MAUSAM, **62**, 2 (April 2011), 261-286

Weather in India

HOT WEATHER SEASON (March – May 2010)*

1. Chief features

The hot weather season – 2010 followed a wet winter. However, there has been no abnormal aberration noticed either in terms of the maximum temperature figures or in terms of the prevalence of the *severe heat wave conditions**.

(*i*) The pre-monsoon cyclone season witnessed the formation of two cyclonic storms, *viz*., the Severe Cyclonic Storm 'Laila' (17 – 21 May) over the Bay of Bengal and the Very Severe Cyclonic Storm 'Phet' (31 May – 7 June) over the Arabian Sea.

(*ii*) Systems in mid-latitude westerlies gave rise to precipitation over the northern parts of India during the first fortnight of the season. Convective activity gave rise to thundershowers over northeastern and peninsular parts of the country towards the latter half of April.

(*iii*) Strong winds of tornadic violence created havoc in West Bengal and Bihar on the night of 13 April, causing loss of life and property.

(*iv*) The southwest monsoon set in over Kerala on 31 May.

2. Seasonal rainfall

The sub-divisionwise rainfall and its departure from normal for each month and season as a whole are given in Table 1. Also the sub-divisional rainfall departures for the season March-May 2010 are depicted in Fig. 1.

Convective activity which resulted from the easterly waves, the north-south wind discontinuity that existed in the lower levels, during most parts of March, April and first fortnight of May contributed to *excess/normal* rainfall over northeast India and parts of peninsular India. The formation of severe cyclonic storm (Laila) and its northwestward movement during the second fortnight of May gave *excess* rainfall over Andhra Pradesh. Though the western disturbances remained active almost continuously, the precipitation produced by them never exceeded the *normal* figure.

* Definitions of terms in italics other than subtitles are given in Appendix.

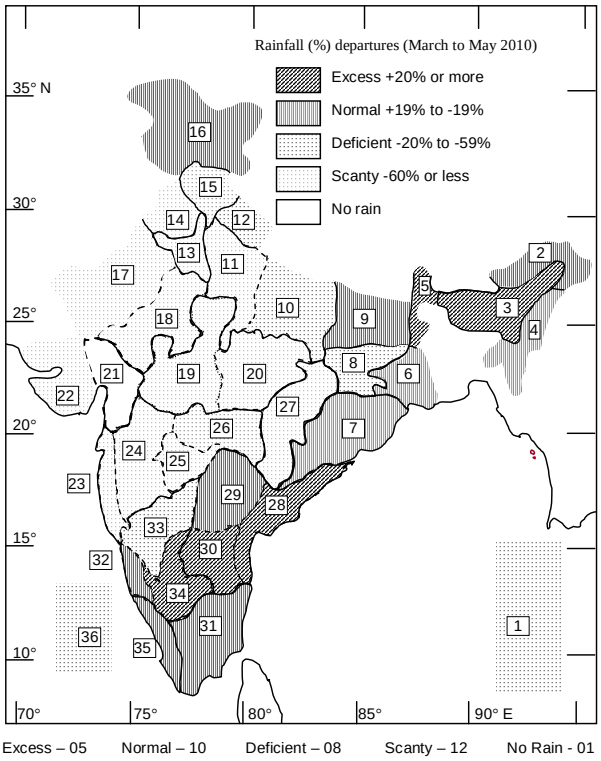

Fig. 1. Sub-divisionwise seasonal rainfall departure from normal (%) for the period (March - May 2010). 36 Sub-divisions are indicated by numbers on the map & bold letters in legend below. The rainfall anomaly values for these sub-divisions are indicated below :

1	–32	**7**	–11	**13**	–90	**19**	–93	**25**	–65	**31**	–5
2	–5	**8**	–37	**14**	–92	**20**	–83	**26**	–53	**32**	–14
3	22	**9**	8	**15**	–36	**21**	–100	**27**	–76	**33**	–26
4	14	**10**	–44	**16**	–11	**22**	–98	**28**	110	**34**	49
5	22	**11**	–66	**17**	–85	**23**	–70	**29**	–6	**35**	–16
6	–13	**12**	–50	**18**	–95	**24**	–72	**30**	31	**36**	–50

3. Significant features during various months

3.1. *March*

3.1.1. *Weather and associated synoptic features*

The details of the weather systems during the month are summarised in Table 2 and the resultant rainfall distribution in Table 3. The principal amounts of rainfall are given in Table 12.

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TABLE 1

Sub-divisionwise rainfall (mm) for each month and season as a whole (March - May 2010)

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	**	21	-98	13	78	-84	311	375	-17	324	473	-32
2.	Arunachal Pradesh	144	164	-13	246	259	-5	274	272	1	663	695	-5
3.	Assam & Meghalaya	105	85	24	397	206	93	349	405	-14	852	695	22
4.	Nagaland-Manipur-Mizoram-Tripura	59	68	-12	170	154	11	312	252	24	542	474	14
5.	Sub-Himalayan West Bengal & Sikkim	35	59	-41	167	119	40	332	260	28	534	438	22
6.	Gangetic West Bengal	6	26	-75	14	48	-72	124	91	36	144	165	-13
7.	Orissa	6	25	-76	10	37	-74	92	60	53	107	121	-11
8.	Jharkhand	3	19	-86	13	21	-39	39	45	-15	54	86	-37
9.	Bihar	**	11	-98	3	18	-82	85	53	60	88	82	8
10.	East Uttar Pradesh	**	9	-99	**	6	-99	18	17	5	18	33	-44
11.	West Uttar Pradesh	**	11	-96	**	5	-94	9	12	-30	9	28	-66
12.	Uttarakhand	4	59	-93	13	35	-63	60	61	-1	78	155	-50
13.	Haryana, Chandigarh & Delhi	1	13	-95	**	7	-97	2	13	-82	3	33	-90
14.	Punjab	1	26	-98	**	12	-98	3	15	-77	4	54	-92
15.	Himachal Pradesh	32	115	-72	47	66	-29	79	66	21	158	247	-36
16.	Jammu & Kashmir	41	162	-75	86	95	-9	168	73	128	295	330	-11
17.	West Rajasthan	**	4	-93	1	3	-85	2	10	-82	3	17	-85
18.	East Rajasthan	**	4	-98	**	2	-87	**	11	-97	1	17	-95
19.	West Madhya Pradesh	1	5	-86	**	2	-98	**	7	-97	1	14	-93
20.	East Madhya Pradesh	1	13	-92	**	6	-95	3	8	-59	5	28	-83
21.	Gujarat region	0	1	-100	0	1	-100	0	6	-100	0	8	-100
22.	Saurashtra & Kutch	0	1	-100	0	1	-100	**	2	-96	**	4	-98
23.	Konkan & Goa	**	**	291	3	3	-17	9	36	-76	12	40	-70
24.	Madhya Maharashtra	3	3	-18	4	10	-55	4	28	-85	11	41	-72
25.	Marathwada	8	6	24	1	7	-91	3	20	-84	11	33	-65
26.	Vidarbha	13	12	8	1	8	-92	1	11	-94	15	31	-53
27.	Chattisgarh	2	15	-88	5	16	-70	6	20	-72	12	52	-76
28.	Coastal Andhra Pradesh	3	12	-74	14	22	-38	180	59	203	197	94	110
29.	Telangana	1	10	-91	11	17	-35	41	29	38	52	56	-6
30.	Rayalaseema	**	7	-96	25	18	41	77	54	44	103	78	31
31.	Tamil Nadu	2	20	-90	21	43	-50	101	68	48	124	130	-5
32.	Coastal Karnataka	2	4	-49	61	27	123	91	148	-39	154	179	-14
33.	North interior Karnataka	1	6	-89	20	26	-24	44	56	-21	65	88	-26
34.	South interior Karnataka	6	9	-28	80	45	79	140	98	43	226	151	49
35.	Kerala	32	38	-16	140	122	15	190	269	-30	362	429	-16
36.	Lakshadweep	1	13	-90	36	43	-17	79	178	-56	116	234	-50

** 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 2010

S. No.	System	Duration	Place of first location	Direction of movement	Final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Western disturbances and other eastward moving systems*					
(*i*)	*As upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	1 - 3	North Pakistan and neighbourhood	Northeast	Jammu & Kashmir	Moved away on 4
2.	Do	3 - 6	Do	Do	Do	Moved away on 7
3.	Do	7 - 12	Do	Do	Do	Moved away on 13
4.	Do	13 - 15	Do	Do	Do	Moved away on 16
5.	Do	15 - 16	Do	Do	Do	Moved away on 17
6.	Do	18 - 20	Do	Do	Do	Moved away on 20
7.	Do	20 - 24	Do	Do	Do	Moved away on 25
8.	Do	25 - 30	Do	Do	Do	Moved away on 31
9.	Do	31 Mar - 1 Apr	Do	Do	Do	Moved away on 2 April
(*ii*)	*As induced cyclonic circulations*					
1.	Upto lower tropospheric levels	3 - 6	South Pakistan and adjoining west Rajasthan	Northeast	West Rajasthan and neighbourhood	Less marked on 7
2.	Do	16 - 17	West Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 18
(*iii*)	*Troughs in westerlies*					
1.	Trough of Low (Mean sea level)	2	Sub-Himalayan West Bengal & Sikkim to Chattisgarh through Orissa	-	-	Became less marked on 3
2.	Do	13 - 14	Southeast Arabian Sea	Stationary	*In situ*	Less marked on 15
3.	Mid and upper tropospheric westerly (upto 5.8 kms a.s.l.)	18	Sub-Himalayan West Bengal & Sikkim to Telangana	Northeast	Assam & Meghalaya to coastal Andhra Pradesh	Moved away on 20
4.	Lower tropospheric westerlies	29 Mar - 3 Apr	Sub-Himalayan West Bengal & Sikkim to north Bay of Bengal	Stationary	*In situ*	Less marked on 4 April
(**B**)	*Other upper air cyclonic circulations*					
1.	Upto lower tropospheric levels	10	South Madhya Maharashtra and neighbourhood	Southsoutheast	Interior Karnataka and neighbourhood	Less marked on 12
(**C**)	*Troughs in easterlies*					
1.	Trough/wind discontinuity	4 - 9	South Chattisgarh to south Tamil Nadu through Telangana and Karnataka	Oscillatory	Orissa to interior Karnataka through Telangana	Jharkhand to south Tamil Nadu on 5; Sub-Himalayan West Bengal & Sikkim to south Tamil Nadu on 6 and from Orissa to south Tamil Nadu on 7 & 8. Less marked on 10

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2.	Trough/wind discontinuity	14 - 17	Jharkhand to south interior Karnataka through Chattisgarh, Vidarbha, Marathwada and north interior Karnataka	Oscillatory	Orissa to south interior Karnataka through south Chattisgarh, Telangana, Rayalaseema	Jharkhand to Rayalaseema on 15 and east Madhya Pradesh to coastal Karnataka on 16
(**D**)	*Trough/wind discontinuity*					
1.	Upto lower tropospheric levels	21 - 27	Lakshadweep to Gangetic west Bengal	Oscillatory	South Tamil Nadu to Orissa	Became less marked on 28. An embedded cyclonic circulation persisted over the northern end of this trough up to 26.
2.	Upto 0.9 km a.s.l.	21 - 31	Orissa to south Tamil Nadu	East	North Chattisgarh to south Tamil Nadu on 30 & 31	Jharkhand to south Tamil Nadu on 22; Chattisgarh to coastal Karnataka on 23; east Madhya Pradesh to coastal Karnataka from 24 to 26; Bihar to Kerala on 27 & 28 and Vidarbha to coastal Karnataka on 29. It continued in the next month also
(**E**)	*Other troughs*					
1.	Upto lower tropospheric levels	13	Lakshadweep area to Marathwada through Karnataka and Madhya Maharashtra	-	-	Less marked on 14

Western disturbances gave rise to precipitation over northwest and northeast India and trough in easterlies caused rainfall in the southernmost part of India during the first week of the month. Northeast India experienced widespread thundershower activity all through the last week of the month. During the second fortnight, Maharashtra and Goa states also received *excess* rainfall. Unlike last year, there was no exceptionally enhanced rainfall activity over the south peninsula, due to the absence of high amplitude easterly waves.

3.1.2. *Temperature distribution*

(a) *Minimum temperatures*

The dates of occurrence of *cold waves* and dates on which the minimum temperatures remained *appreciably to markedly above/below normal* and *above/below normal* are given in Table 4. The same date appearing in two different columns of a sub-division may be reckoned as occurrence of that category over parts of the sub-division. The minimum temperatures were normal for the rest of the days.

The minimum temperatures remained above normal in general on most of the days over almost all the sub-divisions.

The month's and the season's lowest minimum temperature over the plains was 10° C recorded at Imphal (Manipur) on 1, Amritsar (Punjab) on 5, Moradabad (Uttar Pradesh) on 11 and Bagati Magra (West Bengal) on 18 March 2010.

(b) *Maximum temperatures*

The dates of occurrence of *heat waves* and dates on which the maximum temperatures remained *appreciably to markedly above normal* are given in Table 5. It may be noted from the table that even though the temperatures remained *appreciably to markedly above normal* or *above normal* on most of the days over major parts of the country, the *severe heat wave, heat wave* or *hot day conditions* were restricted to a few days over western & central and interior parts of peninsular India.

