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Magnetic Observations at Heard Island, 1953

By

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P R E F A C E

The geomagnetic work at Heard Island, which is described in this report, was planned and carried out by the Bureau of Mineral Resources, Geology and Geophysics of the Department of National Development, and was made possible by the Australian National Antarctic Research Expeditions (A.N.A.R.E.), which established a scientific research station at the island in 1947-48. The instruments used in making the geomagnetic observations were supplied by the Bureau of Mineral Resources, but the observatory buildings and living accommodation were provided by the A.N.A.R.E., which is responsible for the general administration of the research station.

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A B S T R A C T

Brief details are given of the instruments used at the Heard Island Magnetic Observatory in 1953, together with details of calibration and inter-comparison tests carried out.

The main object of the report is to present, in tabular form, hourly values of the magnetic elements (declination, horizontal intensity and vertical intensity) recorded during the year, together with details of magnetic storms and sudden commencements.

Typical magnetograms showing some of the magnetic effects recorded at the observatory are also included.

INTRODUCTION

The Australian National Antarctic Research Expeditions of the Antarctic Division, Department of External Affairs, have been carrying out a programme of scientific research on Heard Island since 11th December, 1947. Included in the programme is the study of terrestrial magnetism, and since March, 1952, a magnetic observatory has been in full-scale operation. The Bureau of Mineral Resources, Geology and Geophysics, Department of National Development, is responsible for the planning and carrying out of the research programme in terrestrial magnetism.

Heard Island is in the Southern Ocean, at latitude 53° South and longitude 73° East (Plate 1).

A short history of the island has been included in a previous report giving the magnetic results for 1952 (Ingall, 1955). Information concerning the observatory site and the absolute and variometer huts can also be found in that report, together with details of absolute, semi-absolute and variation instruments. This report describes the results obtained in 1953.

Absolute and Semi-Absolute Instruments.

During 1953, Quartz Horizontal Magnetometers Nos. 173 and 174 were used to determine values of horizontal intensity. On each absolute observation day, two sets of readings were made with each of the Q.H.M.s. Each set consists of readings with torsion of 0, $+2\pi$, -2π , $+2\pi$, and 0, thus enabling two values of horizontal intensity to be computed from each set.

Q.H.M. No. 172 was returned to Melbourne at the beginning of 1953 to undergo a series of intercomparison observations with Askania Magnetometer No. 508813 at Toolangi Observatory.

Magnetometric Zero Balance No. 62 was used throughout the year for observations of vertical intensity.

Absolute observations of declination were made with a modified Kew magnetometer manufactured by Elliott Bros.

Variation Instruments.

The La Cour magnetograph, of normal sensitivity, was kept in continuous operation throughout 1953.

Orientation of variometer magnets.

On 28th December, 1952, hurricane-force winds moved both absolute and variometer huts, displacing the position of all the variometer spots.

The Z magnet was replaced on its agate bearers.

The H magnet was returned to its former position by rotating the torsion head until the relative positions of the H trace and the H base line were identical with those prior to the hurricane.

Following an H base line shift in June 1953, a new meridian line of $50^{\circ}20'W$ was established in the variometer room. Orientation tests revealed a 4° misalignment of the H magnet. The magnet was re-oriented to within 50 minutes of the prime vertical by adjusting the position of the torsion head and the upper prism of the variometer. Closer alignment was not possible without removing the suspension. Secular variation is causing this residual misorientation to decrease progressively.

The D-variometer spots had been displaced by a small amount and were returned to their original positions. An orientation test made in October, 1953, showed that the

magnet was in the meridian 50°37'W. The discrepancy of about 25' between this position and that to be expected from the alignment test in September, 1952, is apparently due to the movement of the variometer during the hurricane.

Base lines.

Absolute observations were made each week and base-line values computed after the ordinates were scaled at the times corresponding to the times of absolute observations.

Until January, 1953, accurate base-line checks could not be made on the numerous magnetically disturbed days which occur at Heard Island. The rapid fluctuation in value of each component of the field prevented ordinates from being scaled accurately at times between regular time marks on the magnetograms. Consequently the determination of base-line values was restricted to the magnetically quieter days. A system to overcome this disadvantage was designed and installed in January, 1953. Additional time marks are put on the magnetograms at the actual time of observation, by the observer closing an electrical contact in the absolute hut.

As each time trace on the La Cour magnetograms is parallel to the corresponding component trace, it is possible to scale from a time mark spot and make a correction for the constant difference between the two traces, thus obtaining the exact ordinate.

COMPARISON OF ABSOLUTE AND SEMI-ABSOLUTE INSTRUMENTS

Quartz Horizontal Magnetometers Nos. 172, 173 and 174.

In February, 1952, Q.H.M. 172 was intercompared with Q.H.Ms. 187, 188 and 189 on Heard Island. These last three Q.H.Ms. had previously been intercompared with Askania Magnetometer No. 508813 at Toolangi. During 1952 and early 1953, Q.H.Ms. 172, 173 and 174 were regularly compared through base lines, and after a special series of base-line intercomparisons had been done in February, 1953, Q.H.M. 172 was returned to Toolangi for intercomparison with Askania Magnetometer No. 508813 again, in June, 1953. The correction to International Magnetic Standard (I.M.S.) for Askania Magnetometer No. 508813 had previously been determined.

Further intercomparisons between Q.H.M. 172 and Askania Magnetometer No. 508813 were made in November, 1953, and August, 1954.

Q.H.Ms. 173 and 174 were regularly intercompared through base lines during 1953, and by a special series of observations in January, 1954.

It was intended to exchange Q.H.M. 172 for Q.H.M. 173 during relief operations in January, 1954, but this could not be done. I.M.S. corrections for Q.H.Ms. 173 and 174 during 1953 have therefore been extrapolated using measured I.M.S. corrections to Q.H.M. 172 and previously determined differences between Q.H.M. 172 and Q.H.Ms. 173 and 174.

I.M.S. Corrections

February, 1952	Q.H.M. 172	H _{IMS} = 0.00039H
		173 H _{IMS} = 0.00039H
		174 H _{IMS} = 0.00048H
June, 1953	Q.H.M. 172	H _{IMS} = 0.00081H
		173 H _{IMS} = 0.00070H
		174 H _{IMS} = 0.00081H
November, 1953	Q.H.M. 172	H _{IMS} = 0.00088H
		173 H _{IMS} = 0.00077H
		174 H _{IMS} = 0.00088H
August, 1954	Q.H.M. 172	H _{IMS} = 0.00080H
		173 H _{IMS} = 0.00069H
		174 H _{IMS} = 0.00080H

Elliott Bros. Magnetometer.

The Elliott Bros. magnetometer was intercompared in January, 1951, with D.T.M. C.I.W. Magnetometer No.18 at Toolangi and again in February, 1952, with Askania Magnetometer No.508810 at Heard Island. The latter series of intercomparisons was not reliable and the I.M.S. correction in use is that obtained from the former intercomparison, the relationship being:-

$$D_{IMS} = D_{Elliott} - 0.3'$$

Magnetometric Zero Balance No.62.

Magnetometric Zero Balance No.62 was calibrated at Rude Skov before being sent to Heard Island. An intercomparison series at Heard Island in February, 1952, with Askania Earth Inductor No.5010174, did not yield reliable results, and no up-to-date I.M.S. correction is available for B.M.Z. No.62.

VARIOMETER SCALE VALUES AND BASE-LINE VALUES

Observations to determine H and Z variometer scale values, using Helmholtz coils, were made at weekly intervals throughout the year.

Observed and adopted variometer scale values, with reasons for discontinuities in adopted values, are listed in Tables 1 to 5, inclusive.

Tables 6 to 11, inclusive, present similar information concerning base-line values for all three variometers. These values were also determined from weekly absolute observations.

Where possible, times of changes in adopted base-line and scale values have been determined from the records of instrument behaviour and adjustment. However, it has been necessary to make some changes solely by inspection of observed values.

The adoption of base-line values for the Z variometer proved difficult, as these values showed a tendency to drift, particularly in the latter half of the year. At the time of writing it appears certain that the reason for this drift had no connection with the variometer. A detailed examination of B.M.Z. No.62 will not be possible until the instrument is returned to Melbourne.

BASIC HOURLY VALUES AND ASSOCIATED MEANS

Basic Results.

Tables 16 to 51, inclusive, contain mean hourly values of the magnetic declination, horizontal intensity, and vertical intensity. The values represent the means for successive periods of one hour, the first period for each day commencing at midnight, Greenwich Mean Time. To avoid the use of signs, the tabulated values of declination and vertical intensity are in their numerical sense, since both westerly declination and vertical intensity are negative in the algebraic sense. The value at the top of the tables of each element is not the same for all months. Some adjustment was essential to reduce the use of minus signs and tabulated values of four figures, during extremely disturbed periods of magnetic activity.

Maximum and Minimum Values.

The maximum and minimum columns of Tables 16 to 51 contain the momentary extreme values of the element for each day, together with the Greenwich Mean Time of their occurrence.

Computed Means.

The line at the bottom of each table shows average hourly values obtained from all days. Below this line appear average hourly values for selected groups of days.

MONTHLY AND ANNUAL MEAN VALUES

A summary of monthly mean values for each group of selected days is given in Table 12.

These values were used to compute Table 13, which gives the mean value for 1953 of each group of selected days for all three elements.

MAGNETIC ACTIVITY

The principal magnetic storms are shown in Table 14. In classifying these storms, the frequent short-term disturbances which were associated with aurorae, and which usually occurred about 1600 hours and 2200 hours Greenwich Mean Time, were omitted.

Sudden commencements are listed in Table 15. Only clear cases have been noted, this criterion applying particularly to polar sudden commencements.

K-INDICES

K-indices are scaled each month from the records. The scale adopted has a lower limit of 1000 gammas for K=9. The procedure followed is to select the magnetically quiet days from each month's records and use the mean hourly scalings of these quiet days combined with the hourly scalings of the quiet days for corresponding months in 1952, to prepare Sq curves, which are used as the basis for scaling the K-indices. The K-indices are published at monthly intervals in the Geophysical Observatory Report issued by the Bureau of Mineral Resources, Geology and Geophysics.

REPRODUCED MAGNETOGRAMS

Typical examples of magnetic effects observed at Heard Island are illustrated on Plates 2, 3, 4 and 5.

Examples of polar or pulsational sudden commencements are seen on Plates 2 and 3. Plate 3 also illustrates a short-term disturbance not classified as a principal magnetic storm. The K-index of the period 18 to 21 hours is 6.

Plate 4 shows an example of a sudden commencement which, in this instance, preceded only minor magnetic activity.

A storm sudden commencement is illustrated on Plate 5. Also on this magnetogram, between the hours 03 and 07, are manual time marks produced during absolute observations as described in an earlier section.

ACKNOWLEDGEMENTS

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Thanks are also due to all members of the 1953 Australian National Antarctic Research Expedition, who provided invaluable help and assistance throughout the year.

REFERENCE

Ingall, L.N., 1955 - Magnetic Results from Heard Island, 1952.
Bur.Min.Res.Geol.& Geophys., Report No.21.

TABLE 1

Observed and adopted D scale-values

Date	Observed	Adopted	Method used for determination
1953	'/mm	'/mm	
February 8	0.9118	0.912	Torsion head deflections
June 1	0.9118	0.912	" " "
October 6	0.9119	0.912	" " "

TABLE 2

Observed and adopted H scale-values

Observed values determined with Helmholtz coil

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1953	Y/mm	Y/mm		1953	Y/mm	Y/mm	
January 1	10.34	10.41		June 12	10.42	10.41	
" 5	10.49	10.41		" 14	10.40	10.41	
" 10	10.45	10.41		" 22	10.40	10.41	
" 16	10.38	10.41		" 27	10.37	10.41	
" 23	10.40	10.41		July 8	10.43	10.41	
February 3	10.41	10.41		" 16	10.47	10.41	
" 8	10.42	10.41		" 23	10.40	10.41	
" 16	10.38	10.41		" 27	10.40	10.41	
" 20	10.38	10.41		August 3	10.39	10.41	06h August 4
March 7	10.36	10.41		" 19	10.08	10.01	
" 16	10.44	10.41		September 8	10.02	10.01	
" 19	10.47	10.41		" 14	10.00	10.01	
" 23	10.40	10.41		" 23	9.97	10.01	
" 29	10.42	10.41		" 28	10.00	10.01	
April 6	10.34	10.41		October 6	10.04	10.01	
" 8	10.36	10.41		" 12	9.98	10.01	
" 13	10.45	10.41		" 29	9.99	10.01	
" 22	10.44	10.41		November 3	10.02	10.01	
" 27	10.42	10.41		" 11	10.04	10.01	
May 11	10.39	10.41		" 24	10.01	10.01	
" 22	10.38	10.41		" 29	10.00	10.01	
" 25	10.37	10.41		December 7	10.01	10.01	
June 1	10.42	10.41	03h June 7	" 14	10.04	10.01	
" 8	10.51	10.48	06h " 10	" 21	9.97	10.01	
			09h " 12	" 26	10.03	10.01	

TABLE 3

Abrupt changes in the adopted H scale-values

Date	Change from preceding value	Cause of change
1953	Y/mm	
June 7	+0.10	Change in orientation of H magnet
" 10	-0.03	Partial reorientation of H magnet
" 12	-0.07	Partial reorientation of H magnet
August 4	-0.30	Final reorientation of H magnet

TABLE 4

Observed and adopted Z scale-values

Observed values determined with Helmholtz coil

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1953	Y/mm	Y/mm		1953	Y/mm	Y/mm	
January 1	3.08 *	3.07		July 8	3.12	3.11	
" 5	3.10	3.07		" 16	3.13	3.11	
" 10	3.09	3.07		" 24	3.08	3.11	
" 16	3.09	3.07		" 27	3.06	3.11	
" 23	3.06	3.07		August 3	3.09	3.11	
February 3	3.08	3.07		" 5	3.13	3.11	
" 8	3.10	3.07		" 19	3.12	3.11	
" 16	3.08	3.07		" 24	3.12	3.11	
" 20	3.09	3.07		" 31	3.13	3.11	
March 11	3.01	3.07		September 8	3.09	3.11	
" 16	3.06	3.07		" 14	3.12	3.11	
" 19	3.10	3.07		" 23	3.10	3.11	
" 23	3.05	3.07		" 28	3.11	3.11	
" 29	3.11	3.07		October 6	3.10	3.11	
April 6	3.06	3.07		" 12	3.10	3.11	
" 13	3.07	3.07		" 26	3.11	3.11	
" 20	3.02	3.07		November 3	3.10	3.11	
" 29	3.11	3.07		" 9	3.10	3.11	
May 4	3.10	3.07	04h May 5	" 26	3.10	3.11	
" 11	3.12	3.11		" 29	3.10	3.11	
" 22	3.11	3.11		December 7	3.10	3.11	
" 25	3.09	3.11		" 14	3.13	3.11	
June 1	3.10	3.11		" 21	3.10	3.11	
" 8	3.11	3.11		" 26	3.12	3.11	
" 14	3.11	3.11					
" 22	3.12	3.11					
" 27	3.11	3.11					

* Positive deflection only.

