

# Kodaikanal Observatory

Bulletin No. CXXXV

PART I

## SUMMARY OF PROMINENCE OBSERVATIONS FOR THE FIRST HALF OF 1951

1. This bulletin embodies the results of observations of prominences made at Kodaikanal Observatory during the first half of 1951 supplemented by data computed from photographs obtained from Mt. Wilson and Meudon Observatories for those days on which Kodaikanal had imperfect or no observations. Thanks are due to the authorities of Mt. Wilson and Meudon Observatories for their cooperation.

2. *Calcium prominences at the limb.*—During the half year under review, photographs of K-prominences at the limb were obtained at Kodaikanal on 145 days, of those, the plates for 138 days were utilised for computation. The Mt. Wilson and the Meudon Observatories supplied prominence spectrohellograms for 35 and 23 days respectively. In all, observations for 175 days of the half year were available and these were counted as 171 effective days after weighting the photographs according to quality.

The mean daily areas (in sq minutes of arc) and the mean daily numbers of prominences derived from all the above records are given below:—

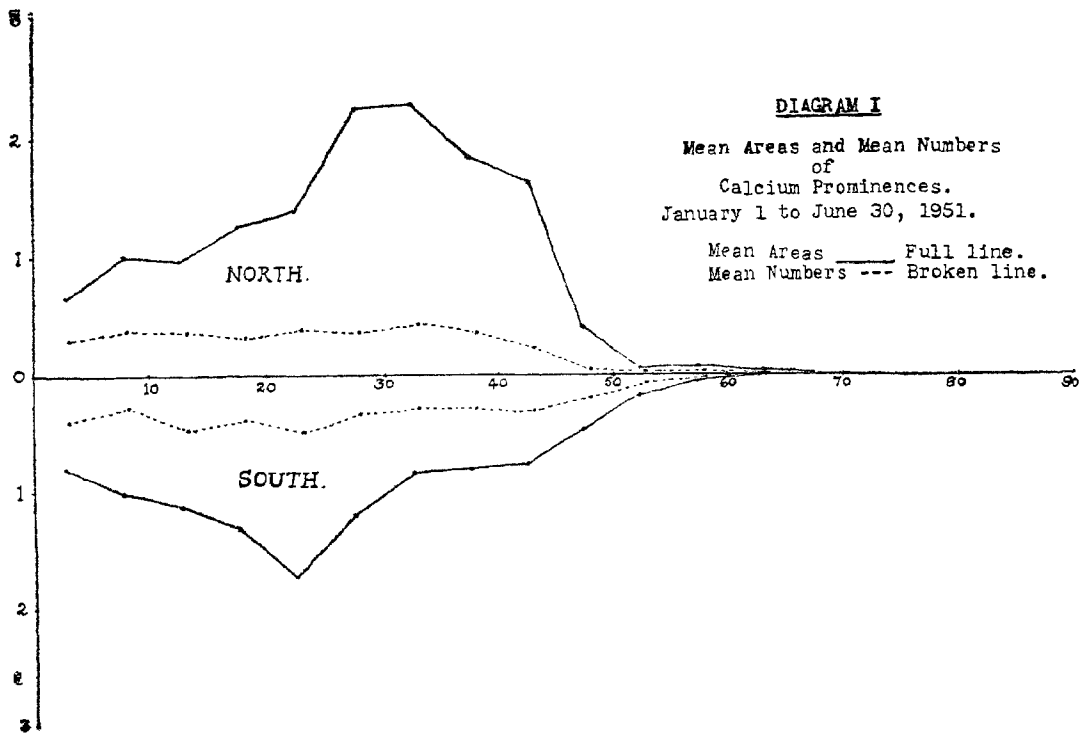
Combined data		
	Mean daily areas (sq minutes)	Mean daily numbers.
North . . . . .	1.37	3.40
South . . . . .	1.00	3.37
TOTAL . . . . .	<u>2.37</u>	<u>6.77</u>

These figures represent slight decrease of activity of prominences (about 1% in areas and 6% in numbers) compared with the activity in the previous half-year. The southern hemisphere continued to be less active than the northern.

Corresponding figures obtained from Kodaikanal records alone are also given below for comparison with data prior to 1923, *i.e.* before international co-operation :

Kodaikanal data only		
	Mean daily areas. (square minutes)	Mean daily numbers
North . . . . .	1.40	3.44
South . . . . .	0.99	3.35
TOTAL . . . . .	<u>2.39</u>	<u>6.79</u>

Diagram I below represents the distribution of areas and numbers in 5° ranges of latitude



(Diagram I)

The curves show peaks of activity of prominence areas centered in the latitude zones 25°-35° N and 20°-25° S; no secondary maxima are seen. The positions of maximum activity in both the hemispheres have remained practically unaltered compared with the previous half year

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

TABLE I

Months 1951.	Number of days (effective)	Areas (Square minutes)	Numbers	Daily means		Mean height "	Mean extent °
				Areas (sq. min.)	Numbers		
January . . . . .	28½	75.95	187	2.66	6.56	49.79	4.46
February . . . . .	27	65.20	163	2.41	6.04	39.66	4.26
March . . . . .	29½	51.80	208	1.74	6.99	36.13	3.63
April . . . . .	28½	64.45	201	2.28	7.12	48.13	3.60
May . . . . .	31	76.15	206	2.46	6.65	49.13	4.17
June . . . . .	26½	72.00	194	2.72	7.32	44.25	3.96
1st quarter . . . . .	85½	192.95	558	2.26	6.54	41.74	4.09
2nd quarter . . . . .	85½	212.60	601	2.48	7.02	47.22	3.91
1st half-year . . . . .	171	405.55	1159	2.37	6.78	44.58	4.00

The distribution of prominences about the sun's axis of rotation is given below :—

1951 January-June	East	West	Percentage east
Total areas (square minutes) . . . . .	200.65	195.9	51.7
Total numbers . . . . .	555	604	47.9

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

### 3. Observations with the Prominence Spectroscope.

*Metallic Prominences.*—Only one metallic prominence was observed during the half-year. The details of the prominence are given below :—

TABLE II

Date 1951	Time I.S.T. h. m.	Base °	Mean Latitude		Limb	Maximum Height in H <sub>α</sub> "	Lines in which observed	Remarks
			North °	South °				
March 3:	07 45	2	10	—	W	57.2	All the 12 lines.	Ht. in D'a=9°.6 b's=9°.6 D3=28°.8 Hβ=32°.0  The prominence showed shifts of 1.5°A to Red & Violet at 8.25

## Doppler displacements of 'C' line in the chromosphere and the prominences

Particulars of Doppler shifts observed in the chromosphere and the prominences with the prominence spectroscopie are collected in following table:—

TABLE III

Date and month	Time I.S.T. (GMT + 05h.30m)		Mean latitude		Limb	Displacements		Remarks
			North	South		To red Å	To violet Å	
Jan 2	h. 07	m. 30		9.5	W	1.5	0.5	Red displacement at middle & violet displacement at base.
11	09	05		18.5	W	Slight	Slight	At base & middle
12	09	30	16		W	1	"	At base.
	09	45		10.5	W	2.0	0.5	Red displacement at top and violet displacement at middle.
February.					NIL			
March 3	08	40	10		W	3.5	1.5 to 2	Displacement in H $\alpha$ 1.6° A to red and violet.  Displacement in D $_3$ at 8.40°. 3° A to Red and 1 A° to violet.  This was a metallic prominence
12	08	45		19	E	0.5	0.5	Near a spotgroup just at the limb.
April 25	08	50	28		W	1.0	1.0	—do— —do—
May 10	11	17	44½		E	2.0		At top of a large prominence.
22	09	45	32½		W	1.5	1.0	At middle of a prominence.
June 18	08	35	34½		W		4.0	At base Subsided to 1 A° to V at 0900 and Nil at 0915.
25	08	15		2.5	W	0.5	0.5	At base
28	07	50		17	E	1.0		At base.
	07	55	33		E	0.5		At top.

## Reversals and displacements on the sun's disc.

During the half-year, the H-alpha line was seen in emission in the vicinity of sunspots on 70 occasions and the D $_3$  line in absorption on 69 occasions. The H-alpha line was also seen displaced over dark markings on the disc in 15 cases. Details of these observations are given below:—

	North	South	East	West	Total
Bright reversals of H $\alpha$ (C) line on the disc . . . . .	50	20	36	34	70
Dark reversals of D $_3$ line on the disc . . . . .	49	20	36	33	69
Displacement of H $\alpha$ (H) line on the disc . . . . .	8	7	6	9	15

Heights of prominences in K, H $\alpha$ , D $_3$ , and H $\beta$  lines

The mean height of 37 prominences observed in H $\alpha$ , D $_3$ , H $\beta$  and K lines was found to be as follows:

Mean height in K line . . . . .	63° 2
Mean height in H-alpha . . . . .	57° 3
Mean height in D $_3$ . . . . .	55° 8
Mean height in H $\beta$ . . . . .	51° 5

## Observations with the Hale Spectroheliograph

Details of observations of the Doppler shifts of the H $\alpha$  line over prominences and absorption markings made with the spectroheliograph are given below:

	North	South	East	West	Total	Displacements		
						To Red	To Violet.	Bothways
Displacements in prominences	17	7	11	13	24	3	4	7
Displacements in dark markings	16	5	7	14	21	2	4	15

*Solar Flares* Table IV contains a list of solar flares observed at Kodaikanal during the half-year under review

TABLE IV.

Date	Time in I S T.						Mean Latitude	Mean Longitude	Intensity	Maximum width of H-alpha line.	Remarks
	Beginning		Maximum		End						
1951	H.	M.	H.	M.	H.	M.	°	°			
January								NIL		Å	
February											
6	—		15	00	15	30	21 N	62 W	1	Not observed.	
26	—		07	45	09	15	(a) 7½ N (b) 10 N	17 W 22 W	2	2.6	There were two distinct regions of omission
March											
3	—		07	45	09	00	10 N	Near W limb	1	1.6	
23	—		09	40	—	—	8 S	13 W	1	1.6	
24	—		07	43	08	30	15 N	20 W	1	1.2	
27	—		08	50	09	10	13 N	54 W	1	1.3	
April											
18 (a)	08	00	08	08	08	30	12 N	10 E	1	2.0	
(b)	09	15	09	20	09	35	13 N	9 E	1	1.8	
19 (a)	—		08	17	08	30	10 N	5 W	1	1.4	
(b)	—		11	28	12	00	10 N	5 W	2	Not measured	Observation incomplete due to cloudy weather
21	—		11	10	12	00	10 N	34 W	1	1.6	
29	—		08	57	09	20	5 S	14 W	1	1.6	
May											
12	—		07	45	08	10	15 N	55 E	1	1.6	
14	—		08	10	—	—	12 N	35 E	1	Not observed	Due to clouds interfering.
16 (a)	08	10	08	13	08	40	14 N	7 E	1	1.8	
(b)	—		09	40	10	00	10 N	36 E	1	1.2	
18	—		07	45	08	45	10 N	22 W	1	Not measured	do.
21 (a)	—		07	48	08	40	8 N	67 W	1	2.8	
(b)	—		07	55	08	30	15 S	23 E	1	1.6	
23	—		08	25	08	40	15 N	4 W	1	Not measured	do.
June											
17	—		07	25	07	45	11 S	26 E	1	Not observed	
18	—		07	37	07	45	11 S	13 E	1	"	
23	—		07	45	08	25	17 N	6½ W	1	1.3	Two bright points.

*Sudden disappearances of prominences and dark markings*

Details of K-prominences and H-alpha absorption markings whose sudden disappearances within an interval of 24 hours or less were observed, are summarised below :—

Nature of phenomenon	Date and time of phenomenon when last seen.		Co-ordinates of phenomenon when last seen		Remarks.
			Mean latitude	Mean longitude	
	I.S.T.		°	°	
		H. M.			
K—prominences	(1) March 9 . . . . .	15 15	25 N	West limb	Disappeared next day
	(2) April 4 . . . . .	08 46	35 N	East limb	Do.
	(3) May 27 . . . . .	08 13	23 S	East limb	Do
H-alpha absorption markings	(1) Feb. 20 . . . . .	15 15	47 S	50 W	Do.
	(2) Feb. 28 . . . . .	15 15	25 N	10 E	Do.
	(3) March 3 . . . . .	15 15	18 S	2 W	No observations on March 4 due to clouds; disappeared as seen on March 5.
	(4) March 9 . . . . .	11 30	16 S	35 W	Disappeared at 1400 IST on the same day.
	(5) April 6 . . . . .	12 29	24 S	75 E	Disappeared next day
	(6) April 28 . . . . .	10 49	15 S	15 E	Do.
	(7) April 28 . . . . .	10 49	20 S	30 W	Do
	(8) May 16 . . . . .	14 14	7 N	7 E	Do.
	(9) May 18 . . . . .	14 15	30 N	37 W	Do.

5. Prominences projected on the disc as H-alpha absorption markings

During the period under review, H-alpha disc spectroheliograms were obtained at Kodaikanal on 157 days, of which the photographs for 25 days were discarded as unsuitable for computation. The Mt. Wilson and the Meudon Observatories supplied photographs for 41 and 33 days respectively. The records were thus available for 177 days of the half year and these were reckoned as 175½ effective days after weightage according to quality of photographs.

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

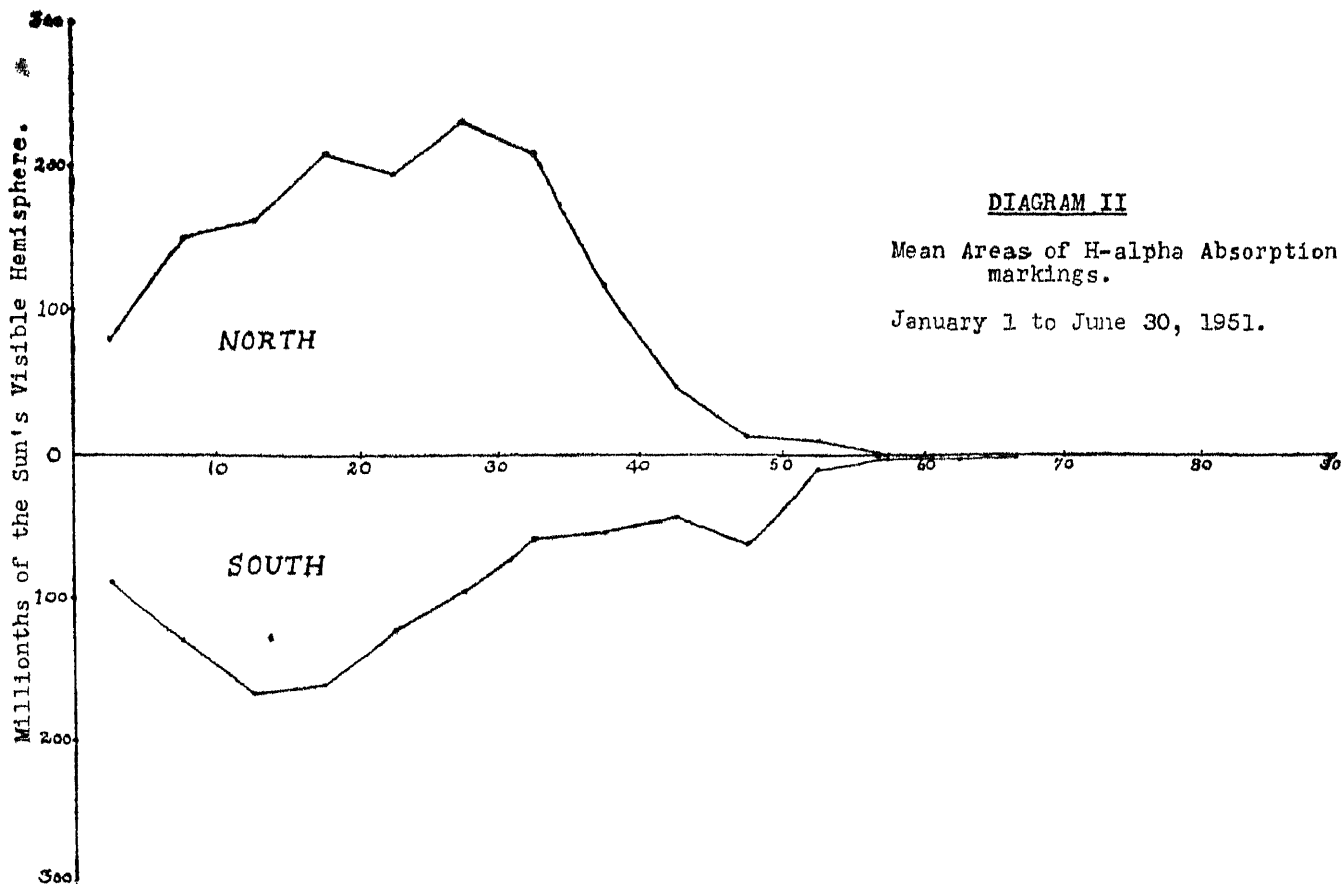
Combined data		
	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North . . . . .	1434.0	12.87
South . . . . .	992.2	10.62
TOTAL . . . . .	2426.2	23.49

As in the case of prominences at the limb, the absorption markings also show a slight decrease of activity (about 10% in areas and 3% in numbers) compared with the previous half-year. Activity was again less in the southern hemisphere.

The figures based solely on Kodaikanal records are also given below for comparison with data prior to 1923.

Kodaikanal data only.		
	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North . . . . .	1417.8	12.53
South . . . . .	983.4	10.37
TOTAL . . . . .	2401.2	22.90

Diagram II below gives the distribution of areas of the markings in 5° ranges of latitude.



(Diagram II)

The curves show maximum activity in zones 25°-30°N, and 10°-15° S with a secondary peak at 45°-50°S. The peak zones represent an equatorward shift of 5° in the north hemisphere and 10° in the southern hemisphere compared to the positions in the previous half-year.

The east-west distribution of the dark markings shows an eastern deficit in both the areas and the numbers. The details are given below :—

PART II.

SUMMARY OF MAGNETIC OBSERVATIONS FOR THE FIRST 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 first half of 1951 derived from the Watson instruments are given here.