TABLE 3

Rainfall distribution for the month in terms of number of day - March 2010

S. No.	Sub-division	Ext. HR	VHR	HR	W	Fw	Sc	Iso	Dry
1.	Andaman & Nicobar Islands	-	-	-	-	-	-	1	30
2.	Arunachal Pradesh	-	-	1	5	3	5	11	7
3.	Assam & Meghalaya	-	2	5	4	1	4	8	14
4.	Naga. Mani. Mizo. & Trip.	-	-	-	3	-	1	5	22
5.	Sub–Himalayan W. B. & Sikkim	-	-	3	-	-	5	6	20
6.	Gangetic West Bengal	-	-	-	-	-	-	3	28
7.	Orissa	-	-	-	-	-	-	9	22
8.	Jharkhand	-	-	-	-	-	-	-	31
9.	Bihar	-	-	-	-	-	-	-	31
10.	East Uttar Pradesh	-	-	-	-	-	-	-	31
11.	West Uttar Pradesh	-	-	-	-	-	-	1	30
12.	Uttarakhand	-	-	-	-	-	-	1	30
13.	Haryana Chnd. & Delhi	-	-	-	-	-	-	1	30
14.	Punjab	-	-	-	-	-	-	1	30
15.	Himachal Pradesh	-	-	-	-	-	3	3	25
16.	Jammu & Kashmir	-	-	-	-	4	1	3	23
17.	West Rajasthan	-	-	-	-	-	-	1	30
18.	East Rajasthan	-	-	-	-	-	-	-	31
19.	West Madhya Pradesh	-	-	-	-	-	-	1	30
20.	East Madhya Pradesh	-	-	-	-	-	-	1	30
21.	Gujarat Region #	-	-	-	-	-	-	-	31
22.	Saurashtra & Kutch	-	-	-	-	-	-	-	31
23.	Konkan & Goa	-	-	-	-	-	-	-	31
24.	Madhya Maharashtra	-	-	-	-	-	1	-	30
25.	Marathwada	-	-	-	-	1	1	1	28
26.	Vidarbha	-	-	-	-	2	1	1	27
27.	Chattisgarh	-	-	-	-	-	-	1	30
28.	Coastal Andhra Pradesh	-	-	-	-	-	-	3	28
29.	Telangana	-	-	-	-	-	-	3	28
30.	Rayalaseema	-	-	-	-	-	-	-	31
31.	Tamil Nadu & Puduchhery	-	-	-	-	-	-	5	26
32.	Coastal Karnataka	-	-	-	-	-	-	2	29
33.	North interior Karnataka	-	-	-	-	-	-	1	30
34.	South interior Karnataka	-	-	-	-	-	-	3	28
35.	Kerala	-	1	1	-	-	2	8	21
36.	Lakshadweep	-	-	-	-	-	-	1	30

Ext. HR : Extermely heavy rainfall, VHR : Very heavy rainfall, HR : Heavy rainfall, W : Widespread rainfall, Fw : Fairely widespread rainfall, Sc : Scattered rainfall, Iso : Isolated rainfall, Dry : Dry weather, '-' Denotes : Nil

TABLE 4

Dates of occurrence of cold wave/severe cold wave and various categories of minimum temperatures - March 2010

Sub-division		Dates (Number of days)						
S. No.	Name	Severe cold wave	Cold wave	Cold day	Appreciably to markedly below normal	Below normal	Appreciably to markedly above normal	Above normal
2.	Arunachal Pradesh	Nil	Nil	Nil	Nil	1, 12 (2)	4, 6, 9, 10, 24, 28 (6)	7, 26 (2)
3.	Assam & Meghalaya	Nil	Nil	Nil	3, 13, 27 (3)	12, 14, 22, 28 (4)	4, 5, 8-11, 16, 21 (8)	6, 7, 14, 20, 23, 25, 26 (7)
4.	Naga., Mani., Mizo. and Tri.	Nil	Nil	Nil	2, 13, 15 (3)	14, 17 (2)	1, 4-6, 8-12, 21, 22, 30 (12)	16, 23, 24, 26, 29 (5)
5.	S. H. W. B. & Sikkim	Nil	Nil	Nil	2, 12, 13, 27 (4)	12 (1)	4-7, 9-11, 14, 15, 20, 22, 24 (12)	8, 17, 26, 29 (4)
6.	Gangetic West Bengal	Nil	Nil	Nil	13, 14, 27 (3)	2 (1)	1, 4-12, 19, 25, 26 (13)	12, 16, 19, 21, 26, 29, 30 (7)
7.	Orissa	Nil	Nil	Nil	16, 17, 21, 27 (4)	13-15, 18, 23, 28 (6)	1, 3, 5, 6, 8, 10, 11, 16, 23, 30 (10)	1, 2, 4-6, 8, 9, 20, 24, 25, 28, 30 (12)
8.	Jharkhand	Nil	Nil	Nil	7, 13-15, 27 (5)	2, 4, 17, 24, 27 (5)	7, 9, 20, 21 (4)	5, 11, 16, 20, 30 (5)
9.	Bihar	Nil	Nil	Nil	2, 7, 13, 15, 27 (5)	1, 3, 4, 27 (4)	6, 10, 11, 14, 18, 20-22 (8)	5, 18-20, 25, 26, 28-30 (9)
10.	East Uttar Pradesh	Nil	Nil	Nil	2, 3, 12, 13, 24, 27 (6)	1, 7, 8, 12, 23 (5)	4, 5, 9, 14, 16, 19-21, 25, 28-30 (12)	3, 6, 10, 15, 17, 18, 24 (7)
11.	West Uttar Pradesh	Nil	Nil	Nil	12, 13, 23 (3)	1, 12 (2)	4, 5, 7, 9, 19-21, 24, 25, 29 (10)	3, 6, 8, 10, 15, 16-18 (8)
12.	Uttarakhand	Nil	Nil	Nil	26, 27, 28 (3)	Nil	4, 5, 13, 21 (4)	3, 6-8, 15, 17, 22, 29 (8)
13.	Haryana, Chandigarh & Delhi	Nil	Nil	Nil	2, 26, 28 (3)	1, 13 (2)	3-5, 7, 12, 19-21, 23-25 (11)	6-9, 12, 17, 22, 29 (8)
14.	Punjab	Nil	Nil	Nil	9, 12, 28 (3)	1, 10-13, 21, 26 (7)	4, 7, 19, 20, 29 (5)	5, 15, 17, 19, 22, 24, 25 (7)
15.	Himachal Pradesh	Nil	Nil	Nil	8, 12, 21 (3)	1, 10-12, 26 (5)	2-6, 13-15, 17, 19, 20, 25 (12)	24, 29 (2)
16.	Jammu & Kashmir	Nil	Nil	Nil	28 (1)	26, 30 (2)	1, 4, 5, 7, 12, 14, 16, 19, 20, 24 (10)	6, 25, 29 (3)
17.	West Rajasthan	Nil	Nil	Nil	18 (1)	Nil	1, 2, 4-17, 19-27 (25)	6, 12, 28-30 (5)
18.	East Rajasthan	Nil	Nil	Nil	12, 18 (2)	Nil	1, 4-17, 19, 20, 22, 24, 25, 27, 28, 30 (23)	6, 18, 21, 29 (4)
19.	West Madhya Pradesh	Nil	Nil	Nil	12, 13, 17, 27 (4)	8, 12, 27 (3)	1-5, 7, 9-15, 18-21, 24, 25, 28-30 (22)	6, 12, 13, 16-18, 23 (7)
20.	East Madhya Pradesh	Nil	Nil	Nil	12, 23, 27 (3)	12, 27 (2)	1-11, 15, 17-21, 24, 25, 29 (20)	12-14, 16, 18 (5)
21.	Gujarat Region	Nil	Nil	Nil	Nil	Nil	2-4, 6, 8, 11-17, 19-22, 24-30 (23)	5-7, 10-12, 18-20, 23, 25 (11)
22.	Saurashtra & Kutch	Nil	Nil	Nil	17 (1)	Nil	1-4, 6-8, 12-16, 19-24, 26-30 (23)	5, 6, 9, 12, 18-20, 25 (8)
23.	Konkan & Goa	Nil	Nil	Nil	Nil	Nil	1, 10, 14 (3)	2, 3, 5, 11, 13, 17, 24, 29 (8)
24.	Madhya Maharashtra	Nil	Nil	Nil	17 (1)	15, 22, 28 (3)	1-4, 6, 8-14, 19, 20, 24, 25, 30 (17)	2, 5-7, 16-18, 21, 22, 24, 26, 27, 29, 30 (14)
25.	Marathawada	Nil	Nil	Nil	Nil	Nil	1-5, 7, 9, 10, 12-14, 19, 20, 26, 29, 30 (16)	6, 11, 20, 21, 23, 24, 27 (7)
26.	Vidarbha	Nil	Nil	Nil	16-18, 27 (4)	16, 21, 22, 24 (4)	1, 3, 4-6, 8, 10-13, 15, 19, 24, 29, 30 (15)	2, 4, 7, 8, 12, 14, 18, 20, 21, 28 (10)
27.	Chattisgarh	Nil	Nil	Nil	13, 22-24, 27, 28 (6)	22 (1)	9, 10, 15, 16, 29, 30 (6)	3, 8, 16, 20, 21 (5)
28.	Coastal Andhra Pradesh	Nil	Nil	Nil	Nil	13, 17 (2)	1, 2 (2)	4-7, 10, 11, 14, 21, 22, 29 (10)
29.	Telangana	Nil	Nil	Nil	2, 16, 23, 25 (4)	17, 22, 26 (3)	1, 14, 20, 21 (4)	5, 6, 8, 29, 30 (5)
30.	Rayalaseema	Nil	Nil	Nil	3, 9, 10 (3)	4, 17, 25, 30 (4)	15 (1)	5, 6, 13, 21, 22 (5)
31.	Tamil Nadu	Nil	Nil	Nil	4, 8, 10, 18 (4)	1, 2, 3, 7, 11, 17, 19 (7)	12, 15 (2)	5, 9, 11, 13, 14, 16, 22, 23, 26-29 (12)
32.	Coastal Karnataka	Nil	Nil	Nil	Nil	Nil	1, 4, 6, 12 (4)	2, 4, 8, 10, 12, 15, 17, 18, 27 (9)
33.	North Interior Karnataka	Nil	Nil	Nil	3 (1)	15, 17, 21, 24, 25, 30 (7)	1, 14 (2)	5-7, 20 (4)
34.	South Interior Karnataka	Nil	Nil	Nil	3, 10, 16 (3)	2, 4, 9, 25, 26, 30 (6)	1, 2, 12 (3)	5, 6, 14, 15, 21, 24, 28 (7)
35.	Kerala	Nil	Nil	Nil	13-16, 29 (5)	10, 17, 24 (3)	3 (1)	1, 5, 6, 22, 27 (5)

TABLE 5

Dates of occurrence of heat wave/severe heat wave and various categories of maximum temperatures - March 2010

