MAUSAM, **55**, 2 (April 2004), 373-388

Weather in India

HOT WEATHER SEASON (March – May 2003)*

1. Chief features

(*i*) *Severe heat wave*† conditions prevailed over some parts of the country during the months of April and May 2003.

(*ii*) One very severe cyclonic storm formed over the Bay of Bengal (10-19 May). It re-curved and crossed Myanmar coast during the night of 19 and hence made no damage over the country. It caused the southwest monsoon current to advance over south Andaman Sea on 16 May. But the unusual and prolonged trajectory of the system might have caused the delay in the further progress of the Bay Current. In addition, the changed flow pattern due to the cyclonic storm caused severe heat wave conditions to prolong until the first fortnight of June over many parts of the country, especially along the east coast.

(*iii*) Southwest monsoon advanced over parts of Maldives-Comorin areas, south Bay of Bengal, parts of east-central Bay and over north Andaman Sea towards the end of May 2003.

2. Seasonal rainfall

Season's rainfall was *excess* in 1 meteorological sub-division (Uttaranchal); normal in 12 meteorological sub-divisions (Andaman & Nicobar Islands, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Bihar, west Uttar Pradesh, Punjab, Jammu & Kashmir, Vidarbha, Chattisgarh, Tamil Nadu); *deficient* in 14 meteorological sub-divisions (Arunachal Pradesh, Assam & Meghalaya, Jharkhand, east Uttar Pradesh, Haryana, Himachal Pradesh, west Madhya Pradesh, Saurashtra & Kutch, coastal Andhra Pradesh, Telangana, north interior Karnataka, south interior Karnataka, Kerala, Lakshadweep) and *scanty* in 9 meteorological sub-divisions (west Rajasthan, east Rajasthan, east Madhya Pradesh, Gujarat Region, Konkan & Goa, Madhya Maharashtra, Marathwada, Rayalaseema, coastal Karnataka). Actual rainfall and its departures for each month and season as a whole are given in Table 1 while sub-divisional rainfall departures for the season March-May 2003 are shown in Fig. 2.

3. Significant features during different months

3.1. *March*

3.1.1. *Weather and associated synoptic features*

Details of weather systems formed during the month are given in Table 2.

Rain/snow occurred at *most places* or at *many places* on 4 to 7 days in Himachal Pradesh and Jammu & Kashmir and on 2 days in Uttaranchal. Rain/snow also occurred *at a few places* or *at isolated places* on 12 days in Himachal Pradesh and on 5 to 6 days in Uttaranchal and Jammu & Kashmir. Rain/thundershowers occurred *at most places* or *at many places* on 4 to 7 days in Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim and Gangetic West Bengal and on 1 to 3 days in Assam & Meghalaya, Orissa, Jharkhand, Haryana, Punjab, coastal Andhra Pradesh and Kerala. Rain/thundershowers also occurred either *at a few places* or *at isolated places* on 15 to 20 days in Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Orissa, Tamil Nadu, south interior Karnataka and Kerala; on 10 to 14 days in Arunachal Pradesh, Gangetic West Bengal, coastal Andhra Pradesh and north interior Karnataka; on 4 to 9 days in Andaman & Nicobar Islands, Nagaland-Manipur-Mizoram-Tripura, Jharkhand, Bihar, Haryana, Punjab, Madhya Maharashtra, Marathwada, Vidarbha, Chattisgarh, Telangana, Rayalaseema and coastal Karnataka and on 1 to 3 days in east Uttar Pradesh, west Uttar Pradesh, east Rajasthan and Lakshadweep. *Heavy to very heavy rain* or snow has occurred on 1 day in Jammu & Kashmir. *Heavy rain or snow* also occurred on 1 to 3 days in Uttaranchal, Himachal Pradesh and Himachal Pradesh. *Heavy rain* also occurred on 1 to 3 days in Andaman & Nicobar Islands, Assam & Meghalaya, Gangetic West Bengal, coastal Andhra Pradesh, Rayalaseema and Kerala.

3.1.2. *Rainfall distribution*

Month's rainfall was *excess* in 16 meteorological sub-divisions (Andaman & Nicobar Islands, Gangetic West Bengal, Orissa, Bihar, Uttaranchal, Punjab, Vidarbha, Chattisgarh, coastal Andhra Pradesh, Telangana, Rayalaseema, Tamil Nadu, north interior Karnataka, south interior Karnataka, Kerala and

† Definitions of the terms in *Italics* are given in Appendix.

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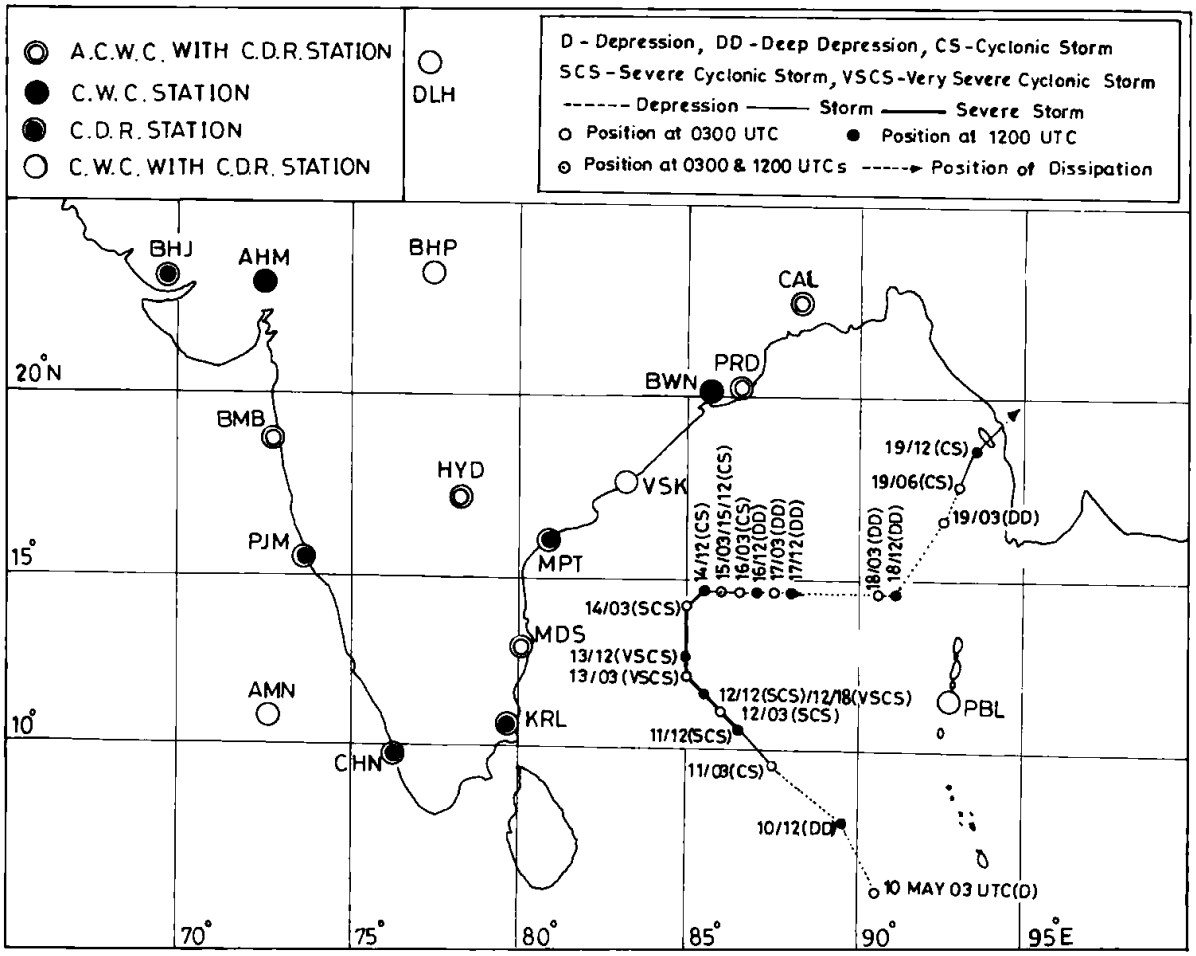

Fig. 1. Track of the cyclonic storm (March-May 2003

Lakshadweep); *normal* in 7 meteorological sub-divisions (Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Jharkhand, Himachal Pradesh, Jammu & Kashmir and coastal Karnataka); *deficient* in 2 meteorological sub-divisions (Arunachal Pradesh and Haryana) and *scanty* in 9 meteorological sub-divisions (east Uttar Pradesh, west Uttar Pradesh, west Rajasthan, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Konkan & Goa, Madhya Maharashtra and Marathwada). There was no rain in 2 meteorological sub-divisions (Gujarat region and Saurashtra & Kutch). Principal amounts of rainfall are given in Table 5.

