

Kodaikanal Observatory

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Bulletin No. CXXXVI

PART I

SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF 1951

This summary is primarily based on observations made at Kodaikanal Observatory during the second half of 1951, supplemented by the data from the photographs obtained from the co-operating observatories of Mount Wilson and Meudon for those days on which Kodaikanal had imperfect, incomplete or no observations. Thanks are due to the Directors of Mt. Wilson and Meudon Observatories for their co-operation.

1. Calcium prominences at the limb.

During the period under review photographs of calcium prominences at the limb were obtained at Kodaikanal on 130 days which were counted as 123½ days after weighting the photographs according to their quality. The Mt. Wilson and the Meudon Observatories supplied prominence spectroheliograms for 35 and 31 days respectively. In all complete observations were available for 173 days which were counted as 166½ effective days.

The mean daily areas of prominences in square minutes of arc and the mean daily numbers derived from the combined records are given below :—

		Combined data	
		Mean daily areas (Square minutes)	Mean daily numbers
North	: : : : : : : : : : .	1.61	3.31
South	: : : : : : : : : .	1.51	3.17
TOTAL		3.12	6.48

These figures represent an increase of 31.6% in area and a decrease of 4.3% in number compared with the activity in the previous half-year.

For comparison with bulletins issued prior 1923, the means based on Kodaikanal photographs alone are given in the following table, 130 days of observation being counted as 124½ effective days.

		Kodaikanal data	
		Mean daily areas (square minutes)	Mean daily numbers
North	: : : : : : : : : .	1.58	3.60
South	: : : : : : : : : .	1.58	3.28
TOTAL		3.16	6.88

The distribution in latitude of areas and numbers of prominences is represented in diagram I, in which the full line gives the mean daily areas and the broken line the mean daily numbers for each zone of 5° latitude. The ordinates represent tenths of a square minute of arc for the full line and numbers for the broken line. The curves show peaks of activity of prominence areas centered in the latitude zone 25°-30° in both the hemispheres. The distribution is the same as in the previous half-year except that the zone of maximum activity in the southern hemisphere has advanced by about 5° polewards.

The monthly, quarterly, and half-yearly mean areas, numbers, heights and extents of prominences are shown in the following table :—

DIAGRAM I

Mean Areas and Mean Numbers of Calcium Prominences

JULY 1 TO DECEMBER 31 1951

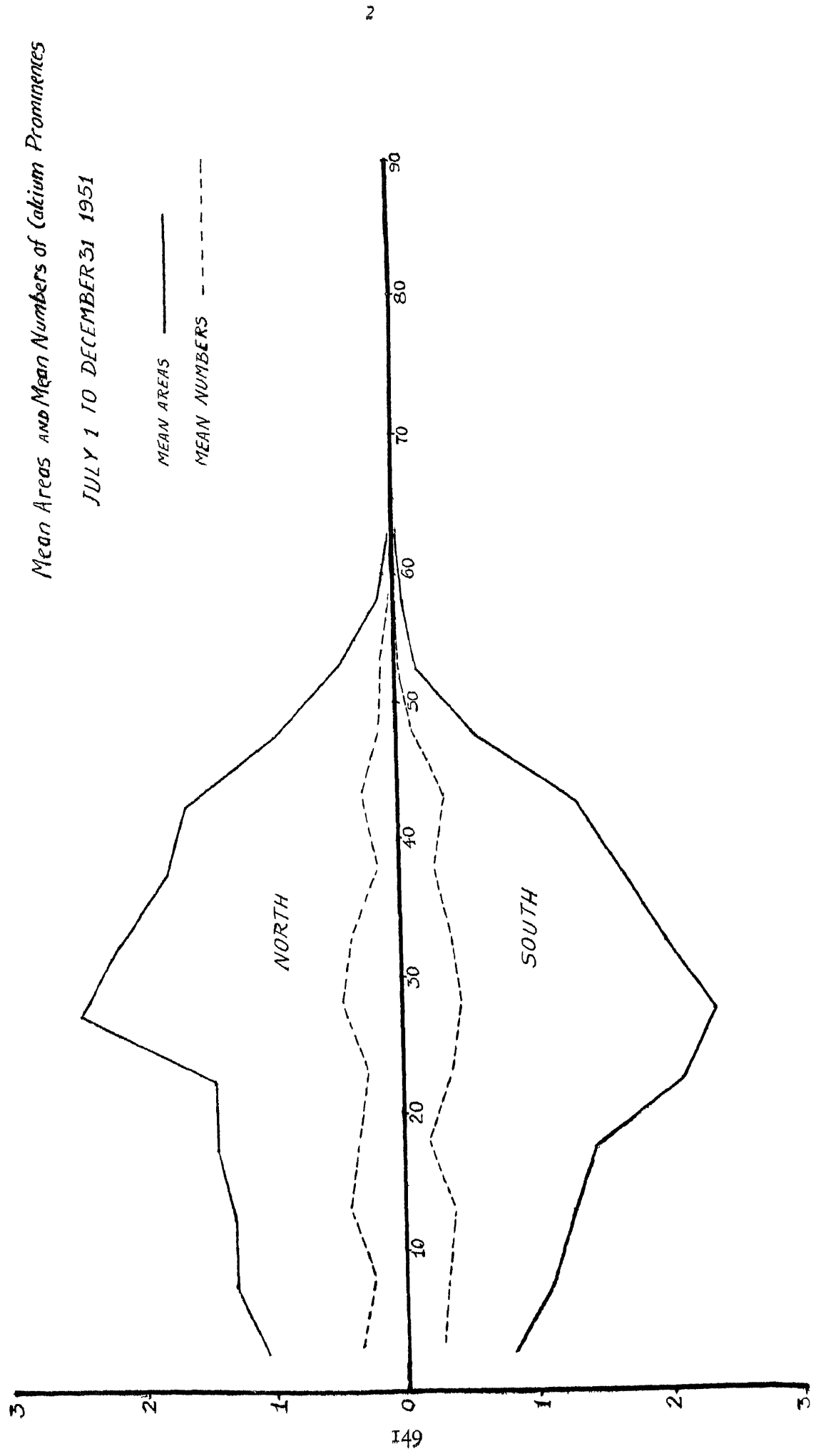


TABLE I
Abstract for the second half of 1951

Months	Number of days (effective)	Areas (square minutes)	Numbers	Daily means		Mean height	Mean extent
				Area. (sq. minutes)	Number		
July	27½	97 20	136	3.57	4.99	51.54	4.81
August	30½	95 90	185	3.15	6.07	52.00	4.99
September	29½	113 50	193	3.88	6.60	49.04	5.09
October	29½	104 85	218	3.59	7.45	48.68	4.05
November	22½	51.95	151	2.33	6.79	38.71	2.93
December	28½	59.55	198	2.11	7.00	43.43	3.53
3rd quarter	87	306 60	514	3.53	5.91	50.76	4.98
4th quarter	79½	216 35	567	2.71	7.11	44.19	3.57
2nd half year	166½	522 95	1081	3.14	6.48	47.31	4.24

The east-west distribution of prominence areas and numbers is given in the table below :—

1951 July-December	East	West	Percentage east
Total area (square minutes)	265.5	257.4	50.8
Total numbers	521	560	48.2

The areas show an eastern excess while the numbers show an eastern deficit.

2. Observations with the Prominence Spectroscope :

(a) Metallic Prominences :

Nine metallic prominences were observed during the period. The details of the prominences are given below :—

TABLE II

Date. 1951	Time I.S.T.	Base	Latitude		Limb	Height in -alpha	Lines in which observed
			North	South			
July 9	08 35	1	.	10	E	20.8	D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ .
Aug. 18	08 43	4	7		W	28.0	—do—
„ 19	08 25	1	29		W	48.8	—do—
„ 25	08 40	4	14		E	..	—do—
„ 30	08 35 09 05	3	5		E	74.4	D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ ; 6678.1 Ht. in D ₂ =12".8 in b ₂ =12".0
Nov. 9	08 40	1	25		W	50.4	D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ .
Dec. 27	09 10	1	10.5		W	32.0	—do—
„ 28	09 25	2	6		W	..	—do— and 6678.1
„ 29	09 35	2	27		W	..	D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ .

The distribution of metallic prominences was as follows :—

	1°—10°	11°—20°	21°—30°	Mean latitude	Extreme latitude
North	3	2	3	15.4	5° & 29°
South	1	—	—	10	10°

Three prominences were on the East limb and 6 on the West limb.

(b) Displacements of the hydrogen line in the chromosphere and prominences

Particulars of Doppler shifts observed in the chromosphere and prominences with the prominence spectroscope are given in the following table —

TABLE III

Date 1951	Time I S T.	Mean Latitude		Limb	Displacement		Remarks
		North °	South °		Red Å	Violet Å	
July 9	h m 08 35		10	E		0.5 (at base)	Metallic, not seen on Ca plates taken at 0803 and 0808 hrs. Prominence seen as dark marking inside limb.
Aug 30	08 35 } 09 05 }	5		E	2 1	2 2.5	At base } At top } An eruption at the limb.
Oct 7	08 40	47		W	0.75		At top
" 8	08 10	51.5		W		0.5	At base.
" 8	08 15	33		W	1.5	0.5	1.5 Å at base and 0.5 Å in the middle
" 8	08 25	22½		E	0.5	3	
" 24	08 15	31		E	2 1.5		At top } At base } Eruptive.
Nov 9	08 30		10	E	1		At top
Dec 27	09 20	15		W	0.5	1.0	At base metallic.
" 28	09 25	6		W	1.5	1.0	At base metallic.
" 29	09 35	27		W	1.5	0.5	1.5 Å at base and 0.5 Å at top; metallic

(c) Reversals and displacements on the sun's disc

During the half-year, the H-alpha line was seen in emission on 48 occasions and D₃ line in absorption on 48 occasions. The H-alpha line was also seen displaced over dark markings in 4 cases (3 towards red and 1 towards violet). These distributions were as follows.—

	North	South	East	West	Total
Bright reversal of H α (c) line on the disc	31	17	29	19	48
Dark reversal of D ₃ line on the disc	31	17	29	19	48
Displacement of H α line on the disc	2	2	2	2	4

Heights of prominences in K, H-alpha, D₃ and Hβ lines

57 Prominences were observed in K, H-alpha, D₃ and Hβ lines. The mean height in the different lines was found to be as follows.—

Mean height in K line :	. . .	64.4"
H-alpha	. . .	57.2"
D ₃	. . .	53.0"
Hβ	. . .	51.6"

3. Observations with the Hale Spectroheliograph.

Details of Doppler displacements in H-alpha line observed over prominences and absorption markings with the spectroheliograph are given below :—

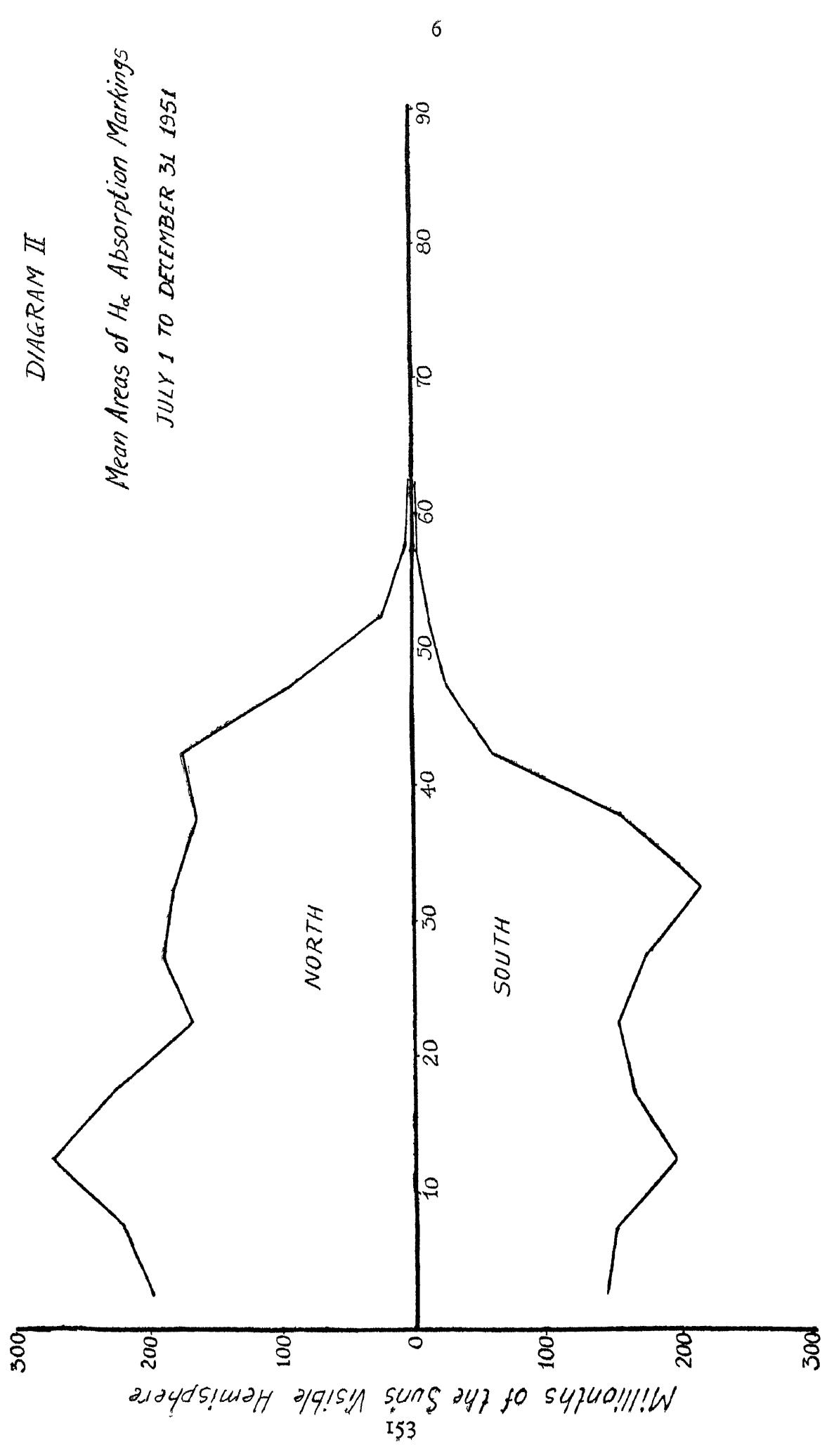
	N	S	E.	W	Total	Displacements		
						To Red	To violet	Both ways
Displacements in prominences .	23	11	17	17	34	5	6	23
Displacements in absorption markings	11	5	13	3	16	1	4	11

Solar Flares.

Table IV gives a list of solar flares observed at Kodaikanal during the period under review :

TABLE IV

Date 1951	Time in I.S.T.			Mean latitude	Mean longitude from central meridian	Intensity	Maximum width of H α observed at the time of eruption	Remarks
	Beg. H. M	Max. H. M	End. H. M.					
July 30 .	09 30	09 40	09 45	6 S	32 W	1	1.0	
Aug. 11 .	..	07 41	08 00	15 S	35 E	1	..	
Aug 30 .	08 30	08 45	09 05	7 N	90 E	2	1.8	
Sep 23 .	08 12	08 25	09 10	15 N	5 W	1	2.0	
Nov 30 .	08 30	..	09 00	7 N	80 W	1	1.2	
Dec 27 .	09 00	..	09 30	3.5 N	53 E	1	1.7	



531

Millionths of the Sun's Visible Hemisphere

500 200 100 0 100 200 300

10

20

30

40

50

60

70

80

90

6

NORTH

SOUTH

Sudden disappearances of prominences and dark markings

Details of K-prominences and H-alpha absorption markings whose sudden disappearances between two consecutive observations were observed are given below:—

Nature of phenomenon	Date and time of phenomenon when last seen	Coordinates of the phenomenon when last seen		Remarks
		I S T	Mean latitude		Mean longitude
K Prominences :				
1	August 3	08 38	20°S	E limb Disappeared next day
2	October 8	08 10	22 5°N	„ Disappeared at 0930 hrs on the same day.
3	October 24	09 10	31°N	„ Eruptive prominence-disappeared on the same day.
Hα absorption markings :				
1	August 6	09 30	16°S	Central meridian Disappeared next day
2	August 18	14 15	5°N	35°E Do.

Prominences projected on the disc as absorption markings

Photographs of the sun's disc in H-alpha light were taken at Kodaikanal on 143 days. The Mount Wilson and Meudon Observatories supplied photographs for 33 and 22 days respectively. Altogether photographs for 178 days were obtained for the half-year which were counted as 175½ effective days after giving due weightage to the quality of the photographs.

The mean daily areas (in millionths of the sun's visible hemisphere and uncorrected for foreshortening) and the mean daily numbers of H-alpha dark markings as derived from all the records are given below:—

<i>Combined data</i>		
	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North	1916 0	16.10
South	1492.6	12.99
Total	3408.6	29.09

Both the areas and numbers show considerable increase over the previous half year,—40.5% for areas and 23.8% for numbers.

The figures based on Kodaikanal observations alone are also given below for comparison with similar data :

<i>Kodaikanal data</i>		
	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North	1841 8	16.04
South	1373 2	13.09
Total	3215.0	29.13

The distribution of mean daily areas in 5° ranges of latitude is shown in diagram II. There is a marked increase in activity in the latitude zones 10°-15° in the northern hemisphere and 30°-35° in the southern hemisphere as compared with the previous half year.

The east-west distribution of dark markings shows an eastern defect both in areas and numbers as will be seen from the following table:—

	East	West	Percentage east
Areas	4522 5	5025.5	47.4
Numbers	2475	2622	48.5

PART II

SUMMARY OF MAGNETIC OBSERVATIONS FOR THE SECOND HALF OF 1951

Introduction

The results of magnetic observations made at the Kodaikanal Observatory during the first half of 1950 have been published in Bulletin No. CXXXII of this observatory. The history of the magnetic observatory and a brief description of the instruments and of the system of observations are given in that bulletin. The data for the second half of 1951 are given here. For July, August and September 1951, the data have been derived from the records of the Watson instruments whereas those for October, November and December 1951 have been derived from the records of the La Cour instruments installed early in 1951. A full description of the La Cour instruments is available in "Magnetisme Terrestre" by V. Laursen, published by the Danish Meteorological Institute.

Determination of Absolute Values

- (1) Absolute observations of horizontal force are made once every week (on Wednesdays) with Kew Magnetometer No. 3.
- (2) Absolute observations of declination are made once every week (on Thursdays) with the same instrument.
- (3) Observations of inclination are made with the Earth Inductor on all days excepting Saturdays, Sundays and other holidays.

Variometer records

(a) Watson instruments :

The charts of the three Watson variometers are changed every alternate day, the records for two consecutive days being obtained on the same paper in the usual way. The optical arrangements for the magnetographs are such that with the H and V instruments an increase in the ordinate corresponds to an increase in the values of the elements; for the D magnetograph, however, an increase in the ordinate corresponds to a decrease in the westerly declination.

(b) La Cour instruments :

The chart for the La Cour instruments is changed daily with all the three elements recorded on the same paper. The optical arrangements for the H, V and D magnetographs are such that with H and V instruments, an increase of the ordinates corresponds to an increase in the value of the elements; for the D magnetograph, however, an increase in the ordinate corresponds to a decrease in the westerly declination.

