METEOROLOGICAL OFFICE, LONDON.

Summaries of Results

OF

Geophysical and Meteorological Observations

in the Year ended 31st December, 1910,

AT

KEW OBSERVATORY, RICHMOND, SURREY;

FALMOUTH OBSERVATORY, CORNWALL;

VALENCIA OBSERVATORY, COUNTY KERRY, IRELAND;

ESKDALEMUIR OBSERVATORY, DUMFRIESSHIRE;

IN CONTINUATION OF THE

Reports of

The Observatory Department of the National Physical Laboratory, 1900-1909,

The Kew Committee of the Royal Society, 1872-1899,

AND OF

The Kew Observatory Committee of the British Association, 1842-1871.

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PREFACE.

By arrangement between the Lords Commissioners of His Majesty's Treasury, the Royal Society and the National Physical Laboratory, the administration of Kew Observatory and of Eskdalemuir Observatory passed to the Meterological Office on 1st July, 1910, and the Meteorological Committee became responsible for the issue of the results of the observations.

In order to avoid the division of the results of the year, and to preserve the adopted forms until the completion of the decade which closes with the year 1910, it was arranged that the tables of results for the year should be issued in the same form and with the same additions as those adopted by the National Physical Laboratory in previous years.

The usual tables of results for Kew Observatory in Terrestrial Magnetism, Meteorology, Atmospheric Electricity and Seismology are therefore given in this volume, with tables for Eskdalemuir similar to those of last year. Magnetic results are also given for Falmouth and Valencia, and the customary table of recent values for observatories in all parts of the world.

As regards meteorological results, it may be remembered that in addition to those here given, hourly readings for Kew, Valencia and Falmouth, with certain annual summaries, have already been published by the Meteorological Committee as Part IV. of the "British Meteorological Year Book," 1910. Daily values for Eskdalemuir appear in Part III. of the same "Year Book," and monthly summaries for all the observatories named are included in the "Monthly Weather Report" which forms Part II. of the same publication.

The tables of results for Kew Observatory are accompanied by an Introduction drawn up by Dr. C. Chree, F.R.S., Superintendent of the Observatory, who deals also with the magnetic results from Falmouth Observatory and Valencia Observatory. The Introduction to the tables for Eskdalemuir is drawn up by G. W. Walker, M.A., Superintendent. The administrative reports for the observatories for the year 1910 are incorporated with the Sixth Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury.

With the issue of this volume the series of tables in the customary form of the Reports of the Kew Observatory is completed. In the year 1911 the tabulations of the magnetic elements at Eskdalemuir become the official hourly magnetic values, replacing those at Kew on account of the disturbance of the curves at that observatory by electric tramways. A number of other questions also fall to be considered in connexion with the issue of the results of the work of the observatories in the decade which now commences.

The consideration of the most suitable forms for the publication of the results obtained at the associated observatories of the Meteorological Office in view of the international relationships in meteorology and geophysics is at present occupying the attention of the Gassiot Committee of the Royal Society.

Meteorological Office, London, S.W.
April 29, 1911.

(Signed) W. N. SHAW,
Director.

SUMMARIES OF RESULTS OF GEOPHYSICAL AND METEOROLOGICAL OBSERVATIONS IN THE YEAR ENDED 31st DECEMBER, 1910, AT KEW OBSERVATORY, RICHMOND, SURREY, TOGETHER WITH SUMMARIES OF MAGNETIC OBSERVATIONS AT FALMOUTH OBSERVATORY AND VALENCIA OBSERVATORY.

INTRODUCTION BY C. CHREE, SC.D., F.R.S., SUPERINTENDENT OF KEW OBSERVATORY, ASSISTANT DIRECTOR OF OBSERVATORIES.

The observational work at Kew Observatory during the year 1910 may be considered under the following heads:—

I. Magnetic observations.
II. Meteorological (including electrical) observations.
III. Seismological observations.

I. MAGNETIC OBSERVATIONS.

The magnetographs have been in constant operation throughout the year. In February an investigation was made to see whether the horizontal force magnet was strictly perpendicular to the magnetic meridian, and a small change of about 2°—representing mainly accumulated secular change—was found to be necessary. In March additional copper strips were introduced to improve the damping of the horizontal force magnet, and the method of supporting these was modified in July. During these operations several changes took place in the scale value of the horizontal force curves the following values being experimentally found to apply.

January to March 14	1 cm = 0·00051.
March 15 to July 29	,, ,, 0·00046.
July 30 to December 31	,, ,, 0·00052.

The scale value of the declinometer remained unchanged, viz., 1 cm = 8′·7.

The principal magnetic disturbances recorded took place on the following dates:—March 27, 28; June 20; September 29; October 12, 13, 19, 27, 28.

The hourly means and diurnal inequalities of the Declination and Horizontal Force for 1910 for the "quiet" days selected by the Astronomer Royal have been tabulated as usual, and the results will be found in Section I. (pp. 12-16), together with the monthly means of the Inclination as derived from the absolute observations. Owing, however, to the disturbance of the vertical force produced by electric trams and railways, it has been found impossible to tabulate the curves for this element satisfactorily. This has led to the omission of the tables of diurnal inequalities of Vertical force and Inclination published previously to 1902.

A correction has been applied to the Horizontal Force curves for the diurnal variation of temperature, use being made of the records from a Richard thermograph as well as of the eye observations of a thermometer.

The mean values of the noons preceding and succeeding the selected quiet days are also given, but these of course are not employed in calculating the daily means or inequalities.

The following were the mean annual values for 1910:—

From curves	Westerly Declination...16° 3′·2.	
	Horizontal Force .....0·18503.	
From absolute observations, corrected	Inclination .....66° 58′·7.	
	Vertical Force .....0·43546.	

The absolute observations were reduced to the mean for the day by applying corrections based on the diurnal variation observed in previous years.

The horizontal and vertical force values given above are not directly comparable with those given in previous years. The experimental redetermination of the moment of inertia referred to in the Report for 1909 was concluded in July, 1910, and the new value thence obtained has been made use of in all calculations relating to 1910. Use has also been made, for the first time, of values of the *two* constants P and Q in the deflection formula $2\,mr^{-3}\,(1 + Pr^{-2} + Qr^{-4})^{-1}$ obtained from deflections at the three distances 22·5, 30 and 40 cms. Further, new values have been made use of for the three deflection distances—based on remeasurement of the deflection bar at the National Physical Laboratory—in which allowance is made for the bending of the bar under its own weight and that of the magnet and carriage. These corrected lengths were in fact obtained in 1909 and were made use of in reducing the observations of that year, but the fact was overlooked when preparing the Report for the year, and information was not supplied as to the consequent effect on the values of the horizontal force (H) and vertical force (V). The different corrections to some extent neutralised one another, so that the differences between the values actually published for 1908 and 1909 and those that would have been obtained if the same procedure and constants had been made use of as for 1910 are not large. Full information may be derived from the following figures:—

Year	Values actually published.		Values on same lines as those for 1910.	
	H	V	H	V
1908	·18515	·43561	·18509	·43636
1909	·18506	·43588	·18502	·43577

Observations of absolute declination, inclination and horizontal force have been made weekly as a rule. A list of recent values of the magnetic elements at the observatories whose publications are received at Kew forms Section Ia, (pp. 17-18).

II. Meteorological Observations.

The several self-recording instruments have been maintained in regular operation throughout the year, and the standard eye observations for the control of the automatic records have been duly registered.

The usual meteorological tables will be found in Section II, (pp. 19-26).

Solar Radiation.—The observations begun in 1907 with the Ångström Pyrheliometer have been regularly carried out. On bright days observations are made between 11.30 a.m. and 12.30. A summary of the results will be found in Section II, Table IV, (p. 22).

Earth Thermometers—The two Symons' earth-thermometers on the lawn, one at a depth of 1 foot and the other at a depth of 4 feet, have been read at 10 a.m., 4 p.m., and 10 p.m. daily throughout the year, and the 10 a.m. readings have been forwarded to the Meteorological Office. A summary of the results appears in Section II, Table V, (p. 23).

Electrograph.—This instrument worked generally in a satisfactory manner throughout the year. The Leclanché battery has proved satisfactory, the potential, which is measured thrice weekly by a Paul "moving-coil" galvanometer, keeping at about 43 volts. Check determinations of the scale value of the Electrograph were made in April, July, September, October and December.

The portable electrometer White No. 53, used for the eye readings of the potential gradient which serve to standardise the curves, had its scale value redetermined on October 27th in the Physics Department of the National Physical Laboratory. The scale value was found to have remained unchanged since the preceding determination.

With the assistance of Mr. J. S. Dines a new apparatus was devised for taking absolute measurements of the potential gradient. This was brought into regular use in April. Previous to that date a number of simultaneous observations were made with the new apparatus and the old—following the new procedure in the one case and the old in the other. It was found that the values obtained with the old apparatus required multiplication by the factor 1·65 to make them comparable with those obtained with the new apparatus, and due allowance was made for this in dealing with the observations of January, February and March. Thus all the results for 1910 published in Section II. may be regarded as relating to the new apparatus and procedure. The new procedure agrees with the old in showing a variation in the factor by which the potential derived from the curve reading has to be multiplied to give the potential gradient, in volts per metre, in the open. The cause of this variation being uncertain, one can only say that 1·65 is the most probable factor to be applied to values published for the potential gradient in years prior to 1910 to make them comparable with the values in the present Report.

Ten curves a month have been selected, as previously, as representative of electrically "quiet" days, defined as days when irregular fluctuations of potential are fewer than usual. The results derived from hourly measurement of these curves appear in Section II, Tables VI and VII, (pp. 24-25). Owing presumably in large measure to the fewness of the selected days, the values deduced from the actual curve measurements showed in some months a considerable non-cyclic element. This was eliminated from the diurnal inequalities in Table VII, in the way customary in dealing with meteorological data.

Wilson Air-Earth Current Apparatus—During the earlier months of the year Mr. J. S. Dines continued his observations with this apparatus, by means of which measurements can be made of the rate of loss of negative charge and thence of the vertical air-earth current. After the termination of Mr. Dines' engagement at the Observatory in June the observations had to be suspended.

Elster and Geitel Dissipation Apparatus.—Observations on the loss of electric charge were made with the Elster and Geitel apparatus, as during the preceding three years, until the end of December, when the observations were brought to a close.

The observations were made in a systematic way between 2 p.m. and 4 p.m., on all days except those on which rain was falling or the wind was high. It was discovered early in the year that the formula that had been employed in calculating the data published for the years 1907, 1908 and 1909 was incomplete; the correct formula was made use of in a discussion of the three years data combined which appeared in the *Philosophical Magazine* for September, 1910. It appeared best on the whole to calculate the data for 1910 by means of the same faulty formula that had been employed in the Annual Reports of the three preceding years, viz.:—

$$\frac{a}{100} = (1/t)\left\{\log\left(V_t/V_o\right) - n\log\left(V'_t/V'_o\right)\right\} \quad \text{- - - (1),}$$

where a denotes the per centage loss of charge per minute, V_o denotes the initial and V_t the final potential in the dissipation experiment, V'_o and V'_t the corresponding potentials in the leakage experiment, both experiments lasting t minutes, while n denotes the ratio (capacity of electroscope alone : joint capacity of dissipator and electroscope). Formula (1) has accordingly been employed in calculating Table VIII, Section II, which is thus immediately comparable with the corresponding tables published in the last three years' Reports.

At the same time, the data for the whole four years have been collected and mean values obtained for the four years combined, based on the correct formula, viz. :—

$$a/100 = (1/t)\,(1-n)^{-1}\left\{\log\left(V_t/V_o\right) - n\log\left(V'_t/V'_o\right)\right\} \quad \text{- - - (2).}$$

These correct 4-year mean data are given in Table IX. In both tables a_+ and a_- refer as usual to positive and negative charges.

The only difference between (1) and (2) is the factor $(1-n)^{-1}$ on the right hand side of (2). The value obtained experimentally for n was 0·3, so that $(1-n)^{-1} = 10/7$. In other words the values published for a_+ and a_- in Table VIII. and in the Reports for 1907, 1908 and 1909 all require multiplication by 1·43 or 10/7. The omission of the factor $(1-n)^{-1}$ obviously makes no difference to the value of a_-/a_+. The value of n is one which it is unfortunately difficult to measure with precision. In the paper in the *Philosophical Magazine* there are several misprints, the most serious being that $1/n$ appears instead of n in the second term on the right hand side of (2). The correct formula was however actually employed in all the calculations summarised in the paper.

The leakage term—i.e. the second term on the righthand sides of (1) and (2)—was by no means always so small as it should have been with good insulation. When the leakage is large and dissipation proper happens to be small, a more than usual uncertainty enters into the values of a_+ and a_- and especially of a_-/a_+. It is at least open to doubt whether the largest and smallest values in Tables VIII. and IX. may not represent the effects of errors in the leakage experiments. One observation taken in January, 1910 made $a_+ = \cdot 022$ and $a_-/a_+ = 11{\cdot}9$, but the value obtained for the leakage in this case appeared so suspiciously high that the observation was cut out.

In forming Table IX. equal weight was allowed in every case to each year of the four, irrespective of the number of observations. Each entry, including those in the last column, is simply the arithmetic mean of the four entries that would have

appeared in the case of the individual years. This explains why the figures in the last column generally differ from those deducible from the corresponding a_- and a_+ assigned as mean values.

III. Seismological Observations.

Professor Milne's "unfelt tremor" pattern of seismograph has been maintained in regular operation throughout the year. Particulars of the time of occurrence and the amplitude in millimetres of the largest movements are given in Section III. (p. 27). The largest disturbances recorded took place on January 22, June 24, and December 13.

A detailed list of the movements recorded from January 1 to December 31, 1910, has been sent to Professor Milne, and will be found in the circulars for 1910 of the British Association "Seismological Investigations" Committee.

