Notes and News

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

Prof. C.A. Hart, Vice-Chancellor of the University of Roorkee, and Dr. L.A. Ramdas, Director of Agricultural Meteorology in the India Meteorological Department, are attending as delegates of India the meetings of the 9th General Assembly of the International Union of Geodesy and Geophysics and of its constituent associations, which are being held at Brussels commencing from 21 August 1951. Dr. L. A. Ramdas will act as the principal delegate.

ROYAL METEOROLOGICAL SOCIETY, LONDON

It is gratifying to note that Sir Charles Normand, C.I.E., D.Sc., has been elected as President of the Royal Meteorological Society, London, for the year 1951-52. Sir Charles joined the India Meteorological Department as a Meteorologist in 1913 and was Director General of Observatories from 1928 to 1944.

INDIA METEOROLOGICAL DEPARTMENT DIRECTORS' CONFERENCE

The annual Directors' Conference of the India Meteorological Department was held at the Meteorological Office, Poona, from 16 to 21 July 1951, under the Chairmanship of Mr. V. V. Sohoni, Director General of Observatories. Deputy Directors-General and Directors of the Department attended.

2. The Conference discussed several administrative and technical questions concerning the department. Of these the following important ones may be mentioned—

(1) Separation of aviation and non-aviation forecasting work ;

(2) Organisation of weather service to aviators in accordance with the ICAO Procedures ;

(3) Formulation of a basic system of visual storm warning signals for international adoption with particular reference to the requirements of tropical countries ;

(4) Need for setting up Central and Regional Research Units ;

(5) Changes in the forms for tabulation and publication of data ;

(6) Publication of a series of articles on problems of Indian Meteorology in the Indian Journal of Meteorology and Geophysics ;

(7) Training of Officers ; Meteorological training of pilots and the compilation of a handbook for their use ;

(8) Staff requirements at Forecasting Offices.

3. The Conference programme included colloquia by Dr. A.K. Das on ' Solar terrestrial relationships ', by Mr. A. K. Roy on ' Air mass discontinuities over India during the pre-monsoon season and the part played by them in the origin, development and progress of thunderstorm cells ', and by Mr. P.R. Krishna Rao on ' The distribution and mechanism of the Northeast Monsoon rainfall over Tamilnad '.

WATERSPOUT OFF SAURASHTRA COAST

Name of vessel :	S. S. Islami
Captain	H. J. Palmer
Voyage	Karachi to Bombay
Ship's position	Lat. 19° 41′ N
	Long. 71° 33′ E
Ship's course 130° :	Speed 11.25 knots
Name of Observer :	Mr. G.R. Kaka, 3rd Officer.

On 21 April 1951, 0300 GMT, a fully formed waterspout was observed bearing 017°—7 miles off (approx.) with two others half formed on either side of it. The full waterspout was joined by another spout about midway between the base of Cumulus cloud and sea surface (see figure on p. 297). At 0309 GMT all three spouts disappeared disintegrating from the surface upwards.

Weather at time of observation—Slight drizzle, 6/8 cloudy : Cumulus and Fracto-cumulus, wind SW-force 3, Barometer 1011.0 mb (true), Att. Thermometer 82°F, Air Temp 81°F, Wet Bulb 79°F, Sea Temp 81°F.

The nearest station to the site of the spout where an upper air sounding was taken is Veraval, about 100 miles to the northwest. An examination of the Veraval sounding of the previous evening (*i.e.*, 1500 GMT of 20 April 1951) indicates that there was a shallow warm moist current near the surface with temperature of about 80°F and mixing ratio of 19 gm/kgm. The temperature and the mixing ratio fell off rapidly to 71°F and 6 gm respectively at about 1200 ft. There was thus a steep lapse rate of both temperature and mixing ratio near the surface and conditions were favourable for the occurrence of mild convection type waterspouts [c.f. Gordon, A.H., Waterspouts, *The Marine Observer*, Vol. XXI, No. 151, pp. 47-60 (1951)]. Above 1200 ft the lapse rate of both temperature and mixing ratio decreased markedly and the air mass showed stable stratification (lapse rate of temperature less than moist adiabatic). Marked instability conditions resulting in a thunderstorm near about Veraval would thus appear improbable.

An examination of the synoptic situation shows that at 0300 GMT of 21 April 1951, that is at the time when the spout was observed, there was an incursion of maritime air northwards in the east Arabian Sea in association with a low pressure trough extending from the west central Arabian Sea to Sind—Makran. Fairly widespread thundershowers occurred along the Konkan coast upto Bombay between 0300 GMT of the 21st and 0300 GMT of 22 April. The thunderstorm belt, however, did not extend to the north of the Latitude of Bombay. This, along with the observations of wind, cloud and weather recorded by the ship's officer, go to show that the incursion of moist air further north, *i.e.*, near about the site of waterspout was probably shallow and the conditions there were more nearly represented by conditions prevailing at Veraval.