Sub-division		Dates (Number of days)						
S. No.	Name	Severe heat wave	Heat wave	Hot day	Appreciably to markedly above normal	Above normal	Appreciably to markedly below normal	Below normal
2.	Arunachal Pradesh	Nil	Nil	Nil	4, 14, 15, 21, 22, 24, 27 (7)	7 (1)	Nil	8 (1)
3.	Assam & Meghalaya	Nil	Nil	Nil	1, 3, 4, 9-27, 29 (23)	2, 5-9 (6)	7, 30, 31 (3)	28 (1)
4.	Naga., Mani., Mizo. and Tri.	Nil	Nil	Nil	1, 2, 4, 9-14, 16, 19-27 (19)	3, 6, 8, 11, 17, 18 (6)	Nil	28, 29 (2)
5.	S. H. W. B. & Sikkim	Nil	Nil	Nil	7, 10-19, 24-26 (14)	1, 4, 5, 7-9, 20-22 (9)	3, 27-30 (5)	2, 20, 23, 31 (4)
6.	Gangetic West Bengal	Nil	Nil	Nil	6, 8, 10, 15, 19, 29 (6)	2, 5, 7, 9 (4)	3, 27, 30 (3)	23 (1)
7.	Orissa	6 (1)	Nil	23 (1)	1-5, 7-10, 13, 14, 20, 21, 30 (14)	12, 15, 22, 24, 26, 27, 29-31 (9)	Nil	17 (1)
8.	Jharkhand	Nil	Nil	Nil	1-3, 5, 6-11, 16-22, 30 (18)	4, 10, 15, 18, 19, 22, 24, 26, 27, 29, 31 (11)	Nil	23 (1)
9.	Bihar	Nil	Nil	Nil	2, 7, 10, 17, 21, 25 (6)	5, 6, 8, 10, 12, 18-20, 26, 27 (10)	Nil	28 (1)
10.	East Uttar Pradesh	Nil	Nil	Nil	5-10, 17, 19-21, 25 (11)	2-4, 11, 17-19, 24, 26, 31 (10)	22, 28 (2)	10, 13, 14, 26, 27 (5)
11.	West Uttar Pradesh	Nil	Nil	Nil	4, 5, 7, 8, 16-20 (9)	2, 3, 6, 9-11, 14, 16, 17, 25 (10)	28 (1)	22, 26, 27 (3)
12.	Uttarakhand	Nil	Nil	Nil	2-6, 8-16, 18, 20, 24 (17)	1, 31 (2)	26-28 (3)	29 (1)
13.	Haryana, Chandigarh & Delhi	Nil	Nil	Nil	2-5, 7, 10, 11, 13-21, 24, 25 (18)	1, 6, 8, 9 (4)	28-30 (3)	26, 27, 29, 31 (4)
14.	Punjab	Nil	Nil	Nil	2, 4, 7, 13-18, 20, 21 (11)	1, 3, 5, 6, 8, 10-12, 22, 24 (10)	26, 28-30 (4)	27, 29, 31 (3)
15.	Himachal Pradesh	Nil	Nil	Nil	3-10, 12, 13-21, 24, 25 (20)	1, 22, 31 (3)	26, 28 (2)	Nil
16.	Jammu & Kashmir	Nil	Nil	Nil	2-4, 6, 7, 10-21, 24, 25 (19)	5, 8, 9, 31 (4)	26, 28, 30 (3)	23 (1)
17.	West Rajasthan	Nil	Nil	Nil	1-7, 9-21, 25 (21)	5, 12, 13, 22, 27 (5)	23, 28-30 (4)	26, 31 (2)
18.	East Rajasthan	Nil	Nil	Nil	1-7, 10-18, 20, 21, 25, 30 (20)	8, 9, 12, 13, 22, 27 (6)	28 (1)	23, 26, 31 (3)
19.	West Madhya Pradesh	Nil	Nil	Nil	1, 3-8, 10-14, 16-21, 29-31 (21)	1, 9, 12, 13, 16, 17, 19, 24-26, 28, 29, 31 (13)	Nil	Nil
20.	East Madhya Pradesh	Nil	Nil	Nil	1, 3-9, 11-14, 17-21, 31 (18)	1, 10, 12, 13, 17, 19, 25, 26, 28, 30 (10)	Nil	Nil
21.	Gujarat region	Nil	4 (1)	Nil	1-5, 7, 11-15, 17, 25, 31 (14)	6, 19, 23, 24, 31 (5)	Nil	8 (1)
22.	Saurashtra & Kutch	Nil	12 (1)	13, 31 (2)	1-3, 5, 7, 10-15, 17, 18, 20, 24, 25, 31 (17)	6, 9, 19, 21-23, 26, 27, 31 (9)	Nil	Nil
23.	Konkan & Goa	Nil	Nil	3 (1)	1-4, 11, 13-16, 18, 20, 25 (12)	5, 8, 17, 19, 22, 24, 26, 27, 31 (9)	Nil	Nil
24.	Madhya Maharashtra	Nil	4, 6, 7 (3)	Nil	1-5, 7, 8, 11, 13, 14, 17, 31 (12)	9, 10, 14, 19-22, 24, 26-31 (14)	Nil	15, 24 (2)
25.	Marathawada	Nil	Nil	Nil	1-8, 10, 31 (10)	9, 19, 20, 31 (4)	15 (1)	15, 16 (2)
26.	Vidarbha	Nil	3-7 (4)	Nil	1-4, 7-10, 13, 14, 18-20, 30, 31 (15)	10, 11, 21, 22, 27-31 (9)	15, 16 (2)	15 (1)
27.	Chattisgarh	Nil	Nil	Nil	1-10, 14, 20, 21, 30, 31 (15)	15, 17, 22, 29 (4)	16 (1)	Nil
28.	Coastal Andhra Pradesh	Nil	2 (1)	13 (1)	1-4, 6, 7, 9, 12, 13, 23, 24 (11)	2, 5, 8, 9, 14, 15, 17, 20, 26, 28, 29, 31 (12)	Nil	11, 16, 18, 22 (4)
29.	Telangana	Nil	4, 7 (2)	Nil	1-10, 30 (11)	13, 14, 17, 20, 21, 23, 29, 31 (8)	15, 16 (2)	21-25 (5)
30.	Rayalaseema	Nil	2 (1)	Nil	1-9 (9)	10, 20, 21, 23, 29, 30, 31 (7)	Nil	16, 18, 23, 25 (4)
31.	Tamil Nadu	Nil	Nil	Nil	1-9, 28-31 (13)	5, 13, 14, 17, 19-27, 29, 30 (15)	10-12 (3)	10, 12, 16 (3)
32.	Coastal Karnataka	Nil	Nil	Nil	2, 4, 13, 16, 17, 20, 31 (7)	8, 10, 11, 15, 19, 21-24, 26 (10)	Nil	Nil
33.	North Interior Karnataka	Nil	7 (1)	Nil	1-8 (8)	9, 13, 21, 30 (4)	Nil	17, 25 (2)
34.	South Interior Karnataka	Nil	Nil	Nil	1-8 (8)	21 (1)	11, 16, 25 (3)	13, 15, 17, 24-26 (6)
35.	Kerala	Nil	Nil	Nil	2, 4, 7, 9, 10, 16, 31 (7)	5, 6, 8, 11-15, 20-22, 24, 27, 30 (14)	Nil	Nil

TABLE 6

Details of the weather systems during April 2010

S. No.	System	Duration	Place of first location	Direction of movement	Final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Western disturbances and other eastward moving systems*					
(*i*)	*As upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	1 - 3	North Pakistan and adjoining Jammu & Kashmir	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 4
2.	Upto 3.6 kms a.s.l.	4 - 9	Do	Do	Do	Moved away on 10
3.	Upto mid tropospheric levels	10 - 13	Do	Do	Do	Moved away on 14
4.	Upper air system	15 - 16	Do	Do	Do	Moved away on 17
5.	Upto 4.5 kms a.s.l.	17	Do	Do	Do	Moved away on 21
6.	Do	20 - 21	Do	Do	Do	Moved away on 22
7.	Do	22 - 24	Do	Do	Do	Moved away on 25
8.	Upper air system	24 - 29	Do	Do	Do	Moved away on 30
9.	Upto 4.5 kms a.s.l.	30 Apr - 4 May	Do	Do	Do	Moved away on 5 May
(*ii*)	*As induced cyclonic circulation*					
1.	Lower levels	3 – 4	Rajasthan and neighbourhood	Stationary	*In situ*	Lesmarked on 5
2.	Lower levels	15	West Rajasthan	-	-	Less marked on 16
3.	Mid tropospheric levels	18	Central Pakistan and adjoining Punjab	Northeast	Punjab and adjoining Haryana	Less marked on 22
4.	Mid tropospheric levels	24 – 26	West Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 27
(*iii*)	*Troughs in westerlies*					
1.	Lower levels	6 - 9	Sub-Himalayan West Bengal & Sikkim to Chattisgarh	Oscillatory	Bihar to Telangana	Lay over : Assam & Meghalaya to south Chattisgarh on 7 & 8
2.	Mid & upper troposphere	8 - 9	Long. 70° E, to the north of Lat. 25° N	Northeast	Long. 73° E, to the north of Lat. 25° N	Moved away on 10
3.	Lower levels	10 - 11	Sub-Himalayan West Bengal & Sikkim to northwest Bay of Bengal	Stationary	*In situ*	Less marked on 12
4.	Between 1.5 & 3.6 kms a.s.l.	16 - 17	Do	Do	Do	Less marked on 18
5.	Lower levels	21 - 26	Do	Do	Do	Less marked on 27
6.	Mid & upper troposphere	22	Long. 70° E, to the north of Lat. 25° N	East	Long. 72° E, to the north of Lat. 25° N	Less marked on 23

TABLE 6 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**B**) *Other upper air cyclonic circulations*						
1.	Lower levels	12 - 15	Assam & Meghalaya and neighbourhood	Stationary	*In situ*	Became less marked on 16
2.	Do	15	West Rajasthan and neighbourhood	-	-	Less marked on 16
3.	Do	15	South Tamil Nadu and neighbourhood	-	-	Less marked on 16
4.	Do	17 - 18	Assam & Meghalaya and neighbourhood	Stationary	*In situ*	Less marked on 19
5.	Between 1.5 and 3.1 kms a.s.l.	23 - 24	Lakshadweep-Maldwees areas and neighbourhood	Do	Do	Less marked on 25
6.	Mid tropospheric levels	27	Assam & Meghalaya and neighbourhood	-	-	Less marked on 28
7.	Lower tropospheric levels	27	Lakshadweep area and neighbourhood	-	-	Less marked on 28
(**C**) *Troughs in easterlies*						
1.	Trough of low	3 - 10	South Andaman Sea and neighbourhood	Northwest	Southeast Arabian Sea	Became less marked on 11
2.	Trough of low (sea level)	27 - 28	Southeast Bay of Bengal and neighbourhood	Stationary	*In situ*	Less marked on 29
(**D**) *Troughs/wind discontinuity*						
1.	Lower levels (continued from last month)	1 - 5	Chattisgarh to south Tamil Nadu	Oscillatory	Marathwada to Lakshadweep	Extended from : north Chattisgarh to Lakshadweep on 3; Vidarbha to coastal Karnataka on 4 and less marked on 6. A cyclonic circulation extending upto 0.9 km a.s.l. lay embedded on this trough on 3; it lay over east cental Arabian Sea off Karnataka coast on 4 and became less marked on 5
2.	Lower levels	10 - 14	Telangana to south Tamil Nadu	Oscillatory	Bihar to south Tamil Nadu	Jharkhand to south Tamil Nadu on 12; south Chattisgarh to south Tamil Nadu on 13 and became less marked on 15
3.	Upto 0.9 km a.s.l.	16 - 30	Bihar to coastal Karnataka	Do	West Madhya Pradesh to north interior Karnataka	A cyclonic circulation lay embedded in the trough over south Tamil Nadu and neighbourhood on 22; two cyclonic circulations-one over south Andhra Pradesh and other over Tamil Nadu on 25; over east Uttar Pradesh on 27; west Uttar Pradesh and neighbourhood from 28 to 30
4.	Mean sea level	27 - 28	Southeast Bay of Bengal	Stationary	*In situ*	Less marked on 29

TABLE 7

Rainfall distribution for the month in terms of number of days - April 2010

S. No.	Sub-division	Ext. HR	VHR	HR	W	Fw	Sc	Iso	Dry
1.	Andaman & Nicobar Islands	-	-	-	-	-	3	4	23
2.	Arunachal Pradesh	-	2	2	5	7	11	3	4
3.	Assam & Meghalaya	2	4	9	11	7	7	4	1
4.	Naga. Mani. Mizo. & Trip.	-	1	3	3	6	9	1	11
5.	Sub–Himalayan W.B. & Sikkim	-	2	2	1	7	8	8	6
6.	Gangetic West Bengal	-	-	-	-	-	2	1	27
7.	Orissa	-	-	-	1	-	1	11	17
8.	Jharkhand	-	-	-	-	-	1	-	29
9.	Bihar	-	-	-	-	-	-	4	26
10.	East Uttar Pradesh	-	-	-	-	-	-	-	30
11.	West Uttar Pradesh	-	-	-	-	-	1	-	29
12.	Uttarakhand	-	-	-	-	-	-	4	26
13.	Haryana, Chandigarh & Delhi	-	-	-	-	-	-	4	26
14.	Punjab	-	-	-	-	-	-	5	25
15.	Himachal Pradesh	-	-	-	-	2	2	5	21
16.	Jammu & Kashmir	-	-	-	2	4	3	4	17
17.	West Rajasthan	-	-	-	-	-	1	-	29
18.	East Rajasthan	-	-	-	-	-	-	-	30
19.	West Madhya Pradesh	-	-	-	-	-	-	1	29
20.	East Madhya Pradesh	-	-	-	-	-	-	1	29
21.	Gujarat region #	-	-	-	-	-	-	-	30
22.	Saurashtra & Kutch	-	-	-	-	-	-	-	30
23.	Konkan & Goa	-	-	-	-	-	-	1	29
24.	Madhya Maharashtra	-	-	-	-	-	1	2	27
25.	Marathwada	-	-	-	-	-	1	1	28
26.	Vidarbha	-	-	-	-	-	-	1	29
27.	Chattisgarh	-	-	-	-	-	1	3	26
28.	Coastal Andhra Pradesh	-	-	-	-	-	1	5	24
29.	Telangana	-	-	-	-	-	-	7	23
30.	Rayalaseema	-	-	2	-	-	2	5	23
31.	Tamil Nadu & Puduchhery	-	-	2	-	-	1	20	9
32.	Coastal Karnataka	-	-	1	-	-	7	10	13
33.	North interior Karnataka	-	-	-	-	1	1	11	17
34.	South interior Karnataka	-	-	3	-	2	6	13	9
35.	Kerala	-	-	4	1	5	4	11	9
36.	Lakshadweep	-	-	-	-	-	2	8	20

Ext. HR : Extermely heavy rainfall, VHR : Very heavy rainfall, HR : Heavy rainfall, W : Widespread rainfall, Fw : Fairely widespread rainfall, Sc : Scattered rainfall, Iso : Isolated rainfall, Dry : Dry weather, '-' Denotes : Nil

TABLE 8

Dates of occurrence of heat wave/severe heat wave and various categories of maximum temperatures - April 2010

