

Weather

HOT WEATHER SEASON (MARCH-MAY 1994)*

1. Introduction

Pre-monsoon thundershower activities in the country are prominent in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim and Kerala. Pre-monsoon thundershower activity is quite significant in Gangetic West Bengal, Orissa, Bihar Plateau, Tamil Nadu and Karnataka. Season's rainfall was excess in 2, normal in 17, deficient in 14 and scanty in 2 meteorological sub-divisions. Season's rainfall was in excess in Andaman & Nicobar Islands and Madhya Maharashtra and normal in Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Orissa, Haryana, Himachal Pradesh, Rajasthan, west Madhya Pradesh, Marathwada, Tamil Nadu, Karnataka, Kerala and Lakshadweep. It was deficient in the remaining sub-divisions outside Gujarat state where it was scanty. Seasonal and monthly rainfall figures are given in Table 5 and seasonal rainfall departures for the meteorological subdivisions are given in Fig. 2.

Actual rainfall and its departures for each month and season are given Table 1.

2. Chief features

- (i) Severe cyclonic storm over Bay of Bengal (29 April to 2 May 1994).
- (ii) Onset of southwest monsoon over Kerala on 28 May 1994.
- (iii) Severe heat wave conditions in Rajasthan on a number of days and in parts of plains of west Uttar Pradesh and west Madhya Pradesh on a few days.

3. Monthly features

3.1. March

3.1.1. *Weather and associated synoptic features* — A well marked low pressure area formed over southeast Bay and adjoining south Andaman Sea on 21 morning and concentrated into a depression on the same evening with its centre lying near 9.5°N/90.5°E. It moved northwards into east-central Bay and neighbourhood and weakened on 24th (Fig. 1). Under the influence of this system Andaman & Nicobar Islands received good rainfall.

During this month, northwest India was affected by 7 western disturbances and 3 induced cyclonic circulations. There were also 3 troughs in the westerlies in the mid and upper troposphere which moved across the country. Details of these systems are given in Table 2.

Rain or thundershowers occurred almost at all the places or at many places on 14 days over Assam & Meghalaya on 4 to 7 days over Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Manipur, Mizoram & Tripura and Sub-Himalayan West Bengal & Sikkim and on 1 day over Madhya Pradesh and Kerala. Rainfall occurred at a few places or at one or two places on 4 to 16 days in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa, Punjab, Himachal Pradesh, Tamil Nadu, coastal Karnataka, south interior Karnataka and Kerala and on 1 to 3 days only in Gangetic West Bengal, Bihar, Haryana, Madhya Maharashtra, Marathwada, coastal Andhra Pradesh, Rayalseema, north interior Karnataka and Lakshadweep. Weather was mainly dry in the remaining subdivisions.

*Compiled by: U. S. De, D. S. Desai and S. G. Bhandari, Meteorological Office, Pune.

TABLE 1

Monthly and seasonal rainfall (mm) for each month and season
(March-May 1994)

