REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1929

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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 1929 has shown considerably less activity than in the previous year, the mean daily number of spots showing a decrease of 12 per cent and the mean daily numbers and areas of prominences showing a decrease of 23 and 29 per cent respectively. There was, however, a slight increase of 4 per cent over the year 1928 in the case of prominences projected on the disc as absorption markings in hydrogen light.

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.

Copies of 117 spectroheliograms were supplied during the year to the Meudon Observatory on request.

Daily character figures for solar activity as regards H*a* bright flocculi and H*a* 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.

3. *Weather conditions* :—Weather conditions obtaining in the morning were on the whole slightly more favourable for solar observations than in the previous year as shown by the larger number of photographs that could be taken during the year. The mean value of the definition in the north dome before 10 a.m. was, however, only 2·6 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 29, slightly less than in the previous year.

4. *Photoheliograph* :—Photographs on a scale of 8 inches to the sun's diameter were taken on 340 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 355 days, prominence plates in K light on 298 days and H*a* disc plates on 295 days. Besides these, the taking of prominence plates in H*a* light was also continued as part of the daily programme of the Observatory and the total number of days on which these photographs were obtained was 248. On the whole 2,563 spectroheliograms were taken 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. Important part of the work during the year has been the monthly meetings of the staff at which important contributions to solar physics, appearing in the periodicals, are reviewed.

8. The Director went on deputation to Pattani to observe the total solar eclipse of 9th May 1929 and he joined the expedition of the Joint Eclipse Committee of the Royal Society and Royal Astronomical Society. Observations of prominences, etc., were taken at Kodaikanal and cabled to Pattani on the 8th, in order to enable the expedition to be prepared for any possible limb phenomena. Special observations were also made in the observatory during the solar eclipse on 9th May. Though the conditions of weather were not quite favourable, a complete series of spectroheliograms and photoheliograms and a complete series of observations with Dobson's spectrograph were taken.

9. Observations with the Dobson spectrograph were continued till nearly the end of 1929 and the plates sent to Dr. Dobson.

10. The Director of the Observatory, Marseilles, has promised his co-operation by sending prominence spectroheliograms, under the scheme of co-operation instituted by the International Astronomical Union.

11. Dr. Hale of the Mount Wilson Observatory has offered the loan of a spectrohelioscope and asked the co-operation of this observatory in a plan for the study of the sun with this instrument. The offer has been accepted and co-operation promised.

Summary of sunspot and prominence observations.

12. *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 numbers of spots visible are also given.

1929.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	28	22	18	16	16	24	23	25	24	15	18	17	246
North	16	8	8	7	10	9	11	13	16	7	8	8	121
South	11	14	10	9	6	15	12	12	8	8	10	8	123
Mean daily numbers.	4·7	4·7	3·4	3·7	4·1	5·4	5·0	4·6	3·2	3·3	4·0	5·2	4·3

Compared with that of the previous year, the actual number of new groups observed has fallen by 8 per cent, and the mean daily

numbers show a decrease of 12 per cent. The preponderance in the southern hemisphere has still persisted though weakened. On the whole it appears that the maximum of the sunspot cycle occurred in the year 1928. The approximate mean latitude of the spots was 10°·9 in the northern and 11°·7 in the southern hemisphere. Bright reversals of the Hα line in the neighbourhood of sunspots numbered 813, as against 915 in 1928. Displacements of the Hα line on the disc totalled 172, a decrease of 51 per cent on those of the previous year. Of these displacements 124 were towards the red, 44 towards the violet and 4 both ways simultaneously. D_3 was observed as a dark line on 790 occasions, as against 841 during 1928.

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

——	North.	South.	Total.
1929—January to June	2·55	2·58	5·13
July to December	2·07	3·03	5·10

The mean daily numbers were 15·2 and 14·2 for the first and second half-years, respectively. Compared with the year 1928 areas and numbers show a decrease of 29 and 23 per cent respectively.

The distribution of prominence areas shows that the maximum of activity during the year is between 20° and 30° of latitude in both the hemispheres. A peak which existed near 60° in the southern hemisphere during the first half-year is found to be 10° lower down during the second half-year. The activity near the poles has practically subsided.

An eruptive prominence photographed on the 5th September 1929 reached a height of 13′ or nearly 567,000 km. above the chromosphere.

Prominences exhibiting metallic lines numbered 52 as against 79 in the year 1928. None of these was beyond latitude 32°·5. Displacements of the hydrogen line in the chromosphere and prominences observed during the year numbered 598 as against 1,067 in the previous year. Of the displacements 354 were towards the red, 214 towards the violet and 30 both ways simultaneously.

The mean daily areas of prominences projected on the disc as absorption markings in hydrogen light was 4,259 millionths of the sun's visible disc, an increase of 4 per cent over the year 1928. The distribution in latitude is nearly similar to that of prominences on the limb.

14. *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, the wireless time signals were also regularly received from Colombo, Calcutta and Rugby. Time signals from Bordeaux were also received for the first three months, but were discontinued as they were received in inconvenient time.

15. *Equipment:*—A quartz prism spectrograph with a sparking set by Adam Hilger and a 10 ft. concave grating spectrograph, the Eagle mounting of which was made at the Observatory workshop, have been added to the equipment of the Observatory.

16. *Seismology:*—The Milne horizontal pendulum recorded 86 earthquakes during the year. For details of the records, reference may be made to the "India Weather Review."

17. *Publications:*—The annual report for the year 1928, and the Kodaikanal Observatory Bulletins Nos. LXXXV and LXXXVI containing the summary of prominence observations for the first and second half of the year 1928, by Dr. T. Royds and Dr. A. L. Narayan, respectively, were published and distributed during the year. In addition, the following papers were published or communicated for publication during the year by the staff of the Observatory :—

(*a*) "Further regularities in the spectrum of doubly ionised Arsenic" by Dr. A. L. Narayan (Zeitschrift Fur Physik).

(*b*) "On the series spectrum of doubly ionised Lead" by Dr. A. L. Narayan (Zeitschrift Fur Physik and Nature).

(*c*) "On the structure of the trebly ionised spectrum of Lead" by Dr. A. L. Narayan (Zeitschrift Fur Physik).

(*d*) Variations in the bases and heights of prominences" by Mr. P. R. Chidambara Ayyar.

KODAIKANAL,
12*th February* 1930.

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