Sub-division		Dates (Number of days)						
S. No.	Name	Severe heat wave	Heat wave	Hot day	Appreciably to markedly above normal	Above normal	Appreciably to markedly below normal	Below normal
2.	Arunachal Pradesh	Nil	Nil	Nil	8, 9, 30 (3)	6, 17 (2)	1, 14, 15, 22, 26 (5)	10, 21, 22 (3)
3.	Assam & Meghalaya	Nil	Nil	Nil	7-10, 13, 17 (6)	5 (1)	1, 2, 11, 14, 18-20, 22, 23, 25-28, 30 (14)	2-4, 7, 10, 12, 21, 22, 26, 29 (10)
4.	Naga., Mani., Mizo. and Tri.	Nil	10 (1)	5, 12 (2)	7, 9, 23 (3)	5, 14, 17 (3)	3, 15, 19, 20, 27, 28 (6)	19, 21, 26, 28 (4)
5.	S. H. W. B. & Sikkim	7, 8, 10, 21 (4)	2-4, 6, 11, 12 (6)	Nil	3-5, 7, 9, 11, 12, 23 (8)	4 (1)	14, 15, 18-20, 22, 26-28, 30 (10)	17, 21, 22, 26, 28 (5)
6.	Gangetic West Bengal	21, 22 (2)	11, 12, 19, 20, 23, 24, 26 (7)	Nil	9-11, 21, 26 (5)	1, 4, 7, 8, 22 (5)	Nil	Nil
7.	Orissa	10-12, 20-22 (6)	1-15, 19, 21, 23-27, 30 (23)	Nil	2, 3, 5, 7-9, 15, 17, 18, 24-26 (12)	10, 28, 29 (3)	Nil	30 (1)
8.	Jharkhand	1, 4, 11, 13-15, 17-21 (11)	1-14, 17-24, 26, 28 (24)	10 (1)	2, 3, 7, 9, 15, 22, 24-29 (12)	Nil	Nil	Nil
9.	Bihar	21 (1)	1, 4-7, 11-14, 22, 25, 26 (12)	Nil	2-4, 7-9, 11, 15, 17, 22-27 (15)	19 (1)	19, 28 (2)	29, 30 (2)
10.	East Uttar Pradesh	11, 12, 14, 15, 21 (5)	1, 3-14, 17-19, 21, 22, 25 (19)	28 (1)	1-5, 15, 20, 22-27 (13)	19 (1)	30 (1)	29 (1)
11.	West Uttar Pradesh	5, 13, 16-20 (7)	5, 6, 9-15, 17-19, 21, 27, 30 (15)	Nil	1-5, 7, 8, 13, 15, 17, 21-23, 25-27, 29 (17)	30 (1)	Nil	29 (1)
12.	Uttarakhand	11, 16 (2)	13 (1)	Nil	1-5, 7-10, 12-15, 17, 18, 20-25, 27-30 (25)	6 (1)	Nil	Nil
13.	Haryana, Chandigarh & Delhi	1, 5, 10-12, 15-21 (12)	3, 4, 6, 8, 10, 12-15, 21, 27-30 (14)	5, 25, 26 (3)	1-5, 7, 9, 20, 23, 25, 26, 29 (12)	7, 30 (2)	Nil	Nil
14.	Punjab	10-12, 15-21 (10)	10, 14, 15, 21, 27, 28 (6)	19 (1)	1, 2, 4, 5, 8, 9, 14, 20, 28-30 (11)	3, 6, 7, 25 (4)	Nil	Nil
15.	Himachal Pradesh	16 (1)	5, 7, 14 (3)	Nil	1-5, 8-15, 17, 19, 20, 21, 23, 24, 27-30 (23)	3 (1)	Nil	Nil
16.	Jammu & Kashmir	1, 11, 16-18 (5)	27 (1)	Nil	1-5, 7-15, 17-21, 25, 27, 28, 30 (23)	21 (1)	22, 23, 29 (3)	22 (1)
17.	West Rajasthan	5, 6, 8-13, 15-20, 27-29 (17)	3-6, 8-15, 17-21, 26, 27, 30 (20)	12, 23-26, 28 (6)	1-4, 7, 21, 25, 26, 28-30 (11)	Nil	Nil	Nil
18.	East Rajasthan	6, 15-19 (6)	4, 9-12, 14, 15, 18-20, 26-28 (13)	5, 10, 12, 23, 26 (5)	1-5, 7, 8, 21, 23, 25-30 (15)	22 (1)	Nil	Nil
19.	West Madhya Pradesh	16-19 (4)	1, 6-8, 10-15, 19, 20, 28, 30 (14)	12, 14, 28 (3)	1-5, 7-10, 13, 15, 20-23, 26, 27, 29 (18)	22, 26, 29, 30 (4)	Nil	Nil
20.	East Madhya Pradesh	10, 17-19, 21, 24 (6)	1, 6,10-15, 19, 20, 28 (11)	14, 24, 26, 28, 29 (5)	1-4, 7, 9, 13, 15, 20-24, 26, 27, 29, 30 (17)	22, 26, 29 (3)	Nil	Nil

TABLE 8 (*Contd.*)

Sub-division		Dates (Number of days)						
S. No.	Name	Severe heat wave	Heat wave	Hot day	Appreciably to markedly above normal	Above normal	Appreciably to markedly below normal	Below normal
21.	Gujarat region	14-18 (5)	6-8, 17, 18 (5)	10, 12, 14, 19, 28 (5)	7, 9, 11-15, 19, 21, 23-26, 28-30 (16)	3, 5, 10, 22, 29 (5)	2, 3 (2)	1, 4 (2)
22.	Saurashtra & Kutch	14 (1)	7-9, 15, 17, 21 (6)	9, 10, 14, 19, 21, 28, 29 (7)	3, 6, 7, 9, 11-15, 19-30 (21)	2, 4, 5, 10, 18, 27, 29 (7)	Nil	1 (1)
23.	Konkan & Goa	Nil	Nil	24 (1)	4-6, 9, 15, 17-21, 23-30 (18)	1-3, 8, 12, 14, 18, 22, 29 (9)	Nil	Nil
24.	Madhya Maharashtra	19 (1)	5, 7, 13-15, 17, 18 (7)	9, 12, 24, 30 (4)	4-9, 11-13, 17, 20-22, 24-30 (20)	1, 3, 14, 15, 19, 22, 28, 29 (8)	Nil	2, 3 (2)
25.	Marathawada	Nil	15, 17 (2)	9, 10, 19 (3)	4, 7-9, 11-15, 18-26, 28 (19)	1, 5, 6, 8, 10, 27, 29, 30 (8)	Nil	Nil
26.	Vidarbha	9 (1)	5-15, 17-20, 23, 24, 26, 28-30 (21)	27 (1)	1-5, 7, 9-14, 21, 22, 24, 25, 27-29 (19)	22, 26, 30 (3)	Nil	Nil
27.	Chattisgarh	5, 17-19, 22 (5)	1, 4, 6-9, 11-15, 17, 19, 20, 23, 24, 26 (17)	28 (1)	1-5, 7, 9, 11, 14, 15, 21-29 (19)	17, 19, 29 (3)	Nil	30 (1)
28.	Coastal Andhra Pradesh	Nil	2, 3, 11, 14, 21 (5)	1, 5, 7, 10, 26, 28-30 (8)	2-6, 10, 12, 14, 15, 19, 20, 22, 23, 25, 30 (15)	1, 8, 9, 17-19, 21, 26-28 (10)	Nil	Nil
29.	Telangana	Nil	7, 8, 11-15, 19-26 (15)	Nil	1-6, 9-12, 14, 17-24, 25, 28, 29 (22)	25 (1)	Nil	Nil
30.	Rayalaseema	Nil	3, 8, 10, 12, 13 (5)	10, 19 (2)	1, 3-6, 10-12, 14, 15, 17-24 (18)	2, 6, 26-28, 30 (6)	Nil	Nil
31.	Tamil Nadu	Nil	2-5, 11-14, 21 (9)	1, 10 (2)	1-15, 17-22, 24-26, 28-30 (27)	8, 15, 18, 22, 25, 27, 29 (7)	Nil	Nil
32.	Coastal Karnataka	Nil	Nil	29 (1)	2, 6, 9-14, 20, 23, 26-28, 30 (14)	5, 6, 15, 17, 22, 28 (6)	Nil	Nil
33.	North Interior Karnataka	Nil	Nil	Nil	4-8, 11-14, 17, 18, 24 (12)	2, 3, 6, 10, 15, 17, 19, 21, 22, 25, 26, 30 (12)	Nil	Nil
34.	South Interior Karnataka	Nil	Nil	Nil	3-8, 10-14, 17, 21, 24 (14)	2, 6, 9, 15, 19, 25, 26, 28 (8)	1 (1)	Nil
35.	Kerala	Nil	Nil	Nil	11-13, 21, 23 (5)	10, 14, 15, 19, 25, 29, 30 (7)	Nil	Nil

The month's highest maximum temperature over the plains was 40° C recorded at Akola (Vidarbha) on 1 March 2010.

3.1.3. *Disastrous weather events and damage*

According to media and other disaster weather reports, *heat wave* took a toll of 2 people each in Kerala and Orissa. Heavy rains and lightning took a toll of 6 people in Assam, 4 in Vidarbha, 2 in Kerala and 1 in Tamil Nadu. Dust storm and hailstorm accompanied by strong winds and rain caused uprooting of trees, destruction of houses and affected power supply in Kohima, lashed northeastern parts of Mizoram, damaging more than 400 houses and also created havoc in Manipur.

3.2. *April*

3.2.1. *Weather and associated synoptic features*

The details of the weather systems during the month are given in Table 6 and the resultant rainfall distribution in Table 7. The principal amounts of rainfall are given in Table 12.

TABLE 9

Details of the weather systems during May 2010

S. No.	System	Duration	Place of first location	Direction of movement	Final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Severe cyclonic storm*					
1.	Severe cyclonic storm (Laila)	17 - 21	Southeast Bay of Bengal and neighbourhood	Westnorthwest, norhthwest, westnorthwest, west, north and finally northnortheast	North coastal Andhra Pradesh and neighbourhood	Details of the system are given in the text. The system became less marked on 22, however, the associated cyclonic circulation lay over Orissa and neighbourhood on 23; coastal Orissa and adjoining northwest Bay of Bengal on 24 and became less marked on 25
2.	Cyclonic storm (Bandu)	19 - 23	West central Arabian Sea	North, northwest and then west	Gulf of Aden	Did not affect the weather over country
3.	Very severe cyclonic storm (Phet)	31 May - 7 Jun	East central and adjoining west central Arabian Sea	-	-	Details are included in the seasonal summary of southwest monsoon - 2010
(**B**)	*Low pressure area*					
1.	Low pressure area	17 - 18	Southwest Arabian Sea	West	-	Moved away westward
(**C**)	*Western disturbances and other eastward moving systems*					
(*i*)	*As upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	4 - 6	North Pakistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 7
2.	Upto 4.5 kms a.s.l.	13 - 19	Do	Do	Do	Moved away on 20
3.	Upto mid tropospheric levels	20 - 21	Do	Do	Do	Moved away on 22
4.	Upto 4.5 kms a.s.l.	22 - 25	Do	Do	Do	Moved away on 26
5.	Upto mid tropospheric levels	26 - 29	Do	Do	Do	Moved away on 30
6.	Do	29 - 30	Do	Do	Do	Moved away on 31
7.	Upto 4.5 kms a.s.l.	30 - 31	Do	Do	Do	Moved away on 1 June
(*ii*)	*As induced cyclonic circulations*					
1.	Lower levels	5	Northwest Rajasthan and neighbourhood	-	-	Less marked on 6
2.	Lower tropospheric levels	6 - 7	West Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 8
3.	Do	14 - 15	Do	Do	Do	Less marked on 16
(*iii*)	*Troughs in westerlies*					
1.	Mid and upper troposphere (upto 7.6 kms a.s.l.)	21 - 22	Lat. 35° N / Long. 85° E to Lat. 20° N / Long. 80° E	Northeast	Lat. 32° N/ Long. 97° E to Lat. 18° N/ Long. 80° E	Moved away on 23
2.	Do	24 - 28	Lat. 32° N/ Long. 87° E to Lat. 20° N/ Long. 82° E	Do	Long. 90 & 93° E, to the north of Lat. 15° N	Lat. 32° N / Long. 95° E to Lat. 15° N / Long. 82° E on 25 and along Long. 90 ° E to the north of Lat. 15° N on 26

TABLE 9 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**D**)	*Other cyclonic circulations*					
1.	Upto Mid tropospheric levels	4 - 5	East Uttar Pradesh and neighbourhood	Stationary	*In situ*	Less marked on 6
2.	Do	8 - 10	Assam & Meghalaya and neighbourhood	Do	Do	Less marked on 11
3.	Do	15 - 18	Do	Do	Do	Less marked on 19
4.	Do	27 - 30	Bihar and adjoining east Uttar Pradesh	Northwest	Rajasthan and neighbourhood	It lay east Uttar Pradesh and neighbourhood on 28 and became less marked on 31
(**E**)	*Troughs in Easterlies*					
	Trough of low (sea level)	1 - 3	Arabian Sea and adjoining Lakshadweep area	Stationary	*In situ*	Less marked on 4
(**F**)	*Trough / Wind discontinuity*					
1.	At lower levels (continued from the last month)	1 – 13	Haryana to south Tamil Nadu	Oscillatory	Jharkhand to coastal Karnataka	Became less marked on 14. Cyclonic circulations were embedded on this trough during 1 - 7 and 10 & 12
2.	Lower levels	15 - 19	Vidarbha to Rayalaseema	Do	West Uttar Pradesh to Marathwada	Vidarbha to Tamil Nadu on 16; Madhya Maharashtra to coastal Karnataka on 17; west Uttar Pradesh to Rayalaseema on 18 and became less marked on 20
(**G**)	*East-west trough*					
1.	Lower levels	29 - 31	Extended from the northern plains to north Bay of Bengal	Stationary	*In situ*	It continued in the next month also

During the entire month, northeast India received widespread rainfall activity with isolated extremely heavy falls due to quasi-stationary troughs in westerlies and cyclonic circulations over Assam & neighbourhood. Three western disturbances passed in quick succession and caused scattered to fairly widespread precipitation over northwest India during the last two weeks of April. The rainfall also occurred over some parts of peninsular India in the first two weeks and then the activity was seen over the entire region owing to the north-south wind discontinuity from Bihar to coastal Karnataka.