*Determination of absolute values.*

- (1) Absolute observations of H F are made once every week (on Wednesdays) with Kew Magnetometer No 3.
- (2) Absolute observations of declination are made once a week (on every Thursday) 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.*—The charts for 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 three 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.

*Determination of scale coefficient.*—The scale coefficients 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. magnetograph and at distances of 122.6 cms and 148.6 cms in the case of the V.F. magnetograph. 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 H.F. magnetograph in  $\gamma/cm.$  for the months January-June 1951 are given below:—

Instrument	Jan	Feb	March	April	May	June
H. F. Magnetograph . . .	48.5	48.1	48.7	48.5	48.3	47.1
V. F. Magnetograph . . .	200	200	200	200	200	200

*Temperature coefficient of the magnetographs.*—The adopted value for the H.F. magnetograph is 32  $\gamma$  per degree F. The temperature coefficient of V.F. magnetograph was found to be negligible.

*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 absolute horizontal force. They 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, including the given week as third of the five. From this 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  $\pm 20\gamma$ .

(b) The base-line values for V.F. magnetograms are derived by expressing the mean ordinates of 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 value of H.F. at that time by the tangent of inclination. The adopted values 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 V.F. variometer in satisfactory working condition, and many changes of adjustment were made, making the conversion of hourly values at times somewhat laborious. In general, the variometer was lacking in stability and only a slight jar was required to alter the position of the magnet.

The performance of the V.F. instrument during the first half of 1951 was not satisfactory. The tabulation of the V.F. records has been done whenever records are reliable.

(c) The base-line value for 'D' was derived by the usual procedure of converting the ordinate corresponding to absolute observations with Kew Magnetometer No 3 into angle and adding this to the corresponding observed absolute declination value. The performance of the 'D' magnetograph was not satisfactory during the first fifteen days of January 1951. The tabulation of the 'D' for these days is therefore omitted.

*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 centred at the full hours of G.M.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 as (a) a quiet day (b) a day of slight disturbance, (c) 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 one of great storm if the range is above 400 $\gamma$ , (ii) of moderate storm if the range is between 251 $\gamma$  and 400 $\gamma$  and (iii) of moderate disturbance, if the range lies between 150 $\gamma$  and 250 $\gamma$ . 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 first half of 1951.



## **TABLES**

TABLE 1

Hourly Values of Declination (Westerly) 1951.

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

1° 47.5' plus tabular quantities.

January

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16	44.8	44.8	45.0	44.0	43.0	43.0	43.8	43.8	43.0	42.9	42.3	41.9	42.2	42.3	42.6
17	44.0	44.0	44.0	43.5	43.1	43.0	43.2	43.8	43.4	43.7	43.4	43.1	43.1	43.0	43.0
18†	43.8	44.0	44.1	44.0	43.1	42.2	42.9	44.1	44.3	44.1	44.0	43.6	43.0	43.6	43.3
19	44.0	44.0	44.1	43.9	43.0	42.8	43.3	43.8	44.0	44.0	44.0	43.9	43.9	43.9	43.7
20	44.9	45.0	45.0	44.8	44.3	43.9	44.0	43.9	43.4	43.3	43.2	43.4	43.8	43.4	43.3
21††	44.8	44.9	44.9	44.1	43.4	43.3	43.5	43.4	43.3	43.0	43.0	43.0	43.1	43.4	43.5
22††	44.3	44.3	44.3	44.6	44.0	43.9	43.5	42.6	44.1	43.0	42.9	42.4	42.7	42.5	42.8
23††	45.1	45.7	45.5	45.0	45.0	45.0	45.0	44.8	44.3	43.9	43.3	43.0	43.3	43.8	43.2
24	44.0	44.6	44.5	44.7	44.4	44.2	44.4	45.0	45.0	44.8	44.2	43.9	43.9	43.9	44.0
25	44.8	45.1	45.2	44.9	44.1	43.9	43.8	43.3	43.1	43.0	43.4	44.0	44.0	44.3	43.9
26	44.9	45.2	45.2	45.2	45.9	46.0	46.2	46.6	45.7	45.0	45.0	44.4	44.4	44.7	44.7
27	44.9	45.2	45.9	46.0	46.0	46.1	46.2	46.9	46.0	45.3	45.0	44.7	44.9	44.9	44.9
28	45.1	45.4	45.8	45.2	45.1	45.1	45.2	45.1	44.9	45.0	44.3	44.0	44.0	44.5	44.3
29	44.9	44.9	45.0	45.0	44.9	44.7	44.7	44.3	44.0	44.0	44.0	43.1	43.1	43.9	44.0
30	44.0	44.1	45.0	45.0	45.6	46.1	46.4	46.1	45.2	45.1	44.4	43.8	44.0	44.3	44.3
31††	44.8	44.9	44.9	44.6	44.2	44.3	44.1	44.1	44.7	44.8	44.4	44.2	44.3	45.0	44.7
Means	44.6	44.8	44.9	44.7	44.3	44.2	44.4	44.5	44.2	44.0	43.8	43.5	43.6	43.8	43.8
Means†	43.8	44.0	44.1	44.0	43.1	42.2	42.9	44.1	44.3	44.1	44.0	43.6	43.0	43.6	43.3
Means††	44.7	44.9	44.9	44.6	44.1	44.1	44.0	43.7	43.9	43.7	43.4	43.1	43.3	43.7	43.5

† International quiet days.

†† International disturbed days.

\* Loss of record. (Day omitted for means)

TABLE 1

Hourly Value of Declination (Westerly) 1951.

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

January

1° 47.5' 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.				
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
42.8	42.9	42.9	42.4	43.0	42.9	43.0	43.6	43.6	43.2	02 32	45.0	10 45	41.6	3.4	16
43.0	43.0	43.1	43.0	43.1	43.4	43.3	43.3	43.4	43.3	01 50	44.2	11 20	42.9	1.3	17
43.1	43.1	43.3	43.4	43.5	43.7	43.7	43.8	44.0	43.6	07 30	44.6	04 35	42.0	2.6	18†
43.7	43.6	43.7	43.7	43.5	43.6	43.8	43.9	44.3	43.8	23 15	44.5	20 35	43.2	1.3	19
43.7	43.7	43.9	44.0	44.0	44.0	44.1	44.2	44.1	44.0	00 45	45.0	10 20	43.0	2.0	20
43.0	43.0	43.7	44.0	44.0	44.2	44.2	44.4	44.7	43.7	00 30	45.0	14 05	42.3	2.7	21††
43.2	44.0	44.2	44.2	44.0	44.2	44.6	44.1	43.8	43.7	21 20	45.0	10 25	42.1	2.9	22††
43.0	43.3	43.3	43.3	43.4	43.0	43.3	43.4	43.9	44.0	01 20	46.1	10 50	42.5	3.6	23††
44.0	44.1	44.2	44.0	44.4	44.4	44.3	44.4	44.7	44.3	07 05	45.1	11 00	43.9	1.2	24
43.8	44.2	44.3	44.3	44.4	44.4	44.4	44.7	44.7	44.2	01 55	45.3	08 50	42.3	3.0	25
44.8	45.0	45.0	45.2	45.0	45.0	45.2	45.1	45.0	45.1	06 50	46.9	11 30	44.0	2.9	26
45.0	45.1	45.2	45.2	45.0	44.9	45.0	45.0	44.9	45.3	07 10	47.0	11 14	44.3	2.7	27
44.5	44.5	44.8	45.0	45.0	44.8	44.7	44.4	44.8	44.8	02 20	46.0	11 00	43.8	2.2	28
44.0	44.2	44.4	44.8	44.8	44.7	44.2	44.0	44.0	44.3	02 42	45.1	11 25	43.0	2.1	29
44.4	44.8	44.8	44.9	45.0	44.9	44.6	44.3	44.8	44.8	06 07	46.7	11 05	43.6	3.1	30
44.1	44.1	44.0	44.2	44.0	44.1	44.3	44.1	44.1	44.4	12 40	45.2	18 55	43.9	1.3	31††
43.8	43.9	44.1	44.1	44.1	44.1	44.2	44.2	44.4	44.2					2.4	Means
43.1	43.1	43.3	43.4	43.5	43.7	43.7	43.8	44.0	43.6						Means †
43.3	43.6	43.8	43.9	43.9	43.9	44.1	44.0	44.4	43.9						Means ††

† 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.)

February

1° 47' 5" plus tabular quantities.

Date.	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	43.9	43.2	44.0	43.3	43.5	45.0	45.7	45.1	45.2	44.7	44.2	44.0	44.4	44.4	44.0
2†	44.0	44.0	44.1	43.7	44.2	45.0	45.1	45.3	45.2	44.7	44.3	43.9	44.0	44.0	44.0
3†	45.0	45.0	44.3	44.0	44.3	44.7	45.0	45.3	45.0	45.2	45.0	44.7	44.7	44.8	44.8
4	45.0	45.0	45.0	43.9	43.8	44.0	44.9	45.2	44.8	44.3	44.0	44.0	44.4	44.3	44.0
5	45.0	45.0	45.0	45.8	46.0	46.2	47.1	46.8	45.9	44.8	44.2	43.8	43.7	44.1	44.1
6	44.7	44.9	45.4	45.0	43.7	43.5	45.0	45.1	45.1	44.3	44.0	43.9	44.6	44.2	44.2
7	45.9	46.1	46.6	46.8	46.7	46.1	46.1	45.3	45.3	44.6	44.8	45.1	45.8	45.1	45.0
8	46.2	46.6	46.4	46.0	45.8	45.6	45.1	44.9	44.3	43.8	43.7	44.5	45.6	45.7	45.3
9	45.2	45.5	45.8	45.5	45.7	46.1	45.1	44.2	44.0	43.9	44.0	44.0	45.0	45.2	45.2
10	45.0	45.4	46.0	46.8	47.3	47.0	46.6	45.0	45.0	44.3	43.0	43.9	44.4	45.0	45.0
11	45.1	45.3	45.6	46.1	46.1	46.4	46.5	46.0	45.1	44.9	44.3	44.2	44.6	45.0	45.1
12	45.1	45.3	45.4	45.8	46.5	47.0	47.1	47.2	46.6	45.7	44.6	44.3	44.8	44.9	45.0
13	45.5	45.1	45.1	45.5	46.1	46.8	47.0	47.2	46.3	45.9	45.5	45.0	45.0	45.1	45.3
14	45.6	45.5	45.6	45.7	46.0	46.8	47.2	47.4	47.1	46.2	45.2	44.4	44.9	45.0	45.3
15†	45.7	45.7	45.3	44.8	44.3	44.3	45.0	45.9	45.5	45.1	45.1	44.8	44.7	44.8	44.8
16†	45.3	45.7	45.9	45.6	45.3	45.2	45.0	45.2	45.9	45.8	45.3	45.2	45.3	45.3	45.3
17	46.0	46.3	46.1	46.0	45.8	45.6	46.4	46.8	46.9	46.3	46.1	45.8	45.8	45.9	45.7
18	46.2	46.3	46.6	46.1	45.2	45.3	45.3	45.3	45.4	45.0	44.3	44.1	44.3	44.5	44.3
19	46.2	46.6	46.8	46.8	46.3	45.6	45.2	45.0	44.4	44.5	44.4	44.1	45.2	45.4	45.3
20†	46.4	46.7	46.9	46.8	46.0	46.0	45.3	45.0	44.6	44.3	44.1	44.4	45.3	45.6	45.4
21	46.1	46.2	46.2	45.8	45.1	44.5	44.0	44.2	44.7	44.3	44.3	44.7	45.0	45.3	45.0
22††	46.0	46.1	46.8	46.2	45.6	45.0	46.7	44.9	44.4	44.0	43.7	43.8	44.8	45.1	45.2
23††	44.9	45.5	46.3	47.0	47.3	47.0	46.7	46.0	44.7	44.2	44.3	44.2	43.6	43.9	44.3
24††	45.0	45.0	45.5	46.2	46.8	46.9	46.9	46.3	45.0	45.0	45.0	44.9	44.3	44.2	44.8
25	45.9	46.1	46.0	46.0	45.3	45.0	44.4	45.4	45.3	45.0	44.8	44.0	43.9	44.3	44.6
26	45.2	45.2	45.1	45.1	44.8	44.7	45.0	45.3	45.1	44.9	44.5	44.0	44.0	44.6	44.4
27††	45.0	45.0	44.1	44.2	45.0	44.3	44.9	45.3	45.4	45.1	45.0	44.4	44.3	44.8	44.9
28††	45.8	46.0	46.3	46.2	46.0	46.4	47.0	46.4	45.8	45.3	45.0	44.0	44.1	44.4	44.8
Means	45.4	45.5	45.7	45.7	45.5	45.6	45.7	45.6	45.3	44.9	44.5	44.4	44.7	44.8	44.8
Means †	45.3	45.4	45.3	45.0	44.8	45.0	45.1	45.3	45.2	45.0	44.8	44.6	44.8	44.9	44.8
Means ††	45.3	45.5	45.8	46.0	46.1	45.9	46.1	45.8	45.1	44.7	44.6	44.2	44.2	44.5	44.8

† 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.)

1° 47' 5" plus tabular quantities.

February

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.		
44 1	44 1	44 0	44 2	44 0	44 0	44 0	43 8	44 1	44 2	06 20	45 8	21 15	43 9	1 9	1
44 1	44 3	44 4	44 5	44 5	44 5	44 6	44 8	44 9	44 4	07 20	45 7	11 05	43 8	1 9	2†
44 3	44 4	44 9	45 0	45 0	45 1	45 0	44 9	45 0	44 8	06 45	45 4	03 20	43 9	1 5	3†
43 9	43 9	43 3	44 7	44 7	44 9	45 0	45 0	45 1	44 5	00 00	45 2	11 10	43 8	1 4	4
43 7	44 0	44 1	44 5	44 8	44 8	44 9	44 9	44 7	44 9	06 30	47 3	14 40	43 5	3 8	5
44 3	44 6	44 6	44 7	45 0	45 0	45 3	45 3	45 4	44 7	02 05	45 6	04 50	42 9	2 7	6
45 0	45 0	45 0	45 1	45 3	45 2	45 6	46 0	46 1	45 6	03 27	47 0	09 35	44 9	2 1	7
45 1	45 0	45 0	45 9	44 9	44 8	44 6	44 7	44 7	45 1	01 30	46 8	09 10	43 5	3 3	8
45 3	45 2	45 2	45 0	45 0	44 6	44 8	45 0	44 9	45 0	01 38	46 2	08 35	43 7	2 5	9
45 3	45 3	45 2	45 1	45 0	44 9	44 9	44 8	44 9	45 2	04 30	47 8	10 39	43 5	4 3	10
45 3	45 4	45 3	45 0	45 0	45 0	45 1	45 2	45 0	45 3	06 06	45 6	10 30	44 0	2 6	11
45 3	45 4	45 6	45 7	46 1	45 9	45 8	45 8	45 9	45 6	06 58	47 3	10 22	44 0	3 3	12
45 1	45 3	45 4	45 3	45 1	45 2	45 1	45 2	45 3	45 6	07 50	47 3	12 00	44 9	2 4	13
45 3	45 3	45 4	45 7	45 9	45 9	45 8	45 8	45 7	45 8	06 32	47 5	11 05	44 3	3 2	14
44 9	45 0	44 9	44 9	44 9	45 0	45 0	45 1	45 1	45 0	07 15	46 0	03 45	44 1	1 9	15†
45 3	45 3	45 3	45 3	45 4	45 3	45 4	45 6	45 9	45 4	08 20	46 2	06 23	45 0	1 2	16†
45 6	45 6	45 6	45 4	45 3	45 3	45 7	45 8	45 9	45 9	07 33	47 0	19 40	45 1	1 9	17
44 1	44 4	44 8	44 6	44 7	45 0	45 1	45 4	45 8	45 2	02 00	46 7	11 27	44 0	2 7	18
45 3	45 7	45 8	45 8	45 8	45 8	45 8	46 0	46 3	45 6	02 30	47 0	10 50	43 9	3 1	19
45 5	45 5	45 6	45 7	45 8	45 9	45 8	45 9	45 9	45 6	02 00	47 0	10 12	44 0	3 0	20†
45 0	45 2	45 5	45 3	45 3	45 0	45 1	45 4	46 0	45 1	00 50	46 3	05 56	43 9	2 4	21
45 3	45 7	45 7	45 2	45 4	45 1	45 1	45 0	44 4	45 1	01 35	46 9	10 23	43 2	3 7	22††
44 4	44 9	44 9	44 8	45 1	45 1	45 1	44 8	44 3	45 1	03 36	47 5	12 09	43 2	4 3	23††
45 0	45 0	45 0	45 1	45 1	45 3	45 3	45 1	45 2	45 4	05 30	47 0	12 37	43 9	3 1	24††
44 7	44 9	44 9	44 9	44 7	44 8	44 9	44 7	45 0	45 0	01 20	46 2	11 35	43 0	2 4	25
44 2	44 5	44 9	44 7	44 7	44 8	44 9	45 0	45 0	44 9	07 00	45 6	11 05	43 9	1 7	26
44 8	45 0	45 0	45 0	45 0	44 8	45 0	45 3	45 5	44 9	23 20	45 8	01 55	44 0	1 8	27††
45 0	45 0	45 0	45 0	44 9	44 5	44 2	44 1	44 0	45 2	06 25	47 2	11 30	43 9	3 3	28††
44 8	45 1	45 0	45 0	45 1	45 1	45 1	45 2	45 2	45 1					2 6	Means
44 8	44 9	44 0	45 1	45 1	45 2	45 2	45 3	45 4	45 1						Means †
44 9	45 1	45 1	45 0	45 2	45 0	44 9	44 9	44 7	45 1						Means ††

† 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.)

