

# Kodaikanal Observatory.

## BULLETIN No. CII.

### SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF THE YEAR 1932

In pursuance of the programme of work adopted since 1st January 1923 under the auspices of the International Astronomical Union, all observatories taking spectroheliograms of the sun have been asked to co-operate with the Kodaikanal Observatory by supplying copies of their photographs on those days when the Kodaikanal records are imperfect or wanting. In response to our requirements for the second half of the year 1932, the Mount Wilson Observatory supplied calcium ( $K_{85}$ ) prominences/plates for 55 days,  $H\alpha$  disc plates for 37 days and the Meudon Observatory supplied calcium ( $K_3$ ) disc plates for 6 days and  $H\alpha$  disc plates for 36 days.

When only incomplete or imperfect photographs for any day are available from more than one observatory, the best photograph is chosen as representing the solar activity of that day, after weighting it according to its quality, and the remaining photographs are ignored.

*Calcium Prominences at the Limb.*—The mean daily areas and numbers of prominences photographed during the half-year by means of the K line of calcium are given below. The means are corrected for incomplete or imperfect observations, the total of 178 days for which plates were available being reduced to 165 effective days

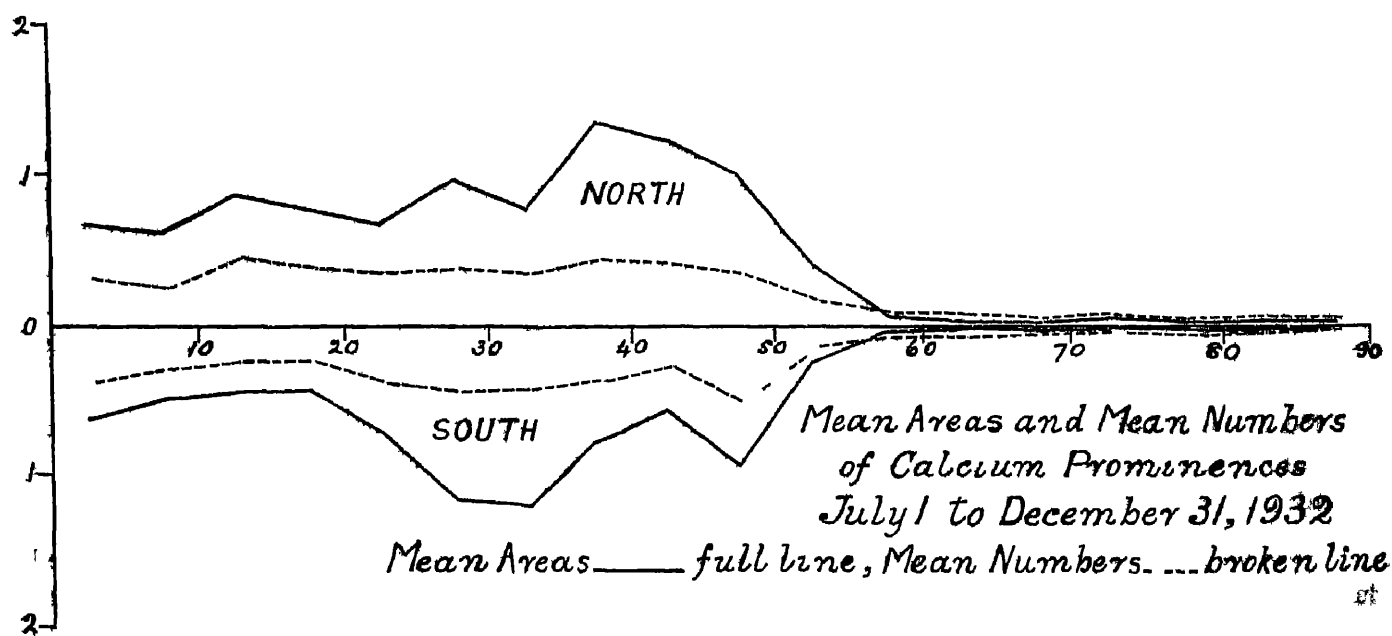
							Mean daily areas (square minutes).	Mean daily numbers.
North	..	...	..	..	.	...	0.96	4.34
South	...	.	...	...	...	..	0.77	4.07
							1.73	8.41
						Total ...		

Compared with the previous half-year, areas and numbers show a decrease of 33 per cent and 22 per cent, respectively.

For comparison with bulletins issued prior to the co-operation of other observatories, the means based on Kodaikanal photographs alone are also given, 143 days of observation being counted as  $122\frac{1}{2}$  effective days.

							Mean daily areas (square minutes)	Mean daily numbers
North (Kodaikanal photographs only)	..	..	.				0.98	4.50
South ( do. )	...	.	...				0.77	4.24
							1.75	8.74
						Total ...		