On the initiative of Professor Milne, a number of very minute movements which would have been neglected in years prior to 1909 have been included on the strength of their coincidence in time with similar movements at Shide and elsewhere. This has led to a large apparent increase in the total number of earthquakes recorded during the year. None of these small movements, however, appear in Section III, Table I, which is thus strictly comparable with the analogous tables published in previous Reports.

SUMMARIES OF RESULTS OF GEOPHYSICAL AND METEOROLOGICAL OBSERVATIONS AT THE KEW OBSERVATORY.

SECTION I. MAGNETIC OBSERVATIONS, 1910, KEW OBSERVATORY.

Latitude 51° 28′ 6″ N., and Longitude $0^h\ 1^m\ 15^s.1$ W.

The results in the following Tables I to IV are deduced from the magnetograph curves, which have been standardised by observations of Declination and Horizontal Force. The observations were made with the Collimator Magnet K.C.I. and the Declinometer Magnet K. O. 90 in the 9-inch Unifilar Magnetometer, by Jones.

Inclination observations were also taken with the Inclinometer No. 33, by Barrow with needles $3\frac{1}{2}$ inches in length. Table V gives the monthly means of these observations as actually taken, and also as corrected to the mean of the day from previous years' results. It also gives monthly values of the Vertical Force, calculated from the corrected values of the Inclination and the mean monthly values of the Horizontal Force.

The values of Inclination and Vertical Force are a little influenced by electric tram currents, which produce apparently a slightly enhanced value of Vertical Force throughout the day. The Declination and Horizontal Force inequalities are not absolutely above suspicion in this respect, but any uncertainty that may exist in their case is undoubtedly small.

The Declination and Horizontal Force values given in Tables I to IV are prepared in accordance with the suggestions made in the fifth report of the Committee of the British Association on comparing and reducing Magnetic Observations.

The following is a list of the days during the year 1910 which were selected by the Astronomer Royal, as suitable for the determination of the magnetic diurnal inequalities, and which have been employed in the preparation of the magnetic tables :—

January	8, 11, 15, **16**, 30.
February	6, 10, 12, 13, 19.
March	8, 12, 24, 25, 26.
April	8, **10**, 11, 15, 21.
May	6, 8, 12, 21, 22.
June	3, 5, 17, 18, 28.
July	**2**, 13, **14**, 18, 28.
August	7, 8, 12, 16, 26.
September	3, 4, 17, 18, 19.
October	9, 15, 16, 17, 18.
November	6, 12, 13, 14, 24.
December	9, 11, 12, 17, 23.

Table I.—Hourly Means of the Kew Declination as determined from the selected

Hours	Preceding noon.	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
	(15° + West.)					Winter.							
1910. Months	′	′	′	′	′	′	′	′	′	′	′	′	′
Jan. ...	67·5	65·0	65·6	65·4	65·7	65·9	66·2	66·0	65·4	64·8	64·8	65·3	66·0
Feb. ...	68·2	65·3	65·7	65·5	65·7	65·6	66·0	65·6	65·3	65·0	65·0	66·0	67·5
Mar. ...	70·6	65·0	64·9	64·5	64·5	64·7	65·0	64·4	63·6	62·0	62·0	64·0	67·2
Oct. ...	64·4	60·6	61·0	61·2	60·8	61·1	61·0	61·1	60·1	59·2	59·3	60·6	62·5
Nov. ...	60·8	58·3	59·0	59·1	58·8	59·0	59·3	59·1	58·5	58·0	58·2	59·3	61·0
Dec. ...	61·5	59·1	59·9	60·3	60·1	60·1	60·4	60·3	60·1	59·8	59·9	60·4	61·1
Means	65·5	62·2	62·7	62·7	62·6	62·7	63·0	62·8	62·2	61·5	61·5	62·6	64·2
						Summer.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
April ...	69·7	65·8	65·6	65·1	64·8	64·7	64·9	64·2	62·5	61·0	61·8	63·8	66·4
May ...	67·3	63·8	64·1	64·0	63·6	63·4	62·7	61·4	60·7	60·7	61·7	63·6	65·7
June ...	67·2	63·4	63·1	61·7	61·6	61·3	60·2	59·0	58·8	58·9	60·7	62·9	65·1
July ...	64·8	61·5	61·3	60·9	60·8	60·7	60·0	58·9	58·0	58·1	58·7	60·4	62·3
Aug. ...	66·3	62·1	62·1	61·8	61·9	61·4	60·7	60·2	59·7	59·4	60·2	61·9	64·3
Sept....	65·4	60·1	60·3	59·7	59·5	59·2	59·2	58·8	58·1	58·0	59·2	61·3	63·9
Means	66·8	62·8	62·7	62·2	62·0	61·8	61·3	60·4	59·6	59·3	60·4	62·3	64·6

Table II.—Diurnal Inequality of the

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
					Summer Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−0·4	−0·5	−1·0	−1·2	−1·4	−1·9	−2·8	−3·6	−3·9	−2·8	−0·9	+1·4
					Winter Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−1·1	−0·6	−0·6	−0·7	−0·5	−0·3	−0·5	−1·1	−1·8	−1·7	−0·7	+1·0
					Annual Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−0·8	−0·5	−0·8	−0·9	−1·0	−1·1	−1·7	−2·3	−2·8	−2·3	−0·8	+1·2

NOTE.—When the sign is + the magnet
,, ,, − ,,

Quiet Days in 1910. (The Mean for the Year = 16° 3′·2 West).

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.	Succeeding noon.
						Winter.							
′	′	′	′	′	′	′	′	′	′	′	′	′	′
67·1	68·0	67·8	67·1	66·7	66·5	66·7	66·2	65·9	65·5	65·0	65·1	65·4	68·3
68·3	68·8	68·4	67·3	66·6	66·6	66·5	66·3	65·7	65·4	65·4	65·3	65·5	68·7
69·4	70·9	70·5	69·0	67·3	66·0	65·9	65·7	65·3	65·0	64·5	64·2	64·3	70·9
64·6	65·5	65·1	63·9	62·6	62·3	61·9	61·4	61·2	61·1	61·0	61·4	61·5	65·5
62·6	63·0	62·6	61·8	61·1	60·9	60·8	60·2	59·8	59·4	59·4	59·4	59·6	62·5
61·4	61·6	61·3	61·0	60·6	60·3	59·9	59·8	59·4	59·2	58·7	58·7	58·8	60·9
65·6	66·3	65·9	65·0	64·2	63·8	63·6	63·3	62·9	62·6	62·3	62·4	62·5	66·1
						Summer.							
′	′	′	′	′	′	′	′	′	′	′	′	′	′
69·2	71·6	71·2	69·3	67·7	66·4	65·9	66·0	65·7	65·7	65·6	65·4	65·4	70·2
67·7	68·9	68·6	67·3	66·5	65·9	65·3	64·8	64·8	64·5	64·1	64·1	64·0	68·2
67·1	68·0	68·0	67 2	65·8	64·6	63·7	63·2	63·2	63·1	63·1	63·1	62·8	68·4
63·9	65·2	65·1	64·8	64·3	63·8	63·4	63·1	62·6	62·7	62·4	62·1	61·5	66·0
66·3	67·4	67·8	66·9	65·2	64·1	63·1	63·1	63·2	62·6	62·5	62·0	60·6	67·0
66·0	66·6	65·5	63 7	61·9	60·9	60·9	60·9	60·7	60·4	60·1	59·8	60·3	66·0
66·7	67·9	67·7	66·5	65·2	64·3	63·7	63·5	63·4	63·2	63·0	62·7	62·4	67·6

Kew Declination as derived from Table I.

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
					Summer Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
+3·5	+4·7	+4·5	+3·3	+2·0	+1·1	+0·5	+0·3	+0·1	−0·1	−0·2	−0·5	−0·8
					Winter Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
+2·3	+3·0	+2·7	+1·7	+0·9	+0·5	+0·3	0·0	−0·4	−0·7	−0·9	−0·9	−0·8
					Annual Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
+2·9	+3·9	+3·6	+2·5	+1·4	+0·8	+0·4	+0·1	−0·1	−0·4	−0·6	−0·7	−0·8

points to the West of its mean position.

,, ,, East ,, ,,

Table III.—Hourly Means of the Kew Horizontal Force in C.G.S. Units in 1910. (The Mean for the

Hours	Preceding Noon.	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
	·18000+					Winter.							
1910. Months.													
Jan.	493	504	503	501	502	504	507	508	509	509	503	498	496
Feb.	490	499	498	495	495	500	501	503	504	502	498	493	492
March ...	494	511	508	504	505	506	510	510	509	504	496	491	490
Oct.	489	505	501	498	497	499	501	502	502	497	490	485	486
Nov.	490	502	499	498	499	502	502	505	507	504	498	492	491
Dec.	498	498	495	494	494	498	502	503	506	505	503	499	496
Means ...	492	503	501	498	499	502	504	505	506	504	498	493	492
						Summer.							
April	483	508	503	499	501	502	503	505	501	496	486	477	476
May	494	509	505	502	502	501	501	500	497	490	488	485	488
June	503	518	515	510	512	513	515	509	504	499	495	491	492
July	496	515	511	507	508	509	510	508	504	503	499	496	493
Aug.	490	504	501	497	499	499	499	498	494	488	481	478	481
Sept.	490	498	496	493	494	493	493	492	491	487	484	484	488
Means ...	493	509	505	501	503	503	503	502	498	494	489	485	486

Table IV.—Diurnal Inequality of the Kew

Hours.	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
					Summer Means.							
	+·00005	+·00001	−·00003	−·00002	−·00001	−·00001	−·00002	−·00006	−·00010	−·00015	−·00019	−·00018
					Winter Means.							
	+·00001	−·00002	−·00004	−·00004	−·00001	+·00001	+·00003	+·00004	+·00001	−·00005	−·00010	−·00011
					Annual Means.							
	+·00003	·00000	−·00004	−·00003	−·00001	00000	·00000	−·00001	−·00005	−·00010	−·00014	−·00014

NOTE.—When the sign is + the

(Corrected for Temperature) as determined from the Selected Quiet Days Year = 0·18503).

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.	Succeeding Noon.
Winter.													
497	503	505	506	507	508	509	509	508	508	507	506	505	501
495	501	504	503	503	502	504	504	500	502	501	501	502	501
496	502	506	510	511	511	514	516	515	514	514	513	513	499
492	498	500	501	503	506	507	508	510	510	510	508	507	485
496	500	503	505	504	504	504	505	508	509	507	508	505	495
499	498	498	501	504	504	504	505	505	504	504	503	503	504
496	500	503	504	505	506	507	508	508	508	507	507	506	498
Summer.													
484	493	500	506	508	509	511	513	513	512	512	512	513	483
495	503	509	511	514	516	518	518	517	517	517	515	517	501
497	501	510	516	519	523	529	533	532	529	524	521	519	502
496	503	511	516	517	520	525	528	531	531	530	530	530	502
485	494	498	503	507	509	510	511	512	512	511	510	509	495
492	494	494	495	495	497	497	498	498	497	497	497	497	493
491	498	504	508	510	512	515	517	517	516	515	514	514	496

Horizontal Force as derived from Table III.

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
Summer Means.												
−·00013	−·00006	·00000	+·00004	+·00006	+·00008	+·00011	+·00013	+·00013	+·00012	+·00011	+·00010	+·00011
Winter Means.												
−·00007	−·00002	·00000	+·00002	+·00003	+·00003	+·00004	+·00005	+·00005	+·00005	+·00005	+·00004	+·00003
Annual Means.												
−·00010	−·00004	·00000	+·00003	+·00004	+·00006	+·00008	+·00009	+·00009	+·00009	+·00008	+·00007	+·00007

reading is above the mean,

Table V.—Mean Monthly Values of Kew Inclination and Vertical Force during the Year 1910.

1910.	Mean time of Observation. p.m.	Inclination Observed.	Inclination reduced to the mean value for the day.	Vertical force (mean value for the day.)
	h. m.	° ′	° ′	
January	2 50	66 59·2	66 59·0	·43562
February	3 40	66 59·2	66 59·0	·43549
March	3 45	66 59·1	66 59·1	·43567
April	3 41	66 58·7	66 58·8	·43545
May	3 49	66 59·1	66 59·4	·43575
June	3 32	66 58·0	66 58·3	·43554
July	3 2	66 57·8	66 58·1	·43547
August	3 35	66 58·1	66 58·3	·43523
September	3 24	66 58·6	66 58·7	·43520
October	3 12	66 59·0	66 58·9	·43545
November	2 56	66 59·2	66 59·0	·43553
December	3 0	66 58·1	66 57·9	·43513
Mean for year	...	...	° ′ 66 58·7	·43546

SECTION Ia.

MEAN VALUES, for the years specified, of the Magnetic Elements at Observatories whose Publications are received at the Kew Observatory.

