

KODAIKANAL OBSERVATORY BULLETIN NO. CLXI.

Page.	Table No.	Columns.	Date.	Read.	For.
3	1	5, 6, 7, 8	1st Quarter	3.43 6.88 46.46 3.11	3.54 6.81 46.40 3.10
3	1	5, 6, 7, 8	2nd Quarter	3.85 7.53 41.99 3.57	3.30 7.51 41.8 3.64
3	1	5, 6, 7, 8	1st half year	3.63 7.20 44.16 3.35	3.69 7.19 44.15 3.41

PART - II.

Page No.	Date.	Column/Hour.	Read.	for.
11	20	11	Δ	Δ
11	20	13	Δ	Δ
11	21	11	Δ	Δ
11	21	13	Δ	Δ
11	22	11	Δ	Δ
11	22	13	Δ	Δ
11	23	11	Δ	Δ
11	23	11	Δ	Δ
13	22	2	36.9	35.0
15	28	14	36.3	36.0
16	6	3	33.9	33.0
17	18	11	0848	0748
17	Mean Range	15	5.6	5.4
20	8	2	35.7	35.9
22	10	10	565	551
23	11	7	496	494
43	28	11	2030	0230
44	Mean	--	Mean †	Mean †

PART - III.

76	20	Under 04	220	223
142	12	" 0930	L	C
142	13	" 0930	C	L
222	Count	" 0830	28	29
223	Count	" 1830	30	20
252	Count	" 06	26	2
255	4	Date	†	Nil
298	5	Under 1130	215	25
298	8	" 1130	215	25



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365



Kodaikanal Observatory

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Kodaikanal Observatory

Bulletin No. CLXI

PART I

Summary of Prominence Observations for the first half of 1960

The results of observations of prominences made at Kodaikanal Observatory during the first half of 1960 supplemented by data computed from photographs supplied by the Mount Wilson and Meudon Observatories for those days on which Kodaikanal had imperfect or no observations are summarised in this bulletin.

Calcium prominences on the limb.—During the half year under review, photographs of calcium prominences at the limb were obtained at Kodaikanal on 128 days which were counted as 126½ effective days after giving due weightage to the photographs according to their quality. Spectroheliograms for 23 days were obtained from Mount Wilson observatory and for 40 days from the Meudon Observatory. In all, complete observations were available for 166 effective days.