TABLE 5

Abrupt changes in the adopted Z scale-value

Date	Change from preceding value	Cause of change
1953	γ/mm	
May 5	+0.04	Spontaneous

TABLE 6

Observed and adopted base-line values for D variometer
(Observed values determined with Elliott Magnetometer)
(West declination)

Date	Observed		Adopted		Adopted value used to	Date	Observed		Adopted		Adopted value used to
	°	'	°	'			°	'	°	'	
1953						1953					
January 1	-50	20.1	-50	19.5		July 3	-50	19.7	-50	19.5	
" 8		19.8		19.5		" 9		19.5		19.5	
" 15		19.2		19.5		" 16		19.2		19.5	
" 22		18.4		19.5		" 23		19.8		19.5	
" 24		18.9		19.5		" 30		19.3		19.5	
" 29		19.2		19.5		August 6		19.4		19.5	
February 5		19.4		19.5		" 13		19.6		19.5	
" 12		18.8		19.5		" 20		19.2		19.5	
" 19		18.6		19.5		" 27		19.1		19.5	
" 25		19.3		19.5		September 3		19.4		19.5	
March 5		18.6		19.5		" 10		18.8		19.5	
" 12		19.2		19.5		" 17		19.0		19.5	
" 19		18.9		19.5		" 24		18.5		19.5	
" 26		19.0		19.5		October 1		19.4		19.5	
April 2		19.7		19.5		" 8		19.7		19.5	
" 9		20.4		19.5		" 15		19.0		19.5	
" 16		20.1		19.5		" 22		20.0		19.5	
" 23		19.3		19.5		" 29		19.1		19.5	
" 29		21.3		19.5		November 1		31.4		31.4	00h Nov. 1
May 7		20.1		19.5		" 5		31.4		31.4	
" 14		19.4		19.5		" 12		31.2		31.4	
" 21		20.0		19.5		" 19		31.6		31.4	
" 28		20.0		19.5		" 26		30.9		31.4	
June 4		20.8		19.5		December 3		30.4		31.4	
" 10		20.0		19.5		" 10		31.4		31.4	
" 17		19.9		19.5		" 17		32.3		31.4	
" 25		20.6		19.5		" 24		33.0		31.4	

TABLE 7

Abrupt changes in the adopted D base-line value
(West declination reckoned as negative; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1953	° ' "	
November 1	-00 11.9	Torsion head adjusted

TABLE 8

Observed and adopted base-line values for H variometer
(Observed values determined with QHMs Nos. 172, 173 & 174)

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1953	Y	Y		1953	Y	Y	
January 1	18080	18080	03h Jan. 3	July 3	18132	18132	
" 8	18130	18126		" 9	18133	18132	
" 15	18126	18126		" 16	18133	18132	
" 22	18127	18126		" 19	18133	18132	
" 29	18128	18126		" 30	18131	18132	06h August 4
February 5	18130	18126		August 6	18447	18451	
" 12	18128	18126		" 13	18452	18451	
" 19	18126	18126		" 20	18453	18451	
" 25	18125	18126		" 27	18452	18451	
March 5	18123	18126		September 3	18451	18451	
" 12	18124	18126		" 10	18452	18451	
" 19	18125	18126		" 17	18448	18451	
" 26	18127	18126		" 24	18446	18451	
April 2	18125	18126		" 26	18447	18451	
" 9	18122	18126		October 1	18452	18451	
" 16	18124	18126		" 8	18450	18451	
" 23	18126	18126		" 15	18452	18451	
" 29	18122	18126	00h May 4	" 22	18450	18451	
May 7	18117	18116		" 29	18452	18451	
" 11	18116	18116		November 5	18452	18451	
" 14	18118	18116		" 12	18453	18451	
" 21	18116	18116		" 19	18452	18451	
" 28	18116	18116		" 26	18453	18451	
June 4	18112	18116	03h June 7	December 3	18451	18451	
" 10	18237	18237	06h June 10	" 10	18451	18451	
" 10	18588	18588	09h June 12	" 17	18449	18451	
" 12	18132	18132		" 24	18450	18451	
" 17	18132	18132					
" 25	18132	18132					

TABLE 9

Abrupt changes in the adopted H base-line values
(Horizontal intensity is reckoned as positive; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1953	Y	
January 3	+ 36	Torsion head adjusted
May 4	- 10	Spontaneous
June 7	+121	Unexplained movement of H magnet
" 10	+351	Torsion head adjusted
" 12	-456	Torsion head adjusted
August 4	+319	H magnet realigned.

TABLE 10

Observed and adopted base-line values for Z variometer
(Observed values determined with BMZ No. 62)
(Values not corrected to I.M.S.)

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1953	Y	Y		1953	Y	Y	
January 1	-47097	-47105		July 16	-47125	-47124	
" 8	47100	47105		" 23	47129	47124	07h July 24
" 15	47107	47105		" 26	47140	47140	
" 22	47100	47105		" 30	47141	47140	
" 29	47104	47105		August 6	47139	47140	00h Aug. 13
February 5	47105	47105		" 13	47134	47132	
" 12	47106	47105		" 20	47131	47132	
" 19	47109	47105		" 27	47132	47132	
" 25	47101	47105		September 3	47132	47132	
March 5	47122 *	47105		" 10	47130	47132	
" 12	47106	47105		" 17	47128	47132	
" 19	47102	47105		" 21	47130	47132	
" 26	47109	47105		" 26	47129	47132	
April 2	47105	47105		October 1	47128	47132	
" 9	47105	47105	03h April 14	" 8	47134	47132	
" 16	47114	47113		" 15	47129	47132	
" 23	47112	47113		" 22	47133	47132	00h Oct. 31
" 29	47109	47113		" 31	47135	47136	
May 7	47114	47113		November 6	47136	47136	
" 14	47111	47113		" 12	47141	47136	
" 21	47111	47113		" 16	47135	47136	
" 28	47111	47113		" 19	47141	47136	
June 4	47114	47113		" 26	47133	47136	00h Dec. 4
" 10	47114	47113		December 4	47127	47127	
" 17	47110	47113		" 10	47129	47127	
" 25	47112	47113	00h July 1	" 17	47126	47127	00h Dec. 18
July 3	47122	47124		" 24	47136	47137	
" 9	47121	47124					

* Not considered in base-line adoptions.

TABLE 11

Abrupt changes in the adopted Z base-line values

(Vertical intensity is reckoned as negative; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1953	γ	
April 14	- 8	Spontaneous
July 1	-11	Spontaneous
" 24	-16	Z variometer fixed mirror adjusted
August 15	+ 8	Spontaneous
October 31	- 4	Spontaneous
December 4	+ 9	Spontaneous
" 18	-10	Spontaneous

TABLE 12

Summary of monthly mean values

Month	D			H			Z		
	°	'	Y	°	'	Y	°	'	Y
1953	All days						Ten least disturbed days		
January	-50	02.1	18478	-47150	-50	01.8	18482	-47151	
February	-50	04.7	18465	-47147	-50	03.2	18478	-47154	
March	-50	06.7	18458	-47149	-50	06.2	18472	-47156	
April	-50	06.8	18469	-47168	-50	06.5	18475	-47171	
May	-50	08.0	18466	-47178	-50	07.2	18477	-47184	
June	-50	07.9	18477	-47186	-50	07.9	18480	-47187	
July	-50	10.0	18470	-47195	-50	09.8	18476	-47194	
August	-50	11.3	18471	-47202	-50	10.7	18482	-47202	
September	-50	13.2	18464	-47208	-50	12.2	18479	-47211	
October	-50	12.9	18471	-47210	-50	12.2	18482	-47214	
November	-50	12.8	18480	-47223	-50	12.7	18485	-47220	
December	-50	12.9	18489	-47230	-50	12.7	18491	-47235	
	Five international quiet days						Five international disturbed days		
January	-50	02.0	18483	-47151	-50	01.9	18470	-47138	
February	-50	03.0	18478	-47153	-50	08.4	18420	-47131	
March	-50	05.0	18476	-47162	-50	06.7	18439	-47129	
April	-50	06.6	18475	-47170	-50	07.8	18448	-47162	
May	-50	07.2	18478	-47182					
June	-50	08.1	18480	-47189	-50	07.7	18472	-47193	
July	-50	09.6	18476	-47195	-50	10.9	18459	-47196	
August	-50	10.5	18481	-47204	-50	12.8	18456	-47207	
September	-50	12.1	18480	-47212	-50	16.2	18432	-47194	
October	-50	11.8	18484	-47214	-50	14.7	18443	-47195	
November	-50	12.6	18487	-47222					
December	-50	12.7	18491	-47237	-50	13.8	18485	-47229	

TABLE 13

Summary of annual mean values

Year	D			H			Z		
	°	'	Y	°	'	Y	°	'	Y
1953									
All days	-50	09.1	18471	-47187					
Ten least disturbed days	-50	08.6	18480	-47190					
Five international quiet days	-50	08.4	18481	-47191					
Five international disturbed days	-50	10.1	18452	-47177					

TABLE 14

Principal magnetic storms

Greenwich Date	Storm time			Sudden commencement			Degree of activity ϕ	Maximal activity on K-scale 0-9	Ranges				
	G.M.T. of beginning			Amplitudes					Gr. day	K-index	D	H	Z
	h	m	h	d	h	h							
1953													
January 5	05	30	07	03	.....	.....	B	4,5,8	5	125	1075	515
January 18	10	00	20	16	.....	.....	C	1	20	39	309	187
January 24	08	00	24	24	.....	.....	C	5,6,7	26	28	207	170
January 25	04	00	31	15	.....	.....	B	6,7	27	94	1154	435
								8	28				
								7	29				
February 22	15	00	28	24	.....	.....	A	7,8	22	123	1308	623
								8	24				
March 1	20	04	04	04	PSC	.....	A	6	2	151	1066	495
March 8	13	20	11	04	.....	.....	A	8	8			
								1,8	9				
March 19	00	00	20	03	.....	.....	B	8	19	145	1191	506
March 20	18	08	29	03	PSC	.....	A	8	24	68	515	291
								8	24	137	1417	488	
April 3	15	00	04	24	.....	.....	B	8	3			
								1,7	4	69	575	259	
April 16	01	00	17	04	.....	.....	A	8	16	66	1004	298
April 18	18	30	24	01	.....	.....	B	1	21	57	505	340
May 4	20	50	10	01	PSC	.....	B	8	6	88	(783)	292
May 14	20	00	21	02	.....	.....	A	7	16	(228)	(1830)	(868)
June 1	17	22	06	22	PSC	.....	B	5,7,8	2	66	701	297
								1,7	3				
June 29	07	30	03	01	.....	.....	B	6,8	29	145	1005	299
								1	30				
July 23	08	09	24	23	SSC	+1	A	8	23	117	1290	511	
July 25	16	32	31	16	PSC	.....	B	7	27	38	365	195
a August 10	07	00	14	06	.....	.....	A	8	24	125	1123	369
August 23	00	24	26	03	SSC	+1	B	7	27	73	659	291	
August 26	13	00	01	03	.....	.....	A	8	15	197	1349	817
September 2	01	00	05	10	.....	.....	B	9	15	281	571	281
b September 15	03	00	18	03	.....	.....	A	8	19	129	1197	484
September 18	15	30	26	00	.....	.....	A	6	15	171	1190	649
October 15	08	45	21	16	SSC	+2	A	7	15	39	452	185	
October 26	18	17	28	03	PSC	.....	B	7	27	90	953	469
c November 12	09	00	21	14	.....	.....	B	7,8	14	88	709	528
November 23	06	00	24	12	.....	.....	B	7	23	121	788	322
December 10	20	50	13	03	.....	.....	B	7	11			

♂ Severe storm classified A. Moderately severe storm classified B. Moderate storm classified C.
 a. Record incomplete on August 11 from 20h to August 12 03h and August 12 from 05h to August 13 03h.
 b. Suspected SSC approximately 02h 59m, commencement obscured during record changing.
 c. Record incomplete on November 13 from 12h to November 14 03h.

TABLE 15

Sudden Commencements

January to December 1953

Date	G.M. Time		Type			Date	G.M. Time		Type		
	h	m				1953	h	m			
1953						1953					
Jan. 8	18	16	Polar	Sudden	Commencement	Aug. 5	18	42	Polar	Sudden	Commencement
" 17	22	09	Polar	Sudden	Commencement	" 23	00	24	Storm	Sudden	Commencement
Feb. 18	17	46	Polar	Sudden	Commencement	Sept. 5	18	48	Polar	Sudden	Commencement
" 20	17	19	Polar	Sudden	Commencement	" 6	20	25	Polar	Sudden	Commencement
March 13	21	27	Polar	Sudden	Commencement	" 15	(03 00)*		Storm	Sudden	Commencement
April 1	17	04	Polar	Sudden	Commencement	" 25	19	03	Polar	Sudden	Commencement
" 10	21	18	Polar	Sudden	Commencement	Oct. 6	18	31	Polar	Sudden	Commencement
" 26	22	09	Polar	Sudden	Commencement	" 15	08	45	Storm	Sudden	Commencement
May 4	20	50	Polar	Sudden	Commencement	" 26	18	17	Polar	Sudden	Commencement
" 19	19	13	Polar	Sudden	Commencement	Nov. 1	18	03	Polar	Sudden	Commencement
" 24	18	58	Polar	Sudden	Commencement	" 7	20	20	Polar	Sudden	Commencement
June 13	17	43	Polar	Sudden	Commencement	" 11	13	10	Sudden	Commencement	
" 21	17	05	Polar	Sudden	Commencement	" 21	18	25	Polar	Sudden	Commencement
" 26	17	57	Polar	Sudden	Commencement	" 27	16	28	Polar	Sudden	Commencement
July 19	19	59	Sudden	Commencement		Dec. 5	17	20	Polar	Sudden	Commencement
" 22	18	11	Polar	Sudden	Commencement	" 13	18	37	Polar	Sudden	Commencement
" 23	08	09	Storm	Sudden	Commencement	" 17	16	01	Polar	Sudden	Commencement
" 25	16	32	Polar	Sudden	Commencement	" 22	19	03	Polar	Sudden	Commencement

* No record due to trace change but possible SSC confirmed by other observatories.