3.1.3. *Temperature distribution*

Day temperatures were *appreciably to markedly above* normal on 10 to 16 days in west Rajasthan, east Rajasthan, west Madhya Pradesh, Saurashtra & Kutch, Madhya Maharashtra, coastal Andhra Pradesh; on 4 to 9 days in Orissa, Jharkhand, east Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, east Madhya Pradesh, Gujarat region, Konkan & Goa, Chattisgarh, Telangana, Tamil Nadu and of south interior Karnataka and on 1 to 3 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Bihar, Uttaranchal, Haryana, Punjab, Marathwada, Vidarbha, Rayalaseema, coastal Karnataka, north interior Karnataka and of Kerala. They were *appreciably to markedly* below normal on 8 to 13 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Bihar, east Uttar Pradesh and of Punjab; on 4 to 7 days in Orissa, Haryana, Jammu & Kashmir, west Rajasthan, east Rajasthan, west Madhya Pradesh and of east Madhya Pradesh and on 1 to 3 days in Jharkhand, west Uttar Pradesh, Uttaranchal, Himachal Pradesh, Gujarat region, Saurashtra & Kutch, Madhya Maharashtra, Vidarbha and

TABLE 1

Sub-divisionwise rainfall (mm) for each month and season as a whole (March-May 2003)

S. No.	Meteorological sub – divisions	March			April			May			Season		
		Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)
1.	Andaman & Nicobar Islands	113	31	263	12	85	-86	287	372	-23	412	487	-15
2.	Arunachal Pradesh	95	121	-22	196	263	-26	193	321	-40	484	705	-31
3.	Assam & Meghalaya	85	92	-7	237	223	7	279	441	-37	602	755	-20
4.	Nagaland-Manipur-Mizoram-Tripura	72	65	11	161	175	-8	243	290	-16	477	529	-10
5.	Sub-Himalayan West Bengal & Sikkim	80	81	-2	188	139	36	263	276	-4	531	495	7
6.	Gangetic West Bengal	72	27	169	38	48	-21	86	96	-11	196	171	15
7.	Orissa	28	23	23	27	30	-10	37	50	-26	91	102	-10
8.	Jharkhand	17	18	-6	10	21	-52	27	44	-40	54	83	-36
9.	Bihar	15	11	37	18	17	8	45	47	-6	77	75	3
10.	East Uttar Pradesh	3	9	-66	13	5	154	4	15	-76	20	29	-32
11.	West Uttar Pradesh	4	11	-68	8	5	87	12	13	-6	24	29	-16
12.	Uttaranchal	67	44	52	42	25	68	79	50	58	189	119	58
13.	Haryana, Chandigarh & Delhi	7	14	-55	3	7	-54	10	14	-28	20	36	-44
14.	Punjab	33	26	29	8	12	-36	3	15	-78	45	53	-17
15.	Himachal Pradesh	80	95	-15	36	55	-34	16	59	-73	132	209	-37
16.	Jammu & Kashmir	155	132	17	83	88	-6	83	66	25	320	286	12
17.	West Rajasthan	**	5	-93	**	3	-97	1	11	-86	2	18	-90
18.	East Rajasthan	1	4	-76	**	2	-83	4	11	-63	5	17	-69
19.	West Madhya Pradesh	**	5	-96	6	2	200	2	7	-77	7	14	-47
20.	East Madhya Pradesh	5	14	-60	1	6	-85	1	8	-81	8	28	-71
21.	Gujarat region	0	1	-100	**	1	-89	0	5	-100	**	8	-98
22.	Saurashtra & Kutch	0	1	-100	2	1	59	0	3	-99	2	5	-57
23.	Konkan & Goa	0	**	-98	**	4	-97	**	34	-99	**	38	-99
24.	Madhya Maharashtra	1	4	-75	2	10	-81	**	29	-99	3	43	-93
25.	Marathwada	**	5	-98	3	5	-49	**	19	-99	3	31	-90
26.	Vidarbha	21	12	-74	9	7	24	**	10	-98	30	30	2
27.	Chattisgarh	36	15	142	11	13	-17	4	17	-78	51	45	12
28.	Coastal Andhra Pradesh	44	10	330	9	21	-58	10	51	-80	63	82	-23
29.	Telangana	20	9	115	11	17	-31	1	27	-98	32	53	-39
30.	Rayalaseema	23	7	228	8	19	-57	2	55	-97	32	81	-60
31.	Tamil Nadu	42	21	102	40	46	-13	46	69	-33	128	135	-5
32.	Coastal Karnataka	7	7	5	38	34	12	11	140	-92	56	180	-69
33.	North interior Karnataka	14	5	159	30	26	16	3	59	-95	47	90	-48
34.	South interior Karnataka	23	9	139	42	46	-8	8	103	-93	73	159	-54
35.	Kerala	66	37	79	128	112	14	89	248	-64	283	398	-29
36.	Lakshadweep	29	12	136	18	43	-57	109	178	-38	156	232	-33

** Indicates amounts between 0.1 to 0.4 mm. (Amounts less than 0.1 is rounded off to 0)

TABLE 2

Details of the weather systems during March 2003

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(**A**) *Western disturbances /Eastwards moving systems*						
1.	Mid tropospheric levels	5-8	North Pakistan and adjoining Jammu & Kashmir	Northeasterly	Himachal Pradesh and neighbourhood	Moved away on 9
2.	Do	9-10	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 11
3.	Do					
4.	Do	13-19	North Pakistan and neighbourhood	Eastnorth-eastwards	Eastern parts of Jammu & Kashmir	Moved away on 20
5.	Do	20-22	North Pakistan and adjoining Jammu & Kashmir	Do	Do	Moved away on 22
6.	Do	22-25	Do	Northeasterly	Himachal Pradesh and neighbourhood	Moved away on 26
7.	Do	25-27	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 27 evening
8.	Do	27-29	Do	Do	Jammu & Kashmir and adjoining areas	Moved away on 30
9.	Do	30 Mar-2 Apr	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 3 April
(**B**) *Western disturbances as an induced systems*						
1.	Low	2-3	Central Pakistan and adjoining areas of west Rajasthan, Punjab and of Jammu & Kashmir	Northeasterly	North Pakistan and adjoining areas of Punjab and Jammu & Kashmir	It was first observed as an induced cyclonic circulation at lower levels over northwest Rajasthan and neighbourhood on 27 February. Less marked on 4. Associated extended upto mid tropospheric levels lay over Himachal Pradesh and neighbourhood on 4 and moved to eastern parts of Himachal Pradesh and neighbourhood on 5. A trough in the lower levels from this system to north Madhya Maharashtra on 28 February to east Madhya Pradesh on 1 March and upto east Uttar Pradesh on 2
2.	Cyclonic circulation upto lower tropospheric levels	9-13	West Rajasthan and adjoining areas of central Pakistan	Do	West Uttar Pradesh, Uttaranchal and Haryana	A trough from this system to Telangana on 10. Moved away northeastwards on 14
3.	Cyclonic circulation lower tropospheric levels	6-9	Assam & Meghalaya	Westerly	Bihar and neighbourhood	A trough/ wind discontinuity extended from Nagaland to east Uttar Pradesh along 26° N on 10 which became less marked on 11
4.	Cyclonic circulation mid tropospheric levels	16-19	Punjab and neighbourhood	Eastnorth-easterly	Uttaranchal and neighbourhood	Moved away on 20
5.	Low	28-30	Central Pakistan and adjoining west Rajasthan	Stationary	*In situ*	Less marked on 31. Associated cyclonic circulation extended upto mid tropospheric levels. Less marked on 29

