each hour has two columns for Amplitude (A) and Period (Tp) in microseconds and seconds. Includes a 'Mean for Day' row at the bottom of the table.

Summary row for the first three months: Mean for Day. January: A = 2.3 μ, Tp = 6.5 s. February: A = 0.5 μ, Tp = 5.9 s. March: A = 1.4 μ, Tp = 5.9 s.

Table with columns for Month (April, May, June) and Hour.G.M.T. (Oh., 6h., 12h., 18h.). Each hour has two columns for Amplitude (A) and Period (Tp) in microseconds and seconds. Includes a 'Mean for Day' row at the bottom of the table.

Summary row for the last three months: Mean for Day. April: A = 1.2 μ, Tp = 6.0 s. May: A = 0.3 μ, Tp = 4.7 s. June: A = 0.1 μ, Tp = 5.0 s.

Note.- The Symbol ... indicates that microseisms were not measured, either by reason of occurrence of earthquakes or lack of record.

Derived from readings for the period of thirty minutes centring at the exact hours, Greenwich Mean Time.

547. Richmond (Kew Observatory).

1932.

Month.	July.								August.								September.							
	Oh.		6h.		12h.		18h.		Oh.		6h.		12h.		18h.		Oh.		6h.		12h.		18h.	
	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.
Day.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.
1	0.3	4.1	0.5	4.8	0.5	4.5	0.5	4.8	0.0	---	0.0	---	0.0	---	0.0	---	0.5	5.2	0.5	5.2	0.4	5.4	0.6	5.6
2	0.5	5.0	0.7	5.0	0.7	4.8	0.7	5.2	0.0	---	0.0	---	0.0	---	0.0	---	0.6	5.6	0.8	5.8	1.1	5.6	1.0	6.3
3	0.5	5.0	0.5	4.8	0.3	4.5	0.3	4.5	0.0	---	0.0	---	0.0	---	0.0	---	1.0	6.3	1.2	6.3	1.2	6.0	1.4	6.0
4	0.3	4.1	0.3	4.3	0.3	4.3	0.3	4.3	0.0	---	0.0	---	0.2	6.0	0.2	5.0	1.9	6.0	1.2	6.0	1.4	5.2	0.6	5.6
5	0.2	5.0	0.5	4.5	0.2	5.0	0.2	5.0	0.2	6.0	0.2	5.6	...	...	0.0	---	0.6	6.0	0.2	5.2	...	...	0.3	4.0
6	0.2	5.0	0.2	5.0	0.2	4.7	0.2	5.0	0.0	---	0.2	6.7	0.0	---	0.2	5.0	0.3	4.3	0.0	---	...	...	0.2	4.5
7	0.2	5.0	0.2	5.0	0.2	5.0	...	...	0.2	4.7	0.2	6.0	0.2	4.7	0.0	---	0.3	4.3	0.3	4.3	...	...	0.2	4.8
8	0.2	4.8	0.3	4.5	0.2	5.0	0.3	4.3	0.0	---	0.0	---	0.0	---	0.0	---	0.2	4.7	0.5	4.0	0.5	4.5	0.6	3.9
9	0.2	4.8	0.3	4.5	0.2	5.0	0.3	4.5	0.0	---	0.0	---	...	...	0.0	---	1.6	4.3	1.3	4.1	0.5	4.7	0.7	5.2
10	0.2	5.2	0.2	5.0	0.3	4.3	0.3	4.5	0.0	---	0.0	---	0.0	---	0.0	---	0.4	5.6	0.2	5.4	0.2	5.0	0.4	5.2
11	0.2	4.8	0.2	4.7	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.7	5.2	0.9	4.8	0.7	4.5	0.5	4.3
12	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	...	...	...	...	0.5	5.0	0.7	5.0	0.7	4.8	0.8	4.3
13	0.0	---	0.0	---	0.3	3.5	0.0	---	...	...	...	...	0.0	---	0.0	---	0.9	5.0	0.9	5.4	0.9	5.2	1.0	5.8
14	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	1.2	5.8	1.8	5.8	1.2	7.0	1.2	7.0
15	0.3	3.7	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	1.8	7.0	1.8	6.7	1.2	6.0	1.0	6.3
16	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	...	...	...	...	0.7	6.7	0.4	5.2	0.6	6.5	0.2	6.0
17	0.0	---	0.0	---	0.0	---	0.0	---	...	...	...	...	0.0	---	0.0	---	0.2	4.7	0.2	4.7	0.2	4.7	0.2	5.0
18	0.2	5.0	0.3	4.3	0.3	4.3	0.3	4.5	0.0	---	0.0	---	0.0	---	0.0	---	0.2	5.0	0.5	5.0	0.6	6.0	0.9	7.0
19	0.2	5.4	0.5	5.0	0.3	4.5	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	1.6	6.7	0.7	6.7	1.1	5.4	0.2	4.7
20	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.0	---	0.4	5.8	1.2	4.8	1.4	5.8	2.7	5.2
21	0.2	4.7	0.2	5.0	0.2	5.0	0.2	5.0	0.0	---	0.0	---	0.0	---	0.0	---	3.3	4.8	2.6	4.8	2.1	4.3	2.6	4.3
22	0.3	4.3	0.3	4.3	0.0	---	0.3	4.5	0.0	---	0.0	---	0.0	---	0.0	---	2.4	4.7	2.1	4.8	1.4	4.7	1.2	4.7
23	0.3	4.1	0.0	---	0.2	4.7	0.3	4.3	0.0	---	0.0	---	0.0	---	0.0	---	0.8	4.1	0.6	3.9	0.8	4.1	0.5	4.8
24	0.2	4.7	0.2	4.7	0.2	4.7	0.3	4.3	0.0	---	0.0	---	0.0	---	0.0	---	1.0	4.7	0.5	4.7	0.3	4.1	0.5	5.0
25	0.3	4.3	0.2	5.0	0.2	5.0	0.4	5.6	0.0	---	0.0	---	0.0	---	0.0	---	0.5	4.1	0.7	5.2	1.2	4.7	0.9	5.0
26	0.2	4.7	0.2	4.7	0.3	4.0	0.2	4.8	0.0	---	0.0	---	0.0	---	0.0	---	0.5	4.1	0.6	5.6	0.2	5.0	0.3	4.0
27	0.3	4.3	0.3	4.3	0.2	5.0	0.3	3.6	0.0	---	0.0	---	0.0	---	0.0	---	0.5	5.0	0.5	5.0	0.5	4.5	0.2	5.4
28	0.3	3.6	0.3	4.1	0.2	5.0	0.3	4.3	0.0	---	0.0	---	0.0	---	0.0	---	0.3	4.0	0.3	4.3	0.3	3.9	0.3	4.0
29	0.2	4.7	0.3	4.5	0.3	4.3	0.3	4.0	0.0	---	0.0	---	0.2	5.8	0.2	5.8	0.5	4.1	0.2	4.8	0.2	5.0	0.3	4.1
30	0.3	4.5	0.3	4.3	0.3	4.1	0.3	4.0	0.2	5.4	0.2	5.0	0.2	5.2	0.2	5.0	0.5	5.0	1.9	4.1	1.1	4.0	0.5	4.8
31	0.0	---	0.0	---	0.0	---	0.0	---	0.2	5.2	0.2	5.0	0.2	6.0	0.5	5.2	0.0	---	0.0	---	0.0	---	0.0	---
Mean	0.2	4.6	0.2	4.7	0.2	4.6	0.2	4.5	0.0	5.3	0.0	5.5	0.0	5.5	0.0	5.2	0.9	5.1	0.8	5.1	0.8	5.1	0.7	5.1
Mean for Day.	$A = 0.2\mu, Tp. = 4.6 s.$								$A = 0.0\mu, Tp. = 5.4 s.$								$A = 0.8\mu, Tp. = 5.1 s.$							