The waterspout was probably of the fair weather type, *i.e.*, of mild convection type, than of the Tornado or storm type (c.f. Gordon Loc. cit.)

SEVERE THUNDERSQUALL OVER BEGUMPET ON 17 MAY 1951

On the evening of 17 May 1951, a severe thundersquall passed over Begumpet. Considerable damage was caused to the tiled roofings and three people were killed when one of the sections of the airline hangar door gave way. Light hail of size of pebbles also fell at some places in Begumpet.

The anemograph at Begumpet Observatory (P.T. head 50 ft above ground) recorded a maximum wind speed of 73 mph at 1621 IST during the thundersquall and there was a rise of pressure of 3.3 mb. The wind direction was apparently from N. The velocity of the wind prior to and after the passage of the squall is given below—

1500 to 1530 IST	Calm
1530 to 1620 ,,	Gusty 15-20 mph from NW
1621 IST	73 mph from N
1623 IST	NE 20 mph

The electrical anemometer at the Air Port about a mile to the north of the observatory indicated a maximum speed of 50 mph at 1620 IST.

The velocity of 73 mph happens to be the highest so far recorded by the observatory anemograph (in existence for the last decade and half), the last record was 62 mph from SE on 18 February 1937.

The discontinuity between *Tc* and *TcTm* air masses was running near Hyderabad on the day.

WEATHER, APRIL—JUNE 1951

The chief features of the weather during the period under review were (a) a heat wave in northeast India and Uttar Pradesh in the middle of May, (b) two depressions in the Arabian Sea, one in April and the other in June and (c) normal arrival of the monsoon along the west coast and in northeast India but delay in its extension into the central parts of the country and Uttar Pradesh.

During the two months April and May, eleven western disturbances affected the country. Out of these, the four western disturbances in April and the first and last two in May were fairly active and caused an excess of rainfall in the Punjab(I), west Uttar Pradesh and west Rajasthan.

There was moderate thunderstorm activity in northeast India and the central parts of the country, particularly in and near east Madhya Pradesh, during the first ten days of April and in the beginning of May. During the remaining days of April and May, the thunderstorm activity was rather feeble over the central parts of the country and in northeast India outside Assam. In Assam, however, widespread or local thundershowers occurred during the last twelve days of April and practically throughout May. Locally very heavy falls were reported from the Khasi hills between 17 and 21 May. Cherrapunji reported an abnormally heavy rainfall of 18.2″ between 1730 IST of 17 May and 0830 IST of next day. The autographic rainfall chart of Cherrapunji for 17 and 18 May 1951 is shown in Fig. 1 (p. 297). According to press reports, the Brahmaputra was in spate and washed away some houses. The telecommunications between Dibrugarh and Gauhati were also disrupted, while severe hailstorms caused damage to property in Gauhati area towards the end of April. In May the Lohit, a tributary of the Brahmaputra flowing by Sadiya, burst its banks and washed away the adjoining railway track. Parts of Sadiya town were inundated and the adjacent aerodrome damaged.

The Peninsula had a wet spell in the middle of April under the influence of a depression in the Arabian Sea. This started as a low pressure wave off the Laccadives-Maldives region on 14 April and moved away towards the Kuria-Muria coast. In association with the depression, widespread thundershowers occurred in Tamilnad, Travancore-Cochin and Malabar-south Kanara between 12 and 15 April while local or scattered thundershowers occurred in the Peninsula outside Saurashtra and Kutch during the next 7 days. A trough of low pressure which lay in the east Arabian Sea off the Konkan-Malabar coast between 24 and 29 May gave good rain in the western half of the Peninsula in the last week of May. The rainfall in April-May was consequently in excess in Deccan (Desh), Hyderabad, coastal Andhra Desa, Rayalaseema, Mysore and Tamilnad.

Most of the country experienced a mild summer in April and in the beginning of May. Day temperatures were as much as 6-12°F below normal in northwest India, Uttar Pradesh and the central parts of the country on a number of days in April. However, after 4 May, the day temperatures began to rise over the country and a heat wave enveloped Gangetic West Bengal, Chota Nagpur, Bihar, east Uttar Pradesh and north Orissa between 11 and 20 May. Temperatures exceeding 110°F were recorded at many places in these divisions. Calcutta recorded 107°F (12°F above normal) on 11 May while in Asansol the temperature shot up to 115°F (15°F above normal) on 20 May. A few deaths due to heat-strokes were reported from West Bengal, Bihar, Uttar Pradesh and Madhya Pradesh. After 20 May, the heat wave

began to abate and during the last week of May, day temperatures were again well below normal over the country. Charts showing the actual maximum temperatures on 20 May and their departures from normals are shown in Figs. 2 and 3 (p. 298).

