REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1927

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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.*—The sun in 1927 has failed to show any marked increase in activity over the year 1926. Spot numbers show an increase of only 7 per cent, prominence numbers an increase of 7 per cent, whilst prominence areas show a decrease of 15 per cent and prominences seen on the disc by absorption a decrease of 20 per cent.

The collection of spectroheliograms from other observatories for those days on which 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.

The Director has reported to the International Astronomical Union the desirability of further co-operation for more complete prominence data.

3. *Weather conditions.*—Weather conditions obtaining in the morning were on the whole favourable for solar observations. The mean definition in the north dome before 10 a.m. was 2·8 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 33.

4. *Photoheliograph.*—Photographs on a scale of 8 inches to the sun's diameter were taken on 336 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 333 days, prominence plates on 294 days and Hα disc plates on 328 days. During the year a total of 2533 spectroheliograms was obtained.

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

7. The alterations to the Hα spectroheliograph mentioned in the last report have formed the principal work of the year. Considerable forethought has been necessary in order to carry out the alterations

with the minimum of interruption of the routine work of the spectroheliographs. The replacement of the fixed feet of the spectroheliograph by movable bases was carried out without the loss of a single day's record. The necessary remodelling of the Hα spectroheliograph involved the loss of six days' record of Hα plates, the loss being necessitated chiefly because the optical parts were not available until the old spectroheliograph was dismantled. The whole of the new Hα spectroheliograph is of metal, mostly aluminium or light alloy, whereby greater stability has been secured but nevertheless the weight of the moving parts of the Hα spectroheliograph has been reduced from 74 lb. (excluding optical parts) to 40 lb. The remodelling of the Hα spectroheliograph was carried out in December so far as was essential to renew the routine Hα photographs. It was not completed in its final stage by the end of the year for certain improvements in the minor supports seemed desirable, but it is anticipated that these and other refinements necessary to take full advantage of the remodelling can be carried out later without loss of record.

8. A newly designed holder of the occulting disc for prominence spectroheliograms has proved invaluable for the photography of rapidly changing prominences by enabling the position of the disc to be changed instantaneously. The greater heights above the sun's surface can only be included in the spectroheliograph by displacing the sun's centre some distance from the central position on the slit plate. The new holder enables the occulting disc to be moved eccentrically to fit the sun's image without loss of time which is invaluable when extremely rapid changes are taking place.

9. Some progress has been made on the review of prominence activity. Mr. P. R. Chidambara Ayyar has found that the variation in prominence areas is due more to a variation in the extent of base than in the height of prominences. Details of this will be included in the review.

10. A daylight comet of extraordinary brilliance was seen near the sun from December 15th to December 18th. The Director was absent from Kodaikanal at this time and the observations were made by Mr. P. R. Chidambra Ayyar who has prepared a bulletin giving details. The comet is now known as Skjellerup's comet of 1927 but appears to have been first seen by Mrs. K. Botes in South Africa on December 2nd. It was independently discovered by many observers and has been remarkable for its extraordinary brilliance when nearest the earth.

11. The transit of Mercury on 10th November 1927 was observed at the request of the Union Astronomer, Johannesburg. Owing to bad weather, only the second contact was observed here and only the third at the Madras Observatory by Mr. A. A. Narayana Ayyar.

12. At the request of the British Research Association for the Woollen and Worsted Industries, Leeds, a number of dyed fabrics were exposed to sunlight to test their fading.

Summary of sunspot and prominence observations.

13. *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 of spots visible are also given:—

1927.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	26	26	28	22	31	21	16	15	24	24	25	23	281
North	9	17	14	11	12	6	6	4	12	11	9	11	122
South	17	9	14	11	19	15	10	11	12	13	16	12	159
Mean daily numbers.	5·3	6·9	5·4	5·4	6·2	3·8	3·4	3·2	4·5	5·3	4·8	3·4	4·8

There has been an increase of activity of 7 per cent on the previous year, as indicated by the above figures, and the southern hemisphere has predominated over the northern.

The approximate mean latitude of the spots was 15°·9 in the northern hemisphere and 14°·7 in the southern.

Bright reversals of the H*α* line in the neighbourhood of sunspots numbered 803, as against 705 in 1926. Displacements of the H*α* line on the disc totalled 308, an increase of over 40 per cent on the previous year. Of these displacements 220 were towards the red, 82 towards the violet and 6 both ways simultaneously. D_3 was observed as a dark line on 643 occasions, as against 456 in 1926.

14. *Prominences.*—The mean daily areas in square minutes of arc derived from Kodaikanal photographic records are as follows :—

——	North.	South.	Total.
1927—January to June	4·15	3·58	7·73
July to December	3·03	2·47	5·50

The mean daily numbers were 19·4 and 19·7 for the first and second half years respectively. Compared with the year 1926 areas show a decrease of 15 per cent and numbers an increase of 7 per cent.

The maximum of prominence activity in high latitudes showed an advance of 10° towards the poles during the first half year when compared with the second half of 1926, but during the second half of 1927 the activity in high latitudes has almost subsided according to areas although still evident in numbers. In other respects the distribution in latitude is of a similar type to that of the second half of 1926.

Prominences exhibiting metallic lines numbered only 81 whereas 152 occurred in 1926. All occurred below latitude 50°. In several features however there was an increase in solar activity during 1927. The number of hydrogen displacements in prominences and in the chromosphere was 787 as against 650 in 1926 but 535 of them occurred in the first half of the year. Of the displacements 456 were towards

the red, 322 towards the violet and 9 both ways simultaneously. The most remarkable displacement occurred in the eruptive prominence of the 14th March 1927 of which further details are given in Kodaikanal Observatory Bulletin No. LXXXIII.

The mean daily area of prominences projected on the disc as absorption markings in hydrogen light was 3,766 millionths of the sun's visible disc, a reduction of over 20 per cent on the year 1926. Their distribution in latitude is similar to that in 1926.

15. *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.

On most days of the year the Colombo time signal at 11h. 30m. has been received on the Director's private wireless set and is loud enough to be transmitted to the office over the telephone.

16. *Seismology.*—The Milne horizontal pendulum recorded 102 earthquakes during the year. For details of the records reference may be made to "The India Weather Review".

17. *Library.*—One hundred and nine volumes were bound during the year.

18. *Publications.*—The annual report for the year 1926 and Kodaikanal Observatory Bulletins Nos. LXXX and LXXXI dealing with the prominence observations of 1926 were published and distributed during the year.

KODAIKANAL,
22*nd February* 1928.

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