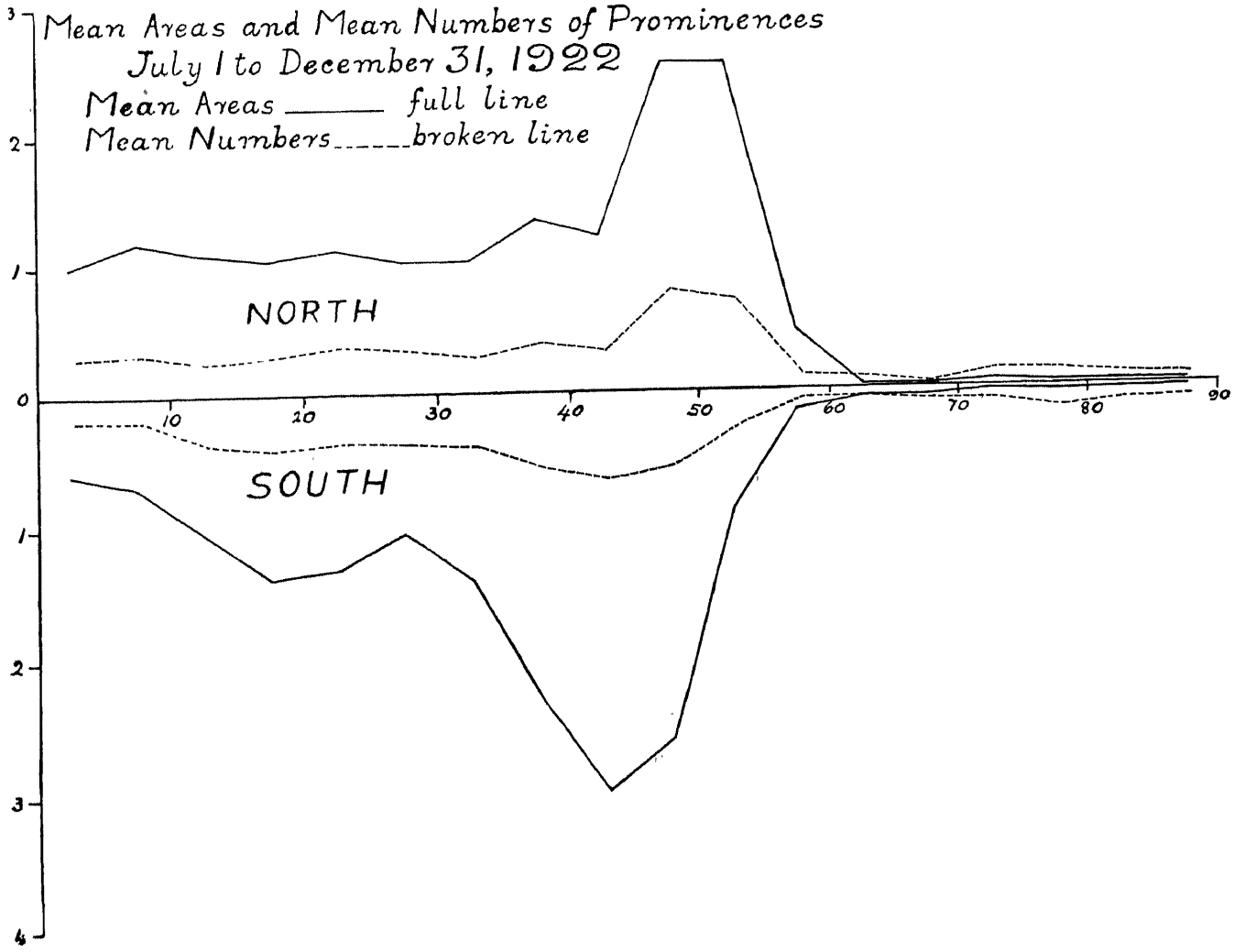
Kodaikanal Observatory.

BULLETIN No. LXXI.

SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF THE YEAR 1922.

The distribution of prominences observed and photographed during the half-year ending 31st December 1922 is represented in the following diagram, in which the full line gives the mean daily areas and the broken line the mean daily numbers for each zone of 5° of latitude. The ordinates represent tenths of a square minute of arc for the full line and numbers for the broken line. The means are corrected for incomplete or imperfect observations, the total of 138 days being reduced to 123 effective days.