TABLE 28

JANUARY 1953

17800 Plus tabular quantiles expressed in Gammas

G. M. T., used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range			
1	682	695(672)	634	685	707	689	676	667	669	679	697	697	678	688	688	710	684	697	693	688	656	631	647	661	678	678	15 34	731	09 34	639	092	
2	684	703(704)	698	700	(687)	669	672	659	673	696	690	690	678	687	687	710	697	708	686	683	672	644	655	672	690	690	15 05	852	19 37	607	124	
3	659	661	687	704	714	705	687	670	656	648	650	660	671	676	699	711	675	708	683	676	673	664	655	672	672	690	02 46	697	09 46	645	237	
4	672	671	680	704	714	705	682	666	675	689	681	685	682	685	682	682	684	682	682	684	678	682	690	693	679	680	04 43	715	09 46	645	049	
5	702	704	719	721	716	718	682	666	675	682	681	685	682	685	682	684	682	682	682	684	678	682	690	693	679	680	11 18	1251	22 13	645	1072	
6	701	704	708	699	692	686	675	671	670	658	658	650	665	665	665	665	667	667	667	667	667	677	673	662	680	680	15 14	879	20 21	558	321	
7	657	672	690	639	681	671	652	662	663	649	653	649	653	649	649	651	651	651	651	651	651	671	673	685	677	677	13 24	736	00 02	627	109	
8	690	671	625	639	677	670	663	661	655	652	659	649	664	673	670	672	678	682	688	687	680	674	665	640	666	666	18 37	702	02 51	601	101	
9	637	648	692	691	676	659	651	651	651	659	665	670	676	678	674	672	678	684	688	690	690	690	690	692	(686)	671	19 39	704	00 51	614	090	
10	690	699	700	713	715	696	682	675	660	650	651	661	668	676	683	688	690	696	698	698	698	688	689	689	689	685	19 14	731	09 34	639	063	
11	674	697(718)	719	701	691	679	668	659	660	671	678	677	676	684	684	680	683	688	687	688	688	688	688	688	688	688	682	03 11	708	09 01	635	053
12	693	679	700	699	701	689	677	657	655	650	654	663	677	692	684	681	683	687	691	682	692	684	685	685	685	687	05 11	751	20 34	597	154	
13	705	712	724	734	734	710	716	704	685	674	680	663	685	689	684	683	693	699	695	687	682	681	686	689	679	679	18 09	710	02 04	628	082	
14	681	646	654	681	688	678	672	676	671	680	677	674	664	671	679	683	693	699	695	687	682	681	686	689	687	687	03 33	726	02 04	659	067	
15	702	714	719	722	712	699	679	675	665	663	664	674	678	680	674	678	681	684	681	684	689	692	686	685	685	687	03 33	726	02 04	659	067	
16	693	701	706	714	700	691	679	668	659	660	671	678	677	676	684	680	683	688	687	688	688	688	688	688	688	684	03 11	708	09 01	635	053	
17	695	707	721	719	707	696	681	676	667	663	663	663	670	676	678	681	683	687	691	682	692	684	685	685	685	684	02 12	725	22 47	612	113	
18	692	707	708	700	705	693	688	679	674	668	670	674	689	747	690	679	706	692	682	692	679	684	687	697	674	14 27	793	12 23	648	140		
19	709	702	680	638	630	604	631	635	678	666	689	700	689	700	774	689	700	692	671	706	682	666	668	600	672	14 27	793	23 31	565	228		
20	584	644	672	681	682	686	680	677	657	673	658	677	671	677	675	675	679	681	684	683	683	683	683	683	683	681	19 54	725	00 37	485	240	
21	687	689	698	707	703	689	680	662	659	656	665	672	694	677	674	680	682	686	696	686	685	688	689	689	689	681	22 34	712	12 04	639	073	
22	693	691	698	689	689	688	680	666	661	651	650	652	655	668	681	682	683	685	686	688	688	688	688	688	688	679	02 32	703	10 47	640	057	
23	648	645	693	713	714	707	704	689	668	664	661	667	671	673	676	683	686	684	684	688	688	688	688	688	688	682	04 02	721	01 15	614	107	
24	697	703	707	704	701	699	704	689	668	664	661	667	642	672	689	753	710	707	717	704	708	690	698	687	692	15 56	797	19 47	441	206		
25	691	693	700	702	698	687	680	678	660	651	688	739	674	661	684	744	734	690	671	577	591	646	655	551	622	14 03	1131	19 33	429	356		
26	503	624	520	550	679	685	675	668	666	666	678	718	803	824	810	777	723	661	590	319	416	464	490	498	622	15 03	1181	18 49	479	1102		
27	605	645	592	680	688	691	676	671	678	673	677	726	803	824	810	777	723	661	638	611	668	672	682	670	691	15 08	825	22 26	438	702		
28	682	695	663	683	681	660	668	657	668	661	661	668	684	679	700	749	731	702	653	624	646	680	648	660	659	16 08	890	18 47	312	687		
29	622	482	614	667	662	664	661	662	662	661	665	668	661	665	671	756	707	730	590	538	685	680	680	666	664	15 20	890	18 47	312	578		
30	634	636	632	654	667	680	663	665	647	652	674	682	679	680	697	725	773	710	679	690	670	684	684	681	676	16 19	917	00 01	587	330		
31	598	626	649	670	662	684	687	663	650	649	664	667	679	693	679	677	681	680	686	688	680	680	680	680	681	669	13 04	730	00 34	574	156	

a Means of 9 values

c Means of 4 values

* Ten least disturbed days
 / Five international quiet days
 # Five international disturbed days
 () Approximate

DESIGNATIONS

DECEMBER 1953

49° 30' West plus tabular quantities expressed in tenths of minutes of arc

G. M. T. used

TABLE 27
HOURLY VALUES OF DECLINATION

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range	
1	449	466	474	475	470	463	452	439	426	419	413	414	412	411	413	413	412	412	413	413	418	418	412	403	413	429	02 25	4 84	22 13	3 88
2	436	449	464	483	477	447	423	413	395	391	392	398	400	400	407	409	406	412	412	416	418	418	426	424	430	429	04 04	5 01	08 48	3 84
3	474	485	476	466	454	431	422	412	402	403	403	386	391	404	390	390	403	411	394	407	422	422	421	416	384	424	04 32	4 70	11 11	3 81
4	409	443	453	465	465	444	433	420	422	421	415	415	422	420	391	402	402	407	464	439	422	424	429	430	430	430	05 00	5 33	18 06	3 55
5	400	464	469	472	459	439	423	420	395	393	392	384	378	383	402	421	421	415	439	421	417	416	422	435	452	421	03 35	4 77	13 20	3 68
6	461	463	454	454	458	463	454	442	412	423	401	407	403	401	407	411	413	416	416	416	422	421	416	392	412	424	03 36	4 95	22 31	3 77
7	448	467	477	485	467	440	435	412	394	385	391	393	402	414	417	418	415	420	420	422	422	421	416	433	391	425	02 05	5 06	10 08	3 67
8	458	464	474	464	457	441	432	420	418	412	404	411	415	419	422	429	430	456	443	449	467	447	447	430	446	425	03 36	4 95	23 43	3 67
9	476	487	485	481	464	452	440	425	412	403	412	422	422	418	415	429	418	409	408	408	409	406	397	439	430	425	01 42	4 95	13 19	3 88
10	521	495	504	519	484	463	434	402	376	328	331	334	276	159	308	412	394	463	475	496	914	753	618	584	458	458	00 35	1 262	12 25	0 54
11	469	491	505	486	476	450	434	428	419	409	397	368	386	401	393	413	422	424	417	480	458	453	467	496	444	444	00 14	5 42	11 53	3 65
12	467	481	485	494	483	470	456	436	432	412	396	380	379	383	412	419	420	419	425	459	488	445	429	440	440	440	01 19	5 68	11 02	3 65
13	450	463	480	485	468	451	439	427	417	406	412	412	414	423	424	425	430	441	425	454	442	441	443	432	432	438	03 21	5 04	09 30	3 99
14	479	490	484	476	471	459	445	427	408	395	410	402	414	412	417	415	413	443	447	422	423	423	425	444	459	444	02 00	5 24	11 30	3 77
15	479	468	477	486	480	458	447	429	403	395	410	402	414	412	417	415	413	443	447	422	423	423	425	444	459	444	01 50	4 89	10 01	3 91
16	465	464	464	466	468	458	441	413	393	374	367	374	380	390	394	408	412	410	408	412	422	421	426	413	434	421	00 43	4 74	10 49	3 60
17	456	458	457	450	449	445	432	404	397	386	384	369	393	388	406	403	395	429	429	459	450	421	421	449	448	423	19 58	4 95	10 35	3 78
18	443	458	457	450	449	445	435	409	399	386	384	369	393	388	406	403	395	429	429	459	450	421	421	449	448	423	02 24	4 67	11 16	3 78
19	440	447	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
20	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	02 24	4 67	11 16	3 78
21	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
22	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
23	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
24	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
25	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
26	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
27	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
28	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
29	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
30	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78
31	440	457	450	446	463	455	442	422	411	402	386	383	385	390	403	412	414	414	412	414	421	421	425	437	422	420	19 22	4 67	11 16	3 78

DESIGNATIONS
 # Ten least disturbed days
 / Five intermational quiet days
 * Five intermational disturbed days
 () Approximate

TABLE 26

NOVEMBER 1953

19°30' West plus tabular quantities expressed in tenths of minutes of arc

G.M.T. used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range			
1	438	440	441	442	441	432	422	410	407	412(415)	421	420	412	413	412	414	414	414	413	417	418	414	413	422	437	427	20 01	457	18 06	383	074	
2	448	456	466	474	473(459)	425	405	410	396	403	406	409	417	416	416	415	414	427	422	418	412	414	413	421	427	427	03 39	485	09 38	394	091	
3	444	449	451	458	460	447	437	416	394	401	412	412	418	418	418	418	420	418	418	418	418	420	412	412	403	420	04 36	471	14 06	386	085	
4	423	453(473)	468	478	451	449	441	425	413	414	413	412	418	416	417	420	418	422	418	421	422	418	420	412	403	432	05 47	478	12 23	404	074	
5	486	495	475	453	447	446	440	383	365	340	289	251	196	223	224	273	358(407)	391	402	402	415	409	412	418	422	422	429	20 23	495	09 30	374	112
6	466	476	466	468	465	446	432	420	390	402	399	390	402	422	422	418	425	417	412	411	411	412	412	412	411	429	01 11	485	11 27	373	112	
7	441	455	453	467	455	422	437	426	392	393	391	402	404	401	401	418	425	417	412	409	411	412	412	412	411	429	02 13	489	08 42	391	097	
8	448	458	454	451	456	444	445	433	392	393	391	402	404	401	401	418	425	417	412	409	411	412	412	412	411	429	02 13	489	08 42	391	097	
9	460	477	478	477	456	446	422	410	398	402	410	419	421	421	417	421	419	417	417	425	422	418	428	422	422	427	04 25	469	20 01	404	065	
10	433	448	454	462	465	458	443	423	377	396	396	404	404	419	420	414	414	414	413	412	415	411	412	415	422	426	04 25	469	20 01	404	065	
11	456	451	465	469	466	456	438	422	377	362	339	382	382	347	252	367	343	343	413	418	427	428	618	539	431	452	20 29	585	13 31	210	475	
12	464	515	474	416	445	450	450	422	382	376	333	382	376	212	352	413	427	416	418	476	664	690	508	399	453	433	20 03	838	12 41	(-63)	904	
13	468	479	478	483	487	431	416	398	373	311	251	227	235	227	235	368	360	438	435	439	470	482	473	472	464	409	18 28	600	13 05	067	533	
14	486	505	555	524	438	453	447	432	385	408	418	406	434	428	428	458	458	458	453	467	453	443	533	476	464	409	03 09	652	18 22	358	294	
15	466	493	496	474	458	455	424	431	417	403	368	374	415	424	424	424	434	399	476	481	437	440	430	431	440	426	17 42	504	10 34	341	246	
16	457	472	482	464	440	408	426	421	412	353	413	404	412	416	416	460	464	464	460	465	483	518	474	466	467	426	20 00	692	13 50	083	609	
17	457	441	487	512	441	435	424	400	375	362	353	304	(287	365)	365	365	365	365	365	365	365	365	365	365	365	426	20 00	692	13 50	083	609	
18	457	441	487	512	441	435	424	400	375	362	353	304	(287	365)	365	365	365	365	365	365	365	365	365	365	365	426	20 00	692	13 50	083	609	
19	461	482	492	468	466	461	448	423	382	386	393	405	423	432	419	419	419	419	419	419	419	419	419	419	419	426	20 52	781	09 13	314	467	
20	505	485	484	484	484	469	438	422	382	347	348	362	419	422	422	422	422	422	422	422	422	422	422	422	422	426	20 52	781	09 13	314	467	
21	458	478	475	477	477	463	440	412	384	393	397	405	430	442	422	422	422	422	422	422	422	422	422	422	422	426	04 23	486	11 03	304	215	
22	458	478	475	477	477	463	440	412	384	393	397	405	430	442	422	422	422	422	422	422	422	422	422	422	422	426	04 23	486	11 03	304	215	
23	432	458	467	468	472	453	444	418	335	305	284	334	374	403	403	404	404	394	474	754	756	753	647	615	427	20 17	806	10 07	393	413		
24	497	487	494	468	472	453	444	418	335	305	284	334	374	403	403	404	404	394	474	754	756	753	647	615	427	20 17	806	10 07	393	413		
25	439	453	469	468	472	453	444	418	335	305	284	334	374	403	403	404	404	394	474	754	756	753	647	615	427	20 17	806	10 07	393	413		
26	457	473	477	460	463	449	426	403	398	402	404	407	413	417	418	421	423	417	413	413	413	413	413	413	413	423	01 50	505	11 20	389	147	
27	438	443	448	442	447	435	422	421	407	391	401	408	411	411	412	413	413	413	413	413	413	413	413	413	413	423	16 41	516	22 50	381	135	
28	429	444	450	445	453	446	422	406	400	399	402	412	413	413	413	413	413	413	413	413	413	413	413	413	413	423	03 41	470	21 32	385	135	
29	457	473	468	452	444	448	422	406	400	399	402	412	413	413	413	413	413	413	413	413	413	413	413	413	413	423	01 46	486	06 00	403	085	
30	432	440	453	456	449	438	423	412	412	412	408	405	413	413	413	416	417	412	412	413	435	444	429	428	440	126	(02 53)	465	13 08	400	065	

