REPORT OF THE KODAIKANAL OBSERVATORY FOR THE YEAR 1934.

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. There has been a considerable increase in all forms of solar activity compared with the year 1933. The mean daily number of spots showed an increase of 75 per cent., the mean daily areas of calcium prominences an increase of 65 per cent., the mean daily numbers of calcium prominences an increase of 44 per cent., and Hα absorption markings an increase of 80 per cent.

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 Hα bright flocculi and Hα dark markings for the year 1934 were communicated to the Observatoire Fédéral, 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. Eight original photoheliograms were supplied to the Greenwich Observatory, 314 original calcium disc spectroheliograms to the Cambridge Observatory and 43 positive copies of Hα and K spectroheliograms and 1 of photoheliograms to the Meudon Observatory.

3. *Weather conditions.*—Weather conditions obtaining in the morning were on the whole slightly more favourable for solar observations than during the previous year. 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 19 as against 16 in the previous year.

4. *Photoheliograph.*—Photographs of the sun on a scale of 8 inches to the sun's diameter were taken on 323 days using a 6-inch achromatic object glass and green colour screen.

5. *Spectroheliographs.*—Monochromatic images of the sun's disc in K light were obtained on 316 days, prominence plates in K light on 301 days and Hα disc plates on 294 days. The total number of spectroheliograms obtained during the year was 2,504. The taking of Hα prominence plates as a routine measure was discontinued from the beginning of 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. *Spectrohelioscope.*—The spectrohelioscope loaned by the Mount Wilson Observatory was set up early in the year and regular observations with it begun from the month of April. Owing to the low activity of the sun, no conspicuous quick-changing phenomena were observed, the greatest eruption noticed being on the 20th December 1934 near solar latitude 25° N and longitude 47° E.

8. Two staff meetings were held during the year.

9. Observations of star transits and of wireless time signals taken during the past year were reduced and the longitude of the Kodaikanal Observatory as determined from them is 5h. 9m. 52·47s, east of Greenwich.

10. *Research work.*—The Director, the Assistant Director and Mr. C. P. S. Menon, Research Fellow of the Madras University, have been engaged throughout the year on the spectrophotometry of certain lines in the sun's spectrum at different points between the centre of the sun's disc and the limb. In this work, use has been made of the 15" lens loaned by the Nizamiah Observatory, Hyderabad. The lines studied were the H and K lines of ionised calcium and the Balmer series of hydrogen. Contours of these spectrum lines at different distances from the centre of the sun's disc have been derived. Preliminary results are shown in the following tables :—

Central intensities expressed as percentages of continuous spectrum.

Distance from centre of sun's disc ..	0	0·44	0·65	0·77	0·86	0·95	0·98
H	14·8	14·9	16·1	16·9	17·1	21·4	22·8
K	14·3	15·6	16·5	16·8	18·7	19·8	21·2
Hβ	24·1	25·7	26·5	27·2	27·0	28·5	29·2
Hγ	27·5	27·5	27·8	27·9	29·0	32·3	34·0

Equivalent width in Angstroms.

Distance from centre of sun's disc. ..	0	0·44	0·65	0·77	0·86	0·95	0·98
H	8·8	9·1	8·8	9·2	9·2	7·7	6·7
K	10·7	10·2	10·6	10·3	10·0	9·4	8·0
Hβ	3·3	3·1	2·9	2·8	2·5	1·8	1·6
Hγ	2·1	..	..	..	..	..	1·3

Summary of Sunspot and Prominence Observations.

11. *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 are also given.

1934.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
New groups	2	4	3	3	6	3	3	4	9	5	6	9	57
North ..	2	2	0	2	3	1	2	2	5	2	1	2	24
South ..	0	2	2	1	3	2	1	2	4	3	5	7	32
Equator ..	0	0	1	0	0	0	0	0	0	0	0	0	1
Mean daily numbers.	0·3	0·7	0·2	0·7	1·3	0·5	0·8	0·5	0·4	0·5	0·8	1·7	0·7

Compared with the previous year, the number of new groups observed was nearly double that of last year and the mean daily numbers showed an increase of 75 per cent. The number of days on which the sun was found to be free from spots was only 165 as against 237 in the previous year. The above figures show that the sun-spot minimum occurred in the year 1933. The approximate mean latitude of spots was 16°·3 in the northern hemisphere and 24°·3 in the southern hemisphere, being higher than in 1933 on account of the higher latitude of spots belonging to the new cycle. There has also been an increase in the case of bright reversals and displacements of the H*α* line observed on the disc in the neighbourhood of spots. Bright reversals numbered 118 as against 78 in the previous year and 14 displacements were observed as against 3 in 1933. Of these 7 were towards the red, 4 towards the violet and 3 both ways simultaneously. D_3 was observed as a dark line on 106 days as against 68 in the previous year.

12. *Prominences.*—The mean daily areas and numbers of calcium prominences as derived from Kodaikanal spectroheliograms were as follows :—

Areas.

	North.	South.	Total.	
1934—January to June	1·80	1·75	3·55	sq. mins.
July to December	1·99	2·05	4·04	,,

Numbers.

1934—January to June	6·38	6·55	12·93
July to December	6·86	6·78	13·64

The activity was almost equally divided between the northern and southern hemispheres. The distribution in latitude showed a maximum activity near 45°, which was about 5° nearer the poles than the maximum in 1933.

Eight metallic prominences were observed during 1934, as against 3 in the previous year. Of these 2 were observed in the northern hemisphere and 6 in the southern hemisphere, their mean latitude being 26° from the equator. Displacements of the hydrogen line in the chromosphere and prominences observed during the year numbered 137, while those observed during the previous year were 86. Of these displacements 66 were towards the red, 68 to the violet and 3 both ways simultaneously.

The mean daily areas of prominences projected on the disc as hydrogen absorption markings amounted to 1990 millionths of the sun's visible hemisphere, as against 1104* during the previous year, representing an increase of 80 per cent. Their distribution in latitude was similar to that of calcium prominences on the limb.

13. *Time.*—The error of the standard clock is usually determined by reference to the 16-hour signal distributed from the Alipore Observatory, Calcutta. 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 was received accurately on most days and all failures were reported to the Postmaster-General, Madras. In addition wireless time signals were received from Colombo, Calcutta and Rugby.

14. *Equipment.*—The Hale spectrohelioscope loaned by the Mount Wilson Observatory was set up for observation. A vertical photographic enlarger with mercury vapour lamp was received on loan from the India Meteorological Office, Poona.

15. *Seismology.*—The Milne-Shaw seismograph recorded 200 earthquakes during the year. For details of records, reference may be made to the "India Weather Review."

16. *Publications.*—The annual report for the year 1933 and Kodaikanal Observatory Bulletin No. 103 "Summary of Prominence Observations for the first half of 1933" were published during the year.

In addition, a criticism of Dr. Chandrasekhar's paper on the "Solar Chromosphere" by Mr. C. P. S. Menon, M.Sc. (Lond)., Research Fellow of the Madras University, working in this Observatory was sent to the Secretary, Royal Astronomical Society, London, for publication in the Monthly Notices of the Society.

KODAIKANAL,
12th March 1934.

T. ROYDS,
Director, Kodaikanal Observatory.

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* Corrected value for 1933.

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