The Arabian Sea branch of the southwest monsoon advanced into Travancore-Cochin on 31 May, the normal date. It extended into Malabar-south Kanara the next day and into Mysore, south Deccan (Desh) and the south Konkan by 2 June. Locally very heavy falls were reported from Malabar-south Kanara and the adjoining regions on the 1st. A depression, which formed in east Arabian Sea off Kathiawar coast on 11 June and moved northwestwards, strengthened the monsoon. The monsoon extended into the north Konkan and feebly into north Deccan (Desh), Saurashtra and south Gujarat during the second week. Vigorous monsoon conditions also prevailed along the west coast south of Ratnagiri throughout the second week. The squally weather which accompanied the heavy rainfall caused local damages along the west coast. *S. S. Maharashmi*, a 1600 ton coastal cargo vessel, is reported to have sunk near Bhatkal about 350 miles south of Bombay on 10 June due to squally weather.

The Arabian Sea branch of the monsoon was generally weak in the third week. Thereafter, it revived slightly and extended into west Madhya Pradesh on 23 June. Good rain fell along the west coast in the fourth week. There was also a temporary advance of the monsoon in Saurashtra and Kutch, north Gujarat and south Rajasthan on 28 June.

The Bay of Bengal branch of the monsoon advanced into northeast India between 4 and 5 June in association with a shallow depression which formed off the Orissa coast and crossed the coast near Balasore on the afternoon of 5 June. The monsoon continued to be vigorous in Assam and active in West Bengal for the next five days. Thereafter, for about a fortnight the activity of the Bay branch of the monsoon was mostly confined to Assam, while the rest of northeast India had little rain. Due to the continuous and locally heavy rain in Assam, many rivers in that State were in floods. According to press reports, the swollen waters of the Brahmaputra carried away nearly 8000 cattle while large tracts of land along its banks were inundated. Considerable damage was also caused to property.

Another depression formed in the northwest Bay of Bengal and crossed the coast near Balasore on the evening of 26 June and moved slowly as a low pressure area upto south Bihar and the adjoining regions by 30 June. Under its influence, the monsoon extended into east Madhya Pradesh, Vindhya Pradesh, Madhya Bharat on 27 June and into east Uttar Pradesh on 29 June. Vigorous monsoon conditions prevailed over east Uttar Pradesh and Vindhya Pradesh on the last two days of the month.

The position regarding the monsoon at the end of June was that it had advanced over the whole country outside north Rajasthan, the Punjab (I) and west Uttar Pradesh. But due to the delay in its effective extension into the central parts of the country and Gujarat, the rainfall over these divisions was in defect.

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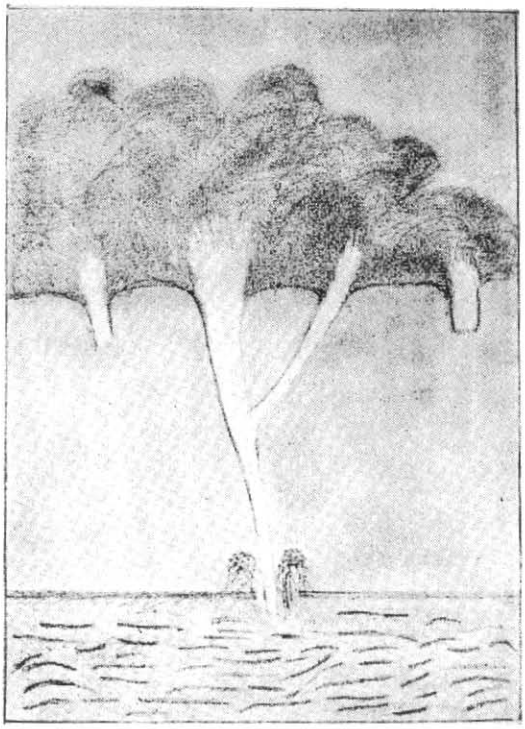
The meteorological world has lost a great figure in the death of Dr. V.F.K. BJERKNES, who passed away at Oslo on 9 April 1951 at the age of 89. He was best known as the founder and inspirer of the Bergen School of "Frontal Meteorology" but his circulation theorems, his construction of constant pressure charts and his introduction of the millibar as an absolute unit of pressure are his other outstanding contributions to the science of meteorology.