Month.	October.								November.								December.							
	Oh.		6h.		12h.		18h.		Oh.		6h.		12h.		18h.		Oh.		6h.		12h.		18h.	
	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.	A.	Tp.
Day.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.	$\mu$	S.
1	1.0	4.7	0.5	4.3	0.5	5.0	0.8	4.3	0.6	5.8	0.5	6.7	0.4	5.4	0.6	6.0	1.7	5.7	1.9	6.5	1.8	6.0	1.3	6.3
2	1.4	4.0	0.8	4.3	0.5	4.3	0.5	4.3	0.4	5.8	1.1	7.0	1.0	7.5	1.0	6.3	1.9	6.5	1.9	6.5	1.9	6.5	1.9	6.3
3	0.6	3.9	0.3	4.3	0.2	5.0	0.2	4.7	0.8	5.8	1.0	5.8	0.6	5.6	0.5	4.0	3.5	7.3	3.4	7.5	3.6	7.5	3.1	8.0
4	0.3	4.3	0.0	---	0.0	---	0.2	5.0	0.3	4.1	0.5	4.3	0.3	3.9	1.9	6.3	1.9	6.3	1.4	7.0	1.7	7.0	1.7	6.5
5	0.0	---	0.0	---	0.0	---	0.0	---	0.3	4.0	0.3	3.7	0.6	3.7	1.0	4.7	0.9	5.4	0.5	4.0	0.9	5.0	2.2	5.4
6	0.0	---	0.0	---	0.2	5.0	0.5	5.0	0.5	4.0	0.8	4.3	0.4	5.6	0.4	6.0	2.0	6.0	1.5	5.4	2.2	5.2	2.2	5.4
7	0.6	5.6	0.5	5.0	0.7	5.2	0.5	4.0	0.6	6.8	1.0	6.3	0.5	4.7	2.0	3.9	3.8	6.3	4.7	6.5	4.7	6.5	4.5	6.5
8	1.3	5.4	1.9	6.5	1.9	6.3	1.8	6.0	0.4	5.4	0.6	6.0	0.2	5.6	0.5	5.0	5.4	6.0	3.6	6.5	1.8	6.0	2.0	5.2
9	1.9	5.6	1.9	5.6	2.1	5.6	1.6	5.2	0.4	6.5	0.4	6.0	0.4	6.3	1.5	6.7	1.5	5.6	1.3	6.5	1.3	5.6	0.4	6.0
10	1.3	6.5	1.5	6.3	1.0	6.0	0.9	6.7	0.9	6.7	0.6	6.0	0.8	6.0	1.3	6.3	0.9	6.7	1.6	6.7	1.8	6.0	2.0	6.0
11	0.8	6.5	0.4	7.0	0.2	5.2	0.2	4.7	1.8	7.0	2.5	7.0	3.2	6.5	2.4	7.3	1.8	6.0	1.7	5.6	1.1	5.2	1.0	5.8
12	0.3	4.3	0.2	6.5	0.2	5.0	0.2	6.0	3.1	7.3	3.6	7.5	2.3	7.0	1.9	6.5	0.7	4.7	0.5	4.5	0.2	4.5	0.3	4.0
13	0.9	6.7	1.7	7.5	1.4	7.0	1.6	7.0	1.9	6.5	1.0	5.6	0.7	5.2	0.2	5.0	0.2	4.7	0.3	4.3	0.0	---	0.3	4.3
14	1.2	6.0	1.1	6.3	1.0	4.5	1.1	5.0	0.5	5.0	0.5	4.3	0.5	5.0	0.3	3.7	0.0	---	0.0	---	0.2	6.0	0.4	7.0
15	1.1	5.0	1.6	5.0	0.9	5.0	1.1	5.4	...	...	...	...	0.0	---	0.0	---	0.8	6.0	1.3	6.3	1.9	7.5	1.6	7.0
16	0.4	5.2	0.7	5.2	0.4	5.6	0.5	4.0	0.0	---	0.0	---	0.0	---	0.0	---	4.9	9.0	4.4	9.0	2.9	8.3	4.4	8.0
17	0.2	5.2	0.7	5.2	0.5	5.0	0.2	5.0	0.0	---	0.0	---	0.0	---	0.0	---	3.3	8.0	2.4	7.7	2.5	7.0	3.6	7.0
18	0.4	5.6	0.5	4.0	1.8	3.7	1.0	4.3	0.3	4.0	0.0	---	0.0	---	0.2	6.0	4.0	7.3	3.2	7.5	2.8	7.0	1.9	7.3
19	1.0	4.5	0.2	5.0	0.5	4.8	0.9	5.0	0.2	5.0	0.2	6.0	1.2	7.0	1.1	7.0	1.8	7.0	1.5	7.5	1.9	6.5	1.7	6.3
20	0.8	6.0	1.3	5.4	1.5	5.4	4.4	7.5	1.6	6.7	1.6	6.7	1.7	6.5	1.8	7.0	1.6	5.2	2.1	5.6	1.7	6.5	1.8	7.0
21	2.1	7.3	2.0	7.0	2.0	6.7	1.5	5.6																



