REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1924

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REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1924.

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 Meteorological Department.

2. *Preliminary.*—The routine work of the Observatory was continued on the same lines as in former years. Under the auspices of the International Astronomical Union, the Kodaikanal Observatory has begun, with effect from 1st January 1923, to collect spectroheliograms from other observatories for those days on which records could not be made at Kodaikanal. 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.

3. *Weather conditions.*—Except in the months of June and July, the observing conditions were on the whole favourable for solar work. 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 30.

4. *Photoheliograph.*—Photographs on a scale of 8 inches to the Sun's diameter were taken on 328 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 329 days, prominence plates on 290 days and Hα disc plates on 294 days.

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 spectrograph.*—A series of comparisons of the solar spectrum with arc spectra has been obtained during the year, and the measurement of these photographs for displacement of the solar lines has been in progress during the year. A vacuum pump has recently been added to the equipment of the Observatory and comparisons with the arc *in vacuo* will be commenced as soon as opportunity affords.

The research on the tripling of arc lines mentioned in last year's report has been completed. The thallium line 5350 proved to be the most suitable line for furnishing the clue to the tripling phenomenon. This line can assume five distinct phases according to the amount of

material in the arc. It was demonstrated that all the lines which undergo tripling, except two difficult cases, were essentially close doublets and the several phases which they assume could be completely explained as stages in the process of reversal of the two components of the doublet. There is consequently no ground for believing that the tripling is due to electrical resolution due to atomic fields, and the phenomenon cannot be utilised to estimate atomic fields in the Sun. The results of this research have been sent in for publication but have not yet appeared.

8. *Study of the Hα line.*—The detailed study of the Hα line has been continued throughout the year. Whenever it seemed profitable, spectroheliograms with the slit set on the edge of the Hα line were obtained in addition to the routine spectroheliograms with the slit set centrally for the record of dark markings. Three features are evidenced which appear to be typical of sunspot disturbances :—(1) a bright ring round the sunspot, (2) outside this a dark flocculus more or less extensive and (3) between the dark flocculus and the coarse reseau of the general undisturbed surface of the Sun there is a bright surround consisting of bright patches larger than in the general reseau, interspersed by dark features sometimes suggestive of the spot vortex. The phenomena in the lower levels of the Sun's atmosphere thus revealed are believed to be a necessary accompaniment of spot disturbances.

Summary of sunspot 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 visible are also given.

——	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	2	3	...	4	10	5	11	8	6	6	8	9	72
North	2	2	...	3	5	4	9	6	4	5	7	8	55
South	...	1	.	1	5	1	2	2	2	1	1	1	17
Daily numbers ...	0·1	0·3	0·1	0·6	1·8	1·5	2·3	1·8	1·6	2·0	1·5	1·3	1·2

There has been a steady increase in activity since the previous year.

The approximate mean latitude of the spots was 23.°7 in the northern hemisphere and 24.°9 in the southern.

One group, evidently belonging to the old cycle, appeared on the visible disc at about latitude +5° on 9th July 1924, persisted during nearly 3½ revolutions of the Sun and crossed the central meridian

on four occasions. It was quiescent during all its apparitions on the visible hemisphere.

Disturbances of the hydrogen and helium lines on the disc have also increased. The number of bright reversals of the Hα line in the neighbourhood of spots was 158, whilst the number of displacements observed on the disc was 51, of which 37 were towards the red. D_3 was observed as a dark line on 74 occasions.

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

——	North.	South.	Total.
1924—January to June	2·71	2·17	4·88
July to December	3·23	2·33	5·56

The mean daily numbers were 16·0 and 15·1, respectively, in the two half-years.

Compared with the year 1923, the above figures indicate an increase of 19 per cent in areas, the increase being more marked in the northern hemisphere.

The distribution in latitude was much the same as in the year 1923, with maxima at 50° in both the hemispheres, but a definite increase of activity has been shown in the lower latitudes.

Prominences showing metallic lines were recorded on 12 occasions, all of them during the second half of the year. Of these, ten were in the northern hemisphere. All the metallic prominences were in positions characteristic of the high latitude spots of the new cycle.

Three hundred and twenty-nine displacements of the hydrogen lines were observed in the chromosphere and prominences. Of these, 185 were towards the red.

Prominences projected on the disc as absorption markings showed a large increase compared with the previous year. Their distribution in latitude during the second half of the year was markedly different from that of prominences at the limb during the same period and shows a well-defined secondary maximum at about latitude 30° in both the hemispheres.

There was an excess of prominence areas in the eastern hemisphere and of numbers in the western throughout the year. In the case of Hα absorption markings, both areas and numbers showed a western excess during the first half-year and an eastern excess during the second.

11. *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.

12. *Seismology.*—The Milne horizontal pendulum recorded 87 earthquakes during the year. For details of the records, reference may be made to the "India Weather Review."

13. *Library.*—Ninety-nine volumes were bound during the year.

14. *Publications.*—The annual report for the year 1923 and the following bulletin were published and distributed during the year :—

LXXIV. Summary of prominence observations for the first half of the year 1923, by T. Royds, D.Sc.

In addition Mr. P. R. Chidambara Ayyar has contributed a short paper in support of "The Limelight of the Moon—An Alternative Theory"—Popular Astronomy, Vol. XXXII, No. 9.

KODAIKANAL,
23*rd January* 1925.

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