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Kodaikanal Observatory.

BULLETIN No. C.

SUMMARY OF PROMINENCE OBSERVATIONS FOR THE FIRST 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 first half of the year 1932, the Mount Wilson Observatory supplied calcium (K_{3s}) prominence plates for 17 days and $H\alpha$ disc plates for 6 days ; the Meudon Observatory supplied calcium (K_3) disc plates for 5 days and $H\alpha$ disc plates for 12 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 182 days for which plates were available being reduced to 172½ effective days.

	Mean daily areas (square minutes)	Mean daily numbers
North	1·31	5 50
South	1·27	5·25
Total .	2 58	10·75

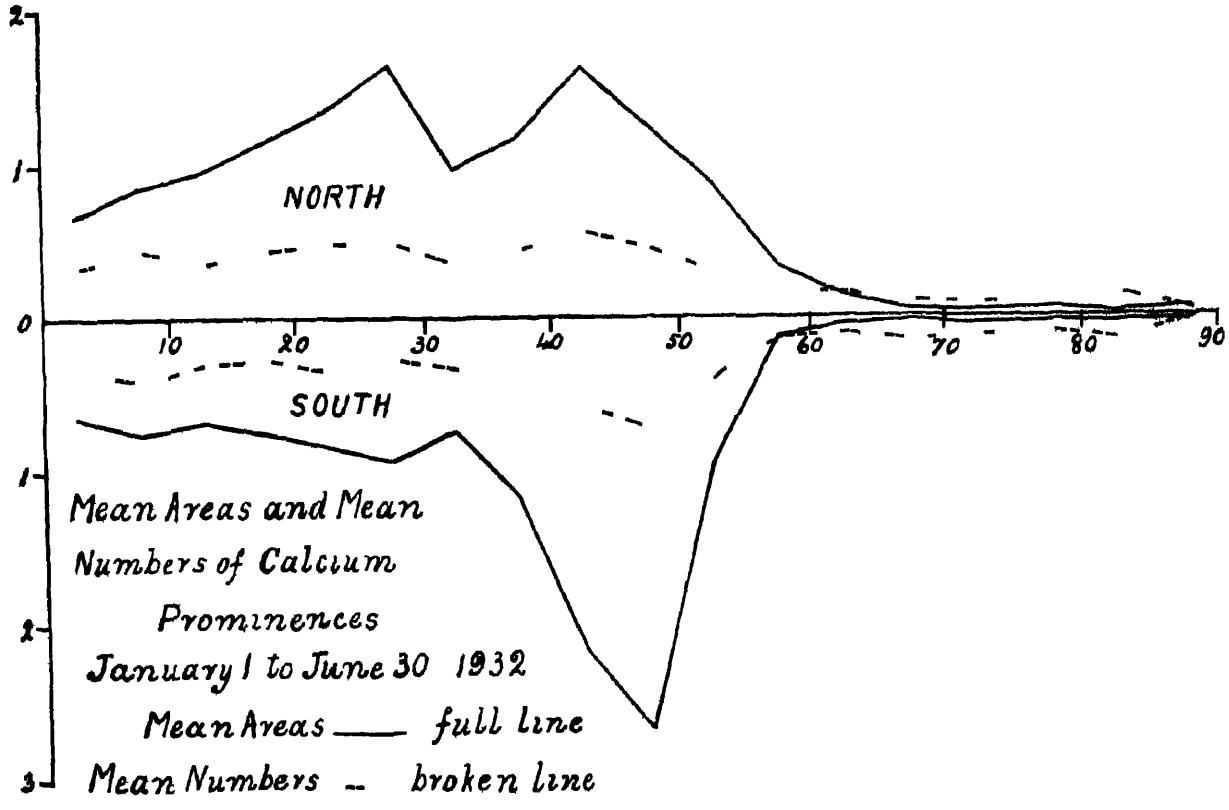
Compared with the previous half-year, areas and numbers show a decrease of about 33 per cent and 11 per cent respectively.

For comparison with bulletins issued prior to the co-operation of other observatories the means based on Kodaikanal photographs alone are also given, 171 days of observation being counted as 158 effective days.