3.2.2. *Temperature distribution*

From Table 8, it may be seen that *severe heat wave conditions* prevailed over many parts of central, north and some parts of peninsular India on a few days and maximum temperatures in general remained above normal on most of the days outside northeast India.

The month's highest maximum temperature over the plains was 47° C recorded at Ganganagar (west Rajasthan), Idar (Gujarat Region) and Daltonganj (Jharkhand) on 4 April 2010.

3.2.3. *Disastrous weather events*

According to media and other disaster reports, heat wave claimed 18 lives in West Bengal, 16 in Orissa, 14 in Jharkhand, 3 in Chhattisgarh and 1 in Saurashtra & Kutch. A tornado-like situation with strong winds estimated to be nearing 100 kmph raged havoc in West Bengal and Bihar on 13 night, claiming the lives of 122 people. More than 80, 000 homes were destroyed in this incidence.

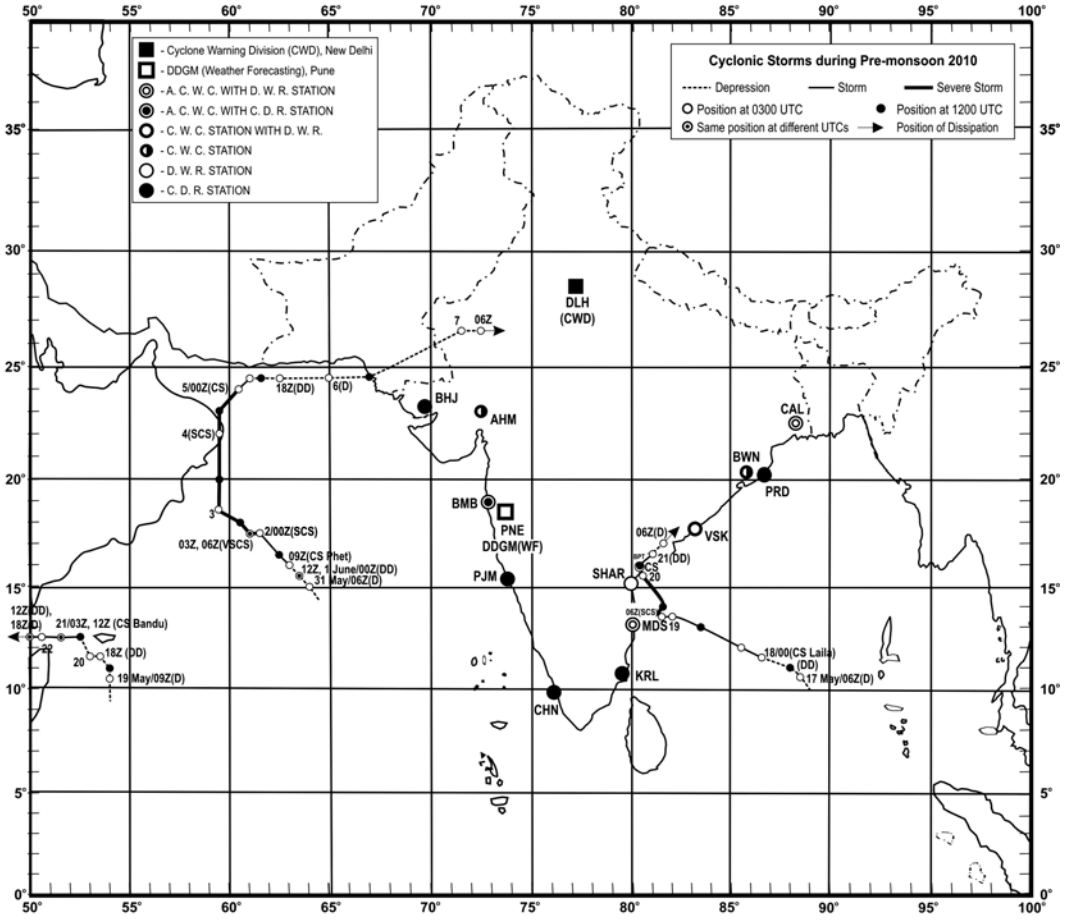

Fig. 2. Tracks of the system during pre-monsoon 2010

Thunderstorm / hailstorm, lightning and squall winds claimed the lives of 19 people in Assam, 16 in Karnataka, 13 in Kerala, 12 in Arunachal Pradesh, 7 in Nagaland-Manipur-Mizoram & Tripura, 5 in Tamil Nadu and 3 in Jharkhand. Snowfall in the Pir-Panchal range of Kashmir claimed the lives of 5 people.

Thunderstorms/squall winds uprooted trees, blew away roofs and destroyed standing crops in northeast and parts of Peninsular India.

3.3. *May*

3.3.1. *Weather and associated synoptic features*

(a) *Advance of southwest monsoon*

The southwest Monsoon set in over the Andaman Sea on 17 May, 3 days prior to normal date (20 May) in association with a Severe Cyclonic Storm (Laila, 16 - 21 May 2010) over the Bay of Bengal. The southwest monsoon further advanced over parts of Comorin area and some more parts of the Bay of Bengal on 21 May and thereafter, there was a hiatus in the monsoon advance lasting for more than a week. However, monsoon set in over Kerala on 31 May, just one day before its normal onset date (1 June).

Subsequent to the onset over Kerala, the northwestward movement of the Very Severe Cyclonic Storm (Phet, 31 May – 7 June), over the Arabian Sea, away from the coast [which initially in its formative stage had served as the onset vortex], delayed further advancement of the monsoon along the west coast by about one week.

(b) *Severe Cyclonic Storm LAILA over the Bay of Bengal (16 – 21 May 2010)*

A low pressure area formed over the southeast Bay of Bengal and neighbourhood in the evening of 15. It concentrated into a Depression at 0600 UTC of 17 and lay

TABLE 10

Rainfall distribution for the month in terms of number of day - May 2010

S. No.	Sub-division	Ext. HR	VHR	HR	W	Fw	Sc	Iso	Dry
1.	Andaman & Nicobar Islands	-	-	2	5	7	8	5	6
2.	Arunachal Pradesh	-	-	2	10	3	7	9	2
3.	Assam & Meghalaya	1	2	6	9	10	6	6	-
4.	Naga. Mani. Mizo. & Trip.	-	1	4	7	3	12	7	2
5.	Sub–Himalayan W.B.&Sikkim	-	3	7	6	5	8	11	1
6.	Gangetic West Bengal	-	-	2	2	3	9	9	8
7.	Orissa	-	-	2	2	1	8	11	9
8.	Jharkhand	-	-	-	-	1	5	8	17
9.	Bihar	-	-	-	-	2	3	12	14
10.	East Uttar Pradesh	-	-	-	-	1	2	6	22
11.	West Uttar Pradesh	-	-	-	-	-	-	2	29
12.	Uttarakhand	-	-	-	1	3	-	8	19
13.	Haryana Chnd. & Delhi	-	-	-	-	1	1	5	24
14.	Punjab	-	-	-	-	1	-	8	22
15.	Himachal Pradesh	-	-	1	2	3	3	12	11
16.	Jammu & Kashmir	-	-	1	3	8	3	8	9
17.	West Rajasthan	-	-	-	-	-	1	3	27
18.	East Rajasthan	-	-	-	-	-	-	2	29
19.	West Madhya Pradesh	-	-	-	-	-	-	4	27
20.	East Madhya Pradesh	-	-	-	-	-	1	5	25
21.	Gujarat region	-	-	-	-	-	-	-	31
22.	Saurashtra & Kutch	-	-	-	-	-	-	-	31
23.	Konkan & Goa	-	-	-	-	-	1	5	25
24.	Madhya Maharashtra	-	-	-	-	-	-	7	24
25.	Marathwada	-	-	-	-	-	-	7	24
26.	Vidarbha	-	-	-	-	-	-	2	29
27.	Chattisgarh	-	-	-	-	-	2	12	17
28.	Coastal Andhra Pradesh	3	-	1	3	1	1	10	16
29.	Telangana	-	-	-	-	1	2	11	17
30.	Rayalaseema	-	-	1	1	1	3	11	15
31.	Tamil Nadu & Puduchhery	-	2	4	2	-	4	22	3
32.	Coastal Karnataka	-	-	1	1	1	6	8	15
33.	North interior Karnataka	-	-	-	1	1	3	10	16
34.	South interior Karnataka	-	-	5	-	3	8	13	7
35.	Kerala	-	3	7	-	9	9	13	-
36.	Lakshadweep	-	-	-	1	2	4	7	17

Ext. HR : Extremely heavy rainfall, VHR : Very heavy rainfall, HR : Heavy rainfall, W : Widespread, Fw : Fairly widespread, Sc : Scattered, Iso : Isolated, Dry : Dry weather, '-' denotes : Nil, Vig: Vigorous monsoon conditions, Active: Active monsoon conditions

TABLE 11

Dates of occurrence of heat wave/severe heat wave and various categories of maximum temperatures - May 2010

Sub-division		Dates (Number of days)						
S. No.	Name	Severe heat wave	Heat wave	Hot day	Appreciably to markedly above normal	Above normal	Appreciably to markedly below normal	Below normal
2.	Arunachal Pradesh	Nil	Nil	Nil	2, 4, 6, 8, 23 (5)	7, 18 (2)	12, 13, 20, 22 (4)	5, 11 (2)
3.	Assam & Meghalaya	Nil	Nil	Nil	2, 4-9, 13, 16, 19, 23 (11)	6, 23 (2)	1, 3, 11-18, 20-22 (13)	8, 10, 12, 20 (4)
4.	Naga., Mani., Mizo. & Tri.	Nil	Nil	Nil	13, 18 (2)	4, 6, 8, 9, 12, 14-17, 19, 20 (11)	12, 22 (2)	1, 3, 8, 11, 13 (5)
5.	S. H. W. B. & Sikkim	Nil	12, 13, 14 (3)	Nil	5, 6, 13-17, 19 (8)	23 (1)	1, 9, 11, 20-22 (6)	6, 7, 10 (3)
6.	Gangetic West Bengal	Nil	Nil	Nil	10 (1)	12, 13 (2)	3, 22, 23 (3)	Nil
7.	Orissa	Nil	1, 4, 6, 10-18 (12)	Nil	3, 4, 11, 12, 14, 15 (6)	4, 5, 10, 19 (4)	3, 5, 7-9, 16, 21-23 (9)	5, 8, 9 (3)
8.	Jharkhand	Nil	14-18 (5)	1 (1)	14, 15, 18 (3)	11-13, 20 (4)	2, 3, 5-7, 21-23 (8)	19 (1)
9.	Bihar	14 (1)	12, 13, 15-17 (5)	Nil	12, 14, 15, 18 (4)	11, 20 (2)	3, 6-9, 22 (6)	2, 5 (2)
10.	East Uttar Pradesh	Nil	14-18 (5)	Nil	12, 13, 15-17, 21 (6)	11, 12, 21, 22 (4)	2-4, 6, 7-9 (7)	1, 3, 5 (3)
11.	West Uttar Pradesh	Nil	7, 13, 15-18, 20, 21, 23 (9)	Nil	16, 18 (2)	1, 11-13, 22 (5)	2-4, 6, 8, 9 (6)	5 (1)
12.	Uttarakhand	Nil	Nil	Nil	1, 2, 6, 10-12, 14-19, 21, 22 (14)	11-13, 20 (4)	8 (1)	9 (1)
13.	Haryana, Chandigarh & Delhi	5 (1)	6, 14-19, 22, 23 (9)	Nil	1, 4, 6, 15-17, 19, 20, 22, 23 (10)	1, 11-13 (4)	3, 7-9 (4)	10 (1)
14.	Punjab	Nil	Nil	Nil	5, 16, 17, 22, 23 (5)	12, 13 (2)	7-9 (3)	19 (1)
15.	Himachal Pradesh	Nil	16 (1)	4 (1)	1, 3-6, 10, 11, 14-17, 20-23 (15)	9, 13 (2)	8 (1)	Nil
16.	Jammu & Kashmir	Nil	Nil	Nil	3-5, 10, 16, 22 (6)	1, 3, 21, 22 (4)	6-9, 15, 18, 19, 23 (8)	6, 12 (2)
17.	West Rajasthan	17, 18, 22, 23 (4)	3-7, 12-23 (17)	8, 11 (2)	3, 4, 11-15, 21, 22 (9)	1, 2, 6, 19 (4)	2, 7 (2)	8, 10, 19 (3)
18.	East Rajasthan	23 (1)	4-7, 13-19, 21-23 (14)	7 (1)	4, 11-15, 18, 21, 22 (9)	1, 6, 8, 19 (4)	Nil	Nil
19.	West Madhya Pradesh	8, 22, 23 (3)	13-23 (11)	1 (1)	1, 6, 11, 14, 17, 20, 22 (7)	8, 10, 12, 13, 16 (5)	2 (1)	1 (1)
20.	East Madhya Pradesh	Nil	12-23 (12)	1, 4 (2)	1, 12, 21 (3)	10, 13, 16, 22, 23 (5)	2 (1)	1, 5 (2)
21.	Gujarat Region	22, 23 (2)	3, 9-15, 17, 19-23 (14)	3, 8, 9 (3)	1-3, 6, 8, 10, 13, 14, 16-19 (12)	1, 3-5, 7, 12 (6)	Nil	Nil
22.	Saurashtra & Kutch	22, 23 (2)	3, 4, 7, 9, 11, 13-15, 18, 20-22 (12)	3 (1)	1, 3, 8, 10, 14, 16, 17, 19, 23, 24 (10)	2, 3, 5-7, 12, 13 (7)	Nil	Nil
23.	Konkan & Goa	Nil	Nil	1 (1)	1, 3, 9, 11, 16-18, 20, 21, 23 (10)	2, 4-8, 10, 12, 13, 15, 19, 22 (12)	Nil	Nil
24.	Madhya Maharashtra	Nil	11-18, 20, 21, 23 (11)	Nil	8, 11, 12, 14-16, 18, 21 (8)	6-9, 13, 17, 18, 20, 21, 23 (10)	1 (1)	7 (1)
25.	Marathawada	Nil	10-18, 20, 21, 23 (12)	6-9, 19 (5)	8, 10, 12, 19-23 (8)	7, 8, 13, 15 (4)	1 (1)	2 (1)

TABLE 11 (*Contd*.)

