

REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1933.

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. *Preliminary.*—There has been a large decline in the case of sunspot activity, but some forms of prominence activity show a general increase over the figures of 1932. The mean daily number of spots shows a decrease of 51 per cent, and the mean daily numbers of calcium prominences a decrease of 7 per cent, whereas the mean daily areas of calcium prominences, $H\alpha$ prominences and $H\alpha$ absorption markings show an increase of 5 per cent, 35 per cent and 58 per cent, respectively.

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 $H\alpha$ bright flocculi and $H\alpha$ dark markings for the year 1933 and also for the year 1917 were communicated to the Observatoire Fédéral, 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. Nine original photoheliograms were supplied to the Greenwich Observatory, 323 original calcium disc spectroheliograms to the Cambridge Observatory and 27 $H\alpha$ disc spectroheliograms (copies) to the Meudon Observatory.

3. *Weather conditions.*—Weather conditions obtaining in the morning 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 2.3 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 16 as against 27 in the previous year.

4. *Photoheliograph.*—Photographs of the sun on a scale of 8 inches to the sun's diameter were taken on 332 days using a 6-inch achromatic object glass and a green colour screen.

5. *Spectroheliographs.*—Monochromatic images of the sun's disc in K light were obtained on 327 days, prominence plates in K light on 303 days, $H\alpha$ disc plates on 281 days and $H\alpha$ prominence plates on 265 days. The total number of spectroheliograms obtained during the year was 2,643.

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 the solar phenomena which cannot be readily photographed.

7. Four staff meetings were held during the year.

8. Observations of star transits and of wireless time signals were taken from October to December 1933 in connexion with International Longitude Programme of 1933.

9. *Research work.*—Solar research during the year was mainly confined to microphotometric study of selected lines in the solar spectrum.

Summary of Sunspot and Prominence Observations.

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

1933.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	6	4	2	2	3	2	3	...	4	3	...	...	29
North ...	6	4	2	2	3	1	3	..	2	2	...	...	25
South ...	...	...	..	...	...	1	...	...	2	1	...	...	4
Mean daily numbers.	1.2	1.1	0.8	0.3	0.3	0.4	0.1	..	0.3	0.2	...	..	0.4

Compared with the previous year, the number of new groups observed has decreased by 59 per cent, and the mean daily numbers showed a decline of 60 per cent. During the year the sun was free from spots on 237 days as against 122 days during the previous year. The preponderance of activity in the northern hemisphere which was exhibited during previous years has very much increased, as shown by the above table. The approximate mean latitude of spots was $8^{\circ}6'$ in the northern hemisphere and $13^{\circ}0'$ in the southern hemisphere. Bright reversals of $H\alpha$ line in the neighbourhood of spots numbered 78 as against 133 in the previous year. Only 3 displacements of the $H\alpha$ line on the disc were noticed during the year as against 9 in the previous year. Two of these were towards red and 1 towards violet. D_s was observed as a dark line on 68 occasions as against 123 during the previous year.

11. *Prominences.*—The mean daily areas of calcium prominences in square minutes of arc, as derived from the Kodaikanal spectroheliograms are as follows :—

	North.	South.	Total.
1933—January to June ...	1.28	0.89	2.17 sq. mins.
July to December ...	1.47	0.99	2.46 ..

The preponderance of activity in the northern hemisphere shown in the previous year is still maintained. The greatest activity is mainly confined to latitudes between 20° and 50° .

The mean daily numbers of calcium prominences were 9'6 and 8'8, respectively, in the first and second halves of the year.

Three metallic prominences were observed during the year as against two in the previous year. Of the three, two were observed in the northern hemisphere and one in the southern all being at about 9° of latitude from the equator. Displacements of the hydrogen line in the chromosphere and prominences observed numbered 86 as against 105 in the previous year. Of the displacements 48 were towards red, 36 towards violet and 2 both ways simultaneously.

The mean daily areas of prominences projected on the disc as absorption markings in hydrogen light were 2,118 millionths of the sun's visible hemisphere. Their latitude distribution is similar to that of the prominences, except that in the second half of the year the activity in the northern hemisphere is mainly confined to the belt 40°—50°, which is not the case for the prominences at the limb.

The mean daily areas of H α prominences in square minutes of arc are as follows :—

	North.	South.	Total.
1933—January to June ...	0'64	0'45	1'09 sq. mins.
July to December ...	0'70	0'41	1'11 „

The distribution in latitude is generally similar to that of the calcium prominences.

12. *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 from the source to be joined through to this observatory. The signal is received with accuracy on most days and all failures are at once reported to the Postmaster-General, Madras. In addition, wireless time signals were also regularly received from Colombo, Calcutta and Rugby.

13. *Equipment*.—A spectroheliograph was received on loan from Mt. Wilson Observatory and is being set up.

14. *Seismology*.—The Milne-Shaw seismograph recorded 91 earthquakes during the year. For details of records, reference may be made to the "India Weather Review."

15. *Publications*.—The annual report for the year 1932 and the following bulletins were published during the year :—

"On the Resonance Lines of Thallium and their probable absence in the Sun" by Dr. A. L. Narayan. Bulletin No. 99.

Summary of Prominence Observations for the first half of 1932. Bulletin No. 100.

"The Hydrogen Content of Prominences," by Mr. C. P. S. Menon. Bulletin No. 101.

Summary of Prominence Observations for the second half of 1932. Bulletin No. 102.

KODAIKANAL,
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