Waterspout off Saurashtra Coast

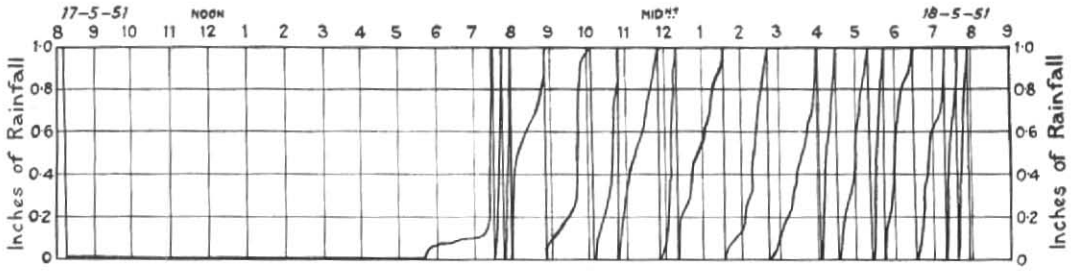


Fig. 1. Hyetogram of Cherrapunji for 17-18 May 1951

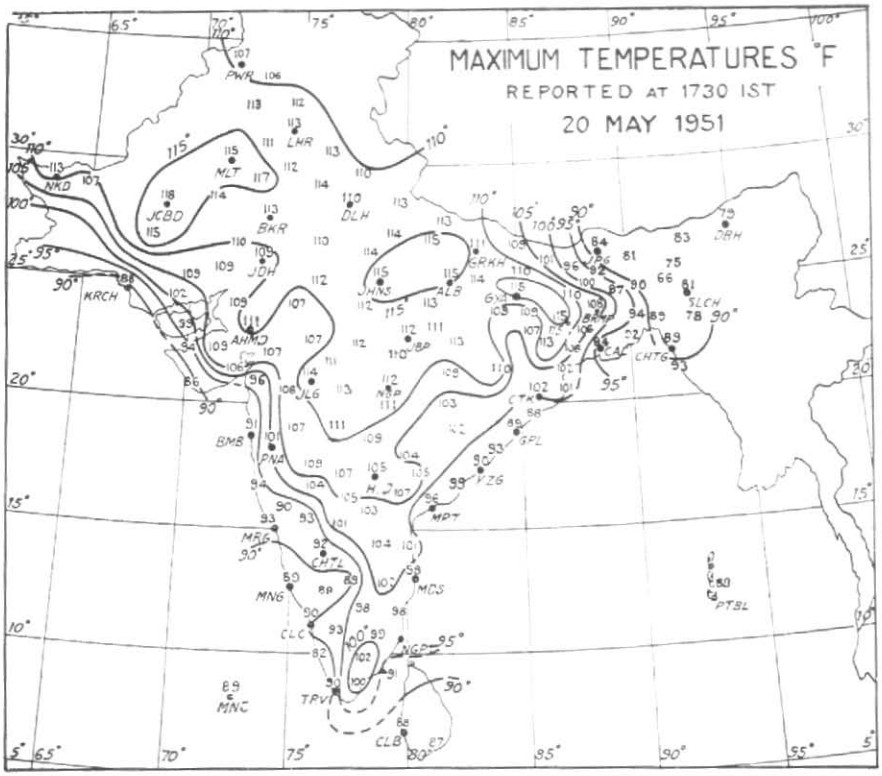

MAXIMUM TEMPERATURES °F
REPORTED AT 1730 IST
20 MAY 1951

Fig. 2

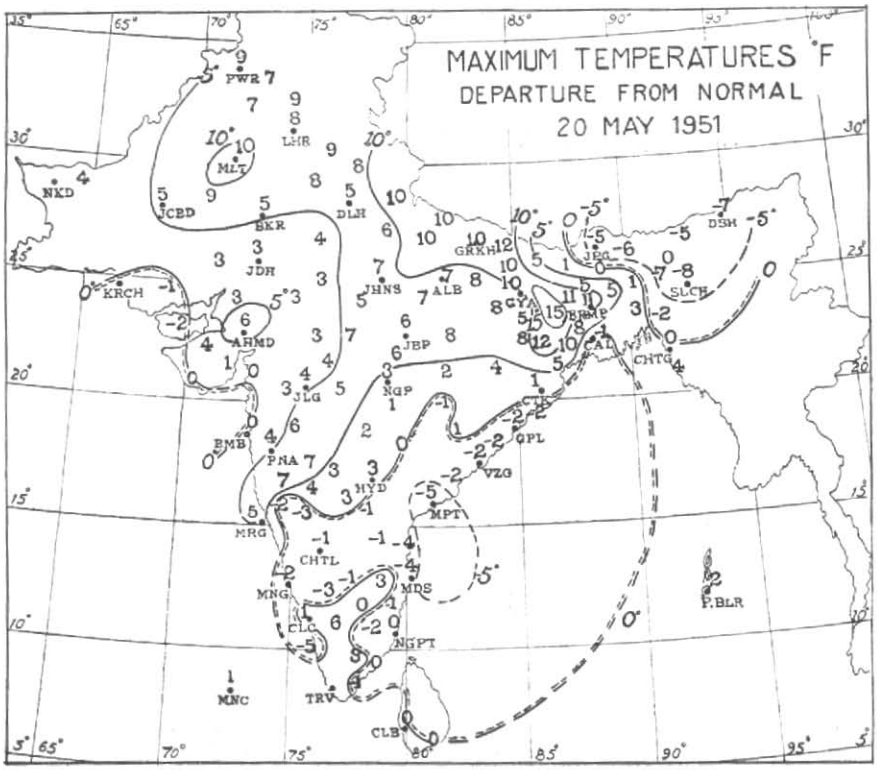

MAXIMUM TEMPERATURES °F
DEPARTURE FROM NORMAL
20 MAY 1951

Fig. 3

KODAIKANAL SOLAR AND GEOMAGNETIC DATA, APRIL - JUNE 1951

Curves showing (a) Kodaikanal daily relative sunspot numbers, (b) daily areas of calcium prominences and (c) daily areas of H-alpha dark markings are given on p. 304. Tables 1 to 4 below summarise the data on solar and geomagnetic phenomena.

TABLE 1

Prominent sunspot groups

Kodaikanal Serial No. of spotgroup	Mean latitude	Date of central meridian passage	Total area (millionths of the sun's visible hemisphere) at central meridian passage
9620 (4th rotation)	10° N	April 18	1850
9620 (5th rotation)	12° N	May 16	3850
9688	20° N	May 22	750
9697	7° S	June 7	600
9700	13° S	June 18	2350

TABLE 2

Solar Flares

Date		Time in GMT						Co-ordinates		Estimated Maximum intensity	Maximum width of H-alpha line observed A°	Remarks
		Beg. h	m	Max. h	m	End. h	m	Mean latitude	Mean longitude			
April 18	(a)	02	30	02	38	03	00	12°N	10°E	1	2.0	Observed in the vicinity of spotgroup No. 9620 (4th rotation)
	(b)	03	45	03	50	04	05	13°N	9°E	1	1.8	
April 19	(a)	—		02	47	03	00	10°N	5°W	1	1.4	
	(b)	—		05	58	06	30	10°N	5°W	2	Not recorded	