March

1° 47 5' plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	44.4	44.6	44.8	45.0	45.0	45.3	45.7	45.4	45.4	45.1	45.0	45.3	44.1	43.9	44.4
2†	45.1	45.0	45.0	44.5	44.0	44.0	43.9	44.0	44.0	43.9	43.8	43.7	43.8	44.3	44.3
3	45.2	45.0	44.8	44.3	44.1	44.2	44.4	44.0	44.0	44.0	44.2	44.0	44.3	45.0	44.8
4†	45.0	45.0	45.0	44.6	44.6	45.0	45.0	45.3	46.0	45.7	45.2	45.0	44.9	44.4	44.4
5†	45.2	45.4	45.2	45.0	44.4	44.3	44.7	44.8	44.7	44.6	44.7	44.9	44.9	45.0	45.0
6	45.3	45.8	45.8	45.8	45.9	45.1	45.0	45.0	45.1	44.3	43.9	43.4	44.0	44.2	45.0
7††	44.9	44.7	44.7	44.4	44.5	44.9	44.9	45.1	45.1	45.3	45.0	45.0	45.1	45.1	45.1
8	44.8	44.6	44.7	44.9	45.0	45.0	45.0	45.3	45.8	45.3	44.8	44.9	44.3	44.2	44.8
9	44.8	45.0	45.1	45.0	45.0	44.9	44.8	45.1	44.8	44.3	44.0	44.0	44.3	44.2	45.0
10††	43.5	44.2	45.0	45.0	45.0	45.2	45.3	45.7	45.3	44.9	44.3	44.0	44.3	44.3	44.4
11	44.3	44.5	44.4	44.3	44.3	44.8	45.0	44.9	44.3	44.0	43.9	43.8	44.0	44.4	44.6
12	45.0	45.0	45.0	45.0	44.9	45.0	44.7	45.1	45.3	44.8	43.7	43.8	44.3	44.2	45.1
13††	44.8	44.3	44.4	44.2	44.5	44.8	44.3	46.1	46.8	45.9	44.1	43.6	43.9	44.1	44.2
14††	45.0	45.0	45.3	45.4	45.9	46.0	46.8	46.9	46.6	46.0	45.2	44.7	44.8	44.6	45.0
15	43.7	42.9	42.7	44.1	45.2	45.9	46.2	46.1	46.1	45.8	45.0	44.5	44.3	44.4	45.0
16	45.6	45.9	45.7	45.1	45.2	45.7	46.1	46.1	45.8	45.4	44.4	44.0	44.8	45.0	45.4
17	45.3	45.4	44.8	44.3	44.4	45.2	45.4	45.8	45.1	43.6	44.0	43.5	44.4	45.0	44.8
18	45.4	45.3	45.1	45.0	45.3	45.7	46.0	46.4	46.3	45.6	44.7	44.7	45.0	45.1	45.0
19	45.7	45.7	45.4	45.0	45.0	45.1	45.4	45.8	46.1	46.2	45.3	46.0	45.0	4.50	45.0
20	45.3	45.2	44.9	44.4	44.3	44.4	45.4	46.1	46.3	46.6	44.9	43.9	43.7	44.3	44.4
21†	45.4	45.3	45.1	44.8	44.1	44.0	44.5	45.1	46.1	46.0	45.3	45.0	45.1	45.3	45.2
22††	45.6	45.3	45.0	44.1	44.0	43.9	44.0	44.5	45.5	45.1	44.5	44.6	44.9	45.3	45.5
23	45.5	44.4	44.0	44.1	44.3	45.1	45.7	46.1	46.2	45.6	44.9	45.0	44.3	45.0	45.3
24	44.7	44.1	33.9	43.7	44.0	44.7	45.1	46.4	47.1	46.9	46.0	45.3	45.3	45.1	45.1
25	45.0	44.5	44.1	44.1	44.4	45.0	45.3	45.9	46.3	45.7	45.1	44.6	44.2	45.1	45.3
26	45.5	45.8	46.0	45.2	44.9	44.9	45.4	46.4	46.3	46.0	45.8	45.7	45.7	45.7	45.4
27	45.5	45.3	45.3	44.9	44.5	44.4	45.0	46.4	47.0	46.7	46.0	45.6	45.3	45.0	45.3
28†	45.2	45.0	45.0	45.0	44.4	44.5	45.0	45.9	46.5	46.3	45.7	45.1	45.0	45.4	45.3
29	45.6	45.6	45.2	45.0	45.1	45.0	45.1	46.3	47.0	46.8	45.9	45.5	45.7	45.7	45.8
30	44.3	44.6	44.3	44.8	45.1	45.4	45.9	46.0	46.4	45.6	45.2	45.2	45.3	45.8	46.0
31	45.7	45.8	45.2	45.0	45.0	45.0	45.5	46.1	46.4	46.1	46.0	46.0	45.6	45.5	45.7
Means	45.0	45.0	44.9	44.7	44.7	44.9	45.2	45.6	45.8	45.5	44.9	44.7	44.7	44.8	45.0
Means †	45.2	45.1	45.1	44.8	44.3	44.4	44.6	45.0	45.5	45.3	44.9	44.7	44.7	44.9	44.8
Means ††	44.8	44.7	44.9	44.6	44.8	45.0	45.1	45.7	45.9	45.4	44.6	44.4	44.6	44.7	44.8

† 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.)  
 1° 47.5' plus tabular quantities

March

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.			
45.0	44.9	44.9	45.0	45.1	45.0	45.0	45.2	45.0	44.9	06 02	45.8	12 23	44.8	1.0	1
44.5	44.8	45.0	45.0	45.0	45.0	45.0	45.3	45.4	44.5	23 10	45.5	10 33	33.6	1.9	2†
44.8	44.9	44.9	45.0	45.0	45.0	45.0	45.0	45.1	44.6	00 30	45.3	07 35	43.9	1.4	3
44.9	44.8	45.0	45.0	45.0	45.0	45.2	45.3	45.2	45.0	07 51	46.0	13 50	44.2	1.8	4†
45.9	45.0	45.0	45.0	45.0	45.0	45.0	45.1	45.2	44.9	01 00	45.5	04 34	44.2	1.3	5†
45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.9	03 47	46.0	10 50	33.2	2.8	6
46.0	45.7	45.1	44.9	45.1	44.9	44.6	44.7	44.8	45.0	15 05	46.1	03 25	44.2	1.9	7††
44.9	44.9	44.7	45.0	44.9	44.8	44.3	44.9	44.9	44.9	08 24	45.9	12 15	44.0	1.9	8
45.1	45.2	45.0	45.1	45.0	45.0	44.9	44.1	43.3	44.7	17 30	45.3	23 35	42.5	2.8	9
45.0	45.0	45.0	45.0	45.0	45.0	44.0	44.9	44.5	44.8	07 22	45.8	00 00	43.2	2.6	10††
44.8	44.9	44.9	44.8	44.7	44.9	44.9	45.0	45.0	44.6	23 15	45.1	11 15	43.3	1.8	11
44.7	45.0	45.0	45.0	45.0	44.9	44.9	44.9	44.8	44.8	07 52	45.5	10 20	33.5	2.0	12
44.3	44.5	44.5	44.9	45.9	45.1	45.1	45.0	45.2	44.7	07 45	46.8	11 03	43.2	2.6	13††
45.0	45.0	45.0	44.8	44.1	44.2	44.3	44.0	44.2	45.2	06 45	47.0	21 50	43.9	3.1	14††
45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.3	44.9	06 10	46.3	12 40	44.3	2.0	15
45.3	45.3	45.4	45.0	45.1	45.1	44.3	45.3	45.3	45.3	05 47	46.1	10 34	43.2	2.9	16
44.9	44.5	44.7	44.0	45.0	45.0	45.0	45.3	45.3	44.9	00 58	45.9	10 45	43.2	2.7	17
45.0	45.0	45.0	45.9	45.0	45.0	45.1	45.2	45.4	45.3	07 28	47.0	10 25	44.4	2.6	18
45.0	45.0	45.0	45.9	45.0	45.0	45.0	45.0	45.2	45.3	04 32	46.5	10 40	44.9	1.6	19
44.8	44.9	45.0	45.0	45.0	45.0	45.1	45.2	45.9	44.9	07 30	46.4	12 15	43.2	3.2	20
45.6	45.7	45.7	45.6	45.5	45.3	45.3	45.5	45.6	45.3	08 30	46.2	04 36	43.9	2.3	21†
45.7	45.4	45.0	45.0	44.9	45.1	45.0	45.1	45.0	44.9	15 25	45.8	05 22	43.8	2.0	22††
45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	08 10	46.4	02 00	43.9	2.5	23
45.1	45.0	45.0	45.0	45.0	44.8	44.7	44.9	44.9	45.1	08 22	47.5	02 30	33.5	4.0	24
45.5	45.7	45.5	45.4	45.3	45.3	45.3	45.3	45.5	45.1	07 57	46.6	02 30	34.0	2.6	25
45.5	45.3	45.3	45.2	45.3	45.0	45.0	45.1	45.3	45.5	07 34	46.8	05 00	44.7	2.1	26
45.4	45.5	45.3	45.3	45.1	45.0	45.0	45.0	45.0	45.4	08 06	47.1	05 22	44.2	2.9	27
45.4	45.5	45.4	45.3	45.2	45.0	45.0	45.2	45.5	45.3	08 28	46.9	03 45	44.3	2.6	28†
45.5	45.2	45.0	45.9	44.9	45.6	45.2	44.0	44.0	45.4	08 08	47.2	23 10	43.9	3.3	29
45.9	45.9	45.7	45.6	45.5	45.4	45.4	45.5	45.5	45.4	07 53	46.6	01 37	44.1	2.5	30
45.8	45.3	45.3	45.2	45.4	45.7	45.8	45.8	45.8	45.6	07 55	46.7	04 07	44.9	1.8	31
45.1	45.1	45.1	45.1	45.0	45.0	45.0	45.0	45.0	45.0					2.3	Means
45.1	45.2	45.2	45.2	45.1	45.1	45.1	45.3	45.4	45.0						Means†
45.2	45.1	44.9	44.9	44.8	44.9	44.8	44.7	44.7	44.9						Means††

† 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)

April

1°47'5 plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1†	45.8	45.4	45.0	44.3	44.3	45.0	45.7	46.7	47.0	46.4	45.4	44.9	45.1	45.5	45.8
2	45.8	45.3	44.9	44.9	45.1	44.9	45.4	46.5	47.1	47.0	46.3	45.7	45.9	46.0	45.5
3††	45.0	44.0	43.8	45.0	45.5	45.9	46.3	47.5	48.1	48.1	47.2	47.0	46.3	46.0	46.1
4††	44.9	44.7	44.7	44.7	44.8	44.9	45.2	46.0	46.0	46.3	45.6	45.1	45.1	45.3	45.4
5	45.1	45.0	44.3	44.3	44.4	44.5	45.1	46.1	46.4	46.0	45.8	45.1	45.2	45.9	45.7
6††	45.0	45.0	44.3	44.4	44.2	44.3	45.1	46.0	46.3	46.0	45.3	45.0	45.0	45.1	45.3
7	44.5	44.0	43.8	43.9	44.3	45.0	45.5	47.0	47.1	46.5	46.0	45.8	45.3	45.4	45.2
8	44.9	44.4	43.9	44.0	43.8	43.9	44.4	45.6	45.9	45.9	45.3	44.9	44.7	45.1	45.2
9	44.8	44.1	44.9	44.0	44.4	45.3	46.7	47.1	47.0	46.0	45.9	45.7	45.3	45.1	45.3
10	44.9	44.0	43.6	43.8	44.9	45.3	46.1	46.8	47.3	47.0	46.2	45.9	46.1	46.1	46.1
11	45.3	45.0	44.7	44.5	44.9	45.3	46.1	47.0	47.0	46.5	45.9	45.4	45.7	45.7	45.8
12	44.9	45.0	44.1	44.1	45.0	45.5	46.3	47.3	47.6	47.1	46.3	47.0	45.6	45.1	45.5
13††	45.0	45.0	44.8	44.9	45.1	45.1	45.3	46.3	47.0	46.6	46.3	46.0	46.0	45.7	45.1
14	45.6	45.0	44.6	44.8	45.0	45.8	46.5	47.0	47.0	46.3	46.8	46.7	45.3	45.9	45.7
15†	45.7	45.0	44.2	44.0	44.3	45.0	46.0	47.0	47.0	46.7	46.1	45.3	45.3	45.2	45.5
16†	45.6	44.9	44.3	44.9	45.4	46.2	47.0	47.2	47.8	47.1	46.0	45.3	45.2	45.4	46.0
17	45.9	45.0	44.2	44.3	45.0	45.6	46.6	48.2	48.7	48.7	48.1	47.2	46.8	46.2	46.2
18††	45.8	45.3	45.0	44.9	44.8	45.5	46.1	46.8	46.8	46.9	47.0	46.0	45.5	46.1	46.3
19	43.7	44.0	44.1	45.1	45.7	46.1	47.1	47.2	47.2	47.0	46.1	45.5	45.0	45.6	45.9
20	44.9	44.1	43.8	44.0	44.2	45.0	46.0	46.8	46.3	46.0	46.0	45.3	45.3	45.3	45.8
21	44.8	43.2	43.1	41.0	44.9	46.1	47.1	47.8	48.0	47.4	46.7	45.9	45.9	45.3	45.5
22	44.8	43.4	43.0	42.7	43.3	44.2	45.4	46.1	45.9	46.0	46.0	45.3	45.0	45.2	45.8
23	44.7	43.5	42.6	43.0	44.1	45.1	46.3	47.3	47.5	47.0	46.3	45.6	45.4	45.4	45.7
24	45.8	45.6	45.0	45.0	45.5	46.6	47.8	48.4	48.1	46.5	45.8	45.0	44.8	45.0	45.5
25	44.8	44.7	44.8	45.1	45.6	46.3	47.3	48.3	48.2	47.9	46.9	46.2	45.8	46.0	46.7
26	45.0	44.3	44.3	44.7	45.3	46.3	47.5	48.0	48.1	47.3	47.0	46.9	46.4	46.0	46.2
27	45.9	45.6	45.0	45.0	45.3	45.8	46.5	47.0	46.7	46.4	46.8	46.4	46.1	46.2	46.5
28†	45.9	45.4	45.0	45.2	46.0	47.0	48.0	48.0	47.4	46.1	45.9	45.2	45.0	45.1	46.0
29	45.6	45.0	45.0	45.0	45.8	46.4	47.5	48.0	47.3	46.8	46.2	45.7	45.0	45.2	46.0
30†	45.8	44.3	43.9	44.3	45.5	47.0	48.0	48.5	48.2	47.5	46.9	46.1	45.9	45.7	45.9
Means	45.2	44.7	44.3	44.4	44.9	45.4	46.3	47.1	47.1	46.8	46.2	45.8	45.5	45.6	45.8
Means †	45.7	45.2	44.6	44.7	45.0	45.8	46.7	47.2	47.2	46.6	45.9	45.2	45.1	45.3	45.8
Means ††	45.1	44.8	44.5	44.8	44.9	45.1	45.6	46.5	46.8	46.8	46.3	45.8	45.6	45.6	45.6

† 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.)

1°47'5 plus tabular quantities.

April

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.	'				
46.0	46.0	46.0	46.0	45.6	45.2	45.7	45.9	45.7	45.6	08	07	47.1	03	27	44.2	2.9	1†
45.7	45.9	45.7	45.0	45.0	44.9	44.7	45.0	45.0	45.5	07	30	47.2	05	20	44.6	2.6	2
46.1	46.1	45.6	45.1	45.0	44.9	44.8	45.0	44.9	45.8	08	43	48.5	02	00	43.2	5.3	3††
45.5	45.3	45.1	45.2	45.2	45.1	45.1	45.2	45.3	45.2	07	41	46.6	01	25	44.3	2.3	4††
45.2	45.6	46.7	45.8	45.3	45.0	44.2	44.1	44.9	45.2	08	24	46.7	22	15	44.0	2.7	5
45.7	45.2	45.2	45.0	45.0	44.8	44.9	45.0	45.0	45.1	07	31	46.4	04	02	44.0	2.4	6††
45.6	45.5	45.2	45.3	45.0	44.9	44.9	45.0	45.0	45.2	08	07	47.2	01	43	43.6	3.6	7
45.2	45.1	45.0	44.8	44.8	44.8	44.9	44.9	44.8	44.8	08	10	46.0	04	00	43.5	2.5	8
45.1	45.0	45.0	44.9	44.9	45.0	44.9	44.8	41.8	41.8	06	38	47.2	02	45	43.0	3.3	9
46.3	44.6	46.0	45.9	45.6	45.0	45.0	45.1	45.3	45.6	07	05	47.6	01	45	43.5	4.1	10
45.9	45.9	45.9	45.8	45.8	45.7	45.6	45.4	45.2	45.7	07	20	47.1	02	45	44.2	2.9	11
45.5	45.6	45.7	45.7	45.6	45.5	45.4	45.1	45.2	45.7	08	15	47.7	02	10	44.0	3.7	12
45.3	45.5	45.7	45.8	45.9	45.3	45.8	46.0	46.0	45.6	07	40	47.0	02	15	44.5	2.5	13††
45.7	45.9	45.8	45.7	45.6	45.7	45.6	45.8	45.8	45.8	08	10	47.1	01	26	44.4	2.7	14
45.8	45.5	45.3	45.5	45.4	45.6	45.5	45.6	45.6	45.5	07	15	47.1	01	13	44.0	3.1	15†
46.1	46.0	46.0	46.0	45.9	45.7	45.7	45.8	45.7	45.9	08	20	47.4	01	55	44.2	3.2	16†
46.7	46.2	46.0	45.9	45.7	45.6	45.5	45.5	45.7	46.2	02	02	48.9	02	18	44.0	4.9	17
45.9	46.2	46.3	45.8	45.2	44.9	44.8	44.7	44.1	45.7	06	23	47.2	04	00	44.5	2.7	18††
46.0	45.9	45.5	45.4	45.1	45.0	45.0	45.1	45.1	45.6	06	47	47.4	00	01	43.5	3.9	19
45.7	45.8	45.9	45.2	45.1	45.2	44.9	45.1	45.0	45.3	07	10	46.9	01	58	43.5	3.4	20
45.9	46.0	45.7	45.7	45.3	45.0	45.0	45.0	45.0	45.6	07	41	48.1	02	13	43.0	5.1	21
45.6	45.7	45.8	45.9	45.2	45.0	45.0	45.0	45.0	45.0	09	25	46.2	02	42	42.5	3.7	22
46.0	46.0	45.9	46.0	45.8	45.3	45.3	45.3	45.7	45.5	07	45	47.6	01	50	42.2	5.4	23
46.0	45.8	45.8	45.7	45.8	45.4	45.0	45.2	45.0	45.8	07	15	48.9	12	05	44.5	4.4	24
47.0	46.3	46.0	45.3	45.0	45.0	44.9	45.0	45.0	46.0	07	22	49.0	01	16	44.5	4.5	25
46.2	46.0	45.9	45.5	45.3	45.3	45.2	45.4	4.55	46.0	07	15	48.2	01	12	44.0	4.2	26
46.7	46.8	46.3	46.0	46.0	46.0	45.9	45.9	46.0	46.1	07	15	47.1	02	05	41.9	2.2	27
46.2	46.3	46.0	46.0	45.8	45.6	45.8	45.5	45.6	46.0	07	12	48.1	02	12	44.9	3.2	28†
45.9	45.8	45.8	45.9	45.9	45.8	45.7	45.8	45.8	46.0	06	53	48.1	12	59	44.9	3.2	29
46.0	46.0	46.0	45.9	*	*	*	*	*	*			*			*	*	30†
45.9	45.8	45.7	45.6	45.4	45.2	45.2	45.2	45.3	45.6							3.5	Means
46.0	45.9	45.8	45.9	45.7	45.5	45.7	45.7	45.7	45.7								Means†
45.7	45.7	45.6	45.5	45.3	45.0	45.1	45.2	45.1	45.5								Means††

† International quiet days.