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**C**) *Other cyclonic circulations*						
1.	Lower levels	11-18	Jharkhand and neighbouring areas	Northeasterly	Sub-Himalayan West Bengal & Sikkim and neighbourhood	Less marked on 19
2.	Mid tropospheric levels	12	Chattisgarh and adjoining areas of Vidarbha and east Madhya Pradesh	Stationary	*In situ*	Less marked on 13
3.	Lower tropospheric levels	18 -21	East Madhya Pradesh and neighbourhood	Easterly	Orissa and neighbourhood	Less marked on 21
4.	Mid tropospheric levels	23-29	South Pakistan and adjoining west Rajasthan	Southeasterly	Vidarbha and neighbourhood on 26	Less marked on 30. A trough extended from this system southwestwards to Konkan & Goa through Marathwada and Madhya Maharashtra on 25 and upto north interior Karnataka through Marathwada on 26. Trough less marked on 30 when it extended from Rayalaseema to Telangana
5.	Mid tropospheric levels	22-23	Bangladesh and neighbourhood	Quasi-stationary	Orissa and neighbourhood	Less marked on 24
6.	Lower tropospheric levels	25-30	Assam & Meghalaya and neighbourhood	Stationary	*In situ*	Less marked on 1 April
(**D**) *Troughs in easterly*						
1.	Lower levels	6-8	Central parts of south Bay	Northwesterly	South Bay	
2.	Do	8-14	South Andaman Sea	Westerly	Do	Less marked on 15
3.	Do	12-25	Do	Do	Southwest Arabian Sea	Less marked on 26
4.	Do	19-26	Do	Do	Southwest Bay and adjoining Comorin-Maldives areas	Less marked on 27
5.	Do	24-27	Do	Do	Southwest Bay	Less marked on 28
6.	Do	26 Mar – 1 Apr	South Andaman Sea and adjoining southeast Bay	Do	Southeast Bay	Less marked on 2 April
(**E**) *Troughs in westerly*						
1.	Lower levels	14-17	East Uttar Pradesh and Vidarbha	Easterly	Bihar to Vidarbha	Less marked on 18
2.	Do	20	Sub-Himalayan West Bengal & Sikkim to northwest Bay along Long. 88° E			
(**F**) *Other troughs*						
1.	Trough/ wind discontinuity	10-27	South Kerala to Telangana through Tamil Nadu, south interior Karnataka and Rayalaseema	Quasi-stationary	North interior Karnataka to Rayalaseema	Less marked on 28
2.	Do	24	Manipur to north Orissa			
3.	North south trough/ wind discontinuity	30 Mar - 26 Apr	Chattisgarh to south Tamil Nadu through interior Karnataka	Do		Bihar to Lakshadweep area on 16. (Jharkhand, Madhya Pradesh, interior parts of Maharashtra, Karnataka and Kerala). Bihar to Kerala through Jharkhand, Chattisgarh, interior parts of Maharashtra, Karnataka on 23. northern parts of Madhya Pradesh and adjoining east Uttar Pradesh to north Madhya Maharashtra through Vidarbha on 27

TABLE 3

Details of the weather systems during April 2003

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(**A**) *Western disturbances /Eastward moving systems*						
1.	Mid tropospheric levels	2-6	North Pakistan and adjoining Jammu & Kashmir	Northeasterly	Jammu & Kashmir and neighbourhood	Moved away on 7
2.	Do	6-10	Do	Do	Do	Moved away on 10
3.	Do	10-13	Do	Do	Do	Less marked on 14
4.	Do	13-17	North Pakistan and neighbourhood	Do	Eastern parts of Jammu & Kashmir	Moved away on 18
5.	Do	17-22	North Pakistan and adjoining Jammu & Kashmir	Do	Himachal Pradesh and adjoining areas of Uttaranchal	Moved away on 23
6.	Do	23-29	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 30
(**B**) *Western disturbances and induced systems*						
1.	Low pressure area	3	Northwest Rajasthan and neighbourhood	Easterly	Northwest Madhya Pradesh	Associated cyclonic circulation in the lower levels lay over northwest Rajasthan and neighbourhood on 3
2.	Cyclonic circulation lower tropospheric levels	5-6	Southwest Rajasthan and neighbourhood	Southeasterly	Gujarat region and neighbourhood	Less marked on 7
3.	Cyclonic circulation mid tropospheric levels	13-17	South Pakistan and adjoining west Rajasthan	Eastnortheasterly	West Uttar Pradesh and neighbourhood	Less marked on 18
4.	Do	24-27	South Pakistan and adjoining southwest Rajasthan	Northeasterly	Uttaranchal & adjoining Haryana and west Uttar Pradesh	A trough from this system in lower levels upto north Madhya Maharashtra on 28 which became less marked on 29
5.	Do	28	Punjab and north Rajasthan			Less marked on 29
6.	Cyclonic circulation lower tropospheric levels	29	South Pakistan and adjoining west Rajasthan		South Rajasthan and neighbourhood on 30	
7.	Low pressure area	2	Northwest Rajasthan and neighbourhood	Easterly	Haryana and adjoining west Uttar Pradesh	Associated cyclonic circulation extended upto mid tropospheric levels. Cyclonic circulation became less marked on 6 over Uttaranchal and adjoining areas
(**C**) *Other cyclonic circulations*						
1.	Lower tropospheric levels	2-6	Assam & Meghalaya and neighbourhood	Southwesterly	Vidarbha and neighbourhood	Less marked on 7
2.	Lower levels	6	Assam & Meghalaya	Westerly	Gangetic West Bengal and neighbourhood on 17	It was seen as a trough at lower levels along Long. 89° E to the north of 21° N. Became less marked on 28

TABLE 3 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Mid tropospheric levels	5-6	North Madhya Maharashtra and neighbourhood	Westerly	North Maharashtra coast	Less marked on 7
4.	Do	7	Southern parts of Maharashtra and neighbourhood	Stationary	*In situ*	Less marked on 8
5.	Do	3-5	Southeast Bay	Easterly	Andaman Sea	Less marked on 6
6.	Lower tropospheric levels	20-24	East Uttar Pradesh and neighbourhood	Do	Bihar and neighbourhood	Less marked on 25
7.	Mid tropospheric levels	29 Apr - 6 May	Central parts of Madhya Pradesh and adjoining Vidarbha	Northeasterly	Assam & Meghalaya and neighbourhood	A trough from the system to Lakshadweep-Maldives areas passes through Marathwada, south Madhya Maharashtra and coastal Karnataka on 29 persisted there till 7 May with the cyclonic circulation over Bihar and neighbourhood on 7. It lay over Chattisgarh and neighbourhood on 11 and less marked on 12
8.	Lower levels	30	Coastal Orissa and adjoining northwest Bay			Less marked on 1 May
(**D**) *Troughs in easterly*						
1.	Lower levels	11-13	Andaman Sea	Westerly	Southwest Bay	
(**E**) *Troughs in westerly*						
1.	North-south trough in the lower levels	28	Along 90° E of 20° N			Less marked on 29
(**F**) *Other troughs*						
1.	Lower levels	26	Lakshadweep-Maldives area to coastal Karnataka		Lakshadweep area to south Madhya Maharashtra through coastal Karnataka on 28	
2.	Do	25 – 27	Vidarbha to north Bay through Chattisgarh and Orissa	Northeasterly	East Uttar Pradesh to northeast Bay through Jharkhand Gangetic West Bengal	Less marked on 28
3.	Trough of low at sea level	28	Central parts of southeast Bay			Less marked on 29
4.		29	Central parts of Madhya Pradesh to Chattisgarh, Jharkhand and Gangetic West Bengal			Less marked on 30
5.	Lower levels	28	Along Long. 75° to the south of 27° N			Less marked on 29