Place.	Latitude.	Longitude.	Year.	Declination.	Inclination.	Horizontal Force, C.G.S. Units.	Vertical Force, C.G.S. Units.
	° ′	° ′		° ′	° ′		
Pavlovsk	59 41 N.	30 29 E.	1906	1 4·2 E.	70 36·6 N.	·16528	·46963
†Sitka (Alaska) ...	57 3 N.	135 20 W.	1905	29 59·1 E.	74 43·2 N.	·15510	·56776
			1906	30 3·0 E.	74 41·0 N.	·15529	·56698
Katharinenburg	56 49 N.	60 38 E.	1906	10 31·0 E.	70 49·5 N.	·17664	·50796
Rude Skov	55 51 N.	12 27 E.	1909	9 36·1 W.	68 44 N.	·17394	·44690
Eskdalemuir ...	55 19 N.	3 12 W.	1910	18 23·3 W.	69 37·8 N.	·16836	·45343
Flensburg	54 47 N.	9 26 E.	1903	11 28·0 W.	68 12·5 N.	—	—
Barth	54 22 N.	12 45 E.	1903	9 52·9 W.	67 37·6 N.	·18261	·44363
Stonyhurst	53 51 N.	2 28 W.	1910	17 20·0 W.	68 42·2 N.	·17407	·44605
Hamburg	53 33 N.	9 59 E.	1903	11 10·2 W.	67 23·5 N.	·18126	·43527
Wilhelmshaven	53 32 N.	8 9 E.	1909	11 46·8 W.	67 30 N.	·18129	·43767
Potsdam	52 23 N.	13 4 E.	1910	9 2·9 W.	66 19·6 N.	·18828	·42945
Seddin	52 17 N.	13 1 E.	1910	9 4·4 W.	66 16·6 N.	·18866	·42932
Irkutsk	52 16 N.	104 16 E.	1905	1 58·1 E.	70 25·0 N.	·20011	·56250
de Bilt (Utrecht)	52 5 N.	5 11 E.	1908	13 12·8 W.	66 47·2 N.	·18551	·43256
Valencia (Ireland)	51 56 N.	10 15 W.	1910	20 44·6 W.	68 13·0 N.	·17892	·44771
Kew	51 28 N	0 19 W.	1910	16 3·2 W.	66 58·7 N.	·18503	·43546
Greenwich	51 28 N.	0 0	1909	15 47·6 W.	66 53·9 N.	·18526	·43432
Uccle (Brussels)	50 48 N.	4 21 E.	1908	13 36·7 W.	66 1·6 N.	·19061	·42867
Falmouth.....	50 9 N.	5 5 W.	1910	17 41·6 W.	66 29·0 N.	·18802	·43208
Prague	50 5 N.	14 25 E.	1909	8 15·1 W.	—	—	—
Cracow	50 4 N.	19 58 E.	1910	5 27·4 W.	—	—	—
St. Helier (Jersey)	49 12 N.	2 5 W.	1907	16 27·4 W.	65 34·5 N.	—	—
Val Joyeux (near Paris)	48 49 N.	2 1 E.	1909	14 32·9 W.	64 43·9 N.	·19727	·41792
Munich.....	48 9 N.	11 37 E.	1906	9 59·5 W.	63 10·0 N.	·20657	·40835
O'Gyalla (Pesth)	47 53 N.	18 12 E.	1910	6 34·5 W.	—	·21076	—
Pola	44 52 N.	15 51 E.	1909	8 36·2 W.	60 6·1 N.	·22194	·38599
Agincourt (Toronto)	43 47 N.	79 16 W.	1908	5 54·1 W.	74 36·9 N.	·16359	·59453
Toulouse	43 37 N.	1 28 E.	1905	13 56·3 W.	60 49·1 N.	·22025	·39439
Perpignan	42 42 N.	2 53 E.	1908	12 58·5 W.	—	—	—
Tiflis	41 43 N.	44 48 E.	1905	2 41·6 E.	56 2·8 N.	·25451	·37799
Capodimonte (Naples)	40 52 N.	14 15 E.	1907		56 13·1 N.		
			1908	—	56 13·0 N.	—	—
			1909		56 14·4 N.		
Tortosa.....	40 49 N.	0 30 E.	1907	13 42·8 W.	58 4·8 N.	·23274	·37362
Coimbra	40 12 N.	8 25 W.	1908	16 46·2 W.	58 57·3 N.	·22946	·38120

SECTION 1A—*continued.*

Place.	Latitude.	Longitude.	Year.	Declination.	Inclination.	Horizontal Force, C.G.S. Units.	Vertical Force, C.G.S. Units.
	° ′	° ′		′	° ′		
*Mount Weather (Virginia)	39 4 N.	77 54 W.	1908	3 39·4 W.	—	—	—
†Baldwin (Kansas)	38 47 N.	95 10 W.	1905	8 27·6 E.	68 43·0 N.	·21843	·56070
			1906	8 29·7 E.	68 44·2 N.	·21810	·56048
Cheltenham (Maryland)	38 44 N.	76 50 W.	1907	5 26·0 W.	70 29·0 N.	·19992	·56402
			1908	5 31·1 W.	70 30·5 N.	·19942	·56344
Athens	37 58 N.	21 23 E.	1908	4 52·9 W.	52 11·7 N.	·26197	·33613
San Fernando	36 28 N.	6 12 W.	1909	15 19·5 W.	54 43·4 N.	·24849	·35126
Tokio	35 41 N.	139 45 E.	1902	4 38·3 W.	48 57·6 N.	·29903	·34350
			1903	4 40·7 W.	48 57·8 N.	·29929	·34384
			1904	4 43·4 W.	48 57·1 N.	·29941	·34384
			1905	4 46·2 W.	48 56·1 N.	·29952	·34376
			1906	4 48·9 W.	48 58·8 N.	·29986	·34470
			1907	4 50·7 W.	48 59·2 N.	·29951	·34438
			1908	4 53·2 W.	48 56·9 N.	·29991	·34439
Zi-ka-wei	31 12 N.	121 26 E.	1907	2 33·6 W.	45 36·6 N.	·33056	·33768
Dehra Dun	30 19 N	78 3 E.	1908	2 36·7 E.	43 42·2 N.	·33293	·31819
Helwan	29 52 N.	31 21 E.	1909	2 49·2 W.	40 40·4 N.	·30031	·25804
Havana	23 8 N.	82 25 W.	1905	2 58·0 E.	52 57·4 N.	·30531	·40452
Barrackpore	22 46 N.	88 22 E.	1908	1 5·6 E.	30 34·6 N.	·37298	·22037
Hong Kong	22 18 N.	114 10 E.	1909	0 2·2 E.	31 0·5 N.	·37091	·22293
†Honolulu (Hawaii)	21 19 N.	158 4 W.	1905	9 21·7 E.	40 5·8 N.	·29226	·24608
			1906	9 23·0 E.	40 2·0 N.	·29220	·24547
Toungoo	18 56 N.	96 27 E.	1908	0 34·4 E.	23 1·9 N.	·38763	·16479
Alibag (Bombay)	18 39 N.	72 52 E.	1910	0 57·7 E.	23 36·3 N.	·36845	·16101
†Vieques (Porto Rico)	18 9 N.	65 26 W.	1905	1 38·3 W.	49 17·0 N.	·29250	·33986
			1906	1 45·9 W.	49 22·1 N.	·29202	·34033
Manila	14 35 N.	120 59 E.	1904	0 51·4 E.	16 0·2 N.	·38215	·10960
Kodai-Kanal	10 14 N.	77 28 E.	1908	0 45·4 W.	3 33·2 N.	·37434	·02324
Batavia	6 11 S.	106 49 E.	1907	0 52·3 E.	30 55·3 S.	·36710	·21988
Dar-es-Salaam	6 49 S.	39 18 E.	1903	7 35·2 W.	—	—	—
			1905	9 37·0 E.	—	·35678	—
Apia	13 48 S.	171 45 W.	1906	9 38·5 E.	29 15·7 S.	·35655	·19977
			1907	9 40·1 E.	29 18·8 S.	·35637	·20010
			1908	9 41·9 E.	29 21·7 S.	·35613	·20036
Mauritius	20 6 S.	57 33 E.	1909	9 16·3 W.	53 39·8 S.	·23377	·31781
Rio de Janeiro	22 55 S.	43 11 W.	1906	8 55·3 W.	13 57·1 S.	·24772	·06164
Santiago (Chile)	33 27 S.	70 42 W.	1907	14 8·7 E.	29 55·3 S.	—	—
			1908	14 5·4 E.	29 55·3 S.	—	—
			1909	13 57·9 E.	29 57·2 S.	—	—
Melbourne	37 50 S.	144 58 E.	1901	8 26·7 E.	67 25·0 S.	·23305	·56024
Christchurch (N. Z)	43 32 S.	172 37 E.	1903	16 18·4 E.	67 42·3 S.	·22657	·55259

* From first 6 months only of year.

† The data for Sitka, Baldwin, Honolulu and Vieques are from the official publications (dated 1909 and 1910) of the U.S. Coast and Geodetic Survey. They are not identical with values given in previous Reports, but the differences are small except at Vieques, where there seems to have been a change of observing station.

SECTION II.—METEOROLOGICAL OBSERVATIONS, KEW OBSERVATORY.

Table I.—Mean Monthly Results of Temperature and Pressure.

Months.	Thermometer.								Barometer.*					Mean vapour pressure.
	Mean.	Means of—			Absolute Extremes.				Mean.	Absolute Extremes.				
		Max.	Min.	Max. and Min.	Max.	Date.	Min.	Date.		Max.	Date.	Min.	Date.	
1910.	°	°	°	°	°		°		ins.	ins.		ins.		ins.
January ...	40·4	44·5	36·1	40·3	56·0	2nd 2 P.M.	21·2	27th 8 A.M.	29·867	30·612	7th 11 A.M.	28·658	24th 4 P.M.	·211
February ...	42·5	47·5	37·2	42·4	54·4	17th 2 ,,	29·0	5th 5 ,,	29·669	30·412	9th 7 & 8 P.M.	28·988	20th 5 & 9 P.M.	·226
March	43·3	50·3	36·5	43·4	56·8	5th 2 ,,	29·8	20th 7 ,,	30·162	30·601	29th 11 A.M.	29·667	9th 8 P.M.	·214
April	46·9	53·9	40·2	47·1	64·0	21st 4 ,,	28·9	3rd 5 ,,	29·841	30·514	1st 0·5 A.M.	29·068	13th 10 P.M.	·242
May	53·7	61·8	46·5	54·2	75·1	22nd 3 ,,	32·8	10th 5 ,,	29·884	30·355	1st 8 A.M.	29·437	6th 4 A.M.	·303
June	60·7	68·9	53·6	61·3	80·5	20th 3 ,,	46·7	15th 4 ,,	29·888	30·392	16th 7 A.M.	29·442	25th 7 P.M.	·398
July	59·0	65·6	53·4	59·5	74·2	28th 2 ,,	48·0	4th 5 ,,	29·879	30·207	13th 10 ,,	29·463	25th 10 A.M.	·383
August	61·0	68·1	54·2	61·2	75·1	14th 2 ,,	49·3	7th 4 ,,	29·904	30·285	31st 8 P.M.	29·452	28th 10 P.M.	·419
September	56·2	63·4	49·4	56·4	73·5	28th 3 ,,	38·0	21st 5 ,,	30·218	30·493	17th 9 & 11 A.M.	29·849	29th 6 A.M.	·350
October.....	53·8	59·0	48·6	53·8	70·3	2nd 2 ,,	39·4	21st 3 ,,	30·012	30·546	4th NOON.	29·353	31st MIDT.	·340
November...	39·2	45·3	33·1	39·2	55·7	1st 4 A.M.	24·0	23rd 3 ,,	29·649	30·198	19th 9 P.M.	28·835	7th 10 A.M. & NOON.	·197
December...	45·0	48·5	41·0	44·8	54·2	16th 9 ,,	28·5	28th 9 ,,	29·715	30·516	31st 10 A.M.	28·935	10th 1 P.M.	·255
Means	50·1	56·4	44·2	50·3	...	...	...	...	29·891	...	...	...	...	·295

* Reduced to 32° at M.S.L., but not corrected for gravity.

This table is compiled from " Hourly Readings, 1910 " included in the British Meteorological Year Book.

SECTION II.—METEOROLOGICAL OBSERVATIONS, KEW OBSERVATORY.

Table II.—Cloud Amount, Rainfall, Weather and Wind Direction.

Months.	Mean amount of cloud (0=clear, 10=overcast).	Rainfall.*			Weather. Number of days on which were registered							Wind.† Number of days on which it was								
		Total.	Maximum.	Date.	Rain. ‡	Snow.	Hail.	Thunder storms	Clear sky.	Overcast sky.	Gales.§	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
1910.		ins.	ins.																	
January	7·0	1·685	0·460	23	15	3	0	0	4	18	1	1	0	0	0	3	13	9	5	5
February	7·3	2·780	0·390	14	22	0	1	0	1	14	5	2	0	0	0	6	12	6	2	1
March	5·5	0·955	0·505	9	8	1	0	0	8	12	0	6	6	4	2	4	5	2	2	6
April	7·8	1·055	0·250	28	16	0	2	0	0	19	0	3	4	1	1	6	6	6	3	0
May	6·1	1·850	0·430	18	16	0	1	1	5	13	1	7	5	4	2	1	4	4	4	0
June	7·2	2·665	0·760	25	13	0	1	4	3	17	0	6	4	3	2	2	8	3	2	3
July	8·0	2·490	0·640	5	15	0	0	1	1	22	0	5	5	1	1	2	9	4	4	2
August	7·3	2·790	1·170	5	17	0	1	3	1	16	0	2	2	1	1	6	11	7	1	3
September	6·9	0·455	0·400	13	3	0	0	1	2	15	0	11	6	2	1	1	3	2	4	3
October	8·1	2·625	0·620	31	15	0	0	0	0	19	3	5	6	7	2	3	3	3	2	3
November	6·4	2·835	0·580	30	14	0	0	0	4	10	1	2	3	1	2	2	5	10	5	6
December	8·2	3·365	0·480	1	19	0	0	0	1	23	3	2	1	2	3	8	6	7	2	2
Totals and Means	7·2	25·550			173	4	6	10	30	198	14	52	42	26	17	44	85	63	36	34

* Measured at 10 A.M. daily by gauge 1·75 feet above ground. † As registered by the Robinson anemograph.

‡ The number of rain days are those on which 0·01 inch rain or melted snow was recorded.

§ In a "gale" the mean wind velocity has exceeded 25 miles an hour in at least one hour of the twenty-four } using the factor 2·2.

‖ In a "calm" the mean wind velocity for the twenty-four hours has not exceeded 3·7 miles an hour }

SECTION II.—METEOROLOGICAL OBSERVATIONS, KEW OBSERVATORY.

Table III.—Bright Sunshine, Solar Maximum and Grass Minimum Temperatures, and Wind.