†† International disturbed days.

\* Loss of record. (Day omitted for means)

TABLE 5

Hourly Values of Declination (Westerly) 1951.

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

May

1°47.5' plus tabular quantities.

Date.	Hours G. M. T.														
	[0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1††	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2††	45.0	43.9	43.7	44.6	45.9	47.0	47.7	48.3	48.5	48.0	46.6	46.3	46.2	46.4	46.5
3	44.5	43.6	43.6	44.4	45.4	46.5	47.9	48.0	47.7	47.4	46.3	45.6	45.6	46.1	45.9
4	44.4	43.5	43.4	43.9	45.0	46.1	47.2	47.6	47.4	46.9	46.2	45.5	45.2	45.1	45.7
5	45.3	44.6	44.4	44.9	45.7	46.6	47.5	48.3	47.7	47.2	46.5	45.9	45.6	45.5	45.8
6	45.4	44.8	44.4	44.4	44.9	45.4	46.1	47.2	47.2	46.7	46.3	45.7	45.4	45.6	46.1
7	45.8	45.3	44.5	44.6	45.8	47.5	47.8	48.6	48.5	48.1	47.5	47.1	46.4	46.5	46.5
8†	45.4	44.5	44.0	44.5	45.4	45.8	46.5	46.8	46.4	45.9	45.5	45.4	45.1	45.6	46.3
9††	45.3	44.5	44.4	44.9	46.5	48.0	48.6	48.5	47.9	47.4	46.8	46.1	45.9	46.5	47.3
10††	45.0	44.4	44.4	45.0	46.3	48.0	48.7	49.1	48.6	47.9	46.1	45.4	45.7	46.4	45.9
11	45.3	44.7	44.9	45.4	45.7	47.1	47.7	*	*	*	*	*	46.5	46.7	47.6
12	47.6	46.7	46.5	46.3	46.4	47.4	48.1	48.7	48.7	48.7	48.7	48.4	47.8	47.7	47.8
13†	47.4	46.3	45.7	46.4	47.1	48.4	49.0	49.7	49.2	48.4	47.7	47.6	47.7	47.6	47.7
14	47.6	46.8	46.6	46.6	46.9	47.7	48.4	49.4	49.4	49.1	48.7	48.7	48.2	47.7	47.7
15	47.5	46.6	46.4	46.0	*	*	*	*	47.7	47.7	47.8	48.0	48.0	47.7	47.4
16	46.4	45.8	45.4	45.4	46.6	47.7	48.5	49.0	49.5	48.7	48.0	46.7	46.8	47.6	47.6
17	46.6	46.2	45.3	44.7	45.9	47.5	48.7	49.6	49.4	48.9	47.4	47.2	46.7	47.2	47.6
18	46.3	45.7	45.7	45.8	46.9	48.0	*	*	*	*	*	*	*	47.3	47.8
19	46.5	45.6	45.2	45.0	46.1	47.4	48.4	48.8	49.7	48.8	48.5	47.7	47.0	47.5	47.8
20†	47.4	46.7	46.6	46.7	47.5	48.4	48.9	49.5	49.5	48.6	47.8	47.4	46.8	46.8	47.8
21†	46.6	46.1	46.4	46.5	47.4	48.8	49.3	49.8	49.8	49.7	49.3	48.3	47.3	47.5	47.8
22†	46.6	45.2	44.8	45.5	46.7	47.6	48.3	49.6	50.0	50.0	49.8	49.1	48.8	48.0	48.0
23	46.7	46.1	45.3	45.8	47.3	48.7	49.4	49.8	49.8	49.6	49.2	48.9	48.5	48.6	48.8
24	47.9	46.8	45.7	45.8	45.9	47.5	48.4	48.9	49.0	48.7	48.0	47.6	46.9	47.5	47.9
25	47.4	46.5	45.8	45.8	45.8	46.7	47.9	49.1	48.9	48.1	47.5	47.6	46.9	47.1	47.7
26††	46.5	46.1	45.6	45.7	46.4	47.6	48.5	48.9	48.4	47.5	47.0	47.9	47.9	48.0	48.7
27	45.7	44.8	45.0	45.8	46.8	48.9	49.9	49.8	50.9	50.2	49.4	48.2	47.9	47.9	47.9
28	46.7	45.9	45.8	46.4	47.9	48.9	49.2	49.0	48.7	47.9	47.9	*	*	47.9	47.9
29	47.0	46.7	46.7	46.8	*	*	49.0	49.0	48.9	48.1	47.9	47.9	47.8	48.0	48.0
30	46.9	46.7	45.9	45.6	45.7	47.0	46.4	46.1	45.9	45.5	45.2	46.0	46.6	46.9	47.5
31	46.5	45.9	45.8	45.9	46.6	46.9	47.0	47.8	47.7	47.0	47.6	46.9	48.0	47.8	47.1
Means	46.3	45.5	45.1	45.4	46.2	47.4	48.1	48.7	48.6	48.1	47.5	47.1	46.8	47.0	47.3
Means †	46.7	45.8	45.5	45.9	46.8	47.8	48.4	49.1	49.0	48.5	48.0	47.6	47.1	47.1	47.5
Means ††	45.4	44.7	44.5	45.0	46.3	47.7	48.4	48.7	48.6	48.0	46.9	46.1	46.1	46.7	46.8

† International quiet days.

†† International disturbed days.

\* Loss of record. (Day omitted for means)

TABLE 5

Hourly Values of Declination (Westerly) 1951.  
(Averages for sixty minutes centred at the full hours of Greenwich mean time.)

May 1°47.5' 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.	'	'	
46 3	45.6	45 5	45.5	45.4	45 3	45 1	44 5	44 8	45 9	06 58	48 6	00 46	43 4	5 2	1††	
46 2	45 9	45 6	45 3	44 8	45.1	45.4	45 4	45 2	45.7	07 20	48 3	00 50	43 5	4 8	2††	
46.2	46 1	46 1	45 5	45 4	45 4	45 4	45 4	45 4	45 6	07 .02	47 9	01 58	43 3	4 6	3	
46 1	45.8	45 8	45 7	45 4	45 4	45 4	45 4	45 3	45 9	06 56	48 5	01 50	44 3	4 2	4	
46.2	46.1	46 0	45 7	45 7	45 6	45 5	45 5	45 6	45 7	07 24	47 5	03 18	44.2	3 3	5	
46 5	46.5	46 5	46 3	46 0	45 5	45.6	45 6	45 7	46 4	07 22	48 7	02 26	44 4	4 3	6	
46.5	46 5	46 4	46 3	46 0	45 6	45 5	45.6	45 5	45 7	07 10	47 4	02 28	43 6	3 8	7	
47 1	46 9	46 5	46 4	46 1	45 2	4.44	43 1	42 5	46 1	06 30	48 7	22 54	40 8	7.9	8†	
46 0	46 5	46 5	46 5	46 5	46.4	46 3	45 8	45.5	46 4	06 58	49 6	01 52	44 2	5 4	9††	
47 7	48 0	48 0	47 8	47 6	47.6	47 5	47 3	47 4	*	*	*	*	*	*	10††	
47 8	47.8	47 7	47 7	47 7	47 6	47 6	47 6	47 6	47 7	07 52	48 9	02 53	46 1	2 8	11	
47 7	47 8	47 8	47 7	47 7	47 7	47 7	47 7	47 7	47 7	07 10	49 8	01 58	45 6	4.2	12	
47 7	47 7	47 7	47 7	47 6	47.4	46 8	47 6	47.7	47 8	07 10	49 6	02 24	46 5	3 1	13†	
47 6	47 6	47 3	46 7	46 6	46 6	46.6	46 6	46 6	*	*	*	*	*	*	14	
47 7	47.6	47 5	47 5	46 7	46 6	46 6	46 6	46 6	47 2	07 16	49.7	01 44	45.0	4.7	15	
47.7	47 6	47 8	47 5	47 4	46.7	46 6	46 6	46 6	47 2	07 30	49 7	02 20	44 6	5 1	16	
47 8	47 8	47 8	47 8	47 6	47 3	46 9	46 9	46 7	*	*	*	*	*	*	17	
47 6	47 5	47.2	47 3	47 0	46 9	46 8	46 8	47.4	47 3	08 02	49 8	02 58	44 9	4.0	18	
47 8	47 8	47 7	47 2	46 8	46 8	46.7	46 7	46 7	47 5	07 42	49 8	02 38	46 4	3.4	19	
47 8	47 8	47 7	47 4	46 8	46 7	46 7	46.7	46 7	47.7	06 50	49 9	01 18	45 9	4.0	20†	
47.9	47 8	47.7	47 5	47 5	47.7	46.8	46.7	46 8	47.7	09 14	50 4	01 50	44.7	5 7	21†	
48.8	48.8	48 7	48 4	47 9	48 0	48.3	47.6	47 7	48 2	07 24	50 1	02 02	45.2	4 9	22†	
47.9	48 0	47 9	47 9	47 9	47.8	47 4	47.4	47 8	47 6	07 18	49 4	02 24	45.3	4.1	23	
47 9	47 9	47 9	47 7	47 5	47 0	46 8	46 8	46 8	47 3	07 40	49 4	02 58	45 6	3.8	24	
48 9	48 8	48 2	47 4	46.9	46 7	46.6	46.7	46.7	47.4	07 06	49 2	02 10	45.5	3.7	25	
47.9	47 8	47.7	47.6	47 1	46.8	46.8	46 8	46 8	47.7	08 08	51 1	00 40	44.6	6 5	26††	
47.9	47 9	47 9	47 9	47 8	47 4	47 0	47.3	46 9	*	*	*	*	*	*	27	
48 0	48 0	48 0	48 0	47 7	47 2	47.2	47.7	47 1	*	*	*	*	*	*	28	
47 1	46 9	46.9	46 9	46 9	46.9	46 9	46.8	46 8	46.5	14 34	48 0	03 30	45.1	2.9	29	
47.1	47 1	46 9	46.9	46.9	46 8	46 7	46 1	46 0	46 9	1. 38	48 1	02 30	45 7	2.4	30	
47 3	47 2	47 1	46 9	46 7	46.5	46.4	46 3	46 3	46.9					4.4	ean.	
47 5	47 5	47.5	47 2	47.6	46 9	46 7	46.7	46.7	47 3						Mean.†	
46.8	46.7	46 5	46.5	46.2	45 9	45.8	45.0	44.9	46 4						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.)

June

1°47' 5 plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	46 0	45 3	44 7	44 1	45 4	46 5	47 4	47 5	47 1	46 9	46 9	46 5	46 7	47 5	48 0
2	46 7	45 9	45 9	45 9	46 4	47 2	48 0	48 5	47 7	46 9	46 5	46 1	46 4	47 5	47 7
3	45 9	45 9	45 8	46 6	47 5	48 7	49 9	49 5	49 1	48 6	47 7	47 3	47 0	47 3	47 6
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
††6	47 5	47 5	47 0	46 5	47 0	48 1	48 6	47 6	48 6	48 1	47 6	47 5	47 0	47 6	48 6
7	47 0	45 5	46 0	45 5	46 0	46 4	48 1	48 8	49 0	48 6	48 1	47 5	46 8	47 0	47 0
8	46 8	45 9	45 3	45 9	47 1	48 7	49 2	49 2	49 2	48 6	47 3	46 3	46 1	46 2	46 9
9	46 1	45 2	44 8	45 1	45 9	47 3	48 0	48 9	48 7	47 8	46 9	46 1	45 7	45 9	46 1
†10	46 2	45 7	45 2	45 3	46 3	47 6	48 2	49 1	49 0	48 2	48 0	47 3	47 1	47 4	48 0
11	45 9	45 6	45 3	45 1	45 4	45 9	47 1	48 2	47 4	47 1	47 1	46 8	46 7	46 5	46 8
12	45 7	45 1	45 1	45 3	46 0	46 3	47 1	47 6	47 6	47 1	47 1	47 0	47 0	47 0	47 1
13	45 6	45 2	45 4	*	*	*	*	*	*	*	*	*	*	*	*
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15	*	*	*	*	*	*	47 6	48 5	48 6	47 4	46 4	46 3	46 3	45 7	46 2
16	44 5	43 3	43 1	43 2	44 0	46 0	47 4	48 3	48 5	48 3	47 3	46 3	45 9	46 7	47 4
††17	46 1	44 9	44 3	44 3	45 6	47 2	48 5	49 5	49 2	48 5	48 3	47 6	46 9	46 7	47 4
††18	46 5	45 9	44 9	45 4	46 4	47 1	47 9	49 5	49 5	48 7	47 3	46 4	46 2	46 1	46 4
††19	45 9	44 8	43 8	44 3	45 4	46 6	47 4	46 9	46 5	46 3	46 4	45 4	46 0	46 4	46 4
†20	45 9	45 0	44 3	44 5	45 6	46 4	47 3	47 6	47 4	47 1	46 6	46 6	46 6	46 8	47 4
21	45 5	45 4	44 9	44 0	44 3	45 4	47 2	47 4	47 8	47 6	47 2	46 6	46 5	46 8	47 4
†22	46 7	45 9	45 4	45 4	45 7	46 4	47 6	49 1	49 1	48 0	47 4	47 4	47 1	47 2	47 4
†23	46 7	45 9	45 2	44 9	45 7	47 1	48 5	49 0	49 4	49 0	48 5	48 4	48 2	47 9	48 3
†24	47 7	46 9	46 5	46 9	46 7	47 7	48 5	49 2	49 4	49 3	49 0	48 3	47 4	47 3	47 3
††25	46 9	45 9	45 9	55 7	46 1	46 9	48 5	49 3	48 7	47 9	46 9	46 3	45 8	45 8	46 1
26	45 4	44 9	44 3	44 5	45 4	46 4	48 5	49 0	48 7	48 3	47 4	46 7	46 5	46 9	47 4
27	46 1	45 4	44 7	45 0	46 4	47 5	48 5	48 6	48 5	48 5	47 9	47 4	47 3	47 3	47 3
28	45 9	45 4	45 4	45 4	45 8	46 1	46 9	47 8	47 9	48 3	47 4	46 7	47 3	47 6	48 3
29	45 9	44 9	44 3	44 9	46 1	46 9	47 8	47 9	48 3	48 1	47 5	47 4	47 4	47 5	48 3
30	46 0	45 4	45 4	45 7	46 6	47 7	48 5	48 7	49 0	48 4	47 3	47 0	47 2	47 4	47 9
Means	46 2	45 5	45 1	45 2	46 0	47 0	48 0	48 5	48 5	48 0	47 4	46 9	46 8	47 0	47 4
†Mean	46 6	45 9	45 3	45 4	46 0	47 0	48 0	48 8	48 9	48 3	47 9	47 0	47 3	47 3	47 7
††Means	46 6	45 8	45 2	45 2	46 1	47 2	48 2	48 6	48 5	47 9	47 3	46 6	46 4	46 5	47 2

† 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)