TABLE 4

Details of the weather systems during May 2003

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(**A**) *Cyclonic storms/ depressions*						
1.	Low pressure area	6 eve.	Southeast Arabian Sea and neighbourhood			Lay as a trough of low on 8 and 9. Became less marked on 10
2.	Cyclonic storm	10-19	Southeast Bay	Northwesterly, then northerly, easterly and finally northeasterly	Myanmar coast	Please see description under 3.3.1.
(**B**) *Western disturbances /Eastward moving cyclonic circulations*						
1.	Mid tropospheric levels	1-4	Northwest parts of Jammu & Kashmir	Northeasterly	Jammu & Kashmir and adjoining Punjab	Moved away on 5
2.	Do	6-8	North Pakistan and adjoining Jammu & Kashmir	Do	Eastern parts of Jammu & Kashmir	Moved away on 9
3.	Do	9-12	North Pakistan and neighbourhood	Do	Do	Moved away on 13
4.	Do	12-16	North Pakistan and adjoining Jammu & Kashmir	Do	Jammu & Kashmir and neighbourhood	Moved away on 17
5.	Lower tropospheric levels	17-24	Northwest Rajasthan and adjoining areas of Punjab	Do	Central parts of Uttar Pradesh	Moved away on 25
6.	Mid tropospheric levels	17-21	North Pakistan and adjoining Jammu & Kashmir	Do	Eastern parts of Jammu & Kashmir	Moved away on 22
7.	Do	22-27	Do	Do	Do	Moved away on 28
8.	Do	22-29	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 30
(**C**) *Other cyclonic circulations*						
1.	Lower tropospheric levels	7-11	Bihar and neighbourhood	Westerly	Chattisgarh and neighbourhood	Less marked on 12
2.	Do	21-24	Central Pakistan and adjoining west Rajasthan	Easterly	West Rajasthan and adjoining Pakistan	Less marked on 25
3.	Do	23-28	South Orissa and neighbourhood	Northerly	Bihar and neighbourhood	Less marked on 29
4.	Mid tropospheric levels	30 May – 2 June	North Pakistan and neighbourhood	Northeasterly	Eastern parts of Jammu & Kashmir	Moved away on 3 June
5.	Do	28-29	Northwest Rajasthan and adjoining Punjab	Easterly	Uttaranchal and neighbourhood	Moved away on 30

TABLE 4 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
6.	Lower tropospheric levels	30-31	Central Pakistan and adjoining northwest Rajasthan	Stationary	*In situ*	Less marked on 1 June
7.	Mid tropospheric levels	31	South Maharashtra-Goa coasts			Less marked on 1 June, a trough extended from east Rajasthan to south Maharashtra-Goa coasts on 1. Gujarat region to Konkan & Goa on 2 and less marked on 3
(**D**) *East-west trough*						
1.	1.5 & 5.8 km a.s.l.	31 May - 2 Jun	Lat 17° N over central parts of Bay			
(**E**) *Other troughs*						
1.	Trough/ wind discontinuity	7-11	Bihar and neighbourhood to south Tamil Nadu	Westerly	Chattisgarh and neighbourhood to south Tamil Nadu	Less marked on 12
2.	North-south trough in lower levels	17 May - 7 Jun	Bihar to Rayalaseema	Quasi-stationary	West Uttar Pradesh to coastal Andhra Pradesh	Less marked on 8 evening

of Chattisgarh. During the month, the highest temperature of 41° C was recorded over number of stations in central India during last week of the month.

Night temperature were *appreciably to markedly* below normal on 9 to 12 days in Jharkhand and Madhya Maharashtra; on 4 to 7 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Orissa, Bihar, east Uttar Pradesh, Haryana, Punjab, west Rajasthan, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Gujarat region, Konkan & Goa, Vidarbha and Chattisgarh and on 1 to 3 days in west Uttar Pradesh, Uttaranchal, Himachal Pradesh, Jammu & Kashmir, Saurashtra & Kutch, Marathwada, Telangana and Rayalaseema. They were *appreciably to markedly above normal* on 22 days in east Rajasthan; on 15 to 20 days in west Rajasthan, west Madhya Pradesh, east Madhya Pradesh and Saurashtra & Kutch; on 9 to 13 days in Haryana, Gujarat region, Madhya Maharashtra, Marathwada and Telangana; on 4 to 8 days in Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Orissa, Jharkhand, Bihar, east Uttar Pradesh, Punjab, Jammu & Kashmir, Vidarbha, Chattisgarh, coastal Andhra Pradesh, Rayalaseema, Tamil Nadu, coastal Karnataka and south interior Karnataka and on 1 to 3 days in Sub-Himalayan West Bengal & Sikkim, west Uttar Pradesh, Uttaranchal, Himachal Pradesh and north interior Karnataka. During the month, the lowest temperature of 3.0° C was recorded at Sriganganagar in Rajasthan on 6 March.

3.1.4. *Disastrous weather events and damages*

According to press reports, 31 persons in West Bengal, 10 in Andhra Pradesh, 4 in Kerala, 3 in Maharashtra and 2 in Karnataka died due to thundersquall, lightning, hailstorm and heavy rain in the mid of the month. Nor'westers caused damage to several houses as well as standing crops and also uprooted many trees in West Bengal. Road traffic was disrupted in Jammu & Kashmir due to snowfall in the month.

3.2. *April*

3.2.1. *Weather and associated synoptic features*

Details of weather systems formed during the month are given in Table 3.

Rain/thundershowers occurred either *at most places* or *at many places* on 12 to 16 days in Arunachal Pradesh, Assam & Meghalaya and Sub-Himalayan West Bengal & Sikkim; on 4 to 8 days in Nagaland-Manipur-Mizoram-Tripura and Jammu & Kashmir and on 1 to 3 days in Gangetic West Bengal, Jharkhand, Punjab, Himachal Pradesh, Madhya Maharashtra, Marathwada and Kerala. Rain/thundershowers occurred either at *a few places* or at *isolated places* on 20 to 26 days in Orissa, Tamil Nadu, coastal Karnataka, south interior Karnataka and Kerala; on 10 to 19 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland–Manipur–Mizoram–Tripura, Sub–Himalayan

West Bengal & Sikkim, Gangetic West Bengal, east Uttar Pradesh, Uttaranchal, Himachal Pradesh, Jammu & Kashmir, Madhya Maharashtra, coastal Andhra Pradesh, Telangana, Rayalaseema and north interior Karnataka; on 4 to 9 days in Andaman & Nicobar Islands, Jharkhand, Bihar, west Uttar Pradesh, Haryana, Punjab, west Madhya Pradesh and Vidarbha and on 1 to 3 days in west Rajasthan, east Rajasthan, east Madhya Pradesh, Konkan & Goa, Marathwada, Chattisgarh and Lakshadweep. *Very heavy rainfall* occurred on 1 day each in Sub-Himalayan West Bengal & Sikkim and Kerala. *Heavy rainfall* also occurred on 5 days in Tamil Nadu and on 1 to 3 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, coastal Karnataka, north interior Karnataka and Kerala.