| S. No. | Meteorological sub-division | March | | | April | | | May | | | Season | | |
|--------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | Actual | Normal | % Dep. | Actual | Normal | % Dep. | Actual | Normal | % Dep. | Actual | Normal | % Dep. |
| 1 | Bay Islands | 128 | 40 | 221 | 176 | 89 | 99 | 395 | 377 | 5 | 699 | 505 | 38 |
| 2 | Arunachal Pradesh | 221 | 100 | 121 | 176 | 191 | -8 | 199 | 340 | -41 | 596 | 630 | -5 |
| 3 | Assam & Meghalaya | 204 | 77 | 163 | 150 | 188 | -20 | 331 | 413 | -20 | 685 | 678 | 1 |
| 4 | Naga, Mani, & Miz. | 159 | 65 | 145 | 127 | 130 | -2 | 104 | 234 | -55 | 391 | 429 | -9 |
| 5 | S.H.W.B. & Sikkim | 53 | 53 | 0 | 89 | 110 | -19 | 195 | 283 | -31 | 337 | 445 | -24 |
| 6 | Gungetic West Bengal | 10 | 26 | -59 | 67 | 42 | 62 | 103 | 98 | 5 | 181 | 166 | 9 |
| 7 | Orissa | 2 | 22 | -92 | 55 | 32 | 73 | 39 | 63 | -38 | 95 | 117 | -19 |
| 8 | Bihar Plateau | 1 | 20 | -95 | 25 | 20 | 26 | 25 | 52 | -51 | 51 | 92 | -44 |
| 9 | Bihar Plains | 0 | 11 | -98 | 7 | 14 | -53 | 27 | 45 | -41 | 33 | 70 | -52 |
| 10 | East Uttar Pradesh | 0 | 10 | -100 | 11 | 6 | 85 | 11 | 16 | -34 | 22 | 32 | -30 |
| 11 | Plains of West U.P. | 0 | 13 | -99 | 13 | 7 | 98 | 7 | 12 | -39 | 20 | 31 | -34 |
| 12 | Hills of West U.P. | 1 | 60 | -98 | 25 | 33 | -26 | 44 | 54 | -17 | 70 | 147 | -53 |
| 13 | Hav., Chandl. & Delhi | 1 | 14 | -91 | 12 | 7 | 85 | 13 | 12 | 13 | 27 | 32 | -17 |
| 14 | Punjab | 1 | 25 | -82 | 12 | 12 | 5 | 13 | 13 | -3 | 29 | 50 | -42 |
| 15 | Himachal Pradesh | 18 | 80 | -78 | 107 | 44 | 142 | 72 | 48 | 49 | 197 | 172 | 14 |
| 16 | Jammu & Kashmir | 28 | 101 | -73 | 75 | 72 | 4 | 42 | 55 | -23 | 145 | 228 | -37 |
| 17 | West Rajasthan | 1 | 5 | -86 | 10 | 2 | 313 | 6 | 8 | -27 | 16 | 15 | 10 |
| 18 | East Rajasthan | 1 | 6 | -90 | 9 | 2 | 323 | 5 | 9 | -46 | 15 | 17 | -12 |
| 19 | West Madhya Pradesh | 0 | 8 | -100 | 16 | 4 | 316 | 2 | 9 | -74 | 18 | 20 | -9 |
| 20 | East Madhya Pradesh | 0 | 18 | -100 | 16 | 13 | 23 | 16 | 16 | 2 | 32 | 46 | -31 |
| 21 | Gujarat Region | 0 | 2 | -100 | 1 | 1 | -58 | 0 | 7 | -98 | 1 | 10 | -94 |
| 22 | Saur., Kutch & Diu | 0 | 3 | -100 | 0 | 1 | -100 | 0 | 4 | -89 | 0 | 8 | -95 |
| 23 | Konkan & Goa | 0 | 0 | -100 | 12 | 5 | 126 | 9 | 42 | -79 | 21 | 48 | -57 |
| 24 | Madhya Maharashtra | 2 | 4 | -37 | 17 | 12 | 202 | 38 | 29 | 30 | 77 | 45 | 71 |
| 25 | Marathwada | 0 | 7 | -97 | 24 | 9 | 151 | 19 | 20 | 3 | 43 | 36 | 19 |
| 26 | Vidarbha | 0 | 18 | -100 | 18 | 13 | 41 | 4 | 14 | -75 | 21 | 44 | -52 |
| 27 | Coastal A. P. | 0 | 12 | -97 | 22 | 24 | -8 | 39 | 57 | -32 | 61 | 94 | -35 |
| 28 | Telangana | 0 | 11 | -100 | 20 | 20 | 1 | 13 | 26 | -51 | 33 | 58 | -43 |
| 29 | Rayalaseema | 0 | 6 | -96 | 20 | 21 | -5 | 41 | 54 | -24 | 62 | 82 | -25 |
| 30 | Tamil Nadu | 9 | 21 | -58 | 52 | 49 | 4 | 67 | 71 | -5 | 127 | 141 | -10 |
| 31 | Coastal Karnataka | 6 | 5 | 23 | 92 | 32 | 184 | 59 | 141 | -58 | 157 | 178 | -12 |
| 32 | N. I. Karnataka | 1 | 7 | -91 | 50 | 26 | 94 | 24 | 49 | -50 | 75 | 81 | -8 |
| 33 | S. I. Karnataka | 5 | 8 | -31 | 71 | 45 | 57 | 87 | 102 | -14 | 164 | 155 | 6 |
| 34 | Kerala | 20 | 40 | -49 | 158 | 114 | 39 | 152 | 256 | -41 | 330 | 410 | -19 |
| 35 | Lakshadweep | 25 | 8 | 210 | 87 | 35 | 149 | 95 | 141 | -32 | 207 | 184 | 13 |