June

$\gamma$  47°.5 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.	'		
48 0	47 8	47 6	47 1	47 1	46.9	46 7	46.9	46 9	46.7	15 02	48 5	02 28	43 9	4.6	1
48 0	48 0	47 9	47 2	47.1	47 1	46 8	46 7	46 4	47 0	06 50	48 9	02 42	45 7	3.2	2
48 1	48 1	47 9	47 6	47 3	47 0	47 0	47 0	46 9	47 6	05 54	50 1	01 58	45 7	4.4	3
*	*	*	*	*	*	*	*	*	*		*		*	*	4
*	*	*	*	*	*	*	*	*	*		*		*	*	5
48 1	48.0	47.9	48.0	47.6	47 5	47.0	47 0	47.6	47 6	06 06	48 1	03 01	46 2	2.5	6††
47.1	47.4	47 1	47.0	47 2	47.0	47 0	46 9	47 0	47 1	07 52	49 1	01 44	45 0	4.1	7
47 1	46 7	46 5	46 4	46.4	46.3	46 3	46 1	46.3	46 9	06 42	49.4	01 50	45 2	4.2	8
46 1	46 3	46 7	46 4	46 3	46 3	46 3	46.1	46 3	46 5	07 16	49 2	02 16	44 4	4.8	9
47 3	47.3	47.1	47 0	46.3	46 3	46.2	46 1	46 1	47.0	07 31	49 2	01 50	45 1	4.1	10†
47 0	47.1	47.1	46.4	46 9	46.5	46.1	46 0	46 0	46 5	07 10	48 4	02 38	44 9	3.5	11
47.2	47 1	47.1	47.1	46.4	46 1	46 1	45 9	45 9	46 5	07 34	47 9	01 54	44 9	3.0	12
*	*	*	*	*	*	*	*	*	*		*		*	*	13
*	*	*	*	*	*	*	*	*	*		*		*	*	14
46.4	46.4	46 4	46 4	46.4	46 4	45.4	45 4	45.4	*		*		*	*	15
47.6	47 6	47.4	47 3	46 8	46.4	46.4	46 7	46 6	46.4	07 44	48 7	02 30	42 7	6.0	16
47.3	47 3	47.4	47 2	46 9	46 9	47.1	47 9	48 0	47 1	07 32	49 7	01 51	44 2	5.5	17††
46 6	46.7	46.5	46.4	46 4	46.4	46 1	46 4	46.4	46 8	07 26	50 0	02 06	44 5	4.5	18††
46 5	46.4	46 1	46 1	46.4	46.4	46.0	45.7	46 2	46.0	06 26	47.6	02 54	43.5	4.1	19††
47.2	47.1	46 7	46.4	46 2	46 0	46.1	46.4	45 8	46 4	07 16	47 9	01 42	44.1	3.8	20†
47.3	47.2	47.4	47.3	47 0	46.5	46 5	46.5	46.7	46 5	07 26	48.0	03 02	43 9	4.1	21
47.6	47.8	47.4	47.4	47 3	47 1	46 9	46.7	46 7	47 1	07 30	49 5	02 43	45.1	4.4	22†
48.5	48.3	48.4	47.9	47 8	48 2	47 9	47.7	47 7	47 7	07 10	49.6	02 10	44.6	5.0	23†
47.4	47.4	47.4	47 5	47.5	47 6	47.5	47.5	47.6	47.7	07 54	49.8	02 06	46.4	3.4	24†
45 1	45 8	46 2	46 4	46.4	46 3	46.4	46.1	45 6	46 6	07 22	39 5	03 20	45.4	4.1	25††
47.4	47.4	47.4	46.9	47 4	46 9	46.1	46 3	46 3	46.8	06 18	49 3	02 40	44.1	5.2	26
47.4	47.4	47.6	47 3	46 9	46 5	46.4	46.1	46.4	47 0	08 40	48 9	02 48	44.5	4.4	27
47.8	47.4	47.3	47 1	46 7	46.5	46.4	46 4	46.4	46 8	07 56	48.7	02 24	45 2	3.5	28
48.1	47.6	47.4	47 1	46.7	46.4	46 4	46.3	46.3	46 9	08 10	48 5	02 10	44.1	4.4	29
47.5	47 4	47 4	47 1	46.7	46 5	46 5	46 4	46 4	47 1	07 36	49 3	01 36	45.1	4.2	30
															31
47.4	47.3	47 2	47 0	46 9	46.7	46.6	46 6	46.6	46 9					4.2	Means
47.6	47.6	47 4	47 2	47.0	47 0	46.9	46.9	46 8	47 2						Means†
46.8	46 8	46.9	46 9	46.7	46.7	46.6	46 6	46 6	46 8						Means††

† 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)

January

39,000γ plus tabular quantities

Date	Hours G. M. T.														14
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1	371	377	396	419	485	448	439	433	413	386	367	365	368	362	352
2††	343	342	346	362	405	435	446	438	403	362	347	350	352	359	352
3	354	353	365	394	425	435	451	464	438	410	385	365	353	349	349
4†	359	349	339	356	354	451	480	480	441	396	371	363	368	371	365
5	375	376	382	399	425	448	458	448	434	415	395	381	375	371	371
6†	373	372	380	398	410	441	445	447	439	411	386	376	374	368	371
7†	356	359	375	403	435	453	453	424	385	348	337	349	362	366	361
8	361	268	377	398	398	476	476	445	402	368	373	377	373	363	345
9†	270	282	396	441	446	502	502	460	411	373	354	364	377	777	377
10	363	368	382	407	438	464	460	447	428	412	402	397	398	398	392
11	340	339	345	350	380	405	414	390	351	312	296	311	326	332	334
12	338	346	341	386	419	444	436	392	370	350	331	342	340	351	343
13	353	357	351	366	389	400	417	413	393	370	350	350	361	361	361
14	355	348	347	363	390	414	429	394	370	348	338	343	354	348	345
15	343	342	344	363	300	408	417	407	383	360	341	344	336	339	341
16	342	337	333	359	383	412	428	424	411	398	379	370	364	352	357
17	342	346	356	382	386	382	486	390	376	374	365	358	354	351	350
18†	351	355	363	381	403	431	460	464	448	423	398	381	375	367	361
19	385	384	289	394	404	417	425	428	422	403	394	386	373	360	362
20	328	333	327	356	356	384	405	418	415	401	391	393	391	389	379
21††	376	380	391	410	430	442	450	448	443	424	406	391	371	317	360
22††	365	265	365	385	371	394	406	390	389	378	380	374	368	354	321
23††	349	356	373	389	394	404	412	405	387	367	348	341	341	339	330
24	355	355	363	384	396	425	435	413	399	380	370	361	360	358	356
25	357	360	369	389	412	433	446	440	427	396	379	369	366	361	354
26	358	358	368	400	440	463	483	493	479	448	417	401	406	407	415
27	344	354	369	388	384	407	402	493	408	394	381	370	354	349	343
28	359	361	369	383	412	444	448	452	447	415	385	378	376	380	374
29	330	330	343	360	369	380	399	402	384	373	355	340	336	333	331
30	354	353	357	378	412	442	458	466	446	431	416	311	405	396	392
31††	356	363	367	378	371	371	344	303	454	252	266	270	291	246	254
Means .	355	357	363	385	406	428	435	426	406	383	368	364	363	357	355
Means † . .	362	363	371	396	416	456	468	455	425	390	369	366	371	370	367
Means †† . .	258	361	368	385	394	409	410	397	375	357	349	345	345	323	323

† 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.)

January

39,000  $\gamma$  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		
$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	H. M.	$\gamma$	H. M.	$\gamma$	$\gamma$		
340	345	349	357	358	357	358	354	353	382	05 02	452	16 00	343	109	1
347	338	332	332	338	354	346	342	347	363	05 42	450	16 42	331	119	2††
362	343	343	346	353	354	348	353	353	376	06 50	469	16 46	342	127	3
374	354	354	365	363	364	369	376	373	380	06 42	490	02 12	338	152	4†
371	371	371	361	357	352	362	376	370	389	05 50	462	20 14	347	115	5
361	371	371	368	368	369	374	371	371	388	06 22	454	20 12	366	88	6†
354	361	361	363	366	361	361	361	360	376	05 24	463	09 46	336	117	7†
367	366	368	275	277	377	377	376	379	388	05 26	490	14 06	342	148	8
387	368	367	365	365	364	363	362	260	393	05 42	517	09 52	353	164	9†
330	272	361	330	335	350	348	345	354	389	05 20	471	18 10	311	160	10
343	328	372	314	305	305	298	311	319	336	06 02	420	10 00	291	129	11
356	338	367	343	351	356	358	355	352	361	05 34	465	10 08	328	137	12
348	356	352	356	356	351	337	342	346	365	06 42	434	20 50	336	98	13
332	345	321	345	338	343	356	359	355	359	06 10	437	19 12	336	101	14
333	343	338	333	328	336	334	347	343	354	05 36	422	19 00	324	98	15
354	352	356	351	342	357	352	356	352	367	06 30	435	01 42	332	103	16
348	348	348	347	352	356	358	356	353	361	03 30	400	00 10	341	59	17
364	363	361	357	357	363	363	371	376	385	06 42	470	00 18	350	120	18†
378	389	383	384	375	378	363	355	336	386	06 14	339	23 26	329	110	19
410	386	390	390	391	393	395	396	400	384	06 52	424	02 14	321	103	20
318	274	275	283	297	303	312	331	326	365	05 34	453	17 18	264	189	21††
330	351	365	366	353	351	388	370	360	368	06 10	414	14 34	304	110	22††
330	330	338	339	358	349	343	351	353	359	06 06	423	17 00	329	94	23††
352	350	355	358	362	359	361	356	355	372	05 44	458	16 04	349	109	24
356	357	357	359	360	359	365	364	364	379	05 58	452	13 56	353	90	25
401	388	379	352	324	325	334	348	358	398	06 58	495	18 54	319	176	26
344	345	345	346	339	335	334	339	333	363	05 40	424	20 26	327	97	27
367	365	369	386	384	362	373	367	367	388	07 30	457	00 30	353	104	28
335	330	328	326	320	316	321	327	329	346	07 34	404	20 18	313	91	29
390	382	368	379	370	368	361	364	378	395	07 14	483	01 56	349	134	30
266	251	352	252	252	265	288	294	290	296	02 58	394	08 18	227	167	31††
354	350	349	349	348	339	352	354	354	371				120	Means	
365	363	363	364	364	364	366	368	368	384					Means†	
317	309	312	314	320	324	337	338	335	350					Means††	

† 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

February

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	327	340	314	303	287	300	314	319	326	320	325	339	345	346	348
2†	348	346	352	364	389	423	436	435	417	395	381	376	371	364	361
3†	344	348	362	401	437	470	497	486	450	419	398	389	382	377	373
4	370	373	381	404	439	466	472	453	424	392	362	343	337	328	313
5	364	368	333	412	455	488	456	465	460	441	426	412	407	393	366
6	342	347	375	400	389	331	303	329	300	313	317	319	336	336	337
7	360	356	369	389	405	429	429	416	376	346	343	348	358	364	363
8	359	355	379	427	452	466	456	443	403	370	364	369	379	385	387
9	332	338	359	385	412	432	415	401	385	347	332	332	331	320	329
10	337	337	357	395	431	441	441	599	360	337	327	337	350	351	349
11	351	347	351	379	414	451	455	438	404	360	334	332	346	356	356
12	356	358	364	372	398	421	400	352	322	288	265	267	295	317	302
13	360	348	349	353	384	414	433	437	417	394	373	357	345	346	351
14	341	339	340	358	399	429	444	440	421	397	383	371	375	377	375
15†	357	359	373	396	424	439	450	438	416	390	376	376	362	251	348
16†	332	345	363	397	431	447	441	430	427	397	369	347	340	352	342
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20†	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21	375	379	397	409	405	487	484	459	424	383	363	384	402	403	398
22††	387	387	403	437	464	488	504	468	407	392	353	354	345	332	328
23†	368	372	374	398	432	455	455	451	373	332	333	350	340	339	314
24††	355	346	341	359	386	413	418	408	377	351	327	332	332	331	330
25	355	351	359	413	449	463	461	453	440	435	425	403	408	409	406
26	405	406	419	454	487	506	508	496	479	463	448	434	419	424	406
27††	401	408	404	396	419	425	456	444	414	396	385	384	386	376	382
28††	433	404	395	435	501	501	514	481	418	423	417	414	399	401	399
Means	361	361	370	394	403	441	443	431	402	378	364	361	363	362	357
Means †	345	349	363	389	400	445	456	449	427	400	381	372	364	361	356
Means ††	389	383	383	405	440	456	469	450	398	379	379	367	360	356	351

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted for means).

Temperature Co-efficient experiment performed.



TABLE 8

Hourly Values of Horizontal Force, 1951.

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

February

39,000γ 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		
349	349	349	349	346	348	361	352	351	335	20	44	373	03	30	277	96	1
357	360	356	359	359	356	357	360	357	374	06	28	413	01	00	345	98	2†
373	372	370	369	373	373	372	372	370	395	06	11	502	02	22	313	159	3†
313	309	311	324	339	343	343	343	354	368	05	42	479	16	30	307	172	4
364	362	364	360	354	336	335	360	349	395	04	24	500	20	46	319	181	5
346	348	351	348	350	358	363	366	370	345	03	21	419	08	14	269	150	6
361	350	325	314	323	335	345	380	349	394	05	22	468	09	32	305	163	7
379	365	346	332	346	356	366	379	371	385	05	24	471	17	20	326	145	8
338	315	314	330	343	332	342	356	351	354	05	22	442	15	14	312	130	9
352	351	351	353	355	359	350	360	365	364	05	36	455	09	38	326	129	10
351	346	362	342	339	340	348	351	352	367	06	02	466	10	42	328	138	11
290	300	310	342	356	343	344	347	358	336	05	26	437	10	30	255	182	12
354	347	340	338	342	353	315	338	310	365	07	02	460	01	30	316	144	13
374	371	375	379	393	377	375	381	374	383	06	34	463	01	42	333	130	14
348	340	337	328	324	324	319	314	320	467	06	10	453	22	38	314	139	15†
340	355	338	340	338	346	316	348	351	369	05	00	449	00	30	331	118	16†
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	17
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	18
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	19
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	20†
392	391	393	396	387	378	378	384	392	405	05	24	494	09	44	303	131	21
306	316	316	339	347	363	371	366	358	380	06	14	542	15	18	296	246	22††
340	340	343	347	371	371	354	315	367	369	05	12	478	14	20	306	172	23††
351	335	362	357	359	361	358	356	355	358	05	12	432	14	38	321	111	24††
406	408	401	402	403	406	402	412	415	412	05	34	472	01	30	344	128	25
401	395	401	415	400	405	408	406	409	433	05	26	522	16	30	390	132	26
399	390	395	395	398	400	410	410	425	404	05	58	469	12	06	374	95	27††
394	389	393	393	396	407	400	396	408	421	04	42	625	04	54	365	260	28††
357	353	355	357	360	361	362	366	367	377							148	Means
355	352	350	349	349	350	349	349	349	376								Means †
358	354	362	366	374	380	379	376	383	386								Means ††

† International quiet days.

†† International disturbed days.

\* Loss of record. (Day omitted for means.)

\* Temperature Co-efficient experiment performed.

TABLE 9

## Hourly Values of Horizontal Force, 1951

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

March

39,000γ plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	398	395	401	427	470	484	490	481	473	453	436	421	410	401	400
2†	416	416	419	436	461	485	495	494	478	466	453	442	429	417	411
3	425	424	432	486	523	536	527	507	480	452	435	437	442	439	428
4†	440	450	466	495	531	554	548	523	517	466	431	427	430	431	416
5†	425	428	442	449	477	503	490	461	450	422	420	424	427	428	419
6	426	430	444	478	508	530	513	487	472	459	453	444	430	432	428
7††	438	446	463	474	486	509	527	528	518	500	482	445	401	336	313
8	388	388	399	424	447	467	461	439	417	409	386	401	407	403	396
9	406	405	413	431	456	478	469	458	448	416	396	399	391	381	387
10††	417	405	422	424	452	491	525	493	463	444	420	408	402	408	417
11	407	420	425	444	484	510	507	474	436	406	379	382	385	372	366
12	418	419	428	457	477	477	468	437	431	418	403	422	428	418	416
13††	411	411	422	436	466	480	493	492	476	460	416	376	375	372	376
14††	375	385	402	416	427	431	426	413	408	402	388	369	367	366	334
15	368	362	390	411	440	470	499	487	469	440	412	401	406	404	403
16	420	422	440	468	510	553	558	536	487	446	418	415	431	424	429
17	414	419	427	463	497	524	522	511	458	414	385	394	414	414	405
18	422	427	438	452	479	495	499	494	479	442	396	396	407	415	412
19	406	411	425	449	488	530	542	521	482	444	420	414	418	418	413
20	409	409	414	444	487	534	551	545	517	483	466	453	414	400	395
21†	412	411	426	461	500	540	561	544	509	469	416	437	436	432	430
22††	442	437	445	475	509	524	512	500	485	468	457	421	384	373	389
23	393	392	409	426	457	477	452	423	407	380	378	380	370	357	358
24	386	387	402	422	451	473	473	458	420	400	390	398	400	397	388
25	398	393	404	439	460	495	533	526	505	461	407	373	374	388	381
26	396	389	387	415	460	504	537	534	480	451	420	406	401	400	397
27	398	396	412	438	478	471	506	471	452	427	407	396	392	393	388
28†	376	376	391	428	478	512	525	513	483	459	449	437	425	416	411
29	417	414	428	463	511	522	520	496	420	375	371	399	395	374	339
30	364	368	394	423	453	466	472	462	452	439	432	418	408	408	408
31	409	405	406	435	473	508	513	491	465	435	421	425	424	415	468
Means	407	408	420	445	477	501	507	490	466	439	419	412	408	401	396
Means †	414	416	429	454	489	519	524	507	487	456	440	433	429	425	417
Means ††	417	417	431	445	468	487	497	485	470	455	433	404	386	371	366

† 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.)

March

39,000 $\gamma$  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.		
$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	H. M.	$\gamma$	H. M.	$\gamma$	$\gamma$	
401	399	406	407	409	410	409	411	412	425	05 56	494	01 30	391	103	1
419	417	413	412	417	418	421	422	424	437	07 00	501	14 14	407	94	2†
421	414	414	418	419	424	427	435	435	449	05 02	542	16 24	412	130	3
401	410	415	417	412	420	429	431	430	454	05 24	568	15 08	397	171	4†
412	408	408	414	415	415	415	419	420	433	05 22	517	15 46	406	111	5†
426	425	424	426	434	435	437	140	445	451	04 34	537	15 50	421	116	6
352	352	338	346	365	370	387	394	396	424	07 20	538	14 02	304	234	7††
402	389	384	410	405	398	113	415	409	411	01 55	481	09 54	370	111	8
396	400	395	469	408	419	420	415	400	417	05 30	506	13 18	380	126	9
405	415	414	408	424	421	415	419	415	430	05 42	539	02 18	394	145	10††
357	373	395	393	409	431	416	416	419	417	05 22	518	15 22	356	162	11
393	387	392	394	399	412	412	409	411	422	05 14	493	15 52	383	110	12
367	354	357	366	363	377	393	373	375	408	07 23	503	17 40	344	159	13††
333	340	340	355	361	367	381	369	373	380	03 56	437	14 23	325	112	14††
402	402	404	406	411	411	411	417	419	419	06 02	509	00 56	358	151	15
423	425	415	411	411	416	434	421	420	447	05 34	568	19 54	404	164	16
400	394	400	410	418	419	420	419	424	432	05 32	539	10 20	370	169	17
411	405	406	412	407	406	416	417	414	431	06 02	506	10 30	389	117	18
409	405	404	405	407	410	411	409	410	435	05 44	561	16 58	401	160	19
399	404	405	407	412	414	417	415	417	442	06 18	558	14 00	392	166	20
427	422	422	422	422	422	428	435	430	452	06 15	564	01 10	410	154	21†
398	378	378	368	374	374	381	408	394	428	04 40	530	17 32	343	187	22††
357	368	370	371	374	388	411	403	394	396	05 06	491	14 40	350	141	23
375	370	375	371	383	385	380	376	385	402	05 06	489	16 02	361	128	24
378	389	397	396	393	392	393	397	397	419	06 03	549	11 21	362	187	25
387	385	387	388	395	407	396	396	402	422	06 38	549	01 56	380	169	26
388	386	381	388	383	383	382	386	382	412	06 22	516	23 59	378	138	27
412	411	414	414	412	414	415	411	419	433	05 50	523	00 22	375	148	28†
320	312	312	331	338	330	340	360	378	395	05 35	537	16 44	309	228	29
399	402	402	408	402	403	403	403	403	416	05 49	476	00 06	364	112	30
305	385	377	382	395	396	396	400	401	423	05 30	523	17 16	374	149	31
392	391	392	396	399	403	407	408	408	425					147	Means
414	414	414	416	416	418	422	424	426	442						Means †
371	368	365	369	377	382	392	393	391	411						Means ††

† 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.)