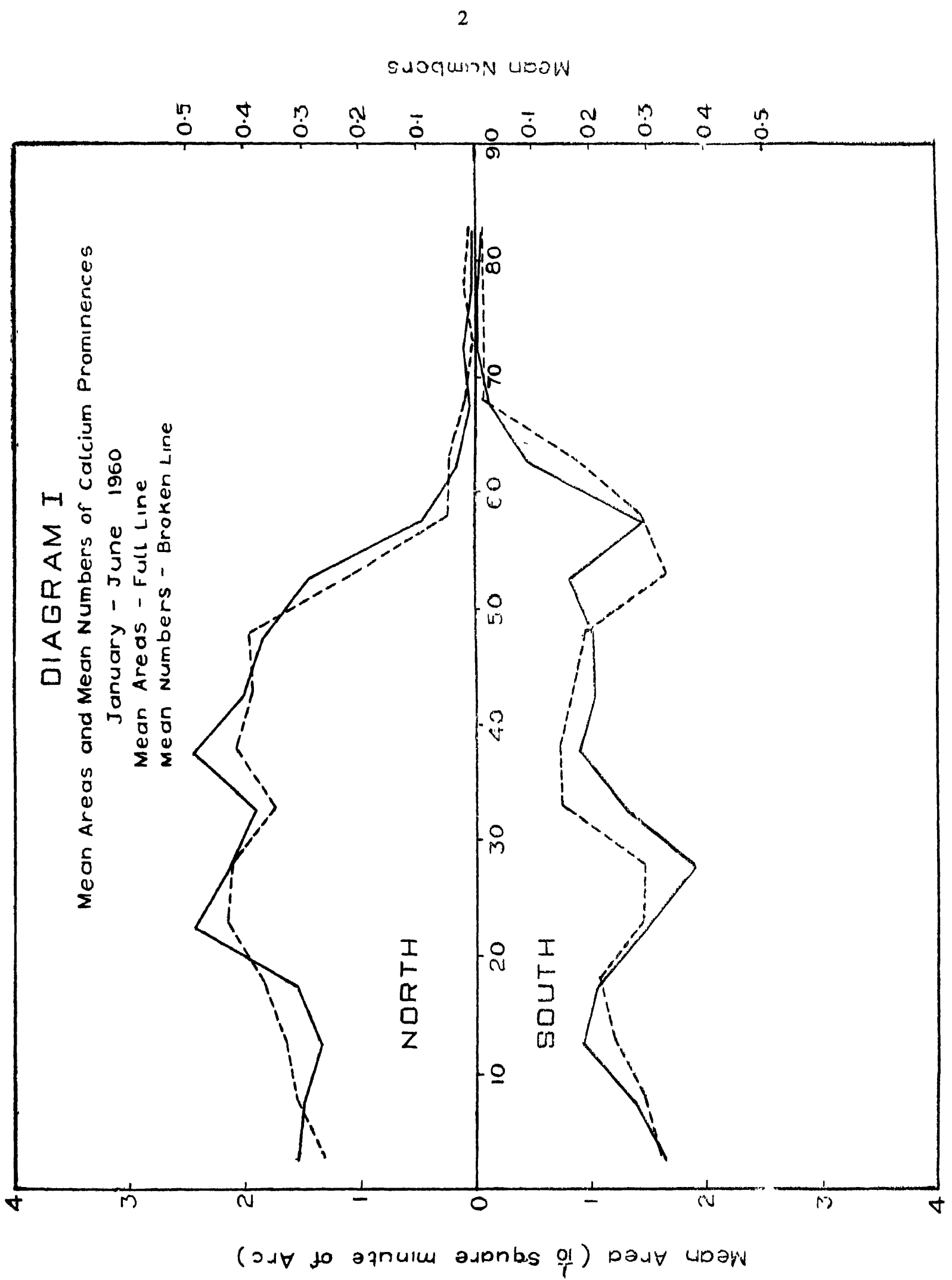
The mean daily areas (in sq. minutes of arc) and the mean daily numbers of prominences derived from the above records are given below:—

	Combined data	
	Mean daily areas (Square minutes)	Mean daily numbers
North	2·08	4·04
South	1·55	3·15
TOTAL	3·63	7·19

These figures when compared with the corresponding values of the previous half year show a decrease of activity, the decrease in area being 41·5% and the decrease in number 21·4%.

The distribution of areas and numbers in five-degree ranges of latitude as obtained from the combined data is represented in diagram I

In the northern hemisphere there are two peaks of activity in the latitude belts 20°—25° and 35°—48°; the maximum activity in the southern hemisphere is in the latitude range 25°—30° with a secondary maximum in the belt 55°—60°.



The monthly, quarterly and half-yearly areas, numbers, heights and extents of prominences as derived from all available photographs are tabulated below:—

1960 months	No. of effective days	Area (sq minutes)	Numbers	Daily means		Mean height	Mean Extent
				Area (Sq. minutes)	Numbers		
January	28½	106.70	207	3.78	7.33	46.08	2.97
February	26½	92.10	179	3.78	6.55	47.04	3.20
March	29½	90.85	195	3.05	6.55	46.33	3.38
April	30	117.85	206	3.93	6.87	45.17	4.21
May	25	75.05	180	3.00	7.20	38.11	3.17
June	26½	120.50	228	4.55	8.60	42.17	2.56
First quarter	84½	289.65	581	3.54	6.81	46.48	3.18
Second quarter	81½	313.40	614	3.83	7.56	41.82	3.64
First half-year	166	603.05	1195	3.69	7.19	44.15	3.41

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

	East	West	Percentage East
1960 January—June			
Total areas (Sq. minutes)	2717.5	3313.0	45.05%
Total numbers	585	610	49%

Observations with the Hale Spectroheliograph

Details of Doppler displacements in the H-alpha line observed in prominences and dark markings are given below:—

	North	South	East	West	Total	Displacements to red & violet
1	2	3	4	5	6	7
Displacements in prominences	40	32	34	38	72	72
Displacements in dark-markings	41	10	21	30	51	51

Solar Flares

Details of solar flares observed during the period are given in the following table:—