Insufficient data

DESIGNATIONS
 * Ten least disturbed days
 † Five international quiet days
 ‡ Five international disturbed days
 () Approximate

SEPTEMBER 1953

19°10' West plus tabular quantities expressed in tenths of minutes of arc

G.M.T. used

TABLE 21

HOURLY VALUES OF DECLINATION

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range		
1	629	624	623	620	625	629	631	626	614	622	592	565	620	596	595	634	616	633	603	637	642	621	618	620	618	618	12 35	688	17 47	546	142
2	630	669	607	615	630	637	639	621	605	613	592	596	601	600	588	644	616	633	603	637	642	621	618	620	618	618	12 35	745	17 46	491	254
3	615	613	611	617	631	641	623	623	621	602	588	575	580	575	583	578	607	562	536	689	691	636	662	631	679	679	15 15	745	18 21	491	254
4	615	613	611	617	631	641	623	623	621	602	588	575	580	575	583	578	607	562	536	689	691	636	662	631	679	679	15 15	745	18 21	491	254
5	620	617	617	621	620	627	652	610	602	603	596	601	606	603	604	608	617	621	654	649	622	607	645	626	608	608	00 01	2628	01 20	369	1385
6	607	610	617	622	628	626	603	606	586	576	560	575	576	605	620	627	631	631	641	646	597	633	629	596	616	616	06 41	723	20 37	520	2259
7	576	586	625	648	641	641	642	633	615	603	607	602	588	605	604	611	601	680	641	639	631	612	612	617	613	619	17 09	816	10 16	545	203
8	606	628	645	623	625	626	618	623	616	608	601	603	609	613	614	613	613	617	627	617	616	607	607	607	613	615	02 36	650	23 48	539	177
9	591	600	605	600	598	603	613	605	597	602	605	603	603	616	608	604	621	636	634	648	679	735	693	626	626	01 06	872	23 35	578	225	
10	746	717	639	632	620	607	607	613	609	603	595	601	600	606	605	617	619	622	625	655	647	625	613	591	612	612	23 33	703	23 35	535	294
11	586	586	609	616	621	618	617	620	597	606	601	579	595	601	610	615	617	622	619	635	640	642	604	648	619	619	20 53	651	21 24	551	168
12	600	616	625	617	623	627	635	628	619	615	611	609	609	620	622	621	622	622	622	622	622	622	622	612	612	618	06 30	643	14 16	602	100
13	607	616	616	620	626	636	638	638	632	620	608	606	610	610	613	617	617	617	617	620	618	620	618	620	618	618	06 30	643	14 16	602	100
14	608	610	609	614	615	619	622	618	607	596	584	580	604	605	605	708	614	620	613	620	618	620	618	620	618	618	18 40	1488	11 16	554	934
15	620	617	632	641	652	652	654	642	627	607	593	589	598	610	610	604	593	629	669	1660	680	657	653	622	618	618	17 53	808	17 29	562	934
16	614	621	645	617	634	633	628	613	609	613	599	590	592	602	632	613	626	642	651	597	613	631	604	607	646	646	22 54	1416	24 00	457	245
17	611	605	622	630	641	635	654	631	613	598	596	599	607	611	611	606	605	603	607	695	663	746	663	638	638	638	22 39	1106	14 03	011	959
18	597	882	890	832	650	672	679	593	576	632	625	584	558	452	534	494	440	607	607	741	597	682	690	727	635	635	01 10	907	15 20	296	1095
19	801	810	800	713	668	631	621	640	620	632	625	584	558	452	534	494	440	607	607	741	597	682	690	727	635	635	01 10	907	15 20	296	1095
20	801	810	800	713	668	631	621	640	620	632	625	584	558	452	534	494	440	607	607	741	597	682	690	727	635	635	01 10	907	15 20	296	1095
21	714	652	677	678	641	635	654	671	638	607	595	576	573	604	609	653	630	675	653	625	701	624	634	620	639	639	02 01	851	12 16	529	322
22	629	719	750	649	598	604	608	623	593	596	593	611	626	629	637	613	640	648	597	633	741	633	638	652	637	637	02 01	1034	18 35	508	526
23	627	657	652	669	678	612	663	577	603	584	522	562	585	538	637	613	648	1662	753	789	817	722	706	743	648	648	18 04	1031	14 00	388	643
24	679	690	663	652	659	670	667	638	610	576	549	520	527	527	594	638	648	695	728	659	596	672	656	640	631	631	18 03	785	13 46	358	427
25	637	631	629	639	650	655	657	648	640	632	608	595	589	606	653	634	631	621	654	617	713	652	633	628	636	636	20 27	745	19 20	546	199
26	623	630	637	640	648	665	651	648	635	624	621	614	597	573	647	624	624	626	624	619	656	641	637	629	642	642	21 13	736	13 38	608	128
27	651	693	700	577	624	661	624	613	617	597	596	553	555	573	647	624	624	626	624	619	656	641	637	629	642	642	21 13	736	13 38	608	128
28	640	637	650	672	665	640	622	631	617	609	615	609	609	611	613	614	613	618	648	643	618	616	616	610	610	610	18 21	649	16 51	596	093
29	629	638	646	640	632	637	631	620	609	609	605	605	603	597	599	603	613	614	616	616	616	616	610	610	610	610	02 21	649	16 51	596	093
30	629	640	641	659	659	657	649	632	610	602	604	596	598	598	601	601	592	586	613	664	630	644	642	627	624	624	19 08	678	17 49	570	108

DESTINATIONS
 * Ten least disturbed days
 † Five international quiet days
 ‡ Five international disturbed days
 () Approximate

JULY 1953

49°30' West plus tabular quantities expressed in tenths of minutes of arc

G.M.T. used

TABLE 22

HOURLY VALUES OF DECLINATION

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range	
1	446	399	430	443	395	399	390	391	376	365	346	352	378	408	410	422	430	427	420	408	418	360	406	396	398	02 53	466	10 17	261	205
2	440	416	475	396	406	381	385	325	357	376	392	380	387	405	388	391	390	381	426	431	377	397	295	373	389	02 52	571	22 08	231	340
3	396	415	410	398	400	403	389	385	372	381	377	366	382	386	379	382	370	409	419	369	344	382	398	401	388	01 59	428	19 56	260	168
4	375	363	399	411	387	379	375	388	388	388	370	392	401	384	380	392	394	404	383	418	411	402	389	395	390	12 00	447	06 41	330	117
5	401	415	404	402	403	395	377	321	336	349	376	378	382	382	383	394	400	409	419	407	392	399	424	397	389	22 20	438	07 29	303	135
6	438	451	405	397	395	395	283	339	385	386	392	397	397	395	396	386	392	387	401	401	401	390	395	401	406	18 54	607	22 54	296	311
7	417	410	395	(346)	293	314	283	339	385	386	392	397	397	395	396	386	392	387	401	401	401	390	395	401	406	20 34	546	06 24	315	207
8	365	393	401	402	400	378	369	376	386	377	369	393	390	395	401	403	395	401	403	413	409	448	425	423	405	19 35	643	01 55	367	276
9	406	386	376	393	397	395	386	385	376	378	386	386	392	394	397	399	402	399	405	512	441	458	473	448	400	00 00	449	02 18	367	082
10	(420)	392	377	411	413	402	397	392	386	388	394	398	402	401	403	403	410	410	404	398	386	395	396	396	392	00 00	478	04 56	377	041
11	396	397	402	(393)	369	390	380	389	389	390	394	388	391	389	391	394	394	394	396	402	429	396	385	379	392	18 15	500	20 45	262	238
12	(383)	389	386	386	383	383	380	386	395	394	391	388	389	389	394	396	402	429	428	414	348	367	426	412	397	16 26	488	21 07	314	174
13	(405)	411	401	395	405	379	400	398	390	381	384	381	379	386	387	393	397	390	420	410	412	376	413	403	391	21 30	408	11 36	376	032
14	(387)	393	385	395	405	402	400	398	390	381	384	381	374	387	395	379	402	394	425	413	413	405	399	397	392	18 37	584	05 32	348	236
15	388	371	383	392	388	386	379	(374)	378	379	378	385	374	387	395	379	402	394	425	413	413	405	399	397	392	17 16	584	05 32	348	236
16	397	396	405	412	410	405	404	399	392	387	387	394	385	387	394	402	405	406	413	412	406	392	395	390	396	19 02	424	09 50	357	067
17	404	403	406	412	410	405	403	397	394	386	384	386	388	388	393	399	398	398	397	395	392	389	394	385	396	02 47	412	23 59	372	040
18	393	391	398	410	415	409	405	404	400	394	394	390	394	394	398	400	405	405	409	409	398	397	397	398	398	01 25	428	01 58	346	082
19	386	365	360	376	380	386	382	383	388	390	384	386	387	387	395	396	400	404	409	406	405	407	397	392	398	05 13	423	22 28	366	054
20	407	404	395	407	411	415	406	404	397	386	373	376	381	380	404	415	415	414	413	411	407	407	384	408	398	05 13	423	22 28	366	097
21	387	382	395	407	411	415	406	404	397	386	373	376	381	380	404	415	415	414	413	411	407	386	420	431	403	18 14	453	21 40	330	122
22	406	399	398	(401)	400	402	404	408	405	399	384	384	388	381	397	404	409	409	419	409	409	386	420	431	403	23 00	479	14 33	397	166
23	461	465	408	442	361	362	397	390	388	373	301	312	357	352	243	347	343	486	479	577	679	(708)	714	786	444	23 00	1263	11 54	349	123
24	531	407	408	415	415	409	(409)	410	409	397	393	376	381	403	405	406	423	465	440	434	420	407	401	398	444	17 06	501	19 21	310	191
25	399	398	398	397	403	407	401	403	399	397	394	397	397	398	399	399	398	399	399	402	440	413	400	406	406	20 41	525	14 47	325	200
26	440	438	440	437	428	411	391	367	376	363	357	370	366	360	363	382	382	404	421	400	459	460	430	464	405	20 41	525	14 47	325	200
27	433	416	430	(456)	356	369	383	350	383	305	366	345	391	394	389	486	404	433	392	382	421	428	301	422	406	19 06	557	22 25	236	376
28	436	444	428	413	399	407	405	407	420	396	366	369	397	394	389	401	401	419	452	474	358	428	301	422	406	15 06	557	22 25	236	381
29	437	468	428	457	417	398	405	403	420	387	385	382	397	394	368	469	440	426	473	462	374	409	417	417	418	15 14	539	20 25	239	381
30	431	387	405	421	422	407	399	399	394	406	394	381	406	394	381	406	366	400	469	463	440	451	451	358	415	18 19	563	23 49	357	226
31	394	433	449	(403)	404	403	403	419	417	379	405	383	390	400	420	406	413	417	429	443	415	425	406	398	409	18 56	471	00 00	341	126

DESIGNATIONS
 * Ten least disturbed days
 † Five international quiet days
 ‡ Five international disturbed days
 () Approximate