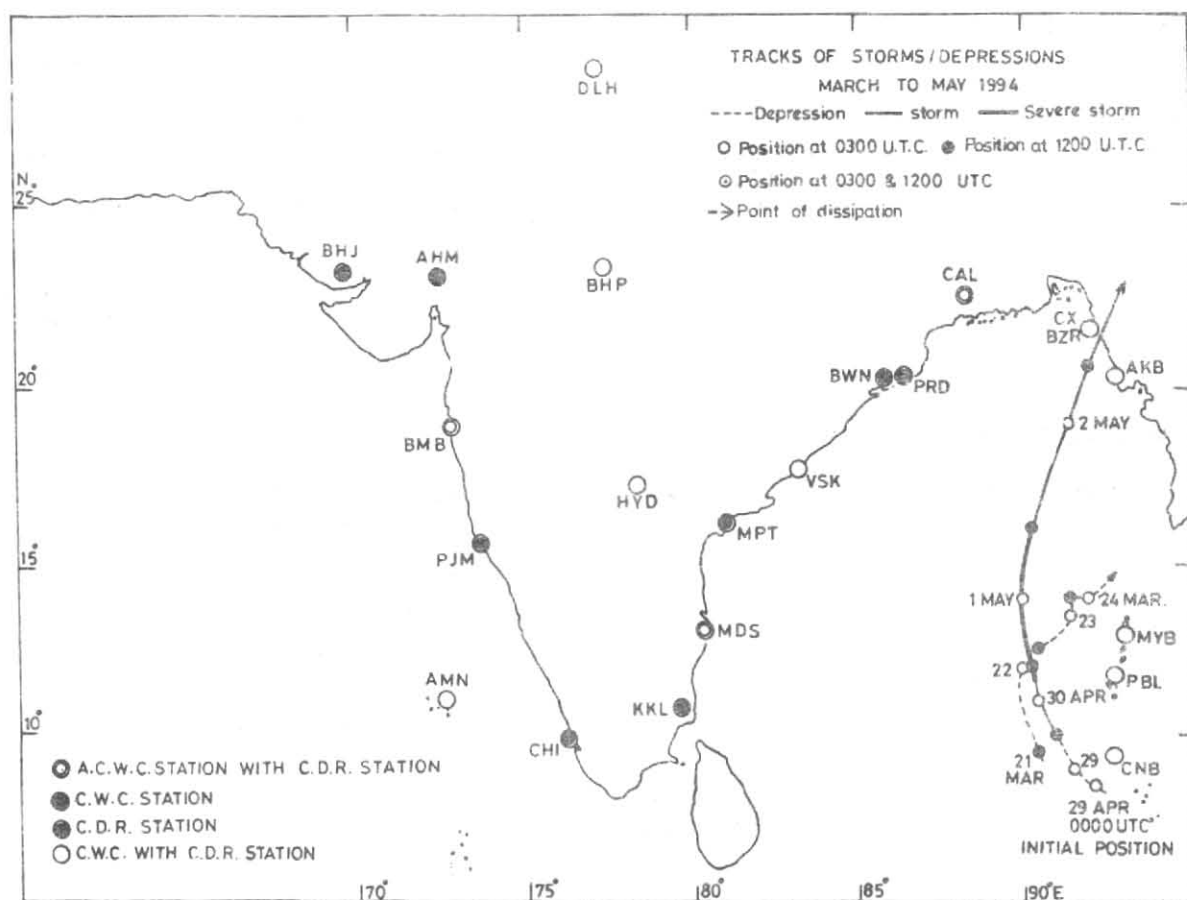


Fig. 1. Tracks of storms/depressions (March-May 1994)

3.1.2. *Month's rainfall* — Month's rainfall was in excess in 6, normal in 1, deficient in 5 and scanty in 5 meteorological sub-divisions. There was no rain in the remaining 8 sub-divisions. Rainfall was excess in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, coastal Karnataka and Lakshadweep, normal in Sub-Himalayan West Bengal & Sikkim, deficient in Gangetic West Bengal, Madhya Maharashtra, Tamil Nadu, south interior Karnataka and Kerala and scanty in Orissa, Bihar, west Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Marathwada, coastal Andhra Pradesh, Rayalaseema and north interior Karnataka. Mainly dry weather prevailed over the rest of the country. Principal amounts of rainfall are given in Table 5.

3.1.3. *Temperature* — Day temperatures were 5°C or more above normal on 4 to 8 days in Himachal

Pradesh, Jammu, Rajasthan, Madhya Pradesh and Gujarat and were 5°C or more below normal on 4 to 6 days in Arunachal Pradesh, Assam & Meghalaya and Nagaland, Manipur, Mizoram & Tripura. The day temperatures were mostly normal to appreciably above normal elsewhere. The highest maximum temperature in the plains of 43°C was recorded at Ahmedabad on 18 and 19, at Porbandar on 18 and Jalgaon on 20.

Night temperatures were markedly below normal in Jammu on 1 and in Bihar Plains on 10. Elsewhere night temperatures were within $\pm 4^{\circ}\text{C}$ of normal over the country. In the plains, lowest minimum temperature of 5°C was recorded at Amritsar on 1 and -1°C in the hills at Srinagar on 1.

3.1.4. *Disastrous weather events and damages* — One person died and 50 injured in Assam and adjoining states due to hail storm.

WEATHER

TABLE 2

Details of the synoptic systems in March 1994

| S. No. (1) | System (2) | Period (3) | Place of first location (4) | Direction of movement (5) | Place of dissipation (6) | Remarks (7) |
|---------------|---|---------------|---|--|--|---|
| (A) | <i>Depression</i> | 21-24 | Southeast Bay and adjoining south Andaman sea | Northnorthwest initially and then northnorth-eastwards | Southern parts of east central Bay and neighbourhood | It was first observed as a trough in the lower level on 18 and became low pressure area over southeast Bay and adjoining south Andaman Sea, weakened into low pressure area on 24 and less marked on 25 |
| (B) | <i>Western disturbance</i> | | | | | |
| 1 | Upper air system | 2-5 | North Pakistan and neighbourhood | Northeastwards | Across Jammu & Kashmir | |
| 2 | Do. | 5-8 | Do. | Do. | Do. | |
| 3 | Do. | 9-10 | North Afghanistan & neighbourhood | Do. | Across northern parts of Jammu & Kashmir | |
| 4 | Do. | 13-15 | Central Pakistan | Do. | Across Jammu & Kashmir | |
| 5 | Do. | 17-22 | North Pakistan and neighbourhood | Do. | Do. | |
| 6 | Do. | 25-29 | Do. | Do. | Do. | |
| 7 | Do. | 29 Mar-2 Apr | North Pakistan and adjoining Afghanistan | Eastnortheastwards | Do. | |
| (C) | <i>Induced cyclonic circulations</i> | | | | | |
| 1 | Lower tropospheric level | 3-5 | South Pakistan & neighbourhood | Northeastwards | Northwest Rajasthan & neighbourhood | |
| 2 | Lower level | 19-22 | Northwest Rajasthan & neighbourhood | Do. | Moved away across Himachal Pradesh | |
| 3 | Do. | 28-30 | West Rajasthan & neighbourhood | Do. | Punjab & neighbourhood | |
| (D) | <i>Troughs in westerlies/easterlies</i> | | | | | |
| 1 | Trough in the easterlies (lower tropospheric level) | 28 Feb-2 Mar | Southeast Uttar Pradesh to south Madhya Maharashtra | Stationary | <i>In situ</i> | |
| 2 | Lower tropospheric level | 9-20 | Sub-Himalayan West Bengal to Assam & Meghalaya | Westwards | Bihar plains to north Assam | |