Determination of scale coefficients

(a) Watson Variometers

The scale coefficient of the H.F. and V.F. magnetographs are obtained fortnightly from deflection observations performed on the instruments, with the deflector magnet at distances of 100 cms and 120 cms. in the case of the H.F. instruments and at distances of 122.6 cms. and 148.6 cms. in the case of the V.F. instrument. The value of the scale coefficient adopted for any month is the average of the mean observed value for that month and those of the preceding and succeeding months.

The scale coefficient of the declination magnetograph has been determined once for all and is 1.03' per mm. The scale coefficients of the H.F. and V.F. magnetographs in V per cm. for months July to September are given below :—

Instrument	July	August	September
H.F. Magnetograph	48.2	48.1	47.8
V.F. Magnetograph	172.0	75.0	75.0

(b) La Cour Variometers :

The scale coefficients of the H.F. and V.F. magnetographs are obtained once every month by placing a Helmholtz coil over the instruments and noting the deflections when known currents are passed through the coil. The coil constant as given by the manufacturers is 7.49 gammas per milliamperere.

The scale coefficient of the declination magnetograph has been determined once for all and is 9.0° cm. The scale coefficients of the H. F. and V. F. magnetographs in γ /cm. for the months October to December 1951 are given below :—

Instrument	October	November	December
H. F. Magnetograph	80 0	80 0	80 0
V. F. Magnetograph	110 0	110 0	110 0

Temperature coefficients of the Magnetographs

(a) Watson magnetographs:

The adopted value for the H. F. magnetograph is 32γ /degree F. The temperature coefficient of the V. F. magnetograph was found to be negligible.

(b) La Cour magnetographs :

Temperature compensation has been incorporated in the design of these instruments.

Base line values

(a) Base line values for H. F. are derived by converting the mean ordinates corresponding to absolute observation with Kew Magnetometer No. 3 in terms of gammas and subtracting these converted ordinates from the mean observed horizontal force. The values derived from the Watson instruments are further reduced to a uniform temperature of 65° F to make the series comparable from month to month and year to year.

The adopted base line value for any week is the mean of five values (all reduced to 65° F in the case of the Watson instrument) including the week in question as the third among the five. In the case of the Watson instrument the base line values for the individual days of the week were determined after applying necessary temperature correction. The accuracy of the base line value derived from the above procedure is estimated to be $\pm 10\%$.

(b) The base line values for the V. F. magnetographs are derived by expressing the mean ordinates of the V. F. magnetograms at the time of inclination observations in terms of gammas and subtracting these from the values of vertical force obtained by multiplying the values of H. F. at that time by the tangent of the inclination. The adopted values in the case of Watson magnetograms were derived from the observed values by careful consideration of the individual values. This procedure was adopted as some difficulty was experienced in keeping the Watson V. F. variometer in satisfactory working condition, and many changes of adjustments were necessary thus rendering the conversion of hourly values at times excessively laborious. In general, the Watson V. F. variometer was lacking in stability, the position of the magnet being apt to be disturbed very easily.

(c) The base line values for 'D' were derived by the usual procedure of converting the ordinates corresponding to absolute observations with Kew Magnetometer No. 3 into angles and adding this to the corresponding observed absolute declination values.

Basic hourly values and associated means

Basic results: Tables 1 to 18 contain hourly values of magnetic declination, horizontal intensity and vertical intensity. The hourly values from the magnetograms represent the average values, during one hour, centered at the full hours of U.T.

The columns headed 'maximum' and 'minimum' give the momentary extreme values of the element for each day.

Computed means :

At the bottom of each table are given the average hourly values obtained (i) for all days, (ii) for five international quiet days and (iii) for five international disturbed days.

Principal magnetic storms :

Magnetically a day is considered to be (a) a quiet day, (b) a day of slight disturbance, (c) a day of moderate disturbance, (d) a day of moderate storm, and (e) a day of great storm, depending on the ranges and the oscillations in the magnetograms. At Kodaikanal a day is provisionally being taken as (i) one of great storm if the range is above 400γ , (ii) of moderate storm if the range is between 251γ and 400γ and (iii) of moderate disturbance, if the range lies between 150γ and 250γ . The range is, however, not the only criterion used in assigning the character of a storm.

Table 19 gives a list of principal magnetic storms recorded during the second half of 1951.

KODAIKANAL :
August, 1953.

A. K. DAS,
Director,
Kodaikanal Observatory.

TABLE I

Hourly Values of Declination (Westerly) 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

July

2° plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	,	,	,	,	,	,	,	,	,	,	,	,	,	,	,
1	33.6	33.4	33.8	34.1	34.6	35.7	36.0	35.6	35.4	35.1	35.5	34.6	34.6	34.7	35.0
††2	34.3	34.0	33.1	33.4	33.5	33.1	33.3	34.0	34.1	34.2	34.5	34.9	35.0	35.3	35.5
††3	34.4	34.5	33.6	33.2	32.6	32.9	34.1	35.0	36.0	36.1	36.0	35.7	35.5	35.3	35.0
4	34.3	33.2	33.2	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	34.5	35.0	36.0	37.5	37.4	37.2	36.6	36.2	36.0	35.6	35.1	35.5
6	34.2	33.2	33.1	33.3	33.9	35.1	36.0	37.0	37.5	36.6	35.2	35.0	34.6	34.4	35.5
7	33.3	32.6	33.0	33.4	35.5	37.4	38.4	39.0	37.6	37.5	37.0	36.1	35.6	35.5	36.0
8	34.6	33.6	33.0	33.5	35.0	35.6	37.0	37.1	37.0	36.8	36.4	36.0	35.6	35.5	36.0
9	34.2	33.5	33.6	33.6	35.5	36.1	37.4	38.0	37.6	37.2	36.6	36.0	35.4	35.6	36.0
†10	34.1	33.2	33.0	33.0	35.1	36.5	38.0	38.6	38.1	37.2	36.0	35.2	35.0	35.4	35.5
11	34.5	33.5	33.5	33.8	34.8	37.0	37.3	37.2	37.0	37.0	36.7	36.2	35.7	35.3	35.5
†12	34.7	33.6	33.4	34.0	35.0	35.4	35.8	36.0	35.6	34.6	34.2	36.0	35.7	35.5	35.6
†13	34.5	33.6	33.1	33.6	34.3	34.4	35.6	36.5	37.2	35.1	36.4	35.0	35.4	35.5	35.6
†14	34.3	34.0	33.8	34.0	34.8	35.4	36.0	36.3	37.4	37.1	36.2	35.6	35.5	35.6	36.1
15	*	*	*	34.0	35.1	37.0	38.2	38.1	38.0	37.6	36.6	36.2	36.1	35.7	36.2
16	34.7	34.3	34.2 [†]	34.4	36.2	37.0	37.4	37.5	37.3	37.1	36.7	35.4	35.2	35.5	35.5
17	34.4	34.2	34.1	34.0	34.6	35.3	37.0	37.7	38.0	37.6	36.2	35.6	35.7	36.0	36.0
18	34.2	33.7	33.6	33.8	35.8	37.0	37.5	37.9	37.6	37.4	37.2	36.6	35.1	35.0	35.4
19	34.6	33.7	33.5	33.9	34.6	35.7	35.0	36.0	35.2	34.6	34.4	34.5	34.6	35.0	35.4
20	34.4	34.2	33.6	35.0	35.4	37.3	38.3	38.2	37.9	37.5	36.9	36.5	36.3	36.7	36.8
21	36.2	35.8	35.1	34.3	35.0	36.1	36.6	37.0	37.2	37.2	37.1	36.9	36.7	36.6	36.8
22	*	35.5	34.8	*	36.7	37.1	37.9	37.9	37.9	37.9	37.8	38.0	37.7	37.6	37.9
23	36.8	36.4	35.8	34.3	35.1	36.0	36.7	37.1	37.5	36.9	36.7	36.1	35.6	35.7	36.2
†24	35.1	34.5	34.1	33.6	35.0	35.4	35.9	36.0	36.1	36.0	35.7	35.2	35.1	35.6	35.9
25	34.6	34.4	34.6	35.0	36.3	37.3	37.5	37.4	37.1	36.2	36.0	36.0	36.0	36.0	36.3
††26	35.2	34.6	34.6	35.0	35.3	36.2	36.3	36.4	36.3	36.3	36.1	35.6	35.2	35.1	35.3
27	34.6	34.4	34.0	33.5	34.3	35.6	36.5	37.2	36.5	36.1	35.6	35.5	35.4	35.4	35.3
††28	35.0	34.2	34.0	*	*	*	*	*	*	*	*	*	*	*	*
29	*	*	*	34.2	35.0	35.3	36.2	37.0	37.3	37.2	36.6	36.0	35.6	35.7	35.8
30	34.6	33.2	32.8	33.1	34.4	35.4	36.3	37.2	36.7	36.0	35.6	34.9	35.5	35.5	35.3
††31	34.7	32.5	32.0	32.2	31.9	33.9	33.9	34.4	35.3	35.3	34.9	34.9	34.6	34.2	33.9
Mean	34.6	33.9	33.7	33.8	34.7	35.7	36.4	36.8	36.7	36.3	35.9	35.6	35.3	35.4	35.6
Mean-†	34.7	34.4	33.5	33.5	33.9	35.5	36.4	36.8	36.5	35.7	35.1	35.3	35.3	35.5	35.6
Mean ††	34.7	33.9	33.3	33.5	33.3	34.0	34.3	34.9	35.4	35.5	35.4	35.3	35.1	35.0	34.9

† International quiet days
 †† International disturbed days.
 * Loss of record (Day omitted for means)

II

TABLE I
Hourly Values of Declination (Westerly) 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

July

2° plus tabular quantities.

Hours G. M. T									Mean.	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag	Time.	Mag		
										H	M	H	M		
35 0	35 0	35 0	34 5	35 0	34 6	34 1	34 2	34 5	34 7	06 58	36 5	01 20	33 1	3 4	I
36 0	35 6	36 0	35 6	35 0	35 1	35 0	34 7	34 2	34 6	15 42	36 5	02 54	32 0	4 5	††2
35 3	35 5	35 2	35 0	34 6	34 7	35 0	34 7	34 5	34 8	09 20	36 5	02 50	32 5	4 0	††3
35 *	35 *	35 *	35 *	34 *	34 *	35 *	34 *	34 *	34 *	*	*	*	*	*	4
35 6	35 7	35 9	35 4	35 1	35 4	35 6	35 4	35 2	*	*	*	*	*	*	5
35 7	35 5	35 4	35 4	35 5	35 0	35 0	35 0	35 0	35 1	08 00	37 7	02 36	32 8	4 9	6
35 6	35 5	35 5	35 5	35 3	35 1	35 0	35 0	35 0	35 6	07 04	39 2	22 50	32 5	7 7	7
36 1	36 1	36 0	35 6	35 5	35 5	35 3	35 2	35 0	35 5	07 50	37 6	02 40	32 8	4 8	8
35 6	35 5	35 4	35 2	34 7	34 9	35 0	35 0	34 6	35 5	07 40	38 2	02 40	32 9	5 3	9
35 5	35 5	35 5	35 5	35 2	35 1	35 0	35 0	35 0	35 5	07 36	38 9	02 36	32 9	6 0	†10
35 5	35 4	35 4	35 4	35 3	35 2	35 1	35 1	35 0	35 5	06 46	38 1	01 54	33 0	5 1	11
36 0	35 7	35 3	35 2	35 0	35 0	35 0	35 0	34 8	35 1	01 14	36 6	02 50	32 5	4 1	†12
35 5	35 3	35 2	35 2	35 1	35 1	35 1	35 1	35 0	35 0	06 56	36 8	03 00	32 8	4 0	†13
35 7	35 6	35 5	35 4	35 3	35 2	35 1	35 0	*	*	*	*	*	*	*	†14
36 6	36 4	36 6	35 4	35 5	35 5	35 5	35 5	35 3	*	*	*	*	*	*	15
35 5	35 6	35 8	35 6	35 5	35 5	35 3	35 2	35 0	35 6	07 26	37 9	02 42	33 8	4 1	16
35 8	35 7	35 6	35 5	35 4	35 3	35 1	35 5	34 6	35 6	07 40	38 2	03 20	33 5	4 7	17
35 5	35 6	36 0	35 6	35 5	35 4	35 3	35 2	35 0	35 6	07 30	38 7	03 12	32 0	6 4	18
35 3	35 1	35 0	35 0	35 0	35 0	34 9	34 8	34 6	34 8	07 04	36 4	02 10	33 5	2 9	19
36 8	36 8	36 8	36 8	36 6	36 6	36 5	36 4	36 7	36 4	06 50	38 9	02 10	33 4	5 5	20
36 8	36 8	36 8	36 8	36 8	36 8	36 8	36 8	36 8	36 5	08 16	37 4	03 10	33 7	3 7	21
37 9	37 8	37 7	37 6	36 9	37 1	36 9	36 8	36 8	*	*	*	*	*	*	22
36 2	36 1	36 1	36 0	35 8	35 8	35 4	35 5	35 3	36 0	08 54	37 8	02 32	33 6	4 2	23
35 9	36 0	36 0	35 7	35 6	35 5	35 3	35 2	35 1	35 4	07 50	36 8	02 56	33 4	3 4	†24
36 2	36 1	36 0	36 0	35 7	35 6	35 5	35 5	35 4	36 0	07 02	37 9	22 42	34 1	3 8	25
35 1	35 2	35 3	35 3	35 3	35 3	35 3	35 3	35 2	35 4	07 26	38 2	08 18	33 9	4 3	††26
35 3	35 3	35 3	35 3	35 3	35 3	35 2	35 1	35 0	35 3	07 30	37 8	02 42	33 0	4 8	27
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††28
35 8	36 0	36 0	36 0	35 7	35 6	35 5	35 4	35 1	*	*	*	*	*	*	29
35 2	35 2	35 2	35 2	35 4	35 2	35 1	35 1	34 9	35 1	07 42	37 5	02 42	32 3	5 2	30
33 9	33 5	34 2	34 8	34 8	34 5	34 7	34 6	34 1	33 8	07 36	35 9	02 46	31 7	4 2	††31
35 6	35 6	35 6	35 5	35 4	35 3	35 2	35 2	35 0	35 4					4 6	Mean.
35 7	35 6	35 5	35 3	35 2	35 1	35 1	35 1	35 0							Mean.†
35 1	35 1	35 2	35 2	34 9	34 9	35 0	34 8	34 5							Mean.††

† International quiet days-
 †† International disturbed days.
 * Loss of record. (Day omitted for means)

TABLE 2

Hourly Values of Declination (Westerly), 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

August

2° plus Tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
††1	34.7	33.7	33.1	34.0	35.5	37.0	38.6	39.0	38.2	37.6	36.7	36.2	35.8	35.4	35.3
2	34.0	33.5	32.0	*	32.7	34.9	36.8	37.9	38.7	38.8	38.5	36.3	35.3	35.0	35.1
†3	*	*	*	*	32.7	34.9	36.8	37.9	38.7	38.8	38.5	36.3	35.3	35.0	35.1
4	33.7	33.5	32.8	32.6	34.3	34.8	36.3	36.8	36.7	36.5	36.2	35.7	35.3	35.2	35.3
5	33.9	32.8	31.7	31.8	31.8	33.1	35.4	37.1	39.1	37.7	36.9	35.2	34.4	34.2	34.8
6	34.3	34.1	33.1	32.1	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	33.8	35.3	36.8	37.8	38.0	37.8	37.2	36.3	35.4	35.3	35.5	35.3
†8	34.6	33.8	33.3	33.5	34.6	35.8	36.9	37.1	37.2	37.0	36.8	35.6	34.8	34.9	35.2
9	34.6	33.4	33.6	34.0	34.6	35.2	36.3	36.4	36.3	35.8	35.5	35.2	34.6	35.0	35.2
†10	34.7	33.6	33.2	33.6	34.8	36.2	37.3	37.9	37.9	37.5	36.7	35.5	35.2	35.0	35.2
11	34.7	34.3	33.6	34.3	35.3	36.3	37.3	37.5	37.2	36.1	35.4	34.3	34.4	35.0	35.5
12	34.6	33.4	33.2	34.3	36.4	37.2	37.3	37.3	36.6	35.7	35.4	34.8	35.0	35.2	35.3
††13	34.3	33.2	33.5	34.5	35.5	36.0	36.2	36.5	35.8	35.3	34.6	34.2	34.1	34.0	34.3
14	34.3	33.7	34.0	35.0	36.0	36.2	36.3	36.5	36.5	36.1	35.7	35.3	35.0	35.2	35.5
15	34.6	33.4	33.1	33.9	35.0	36.0	36.3	36.3	36.0	35.1	34.3	34.1	34.5	34.8	35.2
16	34.2	33.8	34.0	35.0	35.3	36.8	37.3	37.1	37.0	35.3	34.0	34.2	34.0	34.5	35.2
17	34.2	33.8	33.7	34.8	35.0	36.1	37.3	37.4	37.2	36.1	35.0	34.6	35.0	35.6	36.0
†18	33.7	33.6	33.2	34.0	35.0	36.5	36.8	37.0	36.8	36.0	35.6	35.2	35.2	35.6	36.0
19	34.0	33.2	32.7	33.6	35.0	36.3	37.3	37.3	37.0	36.9	35.3	34.7	34.2	34.9	35.8
††20	33.2	33.0	33.3	*	*	*	38.3	38.3	38.0	37.2	36.1	35.0	35.2	35.3	35.3
††21	34.8	33.2	33.1	34.0	35.0	36.3	36.8	37.0	37.0	36.5	34.8	34.2	34.3	34.0	34.0
22	35.1	34.5	34.2	34.3	35.5	36.2	37.3	37.3	37.0	36.0	34.7	34.5	33.7	34.3	34.8
23	34.2	32.7	32.8	33.1	34.5	35.8	36.9	37.0	36.8	36.2	35.6	35.2	35.2	35.2	35.5
24	34.8	33.8	33.5	*	*	37.0	38.0	37.6	37.8	37.2	36.1	35.2	35.0	35.0	35.0
††25	35.0	34.6	34.2	34.5	36.0	36.5	37.0	36.9	36.5	36.3	36.0	35.2	34.6	35.3	35.4
26	34.2	32.8	32.8	33.2	34.0	35.0	36.5	37.3	36.8	35.2	34.2	34.0	34.0	34.3	34.8
27	34.1	33.2	33.2	33.2	34.8	36.3	37.7	37.4	37.3	37.0	36.0	35.2	35.1	35.4	35.5
28	34.1	33.6	34.0	34.9	36.0	36.8	37.4	36.7	36.0	35.6	35.5	34.7	34.5	34.5	34.8
29	34.0	33.6	34.0	35.0	35.8	36.9	37.3	37.3	37.0	36.6	35.4	34.6	34.6	35.0	35.0
†30	34.5	33.2	33.2	34.0	34.9	36.3	37.3	37.0	36.6	36.5	35.7	35.2	34.6	35.3	36.0
31	34.4	33.3	33.5	34.0	35.1	36.2	37.5	37.1	36.7	36.5	35.8	35.1	34.7	35.1	35.7
Mean	34.3	33.5	33.3	33.9	35.0	36.1	37.1	37.2	37.0	36.3	35.5	34.9	34.7	34.9	35.3
Mean†	34.4	33.5	33.2	33.8	34.8	36.2	37.1	37.3	37.1	36.8	36.2	35.4	35.2	35.2	35.6
Mean††	34.7	33.7	33.5	34.2	35.5	36.5	37.7	37.3	36.9	36.4	35.5	34.9	34.7	34.7	34.9

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means.)