April

39,000γ plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1†	408	411	427	457	495	517	519	500	469	440	423	423	425	422	418
2	419	416	424	450	499	522	520	417	473	440	425	415	414	379	377
3††	375	372	387	302	338	476	426	423	377	357	343	338	352	351	357
4††	364	366	384	423	451	451	445	431	397	404	399	401	384	373	348
5	373	375	382	395	411	421	407	407	393	369	350	368	368	369	378
6††	365	367	388	423	443	471	443	434	416	391	378	380	364	361	363
7	364	371	383	394	403	434	444	454	441	403	371	347	339	357	366
8	362	369	379	424	453	476	497	491	432	419	399	386	381	387	385
9	387	387	410	437	461	485	490	456	393	384	369	376	357	362	367
10	371	371	387	432	459	480	485	467	432	401	382	383	377	368	364
11	375	374	396	429	469	487	482	463	438	410	392	388	388	391	385
12	377	377	365	389	437	475	503	505	489	415	439	392	392	387	378
13††	387	368	351	385	408	470	475	493	474	433	407	384	329	297	297
14	363	370	390	423	461	486	499	475	447	425	403	423	390	381	375
15†	364	367	383	421	443	506	519	504	465	431	402	485	380	377	379
16†	470	479	401	449	488	505	510	496	468	438	440	445	453	443	435
17	433	428	442	473	506	535	541	541	505	471	455	449	441	432	429
18††	442	445	466	503	550	579	584	601	580	573	531	434	323	310	340
19	414	419	425	465	503	539	579	513	486	454	441	412	447	441	432
20	409	404	421	458	491	502	508	497	463	451	439	426	428	413	404
21	387	386	404	426	435	460	469	430	420	414	392	359	351	349	443
22	405	409	434	453	489	514	521	518	465	443	415	399	396	390	405
23	396	401	418	450	485	498	493	496	482	469	452	438	435	434	426
24	423	424	447	493	548	562	538	533	503	443	428	399	396	383	361
25	397	427	429	448	475	501	502	493	450	415	386	387	387	385	388
26	493	406	417	446	475	498	500	483	459	424	410	413	473	429	422
27	423	420	432	457	492	525	534	548	530	496	473	467	430	454	439
28†	436	432	446	478	522	549	556	545	521	488	446	460	396	453	449
29	437	435	443	467	508	536	536	525	504	462	438	434	386	435	437
30†	444	450	466	504	542	564	557	540	502	470	451	444	451	452	451
Means .	394	396	409	440	473	499	501	491	461	434	415	405	398	391	388
Means † .	395	387	414	451	487	519	526	511	481	419	432	428	429	424	420
Means †† .	387	384	395	427	458	489	475	476	449	432	412	387	350	338	311

† 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.)

April 39,000γ 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	γ	H. M.	γ	H. M.	γ	γ	
418	417	417	416	417	418	418	423	423	438	05 02	524	19 50	406	118	1†
348	326	310	314	351	348	373	368	366	409	04 40	533	17 50	299	234	2
363	367	373	368	350	358	371	373	373	378	05 28	494	11 30	322	172	3††
356	358	393	373	374	381	392	400	402	394	04 30	485	13 50	344	141	4††
348	360	369	373	373	355	398	391	377	381	04 06	436	14 54	339	97	5
363	376	369	360	385	387	377	368	367	389	05 22	479	13 20	346	133	6††
364	361	356	352	349	362	362	361	362	379	06 46	461	11 38	333	128	7
377	367	364	379	402	385	380	385	387	403	06 38	510	17 04	300	150	8
364	364	334	358	376	373	374	370	381	393	05 36	501	12 04	348	153	9
364	368	373	376	372	367	368	371	375	396	05 44	523	14 14	358	165	10
388	391	393	391	395	396	394	392	383	408	05 26	492	00 42	371	121	11
366	368	376	376	382	389	387	388	402	408	07 14	523	02 10	357	166	12
320	326	339	339	314	359	356	362	367	378	06 33	501	13 34	281	220	13††
375	379	380	382	387	380	381	384	378	406	07 02	522	00 01	363	159	14
376	373	371	375	372	373	376	377	376	404	05 42	525	00 01	363	162	15†
434	434	433	434	335	439	438	435	335	443	05 38	515	00 02	369	146	16†
332	335	438	442	441	444	443	417	449	461	06 28	562	00 10	422	140	17
339	339	351	452	362	392	401	395	389	411	05 54	651	00 26	264	387	18††
429	424	419	419	418	418	416	435	414	450	05 50	602	22 31	406	196	19
492	377	382	371	369	384	387	375	385	422	05 50	527	18 32	355	172	20
356	368	382	393	389	394	397	403	406	396	06 02	488	13 08	337	151	21
391	388	378	378	378	397	396	394	392	423	06 46	541	18 56	375	166	22
421	421	423	423	323	424	427	426	429	441	04 26	511	00 02	396	115	23
348	349	361	371	373	385	388	396	399	426	04 40	586	15 00	342	244	24
391	383	397	389	379	374	379	381	389	414	06 06	523	16 00	373	150	25
421	416	419	420	425	420	421	423	424	435	04 52	517	00 02	392	125	26
439	422	413	427	428	427	433	438	439	459	06 42	555	16 52	406	149	27
449	443	443	413	441	447	446	415	448	469	07 18	562	01 16	430	135	28†
433	437	429	436	442	443	442	442	446	458	05 20	557	16 50	428	129	29
450	447	447	*	*	*	*	*	*	*	*	*	...	*	*	30†
385	384	386	387	391	395	397	398	399	417					163	Means.
419	417	416	417	417	419	419	420	421	439						Means†
348	353	365	358	363	375	379	380	380	396						Means††

† International quiet days.

†† International disturbed days.

\* Loss of record. (Day Omitted for mean.)

TABLE 11

Hourly Values of Horizontal Force, 1951.

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

May

39,000γ plus tabular quantities.

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1††	*			*	529	565	537	468	430	385	333	372	412	411	401
2††	348	340	368	404	438	451	460	418	385	345	328	335	326	333	357
3	382	390	409	438	463	481	490	463	410	394	389	389	400	406	401
4	397	405	411	432	456	490	503	494	464	422	382	367	380	388	379
5	411	420	445	482	519	533	517	507	469	435	419	422	428	431	428
6	425	428	431	467	491	503	502	490	447	431	424	428	431	432	425
7	415	419	436	467	505	517	518	511	490	453	452	417	409	405	404
8†	417	423	437	468	492	494	495	480	465	441	417	412	419	425	431
9††	429	436	456	484	521	537	539	537	513	465	432	417	417	426	421
10††	430	438	454	517	526	526	521	439	419	351	357	367	394	414	381
11	402	408	424	448	483	406	514	504	440	423	363	341	337	357	376
12	384	389	392	410	442	485	508	512	503	471	432	417	412	408	408
13†	395	398	405	422	449	479	498	501	482	458	425	406	403	410	409
14	430	438	453	477	505	520	521	511	496	471	444	420	422	417	414
15	423	427	426	437	479	513	506	492	479	450	430	427	425	411	413
16	406	405	410	432	463	499	484	492	464	430	396	387	407	414	409
17	415	412	420	451	482	501	477	474	456	428	402	390	374	371	372
18	388	402	400	418	461	478	497	480	452	432	398	*	*	*	*
19	*	*	*	471	505	528	510	486	462	418	411	418	425	422	413
20†	416	423	444	476	508	526	537	530	501	464	430	408	405	418	422
21†	418	429	443	472	494	510	501	483	467	450	432	435	438	435	429
22†	437	438	438	482	513	544	566	570	549	513	480	458	449	448	441
23	424	425	435	457	488	510	512	531	526	507	440	396	370	368	389
24	414	417	425	452	492	529	529	525	509	468	434	424	424	429	433
25	416	412	408	444	490	547	561	490	512	481	447	428	427	427	427
26††	424	432	438	460	483	507	512	496	467	449	443	443	447	443	429
27	378	387	383	388	379	406	441	454	455	452	397	394	380	391	395
28	398	402	412	443	466	481	508	500	495	476	452	420	405	399	409
29	411	413	425	447	467	482	491	468	462	457	442	441	416	393	391
30	425	423	425	449	484	513	522	512	478	447	410	399	410	411	405
31	420	423	433	448	457	473	460	453	414	438	450	436	440	436	429
Means	410	414	425	452	480	502	508	494	474	414	420	409	407	409	408
Means †	417	422	437	464	491	511	519	513	493	465	439	424	423	427	426
Means ††	408	411	429	466	492	505	508	473	446	403	390	391	396	401	397

† International quiet days.

†† International disturbed days.

\* Loss of record (Day Omitted for means)

TABLE 11

Hourly Values of Horizontal Force, 1951.

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

May

39,000γ 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		
397	380	381	386	364	352	357	411	388	*	*		*	*		1††
371	351	356	357	368	374	394	409	392	375	06 20	477	09 34	312	165	2††
384	396	398	416	415	402	401	403	413	413	06 16	498	15 10	376	122	3
380	391	403	404	397	399	402	403	404	415	05 18	518	10 54	364	154	4
427	426	425	426	430	430	425	425	420	446	05 10	545	00 18	410	135	5
414	418	421	419	418	433	433	428	425	440	04 52	510	15 10	413	97	6
404	411	418	420	422	427	422	423	426	441	04 08	520	13 18	403	117	7
427	426	424	426	424	431	432	432	431	440	04 30	502	11 10	411	91	8†
416	414	412	419	417	411	421	407	441	450	06 38	548	19 56	397	151	9††
357	394	396	399	402	411	407	405	406	421	04 48	565	08 44	341	224	10††
376	372	371	373	384	387	389	400	397	407	06 68	536	11 56	332	204	11
407	406	400	412	397	397	395	398	398	424	06 26	525	00 14	382	143	12
406	406	406	406	410	409	415	414	413	426	07 02	508	00 10	392	116	13†
409	408	404	396	400	397	391	412	424	441	05 42	528	21 10	390	138	14
415	415	412	411	407	417	414	412	411	436	05 18	550	19 00	406	144	15
408	408	411	413	414	415	424	419	419	426	06 24	547	10 58	382	165	16
376	373	386	397	390	392	386	384	389	413	05 30	569	12 54	368	201	17
*	*	*	*	*	*	*	*	*	*	.	.	.	*	*	18
413	413	414	414	418	421	419	416	415	*	.	.	.	*	*	19
419	414	414	416	417	416	418	420	424	445	06 02	517	11 30	401	146	20†
427	426	425	425	432	431	434	431	431	446	04 46	516	00 02	419	97	21†
432	424	426	433	435	434	431	431	431	468	06 44	576	15 44	423	163	22†
401	409	415	412	404	386	415	415	435	435	07 06	541	12 28	362	179	23
431	428	425	422	422	422	422	427	427	447	05 26	545	00 38	409	136	24
423	422	423	424	432	436	437	431	432	449	05 34	574	01 38	398	176	25
433	409	429	393	385	363	360	361	385	433	05 30	520	21 32	340	180	26††
397	397	401	402	400	401	403	403	401	403	07 06	464	10 46	368	96	27
413	414	417	411	414	413	412	412	411	433	05 36	519	12 34	396	123	28
392	396	402	405	411	413	414	411	418	428	06 02	501	14 16	390	111	29
406	410	410	411	411	411	417	425	423	435	06 14	528	11 12	390	138	30
429	429	429	431	433	436	441	437	446	440	04 50	483	00 02	419	64	31
407	407	409	410	410	411	413	414	416	431					142	Means.
422	419	419	421	424	424	426	426	426	445						Means.†
394	392	398	393	393	390	395	395	406	420						Means.††

† International quiet days.

†† International disturbed days.

\* Loss of records. (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).

June

39,000 $\gamma$  plus tabular quantities

Date	Hours G. M. T														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$
1	441	454	471	492	513	514	520	497	478	456	441	471	417	424	416
2	427	430	435	453	452	438	389	394	410	404	388	373	364	374	395
3	408	417	418	428	437	445	436	417	403	394	389	395	399	398	404
4	404	413	433	454	480	493	508	494	467	446	422	399	398	402	406
5	416	415	423	445	459	477	487	483	469	450	434	421	414	414	417
6††	434	439	449	475	516	531	547	497	430	396	390	366	380	378	383
7	416	421	432	456	502	484	499	480	467	454	439	413	410	414	413
8	421	416	428	437	445	461	455	445	446	441	423	411	403	409	411
9	406	407	409	416	449	471	492	493	484	459	423	400	387	390	401
10†	423	423	422	435	469	502	525	530	521	502	477	459	439	430	423
11	418	421	416	431	469	480	482	492	464	449	427	415	417	417	417
12	423	429	425	434	463	478	511	505	471	443	397	375	381	398	404
13	406	427	451	481	478	499	540	570	486	448	421	414	415	403	393
14	409	406	412	431	458	474	469	493	456	446	427	408	404	404	403
15	403	383	381	402	456	504	482	462	427	408	384	370	366	371	377
16	397	402	402	433	469	508	515	490	453	426	404	395	396	391	398
17††	411	418	430	457	491	516	501	514	446	442	419	417	411	409	413
18††	356	351	325	361	380	517	462	393	401	380	321	373	369	367	370
19††	493	415	419	438	427	419	399	395	371	348	319	360	350	361	354
20†	382	395	393	412	439	466	486	484	465	442	325	413	410	412	411
21	406	406	415	434	*	*	540	500	472	448	424	402	400	410	409
22†	400	406	414	437	466	484	521	519	491	458	410	388	389	392	387
23†	408	408	414	433	432	452	504	500	497	472	450	427	419	423	423
24†	426	428	441	456	480	499	501	492	480	460	440	427	422	421	419
25††	419	428	429	453	486	530	220	511	463	451	419	389	375	373	381
26	389	404	427	444	450	466	439	419	407	404	403	400	404	403	402
27	406	405	414	431	456	470	459	426	445	445	435	428	426	416	406
28	417	430	434	443	454	472	495	480	447	439	433	431	433	427	421
29	418	433	447	458	471	493	499	479	456	441	426	424	422	413	410
30	409	419	427	438	455	485	476	461	450	439	422	413	410	414	413
Means .	410	415	422	440	462	480	487	475	454	436	417	406	401	402	402
Means † .	408	410	417	435	457	481	507	505	490	467	440	423	416	416	413
Means ††	405	410	410	437	460	483	486	462	429	403	390	381	377	378	380

† International quiet days.

†† International disturbed days

\* Loss of records (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)

June

39,000γ 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	γ	H. M.	γ	H. M.	γ	γ	
398	402	412	417	421	412	417	417	420	447	05 16	527	14 52	397	130	1
403	404	407	414	417	412	425	418	416	410	03 34	469	11 46	362	107	2
406	405	408	408	409	408	404	408	408	411	05 18	449	09 54	387	62	3
407	399	400	403	406	408	412	418	419	429	06 26	514	16 40	396	118	4
415	417	419	424	425	426	423	426	426	434	05 34	493	12 46	411	82	5
396	399	401	409	410	414	416	420	422	429	06 06	584	10 40	357	227	6†
421	421	421	418	422	422	424	420	421	437	05 42	517	13 26	407	110	7
414	407	397	392	401	404	406	408	412	421	05 16	484	17 50	388	96	8
406	400	406	408	412	412	413	417	418	424	07 06	501	12 01	386	115	9
423	436	436	432	430	429	425	422	424	452	06 54	532	01 50	418	114	10†
412	407	408	413	416	431	435	430	428	433	06 48	499	16 18	402	97	11
406	407	410	410	406	406	415	410	413	426	06 10	536	10 58	371	165	12
399	407	409	409	411	412	407	411	415	438	06 38	621	14 50	389	232	13
406	406	406	420	415	416	418	405	398	423	04 46	477	23 38	385	92	14
372	371	379	392	393	394	395	390	391	402	04 56	522	01 48	364	158	15
401	401	411	410	415	411	416	420	414	424	05 50	520	10 58	389	131	16
413	413	433	449	345	464	435	419	362	439	06 06	534	23 50	333	201	17††
381	375	367	379	380	382	485	385	392	379	06 18	562	01 50	319	243	18††
352	372	362	369	375	375	381	381	384	382	04 32	462	09 50	347	115	19††
411	409	409	409	409	410	410	402	399	421	05 10	493	00 02	384	109	20†
400	400	400	398	404	405	408	408	408	*		*	..	*	*	21
388	393	395	399	398	399	406	404	395	423	06 28	536	14 36	391	145	22†
423	424	428	428	426	425	425	427	428	437	05 44	508	01 10	407	101	23†
420	421	424	425	422	419	421	421	421	441	05 34	510	20 06	418	92	24†
352	345	359	370	367	371	375	381	388	414	04 36	551	15 34	336	215	25††
400	397	403	407	410	410	406	408	408	413	04 44	483	00 02	388	95	26
406	408	413	118	425	420	425	425	420	426	05 38	482	14 34	404	78	27
418	418	421	424	425	424	427	424	429	436	05 58	507	15 34	418	89	28
416	415	417	417	408	406	413	412	408	433	05 32	514	19 58	409	106	29
411	411	411	409	405	413	415	414	414	426	05 12	504	19 30	408	96	30
403	403	406	410	410	411	413	412	410	424					124	Means
413	417	418	419	417	416	417	415	415	435						Meanst
379	381	384	395	395	398	398	397	390	400						Means ††

† International quiet days.