TABLE 2 (Contd.)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--|---|-------|--|------------------|---|--|
| 3 | Trough in the easterlies (Lower level) | 9-10 | Andaman Sea & neighbourhood | Quasi stationary | <i>In situ</i> | |
| 4 | Upper tropospheric westerlies | 12-15 | Long. 80°E/North of Lat. 15°N | Northeastwards | Sub-Himalayan West Bengal to coastal Andhra Pradesh | |
| 5 | Lower level | 10-15 | North Andaman Sea | Westwards | Southeast Bay & adjoining Andaman sea | |
| 6 | Do. | 15-17 | South Tamil Nadu to north interior Karnataka | Do. | South Kerala to Karnataka coast | |
| 7 | Mid and upper tropospheric westerlies | 19-20 | Long. 64°E/North of Lat. 25°N | Stationary | <i>In situ</i> | |
| 8 | Lower tropospheric level | 20-23 | North Bengal to northwest Bay | Eastwards | West Assam to northeast Bay | |
| 9 | Mid tropospheric level | 24-26 | Southeast Bay to south Bay | Stationary | <i>In situ</i> | |
| (E) <i>Other cyclonic circulations</i> | | | | | | |
| 1 | Lower level | 11-13 | Central Pakistan & neighbourhood | Southeastwards | West Rajasthan & neighbourhood | |
| 2 | Lower tropospheric level | 12-14 | North Pakistan & neighbourhood | Northeastwards | Jammu & Kashmir | |
| 3 | Do. | 14-17 | West Rajasthan & neighbourhood | Do. | Hills of west Uttar Pradesh | |
| 4 | Embedded cyclonic circulation (Lower level) | 30-31 | South Kerala & neighbourhood | Westwards | Moved away | It was first observed as a cyclonic circulation on 26 over south Tamil Nadu & neighbourhood and then as a trough on 30 from north interior Karnataka to south Kerala |

3.2. April

3.2.1. *Weather and associated synoptic features* — During this month, 4 western disturbances and one induced cyclonic circulation moved over northwest India. 5 troughs in the westerlies, in the mid and upper troposphere, passed across the country. There were in all 15 cyclonic circulations which formed in different parts of the country in lower tropospheric levels. Under the influence of these systems, good spells of rain occurred in different parts of the country. Details of these and other systems are given in Table 3.

Rain or thundershowers occurred almost at all the places and at many places on 8 to 17 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Jammu & Kashmir and Kerala, on 1 to 4 days in Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Punjab, Himachal Pradesh, west Rajasthan, east Madhya Pradesh, Rayalaseema, Karnataka and Lakshadweep and at a few places or at one or two places on 1 to 4 days in Arunachal Pradesh, Assam & Meghalaya, east Uttar Pradesh, Gujarat region and Konkan & Goa and 5 to 31 days in rest of the country outside Saurashtra & Kutch.

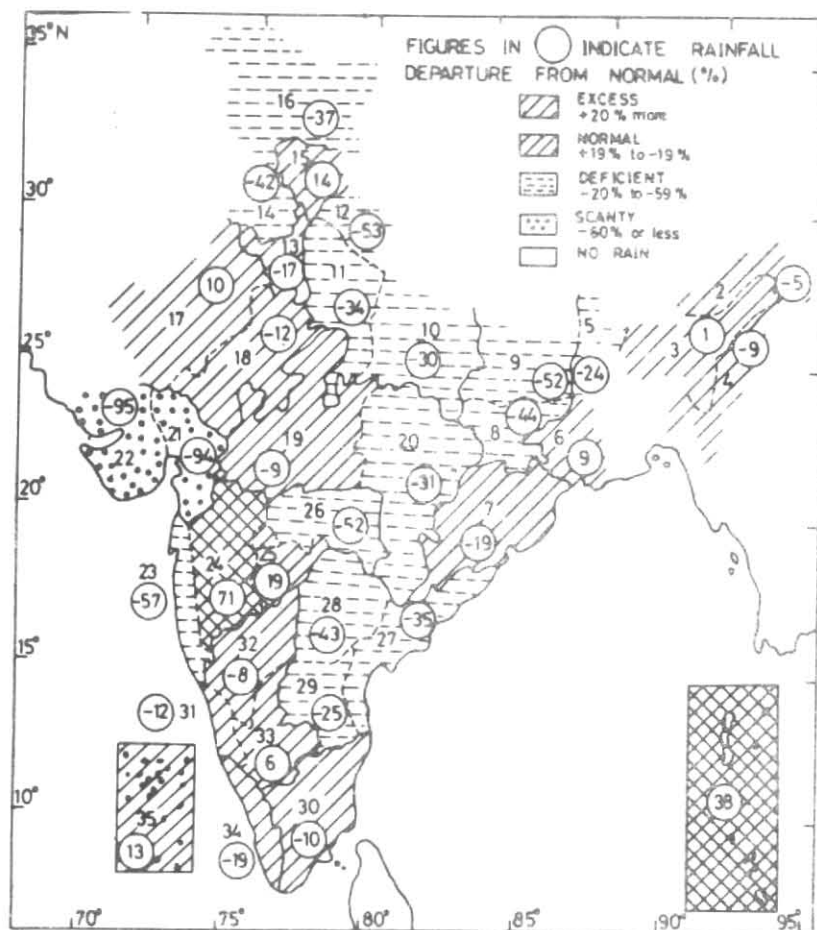


Fig. 2. Rainfall for the period 1 March to 31 May 1994

TABLE 3

Details of the synoptic systems in April 1994

| S. No. (1) | System (2) | Period (3) | Place of first location (4) | Direction of movement (5) | Place of dissipation (6) | Remarks (7) |
|------------|----------------------------|------------|-------------------------------------|---------------------------|--------------------------|--|
| (A) | <i>Low pressure area</i> | 4-5 | Northwest Rajasthan & neighbourhood | Stationary | <i>In situ</i> | Associated cyclonic circulation extended upto 3.1 km asl initially & then it was extended upto 2.1 km asl over Punjab on 5 and 6. Trough from this system to west Madhya Pradesh extended upto 2.1 km asl was seen from 6 to 7 |
| (B) | <i>Western disturbance</i> | | | | | |
| 1 | Upper air system | 3-7 | North Pakistan & neighbourhood | Eastnortheastwards | Moved away | |
| 2 | Do. | 9-13 | Do. | Northeastwards | Do. | |