Sub-division		Dates (Number of days)						
S. No.	Name	Severe heat wave	Heat wave	Hot day	Appreciably to markedly above normal	Above normal	Appreciably to markedly below normal	Below normal
26.	Vidarbha	Nil	7, 9-17, 19-21, 23 (14)	Nil	21, 23 (2)	7, 9, 20, 22 (4)	1-4, 22 (5)	Nil
27.	Chattisgarh	Nil	12-15, 17-19 (7)	Nil	1, 11-18 (9)	10, 19, 23 (3)	2, 3, 6, 9, 20-22 (7)	1, 5, 7, 8 (4)
28.	Coastal Andhra Pradesh	Nil	6-12, 15, 16, 18 (10)	1 (1)	12, 13 (2)	3, 5, 10, 23 (4)	2, 20- 22 (4)	19, 23 (2)
29.	Telangana	Nil	10, 12, 13, 15, 16, 18, 23 (7)	Nil	7, 10, 11, 13-15, 17, 18, 23 (9)	16 (1)	20-22 (3)	1, 3 (2)
30.	Rayalaseema	Nil	14, 15 (2)	11 (1)	11-13, 15-18 (7)	7, 9, 10 (3)	20-22 (3)	1 (1)
31.	Tamil Nadu	Nil	14, 16, 18 (3)	Nil	1, 3, 5-9, 11-15, 18, 19 (14)	6-8, 10, 12, 15-18, 22, 23 (11)	2, 20-22 (4)	2, 19 (2)
32.	Coastal Karnataka	Nil	10 (1)	18 (1)	3-5, 7-9, 11-18, 20-22 (17)	10 (1)	1 (1)	20 (1)
33.	North Interior Karnataka	Nil	11-14 (4)	Nil	8, 10, 13, 18, 19 (5)	11, 12, 15-17 (5)	1-3, 22 (4)	Nil
34.	South Interior Karnataka	Nil	11 (1)	Nil	1, 12, 19 (3)	9-11, 13-16, 23 (8)	2, 3, 20-23 (6)	1, 19 (2)
35.	Kerala	Nil	Nil	Nil	6, 7, 18 (3)	1-3, 5, 9-14, 23 (11)	21 (1)	22 (1)

centered near Lat. 10.5° N / Long. 88.5° E, about 930 kms eastsoutheast of Chennai. It moved northwestwards and intensified into a Deep Depression and lay centered at 1200 UTC, near Lat. 11.0° N / Long. 88.0° E. Moving in a westnorthwesterly direction, the system further intensified into a Cyclonic Storm (Laila) and lay centered at 0000 UTC of 18, near Lat. 11.5° N / Long. 86.5° E, about 700 kms southeast of Chennai. Thereafter, it moved in a northwesterly direction and at 0300 UTC it lay centered near Lat. 12.0° N / Long. 85.5° E; at 1200 UTC of 18 near Lat. 13.0° N / Long. 83.5° E and near Lat. 13.5° N/Long. 82.0° E at 0300 UTC of 19th. The system further intensified into a Severe Cyclonic Storm and lay centered near Lat. 13.5° N / Long. 81.5° E at 0600 UTC of 19th. Remaining practically stationary, the system lay near Lat. 14.0° N / Long. 81.5° E at 1200 UTC. Moving in a northwesterly direction, it lay near Lat. 15.5° N / Long. 80.5° E at 0300 UTC of 20th. The Severe Cyclonic Storm crossed south Andhra Pradesh coast near Bapatla between 1100 & 1200 UTC on 20th and weakened into a Cyclonic Storm at 1200 UTC close to Bapatla (Lat. 16.0° N / Long. 80.5° E). Remaining stationary for some time, it re-curved northnortheastwards and further weakened into a Deep Depression and lay centered over north coastal Andhra Pradesh, about 50 kms north of Machilipatnam (Lat. 16.5° N / Long. 81.0° E) at 0300 UTC of 21st. Continuing its northnortheastward movement, it weakened into a Depression and lay centered at 0600 UTC over coastal Andhra Pradesh, about 100 kms west of Kakinada (Lat. 17.0° N / Long. 81.5° E). Thereafter, it rapidly weakened into a low pressure area in the evening of 21 over north coastal Andhra Pradesh and adjoining Telangana.

The lowest Estimated Central Pressure (ECP) was 986 hPa. The maximum estimated mean wind speed was 55 kts.

The track of the system is depicted in Fig. 2.

(c) *Other intense systems formed over the Indian Seas during the month*

(*i*) *Cyclonic Storm 'Bandu' (19 – 23 May) over the Arabian Sea*

The cyclonic storm formed over south west Arabian Sea and dissipated over Gulf of Aden. As the system did not influence the weather over the Indian Region either directly or indirectly, the description of the system is not included in this article. However, the track of the system is included in Fig. 2 as the area comes under RSMC responsibility.

TABLE 12

Principal amounts of rainfall (3 cm and above) (March, April and May 2010)

Date (1)	March (2)	April (3)	May (4)
1.	NIL	Cherrapunji 16, Raipur 7, Silchar 6, Imphal 5, Kailashahar, Tezpur & Thirumangalam 4 each	Nilakottai 16, Tondi 14, Musiri & Thanjavur 13 each, Andipati, Kozha & Venkatagiri Kota 12 each, Attur, Perundurai 11, Illupur, Karur & Usilampatti 10 each, Dharampuri, Manamadurai, Mangalapuram, Sivagangai, Soolagiri & Thathiyangarpet 9 each, Chengam, Kadaladi, Krishnagiri, Mayanur, Nagapattinam, Periyakulam & Thozhudur 8 each, Aluva Pwd, Kochi, Erode, Kallakurichi, Kanjirapally, Mulbagal, Pondicherry, Pudukottai, Punganur, Thali, Vanur & Vedaranniyam 7 each, Bhavani, Kodaikanal, Natham, Paramathi Velur, Pennagaram, Pollachi, Sholavandan, Subramanya, Theni, Thirukattupalli, Tiruppuvanam, Tiruchirapalli & Vembavur 6 each, Anekal, Barur, Car Nicobar, Cherthala, Chidambaram, Dharapuram, Harangi, Hosur, Kulithalai, Kumarapalayam, Lalgudi, Mudukulathur, Palayamkottai, Parangipettai, Ramanathapuram, Rayakottah, Sankaridurg, Sirkali, Tiruvaiyaru, Tiruvadanai, Valapadi & Viralimalai 5 each, Alapuzha, Avinashi, Chittampatti, Chittur, CIAL Kochi, Cuddalore, Dindugul, Gandarvakottai, Gobichettipalayam, Junagarh, K. Paramathi, Kangeyam, Karaikudi, Kottayam, Kundha Bridge, M. M. Hills, Mannargudi, Manjeri, Mysore, Neelamangala, Palacode, Pappireddipatti, Raj-Nilgiri, Rayalpad, Sargur, Sathyamangalam, T. Narsipur, Thirumayam, Thiruthuraipoondi, Thrissur, Tirukoilur, Tiruppur, Tiruttani, Vaikom & Vedasandur 4 each, Aravakurichi, Bandipur, Bissem-Cuttack, Dhubri, Harur, Idukki, Jaipatna, Jayamkondam, Kadavur, Kanakapura, Ketti, Kollengode, Mayiladuthurai, Namakkal, Needamangalam, Omalur, Ottapalam, Perambalur, Perungalur, Pullambadi, Rasipuram, Sendamangalam, Thiruchendur, Thirumangalam, Thoothukudi, Tiruchirapalli, Tiruvarur, Valangaiman, Vythiri & Yercaud 3 each
2.	Gangtok 3	Cherrapunji & Silchar 8 each, Imphal 3	Guwahati 8, Nuggehalli 7, Mahabaleshwar 5, Ballia FM & Parkal 4 each, Baghdogra, Pattambi, Purnea & Sakleshpura 3 each
3.	Tadong 6, Dibrugarh 5, Passighat 3	Cherrapunji 14, Dibrugarh & Silchar 4 each	Chikkanahalli 9, Haliyal, Kailashahar & Subramanya 6 each, Govindpur, Kanjirapally, Lengpui, Sulya & Tiptur 5 each, Dharwar Hosp., Goeribidanur, Gerusoppa, Ketti, Rampura, Rayadurg & Sakleshpura 4 each, Agartala, Diamond Harbour, Hanumansagar, Hubli, Punalur, Ranebennur & Tiruppuvanam 3 each
4.	NIL	NIL	Vadiaptti 12, Chittampatti 8, Passighat, Thali & Udala 7 each, Jallesore, Raj-Nilgiri & Sholavandan 6 each, Khandapada, Melur, Mettupatti, Periyakulam, Rajghat & Vedasandur 5 each, Aryankavu, Govindpur, Port Blair & Vadakara 4 each, Arantangi, Balimundali, Kansabati Dam, Peermade, Purulia & Thovalai 3 each
5.	Bhuntar 4	Dhubri 4	Panbari & Tirukoilur 10 each, Beki Rd.Bridge 8, Manas NH Xing, Rajampet & Tiruchirapalli 5 each, Aie NH Xing, Chengam, Kollapur, Marungapuri, Mohanpur, Rangiya, Sirkali & Vanyambadi 4 each, Dholla Bazar, Ranchi, Sevoke, Tiruttani & Valangaiman 3 each

TABLE 12 (*Contd.*)

(1)	(2)	(3)	(4)
6.	Silchar 8, Cherrapunji 7	Perumpavur 7, Cherrapunji, CIAL Kochi, Haripad, Piravom & Vaikom 5 each, Alapuzha, Kanjirapally, Mancompu & Thiruvalla 4 each, Kottayam, Kozha & Neyyattinkara 3 each	Govindpur 13, Raj-Nilgiri 11, Thakurmunda 9, Balasore & Bhubaneshwar 8 each, Mohanpur 7, Anandpur & Valapadi 6 each, Akhuapada, Bangripashi, Bhograi, Karambakudi, Nimapara, Pipli & Rajghat 5 each, Alangayam, Bonth, Chickmagalur, Jajpur, Kalaikunda IAF, Midnapore, Orathanadu, Soro, Tangi, Thirukattupalli & Vanyambadi 4 each, Bagati, Balimundali, Daringimbadi, Digha, Jaipur, Jallesore, Kunnavaram & Quazi Gund 3 each
7.	Kayamkulam 5, Cherrapunji 3	Gangtok 5, Piravom 3	Chittur & Perinthalmanna 6 each, Maya Bandar, Thuraiyur & Varanasi 5 each, Attur, Jaipur, K. Paramathi, Kushalnagara & Mannarkad 4 each, Aravakurichi, Bhavani, Kolkata, Jalpaiguri, Periyakulam & Rajapalayam 3 each
8.	NIL	NIL	Cherrapunji 6, Rangiya & Sankarankoil 5 each, Bajpe, Dharwar Hosp., Dharwar Rly, Pantnagar, Phoolbagh & Una C 4 each, Alipur O, Deogarh, Kolkata, Guler, Kalaikunda IAF, Malda & Raj-Nilgiri 3 each
9.	NIL	Vadakara 6, Piravom & Srivaikuntam 5 each, Cherthala, Kochi, Illayangudi & Kollengode, Parambikulam 4 each, Perumbavur, Quilandy & Vaikom 3 each	Kushalnagara 7, Baghdogra & Kanjirapally 6 each, Kailashahar 5, Cooch Behar & Thuckalay 4 each, Gudalur Bazar 3
10.	NIL	NIL	Khonsa 11, Belonia 9, Jorhat & Nagercoil 8 each, Panbari & Tezu 7 each, Dharmanagar, Gosaigaon, Haripad & Namaligarh 6 each, Agartala, Barpeta, Dillighat, Kailashahar, Mohanpur, Neamatighat, Passighat, Rangiya & Sonamura 5 each, Aie NH Xing, Goalpara, Jayapura, Manas NH Xing, Margherita, Midnapore, Nahar Katia & Puthimari 4 each, Arundhutinagar, Bahalpur, Bihubar, Chalakudi, Nalbari, Sulya & Thovalai 3 each
11.	NIL	NIL	Cherrapunji 4
12.	Angul & Athgarh 5 each, Talcher 3	Cherrapunji 9, Nuggehalli 5, Dhubri & Tezpur 4 each	Cherrapunji 18, Tezu 13, Bahalpur & Kokrajhar 11 each, Passighat 9, AP Ghat & Dholla Bazar 6 each, Lakhipur, Lakkavalli & Puttur 5 each, Aie NH Xing, Barpeta, Kailashahar, Manas NH Xing & N. Lakhimpur 4 each, Bajpe, Bhadravati, Dibrugarh & Konni 3 each
13.	Nanded & Therlam 4 each	Srisailam 8, Hosadurga & Koppa 7 each, Belthangady, Gangtok & Panchanhalli 6 each, Harapanahalli, Kottigehara Toll, Mani, Mudigere & Sirugappa 5 each, Chitradurga, Shrirampur & Srirangpatnam 4 each, Belur, Dhubri, Lakkavalli, Mysore, Narasimharajapur & Periyapatna 3 each	Cherrapunji 21, AP Ghat & Lakhipur 9 each, Dibrugarh 8, Khowang & Silchar 7 each, Margherita & Tawang 6 each, Motunga & Nahar Katia 5 each, Gangtok, Hassan, Konni & Tezu 4 each, Ambasamudram, N. Lakhimpur, Tangla & Tezpur 3 each
14.	NIL	Cherrapunji 7, Dibrugarh, Pennagaram & Thali 6 each, Denkanikottai & Yellandur 4 each, Yelhanka 3	Cherrapunji 9, Dibrugarh 7, Bahalpur 6, Gubbi, Passighat & Tezu 5 each, Aie NH Xing, AP Ghat, Dhubri, Gosaigaon, Guwahati, Lakhipur & Manas NH Xing 4 each, Dholai, Kampur, Kokrajhar & Namaligarh 3 each
15.	NIL	Y. N. Hoskote 11, Sargur 10, Tumkur 8, Amarapuram 7, Maiduguri 6, Gooty & Turuvekere 5 each, Bangalore, Bharmasagar, Heggaddevankote, Jagalur, Mundargi, Nanjangud, Nuggehalli,	Dhekiajuli 16, Motunga 7, Kotraguda 6, Bagati, Manthani, Nalgonda & Passighat 5 each, Bahalpur, Bissem-Cuttack, Chepan, Gosaigaon, Murti, Nayagarh, Pulivendala & Tezpur 4 each, Barpeta, Beki Rd.Bridge,

