

# Kodaikanal Observatory

## Bulletin No. CXXXIV

### PART I

#### SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF 1950

The results of observations of prominences made at Kodaikanal Observatory during the second half of 1950 supplemented by data computed from photographs supplied by Meudon and Mt. Wilson Observatories for those days on which Kodaikanal had imperfect or no observations, are presented in this bulletin. Our thanks are due to the authorities of Meudon and Mt. Wilson Observatories for their cooperation.

*Calcium prominences at the limb*—During the half year under review, photographs of Ca-prominences at the limb were obtained at Kodaikanal on 105 days; of these, the plates for 101 days were utilised for computation. Spectroheliograms for 66 days were obtained from Mt. Wilson and for 45 days from Meudon. In all, complete observations were available for 173 days for the half year and these were counted as 164½ 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 of Kodaikanal, Mt. Wilson and Meudon	
	Mean daily areas (sq. minutes)	Mean daily numbers
North . . . . .	1.34	3.71
South . . . . .	1.05	3.48
TOTAL	2.39	7.19

These figures when compared with the corresponding values of the previous half-year show a decrease of activity in both respects, the decrease in areas being 15% and in numbers 11%. The southern hemisphere continued to be less active than the north; the fall in activity in the northern hemisphere was however steeper.

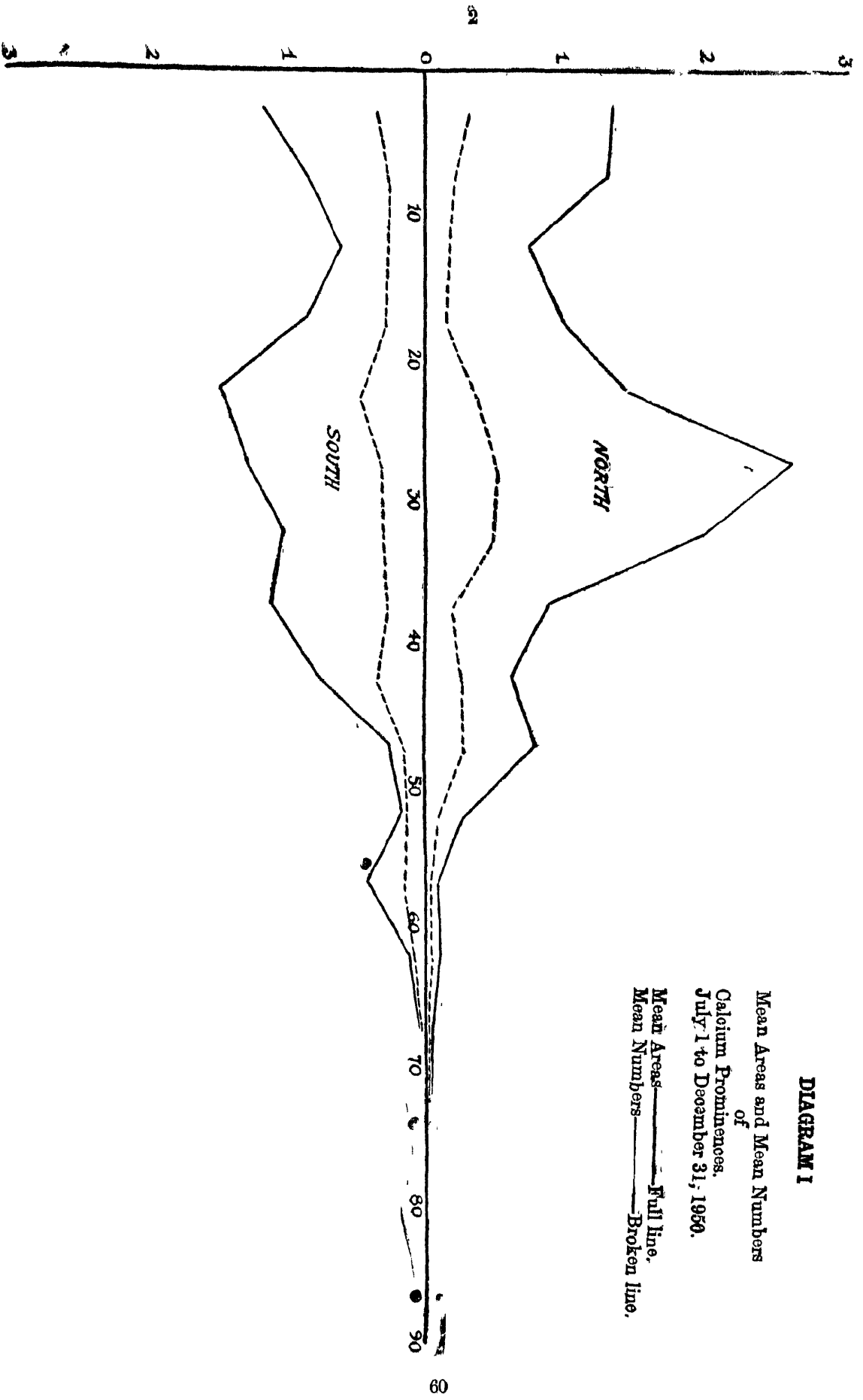
For comparison with data published in bulletins prior to 1923; i.e. before the cooperation of other observatories came into force, the values based on Kodaikanal observations alone are also given below—

	Kodaikanal data only	
	Mean daily areas (square minutes)	Mean daily numbers
North . . . . .	1.30	3.80
South . . . . .	1.00	3.59
TOTAL	2.30	7.39

The distribution of areas and numbers in 5° ranges of latitude as obtained from the combined data is represented in the following diagram:

(Diagram I)

The curve for areas shows that the maxima of activity are centered at 25°-30° N and 20°-25° S. This indicates that the peak of activity in the northern hemisphere has further drifted by 5° towards the equator while that in the southern hemisphere has remained stationary as compared with the last half-year. The small high latitude maximum which was centered at 65°-70° N during the last half year has vanished, but two other small peaks have developed at 45°-50° N and 55°-60° S. In the belts of sunspot activity extending from the equator to 35° the zone of minimum prominence activity was between 10° and 15° in both the hemispheres.



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

TABLE I

Months 1950.	Number of days (effective)	Areas (Square minutes)	Numbers	Daily means		Mean height "	Mean extent °
				Areas (sq. min.)	Numbers		
July . . . . .	27½	79.55	238	2.89	8.65	44.39	4.49
August . . . . .	27½	86.10	249	3.10	8.97	38.92	3.81
September . . . . .	25½	52.60	154	2.04	5.98	36.01	3.53
October . . . . .	27	61.00	168	2.26	6.15	37.98	4.11
November . . . . .	26½	48.90	157	1.85	5.89	37.77	3.18
December . . . . .	29½	64.80	214	2.18	7.19	42.80	3.61
3rd quarter . . . . .	81	218.25	641	2.69	7.91	40.25	3.84
4th quarter . . . . .	83½	174.70	539	2.10	6.47	39.82	3.71
2nd half-year . . . . .	164½	392.95	1180	2.39	7.18	40.06	3.78

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

1950 July-December	East	West	Percentage east
Total areas (square minutes) . . . . .	175.5	217.45	44.66
Total numbers . . . . .	544	636	46.10

The eastern deficit both in the areas and the numbers persists as in the previous half-year.

*Observations with the Prominence Spectroscope.*

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

TABLE II

Date 1950	Time I.S.T.	Base °	Latitudes		Limb	Height in H <sub>cc</sub> (seconds of arc.)	Lines in which observed	Remarks
			North °	South °				
July . . . . .	h. m.				NIL			
Aug. . . . .					NIL			
September . . . . .					NIL			
October . . . . .					NIL			
November 5 . . . . .	08 40	5	..	29½	E	25.6	D's and b's	Ht. in b's=12".8 Ht. in D's=12".0
December . . . . .					NIL			

The metallic prominence was distributed as follows.—

Latitudinal Zone	1°-10°	11°-20°	21°-30°	Mean latitude	Extreme latitudes
North . . . . .			..	..	..
South . . . . .		..	1	29½	29½

*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 spectroscope are collected in table III.

TABLE III

Date and month	Time I S T. (GMT + 05h 30m)	Mean latitude		Lamb	Displacements		Remarks
		North	South		To red A	To violet A	
July . . . . .	h. m.			NIL.			
August . . . . .				NIL.			
September . . . . .				NIL.			
October . . . . .				NIL.			
November . . . . .				NIL.			
December 23 . . . . .	09 45	70°	73°	W	1		Small speck.
	09 50			E	0.5		Do.

*Reversals and displacements on the sun's disc*

Particulars of bright reversals of 'C' line, dark reversals of D<sub>3</sub> line and displacements of 'C' line on the disc are given below:

	North	South	East	West	Total
Bright reversals of H $\alpha$ 'C' line on the (disc)	10	5	8	7	15
Dark reversals of D <sub>3</sub> line on the disc	10	5	8	7	15
Displacements of H $\alpha$ ('C') line on the disc	2	0	0	2	2

*Heights of prominences in H $\alpha$  D<sub>3</sub>, H $\beta$  and K lines*

The mean height of 33 prominences observed in H $\alpha$  D<sub>3</sub>, H $\beta$  and K lines is given below —

Year	Period	Total No of prominences whose heights were measured in H $\alpha$ D <sub>3</sub> and H $\beta$ lines	Mean heights			
			K	H $\alpha$	D <sub>3</sub>	H $\beta$
1950 . . . . .	July-December . . . . .	33	54.2	48.7	45.6	43.6

*Observations with the Hale Spectroheliograph*

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

	North	South	East	West	Total
Displacements in prominences . . . . .	5	4	6	3	9
Displacements in dark markings . . . . .	6	2	6	2	
	Displacements towards				
	Red.	Violet.		Bothways	
In Prominences . . . . .	2	3		4	
In dark markings . . . . .	1	4		3	

*Solar Flares*

Particulars of solar flares observed with the spectroheliograph are given in the following table.—

TABLE IV

Date 1950	Time in I S T.						Latitude	Longitude from Central Meridian	Intensity	Maximum width H-alpha line
	Beginning		Maximum		End					
	H.	M.	H.	M.	H.	M.				
July . . . . .										
August 11 . . . . .	..		08	00			15N	12½ E	1	
September . . . . .										
October 30 . . . . .	..		08	05	08	35	12 N	60 E	1	1.6 A
November 6 . . . . .	..		07	51			12 N	2½ W	1	Not observed.
December 8 . . . . .			08	10	08	35	14 N	65 E	1	1.7 A
December 9 . . . . .	08	11	08	15	08	40	14 N	52 E	1	1.2 A

*Sudden disappearances of prominences and dark markings*

Details of prominences and H-alpha dark 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			
					I.S.T.		Mean latitude.	Mean longitude
					H.	M.		
H-alpha dark markings . . . . .	October 28 . . . . .	11	30	27 S	60 E			
	October 29 . . . . .	11	30	6 S	7 W			
	October 30 . . . . .	15	15	4 N	15 W			
	November 1 . . . . .	10	40	18 N	60 E			
	December 8 . . . . .	15	15	27 N	8 E			
Prominences . . . . .	December 8 . . . . .	11	40	30 N	E limb.			
	December 23 . . . . .	11	30	28 N	E limb.			

*Prominences projected on the disc as H-alpha absorption markings'*

During the period under review, photographs of the sun's disc in the H-alpha line were obtained at Kodaikanal on 127 days, of which the plates on 11 days were rejected on account of their poor quality. Spectroheliograms were also received for 57 days from Mt Wilson and for 43 days from Meudon. The records were thus available in all for 176 days of the half year and these were reckoned as  $172\frac{1}{2}$  effective days after weightage according to the quality of the 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 these photographs are given below:—

Combined data of Kodaikanal, Mt. Wilson and Meudon.

	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North . . . . .	1699.1	14.21
South . . . . .	1005.1	10.06
TOTAL . . . . .	2704.1	24.27

On comparing with the previous half-year's values, these figures show a decrease of activity both in the areas and the numbers as in the case of prominences. The areas show a decrease of 32% and the numbers 25%. The southern hemisphere continued to be less active than the north.

The figures based solely on Kodaikanal photographs are also given in order to facilitate comparison with data published in Bulletins before 1923.

Kodaikanal data only.

	Mean daily areas (millionths of the sun's visible hemisphere)	Mean daily numbers
North . . . . .	1620.7	13.01
South . . . . .	947.1	9.40
TOTAL . . . . .	2567.8	22.41

The distribution of areas of the markings in  $5^\circ$  ranges of latitude as obtained from the combined data represented in the following diagram:

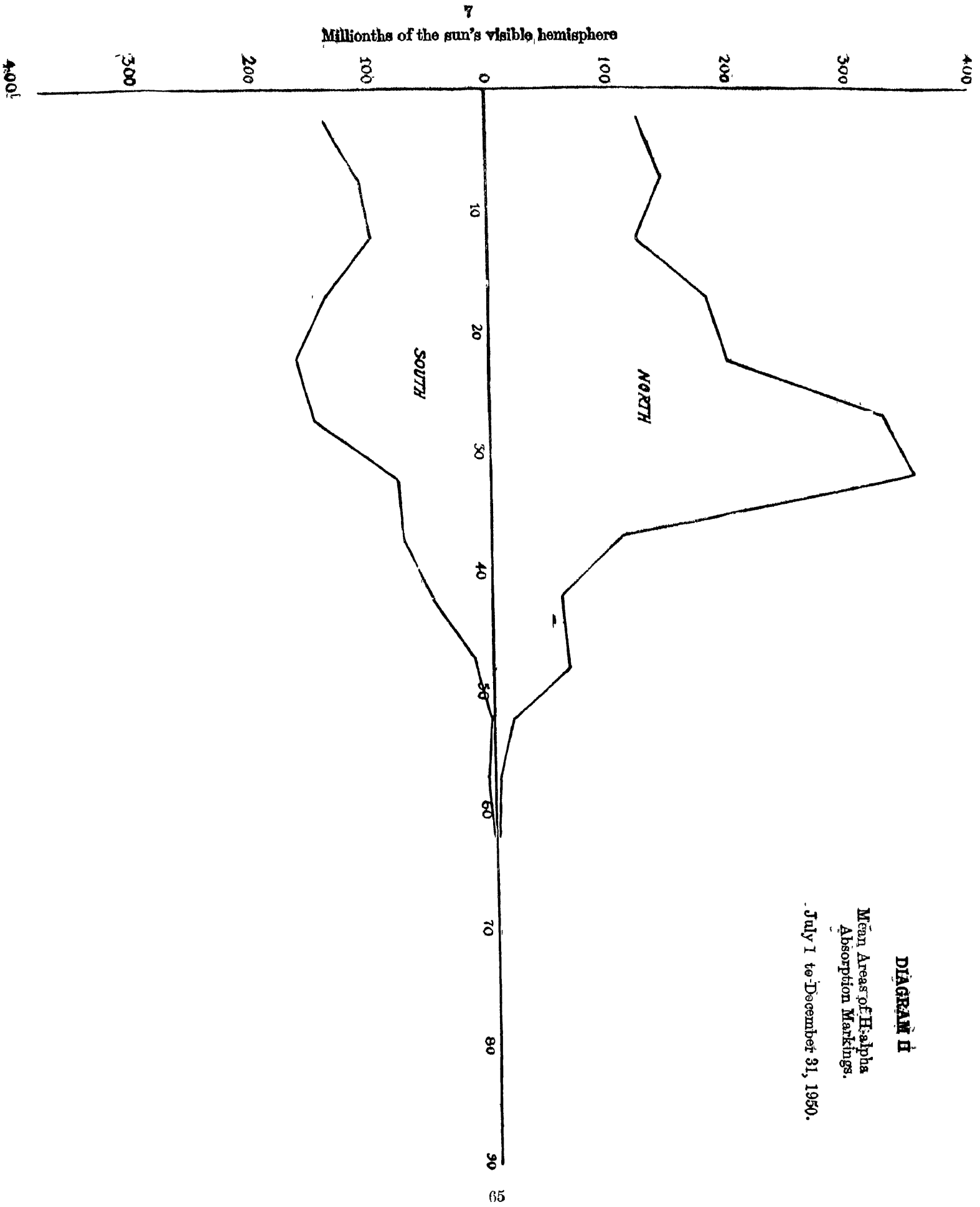
(Diagram II)

The zones of maximum activity of the absorption markings are situated in latitudes  $30^\circ$ - $35^\circ$  N and  $20^\circ$ - $25^\circ$  S. When compared with the positions of the peaks in the previous half-year, the zone of maximum activity in the northern hemisphere has remained stationary while that in the south has drifted towards the equator by  $5^\circ$ .

The distribution of areas and numbers of the dark markings east and west of the sun's axis is given below:—

July—December 1950.	East	West	Percentage East
Total areas (millionths) of the visible hemisphere . . . . .	21602	249569	46.50
Total numbers . . . . .	2036	2151	48.63

The eastern defect both in the areas and numbers persists as in the previous half year.



## PART II.

## SUMMARY OF MAGNETIC OBSERVATIONS FOR THE SECOND HALF OF 1950

*Introduction.*

The results of magnetic observations made at the Kodaikanal Observatory during the first half of 1950 have been published in Bulletin No. CXXXII of this observatory. The history of the magnetic observatory and a brief description of the instruments and of the system of observations are given in that bulletin. The data for the second half of 1950 are given here. The instrumental equipment of the magnetic section has recently been supplemented by the addition of a complete set of La Cour variometers which have been installed in the variometer room. But the data incorporated in the present summary are derived entirely from the records of the Watson variometers.