TABLE 3 (Contd.)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--|---------------------------------------|---------------|---|--------------------|---|---|
| 3 | Upper air system | 14-17 | North Pakistan & neighbourhood | Eastnortheastwards | Moved away across Jammu & Kashmir | |
| 4 | Do. | 22-24 | Do. | Northeastwards | Moved away across Himachal Pradesh | |
| (C) <i>Induced cyclonic circulations</i> | | | | | | |
| 1 | Lower tropospheric level | 31 Mar-1 Apr | Punjab & neighbourhood | Stationary | <i>In situ</i> | |
| (D) <i>Troughs in the westerlies/easterlies, middle and upper tropospheric level</i> | | | | | | |
| 1 | Mid and upper tropospheric westerlies | 30 Mar-4 Apr | Long.60°E/North of Lat.25°N | Eastwards | Moved away | |
| 2 | Do. | 5-9 | Long.69°E/North of Lat.25°N | Do. | Long.70°E/North of Lat.25°N | |
| 3 | Do. | 11-12 | Long.64°E/North of Lat.25°N | Do. | Long.74°E/North of Lat.16°N | |
| 4 | Do. | 15-16 | Long.65°E/North of Lat.25°N | Stationary | <i>In situ</i> | |
| 5 | East-west trough | 20-23 | Bihar Plains to Nagaland | Do. | <i>In situ</i> | |
| 6 | Mid and upper tropospheric westerlies | 28 Apr-11 May | West Uttar Pradesh to north Konkan | Northeastwards | North Bay to Kerala coast through Tamil Nadu | |
| (E) <i>Other cyclonic circulations</i> | | | | | | |
| 1 | Lower level | 31 Mar-1 Apr | South Uttar Pradesh & adjoining parts of North Madhya Pradesh | Stationary | <i>In situ</i> | Trough from this system extended to south Assam from 1 to 5 |
| 2 | Do. | 2-7 | Southwest Rajasthan & neighbourhood | Northeastwards | Moved away across Hills of west Uttar Pradesh | |
| 3 | Do. | 6-9 | South Tamil Nadu & neighbourhood | Westwards | Moved away across Lakshadweep | |
| 4 | Lower tropospheric level | 10-12 | North Konkan & neighbourhood | Stationary | <i>In situ</i> | |
| 5 | Do. | 11-13 | South Rajasthan & neighbourhood | Do. | <i>In situ</i> | |
| 6 | Do. | 13-17 | Southwest Rajasthan & neighbourhood | Eastwards | Moved away across Hills of west Uttar Pradesh | A trough from this system extended to Vidarbha & became less marked on 14 |

TABLE 3 (Contd.)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|-------------------|--------------------------|--------------|--|---------------------|--|--|
| 7 | Lower tropospheric level | 8-10 | South interior Karnataka | Stationary | <i>In situ</i> | |
| 8 | Do. | 12-13 | Coastal Karnataka & neighbourhood | Do. | Do. | |
| 9 | Do. | 13-14 | South Tamil Nadu & neighbourhood | Stationary | Do. | |
| 10 | Lower level | 18-20 | West Rajasthan & adjoining Pakistan | Eastwards | Moved away across Himachal Pradesh | |
| 11 | Lower tropospheric level | 20-23 | Southwest Rajasthan & neighbourhood | Northeastwards | Punjab & neighbourhood | |
| 12 | Do. | 15-17 | Central parts of Madhya Pradesh | Do. | North Madhya Pradesh & adjoining Uttar Pradesh | |
| 13 | Do. | 18-19 | Sub-Himalayan West Bengal & Sikkim and adjoining parts of Bangladesh | Stationary | <i>In situ</i> | Trough from this system was running to Telangana on 18-19 |
| 14 | Do. | 23-27 | Southwest Rajasthan | Eastnorth-eastwards | Moved away across Himachal Pradesh | |
| 15 | Do. | 28-29 | Punjab & neighbourhood | Do. | Moved away across Hills of west Uttar Pradesh | |
| (F) Other troughs | | | | | | |
| 1 | Lower tropospheric level | 30 Mar-3 Apr | Punjab to north west Madhya Pradesh | Stationary | <i>In situ</i> | It was first observed as a cyclonic circulation over west Rajasthan & neighbourhood from 28-30 March |
| 2 | Lower level | 2-5 | Southwest Madhya Pradesh to south Kerala | Do. | Do. | |
| 3 | Do. | 10-13 | Rajasthan to south Madhya Maharashtra | Do. | Do. | |
| 4 | Do. | 18 Apr-9 May | Bihar plateau to south Tamil Nadu | Southwestwards | West Madhya Pradesh to south Tamil Nadu | |
| 5 | Lower tropospheric level | 14-18 | South Tamil Nadu | Stationary | <i>In situ</i> | |
| 6 | Do. | 27-28 | Andaman Sea | Northeastwards | Moved away | |

3.2.2. *Month's rainfall* — Rainfall was in excess in 21, normal in 9 and deficient in 4 Sub-divisions. There was no rain in one meteorological sub-

division, namely, Saurashtra & Kutch. Rainfall was excess in Andaman & Nicobar Islands, Gangetic West Bengal, Orissa, Bihar Plateau, Plains of Uttar