Months.	Bright Sunshine.				Maximum temperature in sun's rays. (Black bulb *in vacuo*.)			Minimum temperature on the ground.			Horizontal movement of the air.* Miles per hour.		
	Total number of hours recorded.	Mean percentage of possible sunshine.	Greatest daily record.	Date.	Mean.	Highest.	Date. †	Mean.	Lowest.	Date. ‡	Average hourly velocity.	Greatest hourly velocity.	Date.
1910.	h. m.		h. m.		°	°		°	°		Miles.	Miles.	
January	63 12	24	7 12	30	67	88	10	31	11	27	9·0	25	16
February	74 18	27	7 0	26	83	100	21	30	18	5, 9, 10	10·6	37	20
March	142 54	39	9 42	3	93	109	7, 28	28	20	15, 20	7·4	22	31
April	116 54	28	12 0	27	104	125	22	34	20	3	8·8	24	28
May	218 48	45	14 18	23	117	131	19, 28	40	23	9, 10	9·3	26	14
June	163 48	33	14 42	3	121	135	21	47	35	4	6·8	21	6
July	110 36	22	10 6	14	117	131	31	50	41	4, 19	7·7	18	6, 16, 21, 24 & 25
August	162 36	36	12 6	10	123	136	1	49	41	29	7·7	20	29
September	136 24	36	11 18	3, 13	107	121	1	42	28	21	5·9	17	14
October	61 36	19	7 48	3	91	116	4	43	29	21	8·5	29	14
November	73 12	28	7 30	16	71	95	1	26	14	17	7·9	25	30
December	26 36	11	4 36	25	65	85	16	35	16	28	10·8	37	16
Totals and Means	1350 54	30·3									8·4		

* As indicated by a Robinson anemograph, 70 feet above the general surface of the ground, the factor 2·2 being used.

† Read at 10 A.M., and entered to the previous day.

‡ Read at 10 a.m., and entered to the same day.

SECTION II, KEW OBSERVATORY.

Table IV.—Measurements of Solar Radiation, with the Ångström Compensation-Pyrheliometer.

Month.	Days of Observation.	Mean Value. *	Maximum.			Minimum.		
			Value. *	State of Atmosphere.	Direction of Wind.	Value. *	State of Atmosphere.	Direction of Wind.
1910.								
January	10	0·785	1·011	Clear	W.	0·622	Hazy	N.W.
February	8	0·871	1·131	Clear	W.S.W.	0·562	Hazy	N.W.
March	10	0·957	1·227	Very clear	W.	0·754	Fairly clear	E.S.E.
April	8	0·980	1·244	Visibility	W.S.W.	0·533	Smoky sky (misty)	N.W.
May	11	1·097	1·296	Visibility	N.W.	0·948	Smoky sky (misty)	E.
June	8	1·054	1·233	Visibility	W.	0·748	Smoky sky (misty)	E.
July	7	1·022	1·269	Clear	S.E.	0·722	Smoky sky (misty)	N.E.
August	9	1·105	1·269	Visibility	W.S.W.	0·825	Clear	W.S.W.
September ...	13	0·920	1·152	Clear	N.	0·646	Very hazy	N.
October.....	6	0·931	1·114	Visibility	W.N.W.	0·586	Very misty	W.
November ...	10	0·803	1·062	Clear	W.N.W.	0·496	Misty	N.W.
December.....	6	0·575	0·664	Thin mist	W.	0·484	Misty	S.S.W.

* Expressed in gramme-calories per sq. cm. per minute.

Measurements taken between 11.30 a.m. and 12.30.

Observations omitted when sun's radiation was intercepted by any visible cloud.

SECTION II, KEW OBSERVATORY.

Table V.—Earth Thermometers.

Month.	1 foot Thermometer.							4 foot Thermometer.				
	Arithmetic Mean of Readings at 10 a.m. and 10 p.m.					Mean Excess of Temperature.		Arithmetic Mean of Readings at 10 a.m. and 10 p.m.				
	Mean.	Max.m.	Date.	Min.m.	Date.	10 p.m. over 10 a.m.	4 p.m. over 10 a.m.	Mean.	Max.m.	Date.	Min.m.	Date.
1910.												
January	39°·9	44°·6	10	34°·8	29, 30, 31	−0°·04	−0°·01	44°·4	45°·1	12 & 13	42°·2	31
February	40·0	43·6	19	35·4	1	+0·56	+0·33	42·6	43·8	25	41·8	7
March	42·4	45·1	10	39·8	1	+0·80	+0·41	43·9	44·4	14, 29, 31	43·3	2, 3, 4, 5 & 6 and 7
April	46·4	51·7	21	41·0	3	+1·01	+0·63	45·5	47·4	30	44·1	4, 5, 6, 7 & 8 and 9
May	53·5	59·3	23	47·4	10	+1·13	+0·74	49·2	52·2	31	47·3	1 and 2
June	61·3	65·0	20	56·7	1	+1·10	+1·00	55·0	56·9	26	52·6	1
July	60·5	63·1	31	58·4	10	+0·91	+0·72	56·6	57·2	31	56·2	11, 12, 13 & 14
August	61·9	63·9	15	59·4	29	+0·75	+0·63	58·1	58·6	21 & 23	57·2	1
September	57·1	61·0	3	54·5	21 & 23	+0·59	+0·79	56·9	58·1	1	55·8	27, 28, 29 & 30
October	54·0	58·4	2	50·0	23	+0·07	+0·24	55·0	55·9	2,3,4,5,6, 7,8,9,10, 11, 12, 13	53·2	31
November	41·1	50·2	1	36·0	23	+0·01	+0·02	48·9	53·1	1 and 2	44·9	30
December	42·7	46·0	15 & 16	38·1	31	+0·08	+0·13	45·6	46·4	20	44·4	3, 4 & 5
Yearly Means and Extremes	50·1	65·0	June 20	34·8	Jan. 29, 30 & 31	+0·58	+0·46	50·1	58·6	Aug. 21 & 23	41·8	Feb. 7

SECTION II, KEW OBSERVATORY.—Table VI.—Hourly Means of Water-dropping Electrograph on selected

Month.	Midt.	1 a.m.	2	3	4	5	6	7	8	9	10	11
1910.												
January	181	173	170	169	169	178	192	221	254	263	264	269
February	246	241	231	212	214	216	217	228	260	276	284	270
March	257	232	211	196	182	184	216	266	260	253	254	223
April	162	154	131	117	114	128	155	183	199	192	170	141
May	164	165	136	111	102	105	116	137	150	170	171	182
June	110	104	90	90	92	92	90	105	133	134	123	112
July	114	103	88	89	87	96	113	121	132	139	132	118
August	92	93	87	81	78	85	101	120	156	128	112	99
September ...	93	81	76	76	71	75	85	101	112	115	121	115
October.....	162	141	125	116	122	125	136	164	185	194	211	216
November ...	214	194	180	174	169	180	204	239	287	310	319	301
December.....	192	178	184	201	204	206	228	207	218	217	202	182

TABLE VII.—Diurnal Inequality of Atmospheric Electric

Month, &c.	1 a.m.	2	3	4	5	6	7	8	9	10	11	Noon.	1 p.m.
1910.													
January	−57	− 66	− 72	**−75**	−61	−40	+ 8	+63	+75	+ 75	**+81**	+26	−27
February	−15	− 33	**−65**	− 60	−56	−53	−32	+25	+56	+ 72	+47	+34	− 1
March	−37	− 68	− 90	**−110**	−104	−45	+42	+36	+27	+ 0	−15	−74	−94
April	−19	− 56	− 77	**−82**	−59	−16	+31	+57	+46	+ 10	−35	−38	−61
May	− 1	− 48	− 90	**−106**	−99	−80	−45	−21	+13	+ 14	+35	+55	+18
June	−14	**−40**	**−40**	− 35	−35	−38	−11	+41	+43	+ 25	+ 4	− 9	−33
July	−24	− 54	− 52	**−58**	−40	− 6	+10	+31	+45	+ 29	+ 2	−22	−28
August	− 6	− 18	− 33	− 39	−25	+ 8	+45	**+77**	+61	+ 29	0	−18	+ 2
September ...	−52	− 62	− 62	**−70**	−62	−42	−11	+13	+19	+ 30	+21	+ 5	− 5
October.....	−69	− 98	**−116**	−107	−100	−82	−31	+ 7	+21	+ 52	+59	+41	+28
November ...	−77	−103	−117	**−128**	−112	−71	−13	+69	+108	**+120**	+86	+33	+ 8
December.....	−51	− 39	− 6	+ 3	+ 8	+14	+14	+36	+36	+ 12	−22	−39	−46
Winter	−50	− 60	**−65**	**−65**	−55	−37	− 6	+48	+ 69	**+70**	+48	+13	−16
Equinox	**−44**	− 71	− 86	**−92**	−81	−46	+ 8	+28	+28	+ 23	+ 7	−17	−33
Summer	−11	− 40	− 54	**−59**	−50	−29	0	+32	+40	+ 24	+10	+ 1	−10
Year	−35	− 57	− 68	**−72**	−62	−37	+ 1	+36	+46	+ 39	+22	− 1	−20

*Principal maxima and

Atmospheric Electric Potential (in volts) of the Self-recording Kelvin "Quiet" Days (10 each month).

Noon.	1 p.m.	2	3	4	5	6	7	8	9	10	11	Midt.
240	212	202	214	232	247	251	260	277	259	249	242	224
262	241	219	204	212	227	243	259	269	287	268	249	230
186	172	180	200	197	222	251	277	297	287	286	255	204
139	125	135	149	160	175	186	205	227	214	184	170	156
194	172	154	156	164	165	171	205	217	214	194	170	156
105	92	90	98	102	116	124	129	134	135	118	114	106
106	103	105	114	116	124	133	140	135	141	136	121	118
90	100	82	75	73	70	80	104	127	133	123	105	98
107	102	102	102	113	115	129	136	131	133	115	107	86
206	199	202	212	208	219	233	233	216	193	190	187	171
273	261	261	272	275	285	284	275	292	287	278	262	252
172	167	161	172	192	203	214	209	203	199	186	177	164

Potential Gradient near the Ground in volts per metre of height.*

2	3	4	5	6	7	8	9	10	11	Midt.	Range of inequality.	Monthly and seasonal mean absolute values.
− 49	− 29	− 1	+22	+ 26	+ 38	+ 67	+ 31	+ 10	− 6	−41	156	399
− 40	**−65**	−49	−23	+ 8	+ 38	+ 56	**+90**	+ 57	+24	− 8	155	432
− 77	− 38	−40	+ 5	+ 58	+106	**+143**	+130	+131	+83	+ 2	253	386
− 43	− 21	− 3	+21	+ 41	+ 71	**+107**	+ 86	+ 39	+17	− 6	189	262
− 11	− 8	+ 6	+ 9	+ 19	+ 77	**+99**	+ 95	+ 60	+21	− 3	205	273
− 37	− 20	−12	+13	+ 28	+ 37	+ 47	**+50**	+ 19	+12	− 3	90	203
− 24	− 8	− 4	+12	+ 29	**+43**	+ 33	**+43**	+ 33	+ 4	− 2	101	232
− 37	− 51	−55	**−61**	− 43	+ 6	+ 53	+ 65	+ 43	+ 6	− 8	138	202
− 3	− 3	+19	+24	+ 52	**+66**	+ 56	+ 62	+ 26	+11	−29	136	206
+ 32	+ 50	+41	+61	**+86**	+ 84	+ 53	+ 12	+ 5	− 1	−31	202	330
+ 7	+ 23	+26	+40	+ 35	+ 17	+ 44	+ 33	+ 14	−14	−38	248	450
−55	− 31	+ 7	+28	**+50**	+ 43	+ 34	+ 30	+ 8	− 6	−28	105	350
− 34	− 26	− 4	+17	+ 26	+ 34	+ 50	+ 46	+ 22	− 1	−29	—	408
− 23	− 3	+ 4	+28	+ 59	+ 82	**+90**	+ 72	+ 50	+27	−16	—	296
− 27	− 22	−16	− 7	+ 8	+ 41	+ 58	**+63**	+ 39	+11	− 4	—	227
− 28	− 17	− 5	+13	+ 31	+ 52	**+66**	+ 60	+ 37	+12	−16	—	310

minima are in heavy type.

SECTION II, KEW OBSERVATORY.

Table VIII. Data from 1910.

"Electric Dissipation" (with Elster and Geitel apparatus).

From formula $a/100 = (1/t)\{\log(V_t/V_o) - n \log(V'_t/V'_o)\}$

Months. 1910.	Number of Days of Observation.	Mean Value.			Greatest Value.			Least Value.			$\frac{\Sigma a_-}{\Sigma a_+}$
		a_+	a_-	$\frac{a_-}{a_+}$	a_+	a_-	$\frac{a_-}{a_+}$	a_+	a_-	$\frac{a_-}{a_+}$	
January ...	13	0·410	0·702	1·98	0·813	1·102	4·00	0·070	0·249	0·90	1·71
February ...	6	·164	·522	3·67	0·221	0·771	6·03	·068	·382	2·00	3·19
March ...	15	·325	·473	1·61	0·583	1·231	2·97	·092	·194	0·79	1·45
April ...	12	·458	·784	1·87	0·742	1·542	3·36	·185	·510	0·98	1·71
May ...	13	·471	·710	1·83	0·836	1·391	3·90	·095	·312	0·70	1·51
June ...	14	·540	·828	1·77	1·168	1·523	4·42	·098	·274	0·94	1·53
July ...	14	·646	·784	1·34	1·334	1·505	2·03	·202	·379	0·53	1·21
August ...	14	·626	·903	1·47	1·031	1·802	2·04	·165	·198	0·79	1·44
September ...	15	·533	·736	1·45	0·969	1·283	2·42	·174	·213	0·85	1·38
October ...	12	·450	·702	1·81	0·717	1·312	4·84	·113	·357	0·82	1·56
November ...	14	·246	·304	1·24	0·425	0·528	1·80	·122	·117	0·92	1·24
December ...	8	0·456	0·568	1·31	0·665	0·823	1·68	0·223	0·369	0·73	1·25
Total, Means, and Extremes.	150	0·444	0·668	1·78	1·334	1·802	6·03	0·068	0·117	0·53	1·60

Table IX. Means from 1907 to 1910.