Date 1960	Time in U.T.						Mean latitude	Mean longitude from central meridian	Impor- tance	Maximum width of H- alpha line observed A°
	Beg. h m.	Max. h m.	End h m.							
1	2	3	4	5	6	7	8			
February 4	*08 45	08 45	08 58	10°N	37°W	1+	2.0			
February 20	*03 07	03 07	03 13	20°S	63°E	1	1.6			
March 29	*08 35	08 37	08 45	12°N	30°E	2	1.8			
April 1	02 42	02 47	03 00	11°N	02°W	1	1.7			
April 3(i)	*03 17	03 17	03 22	12°N	33°W	2	1.7			
April 3(ii)	05 42	05 44	05 52	12°N	35°W	1	1.6			
April 4	*02 18	02 21	02 34	12°N	50°W	2	1.4			
April 5	02 15	02 45	03 08	12°N	62°W	2	1.4			
April 29	02 09	04 04	05 05	10°N	22°W	3	2.0			
May 25	02 35	02 35	02 58	12°N	06°E	1	2.0			
June 10	05 10	05 20	05 25	31°N	56°W	2	1.7			

*First observation of flare and not the beginning of flare.

Surges, Active Prominences etc.

Details of surges, active prominences and eruptive prominences are given in the following table:—

Date	Pheno- menon	Impor- tance	Time in U.T.				Position (Hellographic)		Direction of out- flow	Remarks
			Beg	End	Lat.	Long				
14th Jan., 1960	EPL	1	03 32	05 00	20°N	90°E	r	Disappeared before 1100.		
15th Jan., 1960	EPL	2	04 30	05 10	29°N	90°W	rs			
7th Feb., 1960	EPL	1	09 25	09 30	20°S	90°E	r	S		
6th Mar., 1960	APR	2	03 32	04 15	05°N	90°E	r	Q		
11th Apr. 1960	APR	1	05 37	06 15	05°S	90°E	r	J		
14th Apr., 1960	EPL	2	03 55	04 15	30°N	90°W	r	T		

Code:

DSD—Dark surge on disk,
BSL—Bright surge at limb;
APR—Active prominence region,
BSD—Bright surge on disk;
EPL—Eruptive prominence at limb.

Sudden disappearances

Details of sudden disappearances of prominences and dark markings are given in the following table:—

1960 Date	Time when object last observed before activation (U.T.)		Time when disintegration first observed (U.T.)		Time when object has disappeared (U.T.)		Approximate position of centre		Greatest extension of filament	Importance	Remarks
	hr.	min.	hr.	min.	hr.	min.	Lat.	Long.			
February 4	05	49			08	57	42°N	02°E	25°	3	The dark - marking was not seen on the spectroheliogram taken at 0857.
February 18	04	30			05	00	26°S	90°E	7°	1	Prominence was seen till 0430 hrs. At 0500 when observation commenced it was not seen.
March 24	03	10	0400		04	15	19°S	90°E	10°	1	The prominence observed till 0310 was found to have suddenly changed its shape at 0400 hrs. At 0415 hrs. it disappeared.

