REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1930

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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.*—In accordance with the normal course of the sunspot cycle, there has been a decline in every form of solar activity during the year 1930. The mean daily number of spots shows a decrease of 33 per cent and the mean daily number and areas of prominences show a decrease of 13 and 14 per cent respectively below the year 1929. In the case of prominences projected on the disc as absorption markings in hydrogen light there was a decrease of 19 per cent when compared with the preceding year.

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.

Daily character figures for solar activity as regards H*α* bright flocculi and H*α* dark markings for the year were communicated to the Observatoire Federal, 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. Fifteen original photoheliograms were supplied to Greenwich Observatory, 325 original calcium disc spectroheliograms to Cambridge Observatory and 30 copies of hydrogen disc spectroheliograms to Meudon Observatory.

3. *Weather conditions.*—Weather conditions obtaining in the morning were less favourable for solar observations than in the previous year. The mean value of the definition in the north dome before 10 a.m. was 2·4 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 only 16.

4. *Photoheliograph.*—Photographs on a scale of 8 inches to the sun's diameter were taken on 330 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 299 days, H*α* disc plates on 292 days and H*α* prominence plates on 272 days. A total of 2,457 spectroheliograms were obtained during the year.

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. Eleven staff meetings were held during the year for the discussion of scientific subjects.

8. Preliminary suggestions as regards the wireless determination of longitudes in 1933 have been received from the International Astronomical Union and steps are being taken to participate in the International scheme.

9. *Research work.*—Dr. Royds has measured the heights of Hα absorption markings from spectroheliograms of the 4 years 1926—1929. The mean height of the highest portion of an absorption marking is found to be 33″·5 above the chromosphere, and of the lowest portion 28″·0. This evidence proves that the lowest parts of prominences seen at the limb do not show by absorption (of Hα light) when on the face of the sun.

Dr. Narayan has photographed spark spectra of Tl and Pb with a view to identification of lines due to successive stages of ionisation. He is studying the iron lines in different parts of the electric arc by means of the Lummer-Gehrcke plate. He has also begun preparations for investigating the magnetic fields in sunspots.

Mr. P. R. Chidambara Ayyar has found that one day sunspots are less frequent between longitudes 30°—50° from the central meridian. The effect is less marked for spots of longer duration.

Mr. Salaruddin has measured 2 years plates for the average change in the projected areas of Hα dark markings as they cross the sun's disc.

Mr. A. S. Rao, Madras University Research scholar, has prepared his M.Sc. thesis on the spark spectra of lead from work carried out at the Observatory.

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 the northern and the southern hemispheres. The mean daily number of spots visible are also given.

1930.	January.	February.	March.	April.	May.	June.	July	August.	September.	October.	November.	December.	Year.
New groups ...	23	14	17	20	17	15	16	10	14	8	13	10	177
North	16	5	11	13	11	11	7	5	6	5	9	7	106
South	7	9	6	7	6	4	9	5	8	3	4	3	71
Mean daily numbers.	4·9	3·8	2·8	3·3	3·5	2·5	2·3	2·2	2·8	2·0	2·3	2·3	2·9

Compared with that of the previous year, the number of new groups observed has fallen by 27 per cent, and the mean daily numbers show a decrease of 33 per cent. Unlike in the previous year, the northern hemisphere now shows a large preponderance over the southern. The approximate mean latitude of spots was 10°·9 in the northern and 10°·1 in the southern hemisphere. Bright reversals of the Hα line in the neighbourhood of sunspots numbered 450, while those observed in the previous year were 813. Displacements of the Hα line on the disc totalled 55 as against 172 in 1929. Of these displacements 39 were towards the red, 7 towards the violet and 9 both ways simultaneously. D_3 was observed as a dark line in 435 cases as against 790 during 1929.

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

——	North.	South.	Total.
1930—January to June	3·13	2·16	5·29
July to December	1·26	1·96	3·32

The mean daily numbers were 12·3 and 12·9 for the first and second half-years respectively. The decrease below the year 1929 is 14 per cent for areas and 13 per cent for numbers, although during the first half of the year there was an increase in activity in the northern hemisphere.

The latitude distribution of prominence areas is similar to that of 1929 except that in the first half of 1930 the secondary maximum near 50° is absent in the southern hemisphere.

Prominences exhibiting metallic lines numbered 38 as against 52 in the year 1929. While in general they are not noticed beyond latitude 30°·5, one faint prominence of this type was observed at 45° on the north-west limb during the second half-year. Displacements of the hydrogen line in the chromosphere and prominences observed during the year numbered 276 as against 598 in the previous year. Of the displacements 142 were towards the red, 122 towards the violet and 12 both ways simultaneously.

The mean daily areas of prominences projected on the disc as absorption markings in hydrogen light was 3,437 millionths of the sun's visible hemisphere after correcting for foreshortening, representing a decrease of 19 per cent on the year 1929.

The mean daily areas of hydrogen prominences in square minutes are as follows :—

——	North.	South.	Total.
1930—January to June	1·22	1·00	2·22
July to December	0·48	0·66	1·14

These areas are only 42 per cent of calcium areas in the first half-year and 34 per cent in the second. The distribution of H*a* prominences in latitude is similar to that of calcium prominences and H*a* absorption markings.

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 time signals 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 Lummer-Gehrcke plate of quartz measuring 200 × 30 × 8 mm. and an electro-magnet have been added to the laboratory equipment.

14. *Seismology.*—The Milne horizontal pendulum recorded 95 earthquakes during the year. For details of the records, reference may be made to the "India Weather Review".

15. *Publications.*—The annual report for the year 1929, and the Kodaikanal Observatory Bulletins Nos. LXXXVII and LXXXVIII containing the summary of prominence observations for the first and second half of the year 1929 by Drs. A. L. Narayanan and T. Royds respectively, were published and distributed during the year. The manuscript of the Kodaikanal Observatory Bulletin No. LXXXIX, on the rotation and height of H*a* absorption markings by Dr. T. Royds was sent to the press for publication.

In addition the following papers were published or communicated for publication during the year by the staff of the observatory :—

(*a*) On the third Spark Spectrum of Lead by A. S. Rao and A. L. Narayanan, Zeitschrift für Physik. Band 61.

(*b*) On the Spectrum of Doubly Ionised Tl. by A. S. Rao. Ind. Jr. Physics, Vol. V.

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