"Electric Dissipation" (with Elster and Geitel apparatus).

From Formula $a/100 = (1/t)\ (1-n)^{-1}\{\log(V_t/V_o) - n \log(V'_t/V'_o)\}$

Month.	Number of Days of Observation.	Mean Value.			Greatest Value.			Least Value.			$\frac{\Sigma a_-}{\Sigma a_+}$
		a_+	a_-	$\frac{a_-}{a_+}$	a_+	a_-	$\frac{a_-}{a_+}$	a_+	a_-	$\frac{a_-}{a_+}$	
January ...	49	·407	·617	1·66	1·161	1·631	4·00	·100	·141	0·62	1·49
February ...	44	·304	·579	2·25	·850	1·329	6·03	·067	·231	0·88	2·00
March ...	45	·350	·535	1·67	·879	1·759	3·41	·073	·183	0·64	1·58
April ...	36	·490	·785	1·81	1·477	2·203	4·84	·100	·183	0·84	1·69
May ...	50	·613	·909	1·58	1·403	1·987	3·90	·136	·381	0·70	1·46
June ...	53	·759	1·038	1·53	1·806	2·489	4·42	·140	·303	0·72	1·37
July ...	53	·761	1·054	1·48	1·906	3·416	2·45	·137	·194	0·53	1·40
August ...	43	·701	1·063	1·61	1·473	2·574	2·40	·209	·283	0·79	1·52
September ...	54	·659	·993	1·70	1·586	1·833	5·18	·137	·253	0·85	1·51
October ...	46	·647	1·040	1·75	1·351	2·570	4·84	·161	·326	0·66	1·60
November ...	51	·478	·700	1·70	1·273	1·433	8·91	·033	·167	0·84	1·47
December ...	37	·622	·759	1·28	1·316	1·640	2·20	·204	·180	0·55	1·24
Total, Means, and Extremes.	561	·566	·839	1·67	1·906	3·416	8·91	·033	·141	0·53	1·53

SECTION III.—Table I. SEISMOLOGICAL OBSERVATIONS.

Register of Principal Seismograph Disturbances at Kew Observatory. 1910.

No. in Kew register.	Date.	Commencement.	Time of Maximum.	Maximum Amplitude.	Duration.	Remarks.
		hr. min.	hr. min.	mm.	hr. min.	
1025	Jan. 1	11 22·8	11 49·7	2·9	2 33	
1027	,, 8	15 20·4	15 37·2	1·0	0 54	
1030	,, 22	8 52·6	8·58–9·0	> 17·0	2 36	
1031	,, 23	18 58·9	19 19·4	1·5	1 13	
1035	,, 30	4 36·7	5 29·2	1·1	1 25	
1052	April 12	8 43·4	9 12·2	2·3	1 24	
1070	May 22	6 47·3	7 15·2	2·0	2 25	
1073	,, 31	5 19·2	5 52·0	1·1	1 5	
1081	June 16	6 49·7	8 20·2	2·0	2 10	
1085	,, 24	13 33·2	13 35·0	11·0	0 50	
1086	,, 25	19 30·3	19 39·1	1·3	0 45	
1088	,, 29	11 30 ?	12 28·3	1·5	1 57	
1118	Sept. 1	1 9·2	1 39·8	2·4	1 10	
1119	,, 1	15 3·5	15 20·4	1·5	0 44	
1121	,, 6	20 35·5	21 13·2	1·0	1 10	
1123	,, 9	1 42·9	2 6·6	1·4	1 19	
1143	Nov. 6	21 8·7	21 13·0	1·0	0 34	
1146	,, 9	6 33·1	8 11·9	3·5	2 51	
1148	,, 14	8 18·3	8 33·1	2·0	1 11	
1150	,, 15	14 46·1	15 22·2	1·4	1 8	
1151	,, 29	3 17·2	3 26·3	2·0	0 33	
1155	Dec. 10	9 59·5	10 59·3	1·8	1 55	
1156	,, 13	11 43·3	12 20·1	7·5	3 20	
1158	,, 16	15 10 ?	15 53·1	5·2	3 0	

The times recorded are G.M.T., midnight = 0 or 24 hours.

The figures given above were obtained from the photographic records of a Milne Horizontal Pendulum ; they represent E—W displacements.

The scale value has been 1 mm. = 0″·56 from January to April.

,, ,, ,, = 0″·55 from April to October.

,, ,, ,, = 0″·54 from October to December.

SECTION IV.

MAGNETIC OBSERVATIONS FOR THE YEAR 1910, FALMOUTH OBSERVATORY.

Latitude 50° 9′ 0″ N. Longitude 5° 4′ 35″ W. Height, 167 feet above mean sea level.

Introduction by EDWARD KITTO, *Superintendent and Magnetic Observer.*

Photographic curves of magnetic Declination and of Horizontal and Vertical Force variations have been regularly taken during the year, with the exception of a loss of Horizontal Force record from October 26 to November 2, owing to breaking of the suspension wire of the magnet.

The scale values of the instruments were determined on the 1st August, 1910. The following values of the ordinates of the photographic curves were then found :—

Declination, 1 cm. = 0° 11′·7.
Bifilar, 1 cm. δH = 0·00054.
Balance, 1 cm. δV = 0·00052.

A second series of deflections were made on 30th December, 1910, the result being :—

Declination, 1 cm. = 0°11′.7.
Bifilar, 1 cm. δH = 0·00056.
Balance 1 cm. δV = 0·00070.

The Sensibility of the Vertical Force Magnet was increased and a further series of deflections made when the scale value was found to be :—

1 cm. δV = 0·00050.

Observations with the Absolute Instruments have been made about four times a month of which the following is a summary :—

Determinations of Horizontal Intensity, 47.
Determinations of Inclination, 47.
Determinations of Declination, 47.

The mean values of the Magnetic Elements for the year 1910 are as follows :—

Declination, 17° 41′·6 W ; Horizontal Force, 0·18802 C.G.S. ; Vertical Force, 0·43208 C.G.S. ; Inclination 66° 29′·0 N.

The results in the following Tables, Nos. I, II, III, IV, V, VI, are deduced from the magnetograph curves which have been standardised by the absolute observations. These were made with the Collimator Magnet 66A and the Mirror Magnet 66C in the Unifilar Magnetometer No. 66, by Elliott Brothers, of London, and with the Inclinometer No. 86, by Dover, of Charlton, Kent, employing needles 1 and 2, which are 3½ inches in length.

The Committee and Superintendent are greatly indebted to Dr. Charles Chree, F.R.S., for his valuable assistance particularly in the accurate determination of the Horizontal Force Curve values subsequent to the breaking of the suspension wire.

The effects of temperature on the Horizontal Force curves are very small and are negligible, but a temperature correction has been determined and applied to the Vertical Force curves.

From the hourly means of Horizontal Force in Table III, and the corresponding Vertical Force in Table V, hourly values have been calculated for the Inclination. These and the corresponding diurnal inequalities appear in Tables VII and VIII.

The Tables are prepared in accordance with the suggestions made in the Fifth Report of the Committee of the British Association on comparing and reducing magnetic observations. The time given is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The results are derived from the "quiet" days selected by the Astronomer Royal, mentioned on page 11 above.

The results are printed in the Royal Cornwall Polytechnic Society's Annual Report, as well as in the present Report.

The whole of the instruments have been maintained in good order; and the Magnetic Chamber in the Observatory Building and the Magnetic Hut in the garden have been kept in a thoroughly satisfactory condition.

Table I.—Hourly Means of Declination at Falmouth on Five selected Quiet Days in each Month, 1910.

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
	(17° + West.)				Winter.								
1910.	′	′	′	′	′	′	′	′	′	′	′	′	′
January	43·0	43·4	43·5	43·9	43·9	44·1	43·8	43·4	43·1	42·2	43·0	44·2	45·5
February	43·0	43·3	43·5	43·7	43·4	43·5	43·4	42·9	42·6	42·2	43·3	44·7	46·0
March	43·0	42·8	43·2	43·5	43·3	43·0	42·9	42·2	40·7	40·2	41·9	44·4	47·6
October.....	37·7	38·3	38·6	38·3	38·5	38·1	38·3	37·5	36·6	36·2	37·1	39·1	41·8
November.....	36·5	36·9	37·3	36·9	37·2	37·6	37·0	36·7	36·2	35·8	36·5	38·7	40·6
December.....	36·8	37·2	37·8	37·9	37·8	37·7	37·9	37·6	37·3	37·0	37·9	38·7	39·8
Means	40·0	40·3	40·6	40·7	40·7	40·7	40·5	40·0	39·4	38·9	39·9	41·6	43·5
					Summer.								
1910.	′	′	′	′	′	′	′	′	′	′	′	′	′
April	42·7	42·6	43·1	42·5	42·0	41·8	41·5	40·1	38·6	38·5	40·4	43·1	46·2
May	42·1	42·6	43·2	42·2	42·5	41·2	39·6	39·2	38·6	39·5	41·2	43·4	45·4
June	40·9	40·5	39·8	39·8	39·2	37·8	36·0	35·8	35·8	37·2	39·4	41·8	44·3
July	41·9	41·7	41·5	41·5	41·2	40·8	39·0	38·2	38·0	38·6	40·4	42·0	44·2
August	42·0	41·8	42·4	42·6	41·9	41·3	40·5	39·5	39·1	39·5	41·4	43·9	46·4
September ...	39·4	39·5	39·7	38·9	38·4	38·5	38·1	37·2	36·8	37·6	40·0	42·4	45·1
Means	41·5	41·5	41·5	41·3	40·9	40·2	39·1	38·3	37·8	38·5	40·5	42·8	45·3

Table II.—Diurnal Inequality of the Falmouth

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
					Summer Means.								
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·5	−0·6	−0·4	−0·8	−1·2	−1·8	−2·9	−3·7	−4·2	−3·5	−1·6	+0·8	+3·2
					Winter Means.								
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−1·1	−0·8	−0·4	−0·4	−0·4	−0·4	−0·5	−1·0	−1·7	−2·1	−1·1	+0·6	+2·5
					Annual Means.								
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·8	−0·7	−0·4	−0·6	−0·8	−1·1	−1·7	−2·4	−2·9	−2·8	−1·3	+0·7	+2·9

Note.—When the sign is + the magnet
When the sign is − the magnet

Observatory, determined from the Magnetograph Curves
(Mean for the year = 17°41′·6 W.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
					Winter.						
′	′	′	′	′	′	′	′	′	′	′	′
46·6	46·8	45·7	45·0	44·1	44·0	43·7	43·2	43·0	42·8	43·0	43·0
46·7	46·5	45·2	44·2	43·8	43·9	43·7	43·2	42·8	42·9	42·7	43·0
49·3	49·4	48·4	46·3	44·6	44·2	44·0	43·7	43·4	43·1	43·0	43·0
43·2	43·2	41·9	40·5	39·7	39·3	38·7	38·5	38·5	38·2	38·6	38·6
41·3	40·7	39·5	38·6	38·4	38·0	37·5	36·9	36·3	36·5	36·4	36·5
40·0	39·8	41·1	38·6	38·2	37·7	37·5	37·1	36·8	36·5	36·4	36·5
44·5	44·4	43·6	42·2	41·5	41·2	40·8	40·4	40·1	40·0	40·0	40·1
					Summer.						
′	′	′	′	′	′	′	′	′	′	′	′
48·7	49·1	47·3	45·4	43·8	43·0	42·9	42·9	42·6	42·5	42·3	42·1
47·0	47·1	46·1	45·2	44·3	43·5	42·9	43·1	42·7	42·5	42·7	42·2
45·3	45·7	45·0	43·9	42·5	41·7	41·1	40·9	40·4	40·7	40·5	40·2
44·9	45·2	45·0	44·8	44·6	44·1	43·6	43·6	43·5	43·3	42·8	42·2
47·6	48·3	47·6	46·0	45·0	43·6	43·2	43·2	42·9	42·8	42·5	42·1
46·1	45·4	43·3	41·1	39·9	39·7	39·7	39·8	39·6	39·3	39·0	39·6
46·6	46·8	45·7	44·4	43·4	42·6	42·2	42·2	42·0	41·8	41·6	41·4

Declination as deduced from Table I.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
					Summer Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+4·6	+4·8	+3·7	+2·4	+1·3	+0·6	+0·2	+0·2	−0·1	−0·2	−0·4	−0·6
					Winter Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+3·4	+3·3	+2·5	+1·1	+0·4	+0·1	−0·2	−0·6	−0·9	−1·1	−1·1	−1·0
					Annual Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+4·0	+4·0	+3·1	+1·8	+0·9	+0·3	+0·0	−0·2	−0·5	−0·6	−0·7	−0·8

points to the west of its mean position.
points to the east of its mean position.

Table III.—Hourly Means of Horizontal Force at Falmouth
Five selected Quiet Days in each Month, 1910.

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
0·18000 + (C.G.S. units).						Winter.							
1910.													
January	782	781	782	783	783	785	786	787	787	781	773	771	772
February	785	785	786	786	789	790	790	791	789	783	777	774	774
March	798	797	795	795	796	797	797	796	792	784	778	775	779
October	811	808	806	808	809	810	810	810	805	797	789	787	795
*November ...	808	807	807	809	809	810	814	812	811	802	794	792	792
December ...	804	804	804	807	809	811	814	815	814	810	803	799	801
Means	798	797	797	798	799	801	802	802	800	793	786	783	786
						Summer.							
1910.													
April	808	803	802	803	803	802	802	800	796	785	775	771	778
May	807	806	808	803	804	803	800	796	790	785	782	784	790
June	817	816	813	816	814	816	810	805	799	792	787	789	795
July	816	813	812	812	812	812	808	804	802	799	795	794	796
August	809	809	807	808	807	806	806	800	791	785	781	784	788
September ...	815	813	812	812	810	809	805	805	796	788	788	792	803
Means	812	810	809	809	808	808	805	802	796	789	785	786	792

* Mean of four days.