3.2.2. *Rainfall distribution*

Rainfall was *excess* in 7 meteorological sub-divisions (Sub-Himalayan West Bengal & Sikkim, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, west Madhya Pradesh, Saurashtra & Kutch and Vidarbha); *normal* in 11 meteorological sub-divisions (Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Orissa, Bihar, Jammu & Kashmir, Chattisgarh, Tamil Nadu, coastal Karnataka, north interior Karnataka, south interior Karnataka and Kerala); *deficient* in 11 meteorological sub-divisions (Arunachal Pradesh, Gangetic West Bengal, Jharkhand, Haryana, Punjab, Himachal Pradesh, Marathwada, coastal Andhra Pradesh, Telangana, Rayalaseema and Lakshadweep) and *scanty* in 7 meteorological sub-divisions (Andaman & Nicobar Islands, west Rajasthan, east Rajasthan, east Madhya Pradesh, Gujarat region, Konkan & Goa and Madhya Maharashtra). The principal amounts of rainfall (cm) are given in Table 5.

3.2.3. *Temperature distribution*

Heat wave conditions prevailed on 4 to 7 days in Haryana, west Rajasthan, east Rajasthan, west Madhya Pradesh and on 1 to 2 days in east Uttar Pradesh, west Uttar Pradesh, east Madhya Pradesh, Gujarat region, Saurashtra & Kutch, Vidarbha and Telangana. *Hot day conditions* prevailed on 1 day each in west Madhya Pradesh and west Madhya Pradesh. Day temperatures were *appreciably to markedly* above normal on 13 to 19 days in west Rajasthan, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Madhya Maharashtra and coastal Andhra Pradesh; on 8 to 12 days in east Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, Saurashtra & Kutch, Vidarbha, Chattisgarh, Telangana and Tamil Nadu; on 4 to 7 days in Nagaland-Manipur-Mizoram-Tripura, Orissa, Jharkhand, Bihar, west Uttar Pradesh, Uttaranchal, Gujarat region, Konkan & Goa, Marathwada and Rayalaseema and on 1 to 3 days in Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, coastal Karnataka, north interior Karnataka and south interior Karnataka. They were *appreciably to markedly* below normal on 12 days in Assam & Meghalaya; on 4 to 9 days in Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim and Jammu & Kashmir and on 1 to 3 days in Gangetic West Bengal, Orissa, Jharkhand, Bihar, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, west Rajasthan, Gujarat region, Saurashtra & Kutch, Madhya Maharashtra, Vidarbha, Chattisgarh and north interior Karnataka. During the month, the highest temperature of 46.0^{o} C was recorded at Idar (Gujarat) on 30 April.

3.2.4. *Disastrous weather events and damage*

According to press reports, 131 people (89 in northeast India, 16 in West Bengal, 4 in Maharashtra, 5 in Karnataka, 4 in Kerala, and 3 in Jammu & Kashmir) died due to heavy rain, lightning, hailstorm, thundersquall etc. Telephone lines, transmission towers, trees were uprooted and extensive damage to agriculture was caused due to heavy wind associated with hail/ squall. Heat wave took a toll of 7 people in Maharashtra and 3 in West Bengal during the last week of the month.

3.3. *May*

3.3.1. *Very severe cyclonic storm formed over the Bay of Bengal (10-19 May)*

A trough of low over south Bay organised into a low pressure area over southeast Bay in the evening of 7. It lay as a well marked low pressure area over southeast Bay and neighbourhood on 8. It subsequently, concentrated into a depression and lay centred within half a degree of Lat. 6.0° N/ Long. 90.5° E at 0300 UTC of 10. It intensified into a deep depression in the same evening and lay centred near Lat 8.0° N/Long. 89.5° C at 1200 UTC of 10. It further intensified into a cyclonic storm which lay centred at 0300 UTC of 11 near Lat. 9.5° N/ Long. 87.5° E and then into a severe cyclonic storm, centred at 1200 UTC of 11, near Lat. 10.5° N/ Long. 86.5° E. Moving in a northwesterly direction, it lay centred near Lat. 11.0° N/ Long. 85.5° E, at 0300 UTC of 12 and near Lat. 11.5° N/ Long. 85.5° E, at 1200 UTC of 12. Subsequently, it intensified into a very severe cyclonic storm over the same area at 1800 UTC of 12. Slightly moving in a northwesterly direction it lay centred near Lat. 12.0° N/ Long. 85.0° E at 0300 UTC of 13 and near Lat. 12.5° N/ Long. 85.0° E at 1200 UTC of 13. Subsequently it weakened into a severe cyclonic storm at 0300 UTC of 14 and lay centred near Lat. 14.0° N/ Long. 85.0° E and

further into a cyclonic storm at 1200 UTC of 14 and centred near Lat. 14.5° N/ Long. 85.5° E. Slowly moving eastwards, it lay centred near Lat. 14.5° N/ Long. 86.0° E at 0300 UTC of 15 and remained practically stationary over there until 1200 UTC of 15. It lay centred near Lat. 14.5° N/ Long. 86.5° E at 0300 UTC of 16 and weakened into a deep depression, lay centred at 1200 UTC of 16 near Lat. 14.5° N/ Long. 87.0° E. It lay centred at 0300 UTC of 17, near Lat. 14.5° N/ Long. 87.5° E and at 1200 UTC of 17 near Lat. 14.5° N/ Long. 88.0° E. Continuing its easterly movement it lay centred near Lat. 14.5° N/ Long. 90.5° E, at 0300 UTC of 18 and near Lat. 14.5° N/ Long. 91.0° E, at 1200 UTC of 18. Thereafter, it moved in a northeasterly direction and lay centred near Lat. 16.5° N/ Long. 92.5° E at 0300 UTC of 19. It further intensified into a cyclonic storm over northeast Bay at 0600 UTC of 19 and lay centred near Lat. 17.5° N/ Long. 93.0° E and near Lat. 18.5° N/ Long. 93.5° E at 1200 UTC of 19. It crossed Myanmar coast during the night of 19. Moving inland, it rapidly weakened and lay as a low pressure area over Myanmar at 0300 UTC of 20. Track of the system is shown in Fig. 1.

3.3.2. *Advance of southwest monsoon*

The southwest monsoon advanced over south Andaman Sea and parts of southeast Bay on 16 May. By the end of May, it advanced over parts of Maldives-Commorin areas, south Bay of Bengal, parts of east-central Bay and over north Andaman Sea.

3.3.3. *Weather and associated synoptic features*

Details of the weather systems formed during the month are given in Table 4.

Rain/thundershowers occurred either *at most places* or *at many places* on 12 to 15 days in Andaman & Nicobar Islands, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim; on 6 to 11 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal and Jammu & Kashmir and on 1 to 3 days in Orissa, Jharkhand, Bihar, east Uttar Pradesh, Uttaranchal, Haryana, Tamil Nadu, Kerala and Lakshadweep. Rain/thundershowers also occurred either *at a few places* or *at isolated places* on 25 to 26 days in Tamil Nadu and Kerala; on 14 to 19 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa and coastal Andhra Pradesh; on 8 to 13 days in Andaman & Nicobar Islands, Gangetic West Bengal, Bihar, Himachal Pradesh, Jammu & Kashmir, coastal Karnataka, north interior Karnataka, south interior Karnataka and Lakshadweep; on 4 to 7 days in Jharkhand, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, west Rajasthan and east Rajasthan and on 1 to 3 days in west Madhya Pradesh, east Madhya Pradesh, Madhya Maharashtra, Marathwada, Chattisgarh, Telangana and Rayalaseema. *Very heavy rainfall* occurred on 1 day each in Assam & Meghalaya and Nagaland-Manipur-Mizoram-Tripura. *Heavy rainfall* also occurred on 4 to 8 days in Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim and on 1 to 3 days in Andaman & Nicobar Islands, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, Uttaranchal, Tamil Nadu, Kerala and Lakshadweep.