Air Ministry  
METEOROLOGICAL OFFICE

THE  
OBSERVATORIES' YEAR BOOK  
1932

Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

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AEROLOGICAL SECTION

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Published by the authority of the  
METEOROLOGICAL COMMITTEE



LONDON  
HIS MAJESTY'S STATIONERY OFFICE  
1934

## AEROLOGICAL SECTION.

Station.	Latitude.	Longitude.	Height above Sea Level.
Kew Observatory ..	51° 28' N. ..	0° 19' W. ..	7 metres.
Sealand ..	53° 14' N. ..	3° 0' W. ..	5 metres.

## INTRODUCTION.

**Notes on the tables of Upper Air Temperatures obtained from soundings with registering balloons at Richmond and Sealand, 1932.**

The tables in the Aerological Section are presented in the same form as those appearing in the Observatories' Year Book since 1930. As in that volume geopotential is used in place of geometric height for the vertical coordinate. The units employed are :

- 1 Leo (symbol l) =  $10^5$  c.g.s. units of geopotential.  
 1 Kiloleo (symbol Kl) =  $10^8$  c.g.s. " " " "

A table shewing the relation between height and geopotential in latitude  $52^{\circ} 20'$ , the approximate mean latitude of Kew Observatory and Sealand, is given in the Introduction to the Aerological Section of the Observatories' Year Book, 1930.

The Dines pattern meteorograph was employed solely as before, and the method of operation remained the same as in recent years. A full description will be found in "The Dines Balloon Meteorograph and the method of using it."\* In the computation of pressure-geopotentials the graphical method was employed, checked as to its main features by an arithmetical process. The effect of humidity on the density of the air was neglected.

A total of 46 soundings were made during the year, 29 from the Aviation Service Station of the Meteorological Office at Sealand Aerodrome and 17 from Kew Observatory. In the cases of 30 of these soundings the instruments were found and returned, the rest being lost. In one, which was found and returned, the record was unsatisfactory and could not be utilised. The choice of station from which a sounding was made was generally determined in view of the probable direction and length of the run of the balloon.

The ventilation of the Dines meteorograph is effected solely by the natural draught produced by its vertical velocity. The vertical velocity of the rising balloon may be taken to have lain between the limits 220 and 310 metres per minute in the troposphere. It is probable that even when the balloon is known to have burst, this velocity was not always maintained up to the highest point of the sounding. After the balloon had burst the meteorograph fell at an average rate of about 700 metres per minute.

As regards temperature, unless stated to the contrary the mean of the records on the ascent and descent was employed entirely in computing the published figures. In general the difference between the two records did not exceed  $4^{\circ}\text{A.}$ , with a mean of about half that amount. Whenever direct evidence is available it is almost always found that in the troposphere the descending record is the colder of the two. An analysis of a large number of British soundings has led to the conclusion that as far as the troposphere is concerned this effect is mainly due to a temperature lag of the thermograph member, and that the mean of the two records gives in general a close approximation to the true air temperature.† Occasionally in exceptional circumstances it is deemed best to give greater weight to one record than to the other, or to publish the data from one record only. All such occasions are mentioned in the notes, they generally refer either to occasions of strong solar radiation when the less vigorous ventilation of the meteorograph on the ascent makes that record less reliable than that of the descent, or to the lowest layers of the troposphere only.

\* M.O. 321, H.M. Stationery Office.

† See also :—Memoirs of the Indian Meteorological Department. Vol. XXIV. Part V. By J. H. Field.

In the case of high soundings made during the day-time a pronounced rise of temperature is sometimes observed over about a kiloleo at the extreme top. There is good evidence that this is a fictitious effect due to solar radiation and that the ascent is a great deal more affected by it than the descent. The rise of temperature in such cases is therefore usually ignored, and in addition greater weight is given to the descent than to the ascent in the upper parts of such records as show an unusually large difference between them. All occasions on which such selection has been made are specifically mentioned in the notes. An account of this phenomenon is to be found in "Memoirs of the Royal Meteorological Society," Vol. 2, No. 18. By L. H. G. Dines.

In most cases the meteorograph was fitted with a hair hygrometer. Only one record of relative humidity in each case has been published, which unless specifically mentioned to the contrary in the notes is that of the ascent. The record of the descent appears to be the less reliable for two reasons, first that the previous exposure of the hair to extreme cold and dryness makes it more sluggish in response to changes in the relative humidity, second that the higher velocity at which the meteorograph falls increases the lag in its response reckoned in terms of height. The hygrometer readily shows changes in the relative humidity in the lower part of the troposphere, but the absolute value of its readings may be subject to an uncertain error of five or more on the percentage scale. No difference has been made as concerns this or previous volumes, in the interpretation of the records as between temperatures above and below the freezing point. For purposes of reference it may however be stated that Depograms supplied to the International Commission for the exploration of the Upper Air were, up to the year 1929, drawn on the assumption that the published figures of relative humidity at temperatures below 273°A. referred to ice; since 1930 it has been presumed that they refer to water in all cases. Below a temperature of 250°A. it seems doubtful if in the ordinary way the record has any meaning, and the figures for the higher parts of the atmosphere have not therefore been published.

In order to ensure as far as possible that the hygrometer works under standard conditions, it is normally exposed to a saturated atmosphere for ten minutes about an hour before the sounding is made.

The method employed in calibrating the hygrometer is as follows:—It is first immersed in either water or a saturated atmosphere for at least ten minutes, and a mark made by the scribe on the record plate which is taken as corresponding with steady saturated conditions. It is then taken out, roughly dried to remove superfluous water, and placed as soon as possible in a testing chamber through which a current of air flows continually. The relative humidity of the air stream is next reduced in two or more stages to a minimum value of about 20%, plenty of time being allowed at each stage for the conditions to become steady. When in each case steady conditions have been attained a mark is made by the scribe. The object of the test is to obtain two marks at relative humidities near 25%, and in such case the total time taken is about 25 to 30 minutes from the instant when the hygrometer is removed from the water in the first place. If the relative humidity is reduced in more than two stages the total time taken is greater, allowing about ten minutes per stage. The calibration is carried out at temperatures above 288°A.