TABLE 21

HOURLY VALUES OF DECLINATION

JUNE 1953

49°30' West plus tabular quantities expressed in tenths of minutes of arc

G.M.T. used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range	
1	396	397	374	272	372	376	374	369	358	366	370	373	374	376	377	383	383	394	396	395	400	386	386	376	380	18 01	441	18 46	321	120
2	378	371	374	422	364	365	349	330	326	320	305	240	281	240	147	318	314	367	385	382	501	414	481	510	348	20 41	697	14 21	36	661
3	526	431	414	422	420	375	365	366	343	355	369	377	366	349	397	378	393	405	467	438	403	379	396	414	399	00 34	631	07 55	257	374
4	407	431	376	380	443	375	355	377	370	357	367	361	366	370	374	388	397	357	401	403	381	403	394	394	381	01 53	536	17 35	297	239
5	385	396	391	394	368	395	364	396	382	380	386	376	376	376	377	386	386	414	401	314	374	386	391	394	374	17 15	500	20 00	148	352
6	386	387	359	371	367	365	368	352	359	368	365	378	378	371	377	376	385	389	393	387	382	380	372	380	377	18 36	397	09 27	324	107
7	388	377	381	376	376	377	378	378	377	366	365	367	358	365	376	380	385	376	386	385	387	379	379	381	376	00 29	394	10 52	352	063
8	382	391	390	385	389	382	376	376	369	357	357	367	372	379	379	378	388	390	381	384	365	376	379	381	378	01 29	394	10 52	352	042
9	381	380	378	371	378	366	366	364	369	(349)	358	365	372	379	379	385	389	390	396	387	365	376	378	381	378	01 29	394	10 52	352	042
10	395	384	372	357	357	359	364	364	364	364	364	364	364	364	364	364	364	364	364	364	364	364	364	364	364	00 59	102	01 22	224	878
11	397	402	346	359	365	388	368	373	365	363	377	376	376	376	376	384	384	396	402	402	414	395	380	339	387	18 24	615	23 30	309	306
12	360	366	369	(376)	392	388	375	378	378	365	371	375	376	376	376	386	393	397	404	402	387	386	353	365	380	18 13	468	22 50	352	136
13	384	381	378	383	383	386	387	387	382	376	376	375	377	376	383	386	386	386	382	381	387	376	374	365	378	18 00	437	09 34	360	045
14	378	378	378	380	383	379	376	374	369	365	370	367	366	370	376	380	387	376	415	388	387	382	381	376	378	16 54	440	22 52	338	077
15	373	377	370	372	375	377	376	376	372	366	359	358	363	359	376	376	376	376	401	401	390	397	400	352	379	16 12	406	21 13	336	112
16	378	377	370	372	375	377	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
17	378	366	375	372	378	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
18	378	366	375	372	378	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
19	380	378	380	372	376	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
20	376	369	376	378	376	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
21	376	369	376	378	376	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
22	385	395	384	(386)	386	386	373	365	370	371	377	360	382	382	381	382	386	386	393	389	388	402	402	377	388	18 15	448	22 09	370	179
23	385	395	384	(386)	386	386	373	365	370	371	377	360	382	382	381	382	386	386	393	389	388	402	402	377	388	18 15	448	22 09	370	179
24	376	379	376	376	376	376	376	376	372	366	359	358	363	359	376	376	376	376	397	382	382	386	380	381	379	05 53	387	08 40	361	026
25	358	353	352	350	355	354	360	365	365	370	375	371	377	376	376	382	382	382	388	388	388	388	388	388	388	20 05	403	18 21	312	082
26	379	378	379	379	380	386	389	389	386	386	384	378	378	378	383	386	386	386	386	386	386	386	386	386	386	20 05	403	18 21	312	082
27	379	378	379	379	380	386	389	389	386	386	384	378	378	378	383	386	386	386	386	386	386	386	386	386	386	20 05	403	18 21	312	082
28	385	384	379	(380)	384	377	371	372	367	372	367	372	372	372	372	382	382	382	388	388	388	388	388	388	388	17 51	395	23 49	342	053
29	367	370	376	374	371	373	375	375	362	367	369	373	380	382	382	381	381	381	381	381	381	381	381	381	381	17 20	395	23 49	342	053
30	(588)	368	449	456	409	398	401	373	376	395	378	373	376	376	376	386	386	386	396	397	402	364	394	408	405	00 59	102	01 22	224	878

a Means of 9 values

c Means of 4 values

DESIGNATIONS
 # Ten least disturbed days
 / five International quiet days
 * five International disturbed days
 () Approximate

TABLE 30

HOURLY VALUES OF HORIZONTAL INTENSITY

17700 plus tabular quantities expressed in gammas

G. M. T. used

MARCH 1953

Day	Hour																								Mean	Maximum		Minimum		Range			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24	h	m	h		m	h	m
1	753	760	774	783	783	770	760	759	760	739	746	752	761	768	773	781	781	780	780	783	800	766	767	716	766	32	834	23	52	694	140		
2	650	690	701	654	689	727	717	752	759	855	952	(999)	985	991	008	012	689	(855)	847	742	839	844	832	781	814	48	1468	16	20	402	1066		
3	786	797	(764)	760	759	768	781	755	747	758	762	773	771	775	777	777	786	800	781	788	783	772	785	785	779	02	27	02	25	623	211		
4	723	730	(676)	786	796	789	781	772	764	782	759	768	767	774	775	784	783	784	791	787	781	736	792	789	779	04	45	02	23	44	206		
5	787	791	791	790	800	795	781	771	765	758	759	764	771	778	778	782	778	784	783	792	790	792	759	(695)	776	19	34	02	23	44	206		
6	789	790	792	798	795	789	781	771	765	758	758	764	771	778	778	782	778	784	783	792	790	792	759	(695)	776	19	34	02	23	44	206		
7	(1418)	701	(780)	782	792	788	781	771	765	753	753	757	768	773	771	770	777	790	771	764	776	795	781	777	752	04	12	00	13	239	562		
8	775	773	(770)	777	772	773	760	756	753	763	768	798	796	782	785	787	779	779	782	787	788	785	778	770	688	16	23	00	13	239	562		
9	370	608	(713)	777	772	773	776	782	785	787	779	774	770	774	778	777	779	779	782	786	784	787	781	777	688	16	23	00	13	239	562		
10	576	627	(722)	776	782	785	780	774	765	762	763	762	771	774	778	781	781	781	785	791	792	791	792	790	683	18	00	01	30	232	600		
11	762	745	(786)	796	792	786	782	771	760	759	763	771	777	780	780	782	787	798	789	801	754	753	790	781	746	18	09	00	29	498	300		
12	787	788	791	796	796	789	780	771	760	759	763	771	777	780	780	782	787	798	789	801	754	753	790	781	746	18	09	00	29	498	300		
13	771	782	796	793	787	778	776	773	772	770	771	774	776	773	770	778	783	793	781	783	781	779	776	770	761	03	45	01	09	727	070		
14	779	800	801	804	798	787	762	754	767	755	762	779	782	770	771	778	783	793	781	783	781	787	784	783	777	03	45	01	09	727	070		
15	771	780	793	(790)	780	772	763	757	753	754	764	773	770	776	780	780	782	783	791	784	791	775	771	766	781	03	00	09	40	729	078		
16	772	784	790	792	789	775	755	741	749	753	761	774	779	782	781	781	782	781	784	791	784	790	796	797	805	781	21	08	813	719	113		
17	786	788	793	795	792	786	774	763	757	757	761	763	772	773	775	780	784	783	784	790	796	797	794	795	775	18	25	08	807	749	064		
18	779	741	(758)	771	788	782	781	771	755	749	754	764	752	760	788	806	829	814	803	767	719	687	527	549	751	20	58	804	09	05	752	052	
19	668	692	767	796	798	783	773	760	750	751	757	771	779	779	780	781	804	788	800	730	645	553	660	754	745	16	52	889	22	40	374	515	
20	780	769	(608)	684	760	746	756	750	742	770	778	761	765	771	778	791	795	801	788	779	751	595	757	788	732	16	08	831	19	53	216	615	
21	646	636	669	775	776	750	760	764	763	755	761	760	765	771	778	791	795	801	788	779	751	595	757	788	749	17	10	813	21	12	419	392	
22	781	772	(740)	685	706	765	730	752	745	750	748	779	767	781	799	897	816	801	751	707	708	(582)	760	518	692	18	37	1031	(21	29)	-386	407	
23	777	780	777	760	744	768	746	699	739	759	791	790	787	806	821	806	814	782	806	791	751	600	712	677	737	17	31	924	18	05	390	534	
24	695	(572)	683	748	761	752	741	710	763	787	799	790	787	806	824	806	814	782	806	791	751	600	712	677	737	17	31	924	18	05	390	534	
25	729	736	(792)	763	734	768	749	719	732	755	775	801	786	779	780	795	790	781	781	804	781	701	755	757	756	12	40	827	21	02	513	314	
26	755	707	697	688	772	780	735	740	745	736	764	767	763	770	784	792	802	810	773	722	643	745	754	711	766	19	43	834	20	13	558	294	
27	629	684	776	(792)	788	771	762	767	763	761	762	771	776	781	781	785	779	773	779	773	779	774	662	770	710	749	16	39	852	20	13	558	294
28	781	798	788	787	772	760	772	768	756	756	764	771	776	768	771	775	779	807	775	778	753	761	780	786	775	18	11	898	18	39	608	290	
29	784	788	792	798	791	780	777	763	758	755	760	772	772	773	774	775	777	777	774	772	729	698	685	719	764	03	04	812	22	29	657	155	
30	784	788	792	798	791	780	777	763	758	755	760	772	772	773	774	775	777	777	774	772	729	698	685	719	764	03	04	812	22	29	657	155	
31	784	788	792	798	791	780	777	763	758	755	760	772	772	773	774	775	777	777	774	772	729	698	685	719	764	03	04	812	22	29	657	155	
Mean	711	727	756	767	773	773	766	759	755	761	769	779	784	784	790	799	792	791	769	756	728	692	702	712	758	758	DESIGNATIONS	†	Ten	days	least	disturbed	
Mean	743	752	770	792	793	786	777	767	761	759	761	768	773	776	778	780	782	783	785	781	768	751	762	768	772	772	†	Five	international	quiet	days		
Mean	737	746	776	791	790	784	776	766	761	760	763	768	775	777	779	781	782	782	785	787	790	790	788	787	776	776	†	Five	international	disturbed	days		
Mean	648	670	718	700	729	756	747	740	741	778	809	833	836	829	847	867	799	796	713	726	658	556	582	641	739	739	()	Approximate					

TABLE 32

HOURLY VALUES OF HORIZONTAL INTENSITY

17800 plus tabular quantities expressed in gammas

G. M. T. used

MAY 1953

Day	24 Mean																								Maximum	Minimum		Range		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24	h		m	h	m
1 *	680	679	680	681	676	670	660	657	658	661	667	674	677	680	681	678	682	682	682	681	681	681	680	681	681	687	07	42	653	034
2 **	680	671	671	682	688	684	675	670	664	667	671	670	672	680	681	682	681	682	681	680	680	673	680	676	674	680	08	37	662	029
3 **	681	683	688	693	692	690	682	680	676	670	667	671	674	677	680	678	683	681	682	681	681	681	685	677	675	680	08	32	666	036
4 **	667	671	672	(680)	(682)	682	680	676	670	664	660	(667)	674	681	682	683	681	682	681	681	681	685	689	676	677	704	09	30	658	046
5	674	681	690	(654)	669	671	661	650	644	660	(667)	674	681	682	683	680	683	680	685	723	672	685	641	615	668	19	13	658	220	
6	619	609	639	672	672	651	672	672	671	673	672	704	724	720	682	694	705	699	691	648	(648)	678	641	634	567	641	21	05	629	780
7	653	601	622	(663)	650	639	631	650	632	657	652	653	668	683	679	704	685	682	703	669	669	673	613	605	662	15	31	636	184	
8	649	663	677	685	675	655	640	637	635	646	661	672	680	683	702	714	681	693	679	672	655	680	672	679	662	14	57	648	229	
9	666	672	678	(680)	(676)	(675)	670	671	663	654	672	674	677	680	682	682	682	681	680	682	682	681	681	681	681	672	17	28	639	079
10	680	674	674	677	678	672	671	670	666	666	671	674	680	682	682	682	682	681	680	680	680	680	681	681	681	676	19	40	648	045
11	681	682	685	688	685	683	676	672	666	663	669	671	681	681	682	681	681	681	682	682	682	682	681	681	681	678	21	14	662	079
12 **	682	683	685	688	689	683	676	672	666	663	669	671	681	681	682	682	682	681	680	680	680	680	681	681	681	679	03	32	666	026
13 **	682	682	683	(682)	673	686	673	666	666	670	672	681	679	707	834	(883)	682	682	682	682	681	681	681	681	681	679	03	32	663	028
14 **	(133)	257	449	552	677	682	610	662	681	669	715	870	(939)	986	845	(899)	889	904	742	526	(468)	076	258	204	639	15	10	662	252	
15	524	648	671	681	665	620	653	654	663	670	672	675	675	672	667	667	668	673	671	672	681	630	592	577	541	606	04	29	662	1830
16	502	550	652	664	680	682	641	654	664	666	663	674	672	665	670	672	671	673	682	679	644	550	597	590	647	03	37	685	961	
17	395	550	665	671	669	696	650	619	647	667	702	691	675	672	681	682	675	673	673	681	653	329	346	368	638	10	48	761	190	
18	670	666	662	664	680	682	671	662	645	646	665	679	680	681	679	676	673	672	712	681	636	632	643	639	663	19	04	758	371	
19	653	666	672	(650)	640	661	657	660	662	664	671	672	680	681	679	671	701	674	682	655	640	622	662	664	668	16	45	714	216	
20	678	676	677	681	680	677	671	663	653	649	647	671	679	673	674	678	675	674	687	680	678	674	673	679	663	19	35	745	103	
21	678	676	680	685	686	687	667	674	668	669	676	682	681	681	683	682	677	671	670	681	676	673	675	677	671	18	26	693	178	
22	676	676	680	688	687	682	667	674	678	667	674	678	676	673	675	675	679	692	681	681	681	680	678	674	674	676	19	11	712	057
23	676	676	680	688	687	682	667	674	678	667	674	677	681	681	683	681	681	681	681	681	681	680	678	674	674	676	12	46	712	049
24 *	688	692	682	(666)	643	644	617	616	616	617	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	23	34	641	071
25 *	688	692	682	(666)	643	644	617	616	616	617	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	23	34	641	071
26	676	680	681	690	691	688	682	681	677	673	671	677	681	681	682	681	681	681	681	681	681	680	678	674	658	679	23	34	671	021
27	688	692	682	(666)	643	644	617	616	616	617	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	616	21	28	661	040
28	676	677	678	(675)	680	681	676	671	671	670	672	681	673	667	667	667	667	667	667	667	667	667	667	667	667	674	17	00	661	024
29 *	652	675	686	689	686	687	681	673	672	673	676	679	680	681	681	681	681	681	681	681	681	680	677	672	674	05	34	693	024	
30 *	671	668	674	688	687	682	674	664	664	667	671	674	679	679	674	674	673	673	672	679	674	661	664	675	672	20	18	723	051	
31	631	643	661	669	668	667	661	662	662	663	671	683	687	690	689	689	688	688	688	688	688	688	688	688	688	673	20	18	723	100
Mean	631	643	661	669	668	667	661	662	662	663	671	683	687	690	689	689	688	688	688	688	688	688	688	688	688	666				
Mean #	676	677	680	684	684	681	674	668	666	666	671	676	678	679	679	680	681	681	680	680	681	681	680	675	675	677				
Mean /	681	679	681	685	686	682	675	672	667	666	671	675	678	681	681	681	681	681	681	681	681	681	681	681	681	678				
Mean #																														

