

**ANNUAL REPORT\* OF THE KODAIKANAL OBSERVATORY FOR THE  
YEAR 1949.**

**1. General.**

A Standing Advisory Board for Astronomy and Astrophysics was constituted by the Government of India and the first meeting of the Board was held at Kodaikanal Observatory in April, when matters relating to the development of Astronomy and Astrophysics in India with particular reference to the expansion of the Kodaikanal Observatory were discussed. A report embodying the proposals was submitted to the Government.

In connection with a proposal to establish a high altitude observatory in the Himalayas, a survey party of scientists visited certain locations for the selection of a suitable site.

In pursuance of a scheme sponsored by the International Astronomical Union, daily broadcasts of coded messages (URSIGRAMMES) relating to solar activity were commenced from 1st May 1949 from the All India Met. Broadcasting Centre, New Delhi according to the following schedule :—

Call sign.	Power of station.	Frequencies. (kilocycles)	Time of broadcast.
VVD3	3.5 KW.	5205, 7580, 13100, 17650	1400 & 2000 hrs. G. M. T.

A practice of issuing forecasts of expected ionospheric and magnetic disturbances to the press as well as to certain scientific institutions was commenced during the year.

Prof. O. E. H. Rydbeck, Director, Chalmers Geophysical Observatory, Sweden, visited this Observatory in December.

During the year under review, the construction of a dome for housing the 20" Grubb reflecting telescope received from the Takhtasinghji Observatory at Poona in 1912 was taken up. The old engine house was extended to provide accommodation for the workshop.

Exchange of spectroheliograms and photoheliograms with foreign observatories was continued as in previous years. 220 K-focculus photographs for the first 9 months of 1949 were supplied to the Solar Physics Observatory, Cambridge, and 1 photoheliogram to the Royal Greenwich Observatory. 87 H $\alpha$  focculus and 86 calcium prominence plates relating to the period July 1948—June 1949 were received from the Mount Wilson Observatory and 58 H $\alpha$  focculus and 78 calcium focculus plates for the same period were obtained from the Meudon Observatory, France.

\* This report deals chiefly with the astronomical work of the Kodaikanal Observatory. The Meteorological data will be published in the India Weather Review and the administrative details will be incorporated in the annual report of the India Meteorological Department.

of the year, their distribution in the two hemispheres and the mean daily numbers are given in the following table :--

Month.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Number of new groups	N	12	18	18	14	23	16	10	13	12	18	22	194
	S	20	13	16	18	11	14	15	11	12	10	11	163
Total	32	31	34	32	34	30	25	24	24	30	28	33	358
Mean daily number	6.9	8.3	8.7	7.9	6.4	5.9	6.4	5.5	7.7	6.5	8.3	8.1	7.3

The total number of new spotgroups as well as the mean daily number shows very little change when compared with 1948. There were no spot-free days during the year. The approximate mean latitude of the sunspot groups for the whole year was  $13^\circ$  as against  $14^\circ$  in the previous year.

5. *Prominences.*—The mean daily areas and numbers of prominences as derived from the spectroheliograms taken at Kolaikanal during the year are :

	Areas (in sq. minutes).		
	North	South	Total
January-June . . . . .	2.70	1.68	4.38
July-December . . . . .	2.46	1.27	3.73
	Numbers		
	North	South	Total
January-June . . . . .	6.48	4.68	11.16
July-December . . . . .	6.26	4.06	10.32

Compared with the values for the previous year, the areas show on the whole very little change, an increase of 24 per cent in the northern hemisphere being compensated by practically the same decrease in the southern hemisphere. The distribution of areas in latitude in the northern hemisphere shows a pronounced peak of activity in the zone  $25^\circ$ - $30^\circ$ ; in the southern hemisphere the distribution is nearly uniform from the equator to latitude  $45^\circ$ . A comparison with the previous year's distribution indicates that the high-latitude

maxima have completely subsided and that the activity in the northern hemisphere between  $25^{\circ}$  and  $30^{\circ}$  has increased considerably while the region  $20^{\circ}$ – $35^{\circ}$  S shows little change. The distribution of numbers shows nearly uniform activity from equator to latitude  $\pm 45^{\circ}$ .

27 metallic prominences were observed with the prominence spectroscope. 19 of these were in the northern hemisphere and 8 in the south. 16 were observed on the east limb and the rest on the west limb.

