REPORT

OF THE

KODAIKANAL OBSERVATORY

FOR THE YEAR

1931

PUBLISHED BY THE MANAGER, GOVERNMENT OF INDIA
CENTRAL PUBLICATION BRANCH, CALCUTTA

1932

REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1931.

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.*—There has been a further decline in solar activity during the year 1931. The mean daily number of spots shows a decrease of 41 per cent, the mean areas of calcium prominences show a decrease of 3 per cent and hydrogen prominences a decrease of 20 per cent, the mean daily number of prominences alone indicating an increase of 8 per cent. In the case of prominences projected on the disc as hydrogen absorption markings there was a decrease of 38 per cent when compared with the previous year.

The collection of spectroheliograms from other observatories for those days on which complete 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 of solar activity as regards H*α* bright flocculi and H*α* dark markings for the year 1931 as well as for the period 1923—1928 were communicated to the Observatoire Fèdèral, 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. Thirteen original photoheliograms were supplied to Greenwich Observatory, 324 original calcium disc spectroheliograms to Cambridge Observatory and 24 copies of spectroheliograms to Meudon Observatory.

3. *Weather conditions.*—Weather conditions obtaining in the morning were slightly more favourable for solar observations than the previous year except in the month of December which was below average in this respect. 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 13.

4. *Photoheliograph.*—Photographs of the sun on a scale of 8 inches to the sun's diameter were taken on 327 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 324 days, prominence plates in K light on 303 days, H*α* disc plates on 301 and H*α* prominence plates on 282 days. The total number of spectroheliograms obtained during the year was 2,722.

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. Seven staff meetings were held during the year.

8. *Research work.*—Dr. Narayan has studied the nuclear moments of Indium and Thallium and has published a short note on the subject in "Nature".

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

Mr. G. V. Krishnaswami Ayyangar, M.A., Reader in Mathematics of the Annamalai University, was permitted to do research at Kodaikanal and has measured the time of rotation of Hα dark markings in the equatorial region. His results are given in a bulletin of the Kodaikanal Observatory.

The Director has compared the calcium and hydrogen prominences in spectroheliograms for the years 1929—31 and the results will be published shortly.

Summary of sunspot and prominence observations.

9. *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.

1931.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups ...	6	16	10	11	13	5	12	9	9	8	8	7	114
North	5	11	5	8	10	1	6	5	6	3	6	5	71
South	1	5	5	3	3	4	6	4	3	4	2	2	42
Equator	...	...	...	...	...	...	...	..	...	1	...	...	1
Mean daily numbers.	1·1	2·8	2·3	2·8	1·9	0·7	1·9	1·3	1·6	1·0	1·3	1·5	1·7

Compared with the previous year, the number of new groups observed has decreased by 36 per cent, and the mean daily numbers have fallen by 41 per cent. During the year there were 52 days on which the sun's disc was free from spots, the number of such days during the previous year being only 7. The preponderance of the northern hemisphere over the southern noticed in the previous year has continued during the year. The approximate mean latitude of spots was 8°·8 in the northern and 9°·6 in the southern hemispheres. Bright reversals of the Hα line in the neighbourhood of sunspots numbered 300 as compared with 450 observed during the previous year. Displacements of the Hα line on the disc totalled 37, as against 55 in the year 1930. Of

these displacements, 27 were towards the red, 8 towards the violet and 2 both ways simultaneously. D_3 was observed as a dark line on 283 occasions as against 435 during 1930.

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

	North.	South.	Total.
1931—January to June	2·18	2·06	4·24
July to December	2·13	2·08	4·21

The above figures indicate nearly equal activity in the northern and southern hemispheres and in the two halves of the year in contrast to the situation in 1930. A peak in the latitudes 40°—50° is the principal feature in the latitude distribution of prominences which is very similar in the northern and southern hemispheres. The mean daily numbers were 14·0 and 13·3 for the first and second halves of the year respectively being an increase of 8 per cent over 1930, whilst areas show a decrease of 3 per cent.

Prominences exhibiting metallic lines numbered 25 as against 38 in the year 1930. There was only one observed during the second half of the year, and none was seen above latitude 18°·5. Displacements of the hydrogen line in the chromosphere and prominences observed during the year numbered 245 as against 276 in the previous year. Of the displacements, 150 were towards the red, 80 towards the violet and 15 both ways simultaneously.

The mean daily areas of prominences projected on the disc as absorption markings in hydrogen light was 2,140 millionths of the sun's visible hemisphere, representing a decrease of 38 per cent on the previous year. In the southern hemisphere there is a well-marked minimum between latitudes 20° and 40° in both halves of the year.

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

	North.	South.	Total.
1931—January to June	0·74	0·63	1·37
July to December	0·76	0·63	1·39

These areas are about 33 per cent of calcium areas. The curve of distribution of H*a* prominences in latitude is generally similar to that of calcium prominences.

11. *Time.*—The error of the standard clock is usually determined by reference to the 16-hour signal by telegraph line. From the 15th October onwards, the 16-hour signal is distributed from Calcutta instead of from Madras. The reception of the signal at Kodaikanal is rendered possible by the courtesy of the Telegraph Department which permits the time signals from the source 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.

12. *Equipment.*—The 8-inch equatorial of the Madras Observatory has been transferred to the Kodaikanal Observatory.

A new Milne-Shaw seismograph has been received, which will replace the old Milne Horizontal Pendulum seismograph.

13. *Seismology.*—The Milne Horizontal Pendulum recorded 112 earthquakes during the year. For details of the records, reference may be made to the "India Weather Review".

14. *Publications.*—The annual report for 1930 and the following bulletins were published and distributed during the year :—

LXXXIX. The Rotation of H*α* Absorption Markings and their Height above the Sun, by T. Royds, D.Sc.

XC. Summary of Prominence Observations for the first half of the year 1930, by T. Royds, D.Sc.

XCI. On the Spark Spectra of Lead, by A. S. Rao, M.A. (Hon.).

XCII. Summary of Prominence Observations for the second half of the year 1930, by T. Royds, D.Sc.

In addition, a short note on the hyperfine structure of Indium and Thallium by Dr. A. L. Narayan was published in "Nature", October 17, 1931.

T. ROYDS,
Director,
Kodaikanal and Madras Observatories.

KODAIKANAL,
4th February 1932.

MADRAS : PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS—1932.