TABLE 12 (*Contd*.)

(1)	(2)	(3)	(4)
		Pulivendala, Ramnagaram, Thondebhavi & Yelhanka 4 each, B. Durg, Chikkanahalli, Chitradurga, Subramanya, Thambalapalle & Tiptur 3 each	Chinnoor, Devarakonda, Hasimara, Khandapada, Narsampet, Ramannapet & Tangla 3 each
16.	Cumbum 3	Jorhat 5, Dhubri 4, Khanitar, Peermade & Vaikom 3 each	Krishnagiri & Thali 8 each, Dhubri 7, Cherrapunji 6, N. Lakhimpur, Nancowry & Pulivendala 5 each, Aravakurichi, Dibrugarh, Palacode, Port Blair, Punganur, Ramnagaram & Venkatagiri Kota 4 each, Avinashi, Bhagamandala & Bhavani 3 each
17.	Channagiri, 4, Haripad & Shiggaon 3 each	Punalur 8, Puthimari & Sangli 6 each, Lakkavalli 5, Aryankavu, Gaganbawada, Hatkanangale, Kozhikode, Mudibidre & Satara 4 each, Balehonnur, Cherthala, Kagal, Napoklu, Peermade, Tadong & Thiruvananthapuram 3 each	Maya Bandar 8, Hut Bay 6, Daringimbadi & Perunthalmanna 5 each, AP Ghat, Bihubar & Mohana 4 each, Dillighat, Hiriyur, Kalasa, Lakkavalli, Nancowry, Port Blair & Tikabali 3 each
18.	Angul 6, Jenapur & Jhumpura 5 each, Keonjhargarh 4	Cherrapunji & Gangtok 10 each, Rajapalayam 8, Subramanya 6, Heggaddevankote, Ottapalam, Paramakudi & Vadakara 5 each, Ayikudi, Bhagamandala, Guwahati, Kozhikode, Vaikom & Virajpet 4 each, Cooch Behar, Kailashahar, Periyakulam, Piravom, Sakleshpura & Thiruvananthapuram 3 each	Ottapalam 7, Karipur, Kozhikode & Long Islands 4 each, Anekal, Kanakapura, Maya Bandar, Perinthalmanna & Vadakkancherry 3 each
19.	NIL	Aie NH Xing 8, AP Ghat 7, Molkalmuru, Silchar, Thirumangalam, Vadakara & Williamnagar 6 each, Ambasamudram, Amraghat, Barpeta, Beki Rd.Bridge, Chittampatti, Lakhipur, Lakkavalli, Manas NH Xing, Mettupatti, Sankarankoil, Thalasserry & Usilampatti 5 each, Andipati, Badatighat, Baghdogra, Banihal, Beki-Mathanguri, Dharmatal, Dholai, Gosaigaon, Kampur, Kodaikanal, Lingada Halli PS, Neamatighat, Quazi Gund & Rayakottah 4 each, Alur, Belthangady, Chaparmukh, Dhekiajuli, Hassan, Koratagere, N. Lakhimpur, Panambur & Yegathi 3 each	Cooch Behar 12, Bhatkal & Jalpaiguri 10 each, Thozudur 9, Agumbe & Chennai 8 each, Kundapur & Tiruvarur 7 each, Bahalpur, Gerusoppa, Karkala, Kokrajhar, Panambur, Sathanurdam & Vedaranniyam 6 each, Alankudi, Beki-Mathanguri, Bydgi, Challakire, Gangavathy, Hirekerur, Kunnamkulam, Lakkavalli, Linganamakki, Manki, Nannilam, Nayakanhatti, Pahalgam, Papanasam, Shirali, Silchar, Tambaram, Thanjavur, Thammanpatti & Thyagarthi 5 each, Adiramapatnam, Amarapuram, Chauldoaghat, Chembarambakkam, Gandarvakottai, Goalpara, Hiriyur, Holalkhere, Jayamkondam, Kalpa, Karaikal, Koppal, Lalgudi, Molkalmuru, Muthupet, Nagapattinam, Needamangalam, Ponneri, Pullambadi, Talaguppa, Thirukattupalli, Thiruthuraipoondi, Tondi, Tiruchirapalli & Valangaiman 4 each, Aie NH Xing, Arantangi, Cheyyar, Holaluru, Kampli, Keeranur, Kodavasal, Kumbakonam, Lakhipur, Mayiladuthurai, Motunga, Munirabad, Pondicherry, Ramnagaram, Sagar, Satyavedu, Sorab, Thathiyangarpet, Tiruvidaimaruthur & Vaikom 3 each
20.	NIL	Cherrapunji 36, Gharmura 18, Nalbari 16, Barpeta, Beki Rd.Bridge & Panbari 14 each, Itanagar & Rangiya 13 each, AP Ghat & Kailashahar 11 each, Bahalpur, Dhekiajuli, Puthimari & Silchar 10 each, Aie NH Xing, Beki-Mathanguri, Lakhipur & Tezpur 9 each, Guwahati & Williamnagar 8 each, Kokrajhar 7, Amraghat, Dharampuri & Dholai 6 each, Jorhat & Motunga 5 each, Dibrugarh, Goalpara, Manas NH Xing, N. Lakhimpur & Tangla 4 each, Pennagaram 3	Cherrapunji & Ongole 32 each, Atchampet 27, Baghdogra & Dhubri 21 each, Bahalpur 19, Narsapur & Tikrikilla 18 each, Ponneri 17, Champasari, Cooch Behar, Jalpaiguri, Tada & Tanuku 15 each, Sullurpet 14, Amalapuram, Barpeta, Mathabhanga & Williamnagar 13 each, Beki Rd.Bridge, Bhimavaram, Challakire, Damohani, Gosaigaon, Kandukur & Machilipatnam 12 each, Avanigadda, Goalpara, Kaikalur, Kakinada, Kokrajhar, Nalbari, Chennai & Thamaraipakkam 11 each, Kavali, Koderu, Manas NH Xing, Panbari, Repalle, Tadepalligudem & Tezu 10 each, Addanki, Aie NH Xing, Alapuzha, Bapatla, Chepan, Gajoldoba, Gudur, Lakkavalli, Nayakanhatti, Poondi, Satyavedu, Thiruvallur, Tiptur P.O. & Venkatagiri Town 9 each, Anakapalli, Barobhisa, Chitradurga, Darsi, Gudivada, Hosadurga,

TABLE 12 (*Contd.*)

(1)	(2)	(3)	(4)
			Molkalmuru, Puttur, Rajahmundry, Rayadurg & Tirupathi 8 each, Arakonam, Chembarambakkam, Namsai, Nellore, Peddapuram, Poonamally, Prathipadu, Singlabazar, Srikalahasti, Shrirampur, Tiruttani, Tuni & Yellamanchili 7 each, Bhimadole, Eluru, Kherunighat, Maya Bandar, NH31 Bridge, Rajampet, Rangiya, Sholinghur, T. Narsipur,Tambaram, Tenali & Visakhapatnam 6 each, Arasikere, Basaralu, Beki-Mathanguri, Dholla Bazar, Hiriyur, Holalkhere, Holenarsipur, Jagalur, K. Paramathi, Kancheepuram, Khowang, Mandya, Motunga, Nanjangud, Nuzvid, Pakala, Podili, Puthimari, Rampura, Santebennur, Sriperumbudur, Vijayawada, Visakhapatnam & Yegathi 5 each, Arkalgud, B. Durg, Badatighat, Baragur, Bharmasagar, Bheemunipatnam, Chamarajanagara, Channagiri, Chikkanahalli, Guntur, Halli Mysore, Hassan, Kalyandurg, Karur, Koyyalagudem, Long Islands, Lumding, Mangalagiri, Panchanhalli, Ramgiri, Ranasthalam, Rapur, Rayachoty, Sattenapalli, Sira, Subramanya & Vinjamur 4 each, Ajjampura, Channarayapatna, Chauldaught, Chintalapudi, Diana, Hasimara, Itanagar, Jia Bharali NT Xing, Krishna Raja Sagar, Kadur, Kamalapuram, Ketti, Khanitar, Krishnarajpet, Nandyal, Piduguralla, Tirupattur & Uthagamandalam 3 each
21.	NIL	Cherrapunji 16, Lakhipur 11, Panbari 10, Karimganj & Manas NH Xing 9 each, Aie NH Xing, Bahalpur, Gosaigaon, Kokrajhar & Tezu 8 each, Dhubri & Goalpara 7 each, Dibrugarh, Nalbari & Silchar 6 each, Amraghat, Barpeta, Beki Rd.Bridge, Gudalur Bazar, Gudiyatham, Itanagar, Madapura & Rangiya 5 each, Beki-Mathanguri, Kunnamkulam, Perinthalmanna, Puthimari & Tikrikilla 4 each, Dhekiajuli, Guwahati, Kailashahar, Mannarkad, N. Lakhimpur, Piravom, Srinagar & Vaikom 3 each	Addanki 52, Darsi 18, Kailashahar & Ongole 14 each, Visakhapatnam & Yellamanchili 13 each, Bheemunipatnam, Cherrapunji, Kandukur, Piduguralla & Vijayawada 12 each, Vinjamur & Vizinagaram 11 each, Agartala, Anakapalli, Narsipatnam, Penukonda, Podili & Visakhapatnam 10 each, Atchampet, Bhimadole, Cheepurpalli, Chodavaram, Koyyalagudem, Parlakhemundi, Polavaram, Srinivasapura, Srungavarpu Kota & Tiruvuru 9 each, Chintalapudi, Guntur, Madhira, Malda, Nandigama, Pathapatnam, Ranasthalam, Silchar & Tenali 8 each, Amalapuram, Hollagonda, Kalingapatnam, Kolar G.F., Paderu, Prathipadu, Sattenapalli, Sompeta & Tuni 7 each, Alur, Atmakur, Chintapalli, Gudivada, Kavali, Kuppam, Palakonda & Tekkali 6 each, Anantapur, Bangarpet Lfo, Chilamattur, Dharmavaram, Kukanoor, Macherla, Mangalagiri, Mundargi, Nellore, Nuzvid, Palasa, Passighat, Rajahmundry, Salur, Shillong, Tadepalligudem & Tanuku 5 each, Araku Valley, Bapatla, Bhagalpur, Bhimavaram, Eluru, Gajapathinagaram, Gopalpur C, Ichapuram, Kadiri, Kanekal, Kashinagar, Molkalmuru, Mandasa, Mulbagal, Peddapuram, Piravom, Puri, Rayalpad, Repalle, Thodupuzha, Venkatagiri Kota & Yellandu 4 each, Avanigadda, Chatrapur, Dummagudem, Kalyandurg, Khanitar, Koderu, Konni, Miryalguda, Narsapur, Pavagada, Rentachintala, Saroda, Srisailam, Therlam, Vaikom & Yerragondapalem 3 each
22.	NIL	Cherrapunji 29, Tezu 16, Gosaigaon 14, Kokrajhar 13, Karimganj 12, Margherita & Nahar Katia 9 each, Bahalpur 8, Goalpara, Manas NH Xing & Panbari 7 each, Aie NH Xing, Dholla Bazar, Dibrugarh & Passighat 6 each, Barpeta, Beki Rd.Bridge, Kaikalur, Khowang & Machilipatnam 5 each, Guwahati, Krishnarajpet, Nalbari, Nancowry, Rajampet, Rangiya & Srirangpatnam 4 each,	Tiruvuru 25, Nuzvid 15, Madhira 12, Palasa 11, Chintalapudi, Gopalpur, Ichapuram, Salur, Venkatapuram & Yellandu 10 each, Berhampur & Sompeta 9 each, Bhadrachalam, Chatrapur & Mandasa 8 each, Diamond Harbour, Durgachak, Eturnagaram, Krishnaprasad, Purushottampur, Tekkali & Umarkote 7 each, Banpur, Bhalukpong, Bobbili, Kokrajhar, Kosagumda, Mahabubabad & Rampura 6 each, Aska,

