REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1923

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REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1923.

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

2. *Preliminary.*—The routine work with the photoheliograph, spectroheliographs and the visual observations of solar phenomena was continued in 1923 as in former years. Under the auspices of the International Astronomical Union, the Kodaikanal Observatory has this year begun to collect spectroheliograms from other observatories for those days when observations could not be made at Kodaikanal. This necessitates delay in the publication of the half-yearly bulletins but it is hoped that the greater completeness of the data will more than compensate for the delay. The data of solar activity given in this report are, however, based on Kodaikanal photographs only as in former years, for photographs from other observatories will not be available until a considerable time after the end of the year.

3. *Weather conditions.*—Owing to persistent cloudy weather in some months, the observing conditions were less favourable for solar work than normally. The mean definition in the north dome before 10 a.m. was 2·9 on a scale in which 1 is the worst and 5 the best, while the number of days on which the definition was estimated as 4 or above was 35.

4. *Photoheliograph.*—Photographs on a scale of 8 inches to the Sun's diameter were taken on 321 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 308 days, prominence plates on 270 days and Hα disc plates on 277 days. The daily programme with the spectroheliographs was maintained uninterrupted throughout the period of reroofing of the building.

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

7. *Grating spectrographs.*—During February and March, the spectroheliograph building was reroofed. The spectrograph had to be dismantled during this operation and valuable time was taken in its re-erection and readjustment after the construction work was completed.

Studies of arc spectra have been made during periods of bad weather. Experimenters have previously observed that some arc lines become double or triple according to the amount of vapour present in the arc, and have suggested that this was an effect of the electric force due to atomic fields. This was chosen for further investigation as it promised to furnish evidence of the atomic fields operating in the Sun. If the tripling of arc lines is really due to atomic fields it ought to occur with many spectrum lines instead of being an exceptional occurrence. The visible spectra of many substances were therefore searched through, and

each line was examined for the tripling effect when the amount of vapour was largely increased, but only about a dozen lines have been found to triple in the visible spectra of many substances tried. The most suitable of these lines were thoroughly investigated and though the experiments are not quite completed, it appears likely that in all cases the apparent tripling is a misinterpretation of what is actually taking place.

A new series of comparisons of the solar spectrum with that of iron was commenced during the year.

8. *Registration of the Hα line.*—A device has been added to the Hα spectroheliograph for registering the Hα line step by step across the Sun's disc. Only a few photographs were taken during the year, partly owing to a temporary shortage of red sensitive plates.

Summary of sunspots and prominence observations.

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

——	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	4	4	3	2	3	4	3	..	4	3	3	2	35
North	3	2	3	1	2	2	2	...	2	1	1	2	21
South	1	2	...	1	1	2	1	...	2	2	2	...	14
Daily numbers ...	0·6	0·2	0·3	0·5	0·4	0·7	0·3	...	1·0	1·0	0·9	0·3	0·5

The above figures indicate a decrease of about 50 per cent in the number of new groups as compared with the year 1922.

The approximate mean latitude of the spots was 10° 4 in the northern hemisphere and 13°·2 in the southern.

The appearance of a few high latitude spots since September indicates that the minimum period has passed and the new cycle has commenced.

The number of bright reversals of the Hα line in the neighbourhood of spots was 55, whilst the number of displacements observed on the disc was 18, of which 15 were towards the red. D_3 was observed as a dark line on 17 occasions.

10. *Prominences.*—The mean daily areas in square minutes of arc derived from the Kodaikanal photographic records are shown below :—

	North.	South.	Total.
1923—January to June	2·48	2·10	4·58
July to December	2·22	1·96	4·18

The mean daily numbers were 15·8 and 15·1 respectively in the two half-years.

Compared with the previous year, these figures show an increase of 35 per cent in the case of areas and 44 per cent in numbers.

The distribution in latitude was identical in the two periods of six months and shows very little change from that of the year 1922.

Only eight metallic prominences were observed during the year, of which 6 were in the northern hemisphere.

A northern preponderance is also shown in the case of displacements of the hydrogen lines at the limb of which 357 were recorded as against 315 during the year 1922. 181 of these displacements were towards the red.

Prominences projected on the disc as absorption markings show a 13 per cent increase on the activity in the second-half of 1922 but a decrease of 37 per cent on the whole year of 1922. During 1923 the mean daily area observed (corrected for foreshortening) amounted to 2,089 millionths of the Sun's visible hemisphere.

There was an excess of prominences in the western hemisphere throughout the year, while the Hα absorption markings showed a western excess during the first half-year and an eastern excess during the second.

11. *Magnetic observations.*—The Survey of India, on whose behalf the magnetic observations at Kodaikanal have been undertaken, intimated that the observations were not required from 1st October 1923 and they were in consequence completely discontinued from that date. During the period January to September 57 "Moderate" magnetic storms were registered by the self-recording instruments.

12. *Time.*—The error of the standard clock is usually determined by reference to the 16-hour signal from the Madras Observatory. This is rendered possible by the courtesy of the Telegraph Department which permits the Madras wire 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.

13. *Seismology.*—The Milne horizontal pendulum recorded 121 earthquakes during the year. For details of the records, reference may be made to the annual summary of the "India Weather Review."

14. *Library.*—83 volumes were bound during the year.

15. *Publications.*—The annual report for the year 1922 and the following bulletins were published and distributed during the year:—

LXXI. Summary of prominence observations for the second-half of the year 1922.

LXXII. Report of the Indian Eclipse Expedition to Wallal, West Australia, by J. Evershed, F.R.S.

LXXIII. The effect on wave-length in arc spectra of introducing various substances into the arc, by T. Royds, D.Sc.

KODAIKANAL,
13*th February* 1924.

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