

*Kodaikanal Observatory, Kodaikanal*  
(Director, Dr A. K. Das)

*General.*—Concrete proposals were submitted to the Government of India for acquiring for this Observatory a polarizing monochromator of the latest type, an 8-inch coronagraph and a large solar telescope and spectrograph.

It is hoped that Government sanction for the purchase of these instruments will be received shortly.

The Standing Advisory Board for Astronomy and Astrophysics in India was reconstituted by the Government for another period of three years.

*International cooperation.*—Exchange of spectroheliograms with foreign observatories was continued. 773 *K*-disk spectroheliograms for the period 1951 January to 1953 September were sent to the Director, The Observatories, Cambridge University. Eight photoheliograms together with the relevant zero plates for certain specified dates in 1951–52 were sent to the Royal Greenwich Observatory on request. 32 H-alpha and 42 *K*-disk spectroheliograms for the period 1952 July to 1953 June were received from Meudon Observatory, France. 124 H-alpha disk spectroheliograms for the period 1951 July to 1953 June and 103 *K*-prominence spectroheliograms for the period 1952 January to 1953 June were also received from the Mount Wilson Observatory, U.S.A.

Quarterly statements relating to solar flares were sent as usual to Dr L. d'Azambuja of the Meudon Observatory and to Mr H. W. Newton of the Royal Greenwich Observatory.

The practice of broadcasting daily URSIGRAMMES relating to solar and geomagnetic activity and of issuing warnings for expected ionospheric and geomagnetic disturbances was continued.

With effect from 1953 April the practice was adopted of supplying to the Chief, Central Radio Propagation Laboratory, National Bureau of Standards, Washington, D.C., U.S.A., monthly median values of F<sub>2</sub> layer critical frequency and the maximum usable frequency factor for 3000 km transmission as observed at Kodaikanal. Monthly median values of all other ionospheric parameters are supplied to him quarterly.

*Routine observations.*—Weather conditions during the year were less favourable for solar observations than in the previous year. Photoheliograms were taken on 296 days and visual observations of the Sun were made on 295 days as against 306 and 319 days respectively in the previous year. H-alpha disk, calcium disk and calcium prominence spectroheliograms were obtained on 285, 273 and 254 days respectively as compared with 301, 282 and 269 days in 1952. Observations with the spectrohelioscope were made on 283 days.

The average definition of the Sun's image on a scale in which 1 is the worst and 5 the best was 3.1 as compared with 2.8 in 1952. There were 38 days on which the definition was 2 or less and 61 days on which the definition was 4 or more.

*Sunspot activity.*—There was a further steep decrease in sunspot activity during the year, the decrease being 60 per cent compared with 1952. There were 142 spot-free days out of the total of 296 days of observation as against 38 spot-free days in 1952. The yearly mean latitude of all the observed spot-groups in the northern and southern hemispheres was  $9^\circ$  and  $8^\circ.4$  respectively as against  $9^\circ.5$  and  $9^\circ.7$  for the previous year. There were five groups in the north and four in the south hemisphere within the latitude range  $0^\circ$ – $5^\circ$ .

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No. of new spot-groups	N 6 S 2	1 Nil	4 3	1 2	1 1	3 1	Nil 1	3 1	1 1	1 3	Nil 1	Nil 2	21 18
Total	8	1	7	3	2	4	1	4	2	4	1	2	39
Mean daily numbers	2.08	0.40	0.65	1.20	0.87	1.12	0.50	1.35	0.87	0.37	0.14	0.09	0.82
Kodaikanal daily relative number	27.6	4.4	7.5	20.6	11.3	15.0	7.0	17.0	10.3	5.9	1.6	1.0	10.77

*Solar flares.*—Three solar flares, all of intensity 1, were observed during the period.

*Radio astronomy.*—Recording of solar noise at 100 Mc/s was continued with a Radio Telescope with a twin Yagi type of antenna.

*Geomagnetic observations.*—Continuous photographic recording of  $H$ ,  $V$  and  $D$  with Watson and La Cour magnetographs was continued. Visible recording of the horizontal force with an Askania Magnetic Field Balance was commenced in April. Absolute measurements of  $H$  and  $D$  were made once a week with a Kew Magnetometer and observations of inclination on five days in the week with an earth inductor.

During the year 15 magnetic storms with range in  $H > 150\gamma$  were recorded as compared with 25 in 1952. Of these five were of the sudden commencement type. No storms were recorded with ranges in  $H$  exceeding  $400\gamma$ .

*Ionospheric observations.*—Regular ionospheric observations during daylight hours with the Automatic Ionosphere Recorder were continued.

*Cosmic ray observations.*—Photographic recording of cosmic ray intensity was continued using a Kolhörster apparatus.

*Seismology.*—The Milne-Shaw Seismograph (E-W component) recorded 122 earthquakes.

*Meteorology.*—Meteorological observations with all the visual and self-recording instruments were carried out as usual.

*Library.*—36 books and 832 periodicals were added to the library.

*Research work.*—Under the Research Training Scheme sponsored by the Ministry of Education, Government of India, two senior and two junior scholars were working in the Observatory.

The following problems in solar physics and geophysics were investigated during the year :—

1. Experimental study of centre-to-limb variation in the intensity of the continuous spectrum of the Sun;
2. Measurement of the difference of temperature between the equator and the pole of the Sun by spectroscopic method;
3. Study of radiation flux across sunspots;

4. Investigation of the sporadic E layer at Kodaikanal;
5. Investigation of very long sequences of geomagnetic activity associated with solar M regions;
6. Lunar stratification of the F2 layer of the ionosphere;
7. Variation in the D layer absorption.

*Publications.*—The following notes and papers were published or sent for publication during the year :—

- (1) "Temperature at Pole and Equator of the Sun", *Vistas in Astronomy*.
- (2) "Temperature at Pole and Equator of the Sun" (Abstract), *Nature*.
- (3) "Eruptive Prominence of 1953 February 26 and associated Radio Noise Burst", *Nature*.
- (4) "Can Matter be Created out of Cosmic Radiation?", *Die Naturwissenschaften*.
- (5) "Radio Noise Bursts from Solar M-Regions", *Nature*.
- (6) "Geomagnetic Activity and the Sunspot Cycle", *Nature*.
- (7) "The Sporadic E Layer at Kodaikanal", *Journal of Geophysical Research*.
- (8) "Very long sequences of Geomagnetic Activity and its annual Variation", *Nature*.
- (9) "Study of the Continuous Solar Spectrum in the Visible Range", *Annales d'Astrophysique*.
- (10) "Radiation Flux in Sunspot Umbrae", Paper II, *Zeitschrift für Astrophysik*.
- (11) "Study of Diurnal Variation of the Horizontal Component of the Magnetic Field at Kodaikanal", *Indian Journal of Meteorology and Geophysics*.
- (12) "Kodaikanal Observatory Bulletin No. 136 for the second half of 1951 giving the summary of the results of solar and magnetic observations."
- (13) Kodaikanal Observatory Bulletin No. 137: "Discussion of the results of observations of solar prominences made at Kodaikanal from 1904 to 1950".
- (14) "Kodaikanal Observatory Bulletin No. 138 for the first half of 1952 giving the summary of the results of solar and magnetic observations."
- (15) Quarterly synopsis of solar, geomagnetic and ionospheric observations made at Kodaikanal: *Indian Journal of Meteorology and Geophysics*.
- (16) Annual Report of the Kodaikanal Observatory for 1952.