TABLE 2

Hourly Values of Declination (Westerly), 1951

(Averages for sixty minutes centered at the full hours of Greenwich mean time.)

August

2° plus tabular quantities

Hours G.M.T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag	Time	Mag		
'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	
36 0	35 8	35 5	35 5	35 3	35 2	35 1	35 0	34 8	35 8	07 20	39 1	02 24	32 1	7 0	††1
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	2
35 3	35 2	35 7	34 9	34 8	34 7	34 6	34 4	33 9	*	*	*	*	*	*	†3
35 3	35 3	35 2	35 2	34 8	34 5	34 3	34 2	33 9	34 9	07 00	37 2	07 52	31 3	5 9	4
35 0	35 1	35 3	35 1	34 9	34 7	34 5	34 3	34 3	34 7	07 36	39 5	07 52	31 3	8 2	5
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	6
36 8	36 3	35 8	35 6	35 5	35 4	35 2	35 1	35 0	*	*	*	*	*	*	7
35 3	35 4	35 5	35 4	35 2	35 1	35 0	35 0	35 0	35 3	07 00	37 3	02 20	32 6	4 7	†8
35 3	35 4	35 5	35 5	35 4	35 3	35 3	35 2	35 1	35 2	06 56	36 5	01 52	32 5	4 0	9
35 3	35 5	35 5	35 5	35 5	35 3	35 2	35 0	35 0	35 5	07 16	38 4	02 12	32 4	6 0	†10
36 0	36 0	36 0	36 0	35 7	35 6	35 5	35 2	35 5	35 5	06 52	37 7	02 00	32 4	5 3	11
35 4	35 8	35 8	35 4	35 3	35 2	35 2	35 0	35 0	35 4	06 12	37 4	01 52	32 5	4 9	12
34 5	34 7	35 0	35 3	35 5	35 5	35 2	35 2	35 0	34 9	07 04	36 7	01 52	32 6	4 1	††13
35 5	35 5	35 5	35 5	35 3	35 3	35 5	35 3	35 1	35 4	07 04	36 7	01 04	32 8	3 9	14
35 3	35 5	35 5	35 5	35 5	34 8	34 5	34 5	34 5	34 9	05 20	36 6	02 36	32 6	4 0	15
35 4	35 5	35 5	35 5	35 3	35 1	35 0	35 0	35 0	35 2	06 16	37 5	01 32	33 1	4 4	16
35 6	35 2	35 4	35 5	35 3	35 2	35 4	35 0	34 6	35 4	06 48	37 6	10 56	31 5	6 1	17
36 0	35 8	35 5	35 5	35 5	35 3	35 2	35 0	35 0	35 4	07 48	37 3	01 36	32 4	4 9	†18
35 8	35 6	35 9	36 0	35 8	35 5	35 2	34 6	34 1	35 3	06 36	37 5	02 04	32 4	5 1	19
35 5	35 8	36 0	36 0	36 0	35 8	35 5	35 5	35 2	*	*	*	*	*	*	††20
34 8	35 0	35 1	35 3	35 3	35 5	35 5	35 5	35 5	35 1	06 36	37 1	02 20	31 9	5 2	††21
35 3	35 3	35 3	35 3	35 3	35 3	35 3	35 0	35 0	35 3	07 04	37 4	01 52	31 9	5 5	22
35 5	35 2	35 5	35 5	35 5	35 5	35 5	35 3	35 0	35 2	08 12	37 2	02 20	31 9	5 3	23
35 2	35 5	35 5	35 5	35 5	35 5	35 5	35 3	35 1	*	*	*	*	*	*	24
35 5	35 5	35 5	35 2	35 5	35 3	35 1	35 0	35 0	35 5	07 04	37 1	01 56	33 5	3 6	††25
35 0	35 2	35 3	35 4	35 4	35 3	35 2	35 0	34 5	35 8	07 12	37 4	02 16	31 5	5 9	26
35 5	35 5	35 5	35 5	35 5	35 3	35 1	35 0	34 6	35 4	06 36	37 8	02 24	32 5	5 3	27
35 2	35 5	35 5	35 5	35 5	35 3	35 0	35 0	34 6	35 3	06 20	37 5	01 52	32 9	4 6	28
35 0	35 0	35 0	35 3	35 3	35 3	35 1	35 0	35 0	35 3	06 40	37 4	02 12	32 0	5 4	29
35 8	35 5	35 5	35 3	35 2	34 6	34 5	34 5	34 5	35 2	06 08	37 4	01 52	32 3	5 1	†30
35 8	35 7	35 6	35 2	35 1	34 8	34 7	34 6	34 5	35 3	07 32	37 9	01 00	32 6	5 3	31
35 3	35 5	35 5	35 4	35 4	35 2	35 1	34 9	34 8	35 2					5 2	Mean
35 6	35 5	35 5	35 4	35 3	35 1	35 0	34 9	34 9							Mean†
35 2	35 3	35 3	35 3	35 4	35 4	35 5	35 2	35 1							Mean††

† International quiet days

†† International disturbed days.

* Loss of record (Day omitted for means).

TABLE 3

Hourly values of Declination (Westerly), 1951

(Average for Sixty minutes centred at the full hours of Greenwich mean time)

September

2° plus tabular quantities

Date	Hours G.M.T														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
†1	34 0	33 8	33 6	34 5	35 7	36 0	36 8	36 1	37 0	36 8	36 4	36 2	35 2	35 3	35 4
†2	33 7	32 7	32 6	34 8	37 3	38 5	39 5	39 2	38 6	37 2	35 2	34 6	35 0	35 3	35 3
†3	34 2	32 6	33 1	34 0	35 3	36 4	37 9	37 5	37 0	36 2	35 1	34 6	34 5	34 7	35 4
†4	34 2	33 2	33 1	34 0	35 3	37 1	37 9	38 0	37 6	36 5	35 4	35 3	35 3	35 4	35 5
5	34 0	33 2	33 5	34 7	36 0	38 0	39 0	39 5	38 1	37 1	36 2	35 1	34 6	35 0	35 2
6	33 7	32 2	32 1	33 0	35 0	37 0	37 8	37 9	37 5	36 5	35 1	34 6	35 0	35 2	35 3
7	34 5	32 6	33 1	34 5	35 6	36 9	37 3	37 6	37 2	36 6	35 4	34 3	35 2	35 2	35 3
8	34 6	33 2	33 1	33 6	34 7	36 3	37 3	38 0	37 2	35 6	35 1	34 6	34 4	34 8	35 0
9	34 6	33 2	32 6	33 0	34 0	35 2	37 0	38 0	37 0	35 6	34 2	34 1	34 0	34 2	34 4
10	34 3	33 7	33 2	34 0	35 3	36 4	38 0	37 6	37 0	35 5	34 6	33 6	33 5	33 5	33 6
11	34 0	32 7	32 6	33 0	34 8	35 4	36 2	36 3	36 0	35 6	35 1	34 6	34 5	34 6	35 0
12	34 2	32 5	32 7	33 0	34 0	35 5	36 8	37 0	36 6	36 0	35 0	34 8	34 6	34 4	34 2
13	34 1	33 0	32 7	33 3	34 4	35 3	35 5	36 3	36 5	36 2	35 1	35 0	35 0	34 8	34 4
14	34 1	32 7	32 6	32 5	33 0	33 6	35 0	35 2	35 2	35 1	34 6	34 5	34 4	34 5	34 6
15	34 0	33 6	33 5	33 7	34 0	34 5	34 9	35 0	34 6	34 4	34 1	33 6	33 6	34 0	34 3
††16	34 0	33 2	33 1	34 0	35 5	36 4	37 3	37 1	36 6	36 1	34 6	33 6	33 4	33 1	33 8
17	33 8	32 7	33 1	34 0	35 3	36 4	37 0	36 2	35 6	34 6	33 7	33 2	33 8	34 3	34 8
18	33 7	32 6	33 0	34 1	35 4	36 0	36 4	36 1	35 6	35 2	34 3	34 2	34 3	34 6	34 9
19	33 7	33 3	33 2	34 0	35 5	36 4	36 9	36 9	36 5	35 6	35 3	35 2	35 2	35 4	35 3
††20	33 0	32 6	32 5	33 0	34 0	35 0	36 0	36 3	36 0	34 1	32 7	33 5	34 1	33 6	34 3
††21	34 3	33 6	33 5	34 5	35 0	35 6	36 1	36 4	35 7	35 2	34 2	33 6	33 9	34 0	34 3
††22	33 7	32 7	33 0	33 4	34 6	35 6	36 0	36 4	36 3	36 1	36 0	34 4	34 1	34 1	34 6
23	34 3	33 6	33 1	33 6	34 8	35 3	36 5	36 8	36 9	35 6	35 4	35 1	34 7	34 4	34 1
24	34 8	34 2	34 2	34 4	34 9	35 5	36 0	36 3	36 1	35 6	34 4	34 2	34 4	34 5	34 6
††25	34 6	34 0	33 7	34 1	34 6	35 1	35 1	35 2	35 1	34 7	34 3	33 6	33 4	33 3	33 1
26	31 2	31 6	32 2	34 0	34 5	35 0	35 9	36 4	36 1	35 4	35 1	35 0	35 0	35 0	34 8
27	33 8	33 6	33 4	34 1	35 2	35 4	35 9	36 4	36 1	35 2	35 0	34 8	34 9	35 0	35 0
28	33 2	32 6	33 4	34 5	35 1	35 2	35 5	36 0	35 7	35 1	34 6	34 5	34 4	34 6	34 8
29	34 3	34 0	34 3	34 6	34 9	35 0	35 1	35 3	35 2	35 1	34 6	34 4	34 4	34 3	34 3
†30	34 0	33 6	34 0	34 5	34 9	35 9	36 4	36 3	36 1	34 6	34 1	33 6	34 0	34 4	34 9
31															
Mean	33 9	33 1	33 1	33 9	35 0	35 9	36 6	36 8	36 4	35 6	34 8	34 4	34 4	34 5	34 7
Mean †	34 0	33 2	33 3	34 4	35 7	36 8	37 7	37 4	37 3	36 3	35 2	34 9	34 8	35 0	35 3
Mean ††	33 9	33 1	33 2	33 8	34 7	35 3	36 1	36 3	35 9	35 2	34 4	33 7	33 8	33 6	34 0

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 3

Hourly values of Declination (Westerly), 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

September

2° plus tabular quantities

									Mean	Maximum		Minimum			Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.	Range	
										H. M.		H. M.			
35 3	35 2	35 1	35 3	35 4	35 2	35 2	34 7	34 5	35 3	06 26	37 2	02 26	32 0	5 2	†1
35 3	35 3	35 3	35 3	35 2	35 1	35 0	35 0	35 0	35 7	06 30	40 2	01 36	31 9	8 3	†2
35 4	35 4	35 4	35 3	35 2	35 1	35 0	35 0	34 8	35 2	06 52	38 2	01 40	31 9	6 3	†3
35 5	35 4	35 3	35 1	35 0	34 7	34 6	34 5	34 4	35 3	07 36	38 1	01 56	32 6	5 5	†4
35 3	35 3	35 2	35 1	35 0	34 8	34 7	34 6	34 2	35 6	06 56	39 9	01 32	32 8	7 1	5
35 3	35 2	35 1	35 0	35 0	35 0	35 0	34 8	34 6	35 1	06 52	38 2	02 04	31 6	6 6	6
35 3	35 3	35 0	35 0	35 0	35 0	35 0	35 0	35 0	35 3	06 40	37 9	01 56	31 9	6 0	7
35 3	35 2	35 1	35 0	35 0	35 0	35 0	35 0	35 0	35 1	07 40	38 3	01 52	32 6	5 7	8
34 8	35 0	35 3	35 2	35 1	35 0	35 0	34 8	34 2	34 8	07 12	38 4	02 26	32 3	6 1	9
34 5	34 8	34 9	35 0	35 0	35 0	35 0	34 8	34 6	34 9	06 44	38 2	02 00	32 8	5 4	10
34 7	35 0	35 3	35 2	35 0	35 0	35 0	35 0	35 0	34 8	06 32	36 5	02 24	31 9	4 6	11
34 4	35 2	35 1	35 0	35 0	35 0	35 0	35 0	34 8	34 8	07 24	37 1	02 08	32 5	4 6	12
34 2	34 4	35 2	35 0	34 6	34 6	34 7	34 9	34 6	34 7	08 36	36 8	02 04	32 6	4 2	13
34 8	35 0	34 9	34 7	34 6	34 9	34 6	34 5	34 4	34 4	07 36	35 3	01 36	32 1	3 2	14
34 6	35 0	35 1	35 1	34 8	34 6	34 5	34 4	34 1	34 3	07 32	35 2	01 40	32 9	2 3	15
34 0	34 9	35 0	35 3	35 2	35 0	35 0	34 6	34 9	34 8	06 40	37 5	01 40	32 5	5 0	††16
34 9	35 0	35 0	35 0	35 0	34 8	34 6	34 5	34 4	34 7	06 32	37 3	01 04	32 0	5 3	17
34 7	34 6	34 9	34 8	34 7	34 4	34 2	34 1	34 0	34 6	05 52	36 8	01 56	32 2	4 6	18
35 1	35 3	35 4	35 5	34 5	34 0	33 6	33 9	33 6	35 0	06 42	37 3	01 52	32 3	5 0	19
34 5	34 5	35 0	35 1	35 0	34 6	34 5	34 3	34 3	34 3	07 32	36 6	10 36	31 9	4 7	††20
34 4	34 8	35 0	35 0	35 0	34 8	34 6	34 6	34 5	34 7	07 12	36 8	01 40	33 1	3 7	††21
34 7	34 9	35 0	35 0	34 9	34 8	34 6	34 6	34 5	34 7	07 20	36 8	01 44	31 9	4 9	††22
34 3	34 4	34 5	34 5	34 6	34 8	35 0	35 0	35 0	34 8	07 24	37 2	01 40	32 9	4 3	23
34 7	35 0	34 7	35 0	34 7	34 9	35 0	34 9	34 7	34 9	07 08	36 7	02 04	33 5	3 2	24
33 4	34 4	33 7	34 0	33 8	33 5	33 3	32 7	32 2	33 9	06 56	35 4	23 54	32 1	3 3	††25
34 6	34 5	34 4	34 4	34 3	34 1	34 0	34 0	34 4	34 4	07 04	36 8	00 24	28 9	7 9	26
34 7	34 9	35 0	34 8	34 7	34 6	34 5	34 3	34 0	34 8	07 24	37 1	01 08	32 7	4 4	27
35 0	35 0	34 9	34 8	34 6	34 5	34 5	34 5	34 4	34 6	07 44	36 3	01 26	32 0	4 3	28
34 5	34 8	34 9	35 0	34 7	34 6	34 5	34 5	34 4	34 7	07 44	35 7	01 34	33 5	2 2	29
35 0	35 0	35 0	34 9	34 8	34 6	34 7	34 8	34 9	34 8	06 42	36 8	01 00	33 0	3 8	†30
															31
34 8	35 0	35 0	35 0	34 8	34 7	34 7	34 6	34 5	34 8					4 9	Mean
35 3	35 3	35 2	35 2	35 1	34 9	34 9	34 8	34 7							Mean†
34 2	34 7	34 7	34 9	34 8	34 5	34 4	34 2	34 1							Mean ††

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means)

TABLE 4
 HOURLY VALUES OF DECLINATION (WESTERLY), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 2° plus tabular quantities

October

Date	Hours G. M. T														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	34.5	33.5	33.5	34.9	35.3	35.6	36.4	36.0	35.3	34.9	34.9	34.8	34.5	34.5	34.0
2	33.6	33.5	33.8	33.8	35.6	35.5	35.9	36.4	35.8	35.1	34.9	34.8	34.8	34.7	34.7
3	35.0	33.7	35.6	35.1	36.6	36.3	35.9	35.9	34.8	35.3	34.9	34.9	35.0	35.0	35.1
†4	34.5	34.0	35.0	35.4	36.0	36.3	36.2	35.8	35.6	35.0	34.8	35.0	35.2	35.0	35.0
5	34.5	34.3	34.7	34.9	35.7	36.1	36.2	35.5	35.3	34.9	34.4	34.5	34.7	34.8	34.9
†6	34.0	34.8	35.2	35.6	35.6	36.2	36.2	36.1	35.5	34.5	34.3	34.3	34.4	34.5	34.8
7	34.6	34.7	34.8	34.9	35.9	36.5	36.7	37.5	37.5	36.7	35.7	35.1	34.9	34.7	34.8
††8	35.3	35.1	34.7	34.4	34.8	35.0	34.8	34.6	34.7	34.8	34.4	34.5	34.2	34.5	34.5
9	35.0	34.7	34.8	35.1	35.8	35.9	36.9	36.5	35.9	34.9	34.9	34.9	34.8	34.4	34.8
10	35.0	34.8	34.6	34.6	35.1	35.3	35.8	35.7	35.3	34.7	34.6	34.0	34.3	34.6	34.6
11	34.6	34.5	34.7	34.8	35.3	35.5	35.4	35.1	34.5	34.1	34.1	33.9	34.0	34.4	34.5
12	34.8	35.0	35.2	35.5	36.1	36.4	36.1	35.5	34.6	34.3	34.4	34.7	34.8	35.0	35.3
13	34.4	35.2	35.3	35.3	35.7	35.8	35.5	35.1	34.7	34.3	34.0	34.0	34.7	34.8	34.7
14	35.1	34.8	34.7	34.7	35.4	35.9	35.8	35.7	35.0	34.6	34.5	34.7	34.8	34.8	34.7
15	34.6	34.2	34.0	34.0	35.1	35.8	36.2	35.9	35.7	35.0	34.1	34.0	34.7	34.6	34.6
16	35.1	35.1	35.0	35.1	35.7	36.1	35.4	35.3	35.0	34.6	34.0	4.4	34.2	34.0	34.3
††17	34.8	34.5	34.5	34.6	34.7	35.0	35.4	35.1	34.5	34.3	33.8	33.4	34.0	34.3	34.2
††18	34.4	34.4	34.6	34.7	35.2	35.3	35.2	34.6	34.0	33.7	33.8	34.3	34.4	34.3	34.4
††19	34.7	34.4	34.1	34.3	34.6	34.8	34.6	34.5	34.4	34.0	34.3	34.3	34.1	34.4	34.6
20	34.8	34.5	34.3	34.5	34.8	35.5	35.5	35.0	34.6	34.4	33.7	33.9	34.4	34.5	34.6
21	34.9	34.9	34.6	34.4	34.5	35.1	35.0	34.9	34.5	33.9	33.8	33.8	34.2	34.4	34.4
22	34.9	34.7	34.6	34.8	34.7	35.3	35.1	34.8	34.7	34.7	34.5	34.4	34.2	34.0	34.0
23	34.9	34.8	34.6	34.9	34.9	35.2	35.2	34.7	34.1	33.5	33.5	33.6	33.5	33.6	33.6
†24	35.3	35.4	35.5	34.9	34.8	35.2	35.1	38.9	35.0	35.0	34.9	34.8	34.8	34.8	34.8
†25	34.5	34.4	35.5	35.5	35.7	35.8	35.6	34.9	34.9	34.7	34.5	34.6	34.9	34.7	34.7
26	35.6	35.8	36.1	35.9	35.6	35.5	35.5	35.3	35.1	34.9	34.8	34.7	34.8	34.8	35.0
27	35.2	35.0	34.8	35.4	35.8	36.2	36.1	35.4	35.5	35.4	35.4	35.3	35.4	35.1	35.0
††28	35.4	35.4	35.6	35.5	35.2	35.1	35.6	35.7	35.3	35.1	35.0	35.0	35.6	35.2	35.3
29	34.5	34.9	35.3	35.3	35.1	35.6	36.3	35.5	33.8	33.6	33.8	33.9	34.3	34.0	34.0
30	34.9	34.9	34.9	34.7	35.4	35.5	34.7	33.7	33.2	32.9	32.2	33.3	34.0	33.7	34.0
†31	34.4	34.5	34.5	34.4	34.6	34.9	34.6	34.3	34.5	34.8	34.9	34.9	34.8	34.5	34.5
Sum															
Mean	34.8	34.7	34.8	34.9	35.3	35.6	35.6	35.5	34.9	34.6	34.4	34.4	34.6	34.6	34.6
Mean†	34.5	34.6	35.1	35.2	35.3	35.7	35.5	36.0	35.1	34.8	34.7	34.7	34.8	34.7	34.8
Mean††	35.0	34.9	34.7	34.7	34.9	35.0	34.1	34.9	34.6	34.3	34.3	34.3	34.5	34.5	34.6