When the contraction of the hair corresponding with a relative humidity of 25% has been determined in the manner described, the contraction throughout the scale under the conditions met with in the sounding is assumed to follow an empirical law, which has been determined from the average behaviour of a large number of hairs. A table expressing this law appeared in the Introduction to the Aerological Section of the Year Book for 1930 and represented the procedure which had been adopted up to the end of that year. As a result of further experiments made in 1931 it was found desirable to amend the statement of the empirical law of contraction of the hygrometer hairs, and for purposes of tabulation since January, 1931, the following table has been used:

Relative humidity %	110	100	95	90	80	70	60	50	40	30	25
Contraction of hair. Saturated length.	—·07k	00k	·035k	·080k	·185k	·315k	·45k	·59k	·74k	·90k	·99k

Here, the quantity  $k$  is defined as the contraction of the hair from its saturated length at the relative humidity of 25% expressed as a fraction of the saturated length, and determined as set out in the preceding paragraph.

The average value of  $k$  has been found to be about .0099, but individual hairs differ from the mean by anything up to 15% on either side. This figure is based on observations made on about 80 meteorographs, involving 40 or more entirely separate human hairs derived from various sources.

In working up the records the hair has been assumed to have a uniform absolute coefficient of thermal expansion of  $34 \times 10^{-6}$  per degree A. Since the frame of the hygograph is made of nickel silver having a coefficient of  $18 \times 10^{-6}$  the relative expansion of hair to frame is  $16 \times 10^{-6}$  per degree A.

No allowance has been made in computing the published figures for the fact that the results of the calibration are not necessarily valid at low temperatures below the freezing point.

It has been noticed on many occasions that on passing through a cloud the hygograph hairs expand more than they do when immersed in water or in an artificial saturated atmosphere; heretofore these occasions have been uniformly tabulated as 100%. This phenomenon is not yet fully understood, but it has been proved that it is not due to errors in calibration or setting of the instrument; accordingly in this volume its occurrence is indicated by publishing a value of the relative humidity in excess of 100%. The values are determined by extrapolation of the table upwards through 100, the extension being indicated in brackets. If, for example, the hairs are found to have extended by  $.035k$  beyond their length when immersed in water at the same temperature the relative humidity is tabulated as 105%, but there is not enough evidence to be able to state what exactly is the corresponding physical condition of the atmosphere in regard to water vapour.

Data of well marked inversions and regions of zero lapse rate in the troposphere are included in the notes on the soundings. They are set out in a uniform manner on the principle that corresponding values of geopotential, temperature and relative humidity are given for the salient points in each special case, the sequence being always from lesser geopotentials to greater.

The figures given in the table of lapse rates do not in every case agree with the temperatures appearing in the table of temperature-geopotentials. The reason for this is that both were determined independently from the original data, which can sometimes profitably be read to the nearest half degree, but are rounded off to whole degrees for publication.

The lapse rates given between ground level and 0.5 Kl. are determined from the reading in the thermometer screen at the station and that of the meteorograph at 0.5 Kl. A source of error arises here in that the two standards are independent and are not exposed in the same manner. A small difference is capable of making an appreciable error in the lapse rate, and it is possible that lapse rates apparently greater than  $10^{\circ}\text{A. per Kl.}$  in this layer are sometimes due to this cause.

Whenever possible the meteorograph was briefly calibrated again at one temperature after return, before the record plate had been disturbed, in order to discover whether any shift of zero had taken place since the previous calibration. This provides some check on the behaviour of the instrument, but disturbance is almost inevitable considering the rough treatment experienced in the shock of the fall and after. The mean values of the disturbance without regard to sign were  $1.7^{\circ}\text{A.}$  for the temperature and 6 mb. for the pressure.

All new meteorographs, and all old ones used again after repair, were seasoned in a vacuum chamber before use by being subjected to several slow reductions of pressure. This process has been found greatly to reduce the chance of a systematic difference occurring between the results of a fast and slow calibration. More detail is given in the Introduction to the tables for 1923, and within the limits of accuracy at present attainable in the measurement of upper air pressures, the results of the fast reduction of pressure in the calibration test may be taken as applying to the slow reduction in the actual sounding.

The lag, or difference in pressure reading as between a falling and a rising pressure, is of the order 3 or 4 millibars on the average in the middle region of a high sounding, falling off to lesser values on either side. If a correction be applied to the recorded temperature-pressures to allow for this error, it results, for an average sounding in the troposphere, in an increase in the difference between the temperatures recorded at any pressure on the ascent and descent. The effect is to make the recorded temperatures on the descent too high by about half a degree at a level of 6 or 7 kiloleos, with a tendency for the error to fall off above and below. When the mean of the two records is employed the resultant error is halved and becomes negligible.

In Table 548 occur the entries "Type of Tropopause" and " $L_c$  = Geopotential at Tropopause." These are defined as follows:—Type I. The stratosphere commences with an inversion, and  $L_c$  is the geopotential at the first point of zero temperature gradient. Type II. The stratosphere begins with an abrupt transition to a temperature gradient below  $2^\circ\text{A}$ . per kiloleo without inversion, and  $L_c$  is the geopotential of the abrupt transition. Type III. There is no abrupt change of temperature gradient, and the base of the stratosphere is taken at the point where the mean fall of temperature for the kiloleo next above is  $2^\circ\text{A}$ . or less, provided that it does not exceed  $2^\circ\text{A}$ . for any subsequent kiloleo. In the Remarks on the Soundings the pressure distribution is classified according to the types defined in "Aids to Forecasting."†

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†—E. Gold, F.R.S., Geophysical Memoir No. 16, M.O. 22of, London, 1920.