TABLE 4

Details of synoptic systems in May 1994

| S. No. | System | Period | Place of first location | Direction of movement | Place of dissipation | Remarks |
|---|--|--------------|---|---|---------------------------------------|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| (A) Cyclonic storm | | | | | | |
| 1 | Severe cyclonic storm (with a core of hurricane winds) | 29 Apr-3 May | Andaman Sea | Initially north-north westerly then northerly | Myanmar & adjoining Mizoram & Manipur | Low pressure area on 29 (7.5°N/94°E). Deep depression on 29th (9.0°N/91.5°E). Cyclonic storm on 29 (evening) (10°N/91°E). Severe cyclonic storm on 30 (12°N/90.5°E). Severe cyclonic storm with a core of hurricane winds (CHW) on 1 (16°N/90.0°E) & weakened into well marked low pressure area on 3 |
| 2 | Low pressure area | 8-9 | Arabian Sea | Stationary | <i>In situ</i> | |
| (B) Western disturbance | | | | | | |
| 1 | Upper air system | 3-6 | North Pakistan & neighbourhood | Northeastwards | Moved away | |
| 2 | Do. | 7-11 | Do. | Do. | Moved away across Jammu & Kashmir | |
| 3 | Do. | 13-16 | Do. | Do. | Do. | |
| 4 | Do. | 25-27 | Northwest Pakistan & adjoining Jammu & Kashmir | Eastnortheastwards | Moved away | |
| 5 | Do. | 27 May-1 Jun | North Pakistan | Do. | Moved away across Jammu & Kashmir | |
| (C) Induced cyclonic circulation | | | | | | |
| 1 | Lower tropospheric level | 5-7 | Northwest Rajasthan and adjoining parts of Punjab | Stationary | <i>In situ</i> | |
| 2 | Do. | 7-11 | Western parts of Punjab & adjoining parts of Pakistan | Eastwards | Moved away across Himachal Pradesh | |
| 3 | Do. | 12-15 | South Pakistan & adjoining parts of west Rajasthan | Northeastwards | Punjab | |
| (D) Other cyclonic circulations | | | | | | |
| 1 | Lower tropospheric level | 29 Apr-3 May | South west Rajasthan | Do. | Hills of west Uttar Pradesh | |

WEATHER

TABLE 4 (Contd.)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--|--|---------------|---|--------------------|---|---|
| 2 | Lower tropospheric level | 11-12 | South Rajasthan & neighbourhood | — | — | Merged with the induced cyclonic circulation (no. 3) on 12 May |
| 3 | Do. | 11-12 | Orissa & neighbourhood | Stationary | <i>In situ</i> | Trough from this system located from Orissa to south Tamil Nadu across Andhra Pradesh from 12 to 14 May |
| 4 | Lower level | 16-17 | Southwest Rajasthan & neighbourhood | Do. | Do. | |
| 5 | Lower tropospheric level | 15-17 | Bihar plains & adjoining Sub-Himalayan West Bengal & Sikkim | Do. | Do. | Trough was located from this system in lower level to north Kerala across east Madhya Pradesh, Vidarbha & interior Karnataka on 15 & 16 May |
| 6 | Mid & upper tropospheric level | 17-20 | Southeast Arabian Sea & adjoining Maldives | Westwards | Moved away | |
| 7 | Embedded cyclonic circulation (Lower tropospheric level) | 17-21 | Southeast Uttar Pradesh & neighbourhood | Eastwards | Gangetic West Bengal | |
| 8 | Lower level | 22-25 | Punjab & West Rajasthan | Do. | East Rajasthan & neighbourhood | |
| 9 | Lower tropospheric level | 19-30 | North Punjab & neighbourhood | Eastnortheastwards | Haryana & neighbourhood | |
| 10 | Embedded cyclonic circulation | 24-30 | West central & adjoining southwest Bay | Westwards | Do. | |
| (E) <i>Trough in the easterlies/westerlies</i> | | | | | | |
| 1 | Upper tropospheric westerlies | 3-5 | Long. 64°E/ North of Lat. 25°N | Eastwards | Moved away | |
| 2 | Mid and upper tropospheric westerlies | 12-14 | Long. 64°E/ North of Lat. 25°N | Do. | Long. 67°E/ North of Lat. 20°N | |
| (F) <i>Other troughs</i> | | | | | | |
| 1 | Lower level | 8-9 | Andaman sea | Stationary | <i>In situ</i> | |
| 2 | Lower tropospheric level | 17 May-1 June | Northwest Rajasthan to north West Bay across north Madhya Pradesh | Westwards | North Rajasthan to interior parts of Peninsula, through west Madhya Pradesh | |

TABLE 4 (Contd.)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|-----|-------------|------------------|--|------------------|---|--|
| 3 | Lower level | 23 May- 1 Jun | West Rajasthan to central Bay through Uttar Pradesh & Orissa | Quasi-stationary | North Rajasthan to interior parts of Orissa | |
| 4 | Do. | 26-29 | Off Kerala coast | — | — | Under the influence of this trough, a low pre- ssure area was formed in the month of June |

Pradesh, Haryana, Himachal Pradesh, Rajasthan, Madhya Pradesh, Maharashtra, Karnataka, Kerala and Lakshadweep; normal in Arunachal Pradesh, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Punjab, Jammu & Kashmir, Andhra Pradesh and Tamil Nadu; deficient in Assam & Meghalaya, Bihar Plains, hills of west Uttar Pradesh and Gujarat region and no rain in Saurashtra & Kutch. The principal amounts of rainfall (cm) are given in Table 5.