In the northern hemisphere the activity is less than during the first half of the year in all latitudes below 50°, but from 50°—60° the activity is greater resulting in an advance of the zone of maximum activity of $2\frac{1}{2}$° towards the pole. In the southern hemisphere the changes are almost complementary, there being generally an increase in lower latitudes and a decrease from 50° to 60°, the zone of maximum activity having receded 5° towards the equator.

The mean daily areas and numbers corrected for imperfect observations are given below :—

	Mean daily areas (square minutes).	Mean daily numbers.
North	1·58	5·04
South	1 70	5·31
Total ...	3·28	10·35

Areas show a slight increase and numbers a slight decrease on the first half-year. The northern hemisphere has suffered a decrease of about 18 per cent in both areas and numbers whilst the southern shows an increase of 34 per cent in areas and 8 per cent in numbers. This has resulted in the northern preponderance of the first half-year being changed into a slight southern preponderance. The northern prominences were, however, slightly brighter than the southern.

The monthly, quarterly and half-yearly areas and numbers, and the mean height and mean extent of the prominences are given in table I. The unit of area is 1 square minute of arc. The mean height in this and previous bulletins is derived by adding together the greatest heights reached by individual prominences and dividing by the total number of prominences observed; the mean extent is derived by adding together the lengths of the base on the chromosphere of individual prominences and dividing by the total number of prominences observed.

TABLE I.—ABSTRACT FOR THE SECOND HALF OF 1922.

Months.	Number of days (effective).	Areas.	Numbers.	Daily Means.		Mean height.	Mean extent.
				Areas.	Numbers.		
						"	°
July	14½	42·5	143	2·93	9·9	34·6	4·15
August	22	49·5	173	2·25	7·9	34·1	4·22
September	22	64·9	205	2·95	9·3	35·7	4·23
October	19½	50·0	140	2·56	7·2	38·7	3·80
November	16	59·9	155	3·74	9·7	36·4	4·15
December	29	137·2	457	4·74	15·8	31·8	3·58
Third quarter	58½	156·9	521	2·68	8·9	34·9	4·20
Fourth quarter	64½	247·1	752	3·83	11·7	34·6	3·74
Second half-year	123	404·0	1273	3·28	10·4	34·4	3·93

Distribution east and west of the Sun's axis.

Areas show an excess in the eastern hemisphere, but in the case of numbers there is a western preponderance as shown below :—

1922 July to December.	East.	West.	Percentage east.
Total number observed	618	655	48·6
Total areas in square minutes	207·7	196·4	51·4

The average brightness of a prominence was the same on the east limb as on the west.

Metallic prominences.

Metallic prominences were scarce during the half-year only seven being recorded, of which four were observed in the month of December. Details of these prominences are given in the following table :—

TABLE II.—LIST OF METALLIC PROMINENCES OBSERVED AT KODAIKANAL, JULY TO DECEMBER 1922.

Date.		Hour. I S T.	Base	Latitude.		Limb.	Height.	Lines.
				North.	South.			
1922		H. M.	°	°	°		"	
July	15	10 27	1	17·5		W	10	b_1, b_2, b_3, b_4, D_1, D_2.
October	22	8 40			7	W	120	4924·1, 5016, 5018·6, b_1, b_2, b_3, b_4, 5234·8, 5316·8, 5328·2, 5363·0, D_1, D_2, 6677.
November	18	8 18	8		12	W	20	b_1, b_2, b_3, b_4, D_1, D_2.
December	2	11 22			15	E	10	b_1, b_2, b_3, b_4, D_1. D_2.
	22	8 56	5	6		E	20	b_1, b_2, b_3, b_4, 5316·8, D_1, D_2, 6677, 7065.
	24	9 15	26	15		E	60	b_1, b_2, b_3, b_4, 5316 8, D_1, D_2.
	25	9 5	3		4·5	E	25	b_1, b_2, b_3, b_4, 5316·8, D_1, D_2.

The distribution in latitude of the metallic prominences was as follows :—

——	1° to 10°	11° to 20°	Mean latitude.	Extreme latitudes.
			°	° °
North	1	2	12·8	6 and 17·5
South	2	2	9·6	4·5 and 15

Four were on the east limb and three on the west.

Displacements of the hydrogen lines.

Particulars of the displacements observed in the chromosphere and prominences are given in the following table :—

TABLE III.—DISPLACEMENTS OF HYDROGEN LINES.