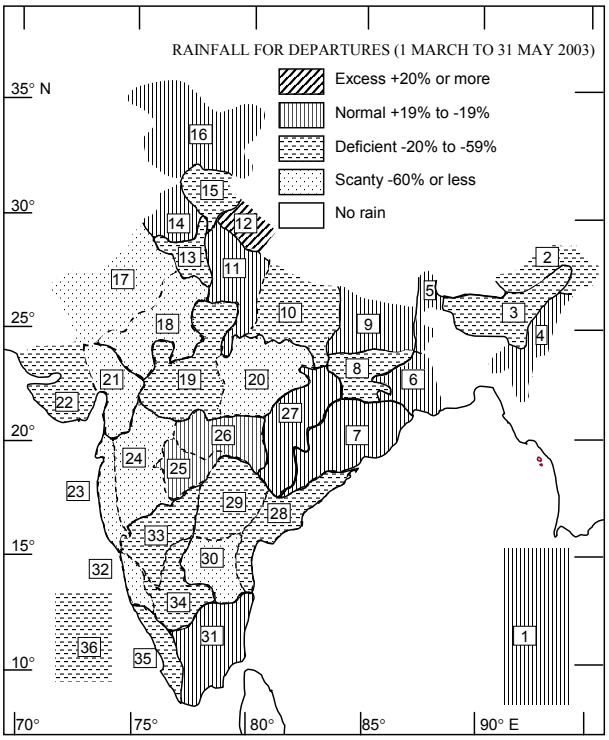

Fig. 2. Sub-divisionwise seasonal rainfall departure from normal (%) for the period (March - May 2003). 36 Sub-divisions are indicated by numbers on the map & bold letters in legend below. The rainfall anomaly values for these sub-divisions are indicated below :

1	–15	**7**	–10	**13**	–44	**19**	–47	**25**	–90	**31**	–5
2	–31	**8**	–36	**14**	–17	**20**	–71	**26**	2	**32**	–69
3	–20	**9**	3	**15**	–37	**21**	–98	**27**	12	**33**	–48
4	–10	**10**	–32	**16**	12	**22**	–57	**28**	–23	**34**	–54
5	7	**11**	–16	**17**	90	**23**	–99	**29**	–39	**35**	–29
6	15	**12**	58	**18**	–69	**24**	–93	**30**	–60	**36**	–33

3.3.4. *Rainfall distribution*

Rainfall during May was *excess* in 2 meteorological sub-divisions (Uttaranchal and Jammu & Kashmir); *normal* in 5 meteorological sub-divisions (Nagaland-

TABLE 5

Principal Amounts of Rainfall (1 cm and above) (March, April and May 2003)

Date	March	April	May
(1)	(2)	(3)	(4)
1.	Dharamsala 7, Dhundhi 6, Pahalgam 5, Nakodar & Bangana 4 each, Ludhiana, Zira, Bhuntar & Srinagar 3 each, Chandigarh, Batote & Banihal 2 each, Hindon & Dehra Dun 1 each	Hasimara 5, Konni 3	Srinagar & Pamban 4 each, Hut Bay, Imphal, Tondi & Attiramapattinam 3 each, Kolkata, Krishnanagar, Kolhapur & Panambur 2 each, Tezpur, Canning Town, Keonjhargarh, Ranchi, Banihal & Quazigund 1 each
2.	Banihal 13, Dhundi 8, Kangra 7, Bhang, Dharamsala & Pahalgam 6 each, Bhuntar & Srinagar 5 each, Mukteswar & Batote 4 each, Dehar Dun, Dasuya & Shimla 3 each, Adampur 2, Sarsawa & Thanesar 1 each	Bihubar 8, Quilandy 6, Gangtok 5, Passighat 1	Kochi 6, Kodaikanal 5, Belgaum & Coonoor 4 each, Banihal, Quazigund, Pamban & Kozhikode 3 each, Gangtok, Tadong, Canning Town, Diamond Harbour, Cial Kochi & Palghat 2 each, Car Nicobar, Tezpur, Paradip & Kalpa 1 each
3.	Banihal 9, Batote 6, Katra 5, Barsar, Kahu, Jammu & Srinagar 3 each, Kalka & Bhuntar 2 each, Dehra Dun & Raya 1 each	Kozhikode 5, Cherthala & Kunnamkulam 4 each, Gangtok, Silchar & Alapuzha 2 each, Pahalgam, Uthagamandalam & Thiruvananthapuram 1 each	Maya Bandar 5, Agartala, Gangtok, Tadong & Quazigund 4 each, Hut Bay & Pahalgam 3 each, Valparai 2, Imphal & Kolkata 1 each
4.	Kalpa 5, Patsio 2, Roing 1	Banihal, Pahalgam & Kozhikode 3 each, Gangtok, Srinagar & Quazigund 2 each, Rampur Bushar & Bareilly 1 each	Kailashahar 6, Silchar 3, Agartala, Imphal, Madurai & Punalur 2 each, Hut Bay & Dibrugarh 1 each
5.	Dhollabazar 1	Gangtok 5, Jalpaiguri, Ranchi, Jamshedpur & Balachaur 2 each, Kolkata, Gopalpur, Purnea, Sultanpur, Ambala & Mysore 1 each	Agartala 13, Passighat 8, Silchar 7, Kannur & Thiruvananthapuram 4 each, Imphal & Cial Koch 2 each, Maya Bandar, Guwahati & Salem 1 each
6.	Nil	Kota & Tirupattur 2 each, Canning Town, Keonjhargarh, Ranchi & Vellore 1 each	Thiruvananthapuram 12, Kochi 6, Dibrugarh 5, Passighat 4, Karipur & Agathi 2 each, Salem & Amini Divi 1 each
7.	Nil	Hyderabad & Cial Kochi 2 each, Wardha & Punalur 1 each	Kochi 6, Salem 4, Kozhikode 3, Dharmapuri & Pondicherry 2 each, Dibrugarh & Valparai 1 each
8.	Palayamkottai 2	Mahabaleshwar, Nasik & Aurangabad 1 each	Nalbari 5, Guwahati, Cooch Behar, Kharagpur & Daporijo 3 each, Gangtok 1
9.	Nil	Daporiji 1	Minicoy 12, Nancowry 3, Guwahati, Agartala & Alapuzha 2 each, Car Nicobar, Imphal, Gangtok, Kolkata, Krishnanagar & Bhagalpur 1 each
10.	Banihal & Panhala 1 each	Kozhikode 9, Mandya 3, Gangtok 2	Minicoy 11, Kondul, Bhagalpur & Gaya 3 each, Nancowry, Balasore & Gorakhpur 2 each, Agartala & Gangtok 1 each
11.	Banihal & Panhala 1 each	Belgaum & Punalur 4 each, Gadag 3, Tondi 2, Nizamabad, Tuticorin & Thiruvananthapuram 1 each	Car Nicobar, Port Blair & Shikaripura 4 each, Maya Bandar 3, Hut Bay 2, Kondul 1
12.	Awantipur 7, Quazigund 4, Bhang, Srinagar & Banihal 2 each, Katra 1	Aryankavu 3, Ottapalam 2, Dibrugarh, Guwahati, Shillong, Solapur, Nandyal, Tuticorin, Kottayam & Punalur 1 each	Nancowry & Maya Bandar 4 each, Karipur 3, Port Blair, Gangtok, Purnea, Madurai, Kozhikode & Punalur 1 each