April 21		—		05	40	06	30	10°N	34°W	1	1.6	
April 29		—		03	27	03	50	5°S	14°W	1	1.6	
May 12		—		02	15	02	40	15°N	55°E	1	1.6	
May 14		—		02	40	—		12°N	35°E	1	Not measured	

TABLE 2 (*contd*)

Solar Flares

Date		Time in GMT						Co-ordinates		Estimated Maximum intensity	Maximum width of H-alpha line observed	Remarks
		Beg.		Max.		End.		Mean latitude	Mean longitude			
		h	*m*	*h*	*m*	*h*	*m*				Å	
May 16	(a)	02	40	02	43	03	10	14°N	7°E	1	1.8	Observed in the vicinity of spotgroup No. 9620 (5th rotation)
	(b)	—		04	10	04	30	10°N	36°E	1	1.2	
May 18		—		02	15	03	15	16°N	22°W	1	Not measured	
May 21	(a)	—		02	18	03	10	8°N	67°W	1	2.8	
	(b)	—		02	25	03	00	15°S	23°E	1	1.6	
May 23		—		02	55	03	10	15°N	4°W	1	Not measured	
June 17		—		01	55	02	15	11°S	26°E	1	Not observed	Observed in the vicinity of spotgroup No. 9700
June 18		—		02	07	02	15	11°S	13°E	1	Not observed	
June 23		—		02	15	02	55	17°N	6½°W	1	1.3(two bright points)	

TABLE 3

Sudden disappearance of prominences and H-alpha dark markings

Nature of phenomenon	Date and time of phenomenon when last seen		Co-ordinates of phenomenon		Remarks
			Mean latitude	Mean longitude	
Prominences	April 4	0316 UT	35°N	90°E	Disappeared next day
	May 27	0243 UT	23°S	90°E	Do.
H-alpha dark markings :	April 6	0659 UT	24°S	75°E	Do.
	April 28	0519 UT	15°S	15°E	Do.
	April 28	0519 UT	20°S	30°W	Do.
	May 16	0844 UT	7°N	7°E	Do.
	May 18	0845 UT	30°N	37°W	Do.