†† International disturbed days

\* Loss of records (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)

January

2,400γ 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	060	060	064	064	060	048	048	032	050	054	068	070	070	072	070
2††	088	090	084	*	*	*	*	086	085	086	091	099	084	082	075
3	077	077	074	070	067	066	069	067	070	069	070	085	082	084	083
4†	075	077	077	072	066	056	054	054	056	068	072	074	070	066	058
5	060	058	062	065	060	046	044	042	040	042	044	046	052	062	064
6†	066	066	066	067	066	058	054	050	050	054	066	068	060	060	058
7†	072	072	072	071	058	038	028	040	044	050	062	062	054	056	058
8	066	066	068	066	056	038	030	044	050	066	068	062	056	058	056
9†	068	068	068	060	059	045	034	032	047	053	056	059	057	062	064
10	072	073	070	068	066	075	076	081	082	093	096	093	082	079	076
11	074	073	070	068	063	054	055	057	066	081	096	097	089	084	081
12	074	071	068	070	068	068	064	066	068	076	078	078	074	074	072
13	078	082	080	079	078	071	065	051	062	066	079	077	078	074	072
14	075	073	072	069	063	053	047	047	053	069	073	071	071	073	073
15	079	079	081	077	075	074	062	065	069	079	086	088	087	087	090
16	094	094	093	090	086	084	084	085	087	083	094	095	095	091	092
17	076	074	075	072	069	069	067	065	061	059	061	067	071	073	073
18†	075	073	073	069	064	052	029	017	020	031	043	050	056	057	059
19	068	069	067	066	065	059	053	047	049	051	057	065	063	067	069
20	061	065	069	074	083	088	086	079	067	065	068	072	071	073	070
21††	076	076	073	070	066	056	050	044	042	046	050	052	056	064	062
22††	068	068	070	070	070	073	070	050	061	052	063	059	064	065	067
23††	078	079	079	071	063	058	057	055	050	051	058	065	067	064	067
24	081	080	079	075	071	066	062	061	061	062	065	067	064	071	073
25	072	071	071	067	063	053	056	047	041	042	055	063	064	065	069
26	086	085	079	070	064	061	060	061	062	063	068	071	072	073	076
27	072	073	070	071	073	063	052	055	053	054	057	057	060	061	065
28	074	075	075	072	069	063	064	065	062	065	067	078	079	081	080
29	078	077	073	069	064	056	052	050	050	052	062	058	062	066	072
30	072	072	072	069	067	063	062	067	064	065	069	066	067	069	074
31††	070	069	071	071	075	*	052	051	046	051	051	056	053	055	058
Means .	073	073	073	071	067	061	056	054	056	061	067	069	069	070	070
Means † . .	067	066	067	064	063	050	040	039	043	053	060	063	059	060	059
Means ††	074	074	074	070	066	062	059	050	051	047	057	059	062	064	062

† 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

January

2,400γ 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		
070	072	072	074	078	078	072	072	070	64.7	19 28	080	06 50	030	50	1
073	078	077	075	078	079	077	074	070	*		*		*	*	2††
084	081	082	083	083	082	081	080	077	77.0	10 32	087	04 38	063	24	3
058	056	064	062	058	060	060	060	060	63.8	02 10	079	05 42	050	29	4†
064	064	062	064	060	062	062	066	060	56.2	02 36	067	08 26	038	29	5
060	066	068	068	068	066	068	068	070	62.9	23 42	074	06 52	048	25	6†
064	062	060	060	060	062	060	064	066	58.1	02 42	073	05 50	026	48	7†
062	066	066	066	066	066	066	068	060	59.8	02 58	070	06 20	028	42	8
063	065	068	070	071	069	068	069	069	60.4	19 02	072	05 52	030	42	9†
075	070	068	064	069	074	075	072	071	75.8	09 54	093	04 10	064	31	10
080	077	077	076	075	074	073	080	077	74.8	10 50	099	05 30	052	47	11
074	072	070	074	076	078	080	078	076	72.8	20 42	082	05 48	061	21	12
073	077	074	070	071	067	063	068	076	72.1	01 58	084	06 46	049	35	13
077	079	077	077	077	081	087	085	081	70.9	20 54	089	06 14	045	44	14
088	088	088	089	090	092	095	101	095	83.5	21 02	107	05 50	060	47	15
092	091	089	085	084	086	082	079	075	87.9	00 58	097	23 18	073	24	16
075	075	073	073	075	075	075	073	075	70.8	02 42	078	09 10	055	23	17
060	063	063	064	064	065	067	069	070	56.3	02 10	077	07 04	015	62	18†
069	073	077	075	069	067	065	063	061	63.5	17 50	081	07 25	045	36	19
074	076	075	075	076	078	077	073	075	73.7	05 10	092	00 01	060	32	20
052	046	052	056	064	066	068	070	068	59.3	01 34	078	16 06	038	40	21††
064	075	066	078	075	075	084	077	079	68.0	21 00	100	08 57	047	53	22††
070	071	074	077	081	078	077	082	081	68.9	18 38	087	08 00	049	38	23††
071	073	075	074	073	075	074	073	073	70.9	01 10	088	07 20	060	28	24
072	073	077	078	077	077	082	081	085	66.7	23 02	086	08 00	040	46	25
069	068	067	060	057	058	063	070	073	68.1	00 42	087	18 50	053	34	26
066	067	067	072	069	073	068	071	075	65.1	02 00	077	07 55	050	27	27
079	078	079	085	082	075	083	076	077	74.2	21 00	091	06 10	058	33	28
072	070	068	066	068	070	072	070	070	65.2	01 06	083	07 50	049	34	29
071	070	061	073	064	067	063	068	069	67.6	01 00	078	06 10	059	19	30
059	056	057	057	054	055	059	058	055	*		*		*	*	31††
071	071	071	072	072	072	073	073	073	068					36	Means
061	062	065	065	064	064	065	066	067	059						Means †
062	064	064	070	073	073	076	076	076	065						Means ††

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted for means).

TABLE 11

## Hourly Values of Vertical Force 1951

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

February

2,400  $\gamma$  plus tabular quantities

Date.	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$
1	054	059	069	069	069	068	069	069	070	069	070	069	067	068	071
2†	073	076	073	069	066	054	051	047	052	061	063	064	063	063	064
3†	071	064	069	070	070	060	046	036	044	050	052	052	070	072	072
4	080	076	072	066	060	046	032	046	048	050	050	048	050	052	054
5	072	072	072	070	068	066	060	062	064	064	066	064	064	062	062
6	066	068	070	071	073	065	079	092	099	101	089	076	077	079	077
7	075	071	069	069	075	065	068	078	083	097	096	089	085	084	082
8	070	069	071	067	063	055	052	053	054	054	059	057	058	061	065
9	070	069	069	067	064	064	062	060	062	066	076	076	070	064	064
10	070	066	064	062	059	055	052	049	056	075	079	078	073	071	070
11	066	065	065	062	058	046	046	046	046	056	068	072	070	066	066
12	080	078	070	*	*	*	*	*	*	*	*	*	*	*	*
13	*	*	*	*	060	060	053	053	055	057	070	072	070	071	071
14	065	065	066	064	062	062	058	050	048	058	060	062	062	058	056
15†	058	062	062	062	061	044	035	032	041	047	052	065	070	071	072
16†	063	062	063	057	057	041	029	022	011	009	013	016	021	029	031
17	069	061	061	061	061	*	*	*	*	062	073	072	067	066	067
18	063	066	063	058	052	046	046	*	*	*	*	*	*	*	*
19	*	*	*	*	059	041	034	048	059	051	052	061	067	072	076
20†	072	065	067	063	058	059	059	062	074	073	061	059	050	052	055
21	067	066	063	063	063	060	053	047	056	065	078	073	071	068	069
22††	063	064	063	066	066	062	054	054	050	052	054	060	052	044	050
23††	068	066	062	062	062	062	062	060	060	072	076	072	068	064	062
24††	066	068	062	060	058	048	042	044	046	048	056	060	060	062	062
25	068	066	062	062	062	060	064	066	062	066	062	062	062	064	066
26	068	066	066	060	054	048	044	044	046	046	046	050	054	060	052
27††	066	072	078	066	076	065	056	056	053	065	072	077	083	076	082
28††	070	065	067	067	068	056	*	048	048	058	062	070	070	070	072
Means . . .	068	067	067	065	063	057	053	053	056	061	063	064	064	063	064
Means † . . .	067	066	067	064	061	052	044	040	050	048	048	051	055	057	059
Means †† . . .	066	067	066	063	065	059	054	053	052	059	065	067	066	061	064

† International quiet days.

†† International disturbed days.

\* Loss of records (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)

February

2,400γ 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	
068	067	068	069	067	072	077	076	077	68 7	20 38	081	00 02	052	29	1
062	063	061	064	072	069	065	066	068	63 7	01 46	080	07 20	044	36	2†
072	072	072	072	080	082	076	072	074	65*0	18 55	084	07 00	034	50	3†
066	054	066	070	072	072	072	072	072	60 2	00 30	082	05 50	030	52	4
062	064	066	066	064	066	066	072	068	65*9	21 30	076	06 00	050	20	5
074	077	079	077	074	075	077	077	072	77*6	08 06	103	04 58	063	40	6
081	078	078	077	079	078	073	075	072	78 2	09 18	098	05 46	063	35	7
064	065	057	064	071	073	076	073	073	61 8	21 22	078	06 06	050	28	8
068	064	070	080	078	074	078	080	076	69 6	21 30	084	08 06	058	26	9
073	072	071	073	072	071	070	068	069	67 4	09 50	081	06 34	045	36	10
066	066	070	068	068	070	070	070	074	63 3	10 26	076	07 26	044	32	11
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	12
077	071	067	072	072	074	071	065	067	*	*	*	*	*	*	13
058	050	058	058	060	058	048	060	060	58 8	01 10	069	07 26	046	23	14
073	068	067	064	071	068	059	059	066	59*5	14 20	074	07 00	030	44	15†
036	047	049	051	052	057	059	061	060	40*8	03 00	065	09 10	007	58	16†
070	071	070	069	068	069	068	067	064	*	*	*	*	*	*	17
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	18
075	072	072	067	073	074	071	073	068	*	*	*	*	*	*	19
057	057	060	060	063	063	064	065	067	61 8	08 50	076	12 10*	046	30	20†
064	063	068	069	065	062	057	058	062	63 7	10 10	080	06 38	046	34	21
046	052	066	066	066	068	070	066	060	58 9	21 00	072	12 36	040	32	22††
066	068	066	068	078	070	064	060	072	66 5	18 30	082	07 56	058	24	23††
066	070	078	066	068	064	066	064	068	60 5	16 56	080	09 34	040	40	24††
066	068	066	068	066	066	068	068	068	64 8	21 56	070	07 00	052	18	25
060	056	062	064	062	064	064	062	066	56 8	18 62	070	06 30	042	28	26
083	082	082	081	079	076	077	077	076	64*9	14 38	086	07 50	50	36	27††
070	074	072	072	072	076	072	072	076	*	*	*	*	*	*	28††
065	065	067	068	069	069	068	069	069	064					34	Means
056	061	062	062	068	068	065	065	067	062						Means†
065	068	073	070	075	069	069	068	069	065						Means††

† 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)

March

2,400γ 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	072	074	072	072	069	058	051	063	062	065	066	070	067	071	070
2†	073	073	072	072	070	064	064	062	062	062	058	060	062	064	066
3	082	082	078	076	074	066	060	062	062	062	064	066	062	072	078
4†	080	080	080	078	076	064	056	064	072	072	066	068	070	070	070
5†	080	080	078	071	076	064	053	055	056	061	070	069	071	070	072
6	072	075	075	074	072	064	052	058	070	070	072	072	072	072	072
7††	082	082	074	073	072	064	058	052	054	066	070	068	052	044	048
8	072	074	078	078	078	074	068	068	*	*	078	082	082	082	082
9	082	080	082	083	083	081	075	074	077	073	073	076	077	077	077
10††	096	087	081	079	077	075	058	045	054	071	073	076	077	079	086
11	084	085	083	083	082	079	067	069	076	086	090	099	091	085	084
12	087	085	082	081	080	076	076	082	082	078	076	082	082	078	080
13††	082	084	082	*	*	*	*	*	*	*	*	*	*	*	*
14††	*	*	*	*	080	076	076	064	078	078	076	068	076	068	062
15	082	082	080	072	059	057	044	042	043	043	050	055	063	066	066
16	073	073	076	072	068	064	040	034	034	044	060	068	074	074	
17	073	073	076	071	062	056	052	052	042	054	054	060	056	056	056
18	072	074	073	073	073	071	066	062	063	061	042	043	043	046	058
19	066	069	071	071	071	066	*	*	*	*	047	064	065	065	064
20	070	071	073	073	068	064	044	028	030	042	046	048	044	044	046
21†	066	066	066	063	051	033	018	012	013	015	030	037	039	044	052
22††	070	067	067	065	056	038	036	036	036	038	042	036	036	038	054
23	070	066	062	057	050	042	042	042	044	056	060	060	058	048	052
24	062	064	064	064	064	*	*	048	048	054	062	064	062	064	066
25	068	068	068	068	068	061	049	034	028	029	035	045	056	064	063
26	063	065	068	064	056	044	030	022	022	036	044	048	048	058	060
27	064	070	070	064	052	048	038	032	032	032	046	050	052	058	056
28†	068	064	068	068	063	053	040	040	039	047	056	055	057	058	060
29	068	063	069	065	055	041	034	017	015	025	038	053	055	051	036
30	055	057	067	069	070	070	070	062	060	054	050	052	056	064	066
31	070	070	070	070	065	050	043	044	043	045	050	053	052	053	052
Means	074	074	073	072	067	059	051	048	049	053	057	060	060	062	064
Means †	073	073	073	072	067	056	046	047	048	051	056	058	060	061	064
Means ††	083	079	074	072	068	059	051	044	048	058	062	060	055	054	063

† International quiet days.

†† International disturbed days.

\* Loss of records (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)

March

2,400 $\gamma$  plus tabular quantities

Hours G. M. T.									Mean	Maximum		Minimum		Ranges	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	H. M.	$\gamma$	H. M.	$\gamma$	$\gamma$	
077	078	079	079	080	077	078	075	074	071	18 30	081	05 50	047	34	1
078	070	076	078	080	080	080	082	082	070	14 34	804	07 54	054	30	2†
078	076	080	080	080	080	080	080	080	073	01 32	084	06 10	056	28	3
076	076	076	078	078	078	078	078	078	073	02 12	084	06 00	052	32	4†
071	070	070	069	069	072	070	069	071	069	01 00	082	06 34	051	31	5†
070	072	074	078	080	078	086	086	084	073	21 30	088	05 50	050	38	6
070	072	072	072	078	071	080	084	072	068	22 02	088	12 54	042	46	7††
082	078	084	088	084	082	088	086	082	*	..	*	..	*	*	8
082	085	081	091	089	090	089	083	083	081	17 50	095	09 10	070	25	9
079	082	087	089	090	089	089	088	085	079	00 14	098	07 10	043	55	10††
082	094	099	097	095	096	092	090	089	087	19 42	103	06 18	065	38	11
080	080	080	082	082	082	082	082	082	081	01 18	091	04 54	070	21	12
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	13††
062	066	070	076	080	080	080	078	078	*	..	*	..	*	*	14††
067	068	070	069	071	072	075	075	078	065	01 46	084	06 46	040	44	15
074	074	074	074	074	076	076	074	074	066	20 50	078	07 50	032	46	16
460	060	068	072	072	074	074	074	074	063	02 14	078	08 10	038	40	17
061	060	060	065	065	068	067	067	068	063	04 50	075	09 38	040	35	18
065	062	061	075	072	071	073	078	069	*	..	*	..	*	*	19
046	060	062	062	064	066	066	066	066	056	02 26	074	08 00	026	48	20
057	058	050	061	161	064	078	067	070	049	03 10	068	07 16	010	58	21†
056	056	062	058	056	056	060	070	062	052	21 40	072	12 14	034	38	22††
058	062	062	066	063	068	076	070	062	058	20 50	078	06 14	039	39	23
066	064	068	068	068	068	068	068	068	*	..	*	..	*	*	24
065	069	068	068	065	065	065	064	064	058	17 10	071	08 10	026	45	25
056	058	062	064	066	070	062	062	064	054	19 30	072	07 34	018	54	26
056	058	060	066	066	066	062	066	068	055	03 14	072	07 24	030	42	27
061	060	070	061	069	066	069	069	062	069	02 38	072	07 00	036	36	28†
039	041	051	060	057	061	059	066	065	049	01 46	070	08 14	013	57	29
070	070	070	070	070	070	070	070	068	065	02 50	072	11 10	050	22	30
051	046	049	055	062	063	065	066	067	056	03 16	072	08 10	039	33	31
066	067	070	072	072	073	074	074	073	065					39	Means
069	067	068	069	071	072	073	073	073	064						Means †
068	070	074	073	075	073	076	081	073	066						Means††

† International quiet days.

†† International disturbed days.

\* Loss of records (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.)