DESIGNATIONS
 * Ten least disturbed days
 / Five international quiet days
 # Five international disturbed days
 () Approximate

TABLE 34

HOURLY VALUES OF HORIZONTAL INTENSITY
18000 plus tabular quantities expressed in gammas

G. M. T. used

JULY 1953

Day	Hour																								Range							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24						
1	455	452	438	445	457	466	457	468	453	441	470	507	483	484	487	488	489	493	481	482	477	451	456	469	469	481	457	357	09 17	392	145	
2	472	464	364	367	478	450	463	461	453	467	471	476	481	484	486	493	490	488	492	452	472	457	456	453	457	457	457	457	457	457	358	
3	465	465	457	473	480	482	463	461	453	463	474	470	481	488	486	486	489	492	485	478	446	467	481	473	474	474	474	474	474	474	404	
4	410	414	467	467	452	443	453	462	477	474	472	453	491	490	485	484	484	479	510	479	481	474	464	466	468	468	468	468	468	468	375	
5	470	467	467	480	479	466	433	416	442	445	451	477	483	479	477	477	477	476	479	483	479	477	473	469	468	468	468	468	468	468	375	
6	426	310	473	(396)	394	414	414	464	469	466	468	472	472	470	467	463	471	477	476	476	473	474	469	467	467	467	467	467	467	467	247	
7	478	478	464	483	477	468	459	446	451	455	467	479	486	483	480	477	470	479	477	468	453	450	474	459	459	459	459	459	459	459	224	
8	353	433	477	483	477	468	477	477	482	474	477	482	484	479	479	477	477	478	479	478	477	476	477	477	477	477	477	477	477	477	171	
9	461	463	457	483	489	484	466	466	468	468	470	478	478	479	478	477	477	478	479	478	480	486	482	469	469	469	469	469	469	469	075	
10	454	435	462	481	489	488	489	487	480	472	469	476	482	485	486	484	482	480	477	474	477	476	477	477	477	477	477	477	477	477	039	
11	479	477	476	481	489	488	487	486	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	039	
12	478	480	484	487	486	487	487	486	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	028	
13	472	477	484	486	489	487	466	445	445	459	443	465	477	474	466	472	496	476	476	476	476	476	476	476	476	476	476	476	476	476	085	
14	474	473	470	478	481	482	479	477	476	476	477	477	481	484	487	488	487	488	488	488	488	488	488	488	488	488	488	488	488	488	110	
15	471	458	460	465	471	458	471	470	457	454	467	478	477	477	477	477	477	478	477	477	477	477	477	477	477	477	477	477	477	477	022	
16	472	471	469	471	477	479	477	473	466	464	466	476	477	477	477	477	477	478	478	480	481	478	478	478	478	478	478	478	478	478	039	
17	474	476	478	482	484	481	478	467	451	451	459	474	479	480	487	486	486	487	486	485	483	484	484	484	484	484	484	484	484	484	033	
18	474	463	467	482	484	(487)	485	480	476	468	469	477	479	480	481	481	481	481	479	481	499	479	466	468	480	480	480	480	480	480	025	
19	478	472	473	490	496	489	486	478	474	471	471	471	473	474	473	477	477	478	479	479	479	479	479	479	479	479	479	479	479	479	025	
20	471	476	471	477	487	485	477	477	474	471	470	471	473	474	473	477	477	478	479	479	479	479	479	479	479	479	479	479	479	479	479	052
21	472	471	482	489	487	480	474	462	453	448	457	466	471	467	467	469	472	474	475	475	475	475	475	475	475	475	475	475	475	475	475	129
22	477	479	481	(487)	484	483	477	474	462	453	453	464	470	473	474	478	478	478	478	480	481	478	478	478	478	478	478	478	478	478	478	139
23	412	456	464	(441)	432	469	463	461	455	440	509	494	485	577	(698)	611	595	521	496	328	278	(247)	131	280	449	449	449	449	449	449	129	
24	409	447	471	481	484	483	(482)	480	477	476	478	473	477	482	482	478	480	498	478	482	480	478	478	480	479	479	479	479	479	479	139	
25	480	481	483	485	484	480	471	469	467	467	470	478	478	480	483	478	477	495	482	498	494	480	473	471	471	471	471	471	471	471	207	
26	419	405	460	479	479	478	462	452	455	458	467	479	498	496	501	497	489	484	489	500	499	441	466	452	452	452	452	452	452	452	285	
27	363	410	465	(437)	427	426	427	417	412	446	444	479	519	497	491	510	488	491	481	482	472	461	457	427	427	427	427	427	427	427	273	
28	427	380	389	457	463	466	476	461	431	446	454	472	501	489	490	486	487	489	509	508	509	471	451	457	457	457	457	457	457	457	273	
29	448	384	430	409	434	425	456	477	464	468	471	498	497	498	493	498	487	479	506	491	(413)	429	465	398	459	459	459	459	459	459	292	
30	382	456	478	485	478	469	462	435	439	452	469	477	492	493	484	480	504	488	502	484	458	396	465	443	464	464	464	464	464	464	262	
31	451	469	426	(425)	466	476	467	455	465	456	450	473	471	465	481	488	484	479	481	511	485	478	469	468	468	468	468	468	468	468	144	
Mean	449	451	461	464	471	471	467	463	460	461	467	477	483	484	489	488	485	484	485	479	469	457	450	455	470	470	470	470	470	470	DESIGNATIONS	
Mean *	473	470	474	483	486	484	478	473	467	463	466	474	477	478	480	479	478	480	480	481	482	477	470	471	476	476	476	476	476	476	* Ten least disturbed days	
Mean †	475	472	475	481	484	483	481	474	465	461	464	474	478	478	479	479	479	479	480	479	479	478	472	474	476	476	476	476	476	476	† Five international quiet days	
Mean ‡	448	384	430	409	434	425	456	477	464	468	471	498	497	498	493	498	487	479	506	491	413	429	465	398	459	459	459	459	459	459	‡ Five international disturbed days	
																															() Approximate	

a Means of 9 values
c Means of 4 values

TABLE 35
HOURLY VALUES OF HORIZONTAL INTENSITY
18000 plus tabular quantities expressed in gammas

AUGUST 1953 G. M. T. used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range						
1	469	457	437	435	468	481	477	459	456	455	458	466	479	470	486	487	486	530	504	483	476	425	474	476	471	471	17 45	590	21 34	405	185				
2	474	473	456	455	467	482	477	475	472	461	456	472	479	483	481	480	477	476	483	489	489	466	470	473	456	471	19 06	527	03 31	425	102				
3	434	466	477	485	487	479	466	463	463	467	471	478	479	478	478	478	478	478	478	489	499	483	485	483	481	476	19 04	509	01 32	418	091				
4	480	464	434	485	487	479	466	463	463	467	471	478	479	478	478	478	478	478	489	499	483	485	483	481	476	19 04	509	01 32	418	091					
5	481	476	483	495	496	492	483	479	468	479	478	483	486	485	485	488	488	484	483	484	511	491	474	477	484	484	19 13	552	09 36	432	125				
6	491	495	497	501	500	500	495	491	486	479	478	483	486	485	488	486	486	491	490	485	489	486	489	483	490	489	16 41	528	10 12	474	054				
7	491	481	449	466	483	491	490	481	474	465	464	478	481	485	490	490	485	488	490	490	490	483	481	475	455	479	19 15	499	02 29	422	077				
8	444	471	486	485	483	491	490	479	468	465	472	481	483	482	488	488	487	486	488	487	486	494	487	488	481	482	20 18	506	00 18	434	072				
9	482	483	481	485	482	481	483	471	485	441	464	454	471	480	494	490	498	483	491	492	451	432	471	481	481	476	20 18	519	20 47	396	123				
10	313	381	353	(299)	379	438	451	457	461	462	463	472	475	481	478	481	530	531	486	(485)	471	475	451	357	289	350	456	16 52	596	22 35	194	362			
11	486	481	477	486	481	480	486	481	477	471	475	479	481	481	481	481	481	486	481	471	465	359	412	461	461	466	18 29	501	02 00	409	092				
12	434	434	431	461	481	486	481	473	471	461	459	469	477	479	477	479	486	487	486	481	481	481	481	480	483	472	19 20	496	20 16	265	231				
13	480	477	481	489	491	491	488	478	464	465	468	471	472	481	481	481	481	479	475	478	347	480	480	480	480	472	21 42	500	01 37	414	086				
14	432	464	487	480	472	482	485	481	473	463	443	453	475	486	479	471	474	481	481	481	481	481	480	471	479	473	05 03	501	13 45	463	038				
15	484	481	480	484	492	500	491	481	471	467	469	473	479	471	472	479	476	479	480	481	482	482	481	481	481	480	04 37	500	02 39	448	052				
16	481	471	454	478	494	494	491	482	474	469	467	471	474	477	474	481	481	486	479	481	480	483	481	482	481	480	18 00	494	11 17	467	027				
17	477	481	481	(481)	487	490	488	480	471	468	468	471	474	477	474	481	481	486	488	483	482	482	482	481	481	480	05 14	500	10 05	463	037				
18	481	482	486	490	495	494	488	479	472	468	466	473	479	481	482	482	482	482	482	482	483	483	486	486	486	483	03 46	502	09 54	458	042				
19	489	490	491	497	493	497	491	482	469	461	462	472	478	479	476	474	473	473	477	477	481	484	491	490	483	481	20 50	502	09 54	458	042				
20	487	488	479	491	512	515	506	493	471	460	461	477	531	562	560	574	659	631	592	497	507	210	340	215	488	20 16	861	22 47	013	848					
21	430	458	463	439	420	451	444	463	472	461	462	479	493	503	519	481	576	523	485	491	402	458	281	(166)	435	19 16	683	(23 00)	-262	945					
22	421	422	476	463	416	461	478	470	470	467	471	475	470	469	481	481	491	498	494	469	444	448	465	431	465	14 08	557	00 10	359	198					
23	433	373	223	392	477	473	471	460	466	476	471	521	527	494	(563)	571	593	518	497	483	480	391	392	429	462	17 09	559	21 55	288	271					
24	390	423	(373)	434	449	395	467	466	472	462	462	489	508	509	489	545	492	518	536	(495)	447	435	(322)	274	457	19 31	760	02 10	102	658					
25	421	454	(468)	466	403	411	429	466	460	(453)	462	463	483	504	503	483	491	543	474	488	409	426	378	442	461	17 40	659	20 31	250	409					
26	385	276	353	453	471	434	405	450	(498)	476	461	471	483	488	502	521	480	478	479	402	461	440	390	360	442	15 01	621	01 20	185	429					
27	424	444	(383)	397	433	(476)	463	444	440	454	467	482	484	509	516	489	481	483	480	469	430	465	462	443	459	14 25	558	(02 50)	343	215					
Mean	448	454	444	453	458	471	472	473	468	465	468	476	484	487	491	491	498	497	490	484	464	445	450	431	471	471	DESIGNATIONS								
Mean	475	480	483	490	493	493	483	480	471	468	468	476	480	480	481	482	481	482	483	489	485	484	484	484	484	482	482	482	482	482	482	482	482	482	
Mean	484	485	486	490	493	494	481	481	471	466	465	472	478	478	477	479	479	480	481	483	483	485	485	483	483	481	481	481	481	481	481	481	481	481	
Mean	475	373	350	430	463	467	458	466	475	470	469	490	508	512	504	537	569	538	523	471	454	386	333	254	456	456	456	456	456	456	456	456	456	456	456

DESIGNATIONS
 * Ten days
 † Five International quiet days
 ‡ Five International disturbed days
 () Approximate

TABLE 36

HOURLY VALUES OF HORIZONTAL INTENSITY

17600 plus tabular quantiles expressed in gammas

G. M. T. used

SEPTEMBER 1953

Day	Mean																								Range								
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	h	m			
1	863	867	877	889	890	882	876	877	866	864	870	869	892	881	870	883	877	879	892	880	875	880	870	881	877	877	18	27	922	18	56	846	076
2	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	17	43	1044	01	58	719	295
3	865	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	17	42	1142	22	27	207	1349
4	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	55	1093	00	24	207	1300
5	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	18	55	970	00	55	080	1050
6	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	20	27	908	08	13	802	1050
7	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	17	12	1022	10	35	827	195
8	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
9	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
10	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
11	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
12	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
13	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
14	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
15	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
16	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
17	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
18	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
19	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
20	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
21	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
22	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
23	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
24	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
25	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
26	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
27	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
28	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
29	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149
30	860	881	880	889	894	890	885	880	874	871	868	869	899	899	893	899	899	932	899	877	867	854	816	830	865	865	15	25	920	00	20	771	149

DESIGNATIONS
 * Ten least disturbed days
 † Five international quiet days
 ‡ Five international disturbed days
 () Approximate