	Mean daily areas (square minutes)	Mean daily numbers
North (Kodaikanal photographs only)	1·35	5·58
South (do.)	1 32	5 36
Total .	2 67	10·94

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° 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 is almost the same in the southern hemisphere but there are two peaks in the northern hemisphere in the belts 25°—30° and 40°—45°, as against

one in the belt 45 —50 in the previous half year The peak that occurred in the belt 45 —50 in the northern hemisphere during the previous half year has shifted 5 towards the equator



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 FIRST HALF OF 1932

Months 1932	Number of days (effective)	Areas	Numbers	Daily means		Mean height	Mean extent
				Areas	Numbers		
January	29½	87 1	33	2 9	11 3	30 3	4 70
February	27	81 4	336	3 0	12 4	28 4	3 61
March	29½	9 2	337	3 1	11 4	31 6	4 33
April	28½	72 3	297	2 5	10 3	32 8	3 71
May	28½	54 6	264	1 9	9 3	31 3	3 48
June	29	57 4	284	2 0	9 8	32 3	3 92
First quarter	86½	259 7	1 010	3·0	11 7	30 1	4 21
Second quarter	86½	184 3	845	2 1	9 8	32 1	3 71
First half year	172½	444 0	1 855	2 6	10 7	31 0	3 98

Distribution East and West of the Sun's Axis

As in the previous half year both areas and numbers showed a defect at the east limb as will be seen from the following table —

1932 January to June	East	West	Percentage east
Total number observed	884	971	47 65
Total areas in square minutes	204 8	239 1	46 14

Hydrogen Prominences at the Limb.

During the half-year, photographs of the prominences in hydrogen light were taken in this Observatory on 158 days which were counted as 141½ effective days. The mean daily areas of hydrogen prominences in square minutes of arc, are given below :—

	Mean daily areas (square minutes)
North	0·49
South	0·52
Total ...	1·01

Compared with the previous half-year, Hα prominence areas show a decrease of about 27 per cent. The percentage of Hα areas to calcium areas is 38. The curve of distribution of Hα prominences is similar to that of calcium prominences.

Metallic Prominences.

Two metallic prominences were observed during the half-year. The details are given below :—

TABLE II.—LIST OF METALLIC PROMINENCES—JANUARY TO JUNE 1932.

Date	Time I S T.	Base.	Latitude. North	Latitude. South	Limb	Height	Lines.
1932	H M	°	°	°		"	
January 2	.. 12 25	1	16 5	.	E	10	b_4, b_3, b_2, b_1, D_2 and D_1
7	. 9 20	3	..	12 5	W	25	b_4, b_3, b_2, b_1, D_2 and D_1.

Displacements of the Hydrogen Line.

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

TABLE III —DISPLACEMENTS OF THE HYDROGEN LINE.

Date.		Time I S T.	Latitude. North	Latitude. South	Limb	Displacement Red	Displacement Violet.	Displacement Both ways	Remarks.
1932.		H M.	°	°		A.	A	A	
January	1	8 55	79 5		E		1		At base
	2	12 36		27	W		Slight.		In chromosphere
	5	9 5	72 5		W	Slight			At top
	6	9 40	20		W		1		Do.
		9 17		58	E	Slight			In chromosphere.
	7	9 20		12 5	W		2		At top.
	9	9 26		88 5	W	2			Do.
	10	9 0		32	W	0 5			Do
	17	9 17		10	W		0 5		At base.
		9 15		3	W	1			At top.
	18	8 56	45		E		0 5		At base.
		9 7	30		E	Slight			At top.
	19	8 47	32		W	Slight			
	20	9 24	74		E		Slight		At top
		9 19		10	E		1		A detached filament displaced throughout