TABLE 4

Principal magnetic storms

Greenwich date 1951	Storm-time GMT of begin. *h* *m*	Storm-time GMT of ending[1] *d* *h*	Sudden commencement Type[2]	Sudden commencement Amplitude[3] *D* ′	*H* γ	*Z* γ	C-figure, degree of activity[4]	Maximal activity Greenwich day	Ranges *D* ′	*H* γ	*Z* γ
April 1	18 50	7 22	...	...	...	...	m	3	5	245	117
April 12	21 52	14 13	s.c.	...	+8	...	ms	13	3	250	45
April 18	06 50	19 14	s.c.	−0.8	+83	+21	s	18	4	403	88
			Note—On April 19, Crochet observed between 0522 and 0630 GMT ; Radio fade-out (AIR) reported between 0445 and 0650 GMT								
April 30	06 40	3 20	s.c.	−0.2	+23	...	ms	1	5	273	102
May 9	17 46	11 15	s.c.	...	+16	...	m	10	9	243	71
May 25	18 42	27 11	s.c.	...	+12	...	m	27	6	193	26
June 6	04 14	7 09	s.c.	−0.2	+26	...	m	6	3	248	66
June 14	17 50	15 13	s.c.	$\overline{\Delta}$	+26	+17	m	15	$\overline{\Delta}$	171	128
			Note—On June 13, Crochet observed between 0600 and 0712 GMT ; Radio fade-out (AIR) reported between 0550 and 0910 GMT								
June 17	16 58	18 19	s.c.	−0.3	+41	+17	ms	18	5	263	64
			Note—On June 18, Crochet observed between 0602 and 0630 GMT								
June 18	23 10	19 11	s.c.	...	+15	+11	m	19	4	126	$\overline{\Delta}$

The following symbols and conventions have been used according to recognised practice—

1. Approximate time of ending of storm construed as the time of cessation of reasonably marked disturbance movements in the traces

2. s.c. = Sudden commencement ... = Gradual commencement

3. Signs of amplitudes of *D* and *Z* taken algebraically ; (*D*—reckoned negative being westerly)

(*Z*—reckoned positive being vertically downwards)

4. Storm described by three degrees of activity: m—for moderate (when range is between 150 γ & 250 γ) ; ms—for moderately severe (when range is between 251 γ & 400 γ) ; s—for severe (when range is above 400 γ)

AIR = Observed by All India Radio

$\overline{\Delta}$ = Loss of record

MAGNETIC OBSERVATORY, ALIBAG (BOMBAY)

Three hourly Indices of Geomagnetic Activity

(K9=300γ)

(Scale values of variometers in γ/mm : D=11.3; H=4.4; Z=2.4)

Greenwich Day	JANUARY 1951				FEBRUARY 1951				MARCH 1951			
	K-indices		Sum	Char. 0–1–2	K-indices		Sum	Char. 0–1–2	K-indices		Sum	Char. 0–1–2
1	2321	3222	17	0	5422	3243	25	1	3232	2221	17	0
2	2233	4343	24	1	2211	1122	13	0	1221	3212	14	0
3	1412	2122	15	0	1122	1122	12	0	1322	2221	15	0
4	1221	1322	14	0	1124	3332	19	1	1231	1122	13	0
5	2221	2333	18	1	2443	4354	29	1	1221	2211	12	0
6	2121	1121	11	0	4544	2223	26	1	2344	4332	25	1
7	1221	2121	12	0	3211	2221	14	0	2126	6452	28	2
8	1232	3222	17	1	1113	2554	22	1	2225	3443	25	1
9	1222	2111	12	1	1223	4435	22	1	2222	3434	22	1
10	1211	1543	18	1	2332	3234	22	1	5442	4342	28	1
11	2122	2334	19	1	2222	2433	20	1	3222	3552	24	1
12	2323	2221	17	1	3212	4543	24	1	3224	4231	21	1
13	2232	1142	17	1	3223	3242	21	1	1125	3554	26	1
14	1122	2232	15	1	2122	1242	16	1	3323	4343	25	1
15	2122	3234	19	1	1221	1113	12	0	3423	2221	19	1
16	2122	3342	19	1	0111	1111	7	0	1324	3443	24	1
17	1321	1121	12	1	1111	1232	12	0	2254	2422	23	1
18	1321	2112	13	1	2114	2232	17	1	2234	3222	20	1
19	2332	4244	24	1	2223	2222	17	0	2322	1221	15	0
20	3112	2211	13	0	2112	2111	11	0	1115	2221	15	1
21	1124	5534	25	2	1111	2243	15	1	0122	1222	12	0
22	2443	5555	33	1	2255	4544	31	2	3325	5534	30	2
23	2223	3342	21	1	3354	4355	32	2	3423	4354	28	1
24	1222	3222	16	0	3333	4532	26	1	2222	2333	19	1
25	2111	2122	12	0	2222	2223	17	1	2314	2312	18	1
26	1322	3544	24	1	2222	3432	20	1	2133	3243	21	1
27	4232	2332	21	1	4233	4445	29	2	1322	1212	14	0
28	3222	3453	24	1	5765	4233	35	2	1000	1112	6	0
29	1212	2222	14	1					1353	5334	27	1
30	2231	2334	20	2					3112	3122	15	1
31	3544	4343	30	2					1231	3221	15	1