Date.		Time I.S.T.	Latitude.		Limb.	Displacement.			Remarks.
			North.	South.		Red.	Violet.	Both ways.	
						A	A.	A.	
1922		H. M.	°	°					
July	3	8 39	33·5		W	1			At top
	4	9 11		15	E		Slight		
	5	11 40		70·5	W	1			At top.
	25	8 37		28·5	W	Slight			
	26	10 20	21		E	0·5			
	28	8 38		17	W		Slight		
	29	8 35		42·5	E		2		
	29	10 31		3	W	Slight			
	31	8 32	78·5		E	0·5			
	31	8 30	71		E		Slight		At base.
August	4	8 26	75·5		E		Slight		
	7	8 5		43·5	W	Slight			At top.
	8	8 32		83	E	Slight			
	9	8 55	21		E	3			
	9	8 29	28		W	Slight			At top.
	12	9 10		38	W		1		Do
	13	9 1		45·5	W	0·5			Do.
	13	8 55	7		W	Slight			
	14	8 41	81·5		E	0·5			
	14	8 50	41·5		E		Slight		
	16	9 31		15	W	1			At top.
	21	8 35	73·5		W		Slight		
	22	8 41	15		E	Slight			
	25	8 31		19	E		0·5		
	26	9 14		31·5	E		Slight		
	26	9 46	30		W		4		At base.
September	1	8 22	9		W		Slight		At top.
	5	10 10		27·5	W		Slight		
	6	8 22		13·5	E	2			At base.
	10	8 40	32		E		0·5		Do.
	10	8 42	16		E	2			Do.
	10	8 32		70	W	1·5			Do.
	11	8 51	17		W	Slight			
	16	8 46		56·5	E		1		At top.
	18	8 39	33·5		W	1·5			Do.
	18	8 37	79·5		W	0·5			
	19	8 20	51·5		W	1			
	20	8 51		69	W		2		
	25	8 24	30		E	1			At base.
October	3	10 0	83		W	1			
	5	8 55	37·5		E	Slight			
	5	8 49		49	W	0·5			
	7	8 58		12	W	Slight			
	9	9 2	50		W		0·5		At base.
	10	8 44		19	E	1			
	10	8 39		79	E		Slight		
	13	8 48	64·5		E		Slight		
	18	9 0		77·5	E		0·5		At base.
	20	9 17	74		E	1			
	22	8 40		5	W	2			
	22	8 40		7	W		1		
	31	10 40		39	E	2			
November	6	8 38	3·5		W	2			
	13	8 41		61	W		0·5		
	13	8 28	71		W	1			
	14	9 30		43	W	0·5			At top.
	18	8 10	42		W		Slight		
	19	8 33		17	W	1			

Date.		Time I.S.T.	Latitude.		Limb.	Displacement.			Remarks.
			North.	South.		Red	Violet.	Both ways.	
1922		H. M.	°	°		A.	A.	A	
November	20	8 57	48		E		1		At base
	20	8 46		56	W	0·5			
	20	8 43		24·5	W	1·5			
	21	8 44	68		W	0·5			
	22	9 14	86·5		E	2			At top.
	22	8 54	78		E		1		Do
	22	8 43		56	E	0·5			At base.
	24	8 44	43		W		Slight		Do
	24	8 42	60 5		W	Slight			At top
December	2	11 22		15	E	0 5			
	7	9 14		20	E	1			At base.
	7	9 2	50		W	1			
	8	8 50	4		W	2			At top.
	8	8 46	49		W	1			Do.
	8	8 46	47		W	0·5			
	8	8 32	81		W		0·5		At base.
	11	9 8	7		E		Slight		At top.
	11	9 0		85	E	0·5			
	11	8 44		12	W	1			
	11	8 42		1	W		Slight		
	12	9 2	62		E	0·5			In chromosphere
	12	9 2	61		E		1		Do.
	12	9 22	59		W	0 5			
	13	9 11		12	W		3		At base.
	14	8 38	64		E		Slight		Do.
	14	8 35	59		E	Slight			
	14	8 40	78		W		Slight		
	15	8 25	49·5		W		Slight		
	17	8 51		27·5	W	1			
	17	8 46	56		W		Slight		At base.
	17	8 45	80		W	Slight			
	19	8 30		34	W		Slight		
	20	8 54		30	E	0·5			
	21	9 6	20		E	1			At base.
	21	8 46	54		W	1			
	23	8 54	79		E		Slight		At base.
	23	9 7	16		E	1	3		To red at base ; to violet at top.
	24	8 56	6·5		E	3			At base
	25	9 5		4·5	E	1·5	0·5		To red at base ; to violet at top.
	26	9 20	32·5		E	1			At top.
	28	8 27		78 5	E	Slight			

The total number of displacements was only 102 as against 213 in the first half-year. They were distributed as follows :—

Latitude.	North.	South.
1°—30°	17	23
31°—60°	20	12
61°—90°	21	9
Total ...	58	44

East limb	47
West limb	55
Total ...	102

Sixty-two displacements were towards the red and the rest towards the violet.

