

## REPORT\* OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1945

This report embodies the data of solar activity based on observations made exclusively in this Observatory.

The year 1945 has witnessed a marked increase in all forms of solar activity over the previous year.

The collection of spectroheliograms from other observatories for those days on which incomplete records were obtained here, has been resumed and accordingly 14 positives on film of H $\alpha$  flocculus and 5 positives on film of calcium flocculus photographs for the year 1939 were received from Meudon Observatory, France. 55 original negatives on glass of the photoheliograms for the years 1939 and 1940 were supplied to the Astronomer Royal, Greenwich Observatory. 62 positives of calcium flocculus plates for the last quarter of 1942 and 68 for the third quarter of 1943 were supplied to the Solar Physics Observatory, Cambridge. 105 H $\alpha$  flocculus positives and 24 calcium flocculus positives for the years 1939 to 1944 were supplied to the Meudon Observatory, France.

Daily character figures of solar activity according to H $\alpha$  bright flocculi and absorption markings were communicated to Professor Brünner, Zürich, for inclusion in the Quarterly Bulletin on Solar Activity. Daily character figures from calcium flocculi were also worked out and sent to Professor Brünner.

2. *Observing conditions.*—During this year, the weather conditions being more favourable than in the previous year, there has been an increase in the number of days of observation. The conditions for solar observations were practically the same as in the previous year. The mean value of definition noted in the north dome before 11 A.M. (I.S.T.) was 2.86 on a scale in which 1 is the worst and 5 the best, as against 2.63 of the previous year; there were 58 days on which the definition was estimated to be 4 or above as against 39 of the previous year.

3. *Photoheliograph.*—Direct photographs of the sun on a scale of 8" to the sun's diameter were taken on 305 days using a 6-inch achromatic object glass and a green filter.

4. *Spectroheliographs.*—Photographs of the monochromatic images of the sun's disc in K light were obtained on 294 days, prominence plates in K light on 283 days and H $\alpha$  disc plates on 270 days. A total of 1541 spectroheliograms was obtained during the year.

5. *Six-inch Cooke Equatorial and Spectroscope.*—Visual observations of solar phenomena which could not be readily photographed were continued with this instrument as in previous years.

6. *Spectrohelioscope.*—Observations with this instrument were made on all days of favourable weather, except on Sundays and public holidays, special attention being paid to the bright chromospheric eruptions and breaking of dark markings. A quarterly list of chromospheric eruptions together with the times of observations were communicated to Prof. Brünner of Zürich.

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\*This report deals chiefly with the astronomical 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.

7. *Research work.*—The band spectra of the oxides of Ca, Cu, Sc and Y have been photographed by the Director in the Red and Infra-red with a view to identifying these in the solar spectrum.

8. *Sun-spots.*—The following table gives the monthly numbers of new groups observed at Kodaikanal and their distribution between northern and southern hemispheres. The mean daily numbers are also given :—

1945.	January	February	March	April	May	June	July	August	September	October	November	December	Total.
New groups ..	11	5	5	7	13	8	11	5	15	15	10	7	112
North ..	6	1	2	0	4	2	5	2	6	7	3	4	42
South ..	5	4	3	7	9	6	6	3	9	8	7	3	70
Mean daily numbers	1.6	0.8	1.3	2.0	2.5	2.7	2.2	1.0	2.0	3.6	2.9	1.9	2.0

When compared with the figures of the previous year, the number of new groups shows an increase of 160% and the mean daily numbers show an increase of 186%. The sun's disc was free from spots on 35 days while the corresponding figure for the previous year was 156, thus indicating that the minimum of spot activity occurred in the year 1944. The approximate mean latitude of the spots was 24.9° and 25.7° in the northern and southern hemispheres respectively, being considerably higher than the previous year's figures, due to the high latitude spots belonging to the new cycle. Bright reversals of the H $\alpha$  line on the disc were observed with the spectroscope in the neighbourhood of spots on 10 occasions and dark reversals of D $_3$  line were observed on 13 occasions. Only one displacement of the H $\alpha$  line both ways simultaneously was observed during the year.