TABLE 37

HOURLY VALUES OF HORIZONTAL INTENSITY

18000 plus tabular quantities expressed in gammas

OCTOBER 1953

G. M. T., used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum	Minimum	Range			
1	493	492	485	463	443	473	471	471	457	445	451	458	470	470	473	478	481	484	485	474	391	477	465	462	466	467	18 08	513	19 18	279	234	
2	470	491	497	502	501	494	481	471	474	460	458	459	470	471	475	475	483	482	486	487	491	491	491	490	480	478	58	513	08 59	451	062	
3	471	491	503	501	492	481	481	475	465	454	456	466	466	463	464	477	489	489	487	491	494	496	496	496	483	483	03 40	510	08 28	460	050	
4	481	491	501	508	506	500	500	482	470	461	455	460	470	481	490	491	489	488	486	493	500	498	500	500	501	489	18 54	520	09 09	458	062	
5	483	488	504	511	507	496	496	481	471	462	460	465	475	483	490	490	474	481	481	481	481	481	482	485	479	475	18 54	520	08 13	440	110	
6	507	511	516	504	501	491	491	493	465	432	432	434	470	476	484	474	482	483	485	487	491	487	505	421	491	471	20 26	511	21 20	045	466	
7	468	485	497	513	498	485	485	473	461	456	456	459	468	479	481	490	483	482	485	488	491	491	487	487	484	491	484	00 40	520	07 18	441	079
8	503	506	514	501	511	502	491	471	452	463	460	462	468	472	479	481	483	482	485	488	491	487	487	484	481	481	18 41	552	19 29	391	161	
9	485	500	504	505	497	487	487	490	473	461	459	461	471	479	483	480	483	482	485	488	491	489	488	488	481	481	14 55	543	09 02	454	089	
10	486	491	492	493	496	491	491	475	462	456	456	461	471	478	483	480	483	482	485	488	491	489	488	488	481	481	500	500	19 05	456	044	
11	491	489	489	491	502	496	496	485	476	471	469	463	466	470	480	481	483	483	483	483	483	483	483	483	483	483	481	504	10 05	453	051	
12	490	496	501	502	493	482	482	471	468	461	460	466	462	470	480	481	483	483	483	483	483	483	483	483	483	483	481	507	09 56	453	054	
13	501	502	507	512	510	497	481	465	460	452	451	459	471	475	483	501	537	476	439	478	477	482	493	495	500	483	03 37	507	09 56	453	054	
14	225	384	(497)	482	485	464	461	461	467	452	451	459	471	475	483	501	537	476	439	478	477	482	493	495	500	483	14 40	600	23 28	-234	1134	
15	393	495	(482)	479	483	468	461	461	466	466	535	462	468	484	501	(601)	691	500	498	454	(287)	387	279	129	231	402	15 42	642	(23 04)	-080	722	
16	421	461	(432)	403	446	453	451	442	431	442	485	543	567	656	643	(820)	632	624	550	407	329	447	300	181	167	470	15 14	839	(21 25)	129	710	
17	420	297	(357)	421	437	474	466	471	468	473	478	469	497	551	511	(574)	580	491	509	457	(285)	351	370	417	436	463	15 11	825	(22 40)	-044	1004	
18	469	490	475	477	481	474	466	471	468	471	478	469	497	463	509	502	473	468	469	471	480	478	472	480	483	463	14 16	754	09 07	451	744	
19	483	491	(475)	443	445	453	454	440	433	450	461	462	479	483	486	471	501	502	513	475	467	464	422	441	449	464	11 07	632	00 00	417	704	
20	451	455	(477)	488	481	462	454	445	445	458	447	453	466	475	471	495	478	480	485	483	487	488	481	472	477	474	17 33	600	03 55	381	219	
21	489	481	486	477	471	475	472	466	463	460	451	450	466	472	471	491	480	480	485	483	483	488	488	486	486	474	17 53	623	00 00	417	222	
22	466	449	481	503	495	488	475	466	457	451	445	456	461	472	471	481	480	480	485	483	483	488	488	486	486	479	18 54	498	09 47	440	058	
23	461	432	(466)	478	474	474	445	445	430	437	436	435	460	463	472	472	480	481	482	481	481	481	481	481	481	481	17 53	600	10 06	423	108	
24	464	490	498	504	493	478	469	469	462	457	454	457	461	471	479	481	481	482	482	481	481	481	481	481	481	481	17 53	600	10 06	423	108	
25	500	508	511	511	493	483	470	462	462	462	459	461	469	481	483	481	480	481	482	483	483	483	483	483	483	483	483	03 25	510	20 56	204	306
26	420	455	497	503	495	465	441	455	463	463	469	471	475	480	481	481	483	481	482	483	483	483	483	483	483	483	03 40	510	00 52	360	150	
Mean	457	467	481	484	485	480	467	463	459	469	467	475	487	492	507	508	495	487	463	446	451	438	436	437	471	471	DESIGNATIONS					
Mean *	485 ^a	494 ^a	500 ^a	504	500	491	479	468	459	458	460	467	473	479	482	483	484	485 ^a	489 ^a	491 ^a	492 ^a	492 ^a	490 ^a	488 ^a	482	482	* Ten days					
Mean †	486	491	495	503	501	493	480	471	463	462	462	468	476	484	485	485	484	485	488	489	489	494	493	493	484	484	† Five international quiet days					
Mean ‡	362	377	421	432	460	464	448	474	472	513	495	478	552	533	611	597	551	483	367	356	326	316	265	262	443	443	‡ Five international disturbed days					
	a Means of 9 values																															
	() Approximate																															

DESIGNATIONS
 * Ten days
 † Five international quiet days
 ‡ Five international disturbed days
 () Approximate

G. M. T. used

TABLE 41
HOURLY VALUES OF VERTICAL INTENSITY
46700 plus tabular quantities expressed in gammas

FEBRUARY 1953

Table with columns for Day (0-28) and hours (0-24), showing hourly vertical intensity values in gammas. Includes a 'Range' column with minimum and maximum values.

Summary table with columns: Mean, Mean #, Mean /, Mean #, and Designations. Designations include 'Ten days least disturbed', 'Five international quiet days', and 'Five international disturbed days (Approximate)'.

TABLE 42

HOURLY VALUES OF VERTICAL INTENSITY

46700 plus tabular quantities expressed in gammas

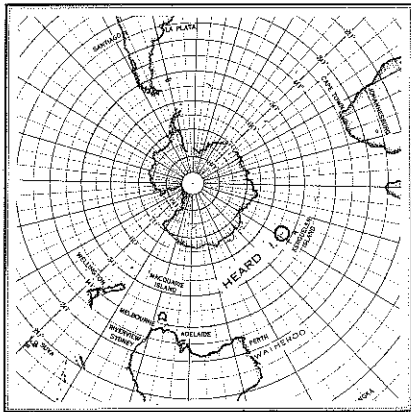
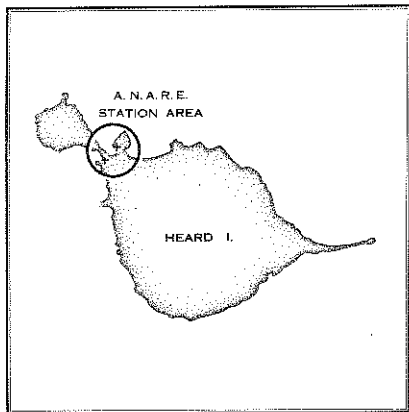
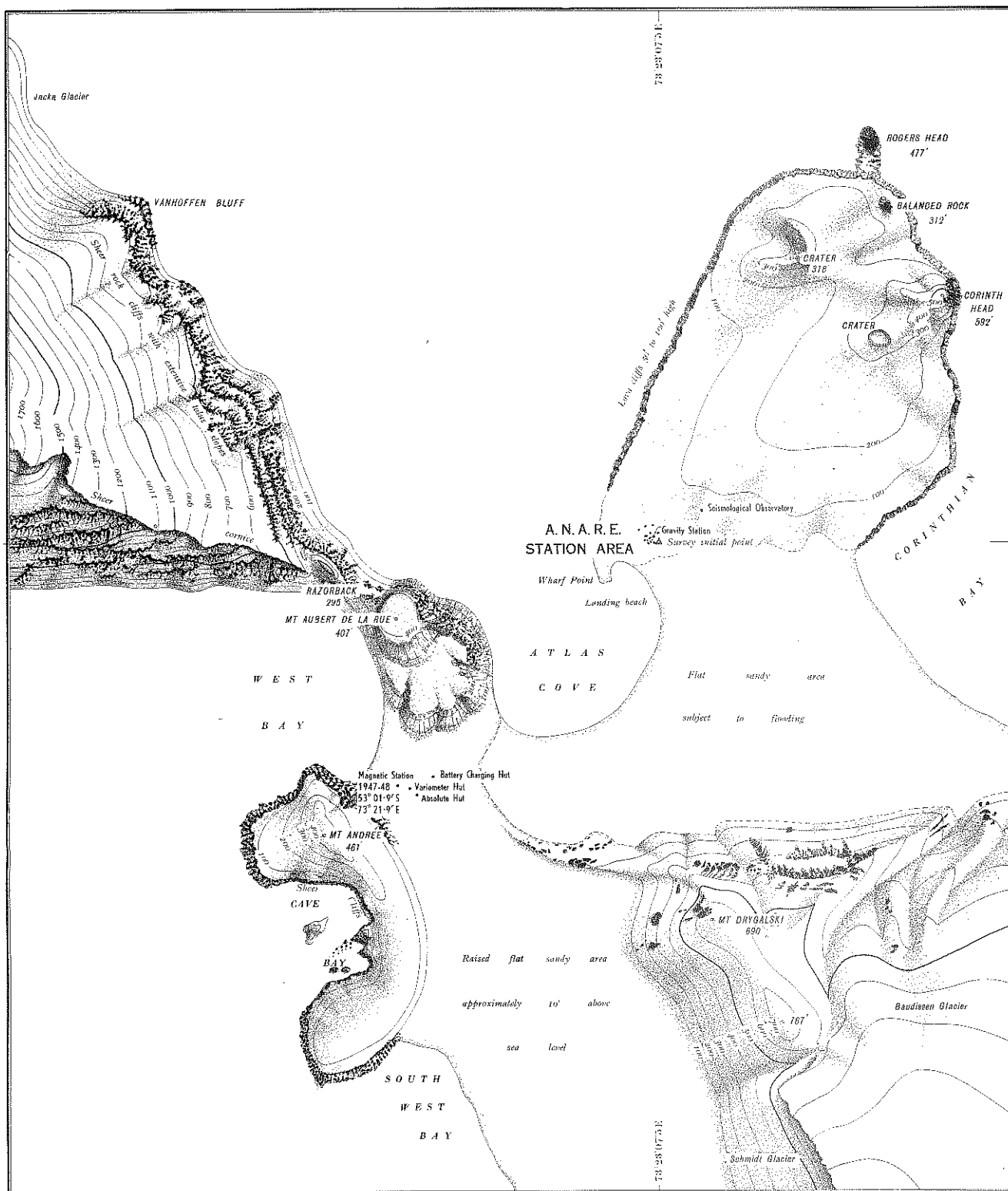
G. M. T. used

APRIL 1953

Day	Hour																								24	Mean	Maximum	Minimum	Range
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
1	360	410	449	457	463	463	461	467	464	473	481	483	473	487	485	479	479	483	499	503	464	459	461	465	461				
2	455	404	405	438	452	459	467	470	474	473	475	471	475	469	469	471	489	481	489	484	482	445	420	427	395				
3	391	407	418	400	453	459	464	474	479	479	481	481	485	485	482	530	516	525	503	494	404	397	388	401	421				
4	442	456	470	475	479	482	488	488	485	486	482	481	479	475	476	476	485	483	485	479	473	457	437	424	407				
5	399	404	407	419	428	442	454	465	469	471	474	473	475	475	476	477	478	479	485	492	479	455	436	433	439				
6	442	462	467	470	473	474	476	478	476	474	473	473	471	470	473	473	474	479	479	482	479	471	465	447	443				
7	454	462	467	470	473	474	476	478	476	474	473	473	471	470	473	473	474	479	479	482	479	471	465	447	443				
8	408	434	457	466	466	465	469	473	476	473	474	474	473	473	476	479	485	479	479	484	479	470	423	371	395				
9	389	407	435	448	455	464	469	471	473	473	474	474	473	473	476	477	477	484	488	484	477	474	470	467	461				
10	463	467	468	469	467	462	460	464	464	464	462	476	465	462	462	462	460	459	535	494	482	452	429	377	409				
11	439	454	462	465	457	462	460	459	474	486	496	500	489	482	482	481	485	485	482	490	464	452	461	470	463				
12	464	471	464	467	471	470	470	470	468	470	468	482	482	482	482	481	485	485	482	476	474	454	448	437	449				
13	457	449	443	464	464	469	473	473	473	473	471	473	473	476	497	513	494	504	473	472	456	448	450	456	460				
14	463	465	469	471	469	471	473	474	476	474	476	489	481	488	489	488	488	480	477	476	456	448	481	484	484				
15	486	481	474	470	462	474	474	474	474	474	474	489	486	491	489	486	485	478	477	483	484	477	475	475	472				
16	470	462	440	464	477	477	480	485	484	485	484	480	479	477	480	480	478	486	486	499	481	408	370	411	440				
17	433	426	439	464	475	475	475	478	478	484	492	492	487	487	489	489	486	484	481	485	489	467	459	444	453				
18	464	465	465	457	451	466	475	478	480	487	488	486	487	488	486	489	486	484	481	485	489	467	459	444	453				
19	456	457	464	457	451	466	475	478	480	487	488	486	487	488	486	489	486	484	481	485	489	467	459	444	453				
20	388	426	432	434	465	473	496	494	507	497	499	500	497	499	500	496	536	550	532	512	503	489	460	439	379				
21	357	388	421	433	432	458	472	490	515	490	499	500	493	497	503	500	493	497	497	455	436	441	419	380	399				
22	427	445	446	450	459	465	470	473	481	486	491	490	490	491	490	521	527	546	517	465	412	407	378	297	324				
23	360	413	443	432	412	426	455	478	487	484	484	481	482	482	483	484	484	484	485	490	447	460	455	450	431				
24	452	467	476	481	481	483	485	486	486	484	484	481	482	482	483	484	484	484	485	487	486	484	481	481	481				
25	479	479	484	480	481	479	480	481	484	479	476	479	481	481	480	480	490	493	487	475	450	429	414	412	412				
26	434	465	474	481	484	480	480	480	481	475	477	476	475	479	484	493	499	499	502	499	488	478	470	420	401				
27	451	424	437	469	477	477	481	482	480	483	478	477	476	479	481	481	480	481	490	480	471	466	458	458	456				
28	451	464	466	481	482	484	484	484	484	484	484	484	486	486	482	482	483	481	481	480	480	480	478	478	478				
29	478	477	478	481	482	484	481	481	481	480	479	481	481	481	481	481	481	481	486	482	481	481	481	479	478				
30	477	476	472	471	472	474	474	478	475	475	477	477	477	477	477	477	479	481	496	494	479	424	437	451	468				
Mean	434	443	450	456	461	466	472	476	479	481	481	482	485	489	495	498	498	492	485	467	455	441	427	427	427				
Mean #	436	446	456	461	468	472	476	478	478	480	480	479	480	480	484	483	481	483	482	478	472	461	452	449	449				
Mean /	442	450	456	461	465	470	475	478	478	480	480	480	480	479	479	482	480	481	481	477	468	459	453	444	444				
Mean #	395	417	425	428	439	450	468	480	492	492	492	493	495	511	529	517	517	498	485	446	429	402	394	403	403				