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means)

TABLE 4
 HOURLY VALUES OF DECLINATION (WESTERLY), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)

October

2° plus tabular quantities

Hours G. M. T.									Mean.	Maximum		Minimum		Range	
15	16	17	18	19	20	21	22	23		Time.	Mag	Time	Mag		
										H. M.		H. M.			
34.6	34.5	34.6	34.6	34.5	34.5	34.5	34.3	34.2	34.7	06 14	36.8	01 14	33.3	3.5	I
34.9	34.7	34.8	34.9	35.4	35.5	35.4	35.4	35.4	34.9	06 42	36.6	01 38	33.4	3.2	2
35.1	35.1	35.1	35.1	35.2	35.1	35.1	34.9	34.5	35.2	06 14	36.8	01 38	33.6	3.2	3
35.0	35.0	35.0	35.0	35.0	35.1	35.1	35.0	34.0	35.1	06 10	37.4	01 54	33.9	3.5	†4
34.9	35.0	35.0	35.0	34.9	34.9	35.0	34.9	34.6	34.9	06 18	37.2	02 02	34.3	2.9	5
34.8	34.8	34.8	34.8	34.7	34.8	34.9	35.0	34.9	34.9	05 54	36.7	02 34	33.8	2.9	†6
34.5	33.8	34.9	34.8	34.7	34.7	35.2	35.3	35.4	35.3	07 02	37.6	16 34	33.7	3.9	7
34.5	34.8	34.9	35.0	34.9	34.9	34.9	35.2	35.3	34.7	00 08	35.8	09 54	34.0	1.8	††8
35.2	35.3	35.1	35.0	35.0	35.1	35.5	35.3	35.2	35.3	06 12	37.1	02 38	34.3	2.8	9
34.8	34.7	34.8	34.8	34.8	35.0	34.7	34.7	34.8	34.8	06 42	36.2	11 18	33.8	2.4	10
34.6	34.5	34.4	34.5	34.6	34.7	34.8	34.9	35.0	34.6	06 10	35.7	12 02	33.7	2.0	11
35.1	35.1	35.0	35.0	34.9	35.1	35.2	35.4	35.4	35.2	05 39	36.6	09 30	34.1	2.5	12
34.8	34.9	34.9	34.8	34.9	35.0	35.0	35.1	35.3	34.9	05 18	35.9	11 22	33.7	2.2	†13
34.5	34.6	34.2	34.1	34.4	34.3	34.5	34.8	34.9	34.8	05 34	36.2	18 02	34.0	2.2	14
34.7	34.8	34.8	34.6	34.8	34.9	35.0	35.1	35.2	34.8	06 30	36.4	03 14	33.9	2.5	15
34.4	34.4	34.4	34.4	34.6	34.8	35.0	34.8	34.8	34.8	05 30	36.3	10 42	33.9	2.4	16
34.3	34.4	34.5	34.6	34.8	34.7	34.5	34.5	34.4	34.5	06 38	35.8	11 28	33.0	2.8	††17
34.4	34.6	34.6	34.3	34.4	34.5	34.7	34.8	34.9	34.5	05 38	36.3	09 38	33.5	2.8	††18
34.6	34.5	34.3	34.3	34.3	34.3	34.5	34.7	34.8	35.1	04 34	35.3	03 38	33.9	1.4	††19
34.7	34.8	34.8	34.7	34.8	34.9	34.8	34.8	34.9	34.7	05 42	35.7	10 42	33.6	2.1	20
34.4	34.3	34.4	34.4	34.4	34.8	34.8	35.0	34.9	34.5	05 38	35.3	10 18	33.5	1.8	21
33.9	34.3	34.4	34.5	34.5	34.7	34.6	34.8	34.7	34.6	05 58	35.4	16 02	33.5	1.6	22
33.7	33.6	33.7	33.6	33.8	33.7	33.8	33.9	33.9	34.1	06 18	35.4	12 42	33.3	2.1	23
34.8	34.8	34.8	34.8	34.8	34.8	34.9	35.0	35.2	35.1	06 42	39.2	07 50	34.5	4.7	†24
34.8	34.8	34.8	34.9	34.9	35.0	35.1	35.3	35.4	35.0	05 54	35.9	10 42	34.4	1.5	†25
34.9	35.0	35.0	35.0	34.9	34.8	34.2	34.1	34.2	35.1	02 32	36.2	23 36	34.0	2.2	26
35.0	35.0	35.0	34.8	34.8	34.9	35.0	35.3	35.3	35.3	05 58	36.4	09 30	34.2	2.2	27
34.3	34.3	34.0	32.3	33.0	33.3	33.9	34.0	34.1	34.7	06 54	55.8	18 38	32.1	3.7	††28
34.2	34.3	34.4	34.2	34.4	34.4	34.5	34.7	34.8	34.5	05 54	36.6	09 38	32.3	4.3	29
34.0	34.0	33.8	33.8	34.0	34.2	34.2	34.3	34.4	34.2	05 54	36.0	09 10	32.8	3.2	30
34.5	34.5	34.5	34.4	34.4	34.7	34.7	34.8	34.9	34.6	05 38	35.1	07 38	34.2	0.9	†31
34.6	34.6	34.6	34.5	34.6	34.7	34.8	34.8	34.8	34.8					2.6	Mean
34.8	34.8	34.8	34.8	34.8	34.9	34.9	35.0	34.9							Mean†
34.4	34.5	34.5	34.1	34.3	34.4	34.5	34.7	34.8							Mean††

† International quiet days.
 †† International disturbed days.
 * Loss of record (d m itted for means).

TABLE 5
 HOURLY VALUES OF DECLINATION (Westerly), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)

November	2° plus tabular quantities														
	Date	Hours, G. M. T.													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
†1	35 2	35 3	35 3	35 4	35 5	35 7	35 5	35 0	34 8	34 8	35 0	35 1	34 9	34 6	34 6
2	35 2	35 0	34 5	34 5	35 0	34 5	33 9	33 9	34 1	34 0	34 2	34 5	34 5	34 5	34 5
††3	35 3	35 2	34 9	34 8	35 0	35 1	35 4	35 2	34 9	34 6	34 8	35 1	35 0	33 8	34 1
4	35 5	35 7	35 5	35 1	35 0	35 1	34 0	33 6	34 3	34 8	35 1	34 9	34 6	34 6	34 6
5	35 6	35 6	35 6	35 4	34 9	35 0	35 1	34 6	34 4	34 7	35 2	34 8	34 9	34 9	34 7
6	34 9	34 9	34 8	35 2	35 5	35 8	35 5	34 9	35 0	35 1	34 8	34 7	34 5	34 5	34 6
7	35 0	34 7	34 3	35 2	35 4	35 9	36 5	37 2	36 0	35 1	35 0	35 2	34 8	34 8	34 8
8	35 7	35 9	35 5	35 4	35 6	35 8	35 8	35 2	34 9	34 7	34 9	35 1	35 2	35 1	35 0
9	35 6	35 9	35 9	35 5	35 4	36 0	36 2	35 2	34 8	34 6	34 7	34 8	34 8	35 0	34 9
†10	34 9	35 3	35 6	35 4	35 6	35 7	35 7	35 5	35 1	35 1	35 2	35 1	34 9	34 9	34 8
11	35 4	35 7	35 8	35 9	35 8	36 1	36 0	35 6	35 5	35 1	35 0	35 1	34 9	34 7	34 7
12	35 7	35 9	35 6	35 7	35 6	35 4	35 1	34 4	34 5	34 5	34 6	34 4	34 3	34 3	34 4
††13	35 9	36 1	35 9	35 9	36 0	35 7	35 6	34 9	34 2	34 3	34 9	35 1	35 1	34 8	34 6
††14	36 1	36 3	36 0	35 9	35 6	35 4	35 6	35 0	34 9	34 9	34 9	35 1	34 8	34 7	34 7
††15	35 4	35 6	35 5	35 3	35 5	35 9	35 2	34 9	34 4	34 0	34 1	34 0	34 7	35 1	35 0
16	35 9	36 2	35 9	36 1	36 5	36 9	36 6	36 3	35 7	35 4	35 2	35 1	35 1	35 2	35 3
17	36 1	36 5	36 5	36 7	36 6	36 2	35 9	35 5	35 4	35 3	35 4	35 1	35 1	35 1	35 2
†18	35 9	36 1	35 7	35 1	34 7	34 9	34 7	34 8	35 0	35 1	35 6	35 5	35 3	35 2	35 1
†19	35 6	36 6	37 0	36 4	36 3	36 1	35 8	35 7	35 3	35 1	35 3	35 1	35 1	35 1	35 2
20	35 9	36 0	35 7	35 1	34 7	34 9	34 7	34 8	35 0	35 1	35 6	35 5	35 3	35 2	35 1
21	35 6	36 6	37 0	36 7	36 4	36 1	35 8	35 7	35 3	35 1	35 3	35 1	35 1	35 1	35 2
22	35 9	36 0	36 2	36 3	35 9	36 1	36 3	35 9	35 8	35 7	35 6	35 2	35 3	35 3	35 3
23	35 7	35 9	36 0	36 2	36 7	36 5	36 2	35 7	35 2	35 3	35 0	35 2	35 4	35 3	35 1
24	35 8	35 8	35 9	35 7	35 6	35 3	35 1	34 8	35 0	35 1	35 1	35 2	35 3	35 1	35 1
25	35 8	35 7	35 8	35 8	35 9	36 0	35 7	35 4	35 1	35 1	35 7	35 5	35 4	35 2	35 1
26	35 6	35 9	36 3	36 1	35 8	35 7	35 5	35 2	34 5	34 4	34 4	34 7	34 9	34 7	34 8
†27	35 4	35 7	35 9	36 0	36 0	35 9	36 0	35 8	34 4	34 8	34 5	34 9	35 0	34 9	34 8
28	35 3	35 7	35 8	35 9	36 2	36 5	36 5	36 3	35 8	35 4	34 9	34 9	35 1	35 2	35 3
††29	36 0	36 5	36 4	35 8	35 8	35 9	35 6	35 4	35 3	34 8	35 0	35 3	35 3	34 9	34 9
30	35 9	36 3	36 2	35 9	35 7	35 4	35 1	35 4	35 2	34 0	33 5	34 7	35 1	34 9	34 7
Mean	35 6	35 8	35 7	35 7	35 7	35 7	35 6	35 3	34 9	34 8	34 4	35 0	34 9	34 8	34 8
Mean†	35 4	34 8	35 9	35 7	35 6	35 6	35 5	35 4	34 9	35 0	35 1	35 1	35 0	34 7	34 9
Mean††	35 7	35 9	35 7	35 5	35 6	35 6	35 5	35 1	34 7	34 5	34 7	34 9	35 0	34 7	34 7

† International quiet days
 †† International disturbed days.
 * Loss of record (days omitted for means).

TABLE 5
 HOURLY VALUES OF DECLINATION (Westerly), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 November 2° plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag	Time	Mag		
										H.M.		H M			
34.8	34.7	34.7	34.6	34.5	34.4	34.7	35.0	35.2	34.9	06 18	35.8	09 18	33.6	2.2	†1
34.5	34.5	34.4	34.6	34.6	34.6	34.7	34.8	35.0	34.5	00 08	35.3	08 10	32.4	2.8	2
34.6	35.0	35.0	35.0	34.9	35.0	35.3	35.2	35.4	33.8	06 18	35.6	13 42	33.4	2.2	††3
34.6	34.7	34.6	34.6	34.7	34.8	34.7	35.2	35.3	34.8	01 00	35.9	06 54	33.2	2.7	4
34.7	34.5	34.6	34.7	34.9	34.9	35.1	34.8	35.1	34.9	01 00	35.9	07 22	34.1	1.8	5
34.7	34.4	34.7	34.7	35.1	35.2	34.8	35.0	35.0	34.9	05 08	36.1	16 48	34.1	2.0	6
34.6	34.8	34.8	34.8	34.9	35.0	35.2	35.5	35.5	35.2	07 14	37.5	02 12	34.0	3.5	7
34.9	35.0	35.0	34.9	34.9	34.6	34.9	35.3	35.4	35.2	06 10	36.1	19 26	34.3	1.8	8
35.1	35.0	34.9	34.8	34.8	34.7	34.5	34.6	34.6	35.1	06 02	36.7	08 10	34.3	2.4	9
35.1	35.4	35.2	35.1	35.1	35.1	35.3	35.3	35.4	35.2	06 30	35.9	11 54	34.6	1.3	†10
34.8	35.0	34.9	35.0	35.1	35.2	35.3	35.5	35.5	35.4	03 12	36.4	14 10	34.4	2.0	11
34.4	34.8	34.9	34.9	34.9	35.0	35.2	35.4	35.6	34.9	01 24	36.3	15 16	34.0	2.3	12
34.3	34.2	34.0	34.4	34.7	34.7	34.9	35.4	35.6	35.0	03 54	36.2	09 34	33.6	2.6	††13
35.1	35.2	35.2	35.1	34.8	34.9	35.1	35.2	35.4	35.2	01 42	36.4	13 10	33.5	2.9	††14
35.3	35.8	35.7	35.7	35.4	35.6	35.7	35.8	35.9	35.2	05 26	36.3	09 30	33.8	2.5	††15
35.3	35.4	35.4	35.5	35.6	36.0	35.3	35.6	35.7	35.7	05 12	37.2	11 42	34.5	2.7	16
35.3	35.3	35.3	35.3	35.3	35.4	35.4	35.3	35.3	35.6	04 42	36.9	11 22	34.7	2.2	17
35.2	35.3	35.2	35.3	35.1	35.1	35.0	35.1	35.2	35.1	01 00	36.4	05 42	34.5	1.9	†18
35.3	35.4	35.3	35.2	35.2	35.3	35.5	35.6	35.7	35.6	02 00	37.2	12 10	35.0	2.2	†19
35.2	35.3	35.2	35.3	35.1	35.1	35.0	35.1	35.2	35.2	01 00	36.3	05 12	34.4	1.9	20
35.3	35.4	35.3	35.2	35.2	35.3	35.5	35.6	35.7	35.6	02 12	37.1	07 50	35.0	2.1	21
35.3	35.3	35.2	35.2	35.0	35.2	35.2	35.0	35.2	35.6	05 18	36.7	19 10	34.9	1.8	22
35.1	35.1	35.2	35.2	35.0	34.9	35.1	35.4	35.6	35.5	05 02	36.8	11 02	34.9	1.9	23
35.0	34.9	34.9	34.9	34.9	35.0	35.3	35.4	35.6	35.2	02 26	36.3	07 12	34.5	1.8	24
35.1	35.1	34.9	35.0	35.0	35.0	35.1	35.3	35.4	35.3	05 34	36.2	17 04	34.6	1.6	25
34.9	35.1	35.1	35.1	35.0	35.0	35.1	35.3	35.4	35.2	03 34	36.5	09 54	34.1	2.4	26
35.1	35.2	35.3	35.2	35.1	35.0	35.1	35.4	35.4	35.3	04 26	36.2	07 18	34.1	†-7	
35.1	35.2	35.3	35.4	35.3	35.5	35.6	35.8	35.9	35.6	05 00	36.7	10 42	34.7	2.0	28
35.3	35.3	35.5	35.4	35.4	35.5	35.5	35.7	35.9	35.5	01 04	36.8	09 42	34.6	2.2	††29
35.2	35.3	35.2	35.2	35.5	35.7	35.2	35.3	35.6	35.3	01 04	36.5	10 10	32.4	†	30
34.9	35.0	35.0	35.0	35.0	35.1	35.1	35.3	35.4	35.2					2.2	Mean
35.1	35.2	35.1	35.1	35.0	35.0	35.1	35.3	35.4							Mean†
34.9	35.1	35.1	35.1	35.0	35.1	35.3	35.5	35.6							Mean††

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 6
HOURLY VALUES OF DECLINATION (WESTERLY), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 2° plus tabular quantities

December

Date	Hours G M T														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
1	35 8	36 5	36 6	36 3	35 9	35 8	35 8	35 6	35 1	34 7	34 4	34 4	34 7	34 9	35 0
2	35 2	35 5	35 7	36 1	35 9	35 9	36 0	35 3	34 3	34 0	34 1	34 3	34 7	34 8	34 8
3	35 8	36 2	36 2	36 2	36 1	35 9	35 5	35 1	34 5	34 3	34 4	34 8	35 2	35 1	35 1
4	36 9	37 7	38 3	37 8	37 2	37 0	36 7	36 1	35 6	35 1	35 1	35 0	35 1	35 0	35 0
5	35 3	35 8	36 1	36 3	36 4	36 0	36 0	35 8	35 2	34 9	35 1	35 0	34 9	35 0	35 1
†6	35 7	35 8	36 0	36 2	36 0	35 9	35 8	35 8	35 4	35 2	35 1	35 1	35 1	35 1	35 1
7	35 8	35 9	35 9	35 6	35 5	35 3	35 3	35 5	35 3	35 2	35 1	35 1	35 1	35 1	35 2
††8	36 5	37 2	36 5	35 9	35 4	35 1	34 2	34 0	33 9	34 4	34 4	34 4	35 1	35 1	35 0
††9	35 9	36 2	36 3	36 0	35 9	35 7	35 3	35 1	34 8	34 2	34 3	34 8	34 9	34 9	35 0
10	36 1	36 5	36 0	36 1	35 6	34 9	34 5	34 7	34 8	34 9	34 6	34 5	34 4	34 7	34 7
11	36 2	36 6	36 9	36 5	36 0	35 5	35 1	34 3	34 3	34 2	34 7	35 0	35 1	35 1	35 1
12	36 0	36 2	36 0	36 1	36 0	35 7	35 2	35 5	35 2	34 4	34 1	34 8	35 1	34 9	35 2
†13	36 7	37 4	37 7	36 5	35 8	35 4	35 2	35 0	34 6	34 3	34 6	34 7	34 9	34 7	35 0
14	36 8	37 1	37 2	37 0	36 5	36 0	35 8	35 9	35 9	35 6	35 1	35 0	35 3	35 5	35 5
15	36 9	37 3	36 9	36 6	36 2	35 8	35 8	35 9	35 2	34 8	34 8	35 3	35 5	35 5	35 6
16	36 8	36 9	36 9	36 5	35 8	34 7	34 5	34 7	34 2	34 0	33 8	34 1	34 0	34 7	34 8
17	35 6	36 0	36 5	36 3	35 2	35 3	35 1	35 0	34 8	34 9	35 1	35 0	35 0	35 0	35 1
18	35 8	36 6	36 1	36 6	36 4	36 2	36 0	35 9	35 8	35 5	35 2	35 1	35 1	35 0	35 1
19	35 7	36 0	36 2	36 2	36 4	36 1	36 3	36 0	35 9	34 9	34 7	35 0	35 1	35 1	35 1
20	35 3	35 7	35 9	35 8	35 7	35 7	36 0	36 6	36 0	35 4	35 2	35 1	34 9	35 0	35 0
21	35 5	35 8	35 7	35 7	35 7	35 7	36 0	36 7	36 3	35 6	35 2	35 0	35 1	35 1	35 1
††22	35 7	35 6	35 9	35 4	35 2	35 2	36 2	37 0	37 0	35 7	35 7	35 0	34 9	35 1	35 1
23	35 3	35 5	35 5	35 3	35 5	35 5	35 1	35 4	35 8	35 6	35 0	34 9	35 0	34 9	34 9
†24	36 0	36 3	36 5	35 8	35 4	35 5	35 5	35 6	35 5	35 6	35 4	35 3	35 2	35 1	35 1
†25	35 9	36 0	35 9	35 4	35 0	34 9	35 1	35 5	35 2	35 7	35 5	35 5	35 5	35 4	35 3
†26	35 9	36 2	36 2	35 3	35 1	35 3	35 6	36 5	36 3	36 0	35 6	35 5	35 4	35 3	35 3
27	35 9	36 1	36 1	35 8	35 6	35 3	35 4	35 3	35 1	35 0	35 0	36 1	36 1	36 4	36 3
††28	37 1	37 5	37 3	35 8	34 5	32 8	32 2	32 1	33 0	33 3	33 8	33 6	33 3	33 4	33 7
29	35 8	35 9	35 9	35 5	35 4	35 7	35 9	35 8	35 4	34 9	34 4	34 5	34 8	34 6	34 4
30	35 8	36 0	36 2	36 0	35 9	36 1	35 9	35 7	35 4	35 1	34 5	34 5	34 8	34 8	34 8
††31	36 3	37 2	37 5	36 6	36 0	35 7	35 5	35 2	34 9	34 4	34 3	34 4	34 7	34 7	34 7
Mean	36 0	36 4	36 4	36 1	36 8	35 5	35 4	35 4	35 2	34 9	34 8	34 8	35 0	35 0	35 0
Mean†	35 8	36 3	35 1	35 8	35 5	35 5	35 4	35 7	35 4	35 4	35 2	35 2	35 0	35 1	35 2
Mean††	36 5	37 1	36 7	35 9	35 4	34 8	34 7	34 7	34 7	34 0	34 4	34 4	34 6	34 6	34 7

† International quiet days.
 †† International disturbed days
 * Loss of record (day omitted for means).