9. *Prominences.*—The mean daily areas and numbers of calcium prominences as derived from Kodaikanal records are as follows :—

*Areas.*

1945	North	South	Total	
January—June .. ..	1.36	1.25	2.61	(Sq. minutes).
July—December .. ..	2.00	2.21	4.21	(Sq. minutes).
	<i>Numbers.</i>			
January—June .. ..	4.68	4.39	9.07	
July—December .. ..	5.40	5.37	10.77	

When compared with the figures of the previous year, there is a marked increase in both areas and numbers, the former being 58% and the latter 30%. The areas show a preponderance in the southern hemisphere as in previous year, but the numbers show a defect. The distribution of areas in latitude shows maximum activity at 45°—50° in the northern hemisphere and at 51°—55° in the southern hemisphere.

Six metallic prominences were observed during the year. Of these, two were in the northern hemisphere and four in the southern hemisphere.

Ninety-one displacements of 'C' line in the chromosphere and prominences were observed during the year with the spectroscope as against eighteen during the previous year. Of these, thirty-one showed displacement towards violet, forty-five towards red and fifteen showed displacement both ways simultaneously. The largest displacement observed during the year was  $4.5A^\circ$  both ways on September 6, 1945.

One hundred and forty-five displacements in prominences were observed with the spectrohelioscope as against twenty five during the previous year. Of these, fifty-two were in the north and ninety-three were in the south, while eighty were in the east and sixty-five in the west. Seventy-seven showed displacement towards red, sixty-seven towards violet while one showed displacement both ways simultaneously.

A long filament-type prominence of height 4' and base only  $1^\circ$  on the east limb of the sun was photographed on February 13, 1945. A large prominence, base extending from  $+2^\circ$  to  $-54^\circ$  on the east limb, height  $2\frac{1}{2}'$  and covering an area of 3 square minutes was photographed on January 6, 1945. Another prominence, base extending from  $+42^\circ$  to  $-15^\circ$  on the east limb, having an area of 4 square minutes was photographed on April 19, 1945.

The mean daily area of hydrogen absorption markings (without applying foreshortening correction) was 2123 millionths of the sun's visible hemisphere, showing a marked increase of 105%. This is mainly due to the appearance of large markings towards the end of the year. The distribution of areas in latitude shows an increased activity between the zones of latitudes  $30^\circ$ — $35^\circ$  and  $50^\circ$ — $55^\circ$  in the northern hemisphere, while in the southern hemisphere the activity is mainly confined to latitude  $35^\circ$ .

10. *Time*.—The error of the standard clock of this observatory was determined mainly by reference to the 8-45, 13-30 and 18-30 hours I. S. T. wireless time signals from Bombay and Greenwich and by occasional observations at the Transit Instrument.

11. *Seismology*.—The Milne-Shaw Seismograph recorded 120 earthquakes during the year and the details of the records are incorporated in the Quarterly Seismological Bulletins published by the India Meteorological Department.

12. *Library*.—The number of books added to the Library during the year was 23.

13. *General*.—The Committee for the Planning of the Post-War Development of Astronomy and Astrophysics in India, appointed by the Government of India, with Prof. M. N. Saha, F. R. S., as Chairman and Dr. S. K. Banerji, O. B. E., D. Sc., F. N. I., the Director General of Observatories, Prof. D. S. Kothari, M. A., Ph. D., F. N. I., Prof. M. Ishaque, M. Sc., D. Sc., Ph. D., F. N. I. and Dr. A. L. Narayan, M. A., D. Sc., F. Inst. P., as members, met at Kodaikanal to discuss the post-war problems relating to the astronomical and astrophysical observatories in India, particularly, for the expansion of the Kodaikanal Observatory. The Committee left for Bangalore for further discussions. The Director of the Observatory attended the Bangalore session of the Indian Science Congress.

14. *Publications*.—The Annual Report for the year 1944 and the Kodaikanal Observatory Bulletin No. 123, "Summary of Prominent Observations for the year 1944" were kept ready for publication.

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