*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 and V.F in  $\gamma/cm$  for the months July-December 1950 are given below :—

Instrument	July.	Aug.	Sept.	Oct.	Novr	Deer
H. F. Magnetograph . . . .	48.9	48.7	48.5	48.1	48.1	47.9
V. F. Magnetograph . . . .	200	200	200	150	150	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 second half of 1950 was not therefore satisfactory resulting in loss of record on many days especially in August 1950. The tabulation of the V.F. records has been done whenever records are reliable.

(c) While working out the statistics for declination, it was noticed that absolute measurements of declination made during 1950 were vitiated by considerable errors and therefore unsuitable for computation of the base-line value. It was fortunate however that no adjustment had been made in the D magnetograph since its initial set-up and therefore the base-line value could justifiably be taken to be constant. This circumstance permitted the utilisation of the base-line value determined with the required accuracy in 1951 for the purposes of tabulation of the data for the second half of 1950. The base-line value was derived by the usual procedure of converting the ordinate, corresponding to absolute observation with Kew Magnetometer No 3, into angle and adding this to the corresponding observed absolute declination value. The value of the base-line so obtained, is  $4^{\circ}27'44''$ . The tabulated values of declination are correct to  $\pm 0.5'$ . The performance of the D magnetograph was not satisfactory during December 1950 resulting in abnormal values in Declination. The tabulation of 'D' for this month is therefore omitted.

*Basic hourly values and associated means*

*Basic results*—Tables 1 to 17 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 (1) a quiet day, (2) a day of slight disturbance, (3) a day of moderate disturbance, (4) a day of moderate storm and (5) 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 18 gives a list of principal magnetic storms recorded during the second half of 1950

KODAIKANAL,  
November 1951.

A. K. DAS,  
Director, Kodaikanal Observatory.

TABLE 1

Hourly Values of Declination (Westerly) 1950

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

July  $1^{\circ} 47.5'$   $3''$  plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	41.5	41.0	40.5	40.9	42.0	42.9	43.9	44.8	44.4	44.0	43.7	43.0	42.6	42.5	43.0
2	41.8	41.0	40.3	40.6	42.2	42.2	44.1	44.8	44.3	43.3	43.4	43.3	43.3	43.0	43.0
3	42.3	41.5	40.7	40.5	40.5	41.5	42.6	44.0	44.8	44.5	44.0	43.4	43.2	43.0	43.4
4††	42.0	40.5	39.5	39.5	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	41.4	42.4	43.6	44.4	45.2	44.7	44.1	43.6	43.4	43.2	43.1	43.1
7	42.0	41.0	41.0	41.5	41.8	42.8	44.0	44.8	44.5	43.7	43.2	42.9	42.6	42.6	42.6
8	41.9	40.9	40.5	40.6	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	41.5	42.1	43.1	44.2	44.9	44.5	43.6	42.8	42.5	42.5	42.6	43.0
10	43.0	41.0	40.6	40.6	41.0	42.0	43.5	45.0	45.2	44.9	44.0	43.2	41.8	41.0	42.7
11††	42.5	42.0	40.7	40.7	41.2	42.5	43.9	43.7	43.7	43.3	43.1	42.4	42.0	42.1	43.0
12††	42.0	41.0	40.5	40.5	42.0	41.1	44.1	44.1	44.0	43.6	42.5	41.7	42.0	42.1	42.7
13	42.5	41.7	41.1	41.7	42.6	43.6	44.1	45.0	45.0	44.1	43.9	43.5	43.0	43.0	43.2
14	42.1	41.0	40.0	40.0	41.0	42.3	42.7	43.2	42.5	42.5	42.0	42.3	42.6	43.1	43.5
15	42.4	41.0	40.5	41.2	42.7	43.9	44.0	44.0	43.7	43.5	42.7	42.6	42.6	42.6	43.0
16	42.4	41.2	40.1	41.0	*	*	*	*	*	*	43.0	43.0	43.0	43.0	43.5
17†	42.3	41.5	41.0	41.5	42.0	43.5	44.2	45.1	44.9	44.0	44.0	44.0	43.5	43.2	43.5
18†	42.5	44.5	41.0	40.7	41.5	42.5	43.4	44.5	44.0	45.5	44.9	44.0	43.4	43.0	43.0
19†	42.4	41.2	40.6	41.0	42.5	43.0	43.7	45.0	44.9	44.3	43.4	43.1	42.3	42.6	43.1
20	42.5	41.5	40.5	41.0	42.0	43.0	44.0	45.1	45.7	46.3	45.5	43.6	43.0	43.5	43.5
21	42.4	41.6	41.1	41.5	42.2	43.1	44.2	44.9	44.3	43.7	44.2	42.7	42.3	42.5	43.0
22	42.5	41.5	40.6	41.2	43.0	44.0	44.5	45.0	44.9	44.8	44.1	44.6	43.5	43.0	43.2
23†	42.1	41.6	41.0	41.6	42.6	43.9	44.5	45.0	44.9	44.5	44.2	43.4	43.4	43.2	43.3
24††	42.4	41.6	41.0	41.5	41.8	42.6	42.8	43.4	42.8	43.1	43.5	43.3	42.3	42.6	43.4
25††	40.3	39.5	39.2	40.0	41.0	42.0	43.1	42.0	43.7	43.2	42.7	42.0	42.0	42.1	42.1
26†	42.5	41.5	41.2	41.5	41.6	42.4	42.6	43.5	44.2	44.0	43.2	43.3	42.4	42.1	42.5
27	41.9	41.4	41.0	41.1	41.5	42.5	41.7	44.5	44.9	44.7	44.3	43.6	43.2	43.2	43.0
28	42.0	40.9	40.3	41.0	41.5	43.0	43.5	44.4	44.2	44.4	43.9	43.5	42.9	42.6	43.0
29	41.3	40.7	40.5	40.9	41.7	43.0	43.1	43.7	44.0	45.0	44.1	43.3	43.0	43.3	43.5
30	42.1	41.5	40.5	41.2	41.2	42.0	43.5	45.1	45.4	45.0	44.1	43.8	43.2	43.4	43.6
31	42.1	41.3	40.9	40.1	40.9	42.0	44.1	44.5	44.3	44.5	44.1	43.7	43.5	43.3	43.2
Means	42.1	41.4	40.6	41.0	41.8	42.7	43.5	44.4	44.4	44.2	43.7	43.2	42.8	42.7	43.1
Means†	42.4	42.0	41.2	41.3	42.4	43.1	43.7	44.6	44.5	44.5	43.8	43.5	43.0	42.8	43.1
Means††	41.8	41.0	40.3	40.7	41.5	42.0	43.2	43.3	43.7	43.3	42.9	42.3	42.1	42.2	42.8

† International quiet days.

†† International disturbed days

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

TABLE 1

Hourly Values of Declination (Westerly) 1950

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

July

1° 47.5' 30" 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.				
43 2	43 4	43 3	43 0	42 6	42 5	42 0	42 0	42 1	42 7	07 55	44 5	02 00	40 4	4.1	1
43 1	43 0	42 7	42 5	42 5	42 0	42 0	41 8	42 2	42 6	07 33	44 8	02 57	40 5	4.3	2
43 3	43 0	43 0	42 7	42 7	42 5	42 7	42 5	42 3	42 7	10 19	44 8	02 50	40 5	4.3	3
*	*	*	*	*	*	*	*	*	*		*		*	*	4††
*	*	*	*	*	*	*	*	*	*		*		*	*	5
43 2	43 0	42 8	42 5	42 5	42 5	42 4	42 1	42 1	*		*		*	*	6
42 7	42 8	42 6	42 6	42 3	42 1	42 0	42 0	42 0	42 6	07 40	45 7	02 10	41 0	4.7	7
*	*	*	*	*	*	*	*	*	*		*		*	*	8
43 5	43 2	43 0	43 1	43 0	42 8	42 5	42 5	42 1	*		*		*	*	9
43 0	43 0	43 2	43 1	43 0	43 0	42 8	42 6	42 7	42 7	06 34	45 4	01 55	40 8	4.6	10
43 6	43 1	43 1	42 9	42 7	42 4	42 0	42 6	42 5	42 5	07 50	43 8	02 35	40 6	3.2	11††
43 3	43 2	43 3	43 2	43 0	43 2	43 1	43 0	42 7	42 6	06 45	45 0	02 30	40 0	5.0	12††
43 4	43 5	43 7	43 5	43 0	43 0	42 7	42 5	42 0	43 2	09 28	46 2	02 00	41 0	5.2	13
43 6	43 3	43 0	43 0	42 8	42 5	42 6	42 5	43 2	42 4	07 10	44 0	02 45	40 0	4.0	14
43 0	43 2	43 1	43 0	43 0	43 0	42 7	42 7	42 6	42 8	07 07	44 0	02 20	40 5	3.5	15
43 4	43 1	43 2	43 0	43 0	42 5	42 5	42 5	42 5	*		*		*	*	16
43 5	43 5	43 2	43 0	42 7	42 5	42 5	42 5	42 5	43 1	07 20	45 2	02 25	41 0	4.2	17†
43 0	42 7	43 0	43 0	43 0	43 0	43 0	42 7	42 6	43 1	08 50	46 0	02 40	40 4	5 6	18†
43 5	43 3	43 2	43 0	43 0	43 0	43 0	43 1	42 9	43 0	07 37	45 0	01 50	40 4	4 6	19†
43 4	43 3	43 1	43 0	42 0	42 5	42 5	42 5	42 5	43 1	09 15	46 4	02 00	40 5	5 9	20
43 3	43 4	43 4	43 1	43 0	42 7	42 7	42 7	42 5	42 9	06 47	45 0	01 53	41 0	4.0	21
43 5	43 4	43 4	42 9	42 5	42 5	42 3	42 5	42 5	43 2	09 05	45 2	01 53	40 5	4.7	22
43 5	43 5	43 3	42 9	42 5	42 5	42 0	42 5	42 5	43 1	06 55	45 1	02 00	41 0	4.1	23†
43 5	43 3	43 0	42 5	42 7	42 5	42 0	42 0	41 4	42 5	09 30	43 5	02 00	41 0	2.5	24††
42 7	43 1	43 3	43 0	43 1	43 1	43 0	42 7	42 6	42 1	07 15	45 0	01 55	38 8	6.2	25††
42 7	43 0	43 0	43 0	42 9	42 6	42 5	42 5	42 3	42 6	08 30	44 2	01 20	41 0	3.2	26†
43 3	43 3	43 0	42 7	42 5	42 4	42 1	42 4	42 5	42 8	07 05	44 6	01 35	40 0	4 6	27
43 4	43 2	43 0	42 6	42 5	42 4	42 0	41 9	42 0	42 7	08 00	45 0	01 35	40 2	4 8	28
43 4	43 4	43 1	42 4	42 6	42 5	42 5	42 0	42 0	42 7	09 20	45 0	01 35	40 0	5 0	29
43 5	43 3	43 0	43 0	42 6	42 5	42 5	42 5	42 1	42 9	07 20	46 0	02 40	40 2	5 8	30
43 4	43 3	43 1	43 0	43 0	42 9	42 6	42 1	42 0	42 8	07 45	44 8	02 40	40 0	4 8	31
43 3	43 2	43 1	42 9	42 7	42 6	42 5	42 4	42 4	42 8					4.5	Means
43 2	43 2	43 1	42 9	42 8	42 7	42 6	42 7	42 6	42 5						Means†
43 3	43 2	43 2	42 9	42 9	42 8	42 5	42 6	42 3	43 0						Means ††

† International quiet days.

†† International disturbed days.

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

TABLE 2  
Hourly Values of Declination (Westerly) 1950'

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

August

$1^{\circ}47.5'$  plus tabular quantities.

Date.	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	42 0	41 0	39 9	39 4	40 0	41 5	42 7	43 4	43 9	44 5	44 4	43 2	43 0	43 1	43 5
2	42 0	41 5	41 0	42 0	42 6	43 3	43 6	44 5	44 4	44 4	43 8	43 4	42 8	42 5	42 6
3	42 0	40 6	39 7	40 0	41 4	42 4	43 1	44 0	44 2	43 5	42 5	41 8	42 5	43 0	43 4
4	42 0	40 6	40 0	40 2	41 5	42 6	43 5	44 2	44 8	44 5	44 0	44 0	43 5	43 0	43 4
5	42 4	41 6	41 0	41 0	41 8	42 6	43 2	44 2	44 9	44 5	44 2	43 6	43 4	43 2	43 2
6	42 0	41 5	41 0	41 1	41 5	42 5	43 5	44 5	44 5	44 5	44 5	44 1	43 1	43 0	43 1
7††	42 5	42 6	41 1	40 5	40 5	41 5	43 5	44 2	44 4	44 6	44 2	44 3	44 0	44 1	44 6
8††	42 9	42 5	41 1	40 5	41 5	42 1	42 5	44 0	42 5	43 0	43 5	43 3	43 0	43 2	43 5
9	42 4	41 8	41 0	41 2	42 0	42 5	43 5	43 5	43 7	43 8	42 9	42 0	41 5	42 0	42 0
10††	42 6	41 5	41 0	41 5	42 5	43 0	44 0	44 2	44 2	43 7	43 1	42 5	42 5	42 1	42 5
11	41 8	40 6	40 6	41 2	42 0	43 6	44 5	44 9	45 0	43 9	42 6	41 5	41 0	42 0	42 6
12	42 4	41 0	40 6	40 6	41 9	43 0	43 1	43 1	42 1	42 2	42 4	42 0	41 7	42 0	42 5
13	42 1	41 5	40 8	41 3	42 5	43 0	44 0	43 8	43 5	43 5	43 2	42 6	42 6	42 7	43 1
14	42 0	41 3	40 6	41 2	41 9	42 5	43 0	43 4	42 6	42 0	41 5	41 2	42 2	42 1	42 6
15	41 5	40 2	39 6	40 0	41 5	43 1	44 5	45 2	45 2	44 5	43 6	43 0	42 5	42 1	42 5
16†	42 0	41 1	40 7	41 6	42 0	43 0	43 7	44 4	44 2	44 0	43 9	43 2	43 0	42 0	42 6
17†	42 4	41 1	40 6	41 6	*	44 4	44 0	44 8	44 1	44 1	42 7	43 2	42 8	42 7	43 0
18	42 2	41 5	40 3	40 1	40 5	41 9	42 5	43 0	43 5	43 3	42 8	42 6	42 6	42 7	43 0
19††	41 3	40 1	39 2	39 8	41 2	42 5	42 5	42 6	43 5	43 6	43 6	43 5	43 0	42 4	42 0
20††	40 2	39 8	39 1	40 0	40 0	40 4	41 3	41 7	41 1	40 4	40 6	41 1	40 3	41 6	42 4
21	42 4	41 5	41 4	42 5	42 7	43 7	44 8	45 2	45 0	44 8	44 1	43 5	43 0	43 0	42 7
22	41 5	41 0	40 1	40 6	42 4	43 7	44 7	44 7	44 7	44 0	43 5	42 4	42 0	42 2	42 6
23	42 4	41 5	41 0	41 5	42 5	43 4	44 3	44 5	43 2	42 5	41 5	40 8	42 0	42 4	42 7
24†	42 0	40 8	40 5	41 3	42 4	43 3	44 2	44 2	43 8	43 0	42 5	41 7	41 8	42 0	42 6
25†	41 6	40 5	40 0	41 0	42 0	42 7	44 0	45 0	44 0	43 2	42 9	42 5	42 7	42 6	43 0
26†	42 0	41 0	40 0	40 5	41 5	42 6	43 6	43 8	43 0	42 5	41 8	41 6	42 3	42 6	43 0
27	42 0	40 8	39 8	40 0	41 2	43 1	44 1	44 5	44 3	43 8	43 2	43 0	43 0	43 0	43 3
28	42 4	41 1	40 5	40 6	42 0	43 5	44 1	44 6	44 2	43 6	42 6	42 5	42 5	42 8	43 0
29	41 2	40 4	40 1	41 2	41 5	42 5	43 9	44 3	44 4	44 2	43 7	43 1	43 3	43 5	43 3
30	41 5	41 1	40 2	40 5	41 7	43 2	44 2	44 9	44 5	43 9	42 8	42 5	42 5	43 0	43 0
31	42 4	41 2	40 6	41 1	42 4	44 0	45 2	45 9	45 2	44 7	43 6	42 8	42 7	42 7	43 0
Means	42 0	41 1	40 4	40 8	41 7	42 8	43 6	44 1	43 9	43 6	43 1	42 6	42 3	42 6	42 9
Means †	41 9	41 1	40 4	41 1	42 0	42 9	43 9	44 3	43 7	43 2	42 8	42 3	42 5	42 3	42 8
Means ††	41 9	41 3	40 3	40 5	41 1	41 9	42 8	43 3	43 1	43 1	43 0	42 9	42 6	42 7	43 0

† International quiet days.

†† International disturbed days.

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

TABLE 2

Hourly Values of Declination (Westerly) 1950:

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

1° 47.5' plus tabular quantities.