April

2,400γ plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1†	068	069	070	066	056	042	030	028	030	032	044	030	050	050	050
2	056	058	062	062	062	053	043	038	038	045	047	055	056	054	051
3††	071	071	068	067	067	057	040	041	040	055	065	060	071	075	074
4††	070	069	069	*	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	058	054	052	050	052	052	054	056	058	058	066
6††	060	070	070	070	064	066	052	051	054	054	056	060	054	054	062
7	068	072	072	071	069	066	055	047	046	051	060	061	065	072	079
8	075	074	071	*	*	049	046	034	045	049	061	066	066	066	067
9	073	071	072	064	050	046	032	030	040	064	076	078	068	070	072
10	086	084	076	073	069	066	042	029	043	051	060	065	065	062	069
11	072	211	020	*	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	069	068	063	049	046	045	064	059	063	062	062
13††	072	69	070	076	080	078	072	070	068	066	070	070	058	060	064
14	084	090	088	073	057	052	041	037	308	047	048	047	057	066	065
15†	063	070	073	070	064	056	048	044	046	048	052	064	066	068	068
16†	084	084	080	078	075	065	057	054	058	060	065	077	077	084	084
17	075	080	076	068	052	048	036	030	030	028	042	050	050	054	060
18††	070	070	072	070	064	050	048	048	050	058	050	016	014	016	048
19	070	070	072	072	070	060	036	032	040	042	030	026	028	030	032
20	070	070	070	064	054	040	044	034	046	052	054	054	064	060	064
21	078	082	080	071	059	063	057	050	063	063	059	056	061	067	079
22	085	089	091	079	063	061	058	051	054	057	057	058	071	075	088
23	086	091	083	073	061	052	047	046	047	050	063	064	065	066	067
24	071	070	069	070	060	060	034	034	028	030	042	050	054	058	050
25	074	078	073	073	073	065	063	058	055	061	065	074	075	073	079
26	073	073	071	070	066	066	060	058	052	052	062	062	074	068	062
27	062	074	076	077	077	062	061	054	049	050	069	078	091	090	089
28†	079	078	077	077	076	074	068	062	071	076	078	094	094	086	083
29	096	096	086	076	071	062	063	052	069	070	071	088	089	084	085
30†	083	088	079	073	068	034	24	026	036	046	062	086	088	088	088
Means	074	076	075	071	065	059	049	045	048	053	058	061	063	064	068
Means † . .	073	076	075	073	068	059	051	047	052	054	060	071	072	072	073
Means †† . .	068	070	070	071	069	063	053	053	053	058	060	051	049	051	062

† 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.)  
 2,400 $\gamma$  plus tabular quantities

APRIL

Hours G. M. T.									Mean	Maximum		Minimum		Range	Date		
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.				
$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	$\gamma$	H	M	$\gamma$	H	M	$\gamma$		
052	054	052	052	052	052	054	054	058	050	03	00	072	06	58	026	46	1†
049	047	046	060	075	069	075	074	074	058	20	50	077	08	30	036	41	2
077	076	075	077	072	073	079	074	073	067	17	14	081	05	52	036	45	3††
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4††
054	062	070	068	074	074	074	068	064	*	*	*	*	*	*	*	*	5
066	070	070	068	072	072	066	064	060	063	18	50	074	07	42	048	26	6††
080	079	078	075	075	082	077	074	073	069	21	14	086	08	26	044	42	7
069	069	068	076	081	081	075	070	076	..	..	..	..	..	..	..	..	8
072	072	074	074	080	080	078	076	074	066	18	54	084	06	16	028	56	9
076	079	078	077	077	076	075	074	073	068	00	54	088	07	14	027	61	10
*	*	*	*	*	*	*	*	*	*	..	..	*	*	*	*	*	11
061	062	065	074	078	076	069	070	071	*	*	*	*	*	*	*	*	12
076	080	088	088	088	088	086	086	088	075	19	50	090	12	22	054	36	13††
064	063	062	062	067	062	063	060	063	061	00	38	092	07	34	035	57	14
068	074	072	078	076	078	076	082	082	066	17	10	084	07	10	042	42	15†
084	087	085	085	084	082	082	079	079	076	17	10	089	07	34	052	37	16†
064	068	070	068	068	070	068	068	070	058	01	30	082	09	00	026	56	17
050	060	066	064	066	076	072	070	068	056	20	10	078	12	30	010	68	18††
034	036	038	040	044	050	056	060	068	047	02	46	076	06	10	024	52	19
066	066	072	070	072	074	078	076	078	062	20	12	080	07	28	032	48	20
080	085	087	087	082	091	091	083	080	073	17	30	093	06	40	048	45	21
077	078	081	073	088	089	088	087	087	074	01	36	093	07	26	047	46	22
064	067	074	075	074	073	072	073	072	067	02	18	093	06	46	044	49	23
052	058	068	072	066	068	072	074	074	057	19	26	076	08	30	024	52	24
078	077	083	077	072	073	071	073	072	071	16	50	087	07	30	053	48	25
062	062	068	074	080	068	066	062	066	066	19	10	082	08	10	048	34	26
088	087	090	085	084	083	086	081	080	076	13	10	093	08	28	045	48	27
000	092	092	094	096	096	096	096	096	085	18	28	099	07	06	058	41	28†
084	085	082	081	080	083	082	081	084	079	00	50	098	06	26	050	48	29
088	088	088	086	086	*	*	*	*	*	*	*	*	*	*	*	*	30†
069	071	073	073	075	075	075	074	075	066							46	Means.
073	077	075	077	077	077	077	078	079	069								Means.†
067	071	075	074	075	077	076	073	072	065								Means.††

†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)

MAY

2,400γ plus Tabular quantities

Date	Hours														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1††	*	*	*	*	070	050	026	028	046	059	060	060	720	070	070
2††	074	070	070	070	066	066	062	060	072	072	090	088	074	074	084
3	088	088	074	072	089	061	048	047	050	067	077	076	077	081	076
4	076	075	071	067	063	059	042	042	053	049	058	069	073	072	064
5	066	065	065	065	065	060	055	066	065	065	066	071	069	078	079
6	077	084	075	*	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	062	052	052	050	050	048	052	054	052	052	056
8†	072	072	068	065	063	064	063	061	064	065	072	079	081	078	077
9††	071	080	069	068	067	066	065	065	062	059	061	061	075	072	063
10††	071	070	069	065	055	043	034	039	045	062	077	081	068	071	053
11	070	069	067	066	064	050	040	*	*	*	*	*	*	*	*
12	*	*	*	*	053	046	023	017	018	019	022	035	039	054	049
13†	071	072	069	065	071	061	053	058	058	058	067	071	077	084	074
14	073	073	069	068	066	066	062	048	050	054	052	060	066	068	068
15	080	084	078	*	*	*	*	*	*	*	*	*	036	049	055
16	068	067	067	062	052	043	043	057	057	063	072	074	074	071	067
17	067	069	069	*	*	*	*	*	*	*	*	*	*	*	*
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	*	*	*	*	063	049	040	050	051	055	066	067	061	060	068
20†	060	068	069	069	069	055	049	042	041	045	057	068	079	075	071
21†	079	071	073	069	068	061	060	078	057	055	055	078	077	075	070
22†	074	074	071	067	058	046	038	026	040	026	037	046	060	060	060
23	074	076	076	072	063	056	052	048	052	050	042	*	036	044	052
24	072	074	076	070	056	040	024	020	020	026	036	046	046	056	058
25	060	058	076	074	069	059	043	039	039	043	049	058	061	061	059
26††	057	071	075	071	064	056	058	064	070	070	068	054	056	056	056
27	070	079	062	057	051	064	061	061	062	061	066	077	081	080	077
28	083	080	073	073	064	054	046	032	044	046	*	*	*	*	054
29	078	086	078	*	*	*	*	*	*	*	*	036	042	042	044
30	062	070	068	*	*	*	*	*	*	*	*	*	*	*	*
31	063	064	069	070	070	056	058	066	066	074	078	070	062	054	054
Means	070	072	070	067	063	057	051	050	053	056	064	069	070	070	067
† Means	071	073	070	067	063	057	053	049	052	050	060	068	074	073	070
†† Means	068	070	071	069	063	058	054	057	062	066	074	073	070	068	064

TABLE 17  
Hourly Values of Vertical Force, 1951

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

MAY

2,400γ 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	
072	070	070	074	070	070	078	090	078	*		*		*	*	1††
088	082	080	078	088	090	092	094	084	078	20 50	096	06 34	058	38	2††
077	078	079	083	080	079	079	078	077	073	18 10	090	06 36	044	46	3
059	056	070	071	075	074	069	067	068	064	19 26	077	06 38	040	37	4
080	081	080	079	079	078	077	076	075	071	18 50	083	05 50	053	30	5
*	*	*	*	*	*	*	*	*	*		*		*	*	6
066	072	070	072	072	074	072	072	072	*		*		*	*	7
076	075	072	073	073	074	073	072	071	071	11 10	083	06 12	059	24	8†
068	071	072	075	075	072	073	072	085	069	23 58	087	08 05	055	32	9††
048	057	073	070	069	073	066	065	069	063	11 06	083	06 30	032	51	10††
*	*	*	*	*	*	*	*	*	*		*		*	*	11
058	059	064	065	065	068	069	070	071	*		*		*	*	12
078	075	081	081	082	080	078	077	075	072	17 50	886	06 10	051	35	13†
068	068	068	072	072	072	076	080	076	067	21 50	082	07 30	044	38	14
056	067	067	068	071	071	070	069	069	*		*		*	*	15
065	065	063	064	064	060	065	062	068	063	11 38	076	06 00	041	35	16
*	*	*	*	*	*	*	*	*	*		*		*	*	17
*	*	*	*	*	*	*	*	*	*		*		*	*	18
067	066	066	067	067	063	064	065	067	*		*		*	*	19
072	709	081	081	082	881	081	081	080	068	21 10	084	06 30	040	44	20†
073	074	070	075	077	077	074	075	075	070	01 10	081	05 00	053	28	21†
060	062	066	074	076	076	072	072	070	059	18 30	078	08 00	018	60	22†
060	068	070	068	066	054	070	070	068	*		*		*	*	23
058	058	058	060	060	060	060	060	060	052	01 38	078	07 50	018	60	24
058	057	059	059	062	059	063	065	056	058	01 00	080	06 50	026	54	25
054	052	068	054	054	054	054	054	070	061	01 50	077	16 02	050	27	26††
076	075	076	073	073	072	075	076	075	070	11 48	083	03 46	047	36	27
062	064	068	068	068	070	076	072	078	*		*		*	*	28
048	056	062	062	062	062	062	062	062	*		*		*	*	29
*	*	*	*	*	*	*	*	*	*		*		*	*	30
054	056	056	056	058	062	063	060	062	063	09 54	080	04 58	052	28	31
067	068	071	071	072	072	072	071	071	066					39	Means
072	073	074	077	078	078	076	075	074	068						Means †
065	065	073	069	071	072	071	071	077	068						Means ††

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted means).

TABLE 18

## Hourly Values of Vertical Force 1951

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

JUNE

2,400γ plus tabular quantities

Date	Hours														
	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	070	074	074	068	058	058	064	068	072	074	072	058	058	062	060
2	070	074	078	074	064	056	064	076	086	082	072	062	058	058	076
3	080	088	080	072	058	056	056	050	058	074	078	078	076	074	074
4	082	084	084	080	068	070	050	038	024	032	042	042	046	054	058
5	078	080	080	080	076	068	056	042	038	044	048	058	058	058	058
6††	078	078	080	078	074	065	066	051	050	077	070	069	068	067	066
7	082	081	080	078	072	077	071	062	062	063	075	075	074	076	077
8	075	077	078	077	073	071	058	053	067	086	091	087	076	081	069
9	080	081	081	081	085	075	069	066	057	061	065	070	081	079	079
10†	079	079	079	077	073	072	069	051	049	048	063	059	057	060	057
11	061	064	079	079	072	067	060	052	052	052	052	052	052	052	050
12	064	072	076	084	082	080	078	060	048	046	048	058	060	064	064
13	068	080	084	080	066	062	066	042	040	046	054	060	060	052	058
14	068	072	080	080	072	066	040	036	038	040	040	040	054	060	060
15	072	072	072	*	*	*	*	*	*	*	*	*	*	*	*
16	*	*	*	*	063	059	030	018	023	037	052	059	059	058	060
17††	072	071	071	071	060	054	051	050	054	064	072	072	074	074	078
18††	090	092	080	077	074	081	068	055	076	081	104	105	102	101	088
19††	092	091	086	*	*	*	*	*	*	*	*	*	*	*	*
20†	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22†	*	*	*	*	079	072	053	039	044	051	056	073	073	068	057
23†	067	072	075	075	067	050	033	017	014	023	038	047	049	062	065
24†	077	078	079	*	*	*	*	*	*	*	*	*	*	*	*
25††	*	*	*	*	079	078	057	046	059	064	069	068	065	066	073
26	073	082	087	081	071	057	047	042	059	065	069	074	079	067	075
27	087	081	077	*	086	080	053	073	085	093	091	093	091	098	102
28	089	090	086	084	084	075	073	071	072	078	096	097	091	087	088
29	097	097	094	086	076	074	080	080	084	088	094	088	090	080	084
30	090	088	090	090	086	072	070	070	078	088	094	098	094	090	090
Means	077	080	081	079	072	067	061	054	056	062	068	069	069	069	070
†Means	073	075	077	076	070	061	046	034	031	035	051	053	053	061	061
††Means	080	080	077	075	069	067	063	052	060	074	082	082	081	081	077

†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 centered at the full hours of Greenwich mean time)

JUNE

2,400γ plus tabular quantities

G. M. T.									Means	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	ll. M.	γ	ll. M.	γ	γ	
056	058	066	068	068	068	068	068	068	066	03 06	078	01 46	056	22	1
076	078	078	078	078	078	078	078	078	073	01 50	080	11 42	056	24	2
074	078	078	078	078	078	078	078	080	073	00 46	090	06 28	046	44	3
078	060	062	070	068	066	072	076	078	062	03 00	088	07 31	022	66	4
060	062	072	076	076	078	076	078	078	066	01 50	082	07 46	036	46	5
071	082	079	080	067	074	073	074	077	071	15 30	084	07 36	048	36	6†
073	073	076	074	077	079	081	078	074	075	01 10	084	06 32	058	26	7
068	067	067	066	073	081	082	079	081	071	09 34	093	07 26	051	42	8
082	079	083	079	080	079	079	081	080	076	16 58	086	07 10	055	31	9
059	061	062	055	063	057	058	055	055	062	02 12	081	07 30	046	35	10†
052	050	052	054	056	060	058	064	058	058	03 50	082	06 20	048	34	11
066	066	068	066	066	066	074	066	066	066	02 40	086	09 10	044	42	12
064	064	064	066	064	064	066	064	065	062	02 30	086	07 36	038	48	13
060	062	064	072	074	070	066	064	070	060	01 50	082	07 00	032	50	14
*	*	*	*	*	*	*	*	*	*		*		*	*	15
061	066	074	073	075	075	074	073	072	*		*		*	*	16
080	082	090	094	094	094	092	090	080	074	17 06	098	07 10	048	50	17†
091	092	097	078	097	096	093	090	093	088	10 50	107	06 34	053	54	18†
*	*	*	*	*	*	*	*	*	*		*		*	*	19†
*	*	*	*	*	*	*	*	*	*		*		*	*	20†
*	*	*	*	*	*	*	*	*	*		*		*	*	21
058	069	068	067	067	066	063	064	063	*		*		*	*	22†
064	069	072	073	073	074	075	076	077	059	02 46	079	08 10	012	07	23†
*	*	*	*	*	*	*	*	*	*		*		*	*	24†
058	059	070	071	072	07	072	059	070	*		*		*	*	25†
076	077	079	079	084	085	088	085	086	078	01 50	089	06 37	040	49	26
086	096	102	101	103	101	097	093	091	*		*		*	*	27
090	090	089	093	091	090	092	094	095	087	00 42	099	07 18	069	30	28
084	084	084	084	084	088	086	088	090	086	01 02	099	06 28	070	29	29
090	094	096	096	096	096	104	098	098	090	20 10	106	06 10	068	38	30
072	073	075	075	077	077	078	077	077	072					41	Means
061	065	067	064	068	065	067	065	066	060						Means
081	085	089	084	086	086	086	085	083	078						† Means

\* Loss of record (Day omitted for means).

† International quiet days.

†† International disturbed days.

TABLE 19  
PRINCIPAL MAGNETIC STORMS RECORD AT KODAIKANAL  
(January—June 1951)

Greenwich date 1951	Storm time				Type (2)	Sudden commencement			C Figure degree of activity (4)	Maximal activity Greenwich day	Ranges			Remarks
	G.M.T. of beginning		G.M.T. of ending (1)			Amplitude (3)					D	H	Z	
	H	M	D.	H.		D	H	Z						
January 31 .	02	32	1	09	s.c. (probable)		+35	+1	m	31	3	164	*	
February 22	06	04	24	19	..	.	.	.	ms	23	4	255	8	
February 27 .	00	25	28	15	s.c.		+20	+1	ms	28	4	268	14	
April 1 .	18	50	7	22	..			.	m	3	5	245	117	
April 12 .	21	52	14	13	s.c.		+8	.	ms	13	3	250	45	
April 18	06	50	19	14	s.c.	-0 8	+83	+21	s	18	4	403	88	On April 19, crochet observed between 0522 and 0620 GMT. Radio fade out (All India Radio) reported between 0445 and 0650 GMT.
April 30 .	06	40	3	20	s.c.	-0 2	+23	.	ms	1	5	273	102	On June 13, crochet observed between 0600 and 0712 GMT. Radio fade-out (All India Radio) reported between 0550 and 2910 GMT.
May 9	17	46	11	15	s.c.	..	+16	.	m	10	9	243	71	On June 18, crochet observed between 0602 and 0630 GMT.
May 25 .	18	42	27	11	s.c.	.	+12	.	m	27	6	193	26	
June 6	04	14	7	09	s.c.	-0 2	+26	.	m	6	3	248	66	
June 14 .	17	50	15	13	s.c.		+26	+17	m	15	*	171	138	
June 17 .	16	58	18	19	s.c.	-0 3	+41	+17	ms	18	5	263	64	
June 18 .	23	10	19	11	s.c.	.	+15	+11	m	19	4	126	*	

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

- (1) Approximate time of ending of storm construed 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 $\gamma$  and 250 $\gamma$ ),  
(ms) for moderately severe (when range is between 251 $\gamma$  and 400 $\gamma$ );  
(s) for severe (when range is above 400  $\gamma$ )

\*=Loss of record.