^a Means of 9 values

DESIGNATIONS
 * Ten least disturbed days
 / Five international quiet days
 # Five international disturbed days
 () Approximate



LOCALITY DIAGRAMS

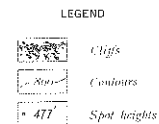
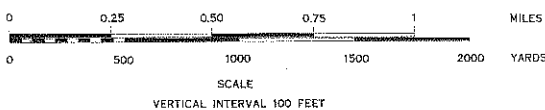
SKETCH MAP SHOWING LOCATION OF MAGNETIC AND SEISMOLOGICAL OBSERVATORIES, AT HEARD ISLAND

Reference: Survey Initial Point (Camp Area) 53° 01' 11" S
73° 23' 07" E

Control: Based on Triangulation Control Survey by R. Dovers 1948

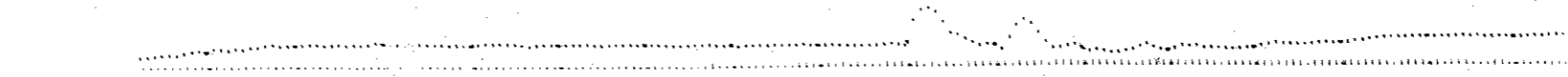
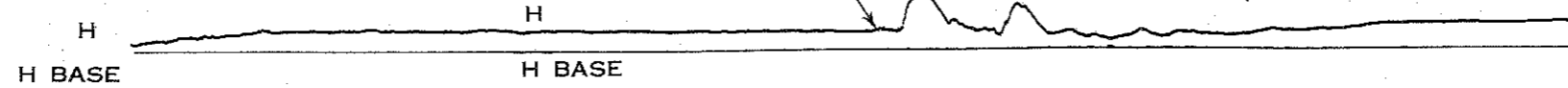
Detail: Sketched in from uncontrolled ground photography based on known stations by K. Simmons and I. Moller, 1950.

Reliability: Reliable sketch.

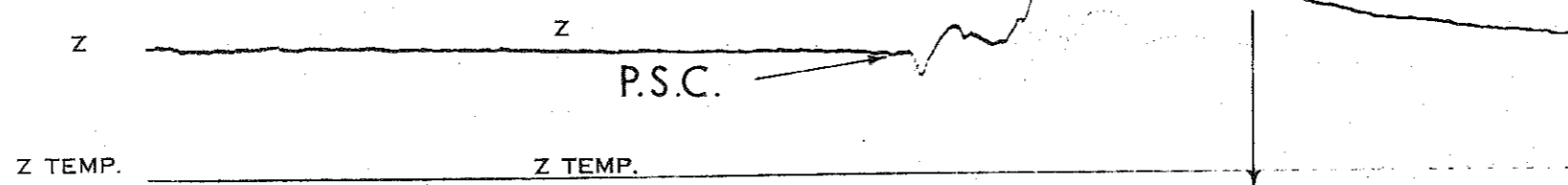
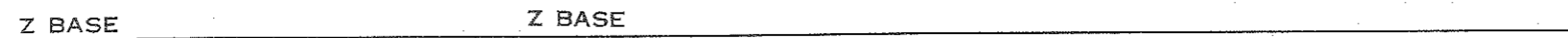
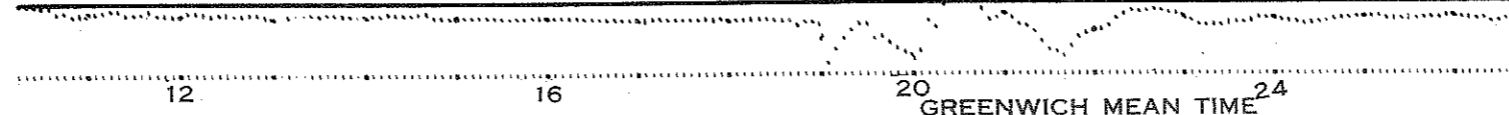
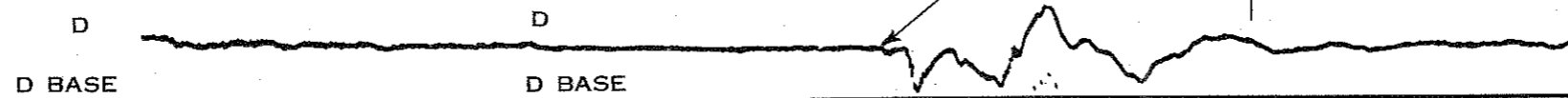


H TEMP.

H INCREASING 10.0 γ per mm



0.91 minutes per mm EAST



Z INCREASING NUMERICALLY

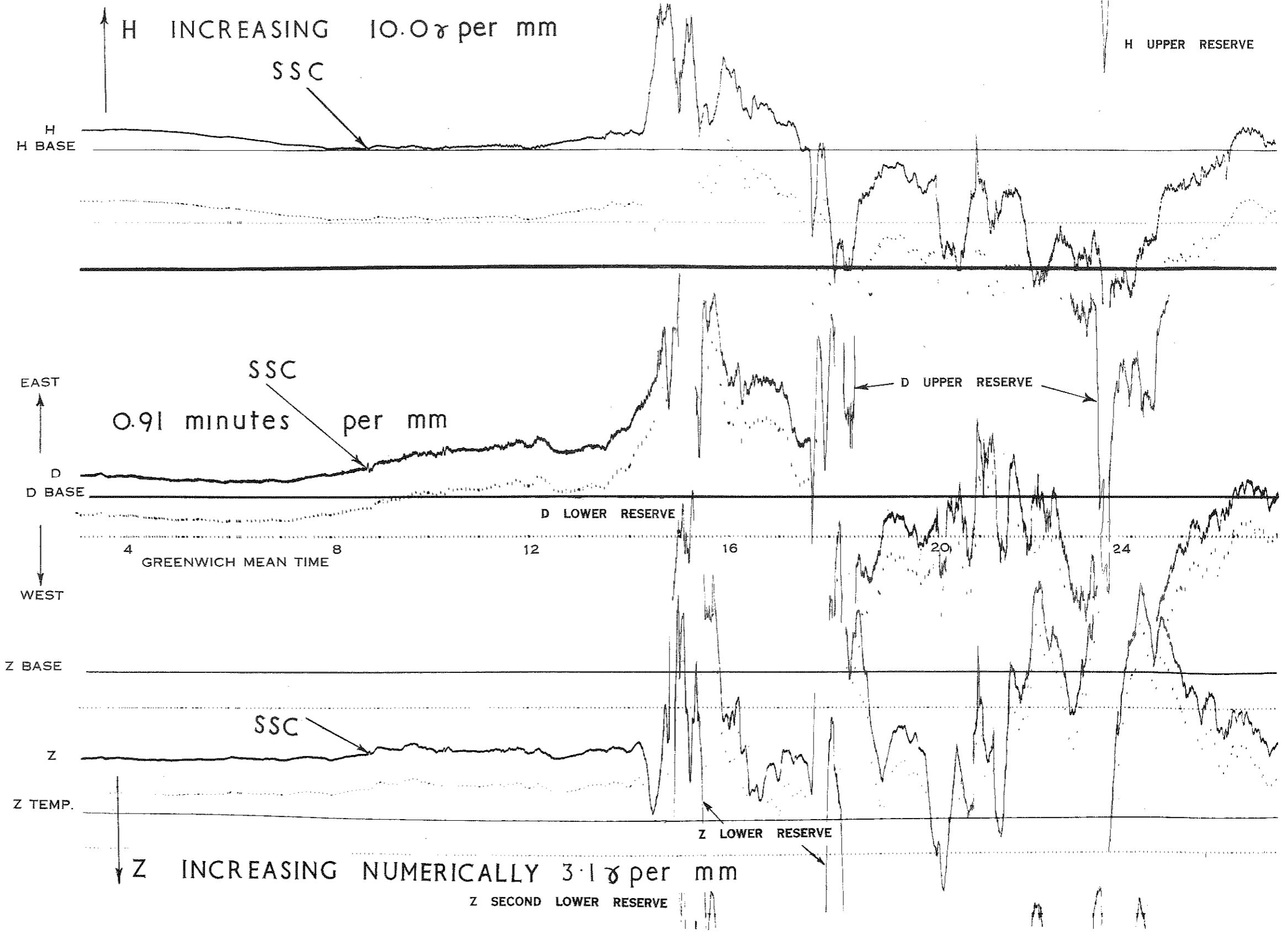
3.1 γ per mm

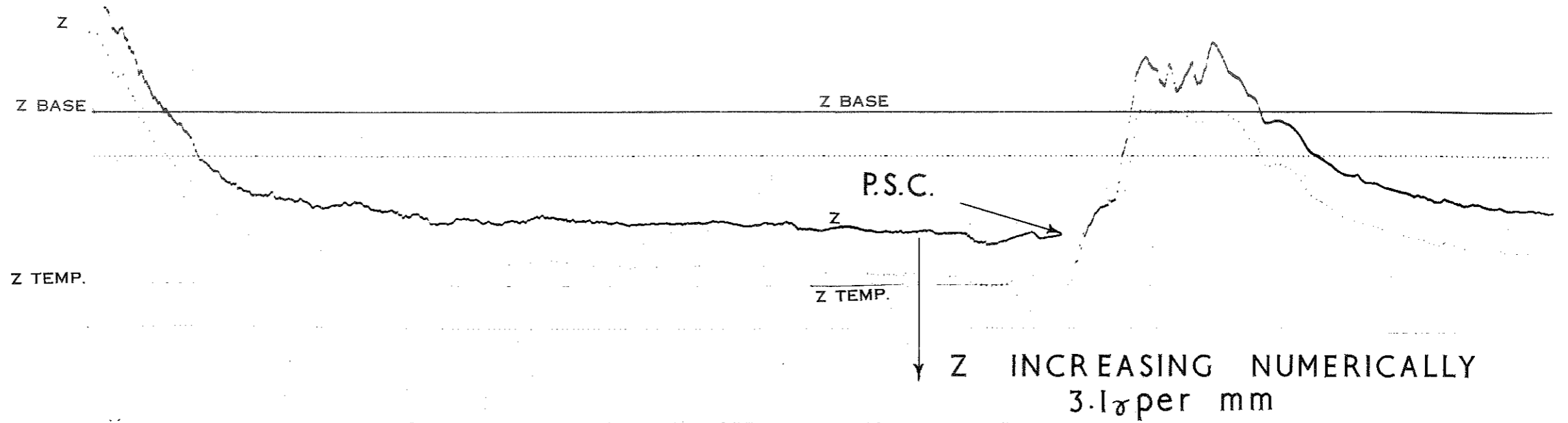
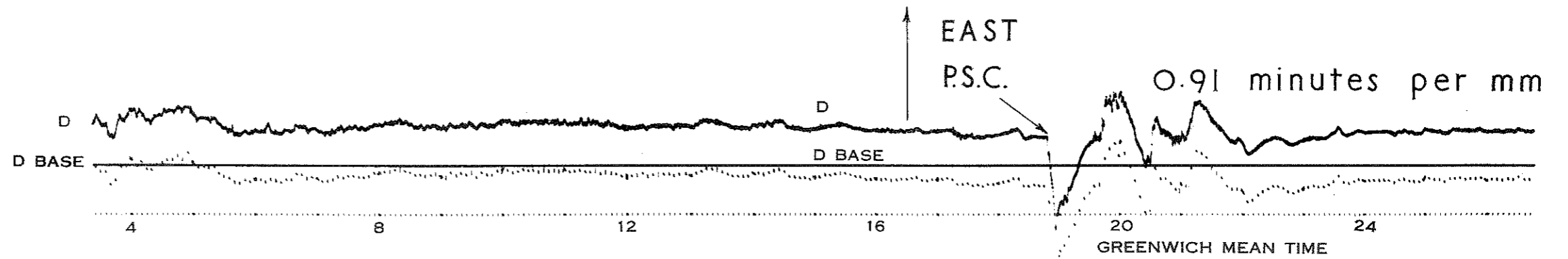
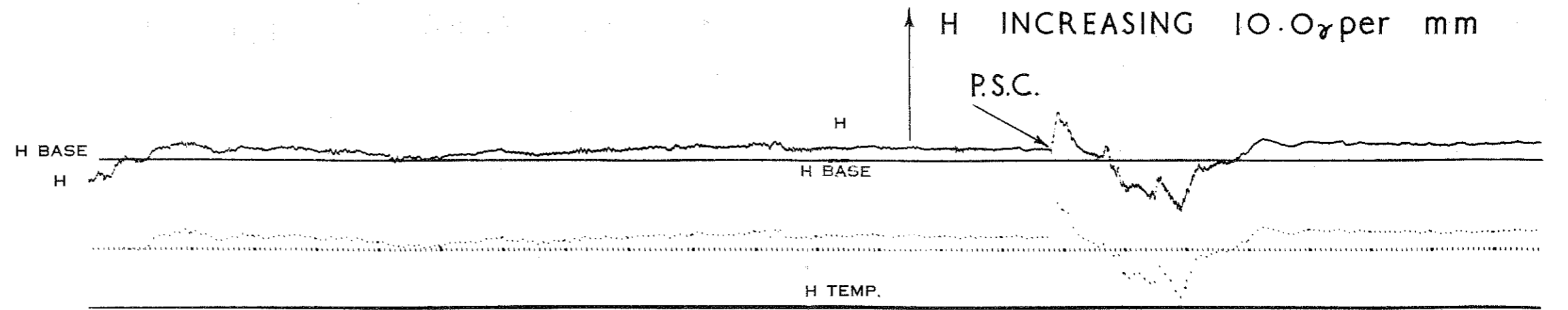
15 OCT. 1953
H TEMP.

MAGNETIC OBSERVATORY
HEARD ISLAND

16 OCT. 1953

PLATE 5





19 JULY 1953

MAGNETIC OBSERVATORY
HEARD ISLAND

20 JULY 1953