TABLE 6
 Hourly values of Declination (Westerly), 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 December 2° plus tabular quantities

Hours G M T									Mean	Maximum		Minimum		Range	Date	
15	16	17	18	19	20	21	22	23		Time	Mag	Time	Mag			
										H	M	H.	M.			
35 0	35 1	35 1	35 1	35 2	35 3	35 3	35 3	35 1	35 3	03	10	36 8	10 22	34 3	2 5	1
34 8	34 8	34 8	35 0	35 1	35 2	35 2	35 2	35 6	35 1	03	18	36 4	09 14	33 7	2 7	2
35 1	35 1	35 0	35 1	35 3	35 4	35 6	36 2	36 2	35 4	03	34	36 5	10 18	34 2	2 3	3
35 0	35 1	35 1	35 2	35 0	34 9	34 9	35 0	35 2	35 8	02	26	38 4	08 42	34 7	3 7	4
35 2	34 8	35 3	35 3	35 3	35 3	35 3	35 4	35 6	35 4	03	02	36 6	09 22	34 7	1 9	5
35 2	35 3	35 3	35 3	35 3	35 3	35 5	35 6	35 6	35 5	02	58	36 4	09 50	34 9	1 5	†6
35 1	35 1	35 0	35 2	35 6	35 7	35 8	36 0	36 2	35 4	23	38	36 4	17 46	34 8	1 6	7
34 9	34 9	35 0	34 9	35 1	35 2	35 2	35 4	35 6	35 1	01	42	37 3	08 34	33 8	3 5	††8
34 4	34 5	34 7	34 8	34 7	34 8	35 3	35 6	35 9	35 1	03	10	36 9	09 34	34 0	2 9	††9
35 0	34 9	34 8	35 1	35 2	35 3	35 4	35 3	35 9	35 2	02	06	36 9	12 18	34 3	2 6	10
35 0	35 2	35 2	35 2	35 2	35 3	35 5	35 8	35 9	35 4	02	38	37 1	07 30	33 9	3 2	11
35 8	35 8	35 8	35 6	35 5	35 6	35 8	35 8	36 1	35 5	01	50	36 5	10 22	34 0	2 5	12
35 3	35 3	35 3	35 4	35 4	35 8	35 8	36 1	36 5	35 5	01	42	37 8	09 30	33 8	4 1	13
35 3	35 4	35 8	35 6	35 8	35 8	36 0	36 5	36 7	36 0	01	34	37 3	10 42	34 7	2 6	14
35 5	35 6	35 6	35 5	35 5	35 5	35 6	36 1	36 2	35 8	02	18	37 8	09 50	34 5	3 3	15
35 3	35 4	35 4	35 4	35 3	35 5	35 5	35 8	35 6	35 2	02	30	37 4	10 42	33 6	3 8	16
35 1	35 1	35 1	35 3	35 4	35 4	34 8	35 1	35 3	35 3	01	22	36 8	10 22	34 5	2 3	17
35 2	35 4	35 2	35 2	35 1	35 1	35 0	35 1	35 1	35 5	03	34	36 8	13 14	34 8	2 0	18
35 3	35 2	35 2	35 3	35 1	35 2	35 3	35 5	35 5	35 5	04	18	36 6	10 26	34 5	2 1	19
35 0	35 2	35 3	35 3	35 3	35 4	35 3	35 4	35 5	35 5	07	06	37 0	09 34	34 8	2 2	20
35 3	35 4	35 4	35 4	35 3	35 3	35 6	35 4	35 6	35 5	07	42	37 0	11 26	34 9	2 1	21
35 1	35 0	35 0	34 7	34 6	34 8	34 6	34 8	35 1	35 3	07	42	37 3	12 14	34 0	3 3	†22
35 1	35 1	35 2	35 3	35 4	35 5	35 7	35 7	35 9	35 3	09	38	36 0	10 46	34 6	1 4	23
35 2	35 3	35 3	35 2	35 3	35 3	35 6	35 6	35 8	35 5	03	10	36 6	14 02	35 0	1 6	†24
34 9	35 8	35 7	35 5	35 4	35 3	35 3	35 4	35 7	35 5	01	10	36 7	11 18	34 7	2 0	†25
35 3	35 4	35 5	35 5	35 5	35 6	35 7	35 8	35 9	35 7	06	54	36 7	04 02	35 0	1 7	†26
36	36 6	36 6	36 6	35 9	36 0	36 2	37 0	37 5	36 0	23	04	37 7	10 42	34 8	2 9	27
34	34 2	34 3	34 7	35 0	34 3	35 3	35 3	35 6	34 4	01	10	37 7	08 50	32 0	5 7	††28
34 8	34 9	35 0	35 1	35 3	35 4	35 4	35 4	35 5	35 2	05	50	36 0	14 30	34 3	1 9	29
35 3	35 3	35 3	35 3	35 3	35 3	35 6	35 7	35 9	35 4	06	46	36 3	11 02	34 4	1 9	30
34 8	34 7	34 9	35 0	34 9	34 7	34 4	34 2	34 4	35 2	02	12	37 6	10 32	34 1	3 5	††31
35 1	35 2	35 2	35 2	35 3	35 3	35 4	35 6	35 7	35 4						2 6	Mean
35 2	35 4	35 4	35 3	35 3	35 5	35 6	35 7	35 9								Mean†
34 7	34 7	34 8	34 8	34 9	34 8	35 0	35 1	35 3								Mean††

† International quiet days
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 7
 HOURLY VALUES OF HORIZONTAL FORCE, 1951
 (Averages for Sixty Minutes Centred at the full hours of Greenwich mean time)
 July 39000γ plus tabular quantities.

Date	Hours G. M. T														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1	403	402	400	410	439	459	467	460	448	428	415	395	380	372	367
2††	326	326	294	272	318	307	313	331	370	334	322	322	327	341	337
3††	359	353	362	381	401	430	443	435	423	401	376	371	373	370	372
4	393	395	401	439	419	412	404	414	413	405	403	395	390	383	384
5	391	404	425	445	468	472	449	439	401	391	391	386	397	401	402
6	410	424	446	464	474	480	468	449	440	412	402	400	403	399	401
7	396	405	415	429	453	473	492	490	475	453	434	420	412	412	419
8	403	411	420	439	467	479	479	475	458	455	447	425	415	414	419
9	401	404	423	454	459	483	503	479	469	441	430	416	402	401	402
10†	407	412	410	434	464	477	493	496	462	444	424	409	405	406	406
11	418	422	430	445	468	480	494	499	478	473	444	411	407	409	412
12†	412	415	426	442	459	482	497	497	482	460	436	419	411	412	414
13†	405	399	392	402	435	459	472	480	480	460	432	406	395	398	403
14†	395	400	407	425	443	465	479	472	468	458	436	406	391	395	395
15	*	*	*	*	444	474	497	494	481	455	427	404	391	393	403
16	370	374	381	394	399	435	430	438	432	408	373	350	348	353	360
17	395	403	411	419	431	454	465	474	475	427	397	392	391	392	388
18	385	399	406	420	462	447	467	443	433	403	398	382	371	366	365
19	386	390	396	406	435	456	477	463	452	428	406	402	396	396	401
20	402	406	415	*	*	477	457	419	407	398	392	390	388	395	398
21	390	392	396	419	451	478	487	492	472	444	415	377	366	376	383
22	398	401	408	425	453	458	463	429	417	398	395	389	380	384	384
23	384	382	374	393	422	427	452	462	460	436	409	391	377	378	386
24†	382	392	400	423	447	455	448	453	443	433	409	387	376	375	385
25	398	402	402	416	440	475	475	455	434	422	402	379	374	389	398
26††	400	403	414	428	434	448	420	390	384	390	389	389	379	374	367
27	378	382	376	382	393	415	444	454	440	406	390	382	372	374	378
28††	400	416	429	430	453	450	454	428	396	405	390	372	372	376	376
29	370	375	384	412	388	403	399	405	406	391	401	398	388	381	376
30	383	387	392	423	437	452	449	432	416	401	381	373	379	377	378
31††	396	405	414	421	431	444	421	415	393	383	368	346	317	337	309
Sum . . .															
Mean . . .	391	396	401	417	436	450	455	450	439	420	404	389	383	384	385
Mean† . . .	400	404	407	425	448	468	478	480	467	451	427	405	396	397	401
Mean†† . . .	376	381	383	386	407	416	410	400	393	383	369	360	354	360	352

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 7

HOURLY VALUE OF HORIZONTAL FORCE, 1951

(Averages for Sixty Minutes Centred at the full hours of Greenwich mean time)

July

39000γ plus tabular quantities

Hours G M T									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag	Time	Mag		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H M	γ	H M.	γ	γ	
364	366	376	377	374	378	390	389	379	402	06 48	472	23 46	336	136	1
340	348	356	360	362	360	393	365	358	335	08 40	486	05 54	254	232	2†
378	372	369	381	380	378	381	389	385	386	06 20	448	01 32	351	97	3†
384	383	386	385	395	393	388	385	389	397	04 18	462	16 56	381	81	4
400	399	401	401	405	406	404	400	400	412	05 38	481	00 14	383	98	5
408	414	411	411	411	411	402	395	398	422	06 08	482	22 00	394	88	6
422	420	417	419	421	423	424	428	423	432	06 58	497	00 02	394	103	7
423	422	523	422	419	419	416	415	409	432	06 46	486	00 20	401	85	8
397	394	397	395	386	391	392	392	392	421	05 42	522	18 52	380	142	9
407	408	409	410	411	415	407	406	406	426	06 38	507	00 22	402	103	10†
406	408	410	415	416	415	414	415	417	434	06 30	508	15 22	400	108	11
415	416	415	409	407	409	412	411	411	432	06 50	498	18 38	405	93	12†
402	402	399	400	399	402	403	403	403	418	07 10	486	12 10	391	95	13†
391	391	394	396	398	399	397	396	392	416	06 06	486	12 10	389	97	14†
406	415	406	396	387	386	376	362	381	*	*	*	*	*	*	15
370	379	384	381	372	384	389	393	390	387	05 10	446	11 26	340	106	16
379	375	376	383	373	376	379	385	383	405	07 32	503	17 12	371	132	17
379	378	378	385	385	390	390	403	398	401	04 14	496	14 30	358	138	18
402	403	397	406	399	401	406	405	404	413	05 54	489	00 04	385	104	19
394	393	399	404	404	409	408	408	404	*	*	*	*	*	*	20
375	392	392	393	391	391	391	392	395	410	06 52	498	11 42	364	134	21
377	370	367	374	388	389	390	391	391	401	06 08	475	17 14	361	114	22
388	389	390	392	388	387	388	387	390	401	07 48	474	01 48	363	111	23
387	390	390	391	391	394	395	398	399	406	04 40	460	12 38	371	89	24†
392	389	388	393	391	388	395	405	405	409	05 06	487	11 24	369	118	25
361	379	383	385	385	383	383	386	384	393	04 50	461	15 26	355	106	26††
383	390	379	374	377	385	389	392	392	393	06 40	464	12 26	370	94	27
376	376	370	361	374	387	386	383	381	398	05 22	506	17 48	357	149	28†
376	382	383	371	372	375	379	375	373	386	07 12	424	19 22	370	54	29
381	374	372	368	388	383	379	394	390	395	05 26	460	18 04	366	94	30
296	295	283	285	299	303	319	331	342	356	05 14	463	17 28	280	183	31††
															Sum
385	386	386	387	388	390	391	393	392	404					113	Mean
400	401	401	401	401	404	403	403	402							Mean†
350	354	352	354	360	362	366	371	370							Mean††

† International quiet days.

†† International disturbed days

* Loss of record (day omitted for means).

TABLE 8
 Hourly Values of Horizontal Force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time.)
 39,000γ plus tabular quantities.

August

Date	Hours: G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1††	363	369	352	368	374	399	431	447	440	438	401	375	374	372	379
2	373	371	360	377	393	406	441	430	413	413	394	382	379	378	378
3†	375	378	379	443	467	500	501	507	499	469	438	409	409	413	415
4	428	435	444	466	482	491	507	506	493	477	458	444	439	438	435
5	433	442	443	475	505	542	570	551	527	494	434	455	443	444	446
6	402	409	431	459	470	473	470	457	448	432	436	427	412	412	411
7	425	432	450	488	508	542	541	525	507	486	442	421	426	439	440
8†	431	432	447	469	499	519	530	530	519	500	468	447	440	447	441
9	430	434	448	468	498	513	510	493	454	428	415	410	415	426	425
10†	430	435	449	480	510	532	535	504	483	466	441	436	439	429	434
11	439	444	454	469	490	525	540	535	506	472	449	425	421	415	410
12	422	432	437	460	496	526	512	502	481	461	440	421	411	411	412
13††	428	429	429	461	477	435	430	381	381	371	384	407	399	370	332
14	391	406	423	446	460	464	466	474	470	460	443	417	411	417	412
15	405	405	412	439	453	473	489	465	448	436	424	418	416	415	410
16	417	428	436	450	475	460	483	485	478	503	354	328	369	391	387
17	411	415	438	439	*	*	*	*	*	*	409	409	416	428	420
18†	389	401	411	447	467	495	490	480	478	458	430	406	404	417	416
19	422	423	433	448	474	492	497	484	454	427	404	397	397	403	401
20††	420	420	432	428	409	379	377	374	392	406	401	383	371	372	380
21††	398	388	395	409	425	432	466	428	422	413	388	369	370	365	367
22	377	383	400	415	391	372	396	393	396	390	381	372	359	372	362
23	395	388	391	400	433	*	*	*	*	*	*	*	*	*	*
24	*	*	*	432	424	424	433	428	435	414	397	389	380	385	379
25††	405	414	416	444	467	461	438	470	460	382	393	378	371	379	376
26	391	386	386	392	405	410	423	415	415	391	384	372	382	381	387
27	409	408	414	430	450	468	455	462	458	442	449	421	413	402	393
28	396	401	423	445	461	462	455	447	438	409	413	395	390	394	389
29	386	386	393	414	437	446	451	431	408	402	379	379	376	384	379
30†	396	400	416	440	464	487	493	481	466	451	439	425	411	400	400
31	397	403	419	441	469	493	503	489	460	437	431	422	413	399	392
Mean.	406	411	419	442	460	471	479	470	457	440	418	405	402	403	400
Mean†	404	409	421	456	481	507	510	500	489	469	443	423	421	421	421
Mean††	403	404	405	422	430	421	428	420	419	402	393	382	377	372	367

† International quiet days.

†† International disturbed days.

* Loss of record (Day omitted for means).

TABLE 8
 Hourly Values of Horizontal Force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time.)
 39000γ plus tabular quantities.

August

Hours. G. M. T.									Mean.	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time.	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ	
372	380	389	382	386	385	382	377	373	388	08 06	453	18 04	350	103	1††
378	376	374	375	370	370	370	371	375	385	06 02	451	01 44	357	94	2
422	422	422	423	424	428	429	426	425	434	06 06	514	00 02	374	140	3†
424	420	422	434	431	431	432	434	436	450	05 50	517	15 50	418	99	4
442	441	439	394	395	399	402	403	401	455	05 52	589	18 22	431	158	5
399	383	385	414	420	422	424	422	423	427	03 30	475	16 04	378	97	6
436	436	436	428	428	424	425	427	432	456	05 18	558	11 10	417	141	7
441	442	441	436	435	434	433	427	426	460	06 14	545	00 54	425	120	8 †
430	428	426	424	425	425	434	436	433	443	05 02	517	11 30	405	112	9
440	444	444	436	436	436	440	435	436	456	05 24	561	13 12	424	137	10†
421	421	416	410	410	421	426	424	421	449	05 46	545	13 50	406	139	11
412	403	403	399	411	414	425	424	426	439	04 42	544	16 14	398	146	12
318	318	335	345	349	375	374	383	384	387	04 06	505	15 26	308	197	13††
408	409	408	405	402	407	407	408	406	426	06 40	479	00 04	389	90	14
410	412	407	408	415	417	435	431	420	428	05 50	501	00 16	403	98	15
386	385	385	386	389	389	390	395	408	415	06 22	522	10 38	318	204	16
412	397	382	380	376	370	379	387	389	*	*	*	*	*	*	17
416	422	426	421	423	426	426	423	420	433	05 02	500	11 38	388	112	18 †
402	403	402	392	398	404	410	413	419	425	05 26	507	11 16	394	113	19
385	387	388	376	374	384	409	406	401	394	02 10	437	07 08	350	87	20††
365	366	372	358	351	364	363	370	377	388	05 50	488	16 40	350	138	21††
370	363	363	371	375	391	394	395	395	382	06 06	439	12 00	354	85	22
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	23
380	382	382	378	388	388	387	394	400	*	*	*	*	*	*	24
378	379	387	389	376	398	385	391	391	405	07 14	482	11 26	366	116	25††
379	375	386	393	393	404	403	401	407	394	05 54	450	11 02	367	83	26
386	378	387	396	390	390	409	404	394	417	04 34	479	15 12	374	105	27
385	386	390	385	388	390	407	397	393	410	04 50	486	15 54	384	102	28
383	374	383	385	386	387	394	395	397	397	05 56	463	16 02	373	90	29
398	389	380	381	378	383	386	385	394	418	06 14	497	18 32	371	126	30 †
390	376	378	380	382	382	384	389	396	418	06 24	517	16 30	372	145	31
399	397	399	397	398	403	407	407	407	421					121	Mean .
423	424	423	419	419	421	423	419	420							Mean† .
364	366	374	370	367	381	383	385	385							Mean†† .