August

Hours G. M. T									Mean	Maximum		Minimum		Range.	Date
15	16	17	18	19	20	21	22	23		Time	Mag.	Time	Mag.		
									H. M.		H. M.				
43.2	43.0	43.0	42.5	42.6	42.5	42.0	42.0	42.0	42.4	09 27	43.0	02 48	39.2	5.8	1
43.0	43.4	43.0	43.0	42.9	42.7	42.5	42.1	42.0	42.9	07 00	44.9	01 54	40.5	4.4	2
43.8	48.6	44.2	43.2	43.0	42.7	42.5	42.1	42.1	42.6	08 00	44.8	02 03	39.5	5.0	3
43.2	43.0	43.2	43.0	43.0	42.6	42.0	42.0	42.0	42.7	07 43	44.9	01 59	39.6	5.3	4
43.4	43.3	43.1	43.0	42.6	42.6	42.4	42.4	42.3	42.9	08 58	43.0	02 24	40.7	4.7	5
43.5	43.5	43.4	43.0	42.8	42.0	42.1	42.2	42.4	42.9	07 18	44.7	03 00	40.8	3.9	6
44.9	44.5	44.5	43.5	43.6	43.0	43.1	43.5	44.8	43.4	23 23	44.9	02 46	40.0	4.9	7††
43.2	43.0	43.0	42.6	42.8	42.6	42.5	42.7	42.2	42.7	07 12	44.5	02 30	40.4	4.1	8††
43.0	43.0	42.8	42.6	42.9	43.0	43.0	42.6	42.7	42.5	08 03	44.0	02 18	40.7	3.7	9
42.5	42.6	42.7	43.2	43.0	43.1	42.7	42.7	42.5	42.7	06 38	44.4	02 03	40.7	3.7	10††
42.6	42.9	43.0	43.0	42.8	42.7	42.5	42.5	42.6	42.6	06 45	45.5	01 27	40.5	5.0	11
43.0	42.7	43.0	43.0	42.5	42.5	42.1	42.4	42.2	42.3	06 35	43.5	01 57	40.5	3.0	12
43.2	43.5	43.0	43.0	42.7	42.8	42.6	42.5	42.5	42.7	06 00	44.5	01 54	40.7	3.8	13
43.1	43.5	43.5	43.2	42.9	42.5	42.4	42.1	42.0	42.3	07 13	43.6	02 09	40.5	3.1	14
42.9	43.5	43.2	43.0	42.8	42.1	42.6	42.5	42.5	42.7	07 51	45.7	01 50	39.1	5.8	15
42.6	42.9	42.8	42.7	42.0	42.5	42.5	42.5	42.5	42.7	07 42	44.5	01 55	40.5	4.0	16†
43.1	43.0	43.0	42.7	42.5	42.4	42.2	42.1	42.3	*		*	*	*	*	17†
43.1	42.2	43.0	42.7	42.4	42.0	41.8	42.2	41.5	42.2	08 06	43.6	02 12	38.8	4.8	18
41.7	42.7	42.8	43.3	43.7	43.7	41.5	38.2	41.0	42.1	10 10	44.5	21 56	36.0	8.6	19††
42.5	42.7	43.0	43.0	43.1	43.2	43.0	42.8	42.7	41.5	18 35	43.7	01 57	38.5	5.2	20††
43.0	43.0	43.1	43.0	43.2	43.0	42.5	42.5	42.3	43.2	07 08	45.4	01 54	41.0	4.4	21
42.7	43.0	43.0	43.0	43.0	43.0	42.7	42.5	42.4	42.7	08 30	45.0	02 09	40.0	5.0	22
43.0	43.1	43.1	43.1	43.0	42.9	42.5	42.5	42.4	42.6	08 18	44.9	01 54	40.9	4.0	23
42.9	43.0	43.0	43.0	43.0	42.8	42.7	42.5	42.5	42.6	08 30	44.5	01 47	40.2	4.3	24†
43.0	43.0	43.0	43.0	43.0	43.0	42.7	42.5	42.5	42.6	08 51	45.2	01 54	39.8	5.4	25†
43.1	43.2	43.0	43.0	42.7	42.5	42.5	42.5	42.3	42.4	08 26	44.0	02 06	39.9	4.1	26†
43.5	43.4	43.2	42.8	42.8	42.5	42.5	42.5	42.5	42.7	08 47	44.6	02 23	39.7	4.9	27
43.3	43.5	43.4	43.0	42.8	42.5	42.2	42.2	42.8	42.7	07 10	44.8	02 18	40.2	4.6	28
43.3	43.3	43.0	42.8	42.7	42.6	42.4	42.3	42.4	42.7	08 26	44.7	02 06	40.0	4.7	29
43.2	43.0	43.0	42.8	42.9	42.8	42.7	42.5	42.5	42.7	08 54	45.0	02 28	40.0	5.0	30
43.0	42.5	42.7	43.1	42.5	42.5	42.5	42.4	42.4	43.0	06 42	46.0	01 53	40.5	5.5	31
43.1	43.1	43.1	43.0	42.9	42.7	42.5	42.3	42.3	42.6					4.7	Means
43.0	43.0	42.9	42.9	42.7	42.7	42.6	42.5	42.5	42.6						Means †
43.0	43.1	43.2	43.1	43.2	43.1	42.6	42.2	42.6	42.5						Means ††

† International quiet days.

†† International disturbed days.

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

TABLE 3

Hourly Values of Declination (Westerly) 1950

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

September

1° 47.5' <sup>3</sup> plus tabular quantities

Date	Hours G. M. T.														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1†	42.0	41.5	41.0	40.1	40.2	42.7	43.5	44.2	44.0	44.0	44.0	43.5	42.5	42.5	42.5
2	42.0	41.2	40.2	40.0	41.5	43.6	45.0	45.0	45.2	44.5	44.1	43.5	42.9	42.7	43.0
3††	42.0	41.7	40.7	40.5	40.5	41.6	42.6	42.6	42.8	43.0	43.0	42.5	42.2	42.0	42.5
4††	42.0	41.2	40.9	41.0	41.5	42.5	43.0	43.5	43.5	42.5	41.8	41.4	41.5	42.2	42.2
5††	42.2	41.9	41.0	40.5	41.5	42.6	43.7	44.4	43.6	43.6	43.6	42.5	42.4	42.3	42.2
6††	41.5	40.4	40.0	40.3	41.6	43.1	43.9	44.6	44.5	43.7	42.6	41.6	41.2	41.8	42.2
7	42.2	41.1	40.2	40.5	41.5	42.3	43.5	43.5	43.5	43.0	42.1	41.5	41.4	41.7	42.2
8	42.4	41.0	40.5	41.2	43.0	43.5	43.7	44.5	43.8	43.1	42.5	42.0	42.0	42.1	43.2
9	42.0	41.5	41.0	41.2	42.4	43.0	44.0	44.7	44.7	44.4	43.5	42.5	42.0	42.3	42.7
10	42.0	41.5	40.2	40.6	42.0	43.0	43.8	44.5	44.2	43.3	42.5	42.2	42.5	42.7	42.5
11	42.0	40.6	40.1	40.5	42.1	43.7	44.5	45.1	45.1	44.9	43.8	42.7	42.5	42.7	42.8
12	42.0	41.0	40.0	40.5	42.4	44.0	45.2	44.9	44.5	44.2	43.4	42.5	42.2	42.6	42.8
13	42.0	41.2	40.2	40.5	41.5	43.0	44.5	45.7	45.5	44.5	43.0	42.1	42.1	42.4	42.0
14†	41.9	40.9	40.5	41.2	42.5	44.5	45.7	46.2	45.8	45.3	43.5	42.5	42.2	42.5	42.6
15†	42.2	42.0	41.6	42.1	43.5	44.0	45.2	45.1	44.5	43.8	43.2	42.2	42.1	42.3	42.5
16	42.3	41.7	41.5	41.6	42.7	42.8	44.0	42.5	42.5	44.0	43.5	43.1	43.0	42.4	42.6
17	42.4	41.3	40.7	40.8	41.6	42.1	42.8	43.6	43.7	43.0	42.4	41.6	41.8	42.1	42.5
18	41.8	41.0	40.3	40.6	41.6	42.5	42.6	43.4	43.7	43.2	42.4	41.8	41.2	41.6	41.9
19	42.4	41.5	40.5	40.8	42.0	42.6	43.3	43.8	43.9	43.1	42.1	41.5	40.9	41.3	42.2
20	42.8	41.5	41.0	41.5	42.4	43.0	43.7	44.0	43.7	43.2	42.5	41.0	41.2	41.9	41.7
21	41.9	41.0	40.4	40.6	42.0	42.5	42.6	43.0	42.8	42.5	42.5	42.2	42.0	42.0	42.0
22†	42.0	41.3	40.6	41.0	42.0	42.6	43.2	43.9	43.5	42.7	42.0	41.5	41.6	41.7	41.8
23	42.1	41.0	40.0	40.2	41.2	42.0	42.6	43.7	44.0	43.7	43.0	41.8	41.5	41.8	42.0
24††	41.2	40.4	39.9	41.0	42.5	43.2	44.2	44.5	41.8	43.3	42.3	41.7	41.6	42.8	42.9
25	40.2	40.2	40.0	40.7	42.6	43.4	43.3	45.1	44.5	43.0	42.1	41.8	41.9	42.0	42.0
26	41.8	41.0	40.5	41.2	42.0	42.7	43.3	43.5	43.3	42.5	42.0	41.8	42.1	42.0	42.5
27	42.0	41.7	41.2	41.5	41.7	42.4	43.2	43.7	43.2	42.4	42.0	41.8	42.0	42.2	42.2
28	42.0	41.1	40.8	41.0	41.5	42.0	43.0	43.9	44.1	43.5	42.5	42.0	41.8	41.8	41.9
29†	42.3	42.0	41.1	40.5	40.5	41.5	42.5	43.2	43.4	42.6	42.1	41.7	42.0	42.4	42.1
30	42.3	41.9	40.7	40.7	40.5	41.1	42.5	43.5	43.4	42.5	41.5	41.1	41.5	42.0	42.0
Means	42.0	41.2	40.2	40.8	41.8	42.8	43.6	44.1	43.9	43.4	42.7	42.1	41.9	42.2	42.0
Means †	42.1	41.5	41.0	41.0	41.9	43.1	43.5	44.5	44.2	43.7	43.0	42.3	42.1	42.3	42.3
Means ††	41.8	41.1	40.5	40.6	41.4	42.6	43.5	43.9	43.2	43.2	42.7	41.9	41.8	42.2	42.4

† International quiet days.

†† International disturbed days.

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

TABLE 3  
Hourly Values of Declination (Westerly) 1950  
(Averages for sixty minutes centred at the full hours of Greenwich mean time.)

September

1047.5 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.	'		
42.5	42.6	43.0	42.7	42.5	42.5	42.5	42.5	42.5	42.6	06 30	44.3	02 21	40.0	4.3	1†
43.0	43.1	43.0	43.0	42.8	42.0	42.0	42.2	42.2	42.8	08 00	45.4	02 45	39.2	6.2	2
42.2	42.2	42.2	42.6	42.8	42.2	42.4	42.5	42.8	42.2	19 00	43.1	03 00	40.2	2.9	3††
42.8	42.6	42.8	42.8	42.6	42.5	42.5	42.8	42.5	42.3	06 39	43.6	02 42	40.5	3.1	4††
42.6	42.7	43.0	43.3	42.6	42.6	42.5	42.4	42.0	42.6	07 05	44.5	02 28	40.0	4.5	5††
42.6	42.9	42.9	42.7	42.9	42.7	42.7	42.5	42.5	42.4	06 53	44.7	01 50	39.8	4.9	6††
42.4	42.8	43.0	43.0	43.0	42.9	42.6	42.0	42.1	42.2	06 45	43.6	01 54	40.0	3.6	7
42.5	43.0	43.0	42.5	42.6	42.5	42.5	42.6	42.5	42.6	06 47	44.5	01 42	40.2	4.4	8
42.9	43.0	43.0	42.8	42.6	42.6	42.5	42.2	42.0	42.7	07 46	45.0	02 03	40.6	4.4	9
42.5	42.6	42.8	42.0	42.5	42.5	42.2	42.4	42.2	42.5	07 01	44.6	02 06	40.0	4.6	10
42.6	42.8	42.9	42.5	43.0	42.6	42.8	42.5	42.5	42.8	07 22	45.4	01 56	40.0	5.4	11
43.0	43.1	43.0	42.8	42.2	42.5	42.5	42.5	42.4	42.8	06 18	45.2	02 42	39.8	5.5	12
42.5	42.0	43.0	42.5	42.5	42.5	42.2	42.1	42.4	42.6	07 30	45.7	02 20	40.0	5.7	13
43.0	42.8	42.5	42.5	42.5	42.5	42.5	42.4	42.2	42.9	08 10	46.3	02 01	40.3	6.0	14†
42.6	42.6	42.5	42.5	42.5	42.4	42.5	42.5	42.5	42.9	06 15	45.3	01 59	41.1	4.2	15†
43.0	42.5	42.5	42.4	42.5	42.5	42.5	42.5	42.5	42.6	07 33	45.0	02 00	41.0	4.0	16
42.5	42.2	42.2	42.4	42.2	42.1	42.3	42.1	42.0	42.2	07 25	44.0	02 09	40.5	3.5	17
42.1	42.2	42.3	42.4	42.5	42.5	42.6	42.5	42.8	42.1	08 07	43.8	02 11	40.2	3.6	18
42.1	42.2	42.4	42.4	42.0	42.0	42.3	42.2	42.5	42.2	07 30	44.0	02 09	40.5	3.5	19
41.7	42.4	42.3	42.2	42.0	42.0	42.0	42.0	42.0	42.2	07 10	44.1	02 10	40.8	3.3	20
42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.1	40.0	06 54	43.3	02 09	40.0	3.3	21
42.0	42.1	42.1	42.2	42.0	42.0	42.0	42.0	42.0	42.1	06 57	44.0	02 10	40.5	3.5	22†
42.0	42.0	42.0	42.0	42.0	42.0	42.0	41.3	41.3	42.0	08 10	44.0	02 09	40.0	4.0	23
42.5	42.4	42.7	42.5	42.0	41.5	41.4	41.1	40.2	42.1	06 57	44.6	01 54	39.5	5.1	24††
42.2	42.1	42.5	42.2	42.1	41.9	41.8	42.0	41.8	42.1	07 18	45.5	01 30	39.6	5.9	25
42.5	42.5	42.5	42.0	42.0	41.6	41.4	41.2	41.6	42.1	06 54	43.6	01 43	40.2	3.4	26
42.3	42.1	42.1	42.0	41.9	41.8	41.5	41.6	41.8	42.1	06 58	44.0	02 05	40.9	3.1	27
42.1	42.2	42.2	42.0	42.0	42.0	41.9	41.8	42.0	42.1	07 50	44.3	02 37	40.6	3.7	28
42.0	42.2	42.0	42.0	41.8	41.8	41.8	41.8	42.0	42.0	07 49	43.5	03 22	40.0	4.5	29†
42.0	42.0	42.0	42.1	42.3	42.0	41.7	41.8	41.9	41.9	07 35	43.2	02 30	40.3	2.9	30
42.4	42.5	42.5	42.4	42.4	42.2	42.2	42.1	42.1	42.3					4.2	Means
42.4	42.5	42.4	42.4	42.3	42.2	42.3	42.2	42.7	42.5						Means†
42.5	42.6	42.7	42.8	42.6	42.3	42.3	42.3	42.0	42.3						Means††

† International quiet days.

†† International disturbed days.