Reversals and displacements on the disc.

Thirty-two bright reversals of the Hα line, 6 dark reversals of the D_3 line and 13 displacements of the Hα line on the disc were observed during the half-year. Their distribution is shown below :—

	North.	South.	East.	West.
Bright reversals of Hα	15	17	18	14
Dark reversals of D_3	5	1	3	3
Displacements of Hα	9	4	9	4

Eleven of the displacements were towards the red and 2 towards the violet.

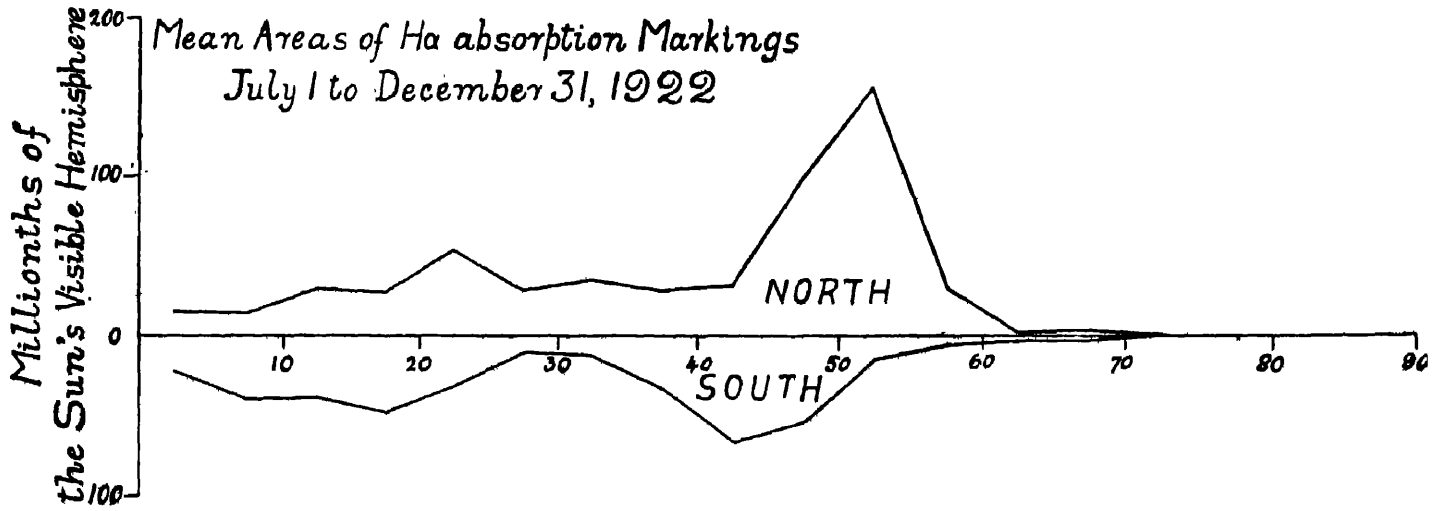
Prominences projected on the disc as absorption markings.

Photographs of the Sun's disc in Hα light were taken on 115 days counted as 94 effective days. The mean daily areas of Hα absorption markings in millionths of the Sun's visible hemisphere, corrected for foreshortening, and the mean daily numbers are given below :—

	Areas.	Numbers.
North	556	5·2
South	368	3·7
Total ...	924	8·9

There has been a great reduction in both areas and numbers amounting to about 65 per cent in the northern hemisphere and 52 per cent in the southern, compared with the previous half-year. Unlike prominences at the limb, the Hα markings still maintain a northern preponderance ; this means that the northern prominences were denser than the southern.

The distribution of the mean daily areas in latitude is shown in the following diagram :—



The diminution of activity is most marked in the region 0°—35° in the northern hemisphere. In both hemispheres the zone of maximum activity has moved 5° towards the equator.

There is again a large excess on the eastern side of the central meridian, the percentage east being 61·38 for areas and 54·46 for numbers.

THE OBSERVATORY, KODAIKANAL,
17th February 1923.

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MADRAS: PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS—1923.

PRICE, 8 *annas.*