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
13.	Ranchi 4, Asansol 2, Daltonganj & Malda 1 each	Silchar 3, Guwahati 2, Imphal 1	Pamban 6, Maya Bandar, Hut Bay & Cannore 3 each, Sarsawa 2, Shillong, Tehri, Shimla, Banihal, Pahalgam & Kochi 1 each
14.	Kolkata 8, Diamond Harbour 7, Bankura 5, Agartala, Canning Town, Puri & Jamshedpur 3 each, Kondul 2, Passighat, Guwahati, Tezpur, Shillong, Gangtok, Paradip, Ranchi, Shimla & Raipur 1 each	Silchar 4, Kochi & Palghat 1 each	Attiramapattinam 10, Tiruchirapalli 4, Pantnagar, Karaikal, Cuddalore, Nagapattinam & Pondicherry 3 each, Kondul 2, Dehra Dun, Panipat, Shimla, Gwalior & Thiruvananthapuram 1 each
15.	Coonoor 8, Bobbili 7, Palyamkottai 6, Waltair 5, Parvathipuram 4, Alapuzha 3, Kochi 2	Guwahati 4, Swampatna & Kupwara 3 each, Mathabhanga 2, Patna & Kalasa 1 each	Dhubri 6, Purnea 3, Kondul, Bhagalpur & Malda 1 each
16.	Aurad 5, Kolkata & Khajuri 4 each, Nancowrie & Deodurga 3 each, Challekere 2, Kottayam 1	Gangtok, Bhuntar, Bhang, Banihal, Kottayam & Punalur 2 each, Dibrugarh, Cooch Behar, Chandigarh, Srinagar, Thiruvananthapuram & Minicoy 1 each	Nancowry & Imphal 3 each, Kondul, Silchar, Gangtok & Bhagalpur 2 each, Port Blair 1
17.	Chincholi, Mandya & Srirangapatna 5 each, Narsinpura 4, Sindagi & Holiyurdurga 3 each, Bellary 2, Silchar, Agartala, Kottayam & Punalur 1 each	Kolkata 3, Imphal 2, Passighat, Silchar & Kolhapur 1 each	Gangtok 5, Tadong 4, Kochi 2, Mandya & Punalur 1 each
18.	Thodupuzha 6, Banihal, Chamrajangara & Perinthalamanna 3 each, Dholao & Pendra, Raipur 2 each, Agartala, Gopalpur, Dharamsala & Visakhaptnam 1 each	Silchar 6, Guwahati, Tezpur, Imphal & Kochi 3 each, Passighat, Dibrugarh & Alapuzha 2 each, Punalur 1	Port Blair & Hut Bay 7 each, Maya Bandar 4, Visakhapatnam & Cuddalore 3 each, Karaikal & Punalur 2 each, Nancowry 1
19.	Kavali 9, Vellore & Kodaikanal 7 each, Nellore 6, Konni 5, Jalpaiguri, Narsapur & Mandya 4 each, Gangtok, Chamrajanagara & Nanjangudu 3 each, Jagdalpur, Coimbatore, Thiruvananthapuram & Punalur 2 each, Bhubaneswar, Chennai & Coonoor 1 each	Alapuzha 2, Silchar, Guwahati, Manali, Banihal, Quazigund, Srinagar & Karipur 1 each	Hut Bay 9, Gangtok 6, Car Nicobar 4, Purnea & Bhagalpur 3 each, Port Blair 2
20.	Gundlupet & Bakkapatna 7 each, Channapatna & Kollegal 6 each, Gannavaram, Kodaikanal & Ramanagara 5 each, Chamrajanagara, Sargur & Sira 4 each, Tezpur, Nagpur & Tuticorin 3 each, Kochi 2, Guwahati & Tirupathi 1 each	Jalpaiguri & Banihal 4 each, Quazigund 4, Bhuntar, Kalpa, Gohar, Theog & Kandaghat 3 each, Dibrugarh, Rajpura, Srinagar & Bangalore 2 each, Tezpur, Imphal, Gangtok, Malakpur & Mysore 1 each	Maya Bandar 3, Malda, Krishnanagar & Deogarh 1 each
21.	Coimbatore 6, Kochi 5, Tadong 4, Tezpur, Gangtok & Nagpur 2 each, Guwahati, Kolkata, Balasore, Pendra, Hyderabad & Minicoy 1 each	Aizwal 7, Passighat, Agartala & Kochi 2 each, Guwahati, Kohima, Cooch Behar, Coimbatore & Punalur 1 each	Agartala 4, Guwahati, Canning Town & Purnea 3 each, Dibrugarh & Jalpaiguri 2 each, Silchar, Kolkata & Jamshedpur 1 each
22.	Guwahati, Jalpaiguri & Tadong 2 each, Passighat & Gangtok 1 each	Munnar 4, Gangtok 3, Dibrugarh, Tezpur & Agartala 2 each, Guwahati & Jalpaiguri 1 each	Kolkata 4, Hut Bay, Agartala, Balurghat & Keonjhargarh 2 each, Nancowry, Dibrugarh, Tezpur, Balasore & Lucknow 1 each

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
23.	Sangli 3, Nancowry & Solapur 2 each, Gadag 1	Kampur 3, Dibrugarh 2, Car Nicobar, Guwahati, Agartala, Kailashahar, Krishnanagar, Sriniketan & Solapur 1 each	Kolkata 7, Gopalpur 3, Keonjhargarh, Chandbali & Jamshedpur 2 each, Gangtok, Digha, Dehra Dun, Mukteshwar, Bhubaneswar, Shimla, Ambala, Hissar & Chandigarh 1 each
24.	Satara 1	Yedwad 5, Belgaum 2, Kondul 1	Agartala, Jamshedpur, Narnaul, Batote & Churu 3 each, Shillong, Hardoi & Hissar 2 each, Srinagar, Banihal, Tiruchirapalli & Kodaikanal 1 each
25.	Srinagar 1	Thodupuzha 5, Jalpaiguri, Cooch Behar, Mangalore, Aluva & Konni 1 each	Gangtok 8, Namsai 7, Jalpaiguri 5, Digha & Balasore 3 each, Kolkata & Kota 2 each, Shillong & Paradip 1 each
26.	Kotkhai, Solapur & Rampurhat 1 each	Tadong & Srinagar 3 each, Gangtok 2, Jalpaiguri, Cooch Behar, Purnea, Pahalgam & Kochi 1 each	Matijuri 13, Amraghat, Kokrajhar & Kailashahar 6 each, Dibrugarh & Agartala 5 each, Daporijo & Waltair 3 each, Jalpaiguri & Tiruchirapalli 2 each, Seppa, Gangtok, Cuttack, Srinagar, Banihal, Visakhapatnam & Salem 1 each
27.	Hut Bay & Lengpui 4 each, Car Nicobar & Anandpur 3 each, Nancowry, Guwahati & Sangli 2 each, Port Blair, Kondul, Tehri, Sundernagar & Jagdalpur 1 each	Jalpaiguri 7, Midnapore 4, Dhundhi, Patsio & Srinagar 3 each, Cooch Behar, Bhang, Kangra, Pahalgam & Tuticorin 2 each, Nancowry, Guwahati, Diamond Harbour, Tehri, Ambala, Quazigund, Sangli & Pamban 1 each	Namsai & Beki Mathanguri 8 each, Mellabazar & Darrang Reserve Forest 7 each, Kailashahar, Gangtok, Tadong & Badatighat 5 each, Tiruchirapalli & Sibsagar 4 each, Tezpur 3, Passighat 2, Shimla, Kottayam & Thiruvananthapuram 1 each
28.	Car Nicobar 9, Gharmura 2	Kottayam 11, Alapuzha 6, Gangtok, Phoolbagh, Tehri, Pantnagar & Coonoor 3 each, Agartala, Imphal, Cooch Behar, Shimla, Dhundhi, Madurai, Palghat & Punalur 2 each, Guwahati, Silchar, Diamond Harbour, Daltonganj, Jagadhari, Nahan, Kodaikanal, Kochi & Palyamkottai 1 each	Gangtok 9, Tadong 8, Madurai 5, Valparai 4, Passighat 3, Dibrugarh, Agartala & Pondicherry 2 each, Guwahati, Tiruchirapalli & Salem 1 each
29.	Jenapur 3, Shillong 1	Kodaikanal 8, Gangtok, Tadong, Bangalore & Coonoor 4 each, Salem, Mangalore, Kozhikoden & Minicoy 3 each, Palayamkottai 2, Keonjhargarh, Ranchi, Thanjavur & Karipur 1 each	Goalpara & Tadong 6 each, Gangtok 5, Lakhipur & Chottabekra 3 each, Karimganj 2
30.	Dholai 6, Thodupuzha 4, Champua 3, Car Nicobar 2, Namaul 1	Tondi 7, Pamban 6, Attiramapattinam & Kottayam 5 each, Agartala 4, Varanasi, Madurai & Madikeri 3 each, Nagapattinam, Mysore & Minicoy 2 each, Tezpur, Gangtok, Patna & Tiruchirapalli 1 each	Gangtok 5, Cooch Behar 4, Pondicherry & Vellore 2 each, Tezpur, Tadong & Cuddalore 1 each
31.	Port Blair & Karimganj 8 each, Balimundali & Kottayam 5 each		Port Blair 11, Maya Bandar 10, Kondul 4, Gangtok 3, Minicoy 2, Car Nicobar, Long Island, Tadong, Nasik & Jalgaon 1 each

Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Bihar and west Uttar Pradesh); *deficient* in 8 meteorological sub-divisions (Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Orissa, Jharkhand, Haryana, Tamil Nadu and Kerala) and *scanty* in 20 meteorological sub-divisions (east Uttar Pradesh, Punjab, Himachal Pradesh, west Rajasthan, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh, Saurashtra & Kutch, Konkan & Goa, Madhya Maharashtra, Marathwada, Vidarbha, Chattisgarh, coastal Andhra Pradesh, Telangana, Rayalaseema, coastal Karnataka, north interior Karnataka, south interior Karnataka and Kerala). There was no rain in Gujarat region. The principal amounts of rainfall are given in Table 5.

3.3.5. *Temperature distribution*

Severe heat wave conditions prevailed on 11 days in coastal Andhra Pradesh and on 1 to 2 days in west Uttar Pradesh, Chattisgarh, Telangana, Rayalaseema and Tamil Nadu. *Heat wave conditions* prevailed on 9 to 12 days in west Rajasthan, east Rajasthan, Vidarbha, Chattisgarh, Telangana and Tamil Nadu; on 4 to 7 days in Orissa, coastal Andhra Pradesh and Rayalaseema; on 1 to 3 days in Gangetic West Bengal, Jharkhand, Bihar, Haryana, Punjab, west Madhya Pradesh, east Madhya Pradesh, Gujarat region, Madhya Maharashtra, north interior Karnataka and south interior Karnataka. *Hot day* conditions prevailed on 1 to 2 days in Haryana, east Madhya Pradesh and Chattisgarh. Day temperatures were *appreciably to markedly* above normal on 13 to 17 days in Madhya Maharashtra, Rayalaseema, Tamil Nadu, coastal Karnataka and south interior Karnataka; on 8 to 12 days in Assam & Meghalaya, west Madhya Pradesh, east Madhya Pradesh, Gujarat region, coastal Andhra Pradesh and Telangana; on 4 to 7 days in Gangetic West Bengal, Orissa, Jharkhand, Bihar, Punjab, Himachal Pradesh, west Rajasthan, east Rajasthan, Saurashtra & Kutch, Konkan & Goa, Marathwada, Chattisgarh and north interior Karnataka and on 1 to 3 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Haryana, Jammu & Kashmir, Kerala and Lakshadweep. Day temperatures were *appreciably to markedly* below normal in 11 to 14 days in Bihar and Jammu & Kashmir; on 7 to 10 in Jharkhand, east Uttar Pradesh, Haryana and west Rajasthan; on 4 to 6 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa, west Uttar Pradesh, Uttaranchal, Punjab and Gujarat Region and on 1 to 3 days in Gangetic West Bengal, Himachal Pradesh, east Rajasthan, west Madhya Pradesh, Saurashtra & Kutch, coastal Andhra Pradesh, Telangana, Rayalaseema and Tamil Nadu.

During the month as well the season's highest temperature of 49.6° C was recorded at Titlagarh (Orissa) on 31 May.

3.3.6. *Disastrous weather events and damage*

According to press reports, during the month, severe heat wave/ heat wave conditions took a toll of more than 1000 people in the Andhra Pradesh, 10 in Orissa and 2 in Tamil Nadu. Thundersquall, heavy rain, lightning and hailstorm took lives of 9 persons in northeast India, 7 in Uttar Pradesh, 6 in Orissa and 1 in Kerala. Stormy wind caused huge damage to houses, telephone lines and standing crops in different parts of the country.

Appendix

Definitions of the terms given in '*Italics*'

Rainfall

Excess	- percentage departure from normal rainfall is + 20% or more.
Normal	- percentage departure from normal rainfall is from –19 % to + 19 %.
Deficient	- percentage departure from normal rainfall is from –20 % to –59 %.
Scanty	- percentage departure from normal rainfall is from –60 % to –99 %.
Most places	- 75 % or more stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.
Many places	- 51% to 74 % stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.
A few places	- 26 % to 50% stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.
Isolated places	- 25% or less stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
Heavy rain	- rainfall amount from 6.5 cm to 12.4 cm.
Very heavy rainfall	- rainfall amount 12.5 cm or more.

Maximum/day temperatures

According to the new criteria, since 1st March 2002, Heat Wave will be declared only when the maximum temperature of a station reaches at least 40° C for plains and atleast 35° C for Hilly regions.

Severe heat wave - departure of maximum temperature from normal is + 6° C or more for the regions where the normal maximum temperature is more than 40° C and departure of maximum temperature from normal is + 7° C or more for the regions where the normal maximum temperature is 40° C or less.

Heat wave conditions - departure of maximum temperature from normal is between + 4° C to + 5° C or more for the regions where the normal maximum temperature is more than 40° C and departure of maximum temperature from normal is +5° to + 6° C for the regions where the normal maximum temperature is 40° C or less.

Hot day conditions - Whenever the maximum temperature remains 40° C or more and minimum remains 5° C or more above normal, provided, it is not satisfying the heat wave criteria.

Markedly above normal - departure of maximum temperature from normal is –5° C to –6° C for the region where the normal maximum temperature is 40° C or less.

Appreciably above normal - departure of maximum temperature from normal is between +3° C to +4° C for the region where the normal maximum temperature is 40° C or less.

Appreciably below normal departure of maximum temperature from normal is between –3° C to –4° C.

Markedly below normal - departure of maximum temperature from normal is between –5° C or less.

Minimum/night temperatures

Markedly below normal - departure of minimum temperature from normal is –5° C to –6° C for the regions where the normal minimum temperature is 10° C or more.

Appreciably below normal - departure of minimum temperature from normal is between –3° C to –4° C for the regions where the normal minimum temperature is 10° C or more.

Markedly above normal - departure of minimum temperature from normal is + 5° C to + 6° C.

Appreciably above normal - departure of minimum temperature from normal is between + 3° C to + 4° C.