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

TABLE 4

Hourly Values of Declination (Westerly) 1950

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

October

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††	42.0	40.8	40.5	40.0	41.0	42.0	43.3	43.5	44.2	43.0	41.5	42.0	41.0	39.9	41.0
2††	42.0	41.2	41.0	41.0	41.5	42.3	43.0	43.9	43.4	42.3	41.3	41.1	41.6	41.7	41.9
3	42.2	41.3	40.5	40.4	40.8	41.3	42.2	42.9	43.1	42.3	41.4	41.0	41.0	41.2	41.9
4	41.9	41.2	40.9	41.0	41.3	42.3	43.0	43.3	43.6	43.2	42.1	41.9	41.3	41.4	41.2
5	41.8	41.0	40.7	41.1	41.9	42.1	42.3	42.6	42.2	41.7	41.1	40.3	40.8	41.4	41.5
6	41.8	41.2	41.1	41.8	42.2	43.1	43.5	43.0	43.3	42.3	41.3	40.8	41.8	42.2	42.0
7	42.1	41.5	41.1	41.2	41.4	41.7	42.2	42.3	42.3	42.2	42.1	42.0	41.8	42.0	41.6
8	42.4	42.1	41.7	41.7	42.3	43.2	43.9	44.0	43.7	43.1	42.4	42.0	42.0	42.0	42.0
9	42.3	41.9	41.3	40.8	41.0	41.0	42.1	43.1	43.1	42.2	40.7	40.7	41.8	42.0	42.0
10†	42.2	41.7	41.4	41.2	41.2	41.5	42.2	42.6	43.2	43.1	42.6	42.0	41.9	42.0	41.9
11	42.0	41.7	41.4	41.0	41.5	42.3	43.3	43.8	43.6	43.0	42.2	41.7	41.6	41.8	41.8
12	42.3	42.1	41.3	41.6	42.0	42.3	43.2	43.3	43.5	43.0	42.2	42.0	42.0	42.0	42.0
13	42.3	42.0	41.1	41.0	41.1	42.1	42.2	42.0	41.6	41.0	41.0	41.0	41.3	41.3	41.6
14††	42.3	42.1	41.2	40.8	42.0	43.1	42.8	42.4	42.3	41.7	41.9	42.1	42.0	41.7	42.0
15	42.0	41.3	40.7	40.4	41.0	41.9	42.0	42.0	41.6	41.9	41.8	41.3	41.2	41.3	41.3
16	42.0	42.0	41.2	41.0	40.8	41.4	42.2	42.1	41.8	41.0	41.0	41.1	41.8	41.2	40.9
17	42.0	41.8	41.2	41.0	41.0	41.1	41.1	41.3	41.2	41.2	41.9	41.3	41.1	41.2	41.0
18	42.0	41.4	40.8	40.3	40.0	40.2	41.3	41.8	42.0	41.4	41.0	40.8	41.2	41.3	41.2
19†	41.9	41.7	41.2	40.3	40.3	40.5	41.1	41.7	41.5	41.1	40.9	41.0	41.2	41.1	41.1
20	41.8	41.6	41.3	41.0	41.1	42.1	43.0	42.8	42.7	42.1	41.7	41.6	41.6	41.3	41.2
21†	42.0	42.0	42.0	41.7	41.7	41.7	41.4	41.1	41.0	41.0	41.0	41.7	41.7	41.6	41.7
22	41.9	42.0	42.0	42.0	42.2	42.1	42.9	42.8	42.3	42.1	41.4	41.0	41.2	41.3	41.9
23	41.1	41.4	42.1	41.6	41.3	41.8	42.0	42.0	42.0	41.3	41.0	41.2	41.4	41.4	41.4
24	41.0	41.2	41.1	41.0	41.0	41.5	42.0	42.1	41.8	41.2	41.0	41.7	41.3	41.2	41.3
25†	41.7	41.7	41.2	41.0	41.0	41.6	42.7	42.8	41.6	41.0	41.0	41.0	41.3	41.8	41.8
26	42.0	42.0	41.3	41.0	41.0	41.3	42.2	42.0	41.2	41.0	41.0	41.1	41.7	41.8	41.8
27†	42.0	41.8	42.0	42.2	42.1	42.3	43.2	42.8	42.3	42.2	42.1	41.6	41.3	41.7	41.6
28††	41.8	42.9	41.7	42.0	42.3	42.8	43.2	43.0	42.1	40.9	40.2	40.3	40.3	40.8	40.9
29††	42.0	41.8	42.3	42.2	42.3	42.4	42.3	42.0	41.3	40.6	40.9	41.0	40.9	41.1	40.9
30	42.4	42.4	42.1	41.1	40.9	41.0	41.0	41.2	40.9	40.4	40.3	41.0	41.2	43.3	40.9
31	42.0	42.1	42.0	42.0	41.7	41.8	42.1	42.1	41.5	40.8	40.2	40.0	40.2	40.3	40.6
Means	42.0	41.7	41.3	41.2	41.4	41.9	42.4	42.5	42.3	41.8	41.4	41.2	41.4	41.4	41.5
Means †	42.0	41.8	41.6	41.3	41.2	41.5	42.1	42.2	41.9	41.7	41.7	41.3	41.5	41.6	41.6
Means ††	42.2	41.8	41.3	41.3	41.8	42.5	42.9	43.0	42.7	41.7	41.2	41.3	41.2	41.1	41.3

† International quiet days.

†† International disturbed days.

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



TABLE 4

Hourly Values of Declination (Westerly) 1950

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

1° 47.5' plus tabular quantities

October

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.			
41.8	42.1	42.2	42.1	42.1	42.2	42.1	42.2	42.2	41.9	09 00	44.7	13 02	39.8	4.9	1
41.9	41.7	42.0	42.2	41.7	42.1	43.0	41.9	42.0	42.0	06 55	44.0	02 30	40.9	3.1	2††
42.0	42.0	41.9	42.0	41.6	42.0	41.8	41.7	42.0	41.7	08 10	43.0	02 40	40.2	3.0	3
41.6	41.9	41.7	41.8	42.0	41.9	41.4	41.6	41.5	41.9	08 00	44.1	01 55	40.6	3.5	4
41.6	42.1	42.0	41.8	41.8	42.0	41.9	41.8	42.1	41.6	07 10	42.8	01 45	40.3	2.5	5
42.0	41.9	41.9	41.8	41.7	41.9	41.9	42.3	42.3	42.0	06 42	44.0	10 35	40.0	4.0	6
41.3	41.3	41.6	41.7	41.9	42.0	41.9	42.0	42.0	41.8	08 00	42.4	01 50	40.7	1.7	7
41.8	42.0	42.0	42.0	42.0	41.8	41.8	42.0	42.1	42.3	07 20	44.2	02 20	41.6	2.6	8
42.0	42.0	42.0	42.0	42.0	41.8	41.8	41.8	41.8	41.9	07 47	43.2	10 30	40.5	2.7	9
41.8	42.0	41.8	41.8	41.4	41.3	41.4	41.9	42.0	41.9	08 20	43.3	03 15	41.1	2.2	10†
41.8	42.0	41.8	41.6	41.6	41.7	41.8	42.0	42.2	42.1	06 55	44.0	02 20	41.0	3.0	11
42.0	42.0	42.0	42.0	42.0	41.9	41.8	42.1	42.2	42.2	07 55	43.6	02 25	41.2	2.4	12
41.6	41.6	41.9	41.3	41.8	41.9	41.7	41.7	41.8	41.6	05 47	42.3	02 30	40.9	1.4	13
42.2	42.1	41.5	41.2	41.1	41.0	41.3	41.9	42.1	41.9	06 10	43.7	04 00	40.8	2.9	14††
41.4	41.4	41.4	41.4	41.5	41.6	42.0	41.8	41.9	41.5	07 15	42.1	02 35	40.0	2.1	15
41.1	41.2	41.3	41.2	41.3	41.4	41.9	41.6	42.1	41.4	06 10	42.5	14 10	40.5	2.0	16
41.0	41.2	41.2	41.2	41.0	41.1	41.9	42.0	42.0	41.3	23 00	42.1	03 10	40.9	1.2	17
41.4	41.5	41.4	41.6	41.3	41.2	41.8	41.8	41.8	41.3	08 00	42.1	04 00	39.9	2.2	18
41.2	41.2	41.3	41.6	41.6	41.5	41.6	41.7	41.7	41.3	07 00	41.8	03 00	40.0	1.8	19†
41.2	41.3	41.7	41.5	41.7	41.8	41.9	41.8	42.0	41.7	06 30	43.2	03 05	40.5	2.7	20
41.4	41.3	41.3	41.2	41.3	41.3	41.3	41.8	41.8	41.5	05 28	42.1	08 53	40.9	1.2	21†
41.8	41.4	41.3	41.2	41.2	41.1	41.0	41.2	41.0	41.7	06 30	43.0	11 15	40.9	2.1	22
41.5	41.5	41.4	41.2	41.0	41.1	41.0	41.1	41.3	41.4	06 45	42.2	00 01	40.9	1.3	23
41.3	41.4	41.4	41.3	41.4	41.4	41.2	41.3	41.5	41.4	05 15	42.2	03 40	40.7	1.5	24
41.9	41.7	41.4	41.3	41.3	41.3	41.4	41.9	41.9	41.6	06 10	43.2	02 55	40.9	2.3	25†
41.9	41.8	41.9	41.9	41.8	41.6	41.6	41.9	41.9	41.6	06 20	42.6	09 55	40.0	1.7	26
41.5	41.5	41.8	41.7	41.6	41.5	41.4	41.7	42.0	41.9	06 40	43.4	12 50	41.2	2.2	27†
40.3	40.6	41.0	40.3	40.4	41.2	41.0	41.2	42.1	41.4	06 35	43.5	10 50	39.5	4.0	28††
40.7	40.9	41.1	41.0	41.1	41.3	41.6	42.2	42.3	41.5	23 30	42.7	09 00	40.0	2.7	29††
40.7	41.2	41.6	41.6	41.6	41.7	42.2	41.7	41.9	41.3	20 40	43.0	08 30	40.2	2.8	30
40.9	41.1	41.4	41.4	41.6	41.7	41.5	41.8	41.8	41.4	06 30	42.2	11 25	39.6	2.6	31
41.5	41.6	41.6	41.5	41.5	41.6	41.7	41.8	41.9	41.7					2.5	Means
41.6	41.6	41.5	41.5	41.4	41.6	41.4	41.8	41.9	41.5						Means†
41.3	41.5	41.6	41.4	41.3	41.6	41.8	41.9	42.1	41.7						Means††

† International quiet days.

†† International disturbed days.

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

TABLE 5

Hourly Values of Declination (Westerly) 1950

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

November  $1^{\circ} 47.5'$  plus tabular quantities

Date	Hours G M T														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1††	42 0	42 0	41 9	42 1	42 3	42 4	42 1	42 9	42 4	42 2	41 9	40 9	40 1	40 3	41 0
2	42 0	42 0	41 9	41 7	41 5	42 1	42 8	42 8	42 0	40 9	40 2	40 2	40 5	40 7	40 4
3	42 0	42 0	41 7	41 6	41 0	41 1	41 5	41 7	41 2	41 3	41 2	41 8	41 7	41 3	41 2
4††	42 3	42 2	42 0	42 0	41 7	41 2	41 0	40 6	40 1	40 0	40 2	40 1	40 1	40 0	40 1
5	42 1	42 3	42 2	42 0	42 0	42 1	42 7	42 6	41 8	41 3	41 0	41 1	41 0	40 9	41 0
6†	41 9	41 9	41 8	40 8	40 3	40 3	40 7	41 0	40 8	40 6	40 4	40 5	41 2	41 2	41 1
7†	42 0	42 0	41 8	41 2	41 0	41 0	41 0	40 9	40 9	41 0	40 6	40 7	41 0	41 2	41 1
8	41 9	41 9	42 1	42 1	42 6	43 0	43 0	43 0	42 4	41 9	41 1	41 1	41 2	41 1	41 0
9	42 0	42 3	42 3	42 0	41 7	42 2	42 3	42 2	41 3	41 4	41 7	41 7	41 8	41 7	41 7
10	42 1	42 6	42 8	43 0	43 1	43 1	42 1	42 0	42 1	41 6	40 8	41 0	41 2	42 0	41 7
11	42 2	42 9	43 2	43 0	43 1	42 6	42 3	41 2	41 1	41 0	41 2	41 0	41 0	41 0	41 2
12	42 4	42 7	42 6	42 0	41 8	41 3	41 0	40 6	40 0	40 0	40 5	41 0	41 3	41 2	41 3
13	42 4	43 1	43 3	43 0	42 3	43 0	42 5	41 2	41 1	41 0	40 9	40 9	41 2	41 1	41 4
14	42 0	42 3	42 6	42 3	42 0	42 0	41 9	41 8	41 3	41 0	41 2	41 2	41 4	41 3	41 3
15†	42 2	42 2	41 8	41 0	40 9	41 6	42 0	42 0	41 3	41 0	41 0	41 2	41 6	41 5	41 3
16	42.1	42 2	42 4	42 4	42 3	42 8	43 0	42 9	42 3	42 0	42 0	42 0	42 0	41 9	41 5
17	41 7	41 8	42 2	41 1	42 1	42 2	42 7	42 0	41 1	40 9	40 8	41 2	41 3	41 4	41 7
18	42 1	42 2	42 4	42 2	42 0	42 0	42 0	41 9	41 2	40 8	40 8	41 0	41 4	41 4	41 8
19†	42 0	42 1	42 3	42 8	43 1	43 3	43 1	43 1	42 8	42.1	41.7	41.7	41.7	41.9	41.9
20†	41 8	41 9	41 6	41 8	41 9	41 8	42 0	41 9	41 6	41 8	41 6	41 5	41 9	42 0	42 0
21	42 0	42 2	42 2	42 0	41 9	42 3	42 8	42 6	42 4	42 2	41 4	41 6	42 0	42 0	42 0
22	42 2	42 4	43 0	42 9	42.8	42 9	43 1	42 5	42 0	42.1	42 0	42 0	42 0	42 0	42 1
23	41 3	42 2	42 9	43 1	43 4	43 9	43 7	43.3	42 9	42 8	42 2	41 8	42 0	42 0	41 9
24	42 1	42 2	42 2	42 6	43 0	42 9	42 9	42 3	41 7	41 6	41 6	41 8	42 0	41 8	41 8
25†	42 8	42 8	42 4	43 0	42.6	42 2	42 0	41 3	40 6	40 6	40 8	40 0	40 3	40 8	41 3
26††	42 2	42 3	42 9	43 2	43 2	43 0	43 0	42 6	42 1	41 0	39 7	40 0	40 4	40 4	40 5
27††	42 6	42 9	42 9	42 9	42 3	41 8	41 4	41 0	40 9	40 8	40 7	40 1	40 4	41 2	41 2
28	42 3	42 9	42 7	42 5	42 5	42 8	42 9	42 6	42 3	42 0	41 2	40 3	41 2	41 0	41 3
29	42 5	42 5	42 5	42 7	42 1	42 3	42 2	41 2	40 3	40 8	41 0	40 8	40 2	41 3	41 2
30	42 3	42 4	42 6	42 9	*	*	*	*	*	41 0	40 7	41 0	41 0	41 0	41 1
Means	42 1	42 3	42 4	42 2	42 2	42 2	42 3	42 0	41 5	41 3	41 1	41 1	41 2	41 3	41 3
Means †	42 0	42 0	41 9	41 5	41 4	41 6	41 8	41 8	41 5	41 3	41 1	41 1	41 5	41 6	41 5
Means ††	42 4	42 4	42 4	42 6	42 4	42 1	42 1	41 7	41 2	41 2	40 7	40 4	40 3	40 7	40 4

† International quiet days.

†† International disturbed days.

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

TABLE 5

Hourly Values of Declination (Westerly) 1950  
 (Averages for sixty minutes centred at the full hours of Greenwich mean time.)

November

$1^{\circ} 47' \frac{1}{2}$   $3^{\circ}$  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			
40 8	40 8	41 1	41.3	41 4	41 5	41 4	41 6	42 0	41 6	06 05	43 5	12 00	39 9	3 6	1††
40 7	40 8	41 3	41 2	41 3	41 3	41 4	41 6	41 8	41 4	06 15	43 0	10 25	40 0	3 0	2
41 3	41 5	41 4	41 3	41 4	41 8	42 0	42 1	42.3	41 6	23 25	42 4	04 20	40 9	1 5	3
40 2	40 3	40 3	40 7	41 0	41 0	41 2	41 6	41 9	40.9	00 25	42 4	13 00	39 9	2 5	4††
41 0	41 0	41 2	41 0	41.0	41 0	41 3	41 5	41 8	41 5	06 30	43 0	13 00	40 8	2 2	5
41 0	41 0	41.0	41 0	41 0	41 0	41 0	41 3	41 6	41 0	00 30	42 0	04 10	42 2	1.8	6†
41 1	41 2	41 2	41 0	41 0	41 1	41 2	41 2	41 4	41 2	01 00	42 1	10 10	40 4	1.7	7†
41 0	41 0	41 0	41 0	41 0	41 0	41 1	41 3	41 3	41 6	06 30	43 1	19 55	41.0	2 1	8
41 7	41 6	41 7	41 3	41 2	41 2	41 1	41 3	41 9	41 7	01 05	42 5	20 10	40 9	1 6	9
42 0	41 8	41.7	41.0	41 0	41 0	41 3	41 6	42 0	41 9	03 40	43 2	10 30	40 5	2 7	10
41 2	41 3	41 2	41 4	41 3	41 4	41 7	42 0	42 0	41 7	02 00	43 3	08 55	41.9	1.4	11
41 4	41 6	41 7	41 7	41 7	41 8	41 8	41 9	42 0	41 5	01 32	43 0	08 30	39.5	3.5	12
41.7	42 0	41.9	41 5	41 6	41 6	41 3	41 3	41 6	41 8	01 45	43.5	09 25	40 7	2 8	13
41.7	41.9	41.9	4. 5	41 5	41 7	41 7	41 8	42 1	41.7	01 37	43 1	08 55	40 9	3 2	14
41.4	41 6	41 3	41 3	41 4	41 3	41 3	41 7	42 0	41 5	00 30	42 3	03 30	40 8	1 5	15†
41.6	41.8	41 8	41.9	41 6	41 4	41 6	41 5	41.6	42 0	06 30	43 1	14 20	41.3	2 8	16
41 7	41 7	41 6	41 6	41 7	41 4	41.3	41.3	41 6	41.6	06 55	43 1	08 10	40 7	2.4	17
41.9	42 0	41 8	41 8	41 6	41 2	41 3	41.6	41 9	41 7	01 40	42 5	09 35	40 6	1 9	18
41.8	41 7	41 8	41 5	41.4	41 6	41 6	41 4	41 9	42 1	04 55	43 4	10 25	41.4	2 0	19†
42 0	42 0	42 0	41 9	41.9	41 8	41 8	41.8	42 0	41.8	07 05	42 1	10 40	41.4	0 7	20†
42 0	42 0	42 0	42 0	42 0	41 9	41 9	41 9	41 2	41 0	06 00	42 9	19 55	41.9	1 0	21
42.3	42 3	42 0	41 7	41 4	41 5	41 3	41 3	41 3	42 1	05 55	43 2	23 25	40 8	2 4	22
42.0	41 9	41 8	41 8	41 8	41 5	41 4	41 6	42 1	42 3	05 30	44 0	20 01	41 1	2 9	23
42 0	41 8	41 9	41 9	41 7	41 7	41 7	42 2	42 3	42 1	05 30	43.0	11 40	41 6	1.4	24
41 6	42 1	42 1	41 9	41 8	41 5	41.7	41 8	42 1	41 7	03 30	43 1	12 15	40 0	3 1	25††
41.3	41.3	41 3	41 6	42.1	42.0	42 4	42 4	42 4	41 8	03 25	43 6	10 09	38 8	4 8	26††
41 5	41 7	41 4	41 5	41 7	42 0	42.2	42 3	42 4	41 7	01 55	43 0	11 30	39 4	3.6	27††
41 8	42 0	42 2	42 1	42 1	42 1	42.3	42 2	42 4	42 1	05 54	43 0	12 57	40 9	2 1	28
41 8	42 0	42 0	42 0	42 0	42 0	42 0	42.0	42 1	4.18	07 10	42 8	07 55	40.0	2 8	29
41 3	41 4	41.7	41 6	41 7	41 8	41 9	41 8	42 1	*		*		*	*	30
41.5	41 6	41 6	41 5	41 5	41 5	41 6	41 7	41 9	41 7					2 3	Mean.
41.5	41 5	41.5	41 3	41.3	41 4	41 4	41.5	41 6	41 5						Mean †
42 0	4. 2	41 2	41 4	41 6	41 6	41 8	41 9	42 2	41 5						Mean. ††

† International quiet days.