Table IV.—Diurnal Inequality of the Falmouth

Hrs.	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
						Summer Means.							
	+ ·00005	+ ·00003	+ ·00002	+ ·00002	+ ·00001	+ ·00001	—·00002	— ·00005	— ·00011	— ·00018	— ·00022	— ·00021	— ·00015
						Winter Means.							
	+ ·00001	·00000	·00000	+ ·00001	+ ·00003	+ ·00004	+ ·00005	+ ·00005	+ ·00003	— ·00004	— ·00011	— ·00014	— ·00011
						Annual Means.							
	+ ·00003	+ ·00002	+ ·00001	+ ·00002	+ ·00002	+ ·00002	+ ·00002	·00000	— ·00004	— ·00011	— ·00017	— ·00017	— ·00013

Note.—When the sign is + the

Observatory determined from the Magnetograph Curves on
(Mean for the year = 0·18802).

1.	2.	3.	4.	5	6.	7.	8.	9.	10.	11.	Midt.
					Winter.						
777	780	781	782	784	784	785	785	784	783	783	782
782	787	786	785	785	786	787	784	783	785	785	787
787	791	798	797	797	799	802	802	799	799	799	798
802	806	806	808	811	813	813	815	815	815	815	814
797	803	806	804	800	801	804	807	812	811	810	806
801	800	802	808	808	810	810	811	810	810	810	809
791	794	796	797	798	799	800	801	801	801	800	799
					Summer.						
789	796	802	805	807	808	809	811	810	810	811	812
800	806	806	812	816	816	818	818	816	814	815	814
801	809	815	817	820	825	828	824	825	822	819	818
804	810	815	818	820	824	828	831	833	832	833	832
796	801	806	813	813	815	816	819	819	818	817	816
808	808	809	808	811	811	817	816	816	817	815	815
800	805	809	812	815	817	819	820	820	819	818	818

Horizontal Force as deduced from Table III.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
					Summer Means.						
−·00007	−·00002	+·00002	+·00005	+·00008	+·00010	+·00012	+·00013	+·00013	+·00012	+·00011	+·00011
					Winter Means.						
−·00006	−·00002	·00000	+·00001	+·00001	+·00002	+·00004	+·00004	+·00004	+·00004	+·00004	+·00003
					Annual Means.						
−·00006	−·00002	+·00001	+·00003	+·00004	+·00006	+·00008	+·00008	+·00008	+·00008	+·00008	+·00007

reading is above the mean.

Table V.—Hourly Means of Vertical Force at Falmouth
Five selected Quiet Days in each Month

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
0·43000 + (C.G.S. units).						Winter.							
1910.													
January	190	190	190	191	192	192	191	191	191	190	188	185	185
February	175	175	175	176	177	177	177	177	176	176	174	173	173
March	236	236	237	237	238	237	237	237	236	234	230	228	228
October	208	209	210	209	208	208	208	208	208	207	205	202	200
November	215	214	213	213	212	211	212	211	212	213	211	208	209
December	174	172	171	171	172	172	172	173	173	172	172	170	171
Means	200	199	199	200	200	200	200	200	199	199	197	194	194
						Summer.							
1910.													
April	217	217	217	218	217	216	216	216	215	212	208	205	203
May.....	240	240	239	239	238	239	238	238	236	234	230	225	223
June	206	205	204	203	203	204	204	203	202	199	195	192	192
July.....	218	217	217	217	217	219	220	219	218	216	213	207	205
August	197	198	198	198	199	201	201	201	201	197	193	188	183
September	243	243	243	243	243	241	241	241	240	235	232	225	224
Means	220	220	220	220	220	220	220	220	219	216	212	207	205

Table VI.—Diurnal Inequality of the Falmouth

Hrs.	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
						Summer Means.							
	+ ·00003	+ ·00003	+ ·00002	+ ·00002	+ ·00002	+ ·00003	+ ·00003	+ ·00002	+ ·00001	− ·00002	− ·00006	− ·00010	− ·00012
						Winter Means.							
	+ ·00001	·00000	·00000	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00001	·00000	·00000	− ·00002	− ·00005	− ·00005
						Annual Means.							
	+ ·00002	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00002	+ ·00002	+ ·00001	+ ·00001	− ·00001	− ·00004	− ·00008	− ·00009

Note.—When the sign is + the

Observatory, determined from the Magnetograph Curves on during 1910. (Mean for the Year = 0·43208).

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
Winter.											
185	187	190	192	191	191	190	190	189	188	188	188
174	176	178	179	179	179	178	177	176	176	176	176
230	235	239	241	241	240	238	236	236	236	236	236
202	205	208	211	210	209	208	208	207	207	207	208
211	212	215	215	214	212	213	213	212	211	210	209
171	174	176	176	175	174	174	173	173	173	172	172
196	198	201	202	202	201	200	200	199	199	198	198
Summer.											
203	209	215	219	221	220	219	217	216	215	215	215
225	228	235	238	240	241	240	238	236	236	236	237
195	199	202	206	209	211	212	211	211	210	210	210
205	207	211	215	218	220	221	221	220	220	219	218
185	188	196	202	203	205	202	201	198	197	197	197
229	236	243	245	245	242	239	238	237	237	238	239
207	211	217	221	223	223	222	221	220	219	219	219

Vertical Force as deduced from Table V.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
Summer Means.											
−·00010	−·00006	·00000	+·00003	+·00005	+·00006	+·00005	+·00004	+·00002	+·00002	+·00002	+·00002
Winter Means.											
−·00003	−·00001	+·00002	+·00003	+·00003	+·00002	+·00001	+·00001	·00000	·00000	−·00001	−·00001
Annual Means.											
−·00007	−·00004	+·00001	+·00003	+·00004	+·00004	+·00003	+·00002	+·00001	+·00001	+·00001	+·00001

reading is above the mean.

Table VII.—Hourly Means of Inclination at Falmouth Observatory,

(Mean for the

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
	(66° +		.)			Winter.							
1910.	′	′	′	′	′	′	′	′	′	′	′	′	′
January	29·9	29·9	29·9	29·8	29·8	29·7	29·6	29·5	29·5	29·9	30·4	30·4	30·4
February	29·2	29·2	29·1	29·2	29·0	28·9	28·9	28·9	29·0	29·3	29·7	29·9	29·9
March	30·1	30·2	30·3	30·3	30·3	30·2	30·2	30·3	30·5	31·0	31·3	31·4	31·1
October	28·4	28·7	28·8	28·7	28·6	28·5	28·5	28·5	28·8	29·3	29·8	29·9	29·3
November ...	28·8	28·9	28·8	28·7	28·7	28·6	28·3	28·4	28·5	29·2	29·6	29·7	29·7
December.....	27·9	27·8	27·8	27·6	27·5	27·4	27·2	27·1	27·2	27·4	27·9	28·1	28·0
Means.....	29·1	29·1	29·1	29·1	29·0	28·9	28·8	28·8	28·9	29·3	29·8	29·9	29·7
						Summer.							
1910.	′	′	′	′	′	′	′	′	′	′	′	′	′
April	28·9	29·2	29·3	29·2	29·2	29·3	29·3	29·4	29·6	30·3	30·8	31·0	30·5
May	29·6	29·7	29·5	29·9	29·8	29·9	30·0	30·3	30·6	30·9	31·0	30·7	30·3
June	28·0	28·0	28·2	27·9	28·1	28·0	28·4	28·7	29·1	29·4	29·6	29·4	29·0
July	28·4	28·5	28·6	28·6	28·6	28·7	29·0	29·2	29·3	29·5	29·6	29·5	29·3
August	28·2	28·3	28·4	28·3	28·4	28·5	28·5	29·0	29·6	29·8	30·0	29·6	29·2
September ...	29·2	29·3	29·4	29·4	29·5	29·5	29·8	29·8	30·4	30·7	30·7	30·2	29·4
Means	28·7	28·8	28·9	28·9	28·9	29·0	29·2	29·4	29·8	31·0	30·3	30·1	29·6

Table VIII.—Diurnal Inequality of the Falmouth

Hours	Midt.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
						Summer Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·3	−0·1	−0·1	−0·1	0·0	0·0	+0·2	+0·4	+0·8	+1·1	+1·3	+1·1	+0·6
						Winter Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·1	0·0	0·0	−0·1	−0·1	−0·2	−0·3	−0·3	−0·2	+0·2	+0·7	+0·8	+0·6
						Annual Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·2	−0·1	0·0	−0·1	−0·1	−0·1	−0·1	0·0	+0·3	+0·7	+1·0	+0·9	+0·6

Note.—When the sign is + the

calculated from Tables III and V, for each month, 1910.
Year = 66° 29′·0).

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
Winter.											
′	′	′	′	′	′	′	′	′	′	′	′
30·0	29·9	29·9	29·9	29·7	29·7	29·6	29·6	29·7	29·7	29·7	29·8
29·4	29·1	29·2	29·3	29·3	29·2	29·2	29·3	29·4	29·2	29·2	29·1
30·7	30·5	30·2	30·3	30·3	30·2	29·9	29·8	30·0	30·0	30·0	30·1
28·8	28·7	28·8	28·7	28·5	28·3	28·2	28·2	28·1	28·1	28·1	28·2
29·4	29·1	29·0	29·1	29·3	29·2	29·0	28·8	28·5	28·5	28·5	28·8
28·0	28·2	28·1	27·7	27·7	27·5	27·5	27·4	27·5	27·5	27·4	27·5
29·4	29·3	29·2	29·2	29·1	29·0	28·9	28·9	28·9	28·8	28·8	28·9
Summer.											
′	′	′	′	′	′	′	′	′	′	′	′
29·7	29·4	29·2	29·1	29·1	29·0	28·9	28·7	28·7	28·7	28·7	28·6
29·7	29·3	29·5	29·2	29·0	29·0	28·9	28·8	28·9	29·0	29·0	29·1
28·7	28·3	28·0	28·0	27·8	27·6	27·4	27·7	27·6	27·7	27·9	28·0
28·8	28·5	28·2	28·2	28·1	27·9	27·7	27·5	27·3	27·4	27·3	27·3
28·8	28·5	28·4	28·1	28·1	28·1	27·9	27·7	27·6	27·6	27·7	27·8
29·2	29·4	29·6	29·7	29·5	29·4	28·9	29·0	28·9	28·9	29·0	29·1
29·2	28·9	28·8	28·7	28·6	28·5	28·3	28·2	28·2	28·2	28·3	28·3

Inclination, as deduced from Table VII.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midt.
Summer Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·2	−0·1	−0·1	−0·3	−0·4	−0·5	−0·7	−0·7	−0·8	−0·7	−0·7	−0·6
Winter Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·3	+0·1	+0·1	+0·1	0·0	−0·1	−0·2	−0·3	−0·3	−0·3	−0·3	−0·2
Annual Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·2	0·0	0·0	−0·1	−0·2	−0·3	−0·4	−0·5	−0·5	−0·5	−0·5	−0·4

reading is above the mean.

SECTION V.

MAGNETIC OBSERVATIONS MADE AT THE VALENCIA OBSERVATORY CAHIRCIVEEN, 1910, by J. E. CULLUM, *Superintendent.*

Latitude, 51° 56′ N. Longitude, 10° 15′ W.

The bi-weekly observations of the Magnetic Elements have been made at this Observatory during the year, the results of which are given in the following tables.

The observations on January 21st, May 18th, and August 22nd, have been rejected on account of their discordance pointing to Magnetic disturbance, but others a few days later are substituted for them.

	Secular Change.
Declination	−5′·7.
Inclination	−2′·1.
Horizontal Force	+·00015 C.G.S.
Vertical Force	−·00041 ,,
Total Force	−·00031 ,,

The secular change of Inclination and the force components is considerably larger than last year.

Table I.—Declination at Valencia Observatory, Cahirciveen, 1910.
(Dover Unifilar 139.)

Date.	Declination, West.	Monthly Mean.	Remarks.
	° ′	° ′	
January 7 ...	20 46·9		
,, 22 ...	20 47·3	20 47·1	
February 9 ...	20 46·2		
,, 10 ...	20 46·7		
,, 23 ...	20 46·6	20 46·5	
March 8 ...	20 48·2		
,, 21 ...	20 48·8	20 48·5	
April 7 ...	20 46·2		
,, 21 ...	20 46·2	20 46·2	
May 7 ...	20 45·3		
,, 18 ...	20 44·3		
,, 23 ...	20 44·7	20 44·8	
June 6 ...	20 44·5		
,, 20 ...	20 44·3	20 44·4	
July 7 ...	20 42·5		
,, 21 ...	20 43·8	20 43·2	
August 8 ...	20 40·5		
,, 24 ...	20 44·7	20 42·6	Disturbed on 22nd.
September 8 ...	20 43·0		
,, 21 ...	20 46·5	20 44·8	
October 10 ...	20 41·0		
,, 22 ...	20 43·4	20 42·2	
November 8 ...	20 41·7		
,, 22 ...	20 43·6	20 42·6	
December 7 ...	20 42·2		
,, 21 ...	20 41·5	20 41·9	
Mean ...	at 10 a.m., G.M.T.	20 44·6	

Table II.—Inclination at Valencia Observatory, Cahirciveen, 1910.
(Dover Circle 118.)