† International quiet days.
 †† International disturbed days.
 * Loss of record. (Day omitted for means.)

TABLE 9
 Hourly values of Horizontal Force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 39000 γ plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
†1	395	396	412	433	450	463	464	452	440	429	419	408	403	412	407
†2	407	403	418	437	449	448	440	431	432	431	422	410	407	408	407
†3	399	404	415	442	456	460	472	455	436	431	429	417	412	411	409
†4	414	415	434	470	505	501	515	506	482	458	434	417	420	418	414
5	400	403	416	458	502	525	523	506	477	439	420	410	417	415	412
6	403	407	421	465	512	528	536	493	451	412	374	365	389	401	398
7	384	385	394	411	447	467	474	469	460	456	443	427	420	416	410
8	402	406	415	449	471	476	477	468	456	439	425	415	409	407	402
9	399	390	387	410	430	482	500	496	468	439	400	383	383	362	345
10	383	377	389	424	475	494	485	471	409	378	385	342	341	326	334
11	380	380	396	425	439	451	463	453	430	408	405	395	377	363	356
12	350	348	369	393	428	440	401	419	391	368	370	356	362	364	347
13	359	374	383	414	440	450	452	414	412	406	393	384	380	382	365
14	372	375	389	427	437	435	445	442	403	398	393	390	390	384	385
15	375	368	389	416	462	467	490	485	425	386	362	352	346	342	352
††16	388	384	409	443	438	443	399	361	380	365	322	287	280	275	312
17	368	370	371	389	427	456	461	428	417	376	347	336	338	353	347
18	362	359	373	410	444	462	465	441	426	403	387	384	387	387	378
19	370	379	402	436	476	498	494	485	439	427	414	403	404	404	402
††20	308	318	332	355	380	394	394	370	332	307	236	266	302	288	322
††21	333	341	355	376	390	406	390	386	343	290	271	315	297	308	
††22	349	335	338	368	397	403	368	381	339	328	353	347	324	307	316
23	340	337	349	351	381	394	409	400	385	354	446	340	343	337	330
24	355	346	349	381	413	444	445	401	380	365	362	346	339	322	345
††25	344	339	354	382	413	434	452	433	396	363	352	315	279	258	235
26	256	261	237	266	267	256	309	323	314	304	293	295	307	304	299
27	318	312	369	364	360	308	437	432	456	370	368	347	307	313	307
28	318	332	320	354	388	421	431	412	373	342	330	333	346	343	340
29	339	344	361	389	400	454	468	446	414	388	375	370	368	363	351
†30	343	335	346	*	*	441	451	415	390	370	365	366	369	348	356
Mean	364	365	377	404	430	443	450	437	414	390	378	362	362	357	356
Mean†	404	404	412	445	465	468	473	461	447	437	426	413	411	412	409
Mean††	344	343	354	385	404	416	401	387	367	342	311	297	300	285	299

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 9

Hourly values of Horizontal Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

September

39000 γ plus tabular quantities.

Hours G. M. T.									Mean.	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time.	Mag.	Time.	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ	
404	401	401	401	403	400	401	403	405	417	05 06	472	00 18	393	79	†1
405	402	407	404	403	403	405	403	406	416	05 02	458	18 30	401	57	†2
409	409	409	409	411	412	411	410	406	422	05 46	479	00 14	397	82	†3
411	411	409	410	407	409	403	403	405	436	04 02	519	21 18	401	118	†4
410	408	407	399	396	400	408	406	398	431	05 18	528	19 04	395	133	5
399	397	397	396	392	384	383	391	387	420	06 10	587	12 06	352	235	6
405	401	397	383	383	401	397	397	400	418	05 54	478	18 48	379	99	7
397	398	392	393	401	396	396	395	393	420	05 16	488	17 58	388	100	8
341	355	365	363	368	372	377	381	381	399	05 08	510	15 00	339	171	9
313	319	321	338	373	366	371	375	379	382	04 44	521	15 06	312	209	10
342	333	344	324	324	319	324	352	356	381	06 02	481	19 58	310	171	11
329	341	351	359	358	369	375	370	351	371	04 38	459	15 06	328	131	12
341	323	325	365	360	349	348	349	361	380	06 02	470	16 52	315	155	13
389	390	392	379	369	364	370	372	380	395	06 30	469	19 56	363	106	14
343	353	349	357	353	359	367	376	377	385	16 14	506	14 48	329	177	15
260	290	292	308	329	337	356	355	345	348	05 10	486	15 22	251	235	††16
385	358	351	363	368	366	369	385	379	379	05 14	480	11 00	327	153	17
373	369	359	372	358	355	353	357	362	389	05 48	474	17 28	345	129	18
362	262	219	240	274	270	289	308	307	373	05 22	505	17 10	200	305	19
294	308	330	325	340	332	332	369	346	329	05 12	445	09 30	205	231	††20
319	327	336	328	350	353	357	356	367	345	04 46	429	11 06	264	165	††21
329	348	334	348	363	363	352	349	344	349	05 10	424	13 34	301	123	††22
337	337	332	339	341	337	359	358	342	357	05 44	428	13 56	329	99	23
330	340	337	335	339	346	356	355	354	362	04 50	453	13 14	312	141	24
217	227	220	219	249	229	205	232	270	309	05 28	454	18 04	193	261	††25
298	295	299	303	303	304	309	314	311	293	04 30	357	05 04	199	158	26
318	324	332	332	330	328	335	342	346	348	07 30	537	11 40	298	239	27
334	333	335	336	337	337	337	338	337	350	06 08	442	07 06	301	141	28
312	291	327	318	322	340	337	340	341	365	05 56	482	16 12	280	202	29
343	351	354	346	356	358	362	366	370	*	*	*	*	*	*	†30
348	347	347	350	356	355	358	363	363	378					159	Mean
407	406	407	406	406	406	405	405	405							Mean†
284	300	302	306	328	323	320	332	334							Mean††

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 10
Hourly values of Horizontal Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

October

39000 γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1	343	339	339	388	419	447	459	426	385	354	349	357	359	359	355
2	334	328	336	367	404	444	403	414	392	355	337	337	339	336	332
3	331	329	330	365	406	438	441	428	397	355	333	329	330	337	335
†4	339	338	361	395	432	434	448	432	446	379	357	352	359	363	355
5	338	337	347	379	427	461	473	448	450	385	364	357	362	363	357
†6	346	338	337	358	409	442	455	441	418	395	376	367	370	370	370
7	371	365	371	391	425	465	477	469	453	429	394	368	347	322	309
††8	302	305	316	329	331	326	352	330	353	281	268	285	291	276	301
9	333	322	320	338	361	400	406	414	385	351	338	342	330	309	293
10	332	332	350	349	382	399	403	402	382	380	366	330	322	307	313
11	330	329	347	370	386	414	409	380	383	362	356	350	338	330	322
12	340	350	373	391	414	442	424	410	390	367	366	346	344	346	342
13	344	349	363	410	446	446	454	442	424	411	382	342	326	314	321
14	343	330	343	370	425	454	454	426	402	366	368	368	368	360	353
15	337	341	354	403	438	468	464	435	400	373	356	350	356	358	
16	368	362	380	401	453	473	466	431	408	378	353	354	359	344	338
††17	359	350	352	384	412	426	396	392	364	314	308	300	279	288	312
††18	326	328	344	380	404	424	404	396	356	304	296	334	344	348	352
††19	356	344	360	368	376	420	436	392	372	360	340	348	342	338	336
20	344	326	334	360	408	440	456	440	404	368	344	340	342	344	352
21	352	356	380	412	456	458	460	438	426	392	362	356	354	356	356
22	362	358	364	372	411	440	456	440	430	412	394	378	364	340	320
23	352	352	360	380	396	412	420	404	382	374	370	364	364	362	354
†24	362	364	380	409	420	434	444	432	426	420	406	398	392	388	384
†25	380	390	404	424	444	454	452	438	424	412	404	402	400	394	392
26	400	406	424	460	478	492	492	460	446	436	418	400	388	392	388
27	374	376	390	424	444	460	464	444	424	404	390	384	384	380	360
††28	380	386	396	422	452	492	470	468	444	416	400	380	400	364	320
29	240	264	296	328	340	348	352	340	328	324	326	328	324	314	310
30	324	332	352	380	396	416	386	385	383	373	356	347	352	349	349
†31	355	364	373	381	411	424	421	402	396	400	400	396	392	376	372
Mean.	345	345	357	383	413	436	435	419	402	375	361	355	352	346	342
Mean†	356	359	371	392	423	438	444	429	422	401	389	383	383	378	375
Mean††	345	343	354	377	395	418	412	396	378	335	322	329	331	323	324

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 10

Hourly values of Horizontal Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

October

39000 γ plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ		
353	347	334	330	327	334	335	338	336	363	05 39	465	18 40	323	142	1
331	327	326	328	328	329	332	336	331	351	05 40	483	17 42	323	160	2
337	337	336	337	339	338	345	343	340	356	05 26	442	12 10	327	115	3
353	351	347	346	347	348	350	347	339	372	05 01	451	18 54	337	114	4
355	349	346	341	346	341	341	344	345	372	05 38	479	17 46	336	143	5
369	365	365	364	363	365	365	367	371	379	05 46	456	01 31	333	123	16
289	293	285	274	257	259	273	289	305	353	06 32	481	20 22	251	230	7
285	297	301	295	309	314	316	316	325	309	06 11	381	10 18	256	125	††8
287	304	306	314	324	320	322	342	332	337	06 40	426	15 14	280	146	9
318	314	320	320	318	318	336	332	325	344	06 54	413	16 26	295	118	10
322	324	308	314	326	334	335	336	337	348	05 18	426	17 22	300	126	11
341	336	333	330	336	346	352	353	350	363	05 33	454	18 09	328	126	12
328	337	340	344	338	350	346	344	336	369	05 14	467	13 00	311	156	13
350	352	338	324	330	351	346	343	343	367	05 50	465	17 40	321	144	14
358	354	354	352	348	364	360	356	358	375	05 14	472	19 01	334	138	15
343	341	325	341	343	357	345	350	368	374	05 31	481	16 50	312	169	16
296	320	294	312	322	346	356	340	332	340	05 25	456	12 30	270	186	††17
336	334	364	348	340	348	352	364	360	354	05 40	434	09 31	282	152	††18
336	332	338	338	336	336	332	346	338	355	05 37	448	12 30	326	122	††19
342	344	348	353	350	364	360	358	356	366	06 06	469	00 18	318	151	20
352	346	346	358	360	372	368	364	364	381	04 28	473	17 20	344	129	21
316	308	328	346	354	352	356	353	354	371	05 30	469	15 54	304	165	22
364	360	356	358	354	360	360	364	364	370	06 00	424	14 14	348	76	23
384	380	380	380	380	380	382	376	380	395	05 52	452	19 10	356	96	†24
390	388	388	392	392	396	396	404	400	407	05 39	456	15 54	378	78	†25
384	384	388	388	384	382	368	388	380	414	05 08	500	21 24	369	140	26
360	364	368	368	372	372	376	378	380	393	05 58	472	14 30	350	113	27
252	192	160	124	044	176	178	196	220	322	05 10	502	19 31	028	474	††28
312	312	312	316	316	322	320	320	324	317	04 52	360	00 02	238	122	29
346	343	344	346	349	350	354	354	355	359	04 52	430	00 07	320	110	30
372	372	372	372	372	372	374	368	368	384	05 32	426	00 13	354	72	†31
337	336	334	334	332	342	343	345	346	363					144	Mean
374	371	370	371	371	372	373	372	372							†Mean
301	295	295	283	270	304	307	312	315							††Mean

† International quiet days
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE II

Hourly Values Horizontal Force, 1951

(Averages for sixty minutes, centred at the full hours of Greenwich mean time)

November

39,000 γ plus tabular quantities.

Date	Hours G.M.T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1†	371	377	399	432	457	475	471	455	439	411	395	388	385	383	378
2	385	370	389	404	437	444	439	440	423	400	388	376	370	361	346
3††	354	360	370	387	404	426	434	430	430	402	372	374	370	350	*
4	*	*	*	*	*	*	*	340	312	308	305	312	318	304	296
5	326	323	339	348	356	360	383	381	363	352	350	339	326	332	335
6	340	337	342	360	362	378	352	327	316	312	319	306	297	290	288
7	339	343	*	*	350	352	356	365	367	355	338	328	320	321	320
8	344	346	350	362	389	407	412	398	385	372	363	356	354	347	346
9	344	348	372	404	432	445	460	430	392	381	378	373	366	355	341
10†	344	348	354	374	383	398	396	392	392	386	382	375	363	353	353
11	354	363	378	389	400	399	386	374	366	368	378	370	367	356	348
12	352	359	372	386	420	426	405	384	348	312	319	316	315	304	299
13††	347	352	272	390	427	406	412	394	382	346	306	330	336	308	296
14††	308	316	340	357	392	360	367	363	319	311	312	331	337	309	315
15††	322	329	344	360	393	405	407	388	363	332	313	306	307	313	317
16	331	334	338	349	362	366	373	380	388	388	367	340	324	334	326
17	356	361	380	399	424	417	395	379	370	383	380	372	371	375	377
18†	344	350	373	396	409	400	387	364	351	359	346	341	349	350	348
19†	360	376	388	406	422	423	416	411	396	389	383	372	364	357	358
20	374	368	375	394	405	396	396	397	401	408	407	392	380	373	372
21	364	375	388	395	403	406	383	384	384	392	399	392	378	373	373
22	369	378	386	394	412	422	412	415	420	411	400	384	368	361	364
23	358	365	385	388	410	412	401	395	388	389	386	379	378	373	354
24	356	371	389	408	424	433	410	385	372	368	367	370	372	370	361
25	369	370	373	394	406	413	401	388	383	379	374	378	374	367	351
26	368	373	387	406	412	406	392	380	368	360	373	383	374	364	343
27†	363	366	383	403	416	417	407	396	383	376	372	374	372	356	360
28	376	388	404	435	452	456	454	442	430	425	418	412	405	392	380
29††	380	384	392	406	429	441	424	398	391	392	377	385	373	358	332
30	370	374	382	412	434	452	440	408	386	385	394	394	391	380	360
Mean	355	360	373	391	410	413	407	394	381	374	354	378	359	352	345
Mean†	356	363	379	402	417	423	415	404	392	384	376	370	367	360	359
Mean††	339	345	362	378	410	403	403	386	364	345	327	338	338	322	315

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE II
 Hourly Values Horizontal Force, 1951
 (Averages for sixty minutes, centred at the full hours of Greenwich mean time)
 39,000 γ plus tabular quantities.

November

Hours G.M.T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ	
378	377	377	375	375	370	369	370	375	398	05 02	477	21 12	368	109	†1
339	342	349	361	361	361	365	364	358	382	06 34	458	15 26	337	121	2
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††3
308	299	290	302	306	310	323	324	328	*	*	*	*	*	*	4
334	332	330	327	335	332	330	330	336	342	06 25	392	11 50	322	70	5
289	285	290	311	318	321	327	325	340	322	04 30	383	15 45	282	101	6
316	309	308	311	318	321	326	338	343	*	*	*	*	*	*	7
344	343	338	338	338	337	338	345	348	358	05 55	418	17 00	336	82	8
320	315	317	324	329	332	340	340	342	366	06 15	476	15 57	312	164	9
352	354	354	348	351	350	350	352	354	365	05 05	415	17 15	343	72	†10
350	348	351	348	352	354	358	357	361	366	04 40	402	17 53	344	58	11
300	298	312	321	335	338	339	339	340	343	04 30	440	16 14	292	148	12
273	250	266	280	260	303	300	292	304	331	04 18	436	16 25	236	200	††13
311	320	340	347	339	325	322	326	325	333	04 10	400	13 45	302	98	††14
328	326	340	327	320	324	336	336	327	340	05 18	415	10 30	298	117	††15
324	328	348	344	344	354	352	352	356	350	08 30	395	14 25	318	77	16
371	372	367	356	362	378	356	339	336	375	04 54	432	23 45	329	103	17
348	344	344	346	354	358	357	356	356	360	04 35	419	10 50	337	82	†18
358	350	356	356	359	364	368	376	378	379	04 00	433	16 10	346	87	†19
356	332	332	340	356	363	351	354	365	374	04 34	417	16 22	319	98	20
377	372	371	370	364	372	371	368	362	380	04 50	418	19 10	358	60	21
366	364	362	363	361	356	364	368	366	382	05 25	428	19 50	355	73	22
336	354	351	358	362	351	350	352	354	372	04 14	426	15 18	335	91	23
332	336	340	345	347	354	360	362	344	370	05 25	442	15 10	317	125	24
337	353	360	359	365	366	356	377	372	374	05 15	417	15 00	331	86	25
348	359	364	357	377	364	358	362	364	373	04 42	416	14 18	337	79	26
362	368	364	366	366	370	370	372	376	377	04 41	434	13 00	359	75	27†
367	351	356	350	365	368	369	382	379	399	04 30	460	16 12	343	117	28
343	358	357	354	359	365	368	364	363	379	05 20	449	14 01	324	125	††29
360	358	359	351	357	366	374	370	371	385	05 14	458	14 14	351	107	30
341	340	344	346	349	352	352	353	354	366					101	Mean
360	359	359	358	361	362	363	365	368							Mean†
314	313	326	327	319	329	331	329	330							Mean††