†† International disturbed days.

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

TABLE 6

## Hourly Values of Horizontal Force 1950.

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

July

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	399	399	398	414	455	477	484	482	470	453	443	429	414	419	429
2	425	429	443	465	480	488	475	464	457	447	439	432	428	422	422
3	429	429	428	446	466	482	500	508	507	500	480	458	434	421	425
4††	362	356	349	366	414	413	446	430	431	421	414	407	405	403	401
5	395	390	390	391	419	463	487	488	478	456	432	414	398	384	390
6	405	405	412	426	446	466	468	466	454	442	423	415	405	401	403
7	407	406	406	423	448	456	465	470	465	444	426	408	406	405	404
8	394	399	408	428	452	473	464	448	421	416	412	406	406	405	401
9	403	407	417	436	451	473	466	465	460	443	435	417	410	413	411
10	402	408	414	432	461	472	472	446	443	422	402	387	383	387	392
11††	409	417	414	431	463	500	524	526	499	476	452	431	434	434	438
12††	411	402	384	392	388	422	416	422	412	392	352	349	349	353	348
13	382	381	385	397	423	455	482	474	467	446	380	359	365	366	368
14	383	388	393	413	439	452	458	456	427	393	374	374	384	394	399
15	391	395	411	432	456	488	489	468	449	425	411	399	395	401	402
16	415	415	420	439	464	484	497	481	467	443	405	395	394	410	410
17†	396	406	424	450	483	502	505	492	464	439	420	406	401	403	405
18†	396	392	392	414	441	461	475	478	464	435	411	397	397	399	391
19†	397	407	416	435	463	481	490	480	470	445	416	405	405	412	413
20	406	413	430	451	482	512	511	506	483	456	420	396	390	390	390
21	378	380	376	384	420	444	450	462	448	431	400	372	365	368	382
22	386	389	393	403	420	445	439	452	459	442	409	394	375	371	374
23†	373	382	387	399	422	443	462	466	456	440	419	390	396	396	393
24††	391	394	419	448	473	483	454	424	410	424	400	351	349	362	367
25††	323	324	310	295	310	330	348	354	340	315	291	289	291	289	280
26†	334	337	340	351	385	415	435	441	435	424	408	393	384	380	386
27	413	424	444	463	487	502	504	503	472	448	428	402	386	380	388
28	376	375	388	401	399	418	411	448	435	417	401	389	384	380	381
29	372	388	402	410	419	434	446	444	444	444	435	406	387	388	386
30	364	366	372	381	418	429	444	433	422	412	399	372	348	364	366
31	361	361	370	388	404	422	425	420	419	423	410	386	375	371	371
Means	389	392	398	413	437	458	465	461	449	433	411	395	388	389	391
Mean †	379	385	392	410	439	460	473	471	458	437	415	400	397	398	396
Means ††	379	379	375	386	410	430	460	431	418	406	382	365	366	370	367

† International quiet days.

†† International disturbed days.

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

TABLE 6

## Hourly Values of Horizontal Force 1950

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

July

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.	$\gamma$	$\gamma$	
426	421	419	419	419	419	422	425	432	432	06 24	407	02 26	386	111	1
419	417	422	427	427	428	428	432	433	440	05 00	403	15 50	416	77	2
428	422	418	419	418	421	411	404	385	443	08 26	512	23 42	370	142	3
393	383	385	383	389	403	399	403	402	398	05 46	457	01 46	343	114	4†
395	396	400	407	405	404	404	405	403	416	06 18	497	12 40	382	115	5
401	404	405	403	404	406	405	406	409	420	05 28	485	12 18	397	88	6
402	401	397	397	397	401	398	396	396	418	07 06	479	23 58	393	80	7
400	395	397	400	402	403	404	406	407	414	05 00	485	00 19	393	92	8
402	412	407	412	409	408	409	411	412	425	06 28	486	15 10	390	87	9
393	387	391	393	397	402	407	411	403	413	06 10	480	11 36	382	98	10
429	428	422	414	413	415	414	443	426	444	06 44	536	06 02	405	131	11††
351	358	363	367	368	386	384	392	392	381	04 50	440	10 02	334	106	12††
379	376	377	377	382	386	377	376	377	397	05 34	495	13 38	356	139	13
397	393	393	395	395	395	394	390	400	403	07 18	473	10 14	369	104	14
395	386	390	388	399	402	404	401	403	416	04 58	505	16 14	385	120	15
409	408	407	410	411	413	410	412	414	420	06 14	510	10 58	393	117	16
405	403	406	406	400	405	406	405	407	427	05 22	513	00 02	395	118	17†
385	387	391	394	396	396	398	399	396	412	06 38	485	15 30	384	101	18†
412	409	413	416	417	417	420	417	418	428	05 56	493	01 10	396	97	19†
385	385	388	387	384	382	390	385	383	421	05 30	529	19 50	380	140	20
386	381	381	382	384	381	388	388	389	397	06 29	469	12 30	360	109	21
376	375	369	366	371	370	368	369	361	395	08 18	473	23 30	361	112	22
391	391	391	390	390	391	391	391	391	406	05 24	472	00 04	372	100	23†
366	365	357	349	362	359	361	356	342	390	05 12	499	23 58	330	169	24††
284	293	296	298	306	318	325	327	330	311	06 46	379	14 14	276	103	25††
380	380	384	389	393	392	389	391	394	389	06 50	448	00 10	332	116	26†
379	390	390	394	399	403	403	403	408	426	05 16	512	12 50	375	137	27
379	377	377	379	379	379	374	374	375	393	06 50	452	00 49	372	80	28
380	375	370	370	370	380	375	375	371	399	04 40	450	23 42	369	81	29
360	363	361	364	364	366	372	369	369	382	04 46	452	11 52	342	110	30
304	359	359	352	352	361	357	356	361	380	04 10	444	21 58	349	95	31
389	388	388	389	390	393	393	394	393	408					110	Means
395	394	397	399	399	400	401	401	401	412						Means†
365	365	365	362	368	376	377	384	380	388						Mean ††

† International quiet days.

†† International disturbed days.

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

TABLE 7

## Hourly Values of Horizontal Force, 1950.

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

August

39000γ 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	365	360	353	367	402	427	439	436	434	416	397	381	372	367	367
2	359	359	350	363	393	412	428	439	441	427	403	379	363	353	351
3	351	355	351	366	385	390	389	391	395	379	351	341	352	351	350
4	350	351	351	368	406	423	427	432	432	419	392	366	354	358	361
5	360	362	373	406	416	442	456	455	440	429	410	394	384	377	370
6	362	365	357	354	358	413	432	432	423	408	393	376	372	376	379
7††	363	356	351	381	395	452	471	460	438	391	358	367	381	400	401
8††	305	270	226	251	226	397	385	319	239	199	250	280	285	279	280
9	274	271	274	291	323	342	365	379	358	322	299	272	268	269	266
10††	314	312	318	337	356	348	367	364	364	367	338	315	306	381	265
11	312	316	317	327	341	343	354	353	351	346	332	312	297	289	285
12	324	320	321	343	359	373	383	373	349	310	309	300	305	314	312
13	323	333	352	376	391	385	379	371	369	362	347	328	335	335	331
14	*	*	*	367	373	382	388	396	389	378	340	332	341	329	331
15	341	349	348	368	401	436	439	419	406	381	355	338	324	324	323
16†	334	340	350	369	393	402	408	405	396	394	349	350	340	343	340
17†	349	358	369	388	425	434	436	423	410	407	387	373	363	362	358
18	350	352	362	381	412	444	451	449	439	420	391	374	365	361	354
19††	314	304	294	281	305	314	320	315	311	289	262	160	043	-22	-45
20††	151	158	172	148	128	152	156	123	094	084	114	142	168	192	201
21	253	254	271	291	336	370	393	397	364	333	306	279	277	280	276
22	284	293	305	325	352	367	365	361	342	321	305	298	309	316	311
23	309	318	331	353	385	398	405	409	388	348	314	292	299	307	309
24†	309	318	333	356	376	384	384	365	346	338	333	327	319	315	312
25†	317	326	348	368	392	404	387	387	376	353	337	329	331	331	329
26†	334	338	352	373	405	424	434	421	402	385	363	348	345	353	349
27	344	352	361	385	424	453	460	462	442	419	393	380	374	371	341
28	339	335	344	377	416	427	431	412	398	378	351	339	325	335	338
29	341	343	358	397	429	420	403	407	367	359	343	339	342	343	321
30	326	337	355	373	402	428	438	394	373	357	343	346	354	367	348
31	339	347	367	391	415	433	440	418	411	398	377	366	361	352	347
Means	323	325	330	347	371	395	402	393	377	358	340	327	320	322	314
Means †	329	336	350	371	398	410	410	400	386	375	354	345	340	341	338
Means ††	289	280	272	280	282	333	340	316	289	266	266	253	237	246	220

† International quiet days.

†† International disturbed days.

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

TABLE 7

## Hourly Values of Horizontal Force, 1950

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

August

39000  $\gamma$  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	$\gamma$	$\gamma$		
363	363	358	353	364	360	351	350	356	379	06	16	445	17	42	348	97	1
344	344	347	348	344	346	343	343	354	372	06	38	471	19	08	339	132	2
349	347	358	360	350	345	342	346	350	360	04	54	415	10	44	331	81	3
359	356	354	358	359	356	358	362	363	376	07	18	439	01	43	344	95	4
370	370	370	365	370	368	362	358	362	390	06	22	460	21	56	356	104	5
378	374	365	366	374	372	361	366	371	380	06	26	437	02	38	340	97	6
400	395	389	361	359	351	343	314	307	383	05	56	478	22	58	283	195	7††
266	271	270	277	279	278	278	281	290	279	06	15	452	08	28	146	306	8††
275	276	279	281	284	282	298	299	296	297	06	44	386	13	40	257	129	9
270	276	280	289	303	320	308	307	309	321	06	58	386	13	54	259	127	10††
280	292	303	302	304	309	313	317	318	317	06	26	367	15	18	275	92	11
311	318	326	323	318	325	324	320	320	328	06	10	393	11	10	288	105	12
327	332	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	13
332	334	329	333	334	340	338	349	360	*	*	*	*	*	*	*	*	14
324	325	332	334	333	327	333	334	334	355	06	12	456	12	28	319	137	15
338	335	335	335	337	335	337	339	342	355	06	42	418	20	40	333	85	16†
354	353	349	349	347	348	348	348	349	374	05	52	440	19	24	344	96	17†
352	354	346	320	312	308	322	324	317	370	05	18	472	20	42	306	166	18
-21	028	072	125	146	213	218	165	140	189	04	22	321	13	46	-67	388	19††
204	211	226	235	235	244	248	253	253	179	23	10	256	07	52	060	196	20††
269	279	273	271	290	287	286	285	284	300	06	18	404	00	06	252	152	21
304	304	306	304	307	308	308	308	308	317	04	42	370	00	02	283	87	22
306	304	305	312	312	311	309	308	313	331	06	42	413	11	00	290	123	23
309	309	309	312	316	319	319	317	323	331	05	02	386	16	50	308	78	24†
327	323	324	324	324	324	324	323	323	343	04	54	411	00	02	310	95	25†
348	343	339	339	339	339	341	343	342	362	06	10	436	00	22	333	103	26†
361	356	351	351	355	352	356	361	360	382	06	32	468	00	02	343	125	27
333	329	329	332	326	315	322	330	328	354	05	58	450	20	03	307	143	28
309	317	319	324	325	325	334	330	324	351	04	49	455	14	16	307	143	29
343	336	334	332	338	347	342	340	343	358	05	52	462	00	14	324	133	30
342	348	342	345	342	341	342	343	348	369	05	40	454	15	30	337	127	31
313	315	317	318	320	323	323	321	322	337							136	Means.
335	333	331	332	333	333	334	334	336	353								Means.†
224	236	247	257	260	281	279	264	260	270								Means.††

† International quiet days.

†† International disturbed days.

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

TABLE 8

Hourly Values of Horizontal Force, 1950.

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

39,000 $\gamma$  plus tabular quantities.

September

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†	357	359	368	392	431	472	487	472	444	407	374	356	353	363	358
2	346	346	354	397	450	474	463	441	415	393	373	359	358	363	360
3††	368	371	386	410	449	466	443	402	344	312	324	329	319	312	305
4††	318	306	315	339	374	403	411	369	339	287	265	265	284	304	300
5††	329	314	321	349	373	375	365	354	341	297	287	286	297	302	293
6††	327	317	316	332	356	374	375	361	366	328	320	290	285	308	313
7	326	331	347	366	386	405	415	391	382	366	350	344	335	335	332
8	344	347	354	380	407	414	406	380	343	308	327	341	340	336	336
9	358	352	353	377	408	434	435	421	400	379	367	358	352	354	354
10	360	356	370	396	413	426	425	426	417	394	386	381	373	359	344
11	343	348	371	391	398	432	449	425	408	395	368	359	359	361	356
12	350	350	361	394	432	455	450	429	390	370	349	351	355	349	343
13	363	368	384	415	466	488	491	466	425	395	383	390	394	396	390
14†	362	366	393	432	462	475	459	437	409	393	384	382	383	384	379
15†	375	377	395	429	462	480	490	466	443	422	408	394	390	389	383
16	390	385	385	412	452	491	504	495	473	454	441	440	441	403	392
17	373	368	368	395	423	447	446	415	401	378	376	382	387	382	367
18	364	355	362	382	420	440	461	447	442	411	374	362	364	358	364
19	377	382	387	413	458	474	483	462	428	396	369	351	348	348	357
20	371	371	367	408	446	448	469	453	429	416	403	376	365	361	341
21	365	366	384	408	439	464	459	434	411	395	387	390	390	386	381
22†	384	383	394	425	456	474	469	452	428	409	398	393	395	392	386
23	392	403	424	456	485	502	507	484	440	418	405	371	346	340	356
24††	396	397	402	452	480	508	500	478	451	415	398	406	414	408	401
25	394	394	408	437	472	486	477	447	389	359	362	374	392	393	373
26	360	358	374	407	438	457	448	427	401	381	370	376	386	384	379
27	378	378	392	414	466	489	491	479	434	407	399	373	382	388	386
28	402	402	414	444	482	507	520	506	471	447	430	420	411	403	407
29†	407	408	419	452	495	528	534	521	492	454	438	430	431	431	426
30	411	413	410	431	479	486	553	554	522	479	438	425	430	434	431
Means . . .	366	366	376	405	439	459	463	443	413	389	375	369	369	368	363
Means †	377	379	394	426	461	486	488	470	443	417	400	391	390	392	386
Means †† .	348	341	348	376	408	425	419	393	368	328	319	315	320	327	322

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted for means)



TABLE 8

Hourly Values of Horizontal Force, 1950.

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

September

39,000γ plus tabular quantities

Hours G M T										Maximum		Minimum		Range	Date
15	16	17	18	19	20	21	22	23	Mean	Time	Mag.	Time	Mag.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M	γ	H. M	γ	γ	
353	353	356	357	359	358	357	357	360	383	05 48	492	11 24	349	143	1†
355	354	356	356	353	365	357	356	360	379	05 10	476	01 20	346	130	2
279	248	252	276	293	281	297	308	317	337	05 10	478	16 26	238	240	3††
303	297	298	303	321	319	321	323	337	321	05 36	428	10 28	255	173	4††
309	311	321	316	315	326	327	334	336	324	05 26	384	10 36	276	108	5††
323	318	312	318	318	328	326	331	331	328	05 38	415	11 40	260	155	6††
324	335	337	337	338	346	343	341	342	352	06 00	432	14 42	322	110	7
339	355	341	343	349	342	347	346	372	354	05 22	427	08 38	299	128	8
353	353	345	343	346	361	358	351	348	369	05 08	442	18 00	342	100	9
353	369	357	350	360	336	356	360	358	376	06 50	444	20 10	335	109	10
354	353	351	351	365	359	362	366	363	374	06 12	459	00 30	341	118	11
346	348	350	350	350	350	350	350	350	370	05 42	459	13 30	341	118	12
384	381	372	355	335	348	351	355	360	394	05 52	496	19 19	329	167	13
375	373	372	371	373	375	374	375	376	394	04 48	482	00 01	360	122	14†
380	379	376	377	379	380	380	385	389	405	06 04	493	00 30	375	118	15†
389	359	359	368	378	373	383	378	381	414	06 10	505	17 06	353	152	16
358	362	338	334	340	347	361	374	368	379	05 36	461	17 12	326	135	17
359	356	354	354	359	364	369	373	378	384	06 08	486	12 11	339	147	18
361	364	367	368	369	382	386	385	382	392	05 56	489	12 11	342	147	19
334	353	371	361	357	375	372	364	370	387	06 14	484	14 30	328	156	20
381	380	383	381	383	381	381	384	386	396	05 26	478	00 52	362	116	21
385	381	381	392	392	388	392	395	395	406	04 51	478	16 06	378	100	22†
362	356	348	356	364	362	394	372	390	402	05 46	513	12 08	341	172	23
400	382	376	376	378	380	412	411	397	418	05 01	519	16 42	358	161	24††
372	368	371	361	382	377	376	377	377	397	04 26	493	08 20	340	153	25
374	370	369	365	370	389	372	369	374	387	05 00	461	01 00	357	104	26
381	380	377	382	387	387	384	384	383	404	05 30	504	10 46	370	134	27
407	408	412	408	409	411	415	414	412	432	06 00	532	00 44	401	131	28
422	418	417	413	413	413	413	415	418	442	05 30	540	00 58	407	133	29†
425	422	425	430	440	427	407	405	410	445	06 38	557	21 30	399	158	30
361	359	358	358	363	364	367	368	371	385					138	Means
383	381	380	382	383	383	383	385	388	406						Means †
328	311	312	318	325	327	337	341	344	346						Means ††

† International quiet days.