No. of Sounding.	872	873	877	879	880	881	884	885	887	888
Date.	Feb. 11	Feb. 12	Apr. 13	Apr. 14	Apr. 20	Apr. 25	May 12	May 12	June 22	June 23
Station.	Kew.	Kew.	Sealand.	Sealand.	Kew.	Kew.	Sealand.	Kew.	Sealand.	Sealand.
Start G.M.T. ... ..	12h. 25m.	16h. 9m.	18h. 5m.	13h. 25m.	13h. 53m.	14h. 37m.	7h. 20m.	13h. 27m.	17h. 42m.	7h. 27m.
$L_t$ = Geopotential at Greatest Height ... .. (Kl.)	15.28	16.22	13.76	17.80	7.38	7.71	17.45	8.92	9.55	18.05
$T_t$ = Corresponding Temperature ... (°A)	223	219	213	223	237	234	222	234	227	225
$P_t$ = Corresponding Pressure ... (mb.)	107	92	136	73	370	357	80	309	282	75
Place of Fall ... ..	Minstead, Lyndhurst, Hants.	Winsham, Chard, Somerset.	Hardygate, Cropwell Butler, Notts.	Ashley, Altrincham, Cheshire.	Danbury, Chelmsford, Essex.	Poplar, London	Lound, nr. Retford Notts.	Rawreth, nr. Rayleigh Essex.	Smethcote, Lebotwood, Salop.	Titley, Kington, Hereford.
Distance ... .. (Km.)	109	192	139	46	67	21	136	63	72	113
Bearing. Degrees from N. ... ..	235	250	103	72	65	76	83	74	171	180
Geostrophic Wind— Speed ... .. (m/s.)	10	13	17	9	12	5	16	16	7	1
Degrees from N. ... ..	50	65	220	250	260	290	235	225	330	—
Wind (Anemograph)— Speed ... .. (m/s.)	4.5	4.5	3	3.5	6	2	6.5	6	7	2.5
Degrees from N. ... ..	45	20	190	245	225	315	210	225	305	270
Humidity at surface ... .. (%)	77	63	66	66	88	49	84	71	73	85
Type of Tropopause ... ..	I.	I.	I.	I.	—	—	I.	—	—	I.
$L_c$ = Geopotential at ,, ... (Kl.)	8.61	10.10	11.56	8.03	—	—	11.19	—	—	11.22
$T_c$ = Temp. at ,, ... (°A.)	218	215	206	224	—	—	219	—	—	219
$P_c$ = Pressure at ,, ... (mb.)	304	240	196	331	—	—	214	—	—	219
Mean. Temp. in Stratosphere	( $L_c+2$ ) to ( $L_c+5$ ) (°A.)	224	220	—	228	—	221	—	—	223
( $L_c+5$ ) to ( $L_c+8$ ) (°A.)	—	—	—	224	—	—	—	—	—	—
( $L_c+8$ ) to ( $L_c+11$ ) (°A.)	—	—	—	—	—	—	—	—	—	—
$T_m$ (Mean Temp. 1 to 9 Kl.) ... (°A.)	243	243	251	246	—	—	257	—	258	259
$P_t$ (Pressure at M.S.L.) ... (mb.)	1030	1029	1025	1009	1003	1017	1007	1013	1024	1026

No. of Sounding.

REMARKS ON THE SOUNDINGS AND THE PREVAILING WEATHER CONDITIONS, 1932

872. Weather cz, snow on ground. Clouds Cu. and St.—Cu. 7/10 from ENE, A—Cu. 1/10 from ENE. *Inversion* (1.44—1.64 Kl., 852—830 mb., 260.3—262.4°A., 85—62%). Pressure distribution:—An anticyclone centred NW of Scotland extends over the British Isles; low over the Azores. Type VIIIa.
873. Weather bz. Clouds Cu. and Fr—Cu. 5/10 from ENE at about 1 Kl. *Inversion* on descent (2.05—2.14 Kl., 786—777 mb., 257.6—258.2°A.). *Inversion* on ascent (2.19—2.29 Kl., 772—761 mb., 256.6—257.4°A.). Pressure distribution:—An anticyclone centred NW of Scotland extends over the British Isles; low to the west of Spain. Type VIIIa.
877. Weather cloudy. Clouds St. 3/10 from SW at about 0.8 Kl., St—Cu. 7/10 from SW at about 2 Kl., the balloon emerged from another cloud layer at 4.07 Kl. *Isothermal* (1.33—1.57 Kl., 866—840 mb., 269.5°A., 80—77%). *Isothermal* (4.88—5.15 Kl., 540—520 mb., 252°A., 85—89%). Pressure distribution:—High over the Bay of Biscay, low to the south-west of Iceland and over Scandinavia. Type V or Va.
879. Weather pr. Clouds Cu—Nb. 7/10 from WSW at about 1.2 Kl., Cirrus 2/10 from WSW. Mean of both records of temperature used except above 14 Kl., where the two differed a good deal and a bias was made towards the descending record; also a rise of temperature of a few degrees at the extreme top was ignored. Pressure distribution:—A depression south of Iceland is filling up and giving way to an anticyclone over the Atlantic. Type Va.
880. Weather showery. Clouds Nb. 10/10 with shower of rain. Ascent curtailed by means of automatic release. Pressure distribution:—A depression NW of Scotland, high over Atlantic and Spain. Type III.
881. Weather cloudy. Clouds St—Cu. 8/10 from W, A—St. 2/10. Ascent curtailed by means of automatic release. *Inversion* (2.61—3.23 Kl., 727—670 mb., 261.6—262.7°A.). Pressure distribution:—Low NE and E of Scotland; high SW of Ireland. Type IV.
884. Weather cr. Clouds St. 9/10 from SW at about 0.6 Kl., Cirrus trace. The hygrogram indicated persistent supersaturation from 2 Kl. to 7.5 Kl. *Inversion* on descent (0.66—0.76 Kl., 927—916 mb., 278.5—279.3°A.). Pressure distribution:—A depression west of Ireland extending over the British Isles is deepening while pressure is rising slowly over the Continent. Type V.
855. Weather cloudy. Clouds St—Cu. 6/10 from SW at about 0.6 Kl., A—Cu. and A—St. 3/10 from WSW. Ascent curtailed by means of automatic release. *Inversion* (0.83—1.16 Kl., 915—878 mb., 279.5—282.5°A., 97—45%). Pressure distribution:—The same as in No. 884. Type V.
887. Weather bc. Clouds Cu. trace, A—Cu. 7/10 from NNW moving at 13 r.p.h. *Isothermal* on ascent (0.40—0.58 Kl., 975—954 mb., 283.5°A., —66%). *Inversion* on ascent (0.58—0.70 Kl., 954—940 mb., 283.5—285.2°A., 66—56%). Pressure distribution:—An anticyclone centred south-west of Ireland extends over the British Isles, whilst shallow depressions are centred over Scandinavia, Russia, and Spain. Type X.
888. Weather overcast. Clouds St. from N at about 0.6 Kl. *Inversion* (0.76—0.93 Kl., 935—917 mb., 281.3—283.4°A., 76—55%). *Inversion* on descent (2.79—2.93 Kl., 724—712 mb., 269.6—271.2°A.) *Inversion* on ascent (3.07—3.23 Kl., 700—685 mb., 268.5—271.0°A., 103—66%). Pressure distribution:—An anticyclone centred south-west of Ireland extends over the British Isles, whilst pressure is low north of Iceland. Type X.