Date.		Time I.S.T.	Latitude. North.	Latitude. South.	Limb.	Displacement. Red.	Displacement. Violet	Displacement. Both ways.	Remarks.
1932.		H M.	°	°		A	A.	A.	
	24	9 47		7	E	1			In chromosphere.
	25	9 12		39	W		Slight		Do.
	26	8 56	17		E		0·5		
		8 58	1		E	Slight			
		8 48	79		W			1	
	29	9 15	66		W	0·5			At base.
		9 14	81		W	Slight			Do.
	31	8 51	83		E		0·5		
		8 58		24	W		0·5		
February	1	9 8		1	E		0·5		At base.
	2	9 16		14	W		0·5		Do.
	4	8 54	36·5		W	1			At top
		8 54	39·5		W	2·5			At top; extends over 6° from 37° to 43°
	7	9 40	42·5		E	1			At top.
	8	9 4	12		W		0·5		At base.
	10	15 14		61·5	E		Slight		Do.
	11	9 6		3·5	E		2·5		At top.
	15	8 44		46	E		0·5		At base.
	16	8 37	74·5		E		Slight		In chromosphere.
	23	8 52		10	W		0·5		
	26	9 33		26	W	1·5			At top.
	27	10 1		12	W		1		Do.
	3	9 14	14		W		0·5		At top.
	5	9 41	4		W	Slight			Do.
	7	10 15	23·5		E	1			Do.
	10	9 0	41		E	1			In chromosphere.
		8 47	4		W	Slight			Do.
	11	9 48	16		W	0·5	1·5		
	13	10 24	41		E	Slight			At top.
	20	8 34	4		W	1			At top; extends over 4° from + 2° to + 6°.
		8 30	48·5		W	1			At top.
	21	8 50		32·5	W	0·5			At top; extends over 2° from − 32° to − 34°.
	28	8 54	49·5		W	1			At top.
	31	9 13		29	W	0·5			Do.
April	1	10 59	36		E	1			At top.
	2	10 1	22		E	1			Do.
	5	9 0		24	W			1	
	7	9 5	5		E	1			At top.
	9	9 4	Equator		E	1			At base.
	14	9 9		29·5	W	1			At top.
		9 8	6		W	0·5			In chromosphere.
	16	9 31		20	E	Slight			At base
	18	8 30	20·5		W	Slight			In chromosphere
	25	10 7		81·5	W		0·5		At base.
	26	9 35	68·5		E	0·5			In chromosphere.
		9 30		54	W	0·5			Do.
	28	9 21		57·5	E	0·5			Do.
	29	9 44	55·5		W	0·5			
	30	10 17	15·5		W	3			At top.
May	1	9 37	11		W		0·5		At top.
	2	8 34	15		W		Slight		At base.
		8 34	18		W	1			At top.
	3	9 17		16	W	0·5			In chromosphere.
	6	9 0	67		W		Slight		At top.
	12	8 50	5		W		0·5		In chromosphere
	13	9 9		72·5	W		1		Do.
		8 39	42		W		0·5		Do.
	29	9 30	9		W	1			At top.
June	6	9 7		9	E		0·5		At top.
	10	9 17		48	W	0·5			Do.
		9 16		39	W	1·5			Do.
	20	9 48		68·5	E		Slight		Do.
	21	9 14	14		E	0·5			Do.
		8 45	18		W		0·5		At base.

The total number of displacements was 80 as against 57 in the previous half-year and their distribution was as follows —

	North	South
Equator	1	...
1° to 30°	24	19
31° to 60°	12	9
61° to 90°	10	5
Total	47	33
East limb	...	29
West limb		51
Total		80

Reversals and Displacements on the Sun's Disc.

One hundred and ten bright reversals of the H_α line, 100 dark reversals of the D_3 line and 8 displacements of the H_α line were observed during the half-year. Their distribution is given below .—

	North.	South	East	West
Bright reversals of H_α	65	45	47	63
Bright reversals of D_3	61	39	40	60
Displacements of H_α	6	2	4	4

Seven displacements were towards the red and one towards the violet

Prominences projected on the Disc as Absorption Markings

Photographs of the sun's disc in H_α light were available from Kodaikanal and the co-operating observatories for a total of 177 days, which were counted as 171 effective days. The mean daily areas of H_α absorption markings (corrected for foreshortening) in millionths of the sun's visible hemisphere and their mean daily numbers are given below —