†† International disturbed days.

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

TABLE 9

## Hourly Values of Horizontal Force, 1950

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

October

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††	309	389	386	415	430	463	492	405	359	361	341	361	320	266	264
2††	402	402	385	424	430	441	449	444	427	369	329	306	329	367	364
3	363	367	375	377	413	411	413	420	387	382	365	360	359	365	373
4	372	368	375	394	423	452	461	442	413	395	372	378	372	385	360
5	369	378	392	413	447	473	479	441	411	389	365	359	351	371	374
6	378	374	379	411	447	488	493	452	408	369	349	366	392	395	386
7	379	382	389	399	447	467	464	431	413	380	370	370	377	373	346
8	385	393	398	419	469	486	493	484	447	409	395	392	395	395	389
9	390	383	390	411	454	490	500	494	467	423	382	390	401	405	403
10†	390	386	395	416	459	488	497	480	453	426	414	410	413	406	401
11	392	390	402	435	*	*	*	*	*	*	*	*	*	*	*
12	*	*	*	*	470	513	537	515	475	441	422	397	390	391	396
13	369	368	404	445	476	474	481	474	429	391	*	*	*	*	*
14††	*	*	*	*	464	478	523	499	472	451	388	378	339	291	311
15	*	*	*	*	377	421	427	408	382	366	347	336	334	332	328
16	327	331	347	379	412	437	433	405	385	350	310	269	268	259	254
17	289	292	297	324	387	412	427	411	395	366	367	361	353	330	306
18	339	338	353	383	411	440	459	441	406	362	344	335	351	357	353
19†	341	342	352	382	422	457	473	455	426	383	357	352	352	349	349
20	365	363	375	399	438	467	474	456	443	421	397	387	385	381	375
21†	375	374	377	398	427	448	453	437	421	403	393	388	383	376	374
22	390	392	407	427	445	450	450	445	434	420	416	415	403	381	361
23	366	375	369	377	405	416	430	429	414	399	390	390	383	380	376
24	365	365	375	408	440	471	471	446	418	384	372	378	382	380	376
25†	363	358	367	397	446	479	488	460	426	403	390	382	382	378	374
26	383	381	389	415	438	448	444	434	417	405	403	396	391	387	382
27†	372	377	392	416	432	445	440	421	406	404	401	401	400	395	392
28††	401	407	422	436	421	443	453	441	422	354	268	240	244	239	238
29††	285	297	311	318	352	366	357	354	342	318	333	342	328	323	331
30	312	288	307	330	331	384	375	355	359	331	317	322	321	326	314
31	334	345	355	378	412	437	402	401	395	372	340	324	301	297	326
Means	363	363	371	394	424	448	453	434	411	384	365	361	359	356	352
Means †	368	367	377	402	437	463	470	451	426	404	391	387	386	381	378
Means ††	372	374	376	398	408	428	438	411	387	351	318	312	305	299	299

† International quiet days.

†† International disturbed days.

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

TABLE 9

Hourly Values of Horizontal Force, 1950.

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

October

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	Time	Mag		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H	M	γ	H	M	γ	γ	
295	316	337	348	363	355	361	377	379	366	06	06	520	13	20	249	271	1††
362	374	345	345	354	367	388	384	370	382	05	18	406	11	00	302	164	2††
385	377	375	384	376	399	389	381	382	382	03	58	434	10	46	353	81	3
361	389	360	380	383	376	377	375	374	389	06	02	471	17	32	349	122	4
363	390	384	379	390	393	389	393	389	395	05	08	403	11	42	344	149	5
378	375	368	353	360	363	368	371	379	392	06	00	505	10	20	334	171	6
316	329	335	346	361	375	382	370	373	382	05	20	474	14	54	313	161	7
390	387	387	392	394	396	396	396	396	412	06	12	499	16	16	384	115	8
400	401	397	392	391	395	401	404	463	415	05	18	507	10	10	375	132	9
394	387	387	385	386	391	391	396	397	415	05	56	500	00	45	383	117	10†
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	11
389	391	390	390	390	384	378	388	385	*	*	*	*	*	*	*	*	12
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	13
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	14††
325	331	332	327	327	329	331	335	335	*	*	*	*	*	*	*	*	15
259	273	270	312	301	302	313	313	312	326	05	00	451	13	46	240	211	16
319	330	305	334	336	331	329	334	334	345	06	02	438	00	24	288	150	17
351	353	344	339	347	348	356	356	353	367	06	06	469	10	36	333	136	18
350	349	350	350	352	356	358	357	357	374	05	52	482	00	02	340	142	19†
374	370	369	370	383	385	385	383	388	397	05	42	478	00	58	362	116	20
370	369	364	368	372	373	378	379	381	391	05	28	457	17	30	363	94	21†
347	353	365	368	378	373	372	386	378	398	04	02	455	15	26	342	113	22
371	368	365	360	366	371	366	366	370	384	04	32	438	18	10	359	79	23
375	376	375	378	378	379	380	383	379	393	05	10	490	01	36	363	127	24
373	373	373	375	376	378	378	375	380	395	05	46	493	01	00	355	138	25†
380	379	378	381	383	380	372	372	376	396	05	50	453	21	38	371	82	26
390	386	386	382	382	387	386	387	389	399	04	50	449	00	42	371	78	27†
229	226	240	233	258	306	306	291	302	326	05	54	475	18	40	203	272	28††
316	289	293	304	307	313	323	337	336	324	05	26	356	16	08	277	169	29††
303	306	327	340	322	327	328	312	316	327	05	08	401	00	56	281	120	30
323	335	349	339	356	357	352	362	354	356	05	10	450	12	16	282	168	31
349	352	351	355	360	364	366	367	367	378							139	Means
375	373	372	372	374	377	378	379	381	395								Means †
301	301	304	307	321	335	345	347	347	349								Means ††

† International quiet days.

†† International disturbed days.

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

TABLE 10

## Hourly Values of Horizontal Force, 1950

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

November

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
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1††	349	349	358	365	375	395	399	381	380	379	374	351	310	302	298
2	338	346	340	353	374	394	410	418	403	377	360	353	339	336	324
3	357	357	361	374	393	408	419	427	426	415	401	385	377	376	377
4††	378	382	393	412	435	444	432	395	368	334	320	292	267	242	228
5	346	346	356	369	371	390	397	397	395	381	372	374	371	366	371
6†	355	358	375	397	423	442	443	424	412	399	393	389	380	374	375
7†	382	383	391	406	446	459	470	471	457	440	425	411	405	399	394
8	399	401	410	426	435	440	444	442	438	434	426	430	425	419	416
9	386	395	412	443	472	486	471	445	430	410	398	400	404	401	401
10	400	417	452	475	479	465	469	455	412	357	329	312	305	295	277
11	347	356	369	388	395	391	420	414	397	379	365	352	347	337	339
12	375	381	394	422	444	458	470	470	444	408	390	378	369	359	356
13	394	396	395	412	421	422	439	415	414	409	403	390	362	332	328
14	379	380	385	401	424	426	429	438	438	433	425	413	405	401	397
15†	392	397	407	426	444	458	454	449	439	436	426	415	401	398	396
16	413	408	428	444	449	453	452	447	437	432	425	417	409	408	408
17	403	409	420	435	454	458	470	436	430	435	441	434	421	411	401
18	407	410	421	444	463	467	461	450	443	438	434	434	424	415	419
19†	390	391	404	431	448	452	451	443	436	423	423	420	419	414	413
20†	405	410	420	443	460	478	479	472	468	455	440	425	420	415	411
21	410	412	425	454	473	479	474	467	458	441	430	426	429	425	420
22	407	406	414	434	454	462	464	461	452	441	433	424	430	424	418
23	391	387	399	419	440	457	449	438	423	407	402	405	405	404	400
24	406	409	424	454	477	493	497	487	460	436	428	424	425	425	424
25††	392	407	411	431	455	432	427	416	410	407	392	372	334	367	382
26††	405	408	417	406	439	440	464	478	484	434	353	341	339	319	339
27††	384	387	403	402	408	414	426	422	411	417	413	388	418	390	392
28	397	398	410	423	449	469	474	469	469	446	426	403	396	378	370
29	395	395	414	430	443	453	465	465	440	421	408	396	386	372	372
30	409	405	411	429	441	453	448	449	456	447	438	428	424	424	419
Means	386	390	401	419	437	446	450	442	432	416	403	393	384	377	375
Means † .	385	388	399	421	443	458	459	452	442	431	421	412	405	400	398
Means †† .	381	387	395	403	426	428	431	417	411	389	360	339	313	307	312

† International quiet days.

†† International disturbed days

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

TABLE 10

## Hourly Values of Horizontal Force, 1950

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

November

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	
327	310	298	318	336	334	332	336	337	345	06 18	412	13 58	285	127	1††
335	345	343	343	345	348	348	348	348	357	06 22	423	13 56	322	101	2
376	374	372	370	370	372	376	377	380	384	08 00	432	00 10	356	76	3
222	222	269	306	317	323	326	330	334	332	04 46	453	16 14	210	243	4††
366	366	361	361	361	364	375	378	371	371	07 10	402	00 30	321	81	5
374	370	370	366	366	367	370	370	370	386	05 20	447	00 10	354	93	6†
393	392	392	392	388	390	389	395	399	411	06 18	479	00 22	381	98	7†
414	405	397	393	397	402	401	401	401	417	06 20	448	18 10	392	56	8
398	392	392	385	380	380	384	381	385	410	05 06	401	19 44	376	115	9
292	316	330	351	349	351	349	353	349	372	03 30	508	13 40	272	236	10
340	357	361	365	371	384	385	393	386	372	06 06	432	13 14	333	99	11
348	359	360	366	371	382	386	385	397	395	06 30	483	14 58	338	145	12
343	366	366	371	385	386	381	372	368	386	06 10	456	14 12	327	129	13
394	394	385	388	393	398	407	401	405	406	07 16	444	00 10	378	66	14
389	388	388	391	397	396	392	399	407	412	06 52	460	18 00	387	73	15†
406	404	403	409	399	394	401	402	394	418	03 52	461	23 26	390	71	16
396	393	401	394	397	404	420	415	410	420	05 56	489	17 38	392	97	17
409	405	403	400	407	405	396	396	396	423	04 38	472	20 42	394	78	18
409	409	409	409	413	414	414	412	412	419	05 06	457	00 30	389	68	19†
410	405	405	414	414	411	410	406	410	429	06 10	485	00 02	404	81	20†
420	417	419	420	420	415	415	406	409	432	04 44	483	21 28	405	78	21
400	380	377	376	373	385	388	390	396	416	06 18	472	18 50	366	106	22
399	400	404	404	404	405	402	404	410	411	04 58	463	00 42	386	77	23
422	425	412	396	376	370	379	391	397	427	05 26	503	19 18	358	145	24
378	402	411	392	400	402	392	407	406	401	04 22	468	11 56	320	148	25††
329	329	354	359	359	370	396	392	384	389	07 56	498	15 24	310	188	26††
388	367	*	*	*	*	*	*	401	*	*	*	*	*	*	27††
384	384	390	401	398	408	421	411	398	415	06 28	485	13 54	355	130	28
382	391	396	405	401	397	406	415	410	411	06 02	480	13 50	368	112	29
418	417	414	427	413	413	423	419	419	427	07 30	462	01 00	404	58	30
375	376	379	382	383	385	388	389	389	400					110	Means
395	393	393	394	396	396	395	396	400	411						Means†
314	316	333	344	353	357	361	366	365	367						Means††

† International quiet days.

†† International disturbed days.

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

TABLE 11

## Hourly Values of Horizontal Force, 1950

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

December

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
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
1†	424	428	437	449	468	478	478	477	472	463	449	458	421	417	423
2	422	427	439	452	479	489	489	493	483	468	448	434	418	419	417
3	440	440	439	446	466	490	511	513	504	479	457	450	449	442	434
4†	424	424	436	457	473	493	512	505	484	461	447	440	432	424	418
5	436	437	442	456	476	500	510	503	504	484	478	473	474	461	458
6	439	450	452	479	509	517	510	493	460	449	413	394	398	405	406
7	394	398	407	409	431	455	460	461	471	471	460	447	433	424	419
8	425	424	423	441	473	506	509	506	494	474	469	447	417	403	401
9	432	432	448	462	466	474	473	457	438	428	418	422	423	422	421
10	439	439	440	454	487	512	517	514	502	477	454	450	449	447	444
11†	433	436	448	462	490	511	515	509	495	481	466	462	456	450	445
12	444	447	451	468	492	502	509	590	589	540	502	482	475	477	475
13††	409	413	382	402	421	382	436	435	440	430	407	396	392	384	397
14††	418	431	443	425	411	445	459	469	478	474	461	444	428	421	420
15	414	415	422	436	458	456	451	460	472	475	448	470	457	453	454
16	438	437	452	471	485	471	477	475	475	471	452	430	417	418	418
17	447	450	467	440	400	407	410	403	394	390	379	376	376	371	371
18	372	373	373	383	395	402	405	407	404	411	412	407	397	380	380
19	361	370	375	376	394	412	398	391	389	387	394	394	389	383	384
20	356	362	379	385	384	379	374	370	384	384	366	351	346	342	363
21†	377	377	383	399	418	428	428	418	411	403	397	385	373	373	370
22††	377	379	386	394	407	416	422	421	412	407	411	407	379	333	392
23††	340	329	336	334	334	362	358	334	319	321	295	308	305	299	298
24††	319	322	327	329	335	359	357	339	322	287	294	305	301	315	309
25	322	317	322	350	362	374	374	360	358	345	345	346	336	336	335
26	369	365	371	399	412	419	422	418	384	346	331	349	351	351	346
27	341	341	343	353	377	391	400	401	391	363	344	334	338	325	323
28	344	344	349	363	385	396	401	396	373	358	346	339	337	337	341
29	347	345	350	372	404	418	407	383	375	372	378	382	382	378	378
30	377	377	382	392	425	444	449	443	430	415	400	392	392	386	382
31†	378	378	385	408	443	457	448	421	394	385	380	377	378	378	378
Means	395	397	403	414	431	443	449	444	436	423	410	405	397	392	390
Means †	407	409	418	435	458	473	476	466	451	439	428	424	412	408	407
Means ††	373	375	375	377	382	393	406	400	394	384	374	372	361	350	343

† International quiet days.

†† International disturbed days.

\* Loss of record; (Day Omitted for means)

TABLE 11

## Hourly Values of Horizontal Force, 1950

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

December

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	
420	414	421	425	426	425	425	428	429	440	06 50	486	16 16	413	73	1†
415	415	417	412	412	422	430	427	431	440	07 24	499	18 42	409	90	2
432	432	432	432	433	433	434	434	434	452	06 26	518	20 50	427	91	3
414	409	408	407	404	404	409	412	416	438	06 02	516	20 00	403	113	4†
452	452	437	423	416	422	425	428	437	453	05 40	517	18 58	413	104	5
397	401	403	407	417	421	426	424	423	437	04 26	532	11 20	388	144	6
423	419	419	419	427	419	420	419	429	431	07 06	481	19 06	390	91	7
400	392	398	402	402	393	399	397	407	433	05 58	521	16 58	388	133	8
418	418	419	420	421	418	424	427	428	434	05 40	482	15 00	416	66	9
445	449	449	451	449	450	454	450	445	461	05 30	526	01 22	436	90	10
445	442	443	447	443	442	442	442	442	460	05 38	523	00 22	430	93	11†
478	481	487	466	463	454	452	452	435	486	06 58	603	23 58	424	179	12
387	378	378	397	388	377	387	392	397	400	06 10	458	20 30	372	86	13††
416	422	421	409	425	426	420	433	423	434	08 22	482	03 56	394	88	14††
458	464	468	467	476	468	468	473	475	457	07 54	486	00 22	411	75	15
418	416	417	414	411	414	414	418	417	439	03 34	494	18 42	410	84	16
364	362	363	365	366	366	371	375	373	391	02 44	477	16 00	361	116	17
381	380	371	367	400	378	378	377	373	388	10 10	418	18 46	353	65	18
384	384	385	399	388	384	388	389	387	387	06 18	422	00 02	359	63	19
346	345	344	345	351	356	351	342	356	361	03 10	390	22 20	338	52	20
369	367	367	373	365	368	373	374	374	386	04 18	435	18 38	364	71	21†
266	288	280	265	274	274	293	315	325	351	06 52	427	16 24	257	170	22††
299	292	293	299	305	315	319	319	315	318	05 06	381	16 18	282	99	23††
305	317	286	276	288	300	310	310	312	313	05 10	370	17 30	262	108	24††
341	340	350	351	370	373	360	369	370	350	05 18	384	01 00	315	69	25
336	339	345	354	358	351	346	350	350	365	05 54	432	09 42	324	108	26
329	328	338	340	334	336	341	346	337	350	06 36	411	14 20	320	91	27
339	339	336	339	339	339	336	339	339	352	05 30	407	17 40	335	72	28
376	375	369	369	369	369	374	376	375	376	05 14	426	01 14	344	82	29
377	380	386	387	383	382	387	387	382	397	05 50	453	00 02	376	77	30
374	373	375	380	384	385	385	381	375	392	05 28	458	17 30	371	87	31†
387	388	387	387	390	389	392	394	394	406					95	Means
404	401	403	406	404	405	407	407	407	423						Means.†
335	339	332	329	336	338	346	354	354	363						Means.††

† International quiet days.