3.2.3. *Temperature* — Heat wave conditions prevailed over west Rajasthan on 30. Day temperatures were appreciably above normal on 2 to 9 days over Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Jammu, west Rajasthan, east Madhya Pradesh, Rayalaseema and Tamil Nadu. While they were markedly below normal by 5° to 10°C over northeast India in the 1st and 3rd week and also in Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Madhya Maharashtra, Marathwada and north interior Karnataka for 3 to 5 days during the month. Elsewhere the day temperatures were normal or within ± 2 to 4°C from normal over the rest period. Highest day temperature of 46°C was recorded at Phalodi on 30.

3.2.4. *Disastrous weather events and damages* — About 40 persons died in West Bengal due to squall and thunderbolt. In Rajasthan 8 people died and several injured due to hailstorm. Thunderstorm accompanied with hailstorm on 9 and 10 of the month over south Maharashtra and neighbouring states killed 10 people. Hailstorm also caused damage to crops in south Maharashtra.

3.3. May

3.3.1. *Severe cyclonic storm (SCS)* — A depression formed over southeast Bay on the morning of 29 April. It rapidly intensified into a cyclonic storm by the same evening and was centred near Lat.10.0°N

and Long.91.0°E (Fig. 1). The system moved north-northwestwards and further intensified into a severe cyclonic storm on 30 evening and was centred near Lat.14.0°N/Long.90.0°E on the morning of 1 May. Recurring northeastwards, it further intensified into a severe cyclonic storm with a core of hurricane winds and lay over east central Bay with its centre near Lat.16.0°N/Long.90.3°E on the evening of 1 May. Continuing its north-northeastward movement, it crossed Bangladesh-Myanmar coast near Long.92.0°E around midnight (1800 UTC) on 2. After crossing the coast, it weakened rapidly into a low pressure area on 3 May. Andaman & Nicobar Islands received heavy-to-very heavy rain during 29 April to 1 May.

3.3.2. *Weather and associated synoptic features* — 5 western disturbances, 3 induced cyclonic circulations and 2 troughs in mid and upper tropospheric westerlies passed across northwestern parts of India. In addition 10 cyclonic circulations and three troughs in lower levels also affected during the month. Details of these systems are given in Table 4.

Rain or thundershowers occurred almost at all the places or at any places on 5 to 17 days over Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, West Bengal & Sikkim, Himachal Pradesh, Jammu & Kashmir and Kerala and on 1 to 4 days over Nagaland, Manipur, Mizoram & Tripura, Orissa, Bihar Plains, Punjab, Konkan & Goa, Madhya Maharashtra, Marathwada, Rayalaseema and Lakshadweep. Rainfall occurred at a few places or at one or two places on 5 to 30 days over the country outside plains of Uttar Pradesh, Saurashtra & Kutch, coastal Karnataka and Lakshadweep and scanty in Gujarat region on 1 to 4 days.

3.3.3. *Month's rainfall* — Rainfall during May was excess in 2, normal in 9, deficient in 19 and scanty in 5 sub-divisions.

WEATHER

TABLE 5

Principal amounts of rainfall (cm)

| Date (1) | March (2) | April (3) | May (4) |
|-------------|--|--|--|
| 1 | — | North Lakhimpur 9, Gondpimpri 4, Thalasserry 3 | Hut Bay 5, Long Island 4, Tissa 3 |
| 2 | — | Agartala 7, Imphal 4 | Car Nicobar 7, Nancowry 5, Pune 3 |
| 3 | — | Salem 6, Calcutta & Tiruchirapalli 3 each | Port Blair & Hut Bay 3 each |
| 4 | Car Nicobar, Hut Bay & Manali 3 each | Punalur 4, Dibrugarh 3 | — |
| 5 | — | Deragopipur 9, Bhuntar 8, Shimla, Srinagar, Nangal, Dehra Dun & Minicoy 3 each | North Lakhimpur 12, Dibrugarh 6 |
| 6 | — | Belgaum, Bhuntar, Cochi & Tuticorin 3 each | Dibrugarh, Kangra & North Lakhimpur 3 each |
| 7 | — | Belgaum, Minicoy, Sundernagar & Thiruvananthapuram 3 each | Arogyavaram & Kozhikode 3 each |
| 8 | — | — | Port Blair & Tezpur 5 each, Punalur & Tiruchirapalli 4 each |
| 9 | — | — | Hut Bay 25, Port Blair 16 |
| 10 | — | Ottapalam 6, Kodaikanal 5, Kannur 4, Hoshangabad & Kolhapur 3 each | Car Nicobar 6, Gangtok 3 |
| 11 | — | Coimbatore 7, Amini Divi 4, Agumbe & Cochi 3 each | Cooch Behar 4, Guwahati & Tezpur 3 each |
| 12 | — | Gadag 10, Kudulu 9, Thiruvananthapuram 4, Pamban & Pusad 3 each | — |
| 13 | Gangtok 4, Tadong 3 | Tiruchirapalli 9, Madurai 7, Sangli 6, Palayamkottai 4 | Beki Road Bridge 3 |
| 14 | — | Kanyakumari 4 | Kodaikanal 5, Coimbatore 4, Amritsar & Tadong 3 each |
| 15 | Cherrapunji & Gangtok 3 each | — | Thrissur 5, Dhubri & Shillong 4 each |
| 16 | Kailashahar 6, Cherrapunji 3 | Thenmala 5, Moncompu 3 | Agartala & Dibrugarh 5 each, Chickmagalur & Shantiniketan 3 each |
| 17 | Cherrapunji, Gangtok, Moncompu & Tuticorin 4 each, Silchar 3 | Ponnani 7, Kozhikode 4, Bahraich & Silchar 3 each | Cooch Behar & Tezpur 3 each |
| 18 | Miao 13, Naharkatia 8, Minicoy & Tezu 5 each | Guwahati 4, Punalur & Rajhat 3 each | Agartala & Calcutta 3 each |
| 19 | Cherrapunji 4 | Vadakara 7, Dibrugarh 4, Cuttack & Tirupattur 3 each | Visakhapatnam 9, Krishnagar 7, Tuni 5, Contal 4, Maya Bandar 3 |
| 20 | Cherrapunji 7, Nancowry 4 | — | Berhampur 6, Calcutta 4, Jagdalpur & Tikarpara 3 each |