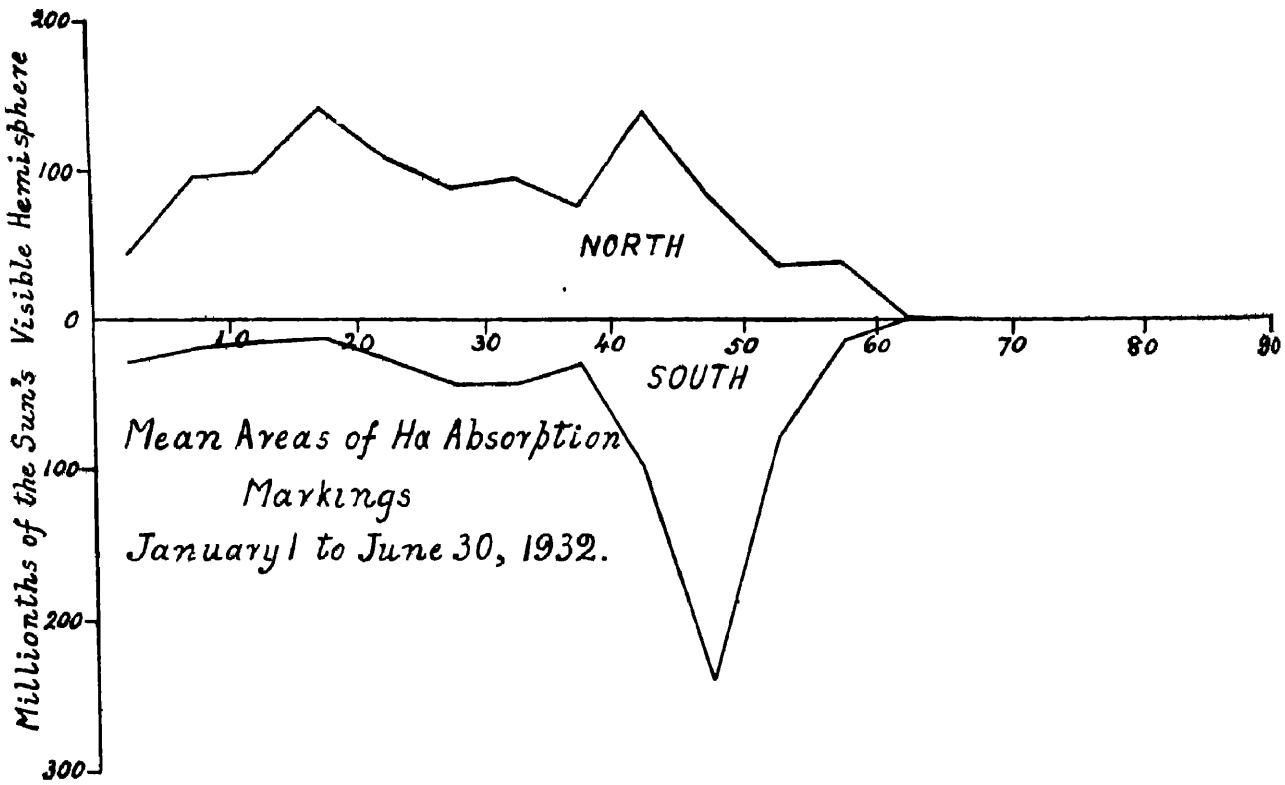
	Mean daily areas	Mean daily numbers
North	1,057	6·89
South	657	3·88
Total	1,714	10 77

The above show a decrease of 21 per cent in areas and of 24 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, 164 days of observation being reckoned as 156 effective days

	Mean daily areas	Mean daily numbers
North (Kodaikanal photographs only)	1,003	6·37
South (do.)	629	3·65
Total	1,632	10·02

The distribution of the mean daily areas in latitude is shown in the following diagram. The high latitude peak in the northern hemisphere has shifted 5° towards the equator while that in the southern hemisphere persists in the belt 45°–50° :—



The areas and numbers show an eastern defect, the percentage east being 48 and 47 for areas and numbers respectively The areas of H_α absorption markings uncorrected for foreshortening are given below :—

	Mean daily areas.
North	553
South	318
Total ...	871

The uncorrected areas amount to 51 per cent of the corrected ones as against 56 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,
25th February 1933

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