548.

$T$ . = Temperature in degrees absolute.  
 $L$ . = Geopotential level above M.S.L. in kiloeos (Kl.)

$P$ . = Pressure in millibars.  
 $RH$ . = Relative Humidity as percentage.

1932.

No. of Sounding.	889.	890.	891.	892.	894.	895.	896.	897.	899.	901.
Date.	June 23.	June 29.	July 13.	July 13.	July 28.	Aug. 10.	Aug. 11.	Aug. 11.	Sept. 14.	Sept. 15.
Station.	Sealand.	Sealand.	Kew.	Kew.	Sealand.	Kew.	Kew.	Kew.	Sealand.	Sealand.
Start G.M.T. ... ..	13h. 10m.	13h. 22m.	12h. 50m.	18h. 30m.	13h. 50m.	18h. 00m.	07h. 00m.	13h. 00m.	18h. 00m.	13h. 08m.
$L_t$ = Geopotential at Greatest Height (Kl.)	21.48	22.10	13.00	21.94	16.04	16.39	16.33	18.84	17.93	19.79
$T_t$ = Corresponding Temperature ... (°A.)	229	232	228	232	227	220	221	224	212	221
$P_t$ = Corresponding Pressure ... (mb.)	44	40	168	42	103	97	98	67	75	57
Place of Fall ... ..	Berriew, Mont-gomery.	Norden, Rochdale, Lancs.	Barnt Green, Nr. Birmingham.	Haversham, Wolverton, Bucks.	Flintham, Nr. Newark, Notts.	Henley, Ipswich, Suffolk.	Albury, Hadham, Herts.	Cherry Hinton, Cambs.	Teversall, Notts.	Little Hayfield, Stockport, Derby
Distance ... .. (Km.)	71	69	150	75	142	124	56	87	114	73
Bearing. Degrees from N. ... ..	191	49	310	335	99	53	29	22	94	76
Geostrophic Wind— Speed ... .. (m/s)	1	8	8	8	11	5	8	8	5	3
Degrees from N. ... ..	—	190	130	255	280	190	160	140	255	280
Wind (Anemograph)— Speed ... .. (m/s.)	0	4	2	4	6	0	0	4.5	1	2
Degrees from N. ... ..	—	160	90	250	305	—	—	160	290	340
Humidity at surface ... .. (%)	58	57	77	84	61	55	96	37	89	79
Type of Tropopause... ..	I.	I.	I.	I.	I.	I.	I.	I.	III.	I.
$L_c$ = Geopotential at ... .. (Kl.)	11.45	11.79	11.59	10.75	10.79	11.96	11.63	11.88	13.57	12.60
$T_c$ = Temp. at ... .. (°A.)	216	213	219	222	221	217	217	216	209	211
$P_c$ = Pressure at ... .. (mb.)	211	198	208	235	232	197	207	200	155	185
Mean Temp. in Stratosphere	{ ( $L_c+2$ ) to ( $L_c+5$ ) (°A.)	222	—	226	227	—	—	221	—	212
	{ ( $L_c+5$ ) to ( $L_c+8$ ) (°A.)	224	—	226	—	—	—	—	—	—
	{ ( $L_c+8$ ) to ( $L_c+11$ ) (°A.)	—	—	—	228	—	—	—	—	—
$T_m$ (Mean Temp. 1 to 9 Kl.) ... (°A.)	259	261	264	262	261	263	263	264	267	268
$P_s$ (Pressure at M.S.L.) ... (mb.)	1026	1012	1006	1006	1006	1017	1014	1012	1026	1031

549.

## REMARKS ON THE SOUNDINGS AND THE PREVAILING WEATHER CONDITIONS, 1932.

1932.