The distribution of prominences in latitude 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  $5^{\circ}$  of latitude. The ordinates represent tenths of a square minute of arc for the full line and numbers for the broken line. Compared with the previous half year, the distribution of activity exhibits some well marked differences. The peak near  $30^{\circ}$  N which was seen in the first half of the year has now disappeared from the northern hemisphere and is evidenced in the southern hemisphere where the activity near  $45^{\circ}$  has been much reduced.



The monthly, quarterly and half-yearly areas and numbers and the mean height and mean extent of the prominences on photographs from all co operating observatories are given in Table I. The unit of area is 1 square minute of arc. The mean height 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 —

TABLE I—ABSTRACT FOR THE SECOND HALF OF 1932

Months, 1932	Number of days (effective)	Areas	Numbers	Daily means		Mean height "	Mean extent °
				Areas	Numbers		
July	29	53.3	262	1.8	9.0	30.4	3.59
August	28	45.2	213	1.6	7.6	35.1	4.37
September	29½	50.6	230	1.7	8.0	35.1	3.33
October	28½	46.4	220	1.6	7.8	33.8	3.59
November	25½	41.0	216	1.6	8.4	33.7	3.06
December	24½	48.3	244	2.0	9.8	32.3	3.32
Third quarter	86½	149.1	705	1.7	8.2	33.4	3.74
Fourth quarter	78½	135.7	680	1.7	8.6	33.3	3.32
Second half year	165	284.8	1,385	1.7	8.4	33.3	3.54

*Distribution East and West of the Sun's Axis.*—Compared with the previous half-year, areas showed a slight defect and numbers an excess at the east limb as will be seen from the following table.—

1932 July to December.					East.	West.	Percentage East.
Total number observed	...	...	.	..	698	687	50.40
Total areas in square minutes	.	.	.	..	140.2	144.6	49.24

*Hydrogen Prominences at the Limb.*—During the half-year, photographs of the prominences in hydrogen light were taken at this observatory on 101 days which were counted as 75 effective days. The mean daily areas of hydrogen prominences in square minutes of arc, are given below.—

						Mean daily areas (square minutes)
North	..	.	..	..	..	0.36
South			...	.	...	0.26
Total						0.62

Compared with the previous half-year,  $H\alpha$  prominence areas show a decrease of 39 per cent. The ratio of  $H\alpha$  areas to calcium areas is 35 per cent. The curve of  $H\alpha$  prominences is intermediate between those of calcium prominences and  $H\alpha$  absorption markings.

*Metallic Prominences.*—There were no metallic prominences observed during the half-year.

*Displacements of the Hydrogen Line.*—Particulars of the displacements observed in the chromosphere and prominences are given in the following table.—

*H $\alpha$*   
TABLE II.—DISPLACEMENTS OF HYDROGEN LINES.

Date	Time I S.T.		Latitude.		Limb	Displacement			Remarks
			North.	South		Red.	Violet	Both ways.	
1932	H	M.							
July	27	9 57		2	E		Slight		At top.
	28	9 53		25	W		0.5		
August	13	8 40		47.5	E		0.5		At top
	14	9 25	83		E	0.5			In chromosphere
	15	10 13		26	E		Slight		Do
	25	8 10	24.5		E	1.5			At top
		8 04		24	W		0.5		In chromosphere
September	15	8 47	52.5		W	0.5			Do
	21	8 35	80		W	0.5			At top.
	23	8 30		62	W	0.5			Do
		8 20		2	W		1		At base
	24	8 40		78.5	W		1		At top
October	20	9 45	2		W	1.5			Do
November	9	11 15		80	E	1			Do
	16	9 0		77.5	E		Slight		Do
	17	8 58		33	E		1		Do
	30	9 56	31		W	0.5			Do
December	5	9 02	48.5		E		0.5		Do
		9 07	21.5		E	1			In chromosphere
	8	9 08	58		E	0.5			At base
	18	8 55	14.5		W	2			At top Displaced 2.5 A to Red at 9h 15m
	21	9 20	8		W	Slight			At top
	27	8 39		28	W	0.5			In chromosphere.
	28	9 16		7	E		0.5		At top
		9 27	15		W	1			At top. Extends over 2° from + 14° to + 16°.