Doppler displacements of the  $H\alpha$  line in prominences were observed on 68 occasions with the prominence spectroscope. In 20 cases the shifts were towards red, in 23 cases towards violet and on the rest of the occasions in both directions. Particulars of a few prominences which showed large Doppler shifts are given below :—

Date	Co-ordinates of prominences.	Doppler displacements observed
January 4 . . . . .	E-limb— $25^{\circ}$ S.	5 Å to red and 3 Å to violet.
February 7 . . . . .	E-limb— $19^{\circ}$ N.	7 to 8 Å to red.
October 8 . . . . .	E-limb — $15^{\circ}$ N.	7 Å to violet.
November 8 . . . . .	W-limb— $18^{\circ}$ N.	12 Å to red.

The heights of 228 prominences were measured with the prominence spectroscope in  $H\alpha$ ,  $D_3$  and  $H^B$  lines. These were compared with the heights of corresponding prominences as obtained from K prominence spectroheliograms. The mean heights were  $60''\cdot 0$  in K,  $56''\cdot 1$  in  $H\alpha$ ,  $52''\cdot 5$  in  $D_3$  and  $48''\cdot 3$  in  $H^B$ .

Particulars of Doppler displacements in prominences and  $H\alpha$  dark markings observed with the spectrohelioscope are given below :—

	Displacement towards			Total.
	Red	Violet	Bothways.	
Prominences . . . . .	13	18	26	57
$H\alpha$ Dark markings . . . . .	21	11	33	65

The mean daily area of  $H\alpha$  absorption markings (without applying foreshortening correction) was 4469 millionths of the sun's visible hemisphere representing an increase of 28 per cent as compared with the previous year. The distribution in latitude shows maximum activity at  $25^{\circ}$ – $30^{\circ}$ N and  $20^{\circ}$ – $25^{\circ}$ S.

#### 6. Solar flares.

During 1949, two cablegrams were sent to the Meudon Observatory concerning exceptionally intense flares observed on January 23 and October 3.

### 7. *Magnetic observations.*

Continuous magnetograph records were obtained of horizontal force, vertical force and declination. Absolute observations of dip were made on five days in the week and those of declination and horizontal force once a week.

Four 'Severe' and eleven 'Moderate' magnetic storms were recorded during the year. The storm commencing on May 12th at 1208 hrs. I.S.T. was the severest recorded at Kodaikanal during the year. The storm was of the sudden commencement type with an initial impulse of 90  $\gamma$  in H and 19  $\gamma$  in V. The trace extended very much below the base line and a considerable portion of the record was lost. Synchronously with the storm complete fade-out of short-wave radio reception was reported. The spot group responsible for this storm crossed the central meridian on May 11th at 1700 hrs. I.S.T. and continued to be active during the succeeding days.

### 8. *Seismology.*

The Milne-Shaw seismograph (E-W component) of this observatory recorded 117 earthquakes during the year. The details of the records are given in the Quarterly Seismological Bulletin published by the India Meteorological Department.

### 9. *Time.*

The standard clocks of this observatory were rated by comparison with Greenwich time signals.

### 10. *Library.*

31 new books and 1,461 periodicals were added to the library during the year.

### 11. *Research work and publications—*

The following notes were published during the year :—

1. The brilliant solar flare of 1949 January 23 and the great magnetic storm of January 24-26 (Observatory),
2. Line-broadening in solar flares (Nature),
3. Existe-t-il une corrélation entre les protubérances à disparition brusque et les perturbations géomagnétiques ? (L'Astronomie),
4. Geomagnetic equator (Current Science),
5. Solar activity and associated geomagnetic and radio disturbances during May-June 1949 (Indian Journal of Meteorology & Geophysics),
6. Lightning discharge at Kodaikanal Observatory (Indian Journal of Meteorology & Geophysics),
7. The comet of November, 1948 (Science & Culture),

The following papers which will appear in the bulletins of this observatory were made ready for the press : --

1. Some observations on the H and K lines in the solar spectrum,
2. Relation between the base and the height of prominences.

Kodaikanal Observatory Bulletins for the years 1939-1946 were sent to the press for printing.

Printed copies of the Annual Reports for the year 1947 and 1948 were received from the press.

A. K. DAS,  
*Director,*  
*Kodaikanal Observatory.*

KODAIKANAL,  
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