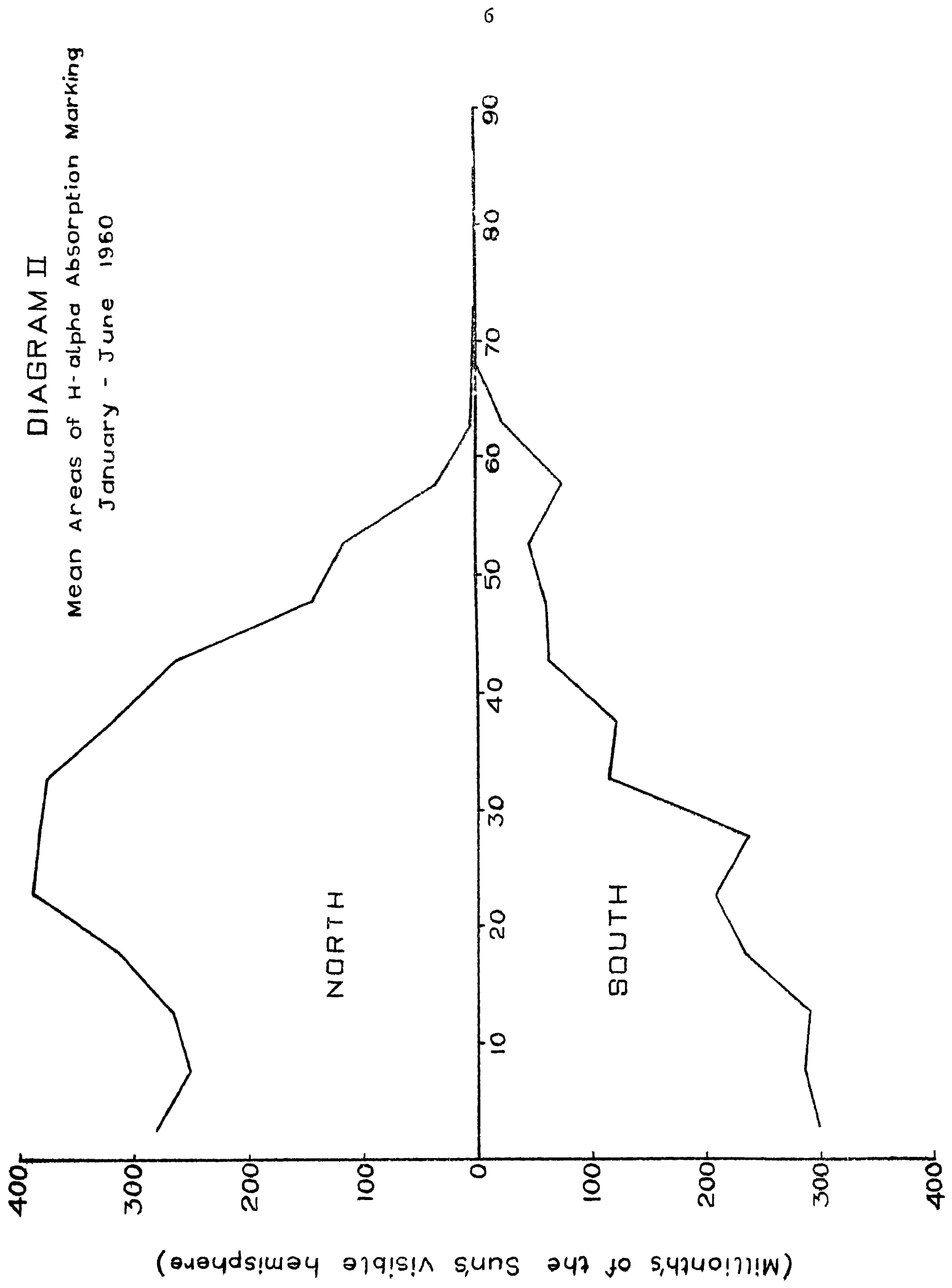
Prominences projected on the disc as absorption markings

During the half-year under review photographs of the sun's disc in H-alpha line were obtained at Kodaikanal on 134 days. H-alpha spectroheliograms were also received for 24 days from Mount Wilson Observatory and for 33 days from Meudon Observatory. On the whole records were available for 174½ effective days.

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 the combined photographs are given below:—

Combined data

		Combined data	
		Mean daily area (millionths of the sun's visible hemisphere)	Mean daily number
North	.	2958	18.62
South	.	1951	14.04
TOTAL		4909	32.66



On comparing with the previous half-year's values, the figures show a decrease in activity, the decrease being 16.7% in areas and 9.6% in numbers.

The distribution of the areas of the absorption markings in 5-degree ranges of latitude as obtained from the combined data is shown in diagram II.

The total area of darkmarkings in the northern hemisphere is considerably more than in the southern hemisphere, with a broad peak of activity in the latitude belt 25°—35°.

The distribution of total areas and numbers of the darkmarkings east and west of the sun's axis of rotation is given below:—

January—June, 1960

	Combined data		
	East	West	Percentage East
Total area (millionths of the sun's visible hemisphere)	4,48,531	4,81,250	48.2%
Total numbers	2,868	2,832	50.3%

Summary of calcium flocculus observations

During the half-year under review, calcium flocculus photographs were obtained at Kodaikanal on 130 days. Spectroheliograms for 32 days were obtained from Mount Wilson Observatory and for 40 days from Meudon Observatory. On the whole records were available for 171½ effective days.

