REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1935.

This report is concerned with the astronomical and seismological work of the Kodaikanal Observatory. The meteorological data will be published in the " India Weather Review " and administrative details will be incorporated in the annual report of the India Meteorological Department.

2. With the advance of the new sunspot cycle, there has been a further increase in all forms of solar activity over that of the year 1934. The mean daily number of spots showed an increase of 293 per cent, the mean daily areas of calcium prominences an increase of 26 per cent, the mean daily numbers of calcium prominences an increase of 2 per cent and Hα absorption markings an increase of 123 per cent.

The collection of spectroheliograms from other observatories for those days on which complete records could not be obtained at Kodaikanal was continued as part of the programme of the International Astronomical Union. The data of solar activity given in this report are, however, based on Kodaikanal photographs only, as photographs from other observatories will not be available until a considerable time after the end of the year.

Daily character figures of solar activity as regards Hα bright flocculi and Hα dark markings for the year 1935 were communicated to the Observatoire Fèdèral, Zurich, under the auspices of the International Astronomical Union. The character figures for K bright flocculi from Kodaikanal plates are communicated by the Cambridge Observatory combined with their own. Five original photoheliograms were supplied to the Greenwich Observatory, 318 original calcium disc spectroheliograms to the Cambridge Observatory and 21 positive copies of Hα disc spectroheliograms to the Meudon Observatory.

3. *Weather Conditions.*—Weather conditions were less favourable for solar observations than during the previous year. The mean value of the definition in the north dome before 10 a.m. was 2·6 on a scale in which 1 is the worst and 5 the best, whilst the number of days on which the definition was estimated as 4 or above was 31 as against 19 in the previous year.

4. *Photoheliograph.*—Photographs of the sun on a scale of 8 inches to the sun's diameter were taken on 324 days using a 6-inch achromatic object glass and green colour screen.

5. *Spectroheliographs.*—Monochromatic images of the sun's disc in K light were obtained on 309 days, prominence plates in K light on 289 days and Hα disc plates on 261 days. The total number of spectroheliograms obtained during the year was 2,312.

6. *Six-inch Cooke Equatorial and Spectroscope.*—Work with this instrument has been continued on the same lines as formerly for the visual observations of solar phenomena which cannot be readily photographed.

7. *Spectrohelioscope.*—Regular observations with the Hale spectrohelioscope were made on all days excepting Sundays and holidays, whenever the weather permitted. With the increase in solar activity there has been a corresponding increase in the number of solar eruptions and of displacements in them. Details of the observations have been communicated to Meudon and Mount Wilson Observatories.

8. *Research Work.*—The Director and the Assistant Director continued their photometric studies of the calcium lines in different parts of the sun's disc, and the Director continued his similar study of the hydrogen lines. The measures have been interpreted to give the densities of the atoms of calcium and hydrogen in the lower part of the sun's reversing layer. Preliminary results give the following values :—

neutral calcium $7 \cdot 8 \times 10^{10}$ atoms per c.c.
ionised calcium $2 \cdot 1 \times 10^{13}$,, ,, ,,
hydrogen (2 quantum state) $3 \cdot 4 \times 10^{10}$ atoms per c.c.

The Director has observed in full day light the bright reversal of the infra-red oxygen triplet in the sun's chromosphere which is evidence of great abundance of oxygen to considerable heights in the chromosphere.

2. *Sunspots.*—The following table gives the monthly numbers of new groups observed at Kodaikanal and their distribution between the northern and southern hemispheres. The mean daily numbers are also given.

1935	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Year.
New Groups .	8	12	11	9	11	13	8	16	19	17	15	20	159
North . .	2	4	5	4	5	5	2	9	12	9	6	8	71
South . .	6	8	6	5	6	8	6	7	7	8	9	12	88
Mean daily numbers . .	1·9	1·8	1·9	1·0	2·1	3·1	2·3	2·7	3·5	4·2	3·9	4·6	2·8

Compared with the previous year, the number of new groups observed was 179 per cent. in excess of that of last year and the mean daily numbers showed an increase of 293 per cent. The number of days on which the sun was found to be free from spots was only 20 as against 165 in the previous year. The approximate mean latitude of spots was $21^{0} \cdot 7$ in the northern hemisphere and $22^{0} \cdot 1$ in the southern hemisphere. Bright reversals and displacements of the Hα line observed on the disc in the neighbourhood of sunspots also showed a considerable increase over the previous year. Bright reversals numbered 369 as against 118 in 1934. The displacements observed numbered 28, while the numbered observed in the previous year was 14. Of these 12 were towards the red, 7 towards the violet and 9 both ways simultaneously. D_3 was observed as a dark line on 303 occasions as against 106 in 1934.

10. *Prominences.*—The mean daily areas and numbers of calcium prominences as derived from Kodaikanal spectroheliograms were as follows :—

	North	South	Total	
	Areas.			
1935—January to June .	2·01	2·50	4·51	sq. mins.
July to December .	2·54	2·61	5·15	sq. mins.
	Numbers.			
1935—January to June .	6·80	6·86	13·66	
July to December .	6·67	6·58	13·25	

The southern hemisphere showed a slight preponderance of activity over the northern. The distribution in latitude showed a maximum of activity near latitude 50°, which is 5° nearer the poles than in 1934.

Twenty metallic prominences were observed during 1935, as against 8 in the previous year. Of these, 3 were observed in the northern hemisphere and 17 in the southern hemisphere, between the latitudes 17° and 34° from the equator. Displacements of the hydrogen line in the chromosphere and prominences observed during the year numbered 174, as against 137 observed in 1934. Of these 99 were towards the red, 66 to the violet and 9 both ways simultaneously.

The mean daily areas of prominences projected on the disc as hydrogen absorption markings amounted to 4447 millionths of the sun's visible hemisphere, as against 1990 during the previous year, showing an increase of 123 per cent. Their distribution in latitutde is similar to that of calcium prominences, with the difference that the peaks of activity are more emphasised than in the latter, so that a secondary maximum of activity near 30° stands out in the former distribution.

11. *Time.*—The error of the standard clock is usually determined by reference to the 16-hour signal distributed from the Alipore Observatory, Calcutta. The reception of the signal at Kodaikanal is rendered possible by the courtesy of the Telegraph Department which permits the time signals to be joined through to this observatory. The signal was received accurately on most days and all failures were reported to the Postmaster General, Madras. In addition wireless time signals were received from Colombo, Calcutta and Rugby.

12. *Seismology.*—The Milne-Shaw seismograph recorded 182 earthquakes during the year. For details of records, reference may be made to the " India Weather Review ".

13. *Publications.*—The annual report for the year 1934 and the following bulletins were published during the year.

No. 104. Summary of Prominence Observations for the second half of 1933.

No. 105. Summary of Prominence Observations for the first half of 1934.

No. 106. Summary of Prominence Observations for the second half of 1934.

No. 107. Oxygen in the Sun's Chromosphere by Dr. T. Royds.

In addition the Director has contributed a note on " Oxygen in Sun's Chromosphere " to Nature, Volume 136, No. 3441, pp. 606, 607.

KODAIKANAL;
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