- No. of Sounding.
889. Weather b. Clouds Cu. 2/10 at about 0.9 Kl. The conditions were calm and sunny, which may perhaps explain the relatively high temperature recorded in the screen compared with that at 0.5 Kl. *Inversion* (0.99–1.22 Kl., 910–884 mb., 281.6–282.0°A., 79–66%). *Inversion* (3.04–3.41 Kl., 703–670 mb., 269.5–270.4°A., 76–65%). Pressure distribution:—The same as for No. 888 but the depression north of Iceland is moving south-east. Type X or VIIIb.
890. Weather cloudy. Clouds Cu. and St-Cu. 8/10 from SSW at about 1.2 Kl., A-St. 1/10. Mean of both records of temperature employed except above 12.5 Kl. where a bias was made towards the descending record; a large apparent rise of temperature shown on the descending record at the extreme top has been ignored. *Inversion* on ascent (2.60–2.81 Kl., 734–714 mb., 272.4–276.0°A., 93–59%). *Inversion* on descent (2.69–2.85 Kl., 725–710 mb., 271.0–273.9°A.). Pressure distribution:—Depressions west of Ireland and over Iceland are deepening and joining up. Type IV.
891. Weather cz. Clouds St-Cu. 5/10 from E, A-Cu. 2/10 from SE. The balloon actually reached a height of 16–17 Kl. but developed a leak and did not burst; the ventilation of the instrument was so insufficient near the top that the record above 13 Kl. was not used. Pressure distribution:—A complex low pressure system covering Europe and the British Isles is slowly giving way to a large anticyclone over the Atlantic. Type VIII or XIII.
892. Weather cloudy. Clouds St-Cu. 7/10 from WSW, A-Cu. 2/10 from SSW moving very slowly. Marked indication on hygrogram of supersaturation at about 1.5 Kl. on both ascent and descent. *Inversion* (1.54–1.82 Kl., 833–805 mb., 281.5–281.9°A., 106–94%). Pressure distribution:—The same as for No. 891. Type XIII.
894. Weather bc. Clouds Cu. and St-Cu. 4/10 from W by S. Cirrus 2/10 from W moving at 16 r.p.h. The upper limit of the lower cloud layer occurred at about 1.4 Kl. Mean of both records of temperature employed, except at the top where a bias was made towards the descending record; a rise of a few degrees at the extreme top was also ignored. *Isothermal* (1.52–1.77 Kl., 836–810 mb., 279.5°A.). Pressure distribution:—Depressions centred over Scotland are filling up whilst an anticyclone centred west of Spain extends over France. Type III.
895. Weather b. Clouds none. Mean of both records of temperature employed except that a marked rise at the extreme top was ignored. *Inversion* (0.88–1.03 Kl., 916–900 mb., 289.7–290.0°A., 75–59%). Pressure distribution:—Pressure high over Germany and the Atlantic with shallow depressions south-west of Ireland and over Iceland. Type VI.
896. Weather bz. Clouds none. *Inversion* (0.10–0.36 Kl., 1013–972 mb., 288.5–294.0°A., 96–63%). Pressure distribution:—The same as for No. 895, the depression over Iceland is filling up slowly. Type VIa.
897. Weather bc. Clouds Ci-Cu. and Ci. 3/10 from SSW. The mean of both records of temperature was employed except that near the ground more weight was given to the ascent than to the descent and above 17.5 Kl. more weight was given to the descent than to the ascent. A marked rise on both records at the extreme top was ignored. *Isothermal* on ascent (7.33–7.52 Kl., 398–387 mb., 249°A., 39–40%). Pressure distribution:—The same as for No. 896. Type VIa.
899. Weather cd. Clouds St. 9/10 from W at about 0.55 Kl. *Isothermal* (4.34–4.50 Kl., 601–589 mb., 270.4°A., 53–51%). Small lapse rate (12.25–12.60 Kl., 193–182 mb., 213–212°A.). Pressure distribution:—A depression is centred over Iceland, an anticyclone south-west of Ireland extends over Europe generally. Type XIa or Va.
901. Weather cm. Clouds St. and St-Cu. 10/10 at about 0.7 Kl. moving very slowly. The mean of both records was employed for temperature, except that above 18.5 Kl. more weight was given to the descending record while a sudden rise at the extreme top was ignored. *Inversion* on descent (0.74–1.39 Kl., 944–872 mb., 287.2–291.5°A.). *Inversion* on ascent (0.95–1.39 Kl., 920–872 mb., 285.7–292.4°A., 105–33%). *Isothermal* (5.09–5.41 Kl., 550–528 mb., 267°A., 27–26%). Sudden changes of lapse rate at (13.07 Kl., 171 mb., 211.3°A.) and (14.16 Kl., 143 mb., 209.5°A.). Pressure distribution:—The depression over Iceland is moving north-east, the anticyclone over the British Isles has increased in intensity. Type XI.

T. = Temperature in degrees absolute.

P. = Pressure in millibars.

L. = Geopotential level above M.S.L. in kiloleos (Kl.)

RH. = Relative Humidity as percentage.

548.

1932.

No. of Sounding.	902.	903.	904.	905.	906.	907.	908.	909.	910.
Date.	Sept. 24.	Oct. 12.	Oct. 13.	Oct. 13.	Nov. 9.	Nov. 10.	Nov. 10.	Dec. 14.	Dec. 15.
Station.	Kew.	Sealand.	Sealand.	Sealand.	Sealand.	Sealand.	Sealand.	Sealand.	Sealand.
Start G.M.T. ... ..	15h. 3m.	17h. 40m.	6h. 55m.	12h. 40m.	17h. 40m.	7h. 50m.	17h. 40m.	17h. 50m.	7h. 30m.
$L_t$ = Geopotential at Greatest Height (Kl.)	10.05	17.32	19.22	14.08	17.49	17.57	17.41	18.97	20.33
$T_t$ = Corresponding Temperature ... (°A.)	223	216	225	223	218	220	216	211	212
$P_t$ = Corresponding Pressure ... (mb.)	257	77	60	130	75	75	77	58	47
Place of Fall ... ..	Hornchurch, Essex.	Melbourne, nr. York.	Little Smeaton, Pontefract.	Shelford, Notts.	Greenfield, Yorks.	Cliffe, nr. Selby, Yorks.	Nash, Ludlow, Salop.	Longstone, Bakewell, Derby.	Nunburnholme, East Yorks.
Distance ... .. (Km.)	39	159	128	135	80	147	102	86	170
Bearing. Degrees from N. ... ..	76	62	68	101	64	76	165	87	62
Geostrophic Wind— Speed ... .. (m/s.)	8	12	18	15	2	7	3	16	18
Degrees from N. ... ..	300	240	270	280	210	210	150	200	230
Wind (Anemograph)— Speed ... .. (m/s.)	2	4.5	4.5	6.5	0	2	1	5.0	60
Degrees from N. ... ..	270	225	245	225	—	135	110	145	190
Humidity at surface ... .. (%)	69	79	82	69	93	94	93	86	67
Type of Tropopause ... ..	—	I.	II.	II.	I.	II.	I.	I.	I.
$L_c$ = Geopotential at „ ... (Kl.)	—	10.85	5.85	6.55	10.21	9.40	10.25	10.86	11.71
$T_c$ = Temp. at „ ... (°A.)	—	214	2.38	232	217	220	216	213	206
$P_c$ = Pressure at „ ... (mb.)	—	218	454	408	240	275	245	217	193
Mean Temp. in Stratosphere									
{ ( $L_c+2$ ) to ( $L_c+5$ ) (°A.)	—	217	235	231	218	219	216	216	215
{ ( $L_c+5$ ) to ( $L_c+8$ ) (°A.)	—	—	229	—	—	219	—	212	212
{ ( $L_c+8$ ) to ( $L_c+11$ ) (°A.)	—	—	226	—	—	—	—	—	—
$T_m$ (Mean Temp. 1 to 9 Kl.) ... (°A.)	260	252	249	246	249	249	252	249	254
$P_t$ (Pressure at M.S.L.) ... (mb.)	1001	1005	996	997	1016	1021	1024	1019	1017

549.