TABLE 12 (*Contd.*)

(1)	(2)	(3)	(4)
		Bangalore, Basaralu, Challakire, Holalkhere, Koyyalagudem, Madhira, Sholinghur, Sundernagar, Vinjamur & Yelhanka 3 each	Gajapathinagaram, Jagdalpur, Nandigama, Palakonda, Parvathipuram, Sandur, Saroda & Visakhapatnam 5 each, Ambodala, Atchampet, Athgarh, Bahalpur, Bellary, Bissem-Cuttack, Cherrapunji, Guntur, Hospet, Jamsolaghat, Jia Bharali NT Xing, Kalingapatnam, Kampli, Kanekal, Karanjia C, Keonjhargarh, Khandapada, Lengpui, Munirabad, Pamidi, Parlakhemundi, Puri, Ranasthalam, Ranpur, Swam-Patna & Yellamanchili 4 each, Bangripashi, Bhanjnagar, Chandanpur, Dummagudem, H.B.Halli, Hindol, Irikkur, Kakatpur, Kashinagar, Koppal, Kunnavaram, Madhabarida, Mohana, Nawarangpur, Nayagarh, Neamatighat, Paderu, Paradip, Pathapatnam & Ram Udayagiri 3 each
23.	NIL	Passighat 18, N. Lakhimpur 8, Cherrapunji 6, Dibrugarh & Punganur 5 each, Mulbagal 4, Tadong 3	Hasimara 16, Athgarh 13, Lakkavalli & Nagarkata 9 each, Phulbani 8, Canning & Hunsur 7 each, Mandasa, Neora, Paradip & Pathapatnam 6 each, Berhampur, Bhanjnagar, Bhubaneshwar, Diana, Gobichettipalayam, Govindpur, Koraput, Naraj, Nargund & Tavaregere 5 each, Balasore, Banpur, Bellary, Chintapalli, Ghatgaon, Hanumansagar, Huliyurdurga, Ichapuram, Kalyandurg, Kotraguda, Kushtagi, Mohana, Nayagarh, Puri, Ranpur, Rayadurg, Tangi & Varkala 4 each, Amarapuram, Aska, Badami, Bagewadi, Basirhat, Digha, Hungund, Nimapara, Palasa, Parlakhemundi, Raj-Nilgiri, Sandur, Tekkali, Tikarpada & Yelburga 3 each
24.	Itanagar 6, Cherrapunji 5, N. Lakhimpur & Passighat 4 each	Cherrapunji 11, Cooch Behar & Kundapur 9 each, Dhubri & Paderu 8 each, Siddapura & Udupi 7 each, Heggaddevankote & Passighat 6 each, Adiramapatnam, Bhatkal, Koyyalagudemdem & Lakkavalli 5 each, Shirali, Thovalai & Turuvekere 4 each, Alapuzha, Kota, Mahabaleshwar, Thiruvalla & Tumkur 3 each	Raj-Nilgiri 8, Amraghat, Ghat & Soro 6 each, Baghdogra, Banavasi, Gobichettipalayam, Kakatpur, Kuzhithurai & Purnea 5 each, Bhavani, Jalpaiguri, Nimapara, Ottapidaram, Ron & Thyagarthi 4 each, Daspalla, Dholai, Erode, Gangtok, Pandavapura, Pattamundai, Piravom, Shiggaon & Silchar 3 each
25.	Cherrapunji 19, Passighat 4	Cherrapunji 19, Belur & Passighat 6 each, Rayadurg 5, Balehonnur, Bandipur, Kamardi, Pandavapura, Pavagada & Tarikere 4 each, Basaralu, Gangtok, Kumarapalayam & Mysore 3 each	Thiruvalla 8, Port Blair, Thuckalay & Varkala 6 each, Angul, Aryankavu, Baghdogra, Chengannur, Cherthala, Guwahati, Hindol, Irinjalakuda, Kozha, Kuzhithurai, Nayagarh, Punalur, Ranpur C & Vaikom 4 each, Bhubaneshwar, Kottayam, Long Islands, Mancompu, N. Lakhimpur, Nagercoil & Nedumangad 3 each
26.	Tadong 7, Gangtok & N. Lakhimpur 4 each	Cherrapunji, Molkalmuru & Thirumangalam 8 each, Kailashahar 7, Jagdalpur & Kosagumda 5 each, Dibrugarh, Kollam, Konni & Shrirampur 4 each, Uthagamandalam 3	Lakhipur 15, Aluva Pwd 14, AP Ghat 13, Silchar 12, Agartala & Amraghat 9 each, Gharmura, Kailashahar & Kanjirapally 8 each, Anandpur, Kochi, Karimganj & Kottayam 7 each, Dholai & Sibsagar 6 each, Amini Divi, Long Islands & Malda 5 each, Beki-Mathanguri, Bihubar, Kayamkulam, Kozhikode, Lengpui, Neamatighat & Piravom 4 each, Barpeta, Beki Rd. Bridge, Cherrapunji, Dharmatal, Haripad, Port Blair, Vadakara, Vaikom & Williamnagar 3 each
27.	Thiruvananthapuram 18, Kayamkulam 12, Cherthala & Haripad 8 each, Chepan, Varkala 7, Passighat 6, Barobhisha & Punalur 5 each, Hasimara, Kottayam, Kumarakom, Piravom & Thiruvananthapuram 4 each, Cherrapunji, Cooch Behar, Diana & N. Lakhimpur 3 each	Kailashahar & Linganamakki 9 each, Mavelikara 8, Gangtok & Kanjirapally 6 each, Alapuzha, Haripad, Kottayam, Kuzhithurai, Lakkavalli, Manjeri & Talaguppa 5 each, Dudda, Minicoy, Pathikonda, Perumpavur, Piravom & Tarikere 4 each, Kamudhi, Kozha, Sattankulam, Srivaikuntam, Subramanya & Thuckalay 3 each	Kailashahar 7, Kuzhithurai 6, Bahalpur, Dhubri & Seppa 5 each, Arundhutinagar, Kolkata, Kottayam & Thalasserry 4 each, Aie NH Xing, Daporijo, Kokrajhar & Lakhipur 3 each

TABLE 12 (*Contd.*)

(1)	(2)	(3)	(4)
28.	Chickmagalur 3	Piravom 7, Hunsur, Mysore, Napoklu & Periyapatna 5 each, Aluva Pwd & Heggaddevankote 4 each, Cherrapunji, Kuppady, Malur, Ottapalam, Raibag, Somwarpet & Tanuku 3 each	Maya Bandar 12, Arundhatinagar & Long Islands 10 each, Nedumangad 9, Agartala 8, Haripad 7, Mancompu 6, Kayamkulam 5, Belonia, Madanpur-Rampur, Sukinda & Tadong 4 each, Dharmanagar, Dhenkanal, Gangtok, Lucknow & N. Lakhimpur 3 each
29.	Lakhipur 10, AP Ghat& Silchar 9 each, Cherrapunji 7, Peermade 5, Agartala, Dharmanagar, Diana, Lengpui, Nagarkata, Rangiya, Sabroom & Thodupuzha 4 each, Arasikere, Arundhatinagar, Imphal, Tangla & Tezpur 3 each	Alathur, Champua, Kollam, Munnar & Punalur 5 each, Banavasi, Cherrapunji, Hangal, Krishna Raj Sagar, Konni & Swam-Patna 4 each, Basaralu, Chittur, Kollengode, Nedumangad & Panbari 3 each	Mancompu 7, Kayamkulam, Kotagarh, Quazi Gund, Srinagar & Virudhunagar 6 each, Palampur & Tadong 5 each, Agartala, Banihal, Imphal, Kailashahar, Kuzhithurai, Sendamangalam, Sohella & Varkala 4 each, Mangalapuram & Titlagarh 3 each
30.	Kailashahar 11, Lengpui 10, Dharmanagar 8, Gangtok 7, Cherrapunji 6, Arundhatinagar 5, Solang Nala & Yellandur 4 each, Akhuapada, Golaghat, Panbari & Yegathi 3 each	Agartala 6, B. Durg & Kamareddy 5 each, Periyakulam 4, Cherrapunji & Khajuri 3 each	Kanjirapally 7, Kochi & Khajuri 6 each, Kollam, Kottayam & Thiruvananthapuram 5 each, Trivandrum 4, Huliyurdurga, Kumarakom & Minicoy 3 each
31.	Kottayam 12, Amraghat 10, AP Ghat & Dholai 8 each, Kanjirapally, Konni, Kumarakom & Silchar 7 each, Alapuzha, Cherthala & Kuzhithurai 6 each, Erode, Hessarghatta, Nelamangala & Tawang 5 each, Dibrugarh, Gharmura, Passighat, Sankarankoil & Solang Nala 4 each, Chengannur, Daporijo, Tezu & Vaikom 3 each	NIL	NIL

(*ii*) *Very Severe Cyclonic Storm 'Phet' (31 May – 7 June) over the Arabian Sea*

The details of this system will be included in the seasonal summary of southwest monsoon season – 2010 as it formed towards the end of May and influenced the onset/advance process of southwest monsoon season. However, the track of the system is given in Fig. 2.

(d) *Other synoptic features and rainfall*

The details of weather systems during the month are given in Table 9 and the resultant rainfall distribution in Table 10. The principal amounts of rainfall are given in Table 12.

A major part of northeast and peninsular India witnessed thunder showers activity throughout the month. Western disturbances and induced cyclonic circulations gave rise to precipitation over the northwest India. Troughs in the lower level westerlies and cyclonic circulations caused rainfall over the northeast India and troughs/ wind discontinuities gave rise to thunder showers over the south peninsula.

3.3.2. *Temperature distribution*

From Table 11, it is seen that *heat wave to severe heat wave* conditions prevailed over major parts of the country except the last week of the month, outside northeast India, Gangetic West Bengal, Uttarakhand, Punjab, Jammu & Kashmir, Konkan & Goa and Kerala inspite of thundershower activity over the major parts of the country.

The month's as well as the season's highest maximum temperature of 49°C was recorded at Idar (Gujarat Region) on 21, Ganganagar (west Rajasthan) on

22 and Jhalawar & Ganganagar (west Rajasthan) on 26, May 2010.

3.3.3. *Disastrous weather events and damage*

As per the media and other disaster reports, heat wave claimed the lives of 158 people in Vidarbha, 75 in Andhra Pradesh, 9 in Madhya Pradesh, 6 in Chhattisgarh, 3 each in Uttar Pradesh and Rajasthan and 2 in Jharkhand. Thunderstorm / hailstorm, squall winds, lightning and heavy rains claimed 108 lives in Bihar, 60 in West Bengal, 18 in Uttar Pradesh, 12 in Assam, 9 in Jharkhand, 10 in Karnataka, 4 in Vidarbha, 1 each in Tripura, Himachal Pradesh and Maharashtra. Also 2 people died due to Avalanche in Ladakh.

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Strong winds and heavy rains also damaged several hectares of crops, many houses, electrical and Telecommunication lines, uprooted trees in West Bengal & Sikkim, Bihar, Maharashtra, Assam and Tripura. Apart from these, an extensive damage was caused by the Severe Cyclonic Storm 'Laila' over Andhra Pradesh.

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 %.

At most places - 76% or more stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.

At many places - 51% to 75 % stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.

At a few places - 26% to 50% stations of a meteorological sub-division reporting atleast 2.5 mm rainfall.

At isolated places - 25% or less stations of a meteorological sub-division reporting at least 2.5 mm rainfall

Extremely heavy rain - rainfall amount 24.5 cm or more.

Very heavy rain - rainfall amount from 12.5 cm to 24.4 cm.

Heavy rain - rainfall amount from 6.5 cm to 12.4 cm.

Temperature

(a) Maximum/day temperatures

According to the criteria being followed 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 at least 30° 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.

Above normal - departure of maximum temperature from normal is + 2° C.

Appreciably below normal - departure of maximum temperature from normal is from – 3° C to – 4° C where the normal maximum temperature is 40° C or less

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

Below normal - departure of maximum temperature from normal is – 2° C.

(b) Minimum/night temperatures

Cold wave conditions - departure WCTn from normal minimum temperature is from –5° C to –6° C where normal minimum temperature $\geq$ 10° C and from –4° C to –5° C elsewhere.

Also cold wave is declared when WCTn is $\leq$ 0° C irrespective of the normal minimum temperature for those stations.

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

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

Below normal - departure of minimum temperature from normal is – 2° C

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

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