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 12

HOURLY VALUES Horizontal Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time),
39000 γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ		γ	γ	γ	γ	γ	γ	γ	γ	γ
1	376	380	387	389	391	399	387	362	356	339	334	317	300	305	309
2	316	317	320	325	350	346	348	330	323	312	306	300	300	297	291
3	303	312	330	354	374	380	365	354	343	330	326	327	322	317	315
4	350	367	395	418	421	424	427	421	399	374	356	326	315	316	294
5	315	327	334	368	377	362	355	356	354	353	347	332	326	325	332
6†	334	339	349	356	361	365	366	382	395	395	379	363	351	350	349
7	342	345	354	370	365	365	367	373	379	382	371	354	345	349	361
8††	347	351	371	357	364	342	352	342	353	350	343	324	307	318	310
9††	319	330	345	349	351	359	355	357	357	330	300	291	289	286	275
10	312	327	350	354	361	339	331	332	331	339	336	332	317	303	308
11	334	349	353	366	379	367	354	359	341	334	329	333	330	322	320
12	339	342	353	365	375	366	351	351	350	347	344	342	340	344	342
13†	339	349	367	399	406	405	394	356	343	332	331	336	335	331	332
14	346	360	378	403	419	417	394	359	338	346	348	348	342	355	354
15	355	335	335	347	361	372	370	376	350	343	341	332	322	326	328
16	318	240	362	382	396	399	381	364	345	338	334	335	336	328	328
17	348	353	360	363	365	378	381	381	383	374	358	344	323	313	306
18	313	314	321	330	333	364	375	381	380	363	347	329	321	311	315
19	306	311	314	323	331	348	371	361	366	352	328	330	329	319	324
20	315	317	320	326	350	359	371	383	389	363	343	327	322	318	318
21	324	323	325	335	347	365	367	370	379	375	363	350	340	337	333
22††	326	325	329	335	354	363	354	363	359	356	336	319	283	382	275
23	284	290	289	291	318	330	350	349	341	336	323	304	309	312	313
24†	319	324	330	337	351	371	378	384	384	381	367	351	335	331	326
25†	326	328	340	353	369	388	392	393	381	364	351	345	335	333	330
26†	329	336	338	347	364	377	386	395	397	383	367	354	342	341	340
27	350	355	371	383	407	401	403	407	403	392	389	376	370	352	343
28††	387	379	394	401	406	375	295	207	196	193	225	326	212	183	190
29	281	288	297	316	350	378	383	376	366	347	333	212	304	301	295
30	311	322	342	355	376	402	405	392	375	352	339	315	325	318	322
31††	334	358	393	411	416	432	430	403	389	347	318	306	316	315	314
Mean	329	335	346	358	371	375	372	365	327	349	339	328	321	317	316
Mean†	329	335	358	358	370	381	383	382	380	371	359	350	340	337	335
Mean††	343	349	366	371	378	374	357	332	331	315	304	291	281	277	273

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 12

HOURLY VALUES OF Horizontal Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time).
39,000 γ plus tabular quantities

Hours G. M. T.										Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23	Mean	Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ	
309	312	310	309	309	314	319	315	317	339	04 31	400	12 03	295	105	1
290	286	280	285	295	299	300	300	301	309	05 52	359	17 06	276	83	2
310	306	308	309	311	315	315	327	346	329	04 31	389	15 41	294	95	3
287	294	309	330	324	311	332	333	322	352	04 14	453	15 33	283	170	4
333	330	335	331	325	330	329	323	334	339	04 19	389	02 42	317	72	5
344	342	341	339	344	345	339	337	341	354	08 31	399	00 25	332	67	†6
351	333	326	315	320	328	346	349	347	352	09 01	389	18 02	308	81	7
298	325	319	305	296	312	317	311	312	330	05 32	404	19 34	283	121	††8
260	259	274	315	300	294	298	301	304	312	04 50	374	15 46	237	137	††9
320	302	313	324	325	327	322	323	332	327	03 46	375	16 01	293	82	10
302	322	322	321	327	321	323	328	338	336	04 54	386	15 10	290	96	11
338	335	332	341	338	334	335	334	335	345	04 21	387	17 10	330	57	12
330	330	331	333	337	338	339	342	340	349	04 14	411	09 04	328	83	†13
352	348	349	348	347	340	343	342	355	360	04 40	428	07 54	329	99	14
327	337	326	322	327	321	311	318	320	338	07 01	386	20 48	310	76	15
329	335	330	330	326	328	340	336	335	345	05 54	412	14 00	324	88	16
311	293	279	290	305	306	300	297	308	334	07 30	389	17 20	269	120	17
318	314	319	320	318	310	310	319	312	331	07 54	391	21 10	302	89	18
312	318	310	319	329	323	319	323	331	329	06 08	381	14 54	285	96	19
317	315	317	326	325	319	318	318	221	333	07 11	394	15 44	313	81	20
333	331	333	333	333	331	331	329	330	342	08 24	384	00 40	321	63	21
271	273	255	300	267	276	300	287	285	311	06 30	377	17 08	239	138	††22
313	306	305	309	309	311	314	317	318	314	06 52	362	00 09	281	81	23
325	325	325	324	321	321	323	323	325	341	07 36	388	19 10	316	72	†24
328	326	324	326	330	328	325	329	331	345	06 25	395	17 16	322	73	†25
342	341	340	339	341	341	335	347	349	353	07 42	399	00 22	328	71	†26
348	347	347	348	348	361	363	378	384	372	04 12	422	15 42	342	80	27
211	233	239	236	249	271	274	275	276	272	03 50	439	08 41	161	278	††28
299	306	309	309	308	310	309	309	309	321	06 14	389	00 23	278	111	29
325	328	332	329	329	333	339	329	327	343	05 30	412	00 37	310	102	30
315	307	304	305	315	307	310	315	309	345	05 31	454	17 32	286	168	††31
314	315	314	318	319	320	322	323	326	335					101	Mean
334	333	332	332	335	335	332	336	33							Mean†
271	279	278	292	285	292	300	298	29							Mean††

†International quiet days.
††International disturbed days.
*Loss of record (day omitted for means).

TABLE 13

HOURLY VALUES OF Vertical Force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time).

July

2,000 γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1	500	502	502	493	483	484	472	472	484	483	489	484	483	483	472
††2	488	489	501	486	472	483	463	469	459	467	466	465	476	480	489
††3	483	482	484	*	*	*	*	*	*	470	463	465	470	470	468
4	470	479	486	479	469	452	461	461	461	469	469	469	463	461	461
5	469	469	464	463	462	462	436	445	453	470	480	475	468	472	470
6	479	479	480	489	454	452	440	431	438	444	452	461	461	461	474
7	481	479	481	476	455	443	431	434	441	453	462	462	465	472	474
8	479	484	476	467	461	458	461	461	458	471	471	471	473	481	478
9	487	483	483	474	465	448	443	446	453	455	457	467	465	467	468
†10	474	472	472	472	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	461	459	464	461	454	457	448	447	461	464	466	466
†12	472	476	474	463	453	458	462	455	453	443	434	452	452	455	456
†13	465	467	469	465	462	461	448	445	442	447	447	452	457	459	459
†14	467	465	464	457	455	440	433	428	431	435	431	436	445	450	448
15	464	464	465	452	449	453	457	462	453	452	455	455	455	*	*
16	460	467	471	466	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	472	471	474	471	460	448	442	444	*	436	442	449	459	459	459
20	472	470	470	*	*	*	*	*	*	*	*	455	455	452	447
21	466	466	473	*	*	*	*	*	*	*	*	*	*	*	*
22	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
†24	453	457	452	452	452	453	460	456	446	439	439	44	446	445	447
25	456	457	454	454	454	453	450	451	460	466	467	462	462	462	459
††26	468	467	462	460	458	453	441	452	444	469	472	469	465	465	464
27	467	466	466	461	455	455	452	449	46	446	451	454	455	455	454
††28	454	455	456	456	456	449	446	450	465	467	461	460	461	460	456
29	451	451	445	447	448	444	446	447	447	451	456	457	455	454	453
30	453	453	452	450	448	446	446	448	452	454	454	457	458	456	454
††31	462	464	463	461	459	445	434	429	430	437	446	448	448	455	448
Mean .	470	471	473	465	459	454	448	449	450	455	457	460	461	463	462
Mean† .	464	466	465	459	455	453	451	446	443	441	438	445	450	452	453
Mean†† .	468	469	458	466	461	457	446	450	449	460	461	461	463	465	464

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 13
 HOURLY VALUE OF Vertical Force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time).

July

2,000 γ plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H.M.	γ	H. M.	γ	γ	
484	486	481	499	489	489	489	501	489	487	01 40	502	07 30	470	32	I
478	486	486	484	484	487	490	489	482	480	01 25	502	06 20	455	47	††2
470	479	479	470	480	482	482	484	482	*	*	*	*	*	*	††3
461	469	469	469	469	469	464	464	461	467	02 00	490	05 50	452	38	4
472	475	475	477	475	479	477	475	474	468	10 10	480	06 25	433	47	5
474	486	478	476	478	474	476	478	483	466	15 20	490	07 10	425	65	6
476	476	476	476	476	472	476	476	476	466	00 35	483	06 30	429	54	7
480	483	488	490	483	487	488	490	487	476	21 55	493	08 45	452	41	8
470	470	472	474	468	468	470	470	474	469	00 10	490	05 15	440	50	9
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	†10
467	471	474	476	474	474	471	471	472	*	*	*	*	*	*	II
458	460	463	465	463	467	463	465	465	459	00 40	480	09 25	428	52	†12
461	465	464	464	464	465	465	467	467	459	02 55	469	07 25	435	34	†13
452	453	457	457	457	459	461	462	462	450	00 05	472	10 10	422	50	†14
*	460	460	459	457	459	459	459	460	*	*	*	*	*	*	15
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	17
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	18
462	460	467	465	467	468	468	468	471	459	23 10	474	09 40	436	38	19
449	449	455	459	459	461	464	466	466	*	*	*	*	*	*	20
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	21
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	22
443	453	446	450	446	446	443	446	450	*	*	*	*	*	*	23
448	450	449	450	456	457	457	456	457	451	20 20	462	09 00	438	24	†24
457	461	460	464	463	458	473	470	471	460	22 45	474	05 50	450	24	25
461	465	471	463	463	461	463	462	460	461	17 05	472	05 20	438	34	†26
453	452	454	456	455	456	454	454	454	455	00 50	470	08 40	440	30	27
457	455	451	451	452	453	450	452	452	455	08 55	468	06 00	444	24	†28
453	455	454	452	452	453	453	453	450	451	11 15	460	04 50	440	20	29
459	460	456	456	460	458	459	461	460	455	22 20	461	05 30	442	19	30
449	450	447	448	453	451	453	454	456	450	01 20	468	07 40	428	40	††31
463	466	466	467	466	467	467	468	467	462					38	Mean
455	457	458	459	460	462	461	463	463							Mean
461	464	464	461	463	463	464	464	463							Mean

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 14
 Hourly values of vertical force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time).
 August
 2,000γ plus tabular quantities

Date	Hours. G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
††1	461	459	459	455	453	451	450	468	445	446	449	455	457	454	451
2	462	462	460	460	452	444	432	427	426	429	432	435	439	438	435
†3	441	441	441	*	436	428	417	410	412	416	419	425	428	431	431
4															
5	446	451	453	450	446	445	439	430	431	433	441	446	452	454	454
6	469	472	473	471	469	445	440	439	440	448	455	465	464	461	462
7	465	466	467	*	*	*	*	*	*	*	*	*	*	*	*
†8					454	446	445	444	446	442	445	451	459	461	458
9	467	471	473	*	*	*	*	*	*	*	*	*	*	*	*
†10	451	455	454	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	464	461	439	434	437	448	450	454	457	455	457
12	466	468	464	455	445	436	430	432	443	445	448	450	448	450	451
††13	451	452	448	442	436	436	432	436	449	454	459	459	451	437	431
14	454	452	446	*	*	*	*	*	438	438	440	441	437	441	448
15	453	452	444	*	436	437	438	438	441	448	448	447	442	438	439
16	443	442	442	442	442	440	441	444	440	423	428	446	454	449	445
17	445	444	446	*	*	*	*	*	*	*	*	449	444	438	438
†18	449	452	448	442	436	422	415	416	414	422	437	449	449	445	446
19	437	436	445	441	437	436	439	447	446	439	444	448	442	434	430
††20	448	446	443	*	*	*	433	434	437	442	432	433	443	449	454
††21	466	468	471	470	469	452	432	427	430	441	440	439	448	447	450
22	456	461	469	*	*	*	*	*	*	*	461	460	462	465	464
23	464	469	464	461	460	459	459	469	469	463	470	470	467	467	466
24	460	465	450	*	*	*	434	435	438	445	440	436	441	448	451
††25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
26	*	*	*	*	439	432	443	446	438	424	426	428	434	433	435
27	441	441	436	433	430	425	420	425	424	432	439	450	448	448	447
28	448	445	438	*	*	*	*	*	*	*	*	442	444	447	449
29	458	461	453	441	429	432	427	437	442	450	452	451	448	448	442
†30	443	444	440	436	423	409	405	495	404	410	429	440	442	435	440
31	452	455	443	429	424	425	425	430	437	449	456	454	453	455	462
Mean	454	455	453	449	443	437	432	435	436	439	445	451	451	448	447
Mean†	446	448	444	439	429	415	410	405	409	416	433	445	445	440	443
Mean††	459	460	459	456	453	446	438	444	441	447	449	451	452	446	444

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 14
 Hourly values of vertical force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 August 2,000 γ Plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time.	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M	γ	H. M.	γ	γ	
452	455	460	463	464	464	462	460	462	456	18 20	468	08 15	444	24	††1
436*	436*	437*	439*	440*	439*	439*	440*	440*	441*	01 05	462*	08 50	426*	36	2
432	434	437	439	439	441	443	444	445	*	*	*	*	*	*	†3
455	458	460	461	463	464	464	467	468	451	22 25	470	07 10	430	40	4
459*	455*	457*	462*	464*	463*	462*	460*	461*	459	01 15	474	07 50	436*	38	5
459	460	462	464	465	464	466	463	466	*	*	*	*	*	*	6
44†	443	446	446	447	448	449	449	449	*	*	*	*	*	*	7
									*	*	*	*	*	*	†8
460	462	461	461	462	465	466	464	464	*	*	*	*	*	*	9
450	451	449	449	450	452	452	450	450	449	01 00	468	06 55	428	40	†10
434	439	445	447	449	454	453	454	454	446	10 35	460	14 10	430*	30	11
453	453	454	454	455	455	453	452	451	*	*	*	*	*	*	††13
44†	439	434	442	441	441	444	440	439	*	*	*	*	*	*	14
															15
445	444	455	444	443	443	443	444	445	443	12 15	456	09 40	420	36	16
439	437	436	436	438	439	443	446	448	*	*	*	*	*	*	17
445	444	446	446	447	446	445	443	445	439	00 50	452	06 45	412	40	†18
434	436	435	432	441	443	444	445	446	440	11 10	450	14 05	427	23	19
459	462	457	454	459	464	473	471	466	*	*	*	*	*	*	††20
45†	447	450	445	447	443	442	454	454	449	02 50	472	07 20	427	45	††21
463	459	464	466	469	469	471	466	467	*	*	*	*	*	*	22
466	465	460	463	463	464	463	465	465	464	10 45	472	05 20	456	16	23
454	454	457	457	461	458	457	461	*	*	*	*	*	*	*	24
															††25
428	434	442	443	442	443	440	437	439	*	*	*	*	*	*	26
441	446	457	455	451	453	459	452	447	442	21 00	460	06 05	420	40	27
448	450	455	455	455	455	458	460	460	*	*	*	*	*	*	28
447	445	448	448	444	442	443	443	442	445	00 50	463	05 55	426	37	29
442	444	445	446	445	450	450	449	451	438	20 20	452	06 50	392	60	†30
464	469	469	472	474	474	473	473	472	454	20 05	474	04 25	424	50	31
448	449	451	451	452	453	453	453	453	448					37	Mean
443	444	445	446	446	448	447	446	448							Mean†
446	447	452	452	453	454	452	456	457							Mean††

† International quiet days
 †† International disturbed days
 * Loss of record (day omitted for means).

TABLE 15

Hourly values of Vertical force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

September

2,000 γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
†1	467	459	452	452	452	453	451	449	453	461	463	453	464	459	457
†2	461	461	451	443	440	434	445	450	461	465	470	470	464	458	449
†3	449	453	441	*	*	*	*	*	*	*	430	433	433	436	437
†4	456	454	449	444	439	432	430	429	436	439	442	449	455	447	452
5	469	462	455	451	446	440	434	434	445	457	477	481	476	472	468
6	442	456	447	442	437	429	427	419	413	427	452	464	469	459	456
7	453	456	450	445	439	430	429	440	444	450	453	454	456	452	453
8	453	451	443	437	432	426	426	428	444	452	456	458	457	457	457
9	454	455	445	439	433	420	418	414	423	428	431	439	437	437	438
10	448	447	442	436	430	415	412	410	409	418	417	424	422	422	429
11	440	441	434	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	429	421	426	423	425	433	433	441	437	445	434
13	439	439	433	*	*	425	418	421	*	433	433	435	436	441	439
14	437	445	449	443	437	425	417	414	415	425	424	425	426	426	431
15	437	439	445	435	430	419	415	410	397	406	414	415	413	418	422
††16	445	443	439	*	*	*	*	*	*	*	*	*	*	*	*
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
††20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
††21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
††22	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
††25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
26	*	*	*	*	439	431	430	434	438	447	449	461	462	457	453
27	455	458	446	443	439	439	442	438	433	436	423	413	426	430	436
28	452	449	439	436	433	409	396	389	409	434	449	451	444	441	448
29	449	451	440	435	430	427	417	413	420	435	438	443	446	447	438
†30	445	441	430	*	*	*	*	*	*	*	*	*	*	*	*
Mean.	452	453	447	441	437	428	426	423	428	438	443	446	447	445	445
Mean.†	461	458	451	446	444	440	442	443	450	455	458	457	461	455	453

* Loss of record (day omitted for means).

† International quiete days.

†† International disturbed days.

TABLE 15

Hourly values of Vertical force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

September

2,000γ plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H.M.	γ	γ		
457	459	461	460	462	458	461	464	463	458	00 15	467	06 55	445	22	†1
451	456	456	456	454	453	451	449	448	454	10 35	472	04 40	432	40	†2
440	442	445	446	449	448	449	452	449	*	*	*	*	*	*	†3
455	456	460	461	460	462	465	468	468	450	22 00	470	07 10	428	42	†4
466	469	464	463	463	461	464	461	455	460	11 35	482	06 50	434	48	5
462	460	459	460	455	453	451	454	454	448	11 45	469	08 15	412	57	6
455	455	454	449	454	457	452	451	453	449	12 15	458	05 50	425	33	7
455	457	458	459	457	456	454	452	452	449	12 40	460	06 05	426	34	8
443	450	448	432	431	430	449	448	448	437	00 45	457	06 30	414	43	9
423	428	428	439	442	444	444	439	438	429	00 20	450	07 15	407	43	10
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	11
431	433	437	442	443	445	445	443	437	*	*	*	*	*	*	12
427	423	429	456	449	441	435	438	442	*	*	*	*	*	*	13
433	433	434	430	429	428	431	434	435	430	02 05	451	06 40	414	37	14
427	426	430	435	436	438	440	438	436	426	01 50	446	08 05	396	50	15
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††16
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	17
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	18
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	19
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††20
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††21
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††22
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	23
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	24
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	††25
452	452	457	454	451	453	452	453	452	*	*	*	*	*	*	26
442	448	447	445	444	445	449	449	449	441	00 40	458	10 50	410	48	27
448	449	452	452	457	456	458	454	448	440	19 20	459	06 55	388	71	28
427	438	443	442	445	452	447	447	447	438	01 05	453	06 40	412	41	29
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	†30
446	449	450	449	449	450	451	451	450	443					43	Mean
454	457	459	459	459	458	459	460	460							Mean†

* Loss of record (day omitted for means).

† International quiet days.

†† International disturbed days.