Date.	Mean of two needles.	Monthly Mean.	Remarks.
	° ′	° ′	
January 7 ...	68 14·0		
,, 22 ...	68 15·7	68 14·9	
February 9 ...	68 13·3		
,, 10 ...	68 13·5		
,, 22 ...	68 13·7	68 13·5	
March 8 ...	68 13·8		
,, 21 ...	68 13·8	68 13·8	
April 7 ...	68 13·4		
,, 21 ...	68 13·9	68 13·6	
May 7 ...	68 13·3		
,, 23 ...	68 12·9	68 13·1	
June 6 ...	68 12·5		
,, 20 ...	68 12·1	68 12·3	
July 7 ...	68 11·7		
,, 21 ...	68 12·1	68 11·9	
August 8 ...	68 12·1		
,, 24 ...	68 12·9	68 12·5	
September 8 ...	68 12·8		
,, 21 ...	68 10·5	68 11·6	
October 10 ...	68 13·8		
,, 22 ...	68 14·8	68 14·3	
November 8 ...	68 12·2		
,, 22 ...	68 12·5	68 12·4	
December 7 ...	68 12·1		
,, 21 ...	68 12·0	68 12·0	
Mean ...	at 1 p.m., G.M.T.	68 13·0	

Table III.—Magnetic Force (C.G.S.) at Valencia Observatory, Cahirciveen, 1910.
(Dover Unifilar 139, and Circle 118.)

Date.	H.F.	Mean.	V.F. H.F. × Tan. Dip.	T.F. H.F. × Sec. Dip.
January 7	0·17900			
,, 22	0·17877	0·17889	0·44835	0·48273
February 9	0·17916			
,, 10	0·17906			
,, 22	0·17894	0·17905	0·44822	0·48260
March 8	0·17899			
,, 21	0·17883	0·17891	0·44798	0·48239
April 7	0·17876			
,, 21	0·17883	0·17880	0·44764	0·48203
May 7	0·17899			
,, 23	0·17921	0·17910	0·44821	0·48266
June 6	0·17893			
,, 20	0·17872	0·17883	0·44722	0·48165
July 7	0·17886			
,, 21	0·17903	0·17895	0·44736	0·48184
August 8	0·17892			
,, 24	0·17895	0·17893	0·44755	0·48221
September 8	0·17881			
,, 21	0·17892	0·17887	0·44705	0·48152
October 10	0·17880			
,, 22	0·17863	0·17872	0·44769	0·48205
November 8	0·17896			
,, 22	0·17891	0·17894	0·44754	0·48198
December 7	0·17904			
,, 21	0·17910	0·17907	0·44770	0·48219
Mean	at Noon, G.M.T.	0·17892	0·44771	0·48215

ESKDALEMUIR OBSERVATORY.

INTRODUCTION TO THE SUMMARIES OF RESULTS OF THE OBSERVATORY FOR THE YEAR 1910, by GEORGE W. WALKER, M.A., *Superintendent.*

Observatory time.—A time signal is received at 10h. daily except on Sundays and Post Office holidays. The time used is Greenwich mean time.

Azimuth of Fixed Mark.—A few observations of the sun were obtained during May and June. The results did not appear to me to be in very good agreement with each other or with the average obtained in 1909. Suspicion arose as to whether the unifilar was capable of giving the required accuracy and whether error was introduced by unequal heating of the instrument and pier during an observation. Further it was unfortunate that observations could only be made for about six or seven weeks when the altitude of the sun was sufficient to obtain an observation through the roof light. Accordingly I suggested that a roof light should be made for observing the Pole Star, which would be available at any time of the year, and that a theodolite of much greater capability than the unifilar magnetometer should be used. These suggestions were approved, and the window was completed in February, 1911. A number of observations have been secured, and, so far, these indicate that there is no very serious error in the values for 1909. A careful examination of possible instrumental errors will be made during the year, and for the present the former value for the azimuth will be retained, viz., azimuth of mark from pier of East hut = 8° 12′·5 W. of S.

The observational work may be dealt with under the following heads :—

I. Magnetic Observations.
II. Meteorological Observations.
III. Seismology.
IV. Other Observational and Experimental Work.

Magnetic Observations.—Absolute observations of Horizontal Force, Declination and Inclination have been made in the East hut during the year.

Numerous experiments were made with a view to ascertaining the best procedure in the deflexion experiment, and as a result of these it has been decided to to use distances 25, 30, 35 cms. and to complete observations at one distance before proceeding to the next. Curve correction is applied for any change in the interval.

Tables of mean monthly values for the year 1910 are given in Section I.

It is gratifying to be able to say that the underground magnet house has been occupied during the whole period covered by this report. The place still requires most careful watching, but we can say that the question of dampness has been reduced to a manageable state.

In accordance with the recommendation of the Gassiot Committee, it was decided to make the Adie magnetographs record geographical components of force. The former H magnet now records the north component, while the former declination

magnet was fitted with a bifilar suspension and now records the west component. Their behaviour in these positions has been very satisfactory. There was initially a certain amount of drifting in the west component magnet, but this has now disappeared.

The behaviour of the Vertical Force magnet has not been satisfactory. It was somewhat unfortunate that the Eschenhagen recorders, which we had on loan from the Admiralty, were requisitioned in February for Capt. Scott's Antarctic expedition. Their removal put an end to any experiments in compensating the magnet for temperature change. A more serious matter however is the fact that a slight mechanical shock, such as occurs in the course of necessary attention to the instruments, generally produces a slight dislocation of the zero. The effect is characteristic of all balances suspended on a knife edge, and the best course appears to be to suspend the magnet by quartz fibres so that it has a true mechanical zero. An experimental model made in the workshop gives promise of success, and it is hoped that a carefully constructed instrument on this principle will be obtained this year.

Experimental models with bifilar quartz suspensions for recording horizontal components are also being made, with a view to making a new set of recorders for magnetic storms.

Meteorological Observations.—During 1910 the control observations of temperature, pressure, weather, etc., were made at 10, 16 and 22 hours. Monthly returns of these were made to the Meteorological Office and have been published in the Meteorological Year Book. On the 1st January, 1911, the observation hours were changed to 9, 15 and 21 hours. With the exception of the photographic thermograph, the recording instruments have been running continuously and tabulation of hourly values carried on. It was found that at certain parts of the thermometer scale, the optical definition was very poor, and accordingly new thermometers were introduced in July. The adjustment and testing of these necessarily interrupted continuous registration for a few weeks.

From the results obtained in 1909 it was clear that the protecting dykes for the rain gauges were too high. It was therefore decided to lower the dyke surrounding the Beckley recorder until it was level with the rim of the gauge. The three gauges were also adjusted so that in each case the rim stands 1 foot above the ground. The dyke round the protected check gauge will be reduced as soon as one year's comparative results have been obtained.

Seismology.—The Milne instrument has continued in action. The Wiechert seismograph was run for some time, but as the results obtained were not satisfactory, its use has been suspended for the present, but its action will probably be re-examined in the near future.

Dr. Arthur Schuster, F.R.S., presented to the observatory a pair of Prince Galitzin's horizontal seismographs. In these the pendulum is made dead beat and electromagnetic registration of the movement is made.

Prince Galitzin visited the observatory in the beginning of July, 1910, in order to superintend the installation of the instruments, and they are now in regular use. They form a most valuable addition to the seismological equipment of the observatory, as they enable one to locate an epicentre without any data obtained from other stations. An interesting feature is the behaviour of both the Milne and Galitzin seismographs when the wind rises to about 30 miles an hour. Both instruments are disturbed, the Milne instrument showing the well-known air tremors. While these are difficult to

distinguish from true small earthquakes, there is no difficulty in distinguishing which is which on the Galitzin records. The record of a small earthquake is totally different from the record of wind disturbance.

A record of all disturbances has been sent as before to Dr. Milne. It may not be out of place to mention here that Dr. Milne visited the observatory when Prince Galitzin was here. He has taken a great interest in our work and has presented a number of works on seismology to our library.

Other Observational and Experimental Work. Atmospheric Electricity. —Ebert's ionisation apparatus has been used whenever occasion could be secured.

It would be of great advantage if the time required for an observation could be considerably reduced and if the apparatus were made more sensitive.

The electrograph has been running continuously since July, 1910, and the sulphur insulation referred to last year has been very satisfactory. The natural time constant was measured frequently at the same time as an observation of air conductivity was made with Ebert's apparatus, and the evidence is fairly clear that the natural time constant increases as the conductivity of the air diminishes, thus indicating that any leakage from the system is mainly due to natural ionisation of the air. The lowest value obtained when every care had been taken to see that no spiders were present, was 40 minutes, while the largest value was no less than 155 minutes. It was thought desirable to increase the efficiency of the water sprayer by doubling the jet. This arrangement has been satisfactory and gives a time constant of 36 seconds. It will thus be seen that the greatest error in potential on account of leakage has been just over 1 per cent. but the usual value is about ½ per cent. Spiders have occasionally given trouble.

The zinc-copper voltmeter referred to last year was run along with the Dolezalek electrometer for some time, and the records were precisely similar. Owing to mechanical imperfection of the quadrants it proved very difficult to get uniformity of scale value above + or − 500 volts. A new set of quadrants and a Dolezalek needle have just been obtained and the instrument is now under test. If it proves successful it will be run along with the electrograph so as to give the very high potentials which are frequently beyond the present range of the Dolezalek electrometer.

In order to obtain the potential gradient in the open, a circular space 15 feet radius was levelled at a considerable distance from the buildings. In the centre of this a pit was dug capable of containing a stone pier with a high potential Wulf electrometer and the observer. When in use a metal lid closes flat over the observer and an aluminium rod rises from the electrometer and passes vertically through a small hole in the lid to a height of 1 metre. Observations are usually made with the fuse burning at a height of 100 cms. and 50 cms. independently. This arrangement eliminates entirely error due to presence of electrometer pier and observer, while the error due to air conductively has been less than 1 per cent as shown by observation of the time constants.

Solar Radiation.—Ångström Pyrheliometer has been used. It appears to be a somewhat rare event here to get suitable conditions between the international hours of 11h and 13h. But as in 1909 I have not been able to take advantage of every opportunity that occurred.

SECTION I.—Table IV.

Mean Monthly Values of Horizontal Magnetic Force (Absolute).

1910. Month.	G.M.T. h. m.	Hor. Force.	Mag. Moment at 0°C.	No. of Obs.
January	12 31	·16834	910·9	4
February	12 9	41	·7	4
March	11 56	32	·7	5
April	11 54	22	·8	4
May.....	11 51	38	·6	5
June	11 42	40	·5	4
July.....	11 30	37	·8	3
August	12 13	35	·6	5
September.....	12 8	48	·6	4
October	11 55	22	·4	4
November	11 45	36	·8	5
December	11 51	44	·1	3
Mean for year	11 57	·16836	910·6	

As the result of special experiments, new values for the P and Q corrections were adopted. This is the main reason for the apparent fall in the value of the magnetic moment since last year.

SECTION I.—TABLE II.

Mean Monthly Values of Declination (Absolute).

1910. Month.	G.M.T. h. m.	Declination W.	No. of Obvs.
		° ′	
January	11 52	18 27·7	4
February	11 47	25·1	4
March.....	11 31	27·3	5
April	11 22	24·1	4
May.....	11 32	24·6	5
June	11 12	21·9	4
July.....	11 6	22·5	4
August	11 44	22·3	5
September.....	11 41	22·9	4
October	11 24	23·3	4
November	11 17	20·9	5
December	11 17	17·6	2
Mean for year	11 29	18° 23′·3	

The absolute azimuth of the fixed mark is still a little uncertain. Preparations have been made for more exact determination by means of a small transit telescope.

SECTION I.—Table III.

Mean Monthly Values of Inclination (Absolute).

1910. Month.	G.M.T. h. m.	Inclination N.	No. of Obvs.
		° ′	
January	15 8	69 39·3	4
February	15 7	38·8	4
March.....	14 37	38·3	5
April	15 5	38·2	4
May.....	15 8	37·8	5
June	14 59	36·5	4
July.....	14 48	36·8	4
August	15 0	37·3	5
September.....	15 6	37·4	4
October	14 53	38·1	4
November	14 33	37·6	5
December	14 52	37·8	3
Mean for year	14 56	69° 37′·8	

SECTION II.—Table I.

Barometric Height from Photographic Recorder, corrected to 32°F. at latitude 45° and mean sea level.

1910. Months.	Mean from Hourly Readings.	Absolute Extremes.							
		Max.	Date.			Min.	Date.		
	inches.	inches.	d.	h.	m.	inches.	d.	h.	m.
January ...	29·690	30·501	6	11	0	28·741	28	15	0
February...	29·502	30·256	9	11	15	28·345	21	2	0
March	30·079	30·652	31	11	0	29·247	10	3	0
April	29·778	30·595	1	0	30	28·861	13	24	0
May	29·903	30·404	24	23	15	29·227	6	8	5
June.....	29·903	30·400	16	8	0	29·347	28	3	25
July	29·859	30·238	13	22	35	29·295	25	12	0
August.....	29·802	30·267	31	24	0	29·292	29	3	0
September	30·251	30·552	17	10	35	29·793	29	5	0
October ...	30·066	30·697	14	9	25	28·884	31	20	55
November	29·568	30·195	19	11	0	28·475	7	7	10
December	29·597	30·379	30	21	45	28·705	16	15	30
Mean and extremes for the year	29·833	30·697	October			28·345	February		

SECTION II.—Table II.

Monthly Mean Results of Temperature at Eskdalemuir Observatory from the Photographic Recorder.