The distribution of the areas of calcium flocculus east and west of the sun's axis of rotation is given below:—

January—June, 1960

	Combined data		
	East	West	Percentage East
Total area (in millionths of the sun's visible hemisphere)	19,25,687	20,38,875	48.6%

The mean daily areas in millionths of the sun's visible hemisphere (uncorrected for foreshortening) of the calcium flocculi as derived from the combined photographs are given below:—

	North	South	Total
Mean daily area (in millionths of the sun's visible hemisphere)	13,789	9,046	22,835

Compared to the previous half-year there is decrease in activity of 12.9%.

Thanks are due to the co-operating observatories for the photographs supplied by them.

PART II

Magnetic observations for the first-half of 1960

Brief descriptions of the absolute instruments, the variometers and the system of observations are available in Bulletins Nos. CXXXII and CXXVI of this observatory. The data given in this Bulletin are derived mainly from the records of La Cour instruments, but in case of failure of La Cour records, Watson magnetograms have been used.

The adopted values of the scale coefficients for the Horizontal Force, Vertical Force and Declination magnetographs for the first half of 1960 were $29\gamma/\text{cm.}$, $120\gamma/\text{cm.}$ and $14'/\text{cm.}$ respectively.

PART III

Ionospheric Observations for the first-half-of 1960

A description of the system of ionospheric observations at Kodaikanal with a brief description of the Ionosphere Recorder has been given in Bulletin No. 146 of this observatory. The present Bulletin contains half-hourly values of eleven ionospheric parameters viz. foF2, foF1, foE, foEs, fbEs, f-min., h'F2, h'F, h'E, h'Es and (M3000) F2 with symbols and terminology as recommended by the Special Committee on World-wide Ionospheric Soundings to the URSI/AGI in its First Report (Brussels, September 2, 1956).

KODAIKANAL OBSERVATORY, }
August, 1962.