The total number of displacements was 25 as against 80 in the previous half-year and their distribution was as follows —

	North	South
1°—30°	6	7
31°—60°	4	2
61°—90°	2	4
	—	—
Total	12	13
	—	—
East limb		12
West limb		13
		—
Total		25
		—

Of the displacements, 14 were towards the red and 11 towards the violet

*Reversals and Displacements on the Sun's Disc*—Twenty-three bright reversals of the H $\alpha$  line, 28 dark reversals of the D $\beta$  line and 1 displacement of the H $\alpha$  line were observed during the half-year. Their distribution is given below —

	North	South	East	West
Bright reversals of H $\alpha$	16	7	11	12
Dark reversals of D $\beta$	15	8	12	11
Displacements of H $\alpha$	1		1	

The one displacement observed was towards the red

*Prominences projected on the Disc as Absorption Markings*—Photographs of the sun's disc in H $\alpha$  light were available from Kodaikanal and the co-operating observatories for a total of 176 days, which were counted as 163 effective days. The mean daily areas of H $\alpha$  absorption markings (corrected for foreshortening) in millionths of the sun's visible hemisphere and their mean daily numbers are given below —

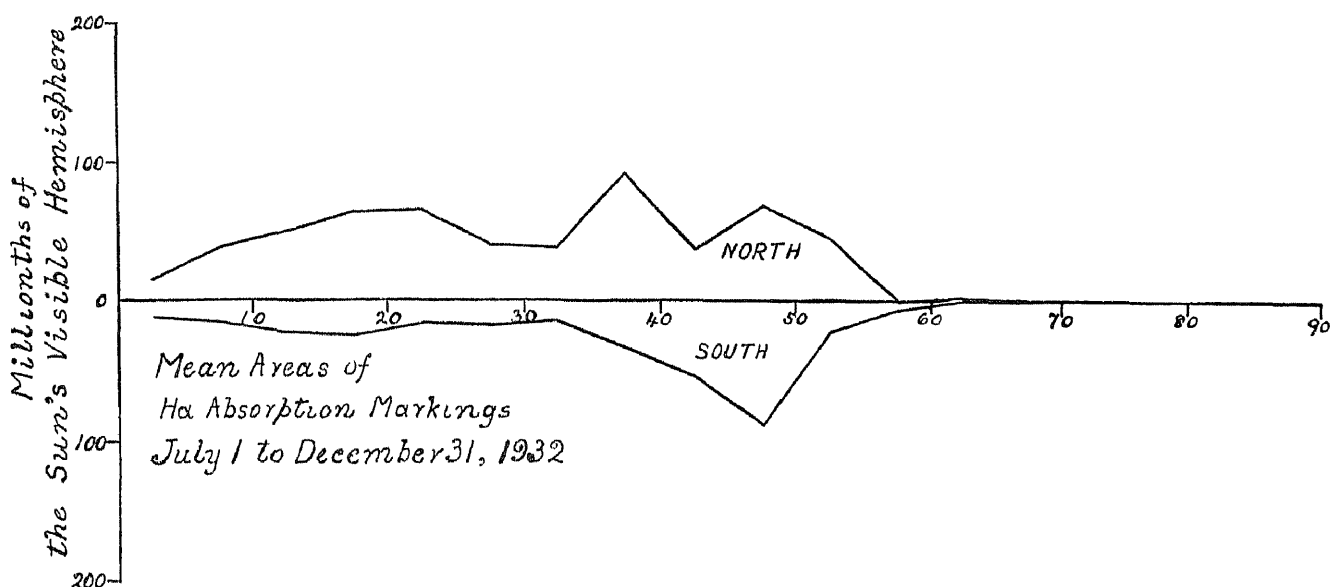
	Mean daily areas	Mean daily numbers
North	553	3 88
South	335	2 48
	—	—
Total	888	6 36
	—	—

The above show a decrease of 48 per cent in areas and 41 per cent in numbers, compared with the previous half-year

For comparison with bulletins issued prior to the co-operation of other observatories, the means based on Kodaikanal photographs alone are also given, 120 days of observation being reckoned as 99 effective days,

	Mean daily areas	Mean daily numbers
North (Kodaikanal photographs only)	589	3 95
Do do	292	2 17
	—	—
Total	881	6 12
	—	—

The distribution of the mean daily areas in latitude is shown in the following diagram. The high latitude peak in the southern hemisphere is much reduced, while that in the belt 40°—45° in the northern hemisphere has shifted 5° towards the equator



Both areas and numbers show an eastern preponderance, the percentage east being 54 and 51, respectively, for areas and numbers. The areas of H $\alpha$  absorption markings uncorrected for foreshortening are given below.—

									Mean daily areas
North	...	..	..	..	...	..	...	...	325
South	..	..	..	...	...	...	...	...	168
									493
								Total ..	493

The uncorrected areas amount to 56 per cent of the corrected ones as against 51 per cent for the previous half-year.

The curve of distribution in latitude is similar to that for the corrected areas as usual.

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

KODAIKANAL,  
13th September 1933.

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