MAGNETIC OBSERVATORY, ALIBAG (BOMBAY)

Three hourly Indices of Geomagnetic Activity

(K9=300γ)

(Scale values of variometers in γ/mm : D=11.3; H=4.4; Z=2.4)

Gr. Day	APRIL 1951				MAY 1951				JUNE 1951			
	K-indices		Sum	Char. 0-1-2	K-indices		Sum	Char. 0-1-2	K-indices		Sum	Char. 0-1-2
1	1112	1122	11	0	2555	2456	34	2	3234	4321	22	1
2	2332	4543	26	1	3344	5454	32	1	1334	4232	22	1
3	3534	4543	31	1	1222	4442	21	1	4221	2111	14	0
4	3343	4534	29	1	3233	3422	22	1	1111	2222	12	0
5	3224	4444	27	1	1222	1112	12	0	3311	1222	15	1
6	3423	4452	27	1	2231	2231	16	1	1354	3211	20	1
7	1333	4342	23	1	1233	2221	16	1	2423	3122	19	1
8	2243	2342	22	1	1112	1121	10	0	2232	2332	19	1
9	2234	4232	22	1	1242	2346	24	2	2112	3201	12	0
10	3222	2232	18	1	3353	6431	28	2	1113	3221	14	1
11	2111	2212	12	1	1233	4223	20	1	1122	1232	14	1
12	3133	3224	21	1	2222	2431	18	1	3243	2132	20	1
13	4445	5433	32	2	1111	0112	8	0	4364	3122	25	2
14	3232	2221	17	1	2121	1224	15	1	1121	0444	17	2
15	2212	2311	14	1	2432	2222	19	1	4443	3323	26	2
16	1111	1112	9	0	2233	1122	16	0	3323	2322	20	1
17	2222	2221	15	0	2223	3433	22	1	1111	1536	19	2
18	1258	6554	36	2	4433	2212	21	1	5563	4413	31	2
19	3433	2223	22	1	2222	1111	12	0	2433	1421	20	1
20	2222	3453	23	1	2212	1111	11	0	2112	1113	12	0
21	3435	3422	26	1	1111	0011	6	0	2342	2211	17	1
22	3234	4342	25	1	2111	1211	10	0	1322	2222	16	0
23	2321	1101	11	0	1235	4352	25	1	2222	1111	12	0
24	1252	5443	26	2	3222	2222	17	0	1212	2122	13	0
25	3233	3432	23	1	2322	2123	17	1	3434	4533	29	2
26	3211	1220	12	0	3222	3555	27	2	4422	2222	20	1
27	1112	3422	16	1	3233	1111	15	1	2342	2322	20	1
28	2222	2221	15	1	2332	2210	15	1	2333	3222	20	1
29	3222	2321	17	1	1133	3323	19	1	2323	3232	20	1
30	1121	1112	10	0	1234	4212	19	1	2222	2231	16	1
31					1314	2233	19	1				