1910. Months.	Dry Bulb. Mean of Hourly Readings.	No. of Days.	Means of Daily Max.	Means of Daily Min.	Means of Daily Max. and Min.	Absolute Extremes. Max.	Date. d	Date. h	Absolute Extremes. Min.	Date. d	Date. d	Wet Bulb. Mean of Hourly Readings.	No. of Days.	Means of Daily Max.	Means of Daily Min.	Means of Daily Max. and Min.	Absolute Extremes. Max.	Date. d	Date. h	Absolute Extremes. Min.	Date. d	Date. h
	F.		F.	F.	F.	F.			F.			F.		F.	F.	F.	F.			F.		
Jan. ...	35·6	21	39·2	30·5	34·8	51·8	2	17	*3·3	26 or 27		35·2	24	38·6	29·6	34·1	49·0	2	16	...	...	
Feb. ...	36·0	23	40·5	30·6	35·5	49·7	5	23	15·8	9	8	35·0	21	39·8	30·2	35·0	48·2	5	22	14·2	9	8
March	39·6	28	46·9	31·2	39·1	56·2	20	16	23·7	29	7	37·3	28	41·9	30·6	36·2	49·1	20	16	23·4	29	6
April ...	40·2	27	47·3	33·6	40·4	55·1	30	16	19·9	1	6	38·2	28	43·0	33·1	38·1	50·2	30	15	18·7	1	6
May ...	†45·7	25	54·5	38·1	46·3	*70·2	22	—	23·0	9	5	44·5	31	50·4	37·6	44·0	62·6	22	15	§23·9	9	5
June ...	†51·9	22	60·3	43·7	52·0	*73·8	10	—	32·1	15	4	50·9	29	55·8	42·9	49·4	65·3	10	Noon	31·1	15	3
July ...	†† ...	...	...	...	...	...	...		...	...		...	...	...	...	...	...	...		...	...	
Aug. ...	54·9	31	61·1	47·9	54·5	70·2	10	13	39·1	25	3	52·2	31	56·5	46·1	51·3	62·0	12 / 14	14 / 15	38·6	25	3
Sept. ...	50·2	30	57·9	42·1	50·0	63·9	5	16	29·2	16	6	47·8	30	53·3	36·5	44·9	57·7	17	13	28·4	16	6
Oct. ...	46·7	29	52·3	39·9	46·3	64·5	1	15	31·5	1	2	44·7	29	49·1	38·7	43·9	58·2	1	15	31·1	1 / 9	3 / 1
Nov. ...	33·9	28	39·0	27·2	33·1	44·5	4	10	17·5	12	6	32·5	27	36·8	25·8	31·3	43·7	13	Noon	16·6	9	4
Dec. ...	40·3	28	43·5	35·8	39·6	51·2	23	19	18·7	28	0	38·7	31	41·9	34·3	38·1	50·5	24	1	14·6	28	5

* Reading supplied from Stevenson Screen. †† Thermometers changed during this month. § Bulb Frozen.

† During May and June the Dry Bulb trace for the upper temperatures was so indistinct that, in May, 6 days, and in June, 7 days, had to be omitted from this cause. The Mean of the Wet Bulb for the corresponding 25 days in May was 43°·0; and for the corresponding 22 days in June 48°·7

SECTION II.—Table III.

Wind Velocity by Dines Pressure Tube, and Bright Sunshine.

1910. Months.	Wind Velocity. Horizontal Movement of the air.					Bright Sunshine.			
	Means of Hourly Readings. Miles per hour.	Highest Gust.				Total Number of Hours recorded.	Mean Percentage of Possible Sunshine	Greatest Daily Record.	Date.
		Miles per hour.	Date.	Hour.					
				h.	m.	h.	%	h.	24, 25,
January	14·6	79	8	18	14	43·7	19	6·2	26
February	15·2	76	17	16	40	49·3	19	6·6	27
March	11·7	63	17	3	25	100·9	28	9·2	29
April	14·3	54	21	5	30	119·5	29	11·0	29
May	13·6	57	30	11	48	180·2	36	14·6	23
June	9·5	45	6	12	35	194·7	38	14·6	17
July	10·2	46	30	13	54	172·6	34	15·8	14
August	10·3	46	19	11	20	107·7	24	10·7	10
September	8·5	50	3	9	5	122·7	33	11·6	3
October	12·5	58	31	21	4	57·8	18	9·0	6
November	7·8	51	1	1	30	88·4	36	7·6	16, 21
December	15·5	59	19	11	4	36·9	17	6·0	27
Means and Extremes for the Year.	12·0	79	Jan. 8	18	14	1274·4	29*	...	...

*This figure applies to the total possible for the year; it is not the arithmetic mean of the monthly readings.

SECTION II.—TABLE IV.

Atmospheric Ionisation and Electrical Conductivity, using Ebert's apparatus.

Date.	Mean Time.	Positive Ions.		Negative Ions.		Air Conductivity in Absolute Electro-magnetic Units.
		Number per cc.	Velocity for 1 volt per cm.	Number per cc.	Velocity for 1 volt per cm.	
1910.	h. m.		cms. per sec.		cms. per sec.	
Feb. 3...	12 28	360	·00	180	1·65	$·33\times10^{-25}$
,, 8...	15 40	240	1·00	0	1·00	·26
Mar. 15...	12 35	750	1·17	570	·17	1·07
,, 22...	12 7	480	·73	210	·24	·44
,, 30...	11 41	300	1·01	0	1·10	·33
,, 31...	11 25	420	·00	150	·00	nil
April 1...	12 4	150	·00	150	·55	·09
May 2...	12 34	150	1·32	0	1·47	·22
,, 10...	11 56	660	1·32	300	1·28	1·38
,, 11...	12 24	0	1·65	30	·88	·03
,, 19...	12 9	0	1·40	480	1·40	·74
June 13...	14 25	360	1·40	90	·92	·65
,, 15...	14 53	510	1·80	180	1·47	1·30
,, 16...	14 10	780	1·17	630	1·98	2·38
,, 17...	14 12	210	1·32	180	1·54	·61
,, 18...	14 0	90	·00	420	·83	·38
,, 20...	14 20	150	1·92	210	·40	·41
,, 21...	14 26	300	1·15	0	1·79	·38
July 4...	14 25	30	·10	0	2·20	·003
,, 8...	14 24	120	2·06	0	2·20	·27
,, 13...	14 20	270	2·20	30	·31	·66
,, 14...	14 25	1080	·82	540	·69	1·38
,, 18...	14 18	840	1·61	420	1·19	2·04
,, 19...	12 4	570	·73	180	1·20	·69
Aug. 1...	14 43	870	1·39	0	1·32	1·32
,, 4...	15 55	60	1·02	0	—	·07
,, 8...	14 30	540	·00	150	·20	·03
,, 16...	11 29	750	1·13	390	·89	1·31
,, 22...	14 50	930	Rain	600	1·06	?
,, 25...	12 1	270	1·23	330	·98	·72
Sept. 5...	12 29	540	·93	90	·00	·55
,, 9...	14 39	270	·96	60	·00	·28
,, 12...	14 44	510	1·10	720	·55	1·05
,, 16...	16 1	60	?	0	?	?
Oct. 5...	14 33	330	1·61	0	1·76	·58
,, 6...	14 32	630	·69	0	·00	·48
Nov. 3...	14 36	630	1·30	120	1·85	1·14
,, 21...	14 53	480	·68	60	1·10	·43
,, 22...	14 49	1050	·88	60	1·54	1·10
,, 29...	15 1	270	1·10	150	·40	·39
Dec. 30...	14 45	600	·94	0	·31	·62

NOTE.—The value adopted for the ionic charge is $1·1\times10^{-20}$ electromagnetic units (Sir J. J. Thomson).

SECTION II.—TABLE V.

Measurement of Solar Radiation by Ångström's Pyrheliometer.

Date.	Mean Time.	Temp. C.	Cosine Zenith Dist.	Radiation in calories per sq. cm. per min.
1910	h. m.	°		
Jan. 25	11 55	3·5	·264	1·015
March 17	12 5	8·5	·544	1·259
,, 21	12 4	10	·568	1·095
May 11	11 30	13	·785	·967 Fine haze
,, 23	11 25	19	·815	1·270
June 7	12 18	20	·842	1·196 Fine haze
July 9	11 20	18	·831	1·222
,, 21	11 30	17	·810	1·294
Aug. 10	7 30	18	·416	1·113
Sept. 19	14 25	13·5	·355	1·179
,, 21	11 50	14·2	·556	1·212
Nov. 29	11 58	6	·230	·996

SECTION III.—TABLE I.

Principal Disturbances recorded on the Milne Twin-boom Seismograph.

Date.	Commencement.	Max. at.	Duration.	Max. Ampt. mms.	Scale Value 1 mm. =	Direction of Displacement.	Remarks.
1910.	h. m.	h. m.	h. m.		"		
Jan. 1	11 15	11 59	3 18	1·2	·39	N.S.	
,, 1	11 12	11 44	3 14	2·9	·39	E.W.	
,, 22	8 55	8 58	1 32	18+?	·36	N.S.	Limit exceeded.
,, 22	8 55	8 58·5	1 36·5	20+?	·39	E.W.	
,, 30	5 3	5 30	0 40	0·9	·37	N.S.	
,, 30	5 4	5 30	0 37	1·0	·40	E.W.	
Feb. 4	?	16 1	?	1·0	·40	E.W.	
,, 4	?	16 10	?	1·2	·36	N.S.	
,, 4	?	16 13	?	0·8	·40	E.W.	
,, 28	21 20	21 43	0 13	1·2	·38	N.S.	
,, 28	21 20	21 41·5	0 16·5	1·0	·35	E.W.	
March 30	17 14	18 53	2 31	1·1	·39	N.S.	
,, 30	17 14	19 0	2 38	1·5	·38	E.W.	
,, 31	18 49	19 32·5	2 35	1·3	·39	N.S.	
,, 31	18 48	19 24	2 40	1·3	·38	E.W.	
April 12	0 33	0 44·5		1·7	·43	N.S.	Long waves start at 0 43·5.
,, 12		0 51·5		1·5	·43	N.S.	
,, 12		1 13		1·2	·43	N.S.	
,, 12		1 20	1 30	1·0	·43	N.S.	
,, 12	0 29	0 44·5		1·1	·38	E.W.	Start at 0 43·5.
,, 12		0 49		1·0	·38	E.W.	
,, 12		1 1·5		1·1	·38	E.W.	
,, 12		1 8·5		1·1	·38	E.W.	
,, 12		1 17		1·6	·38	E.W.	
,, 12		1 19	1 30	1·5	·38	E.W.	
May 22	6 35	7 16·5		0·9	·45	N.S.	
,, 22		7 18·5	2 36	0·8	·45	N.S.	
,, 22	6 35	7 14		1·0	·36	E.W.	
,, 22		7 17·5		1·1	·36	E.W.	
,, 22		7 22		1·2	·36	E.W.	
,, 31	5 10·5	5 45·5	2 54	0·5	·43	N.S.	
,, 31	5 7	5 45·5	2 56	1·0	·36	E.W.	
June 14	19 54	20 2	0 55	?*	·46	N.S.	*Hour break at spot.
,, 14	19 54	20 2·5	0 55	2·8	·34	E.W.	
,, 16	4 19	4 27	0 31	1·1	·46	N.S.	E.W. trace too faint.

TABLE I.—continued.

Date.	Commencement.	Max. at	Duration.	Max. Ampt. mms.	Scale Value. 1 mm. =	Direction of Displacement.	Remarks.
1910.	h. m.	h. m.	h. m.		″		
June 16	6 49	6 53	3 10	1·2	·46	N.S.	E.W trace too faint.
,, 24	13 31	13 39	1 28	2·8	·46	N.S.	
,, 24	13 31	13 37	1 28	8·6	·34	E.W.	
,, 25	19 30	19 44·5	0 57	1·1	·46	N.S.	
,, 25	19 30	19 40·5	0 59	1·5	·34	E.W.	
,, 29	11 9	12 45	2 46	1·1	·39	N.S.	
,, 29	11 10	12 16·5	2 41	2·2	·36	E.W.	
Aug. 31	1 0	1 42·5	2 7	4·0	·43	N.S.	
,, 31	0 58	1 36	2 0	3·0	·34	E.W.	
Sept. 1	14 12	15 20·5	2 26	1·6	·43	N.S.	
,, 1	14 23	15 19·5	2 34	1·7	·34	E.W.	
,, 6	20 10	20 57	2 50	0·7	·43	N.S.	
,, 6	20 16	20 54·5	2 47	2·1	·35	E.W.	
,, 7	7 20	8 24	2 5	0·8	·43	N.S.	
,, 7	7 20	8 20	2 6	1·2	·35	E.W.	
,, 9	1 13	1 53	3 27	1·3	·43	N.S.	
,, 9	1 13	1 53	3 31	1·3	·35	E.W.	
Nov. 6	20 53	21 10	1 5	1·2	·43	N.S.	
,, 6	20 53	21 9	1 3	1·3	·36	E.W.	
,, 9	6 21	8 8·5	3 18	4·0	·43	N.S.	Times of duration and start approx.
,, 9	6 21	8 10	3 19	4·0	·36	E.W.	
,, 14	7 59	8 37	1 41	1·5	·43	N.S.	
,, 14	7 59	8 26	1 45	1·6	·36	E.W.	
,, 15	14 41	15 28	2 33	1·2	·43	N.S.	
,, 15	14 44	15 25	2 25	2·3	·36	E.W.	
,, 26	5 0	6 20	5 9	1·3	·43	N.S.	
,, 26	5 0	6 10	5 12	1·3	·35	E.W.	
,, 29	1 53	3 22	3 19	1·2	·43	N.S.	
,, 29	1 53	3 21·5	3 19	2·4	·36	E.W.	
Dec. 10	*	10 59	?	1·8	·43	N.S.	*Start between 9 44 and 9 59 (times of changing sheet).
,, 10	*	10 54·5	?	1·6	·36	E.W.	
,, 13	11 48	12 22·5	?	12·2	·43	N.S.	
,, 13	11 47	12 17·5		6·3	·36	E.W.	
,, 13		12 23·5	?	7·6	·36	E.W.	
,, 16	15 0	15 55·5	3 0	10·2	·43	N.S.	
,, 16	15 0	15 50·5	3 0	3·7	·36	E.W.	
,, 16	19 17	20 1·5	1 28	1·2	·43	N.S.	
,, 16	19 17	20 1	1 38	0·7	·36	E.W.	