TABLE 5 (Contd.)

| (1) | (2) | (3) | (4) |
|-----|--|--|--|
| 21 | Cherrapunji 14, Hut Bay 11, Dibrugarh, North Lakhimpur & Tadong 5 each, Gohar 3 | Silchar & Tezpur 3 each | Car Nicobar 5, Mananthavady 4, Berhampore & Tiruchhirapalli 3 each |
| 22 | Tezu 14, Cherrapunji 13, Passighat 8, Dibrugarh & Hut Bay 4 each, Port Blair 3 | — | Madurai 8, Bharari Chauldaghat & Thiruvananthapuram 5 each, Balasore 3 |
| 23 | Cherrapunji 59, Tezu 13, Dibrugarh 8, Passighat 4 | Digha 7, Nancowry 4, Calcutta, Dibrugarh & Tezpur 3 each | Chaparmukh 9, Kottayam 8, Tezpur 6, Anandpur & Jalpaiguri 5 each, Hut Bay & Sundernagar 3 each |
| 24 | Chottabekra 9, Silchar 8, Agartala 7, Kollegal 5, Imphal 4 | Dibrugarh 4 | Diamond Harbour 11, Contai 10, Tezpur 7, Kollam 5, Nancowry & Visakhapatnam 4 each |
| 25 | Kailashahar 11, Silchar 4 | Gangtok 5, Passighat 4 | Cooch Behar 14, Badatighat 6, Bhuntar, Patna & Vadakara 3 each |
| 26 | Lumding 7, Cherrapunji 6, Silchar 4, Guwahati 3 | Gharmura 7, North Lakhimpur 3 | Calcutta 7, Madras & Ongole 5 each, Balasore, Cooch Behar & Mysore 4 each, Agartala, Maya Bandar, Raipur & Thiruvananthapuram 3 each |
| 27 | Cherrapunji & Silchar 13 each, Kailashahar 10, Imphal 7, Agartala 6, Balehonnur 5, Calcutta, Cooch Behar & Guwahati 3 each | Gangtok, Kalingapatnam 5 each, Paradip 4, Dhubri 3 | Haripad & Numaligarh 9 each, Tiruvalla 7, Kolhapur 3 |
| 28 | Cherrapunji 9, Konni 7, Tezu 6 | Car Nicobar 11, Nancowry 7, Badvel 4, Cuddapah 3 | Panbari & Tadong 8 each, Gangtok & Thiruvananthapuram 7 each, Salem 6, Mangalore 4, Mysore 3 |
| 29 | Agartala & Kohima 6 each | Parli 5 | Cooch Behar & Goalpara 9 each, Cochi 7, Car Nicobar & Jalpaiguri 6 each, Shillong & Tadong 3 each |
| 30 | Senkottah 12, Cherrapunji 6, Kailashahar 5, Jalpaiguri & Siddapura 4 each | Hut Bay 17, Long Island 9, Parli 6, Nasik 3 | North Lakhimpur 12, Passighat 11, Hrikerur & Paravur 4 each, Gangtok & Minicoy 3 each |
| 31 | Kunnamkulam 5, Hasimara & Kothangiri 4 each | — | Mathanguri 21, Chengannur 7, Jalpaiguri 6, Thiruvananthapuram 3 |

Month's rainfall was excess in Himachal Pradesh and Madhya Maharashtra; normal in Andaman & Nicobar Islands, Gangetic West Bengal, hills of west Uttar Pradesh. Haryana, Punjab, east Madhya Pradesh, Marathwada and Tamil Nadu; scanty in west Madhya Pradesh, Gujarat, Konkan & Goa and Vidarbha and was deficient over the rest of the country.

The principal amounts of rainfall are given in Table 5.

3.3.4. *Advance of southwest monsoon* — The southwest monsoon advanced into the Andaman

Sea and adjoining parts of southeast Bay on 21 May. Its onset over the main land covering south Kerala and southern parts of Tamil Nadu was on 28 May. It also advanced into southeast Arabian Sea, south Lakshadweep area and parts of south and east central Bay on the same day. Onset of monsoon over Kerala was 4 days earlier than the normal date of onset. It advanced into the remaining parts of south Arabian Sea, north Lakshadweep area and north Kerala on 29.

3.3.5. *Temperature* — Heat wave conditions including spells of severe heat wave conditions prevailed on 10 to 13 days over Rajasthan and west

Madhya Pradesh and on 6 days over Vidarbha and on 1 to 3 days over plains of Uttar Pradesh, Haryana, Punjab, east Madhya Pradesh and Marathwada during the second half of the month. Temperatures were otherwise normal to appreciably above normal over the country.

Season's highest day temperature of 49.8°C was recorded at Dholpur (Rajasthan) on 31 May 1994. In addition, several stations in Rajasthan and Uttar Pradesh reported maximum temperatures of 49°C during the last week of May and 1st week of June 1994.

3.3.6. *Disastrous weather events and damages* — More than 100 people died in Rajasthan due to severe heat wave conditions which prevailed between 17 and 31 May. About 30 more persons died due to heat wave in other parts of the country.

Seven persons lost their lives due to thundersqualls in the 1st week of the month in West Bengal.

A large number of fishermen were reported missing along the Bangladesh coast during the passage of severe cyclonic storm. About 200 people also lost their lives.