1932.

REMARKS ON THE SOUNDINGS AND THE PREVAILING WEATHER CONDITIONS, 1932.

- No. of Sounding.
902. Weather bc. Clouds Cu. and Fr-Cu. 5/10 from WNW, A-Cu. 1/10 moving very slowly. Mean of both records of temperature employed except that a little more weight was given to the ascent below 1 Kl. and to the descent at the top. Ascent curtailed by means of automatic release. Isothermal (1.14-1.91 Kl., 870-790 mb., 278°A. 94-32%). Pressure distribution:—A depression centred north-west of Scotland extends over Western Europe while a small secondary to it is moving up the Channel. Type IXa.
903. Weather cr. Clouds Nb. 5/10, St. 4/10 from WSW. A-St. 1/10. Small lapse rate (9.99-10.44 Kl., 250-233 mb., 215.3-215.0°A). Pressure distribution A depression over Iceland is deepening and moving south-eastwards, pressure is high SW of Ireland and over South-East Europe. Type Va.
904. Weather bcpr. Clouds Cu-Nb. 5/10 from W by N at about 0.9 Kl. Mean of both records employed for the temperature except that above 18 Kl. more weight was given to the descent than the ascent and that at the extreme top a sudden rise shewn on both records was ignored. The estimation of  $L_c$  does not strictly follow the rules in that from 10 to 12 Kl. there is a lapse rate of 3; it is difficult, however, to assign any other point as the base of the stratosphere. Pressure distribution:—Similar to No. 903 but the depression is now centred over Scotland. Type III.
905. Weather cprq. Clouds Cu-Nb. 9/10 from W by N at about 0.9 Kl. False Cirrus trace from W moving at 16 r.p.h. Balloon released under large Cu. cloud, it emerged from this cloud at 2.65 Kl. and shewed a rapid fall of temperature on emergence; thus (2.53-2.69-2.88 Kl., 718-706-687 mb., 263.4-261.4-261.4°A., 116-111-93%). Pressure distribution:—The depression over Scotland has moved east and deepened, the anticyclone to the south-west of Ireland remains. Type I.
906. Weather cm. Clouds St-Cu. 9/10 from W by S at about 2 Kl. Inversion on descent (2.19-2.26 Kl., 767-760 mb., 263.6-267.5°A.). Inversion on ascent (2.47-2.63 Kl., 740-724 mb., 264.0-267.6°A., 110-77%). Pressure Distribution:—A shallow depression is centred over the North Sea. An anticyclone south-west of Ireland is giving way before deepening depressions south-west of Iceland and over the Mediterranean. Type XIa.
907. Weather cm. Clouds St. and St-Cu. 9/10 from WSW at about 1.2 Kl. The mean of both records of temperature was employed except that owing to the balloon not bursting an enormous rise of temperature (24°A.) occurred at the extreme top on both records; this was ignored. Inversion on ascent (0.01-0.21 Kl., 1021-995 mb., 278.6-280.0°A., 94-90%). Inversion on descent (2.57-2.71 Kl., 736-722 mb., 262.7-265.0°A.). Pressure distribution:—The depression south-west of Iceland is deepening; an anticyclone exists over Russia. Type VI.
908. Weather cm. Clouds St-Cu. 9/10 from NNW at about 1.5 Kl. The balloon emerged from these clouds at about 2.4 Kl. Inversion on ascent (2.38-2.52 Kl., 757-744 mb., 266.4-268°A., 115-77%). Inversion on descent (2.62-2.77 Kl., 735-720 mb., 266-267°A.). Sudden changes of lapse rate at (10.78 Kl., 225 mb., 219.4°A) and (12.68 Kl., 166 mb., 217°A.). Pressure distribution:—The same as for No. 907, but the Continental anticyclone has spread rather further westward. Type VI.
909. Weather cm. Clouds St. and St-Cu. 9/10 from SSW at about 1.2 Kl. Inversion near the ground. Inversion on descent (1.93-1.97 Kl., 799-795 mb., 269.4-270.6°A.). Pressure distribution:—A depression over Iceland is deepening while pressure remains high over Central Europe and West of Spain. Type Va.
910. Weather cloudy. Clouds St-Cu. 7/10 from SW, A-St. 3/10. Inversion on descent (0.89-0.97 Kl., 910-900 mb., 272.3-274.4°A.). Pressure distribution:—The same as for No. 909. Type Va.





T.=Temperature in degrees absolute.

P.=Pressure in millibars.

L.=Geopotential level above M.S.L. in kiloleos (Kl.)

RH.=Relative Humidity as percentage.

Table with 11 columns for stations: 889, 890, 891, 892, 894, 895, 896, 897, 899, 901. Columns include No., Date, Station, Start (G.M.T.), and specific date/time for each station.

550. GEOPOTENTIALS, TEMPERATURES AND RELATIVE HUMIDITIES CORRESPONDING WITH ISOBARIC SURFACES.—continued. 1932.

Table showing isobaric surfaces for pressures from 100 to 1000 millibars. Columns include Pressure (Millibars), L. (Kiloleos), T. (Temperature), and RH. (Relative Humidity) for each station.

551. PRESSURES, TEMPERATURES AND HUMIDITIES AT GIVEN GEOPOTENTIALS.—continued. 1932.

Table showing pressures, temperatures, and humidities at given geopotentials from 21 to 1005 kiloleos. Columns include Geopotentials (Kiloleos), P. (Pressure), T. (Temperature), and RH. (Relative Humidity) for each station.

Note.—The temperatures are derived from the original tabulations which are generally made to the nearest half-degree, and are shown to the nearest whole degree.

LAPSE RATE OF TEMPERATURE BETWEEN GIVEN GEOPOTENTIALS.—continued.

Degrees absolute per kiloleo.

Table showing lapse rates of temperature between given geopotentials from 2 to 20.5 kiloleos. Columns include Geopotentials (Kiloleos) and Lapse Rate (Degrees absolute per kiloleo) for each station.

Note.—The lapse rates are derived from the original tabulations, which are generally made to the nearest half-degree.