†† International disturbed days.

\* Loss of records. (Day Omitted for means.)

TABLE 12

## Hourly Values of Vertical Force, 1950

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

July

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	134	136	132	132	132	120	120	120	122	124	128	134	132	134	130
2	138	138	134	130	*	*	*	*	†	*	*	*	*	*	*
3	*	*	*	144	140	140	130	130	132	124	120	118	120	120	120
4††	124	136	138	136	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	120	122	126	120	120	128	130	130	130	134	136	140
6	148	146	*	162	156	150	150	144	148	150	148	146	142	148	148
7	150	150	150	146	*	*	*	*	*	*	136	138	138	140	140
8	144	148	146	140	136	134	130	132	140	148	144	142	136	130	130
9	134	132	130	135	140	138	128	134	138	138	138	138	138	138	140
10	140	140	140	140	138	138	140	140	140	140	140	134	132	124	120
11††	130	124	126	128	130	130	128	124	126	130	130	130	130	130	126
12††	130	130	126	130	135	139	141	141	143	143	142	143	143	143	141
13	145	145	147	140	132	130	128	128	120	116	112	116	116	112	112
14	118	120	120	*	*	*	*	*	*	139	129	127	125	115	115
15	113	115	107	107	107	107	103	99	107	115	113	115	113	113	107
16	113	113	113	120	127	125	123	123	125	127	127	127	127	127	127
17†	127	135	135	125	119	117	107	105	107	107	107	109	115	115	119
18†	125	127	127	128	129	129	125	117	121	129	131	133	133	131	131
19†	135	137	135	137	141	135	131	129	125	131	133	133	133	133	133
20	133	133	133	144	156	146	144	124	124	126	136	142	144	144	144
21	160	158	144	137	131	131	131	131	131	131	143	143	143	139	135
22	149	149	151	142	134	128	130	130	120	114	114	114	114	114	114
23†	126	122	120	122	125	125	123	119	117	117	117	119	123	123	123
24††	125	125	127	127	126	124	118	116	132	132	132	130	136	136	136
25††	146	148	152	141	130	132	124	*	*	128	130	134	128	122	118
26†	136	134	128	134	128	130	130	128	132	132	128	126	132	134	136
27	152	152	154	150	150	144	136	136	134	134	134	132	134	134	134
28	136	136	136	132	127	127	127	127	127	127	127	127	127	127	127
29	127	127	127	127	127	125	125	127	125	127	125	125	125	127	127
30	131	131	133	137	115	127	127	127	127	127	127	127	127	127	127
31	*	*	*	130	134	134	130	130	128	130	132	134	134	132	130
Means	134	134	133	132	132	130	127	125	126	128	129	129	130	129	128
Means †	130	131	129	129	128	127	123	120	120	123	123	124	127	127	128
Means ††	128	126	126	128	130	131	129	127	134	135	135	134	136	136	134

† International quiet days

†† International disturbed days

\* Loss of records (Day omitted for means)



TABLE 12  
Hourly Values of Vertical Force, 1950  
(Averages for sixty minutes centered at the full hours of Greenwich mean time)  
July  
2,400r plus tabular quantity.

Date	Range	Flag	Minimum		Maximum		Mean	Hours G M T														
			Time	Min	Time	Max		15	16	17	18	19	20	21	22	23						
1	20	11.1	06 00	138	01 58	130	136	130	134	130	134	130	132	132	131	130	129	130	128	128	Meant	
2	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
3	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
4	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
5	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
6	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
7	*	*	.	.	.	*	120	*	124	*	126	*	128	*	127	127	127	127	127	127	127	Meant
8	21	11.0	05 38	136	01 10	135	144	142	142	142	142	142	142	142	142	142	142	142	142	142	Meant	
9	20	11.2	05 54	136	02 02	137	140	140	140	140	140	140	140	140	140	140	140	140	140	140	Meant	
10	24	11.8	06 00	142	03 08	131	150	150	150	150	150	150	150	150	150	150	150	150	150	150	Meant	
11	24	11.2	06 16	136	07 16	128	130	130	130	130	130	130	130	130	130	130	130	130	130	130	Meant	
12	21	11.0	06 22	140	08 14	140	143	143	143	143	143	143	143	143	143	143	143	143	143	143	Meant	
13	21	10.4	06 42	140	09 38	125	120	120	120	120	120	120	120	120	120	120	120	120	120	120	Meant	
14	24	9.3	07 08	117	11 50	110	113	113	113	113	113	113	113	113	113	113	113	113	113	113	Meant	
15	33	10.5	08 48	143	12 38	125	131	131	131	131	131	131	131	131	131	131	131	131	131	131	Meant	
16	46	9.7	10 10	143	14 28	119	123	123	123	123	123	123	123	123	123	123	123	123	123	123	Meant	
17	22	11.3	06 38	133	10 10	130	133	133	133	133	133	133	133	133	133	133	133	133	133	133	Meant	
18	32	12.1	06 10	153	02 46	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	Meant	
19	42	12.2	06 50	161	18 32	144	152	152	152	152	152	152	152	152	152	152	152	152	152	152	Meant	
20	33	12.0	07 10	162	00 32	140	145	145	145	145	145	145	145	145	145	145	145	145	145	145	Meant	
21	43	11.2	07 10	165	02 10	124	122	122	122	122	122	122	122	122	122	122	122	122	122	122	Meant	
22	15	11.3	06 50	128	00 40	123	125	125	125	125	125	125	125	125	125	125	125	125	125	125	Meant	
23	38	11.0	06 10	148	23 42	132	134	134	134	134	134	134	134	134	134	134	134	134	134	134	Meant	
24	22	12.0	07 00	142	17 50	133	136	136	136	136	136	136	136	136	136	136	136	136	136	136	Meant	
25	28	11.9	07 10	156	00 58	139	136	136	136	136	136	136	136	136	136	136	136	136	136	136	Meant	
26	19	11.9	07 10	138	01 50	128	127	127	127	127	127	127	127	127	127	127	127	127	127	127	Meant	
27	12	12.1	08 08	133	19 54	127	129	129	129	129	129	129	129	129	129	129	129	129	129	129	Meant	
28	*	*	..	..	..	*	136	134	134	134	134	134	134	134	134	134	134	134	134	134	Meant	
29	*	*	..	..	..	*	130	132	132	132	132	132	132	132	132	132	132	132	132	132	Meant	
30	29	11.2	08 10	142	04 10	140	145	145	145	145	145	145	145	145	145	145	145	145	145	145	Meant	
31	33	11.2	08 10	165	05 10	124	122	122	122	122	122	122	122	122	122	122	122	122	122	122	Meant	
32	15	11.3	06 50	128	00 40	123	125	125	125	125	125	125	125	125	125	125	125	125	125	125	Meant	
33	38	11.0	06 10	148	23 42	132	134	134	134	134	134	134	134	134	134	134	134	134	134	134	Meant	
34	22	12.0	07 00	142	17 50	133	136	136	136	136	136	136	136	136	136	136	136	136	136	136	Meant	
35	28	11.9	07 10	156	00 58	139	136	136	136	136	136	136	136	136	136	136	136	136	136	136	Meant	
36	19	11.9	07 10	138	01 50	128	127	127	127	127	127	127	127	127	127	127	127	127	127	127	Meant	
37	12	12.1	08 08	133	19 54	127	129	129	129	129	129	129	129	129	129	129	129	129	129	129	Meant	
38	*	*	..	..	..	*	136	134	134	134	134	134	134	134	134	134	134	134	134	134	Meant	
39	*	*	..	..	..	*	130	132	132	132	132	132	132	132	132	132	132	132	132	132	Meant	
40	29	11.2	08 10	142	04 10	140	145	145	145	145	145	145	145	145	145	145	145	145	145	145	Meant	

† International quiet days.

†† International disturbed days.

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



TABLE 16

Hourly Values of Vertical Force, 1950

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

August

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		
148	150	150	150	154	152	150	150	154	149	23 56	156	08 54	130	26	1
144	146	146	146	146	146	146	146	150	147	03 50	162	10 00	132	30	2
126	124	128	128	130	128	126	128	126	131	00 42	152	11 34	118	34	3
128	116	116	132	132	134	132	132	132	120	19 10	136	05 36	94	42	4
138	138	138	138	140	138	138	138	138	133	19 22	142	07 20	118	24	5
130	134	134	136	138	140	134	136	136	131	20 06	144	06 42	110	34	6
140	138	138	136	136	138	138	130	134	134	01 56	144	07 54	108	36	7††
123	127	125	125	123	127	131	131	131	126	02 14	144	06 52	87	57	8††
132	132	130	132	132	132	132	132	134	132	03 16	156	09 28	114	42	9
130	132	132	134	136	148	132	134	138	133	19 48	150	13 30	120	30	10††
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	11
126	134	136	136	134	136	138	136	130	*	..	*	..	*	*	12
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	13
132	138	140	136	138	140	140	138	140	*	..	*	..	*	*	14
144	146	146	146	146	146	146	146	146	132	18 38	148	07 18	102	46	15
137	137	137	137	137	137	137	139	141	*	..	*	..	*	*	16†
127	125	123	123	123	123	127	127	123	126	00 38	145	04 00	113	32	17†
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	18
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	19††
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	20††
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	21
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	22
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	23
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	24†
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	25†
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	26†
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	27
*	*	*	*	*	*	*	*	*	*	..	*	..	*	*	28
135	139	137	141	143	141	145	145	143	*	..	*	..	*	*	29
141	141	145	145	145	149	145	145	145	138	19 46	153	06 22	107	46	30
135	145	145	145	145	145	147	147	149	134	00 42	151	06 38	103	48	31
135	135	135	137	137	139	137	137	138	133					38	Means
127	125	123	123	123	123	127	127	123	126						Means †
131	132	132	132	132	138	134	132	134	131						Means ††

† International quiet days.

†† International disturbed days.

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

TABLE 14

Hourly Values of Vertical Force, 1950

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

September

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
1†	151	163	161	157	152	142	116	110	120	128	138	146	148	150	154
2	168	168	168	168	156	134	130	128	128	140	150	166	168	170	168
3††	171	180	176	170	155	131	123	125	143	167	171	171	163	163	167
4†	157	183	187	180	173	169	159	165	169	161	173	183	179	179	175
5††	193	191	191	189	189	*	*	133	133	133	127	139	149	153	155
6††	163	161	163	149	134	124	116	118	132	140	152	140	152	158	160
7	162	162	160	146	122	118	118	118	130	138	138	146	144	152	154
8	162	162	158	148	137	125	133	135	139	153	181	181	177	177	175
9	183	181	177	163	143	141	139	139	139	143	153	159	157	159	159
10	161	163	163	145	121	119	119	125	133	137	139	141	141	141	141
11	159	161	153	*	*	*	*	*	*	*	*	*	*	*	*
12					113	109	105	113	119	131	139	139	129	129	135
13	145	151	143	129	115	99	99	103	119	137	143	143	139	137	139
14†	145	147	143	*	*	*	*	105	115	117	125	137	137	131	127
15†	139	141	137	121	105	97	93	101	107	109	109	109	109	109	109
16	127	127	123	121	119	103	95	89	95	109	111	127	127	117	113
17	129	131	129	130	131	129	111	103	109	121	139	137	129	127	129
18	135	135	133	123	121	113	111	*	105	101	103	111	125	125	129
19	143	143	133	113	107	103	93	85	97	105	121	121	123	127	141
20	145	149	143	128	113	103	113	111	113	133	133	127	133	135	135
21	155	155	143	141	79	80	88	96	100	112	136	136	143	136	136
22†	140	140	140	120	105	103	101	115	125	141	143	143	143	143	143
23	155	159	143	123	109	95	87	87	97	115	123	113	113	129	145
24††	163	145	149	*	*	*	*	*	*	*	*	*	*	*	*
25	*		*	63	58	58	58	60	74	74	98	96	96	94	92
26	96	96	90	87	79	67	77	93	101	119	121	123	119	119	121
27	137	137	135	140	144	142	122	122	122	124	130	132	132	132	144
28	158	162	160	142	131	123	115	111	111	125	129	131	131	131	135
29†	149	151	151	147	140	132	122	118	120	134	140	140	140	142	144
30	160	160	158	160	146	142	136	130	128	130	142	156	158	154	152
Means	152	153	150	140	127	118	113	114	121	131	140	142	142	143	145
Means †	145	149	147	136	125	119	108	111	118	128	133	135	135	136	137
Means ††	175	175	175	166	154	141	133	136	148	156	165	165	165	167	167

† International quiet days.

†† International disturbed days.

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

TABLE 14

Hourly Values of Vertical Force, 1950

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

September

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		
156.	158	160	162	166	166	168	168	168	150	21 34	170	07 15	108	62	1†
168	170	170	170	170	174	170	170	170	160	19 30	178	07 22	126	52	2
155	155	163	177	189	177	187	189	185	165	18 36	191	06 00	121	70	3††
175	175	180	187	191	191	189	191	193	179	19 02	195	06 16	157	38	4††
155	161	159	159	163	165	165	163	167	*		*	..	*	*	5††
160	160	160	160	162	162	160	160	160	150	00 30	165	06 14	112	53	6††
154	158	158	158	158	160	160	158	160	147	19 30	166	06 26	116	50	7
175	181	179	181	179	179	181	181	195	166	22 50	197	04 52	121	76	8
159	159	159	159	161	161	163	161	161	157	00 01	185	06 36	137	48	9
147	155	153	149	157	163	159	159	157	145	01 18	169	05 20	117	52	10
*	*	*	*	*	*	*	*	*	*		*		*	*	11
139	139	139	139	141	141	141	143	145	*		*		*	*	12
139	139	139	139	139	141	141	141	143	133	00 36	155	05 40	97	58	13
131	137	137	137	139	139	139	139	139	*		*		*	*	14†
111	113	113	117	125	127	127	127	127	116	00 50	145	06 10	91	54	15†
127	115	127	129	129	129	131	129	129	119	19 02	137	06 26	88	49	16
129	129	119	125	119	121	137	145	143	127	21 38	149	07 14	101	48	17
127	127	129	129	141	141	139	143	143	*		*		*	*	18
143	145	145	147	143	147	147	149	147	128	22 30	153	06 38	83	70	19
137	151	153	147	145	155	153	151	153	136	20 10	161	04 42	99	62	20
136	136	136	138	140	138	138	138	140	128	00 32	159	03 54	78	81	21
143	143	143	145	145	143	143	143	145	139	23 50	153	05 32	99	54	22†
147	145	147	155	165	167	167	163	163	133	20 40	175	06 52	85	90	23
*	*	*	*	*	*	*	*	*	*		*		*	*	24††
90	94	94	94	100	100	98	98	98	*		*		*	*	25
121	125	135	135	139	143	139	137	137	113	19 50	147	05 20	63	84	26
144	146	146	158	160	160	158	154	150	140	23 50	162	07 28	120	42	27
147	149	149	149	149	149	151	151	149	139	01 24	166	06 50	109	57	28
146	148	148	150	158	158	160	160	160	144	22 06	162	07 16	116	46	29†
162	164	168	170	182	170	166	170	170	156	19 08	184	07 50	126	58	30
147	149	150	152	155	155	156	156	157	142					59	Means
139	141	141	143	149	149	149	149	150	136						Means†
163	163	171	175	181	177	179	180	170	165						Means††

† International quiet days.

†† International disturbed days.

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

TABLE 15

## Hourly Values of Vertical Force, 1950

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

October

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††	171	180	180	170	170	157	149	137	149	161	177	179	163	151	159
2††	182	182	173	161	151	152	149	151	152	140	146	147	177	179	182
3	159	149	135	120	104	91	88	92	100	113	113	121	124	128	132
4	136	139	139	137	135	133	127	118	127	141	154	160	160	157	157
5	171	172	159	155	151	144	121	114	119	134	140	148	150	169	169
6	134	120	108	98	88	87	79	79	91	106	116	124	130	125	124
7	137	137	127	123	119	113	113	98	108	113	119	126	132	134	130
8	149	149	143	147	151	136	132	136	142	147	156	159	159	162	162
9	174	180	177	172	165	147	137	129	133	137	142	155	163	167	167
10†	*	*	*	147	147	138	132	132	133	133	143	147	156	157	159
11	163	171	162	150	149	149	133	132	141	149	156	161	163	162	165
12	*	*	*	*	161	145	139	135	143	149	*	*	*	*	*
13	*	*	*	147	144	131	129	121	120	129	135	135	133	135	138
14††	*	*	*	*	142	121	125	135	125	124	133	139	133	127	142
15	165	165	169	168	167	150	139	138	139	144	144	150	157	159	156
16	159	169	173	169	151	144	135	139	141	139	129	127	139	144	151
17	162	169	169	154	149	141	141	141	135	126	138	137	137	129	129
18	143	141	141	141	141	127	117	116	117	123	131	144	147	149	150
19†	161	162	*	141	141	132	120	117	108	115	123	129	129	138	139
20	151	150	150	141	130	115	106	109	114	115	116	121	126	134	133
21†	136	136	140	138	136	133	130	124	121	121	121	120	121	121	124
22	136	136	136	136	130	137	148	151	151	147	144	137	137	136	131
23	141	149	149	150	148	142	141	135	136	133	139	136	136	136	137
24	139	147	139	136	*	*	*	*	*	*	*	*	*	*	*
25†	*	*	*	130	130	121	113	115	117	118	119	125	125	129	129
26	135	133	135	131	130	134	142	141	141	136	134	129	136	140	141
27†	141	150	141	140	139	137	134	140	140	140	140	137	137	139	140
28††	140	141	143	150	157	163	159	167	155	128	108	119	110	119	125
29††	139	139	139	137	139	139	*	*	*	128	132	130	132	130	130
30	130	132	128	120	110	112	102	104	108	104	118	132	136	138	136
31	149	149	148	138	120	117	114	126	123	121	93	102	105	114	123
Means .	149	150	147	142	137	132	127	126	129	130	132	136	139	141	143
Means †	139	144	141	139	137	135	132	132	131	131	131	129	120	130	132
Means ††	164	168	165	160	159	157	152	152	152	142	144	148	150	150	155

† International quiet days.