M. K. VAINU BAPPU,
Director,

MAGNETIC DATA

TABLE 1

Hourly values of Declination (Westerly), 1960

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

January

2° plus tabular quantities

Date	Hours G M T.														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
1†	36.7	37.5	38.4	38.6	38.6	38.5	38.1	38.1	36.3	34.9	34.6	35.0	36.1	36.4	36.0
2†	36.7	36.8	37.5	37.2	37.1	36.7	36.7	36.5	35.6	35.0	34.6	34.7	35.7	36.3	36.0
3	36.5	36.8	37.4	37.8	37.6	37.1	36.9	37.9	37.5	36.4	35.4	35.2	35.8	36.4	35.9
4	36.4	36.5	37.2	37.2	37.6	37.5	37.9	37.9	38.3	38.2	36.6	35.7	36.4	36.5	36.1
5	37.2	37.2	37.2	36.6	36.6	36.4	37.9	37.9	37.9	36.9	36.4	36.1	35.8	35.4	35.1
6	35.1	35.9	36.1	36.4	36.2	36.1	36.4	36.1	35.2	35.4	35.1	35.0	35.1	35.8	35.7
7	36.5	36.2	35.7	35.5	35.7	36.9	38.7	37.5	36.6	36.6	36.5	36.4	36.4	36.6	36.2
8	36.2	36.2	36.6	36.2	35.9	37.3	37.9	37.3	36.7	36.6	36.6	36.2	36.0	36.3	36.5
9†	36.6	36.6	37.3	37.4	37.3	38.6	39.4	39.4	38.6	37.6	36.5	35.8	36.0	36.5	36.3
10††	37.0	37.6	38.4	38.6	37.0	38.0	38.7	39.3	36.3	35.5	34.5	34.6	34.8	34.5	34.1
11††	36.7	37.2	37.6	37.6	36.9	36.6	37.0	37.3	36.3	36.3	35.1	35.5	35.9	35.5	35.2
12	36.9	37.6	38.0	37.3	36.6	36.6	37.7	36.9	35.2	35.2	35.5	36.2	35.8	35.3	35.2
13	36.7	37.4	37.9	37.9	36.9	36.7	37.3	37.0	36.5	36.0	35.6	35.6	36.5	36.5	36.0
14††	37.3	38.6	39.1	38.7	37.8	36.6	36.0	35.0	33.9	33.2	33.2	34.0	34.5	34.9	34.9
15††	36.1	38.0	38.9	38.8	37.4	36.1	36.4	36.0	34.6	33.5	33.6	34.3	35.3	35.6	35.3
16	36.4	36.7	37.1	37.3	36.8	37.5	38.1	38.1	36.8	35.4	34.7	35.2	36.0	36.1	35.6
17	36.7	37.0	37.1	37.0	37.1	37.5	37.3	37.7	36.8	36.0	35.4	35.9	36.0	36.6	36.3
18	37.5	37.7	38.2	38.9	38.2	38.9	39.3	38.5	37.6	34.7	32.0	31.8	33.0	35.3	35.4
19	36.8	37.2	37.2	37.6	37.8	38.3	39.2	38.2	36.8	35.8	35.4	35.4	35.4	35.7	35.5
20	36.9	37.1	37.5	37.6	38.1	38.3	39.2	38.9	39.2	37.8	36.8	35.5	36.1	36.4	35.8
21††	Δ	Δ	Δ	Δ	36.5	37.0	38.3	37.3	35.6	35.6	34.5	34.0	33.1	34.4	34.7
22	36.3	36.1	36.5	36.1	35.6	35.8	37.5	37.6	36.8	35.6	35.5	34.1	35.1	35.4	35.5
23	Δ	Δ	Δ	Δ	35.6	35.9	37.3	38.1	38.3	38.5	38.4	37.1	36.9	36.4	35.6
24	37.1	37.4	37.4	37.1	35.6	34.9	36.0	37.0	37.6	38.0	37.6	36.4	35.6	35.6	35.6
25	37.0	37.3	37.3	37.0	37.0	37.1	37.6	38.0	38.0	38.0	37.8	37.0	36.9	36.4	35.7
26	37.4	37.7	38.0	37.9	36.7	36.3	37.2	37.1	37.0	36.4	36.1	36.1	36.7	36.5	36.4
27	37.1	37.7	38.1	37.9	38.2	37.1	37.2	37.2	36.3	37.0	37.5	37.5	37.2	37.8	37.1
28	37.1	38.1	38.9	39.3	38.8	38.5	38.8	38.5	37.8	36.8	36.4	36.8	37.7	37.7	37.1
29	38.1	38.5	39.1	39.9	40.0	39.8	39.9	39.9	38.4	36.3	35.7	35.7	36.7	37.1	37.0
30†	37.1	38.4	39.2	39.8	39.5	39.3	39.5	38.4	36.8	35.7	35.1	35.4	36.1	37.0	37.0
31†	37.2	37.7	38.2	39.1	39.8	39.3	38.5	37.8	37.1	36.8	36.5	36.5	37.1	37.1	36.7
Mean	36.8	37.3	37.7	37.8	37.4	37.4	37.8	37.6	36.8	36.1	35.6	35.6	35.9	36.2	35.9
Mean†	36.9	37.4	38.1	38.4	38.5	38.5	38.4	38.0	36.9	36.0	35.5	35.5	36.2	36.7	36.4
Mean††	36.8	37.8	38.5	38.4	37.3	36.8	37.0	36.9	35.9	34.6	34.1	34.6	35.1	35.1	34.9

† Five International quiet days

†† Five International disturbed days.

Δ Loss of record: (day omitted for means).

Characteristic : foF1
 Unit : Mc
 Month : May, 1960

TABLE 46 (Contd.)
 Ionospheric Data
 75 0°E Mean Time

Latitude : 10 2°N
 Longitude : 77·5°E

1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330	Date
L	L	L	L	L								1
L	L	L	L	L								2
L	L	L	L	L								3
L	L	L	L	L								4
L	L	L	L	L								5
L	L	L	L	L								6
L	L	L	L	L								7
L	L	L	L	L								8
C	C	C	C	C								9
C	C	C	C	C								10
C	C	C	C	L								11
C	L	L	L	L								12
L	L	L	L	L								13
L	L	L	L	L								14
L	L	L	L	L								15
L	L	L	L	L								16
L	L	L	L	L								17
L	L	L	L	L								18
L	L	L	L	L								19
L	L	L	L	L								20
L	L	A	A	A								21
L	L	L	L	L								22
L	L	L	L	L								23
L	L	L	L	L								24
L	L	L	L	L								25
L	L	L	L	L								26
L	L	L	L	L								27
L	L	L ^H	L	L								28
L	L ^H	L	L	L								29
L	L	L	L	L								30
L	L	L	L	L								31
												Count
.									Median
..								Mean

Sweep 1·0 Mc. to 25·0 Mc. in 27 seconds.