TABLE 16

Hourly values of vertical force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

October

2,000 γ plus tabular quantities

Date	Hours. G.M.T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1	448	449	438	424	410	396	394	402	409	418	426	427	430	436	436
2	439	441	436	427	409	393	380	385	405	418	428	433	431	433	436
3	442	448	441	427	415	401	397	404	413	419	431	430	424	427	437
†4	440	447	438	424	416	416	421	427	427	428	431	437	438	437	438
5	443	449	452	443	435	418	405	408	418	424	430	434	435	435	436
†6	440	448	447	441	438	436	426	429	435	439	443	446	446	447	447
7	449	449	447	442	431	425	418	416	422	425	427	427	425	425	425
††8	440	445	448	445	441	447	447	436	416	418	427	447	440	438	444
9	449	447	444	438	424	416	407	409	416	418	423	427	427	427	425
10	439	440	439	444	451	449	444	431	426	426	427	419	426	427	431
11	448	449	449	449	444	440	433	427	430	429	437	438	438	439	440
12	449	448	444	438	430	427	422	425	429	438	436	425	429	438	439
13	438	440	446	454	449	442	441	447	450	448	438	417	420	427	439
14	449	446	444	441	430	422	422	428	430	431	437	438	438	440	440
15	445	451	456	449	434	422	417	414	416	424	433	438	438	441	442
16	450	449	453	440	438	419	415	416	413	415	425	437	444	442	439
††17	447	449	452	442	433	415	401	400	403	416	428	427	429	439	449
††18	449	450	450	449	429	415	415	427	424	426	438	449	449	450	449
††19	450	450	448	441	437	426	417	419	425	426	430	438	437	445	439
20	450	449	450	449	440	427	416	416	419	422	427	423	437	438	438
21	448	448	445	441	438	423	415	409	406	415	416	426	34	438	438
22	437	441	447	439	438	435	428	423	424	420	423	428	434	431	428
23	448	449	449	449	449	442	438	438	438	438	433	438	438	449	439
†24	440	449	447	441	439	438	442	434	428	427	428	433	437	442	444
†25	438	440	439	445	445	448	451	453	446	447	449	449	445	445	448
26	451	447	440	445	449	445	436	437	438	426	426	427	426	437	438
27	438	445	440	431	419	410	403	410	416	422	426	429	438	438	438
††28	446	448	448	446	442	432	409	406	415	420	427	424	448	424	422
29	459	450	452	454	452	449	449	449	450	450	450	448	444	445	444
30	448	449	448	448	*	*	*	*	*	*	*	*	*	*	*
†31	*	*	*		454	449	449	456	450	440	438	437	438	438	440
Mean.	445	447	446	441	435	427	421	421	424	427	431	433	435	437	438
Mean.†	439	446	443	438	435	435	435	436	434	435	438	441	441	443	444
Mean.††	446	448	449	445	436	427	418	418	417	421	430	437	441	439	441

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 16
Hourly values of vertical force, 1951
(Averages for sixty minutes centred at the full hours of Greenwich mean time)
2,000 γ plus tabular quantities

October

Hours G M T									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	24		Time	Mag	Time	Mag		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H M	γ	H. M	γ	γ	
437	438	436	437	436	439	438	438	438	428	01 15	450	06 20	390	60	1
438	438	438	439	439	438	439	440	439	427	01 00	449	06 15	372	77	2
438	438	438	439	439	439	442	442	440	430	01 05	451	05 50	397	54	3
438	438	438	439	440	441	443	440	438	434	01 00	447	04 40	414	33	4
437	436	436	438	441	438	439	440	438	434	01 40	452	06 10	400	52	5
446	447	448	449	449	449	449	449	449	443	01 35	451	06 05	425	26	16
422	427	427	428	428	433	438	442	447	431	01 00	450	07 20	413	37	7
438	442	440	437	442	442	440	439	442	439	02 00	450	08 10	405	45	18
429	442	440	444	444	440	438	445	438	431	00 10	450	06 05	406	44	9
438	438	444	441	444	446	451	449	442	438	21 05	453	11 10	418	35	10
441	444	439	446	450	451	450	448	448	442	19 50	453	06 40	425	28	11
440	438	438	439	439	440	439	444	439	436	00 15	451	11 25	422	29	12
442	447	448	448	445	448	441	440	441	441	03 13	457	11 15	416	41	13
441	447	440	438	441	447	449	444	444	439	00 15	451	05 10	418	33	14
439	441	441	438	441	450	449	449	449	438	01 53	456	06 08	408	48	15
446	442	437	447	449	459	449	449	456	439	20 00	458	08 25	408	50	16
445	441	438	450	450	458	456	451	449	436	15 35	458	05 55	396	62	17
442	446	461	449	448	449	450	459	460	443	16 23	460	05 35	403	57	18
444	444	448	441	442	444	444	452	450	439	23 45	453	06 15	416	37	19
446	445	448	449	445	453	449	448	448	439	19 55	456	08 00	410	46	20
441	442	446	447	446	449	440	438	437	434	19 50	449	08 20	406	43	21
437	436	446	449	449	449	449	447	448	437	18 13	460	09 25	418	42	22
447	448	449	444	440	442	440	445	444	443	15 20	450	09 45	429	21	23
445	448	449	445	442	441	439	438	439	440	17 10	451	08 15	423	28	24
449	449	449	449	449	449	449	449	448	447	07 00	454	12 15	438	16	25
438	442	447	439	438	440	437	449	439	439	22 05	451	10 25	420	31	26
438	445	447	440	442	445	444	440	444	433	01 45	449	06 10	400	49	27
417	406	427	412	406	485	448	456	460	432	20 00	486	18 50	392	94	28
447	448	449	449	449	449	449	449	448	449	00 10	460	12 40	438	22	29
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	30
444	447	448	449	448	448	449	449	449	*	*	*	*	*	*	31
439	441	443	442	442	447	444	445	445	437					43	Mean
445	445	446	445	445	445	445	444	443							Mean.†
437	436	443	438	438	456	448	451	452							Mean.††

† International quiet days.
†† International disturbed days.
* Loss of record (day omitted for means).

TABLE 17

Hourly values of vertical force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

November

2,000 γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
†1	451	451	450	*	446	438	429	428	426	425	429	439	439	440	440
2	449	441	*	*	444	440	440	430	419	418	420	424	434	432	*
†3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4								420	419	418	428	432	433	436	434
5	440	440	456	460	461	462	462	451	436	430	429	429	431	441	440
6	446	441	449	456	451	450	*	*	453	441	440	439	439	440	438
7	441	443	442	452	451	444	439	430	429	428	428	421	429	436	438
8	441	441	451	451	443	432	430	430	430	430	433	429	432	436	439
9	442	441	450	450	449	443	436	428	429	433	429	426	427	428	428
†10	434	430	430	439	439	446	446	441	440	430	429	428	429	429	431
11	439	434	431	430	432	432	439	449	450	441	440	430	429	429	430
12	438	436	439	433	430	422	428	429	424	429	430	426	424	420	424
††13	436	433	439	440	440	440	436	439	440	425	426	438	430	420	427
††14	429	430	441	440	436	428	418	418	418	429	432	429	428	424	439
††15	430	430	430	430	428	420	419	419	418	420	422	428	428	431	434
16	424	431	430	429	428	427	430	429	424	417	411	418	427	436	429
17	437	437	439	439	431	431	440	442	441	439	431	431	431	430	429
†18	429	430	429	429	425	417	416	424	425	427	422	419	425	425	428
†19	430	430	429	428	426	427	428	426	425	426	422	426	428	430	430
20	427	426	429	434	439	433	431	431	424	414	405	415	418	425	428
21	430	429	426	428	434	446	447	440	438	431	430	430	429	429	429
22	431	431	427	426	429	429	425	419	416	412	410	418	419	425	430
23	426	424	421	419	418	418	418	419	424	428	428	426	428	429	426
24	429	429	430	429	425	419	424	436	441	438	430	427	426	428	426
25	429	428	430	437	440	434	430	431	432	430	422	420	426	429	425
26	427	425	425	421	422	427	434	439	441	441	437	430	426	421	420
†27	432	432	430	430	431	437	446	450	451	448	440	436	432	437	440
28	429	429	429	428	421	417	416	417	418	421	421	427	424	420	420
††29	428	426	421	420	418	415	416	424	428	424	419	419	418	417	417
30	429	428	429	430	434	440	440	444	449	446	433	422	418	417	418
Mean.	432	432	433	434	433	431	432	433	432	430	427	426	427	428	429
Mean †	431	431	429	431	430	432	434	435	435	433	428	427	429	430	432
Mean.††	431	430	433	433	431	426	422	425	426	425	425	429	426	423	429

| International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means.)

TABLE 17
 Hourly values of vertical force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich mean time)
 November
 2,000 γ plus tabular quantities

Hours G. M. T.									Mean.	Maximum		Minimum		Range	Date			
15	16	17	18	19	20	21	22	23		Time.	Mag.	Time	Mag.					
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H	M	γ	H.	M	γ			
440*	440*	441*	441*	448*	448*	448*	449*	450*	*	*	*	*	*	*	*		†	
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		2	
451	432	438	447	436	447	450	442	442	*	*	*	*	*	*	*		††	
440	440	440	444	441	440	440	440	443	443	05	30	470	11	20	429	41	4	
439	441	432	439	439	451	446	446	449	*	*	*	*	*	*	*		5	
438	434	439	437	439	440	440	443	442	438	03	45	453	10	10	420	33	6	
440	440	440	439	440	440	440	440	441	438	03	20	452	10	02	429	23	7	
422	428	439	439	440	440	440	440	440	436	03	23	453	15	10	420	33	8	
434	438	440	439	439	439	439	439	438	436	05	30	451	09	35	425	26	9	
430	433	437	436	439	439	438	439	434	436	07	25	451	13	30	428	23	†	
428	428	433	439	440	440	439	438	436	431	09	50	442	08	18	416	26	11	
419	419	434	440	435	439	436	429	429	432	03	20	446	09	25	410	36	††	
429	434	441	444	438	428	424	430	430	431	17	15	449	07	35	412	37	††	
434	430	447	432	430	430	432	430	424	428	16	54	452	07	45	411	41	††	
429	430	438	437	433	439	433	430	433	429	16	50	444	09	40	410	34	16	
429	431	429	429	431	432	429	427	428	433	07	02	449	17	35	419	30	17	
428	428	429	430	432	434	433	431	430	427	18	40	440	05	35	412	28	†	
429	428	430	433	430	431	431	432	431	429	20	00	441	10	00	419	22	†	
421	418	424	432	438	437	431	433	433	427	03	30	442	10	00	400	42	††	
429	428	428	428	429	430	430	428	428	431	05	52	452	19	30	425	27	21	
433	430	430	429	429	431	432	430	429	426	21	40	438	09	15	405	33	22	
419	427	430	432	432	427	430	428	429	425	19	06	436	14	30	416	20	23	
426	427	431	431	432	432	433	430	429	429	07	50	443	15	10	410	33	24	
425	432	434	432	434	438	432	430	429	430	03	30	442	14	30	418	24	25	
426	436	437	439	441	436	430	430	430	431	19	05	446	13	45	419	27	26	
441	432	432	433	433	432	431	430	430	436	07	38	453	15	10	429	24	†	
419	418	424	428	430	430	429	429	428	424	22	00	438	08	00	411	27	27	
424	430	429	431	432	430	429	429	428	424	16	18	440	13	58	409	31	††	
421	424	427	429	431	433	433	429	440	431	08	10	449	12	05	416	33	30	
429	430	434	434	434	435	433	432	432	431						30		Mean.	
433	431	433	434	433	434	433	433	432										Mean.†
427	428	438	437	431	432	430	429	428										Mean.††

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means.)

TABLE 18
 Hourly values of vertical force, 1951
 (Averages for sixty minutes centred at the full hours of Greenwich Mean Time)
 December 2,000 γ plus tabular quantities

Date	Hours G M T.															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	
1	432	432	431	433	440	439	436	432	429	424	420	419	420	427	430	
2	438	440	438	440	442	439	434	438	439	434	428	423	427	431	431	
3	434	438	441	441	440	438	439	436	433	429	422	423	421	422	424	
4	433	435	433	434	431	429	429	431	429	424	420	408	416	420	419	
5	423	422	420	419	420	420	421	422	421	419	413	417	420	423	426	
†6	427	423	420	421	429	426	428	429	423	421	418	419	421	427	429	
7	427	424	422	426	432	439	438	429	423	417	411	410	417	427	431	
††8	424	421	422	428	429	434	438	440	431	417	409	406	413	422	421	
††9	423	421	421	422	427	431	436	438	434	421	409	409	414	419	417	
10	427	428	428	434	433	435	443	439	428	424	422	418	413	410	416	
11	424	422	418	417	418	420	423	424	412	408	414	417	421	420	421	
12	421	421	420	421	419	426	434	439	429	420	422	418	421	426	420	
†13	425	420	422	420	416	409	410	412	414	416	419	417	417	416	417	
14	419	421	419	418	417	415	420	423	424	424	423	423	422	422	422	
15	420	418	417	416	413	412	412	417	419	422	424	425	423	426	425	
16	428	429	429	*	*	*	*	*	*	*	*	*	*	*	*	
17	*	*	*	414	409	410	416	420	419	416	417	418	410	410	411	
18	423	420	417	414	410	412	412	411	413	416	417	417	417	417	418	
19	419	419	420	422	426	431	427	409	409	416	411	416	420	418	418	
20	419	419	416	414	410	409	405	398	394	395	407	411	417	420	420	
21	422	421	420	420	426	427	424	416	412	410	412	416	419	420	422	
††22	421	420	419	411	407	411	412	404	402	406	409	411	406	410	411	
23	419	419	421	427	423	426	427	418	405	401	397	404	412	417	413	
†24	418	417	413	416	417	405	398	398	394	390	394	400	406	408	409	
†25	410	410	409	414	417	410	405	398	397	397	400	404	406	410	*	
†26	*	*	*	*	408	406	404	394	388	392	398	402	406	409	411	
27	413	412	414	416	411	414	418	407	402	401	400	404	407	408	409	
††28	418	411	414	411	396	398	382	406	400	395	401	394	400	399	410	
29	420	420	420	421	423	420	418	420	414	410	409	405	408	410	414	
30	419	419	420	421	421	416	406	398	398	398	401	402	402	406	411	
††31	410	413	416	412	407	411	408	408	408	405	401	408	409	409	410	
Mean	423	422	422	422	422	422	421	420	416	413	412	413	415	418	419	
Mean†	423	420	418	419	421	413	412	413	410	409	410	412	415	417	418	
Mean††	419	417	418	417	413	417	415	419	415	409	406	406	408	412	414	

† International quiet days.

†† International disturbed days.

* Loss of record (day omitted for means).

TABLE 18

Hourly values of vertical force, 1951

(Averages for sixty minutes centred at the full hours of Greenwich mean time)

December, 2,000 γ plus tabular quantities

Hours G M T									Mean	Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H M.	γ	H M.	γ	γ	
430	433	432	433	434	438	438	434	439	431	04 15	442	11 53	418	21	1
432	432	431	432	434	433	432	432	433	434	03 45	443	11 35	419	24	2
424	428	430	430	430	428	427	430	432	431	03 45	441	12 00	412	29	3
419	426	431	438	436	429	440	433	429	428	21 05	444	11 10	398	46	4
428	422	426	427	424	424	424	430	430	423	17 20	432	10 45	407	25	5
430	426	428	430	430	430	428	423	424	425	03 35	431	09 20	414	17	16
428	420	420	422	424	424	428	428	426	425	05 30	440	10 50	408	32	7
427	426	421	411	410	420	426	421	426	423	06 25	443	11 40	387	56	18
413	421	432	416	428	421	421	423	426	423	06 10	438	11 30	398	40	19
420	419	428	411	431	428	423	423	424	426	06 20	446	12 30	408	38	10
420	424	421	423	427	424	419	419	423	420	06 40	427	08 10	397	30	11
420	420	420	421	421	421	420	420	422	423	06 45	440	11 10	418	22	12
419	420	421	421	419	420	420	419	417	418	02 25	426	05 45	406	20	13
422	424	423	422	419	422	423	423	422	421	08 40	428	05 30	412	16	14
423	427	427	428	424	427	427	428	428	422	22 20	429	05 55	410	19	15
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	16
412	416	413	417	422	421	420	419	422	*	*	*	*	*	*	17
420	419	420	420	420	420	421	423	420	417	21 55	427	08 15	405	22	18
416	420	417	423	426	422	421	420	423	419	05 10	431	15 00	398	33	19
420	422	426	428	428	426	422	421	422	415	18 15	429	09 08	389	40	20
421	421	422	422	421	420	420	420	422	420	03 20	427	08 45	402	25	21
417	417	420	429	412	427	426	420	419	414	18 05	435	12 05	391	44	22
412	411	414	416	413	414	413	417	417	415	05 10	429	08 45	389	40	23
409	412	414	416	417	419	419	413	414	409	03 08	421	09 40	389	32	24
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	25
412	416	417	418	419	419	416	418	414	*	*	*	*	*	*	26
409	410	413	414	416	419	419	420	420	411	21 40	432	13 00	397	30	27
421	423	422	420	420	423	422	420	420	409	16 10	431	06 05	365	60	28
414	420	420	420	420	420	419	419	419	417	03 13	427	11 00	404	23	29
414	416	420	419	419	419	418	414	411	412	03 07	427	08 45	389	38	30
412	410	410	413	419	418	420	417	413	411	04 55	420	10 10	387	33	31
420	421	423	424	423	423	424	423	423	420					32	Mean
419	419	421	422	422	423	422	418	418							Mean†
418	419	421	422	418	421	423	420	421							Mean††

† International quiet days.
 †† International disturbed days.
 * Loss of record (day omitted for means).

TABLE 19
PRINCIPAL MAGNETIC STORMS RECORDED AT KODAIKANAL.
 (July—December, 1951)

Greenwich Date 1951	Storm time.		Type (2)	Sudden commence- ment amplitude (3)			C figure, degree of activity (4)	Maximal activity Green- wich day	Ranges			Remarks,
	G M T of beginning h m	G M T of ending. (1) d. h		D I	H γ	Z γ			D I	H γ	Z γ	
July 1	22 23	4 11	s. c.	..	+27	+14	m	2	7	205	40	
July 28	01 26	29 16	.	.	.	.	m	28	*	151	41	
July 31	00 58	2 11	.	..	.	.	m	31	8	184	73	
August 13	02 30	13 20	.	..	.	.	m	13	4	196	60	
August 15	20 06	17 10	s. c.	.	+33	+10	m	16	6	211	54	
September 5	20 44	6 11	s. c.	.	+19	+13	m	6	7	238	75	
September 10	02 12	14 13	s. c.	..	+15	..	m	10	6	212	*	
September 15	02 32	18 19	s. c.	..	+14	...	ms	16	5	264	*	
September 19	08 40	27 13	.	.	..	...	ms	21	8	364	*	
October 7	09 10	8 19	...	.	.	...	m	7	3	180	49	
October 17	01 10	19 13	...	.	..	...	m	17	4	180	82	
October 28	11 52	28 21	s. c.	-1	+56	+23	s	28	4	408	99	
November 13	03 48	14 23	.	..	..	.	m	13	3	202	33	
December 27	21 54	28 20	s. c.	-1	+32	+20	ms	28	8	276	69	

The following symbols and conventions have been used according to recognised practice :

- (1) Approximate time of ending of storm constructed as the time of cessation of reasonably marked disturbance movements in the traces.
- (2) s. c. = Sudden commencement ; (...) = Gradual commencement.
- (3) Signs of amplitudes of 'D' and 'Z' taken algebraically ; (D—reckoned negative being westerly)
(Z—reckoned positive being vertically downwards).
- (4) Storm described by three degrees of activity (m)—for moderate (when range is between 150 γ and 250 γ) ;
(ms)—for moderately severe (when range is between 251 γ & 400 γ) ;
(s)—for severe (when range is above 400 γ).

* = Loss of record.