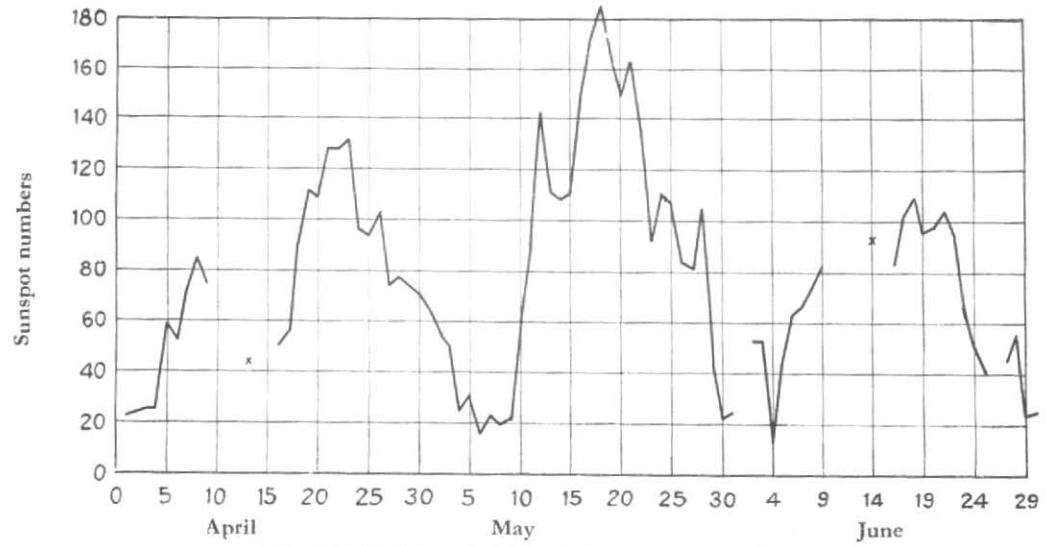


Fig. 1(a) Kodaikanal daily relative sunspot numbers

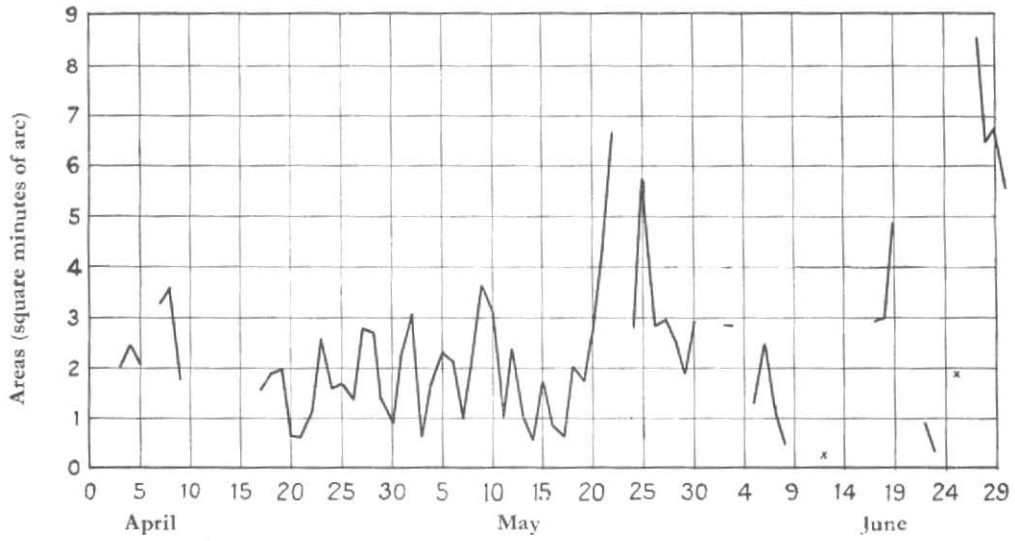


Fig. 1(b) Daily areas of calcium prominences

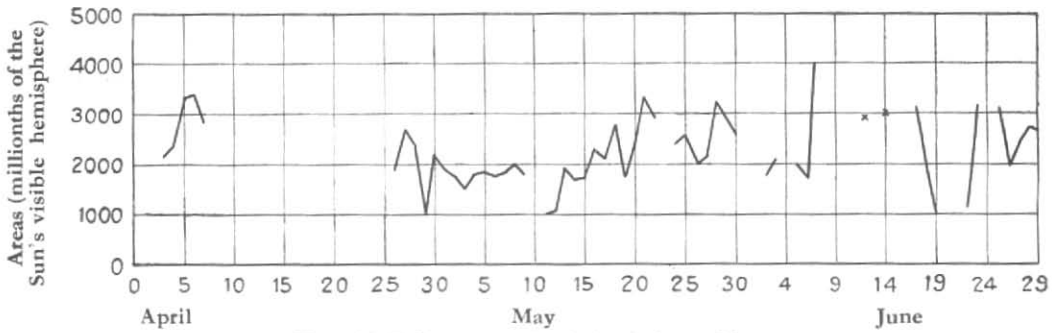


Fig. 1(c) Daily areas of H-alpha dark markings

Note: Breaks in the graphs are due to lack of observations