†† International disturbed days

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

TABLE 15  
Hourly Values of Vertical Force, 1950

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

October

2,400γ 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.		
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	H. M.	γ	H. M.	γ	γ	
177	182	184	182	187	182	182	183	182	171	18 38	190	06 40	133	57	1††
182	181	175	176	179	182	191	183	171	169	15 32	196	09 12	136	60	2††
184	136	133	134	132	139	136	136	136	124	00 50	162	05 30	82	80	3
161	161	159	171	167	169	167	169	171	151	18 12	175	07 00	115	60	4
163	175	175	176	178	181	177	164	150	156	19 42	182	06 58	111	71	5
124	124	124	124	125	125	135	135	137	115	23 10	134	06 34	75	59	6
126	132	137	140	149	149	150	148	148	129	21 34	152	07 02	95	57	7
165	166	171	172	172	174	172	174	172	157	20 46	176	05 30	129	47	8
*	*	*	*	*	*	*	*	*	*		*		*	*	9
159	159	162	162	162	165	165	165	165	*		*		*	*	10†
165	*	*	*	*	*	*	*	*	*		*		*	*	11
*	*	*	*	*	*	*	*	*	*		*		*	*	12
138	137	139	143	147	*	*	*	*	*		*		*	*	13
154	143	139	148	155	157	165	166	*	*		*		*	*	14††
156	157	162	159	162	161	163	163	161	157	01 30	171	06 30	133	38	15
155	157	159	171	159	159	162	159	159	152	01 50	175	11 12	123	52	16
138	137	137	145	144	141	141	141	141	143	01 38	171	08 50	124	47	17
151	147	147	157	159	159	159	161	143	18	54	163	09 00	115	48	18
141	141	139	147	149	150	151	151	150	*		*		*	*	19†
134	134	134	134	136	136	136	136	136	130	00 44	153	06 24	104	49	20
124	133	130	130	133	134	134	136	134	130	03 02	146	11 10	103	43	21†
130	136	145	142	147	145	142	147	141	140	07 12	154	03 42	121	33	22
141	139	139	141	145	147	145	143	139	141	00 50	151	09 06	129	22	23
*	*	*	*	*	*	*	*	*	*		*		*	*	24
130	130	133	133	136	138	133	133	139	*		*		*	*	25†
140	141	142	142	150	148	144	141	141	139	19 06	152	10 58	123	29	26
140	139	139	139	139	140	139	139	140	140	01 16	153	06 00	131	22	27†
123	122	134	129	137	155	147	135	139	138	06 58	170	10 12	103	67	28††
127	118	129	132	132	134	134	134	133	*		*		*	*	29††
137	138	148	149	138	146	144	138	146	129	17 22	151	09 26	102	49	30
133	138	127	134	136	132	128	136	135	127	00 38	151	09 40	90	61	31
144	146	148	150	151	153	152	151	150	142					50	Means.
132	136	135	135	136	137	137	137	137	135						Means †
161	162	164	162	168	173	173	167	164	159						Means.††

† International quiet days.

†† International disturbed days

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

TABLE 16

## Hourly Values of Vertical Force, 1950

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

November

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††	132	135	138	135	135	135	135	133	132	132	131	127	132	135	129
2	144	148	147	149	147	141	134	129	128	118	121	122	127	128	128
3	132	134	133	137	138	136	138	138	134	128	126	124	134	135	136
4††	140	141	140	145	150	144	135	129	129	126	128	128	129	130	135
5	159	159	159	142	129	135	134	134	129	128	120	124	126	132	134
6†	130	132	134	130	125	125	124	124	124	124	129	127	131	139	139
7†	149	149	149	143	138	134	136	130	*	124	127	124	124	129	130
8	136	133	132	129	119	123	121	123	121	120	119	117	115	115	117
9	119	120	123	123	124	120	120	121	121	120	113	109	114	120	121
10	124	125	127	128	130	127	125	119	105	97	106	107	109	113	115
11	135	137	139	136	134	138	134	121	110	108	109	110	112	112	116
12	124	124	126	115	105	109	105	97	87	91	97	101	101	105	111
13	125	121	117	117	117	124	137	139	135	131	127	125	123	113	123
14	131	135	131	149	160	150	148	138	130	130	134	135	135	138	138
15†	146	146	144	133	121	113	114	114	117	117	115	115	114	125	126
16	131	129	126	131	136	130	128	126	124	124	126	130	133	138	140
17	144	142	145	131	117	117	117	118	121	121	115	111	101	107	105
18	112	111	107	110	117	111	113	114	125	118	114	111	105	109	113
19†	114	115	114	114	114	115	115	119	125	127	132	133	135	133	135
20†	143	143	143	133	123	123	127	125	123	123	127	127	133	134	135
21	137	137	139	130	125	122	120	118	120	125	125	125	128	136	136
22	138	137	137	138	138	134	136	136	132	133	134	139	140	142	142
23	142	142	140	125	113	113	119	122	121	125	125	127	128	128	135
24	140	140	137	126	116	112	104	112	114	119	128	130	131	131	130
25††	136	142	134	130	126	120	120	131	132	132	131	126	125	143	142
26††	144	148	142	141	140	146	143	140	128	110	101	124	124	126	131
27††	143	143	143	128	115	134	133	133	134	134	133	131	131	134	*
28	*	*	*	*	*	*	*	*	128	122	111	116	123	122	128
29	134	134	135	*	*	*	*	*	*	*	*	*	*	*	*
30	*	*	*	*	*	*	*	*	*	122	129	134	135	141	139
Means	134	135	134	131	128	127	126	125	123	121	121	122	123	127	128
Means †	133	134	134	127	121	119	120	121	122	123	126	125	128	133	134
Means ††	138	141	139	138	138	136	133	133	130	125	123	126	127	133	134

† International quiet days.

†† International disturbed days.

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



TABLE 16

## Hourly Values of Vertical Force, 1950

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

November

2400  $\gamma$  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	$\gamma$	$\gamma$	
137	131	131	139	144	139	143	143	141	135	19 10	147	11 42	122	25	1††
131	131	131	131	131	133	131	131	133	133	03 22	155	09 26	116	39	2
136	136	138	136	138	138	138	138	138	135	06 46	141	10 00	121	20	3
136	142	159	171	170	166	162	162	159	144	12 46	174	08 54	124	50	4††
134	130	132	132	132	134	135	134	134	135	00 40	161	10 00	118	43	5
142	142	141	150	145	148	151	148	147	136	21 22	153	07 10	122	31	6†
132	136	136	136	134	138	136	138	136	*	*	*	*	*	*	7†
117	115	117	117	120	121	119	120	119	121	00 06	138	12 10	110	28	8
121	121	124	120	121	121	121	121	124	120	16 50	126	11 28	106	20	9
129	141	142	148	142	141	141	139	135	126	18 02	150	08 58	96	54	10
118	126	126	127	127	127	127	127	124	124	02 10	142	08 52	106	36	11
113	117	116	121	121	125	127	124	124	112	02 18	129	07 52	84	45	12
129	139	137	139	141	141	137	131	130	129	14 22	143	01 28	115	28	13
138	138	138	141	144	148	150	147	147	141	03 42	165	08 02	126	30	14
125	126	127	129	131	131	129	129	131	126	00 34	147	05 24	111	36	15†
144	142	145	146	145	144	145	145	144	135	18 36	148	08 26	122	26	16
105	103	113	112	113	117	118	115	112	117	02 12	146	11 36	99	47	17
113	114	113	114	117	115	114	114	113	113	07 54	127	11 02	103	24	18
138	139	139	143	143	143	144	143	141	130	20 40	146	03 24	112	34	19†
135	135	137	139	139	137	137	137	137	133	00 42	145	08 22	120	25	20†
137	137	138	140	140	138	140	138	138	132	14 26	142	07 18	116	26	21
140	138	140	142	142	144	144	145	145	139	23 30	150	08 00	130	20	22
134	135	139	139	140	139	139	139	140	131	00 06	143	05 10	110	33	23
131	131	126	126	120	127	131	131	134	126	00 30	142	06 58	101	41	24
150	144	144	143	144	146	140	146	143	136	16 14	153	05 34	116	37	25††
132	137	142	142	140	143	146	143	143	136	00 34	148	10 00	100	48	26††
*	*	*	*	*	*	*	*	*	*	..	*	.	*	*	27††
134	134	139	134	134	139	145	134	133	*	..	*	.	*	*	28
*	*	*	*	*	*	*	*	*	*	.	*	.	*	*	29
139	139	139	145	139	143	146	145	145	*	.	*	.	*	*	30
131	132	133	135	136	136	136	136	135	130					34	Means.
135	135	136	140	139	140	140	139	139	131						Means.†
139	139	144	140	140	149	148	140	147	138						Means ††

† International quiet days.

†† International disturbed days

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

TABLE 17

Hourly Values of Vertical Force, 1950

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

December

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
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1†	146	146	142	131	128	120	122	116	124	124	126	128	130	132	136
2	148	150	148	135	124	122	118	112	104	104	108	122	124	124	126
3	140	142	140	130	116	120	114	110	98	94	98	100	102	106	102
4†	114	112	104	92	80	74	62	60	66	78	82	92	96	92	94
5	100	100	100	90	78	70	70	68	66	62	68	64	62	60	62
6	68	66	64	80	93	91	94	98	98	92	86	*	+	*	*
7	*	*	*	*	61	65	59	59	*	51	51	55	69	69	71
8	91	91	91	89	87	79	71	71	67	63	63	59	53	51	55
9	71	69	69	66	64	60	60	60	62	64	66	66	66	66	66
10	68	68	66	73	80	76	62	62	62	62	70	70	62	62	62
11†	64	70	66	60	57	57	61	59	59	63	67	71	65	63	69
12	75	77	75	70	60	62	80	78	74	40	46	60	60	68	76
13††	80	82	88	87	85	89	87	87	87	83	83	85	85	81	87
14††	87	87	87	91	96	92	82	84	82	82	96	96	96	98	98
15	96	98	98	86	75	89	93	93	91	89	93	95	95	97	99
16	115	115	115	102	92	88	90	90	86	76	76	76	78	82	86
17	90	90	82	75	68	70	70	70	72	72	70	72	70	70	70
18	78	78	62	65	67	71	83	83	81	81	81	73	71	69	69
19	69	78	62	65	67	71	83	83	81	81	81	73	71	69	69
20	77	75	77	77	67	94	96	92	78	76	76	78	78	78	78
21†	76	78	76	77	79	79	81	81	77	77	71	65	61	65	63
22††	73	71	67	62	57	59	59	67	73	75	71	63	59	53	39
23††	71	67	63	50	38	44	54	60	60	76	72	68	72	60	60
24††	72	78	72	60	47	47	47	49	53	53	53	47	41	47	43
25	39	37	41	45	51	53	55	57	55	57	55	55	57	57	57
26	71	69	71	71	67	65	61	65	55	53	63	71	65	67	63
27	65	69	69	75	79	71	67	67	67	65	67	67	67	67	67
28	71	71	69	62	55	43	47	53	55	57	63	61	63	65	67
29	63	67	67	50	38	30	32	42	60	58	62	50	46	48	48
30	48	50	46	40	32	36	38	38	40	42	52	56	58	54	52
31†	54	56	56	52	48	30	32	52	70	80	72	72	70	70	64
Means . . .	83	84	82	77	72	71	71	72	72	72	74	74	73	73	73
Means † . . .	91	92	89	82	78	72	72	74	79	79	84	86	84	84	85
Means †† . . .	77	77	71	70	65	66	66	69	71	71	75	72	71	68	65

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted means)

TABLE 17  
Hourly Values of Vertical Force, 1950

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

December

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	
136	136	142	138	138	138	142	146	146	134	00 38	150	07 08	112	38	1†
128	130	132	132	130	142	142	142	140	120	01 32	152	08 06	102	50	2
100	102	104	112	112	114	114	114	114	112	00 32	144	09 22	90	54	3
92	96	94	98	98	98	100	100	98	91	00 14	116	07 00	58	58	4†
62	64	64	56	56	60	62	68	68	70	00 12	102	17 58	52	50	5
*	*	*	*	*	*	*	*	*	*		*		*	*	6
73	73	77	85	87	85	87	87	91	*		*		*	*	7
55	59	59	67	69	71	71	71	71	70	02 00	93	12 16	49	44	8
66	66	66	66	66	66	66	66	66	65	00 02	73	05 52	54	19	9
64	64	68	68	70	70	78	78	68	68	03 15	82	12 10	60	22	10
69	69	71	75	73	75	73	73	75	67	18 00	77	05 12	55	22	11†
76	80	80	78	78	80	78	80	80	71	17 28	84	09 00	39	45	12
85	85	87	87	85	81	83	85	87	85	01 34	92	11 16	75	17	13††
96	98	98	96	98	98	98	100	98	93	18 02	108	09 18	80	28	14††
111	113	115	113	115	115	115	115	115	101	23 00	117	03 54	83	34	15
90	90	92	90	90	92	92	90	90	91	00 50	117	09 52	72	45	16
70	70	78	76	80	82	86	84	90	76	00 46	94	04 06	66	28	17
71	69	67	67	75	75	71	71	67	73	06 38	85	02 08	57	28	18
71	69	67	67	75	75	77	77	77	73	08 52	79	03 14	57	22	19
78	78	78	78	78	78	78	78	78	79	06 26	98	22 02	73	25	20
65	71	67	73	73	77	77	77	75	73	06 46	83	11 58	59	24	21†
39	59	59	59	63	59	75	75	75	63	22 10	79	15 00	37	42	22††
60	60	70	72	72	74	78	74	60	64	21 10	80	04 42	36	44	23††
43	41	33	35	43	53	49	43	41	50	00 50	80	18 00	31	49	24††
57	57	57	69	71	67	67	71	71	57	19 42	75	01 12	35	40	25
57	63	59	69	69	63	63	65	63	65	10 38	73	09 48	51	22	26
67	73	75	75	71	69	69	69	69	69	17 30	80	09 00	62	18	27
65	63	63	63	65	63	63	63	63	61	00 46	75	04 58	41	34	28
48	48	48	48	48	48	50	50	48	50	01 00	69	05 42	28	41	29
50	46	48	56	46	54	56	50	52	47	12 40	60	05 22	30	30	30
54	50	50	50	46	40	40	40	50	54	08 50	82	05 30	28	54	31†
73	75	76	77	78	79	80	80	79	76					35	Means
83	84	85	87	86	86	86	87	89	84						Means †
65	69	69	70	72	73	77	75	72	71						Means ††

† International quiet days.

†† International disturbed days.

\* Loss of record (Day omitted means).

TABLE 18  
PRINCIPAL MAGNETIC STORMS  
(July—December 1950)

Greenwich date 1950	Storm time				Sudden Type (2)	commencement Amplitude (3)			C Figure degree of activity (4)	Maximal activity Greenwich day	Ranges			Remarks
	G.M.T. of beginning		G.M.T. of ending (1)			D	H	Z			D	H	Z	
	H	M	D.	H										
July 11 .	13	35	13	15	..			.	m	12	6	161	45	
July 24	01	50	25	21	s.c.	.	+29	+6	m	24	6	223	(44)	
August 7 .	10	54	11	12	s.c.	-1	+43	+8	ms	8	5	306	(57)	
August 19 . .	10	04	20	18	s.c.	-1	+44	*	ms	19	9	365	*	
September 3	04	46	7	00	.				m	3	5	240	(83)	
September 16	10	22	21	10	s.c.	.	+35	+16	m	17	4	163	83	
September 23	07	40	26	23	.	..	.		m	25	5	179	*	
September 30 .	17	46	7	22	s.c.	..	+15	+10	ms	1	5	271	121	
October 16 .	06	06	17	23	.				m	16	2	206	48	
October 28 .	01	06	2	18	.				ms	28	4	272	(80)	
November 4	03	34	4	18	.				m	4	3	243	50	
November 10	00	36	10	18	.				m	10	3	236	54	
November 24	16	58	29	23	.				m	26	5	(188)	*	
December 12 .	05	22	16	12	s.c.	.	+56	+18	m	12	*	231	78	
December 22 .	10	46	27	11	.				m	24	*	175	49	

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

( ) Ranges in parentheses doubtful due to loss of record for a few hours during storm period.