MAUSAM, **66**, 2 (April 2015), 317-336

Weather in India

HOT WEATHER SEASON (March-May 2014)†

1. Chief features

(*i*) The hot weather / pre-monsoon season of 2014 was cyclogenetically not very active, with only one Depression (21-23 May) forming over the Bay of Bengal.

(*ii*) *Heat wave conditions** manifested from the last week of March over eastern parts of India and gradually extended westwards over India during the last week of April.

(*iii*) Precipitation remained above its Long Period Average (LPA) during March and May and below the LPA during April. The All India rainfall for the season as a whole had been 100 % of its LPA.

(*iv*) Persistent and widespread hailstorm activity of moderate to severe intensity occurred over Andhra Pradesh, Karnataka, West Bengal, Maharashtra and Manipur during March. It claimed 39 lives and damaged around 15 lakh hectares of crops and thousands of dwellings.

(*v*) Southwest Monsoon advanced over the southeast Bay of Bengal and Andaman Sea on 18th May.

2. Seasonal rainfall

The sub-division wise rainfall and its departure from normal for each month and season as a whole are given in Table 1. The sub-divisional rainfall departures for the season March-May 2014 are also depicted in Fig. 1.

Nearly relentless passage of Western Disturbances (WDs), cyclonic circulations induced by them, favourable conditions for intense convective activity (especially during the initial half of March), moisture incursion in the lower tropospheric levels from amplified tropical easterly waves and presence of north-south/wind discontinuity caused *normal to excess** rainfall over most parts of India during the season.

The seasonal rainfall over the meteorological sub-divisions was *excess/normal** over many parts of the country outside Andaman & Nicobar and Lakshadweep

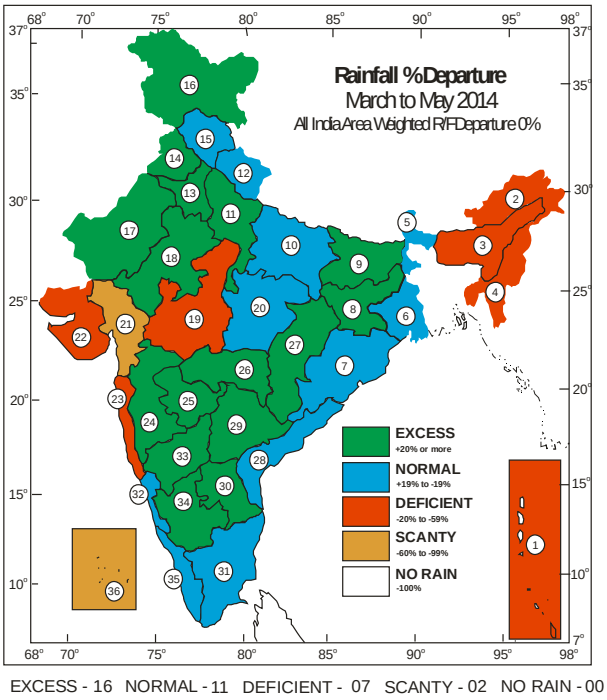

Fig. 1. Sub-divisionwise seasonal rainfall departure from normal (%) for hot weather season (March to May 2014). Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

1	-46	**7**	10	**13**	59	**19**	-44	**25**	223	**31**	21
2	-38	**8**	55	**14**	41	**20**	1	**26**	82	**32**	7
3	-28	**9**	46	**15**	-2	**21**	-60	**27**	35	**33**	75
4	-46	**10**	-12	**16**	21	**22**	-22	**28**	2	**34**	34
5	-14	**11**	36	**17**	89	**23**	-25	**29**	126	**35**	-48
6	-15	**12**	2	**18**	27	**24**	63	**30**	-9	**36**	-67

Islands, the sub-divisions in northeast India, west Madhya Pradesh, Gujarat State and Konkan & Goa where it was *deficient/scanty**.

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 principal amounts of rainfall are given in Table 5.

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

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TABLE 1

Sub-division wise rainfall (mm) for each month and season as a whole (March-May, 2014)

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	0.0	25.0	-100	11.1	81.5	-86	238.0	358.5	-34	249.1	465.0	-46
2.	Arunachal Pradesh	80.3	179.7	-55	86.7	278.8	-69	299.0	291.9	2	466.0	750.4	-38
3.	Assam & Meghalaya	29.5	77.7	-62	51.1	181.2	-72	342.0	331.3	3	422.5	590.2	-28
4.	Naga., Mani., Mizo. and Tri.	25.4	76.8	-67	49.6	149.4	-67	192.5	267.9	-28	267.5	494.1	-46
5.	Sub-Himalayan West Bengal & Sikkim	37.7	63.6	-41	47.9	123.7	-61	308.6	269.8	14	394.2	457.1	-14
6.	Gangetic West Bengal	18.8	28.0	-33	1.7	42.1	-96	120.3	94.7	27	140.8	164.8	-15
7.	Orissa	25.1	27.0	-7	11.7	37.5	-69	111.9	70.2	59	148.7	134.7	10
8.	Jharkhand	22.9	17.1	34	1.9	18.4	-90	98.2	43.9	124	123.1	79.4	55
9.	Bihar	8.4	10.1	-17	0.7	16.3	-96	103.9	51.1	103	112.9	77.5	46
10.	East Uttar Pradesh	15.5	9.1	70	1.7	5.6	-70	10.7	17.0	-37	27.8	31.7	-12
11.	West Uttar Pradesh	23.1	11.3	105	5.4	4.6	18	11.1	13.2	-16	39.6	29.1	36
12.	Uttaranchal	68.4	57.6	19	37.6	33.3	13	52.9	65.1	-19	158.8	156.0	2
13.	Haryana, Chandigarh & Delhi	26.7	12.7	111	7.5	7.5	0	20.3	14.0	45	54.5	34.2	59
14.	Punjab	30.3	25.3	20	24.5	12.5	96	20.8	15.7	32	75.5	53.5	41
15.	Himachal Pradesh	118.4	114.2	4	55.8	65.4	-15	64.7	65.3	-1	238.9	244.9	-2
16.	Jammu & Kashmir	214.5	151.9	41	106.7	97.5	9	73.9	76.6	-4	395.0	326.0	21
17.	West Rajasthan	4.7	3.8	23	8.4	4.2	101	23.0	11.1	107	36.0	19.1	89
18.	East Rajasthan	6.5	3.7	74	7.3	2.9	152	8.4	10.8	-22	22.1	17.4	27
19.	West Madhya Pradesh	4.6	4.6	1	1.4	2.0	-28	1.4	6.9	-79	7.5	13.5	-44
20.	East Madhya Pradesh	17.8	12.5	42	5.1	5.5	-8	2.5	7.1	-64	25.3	25.1	1
21.	Gujarat region	0.2	1.0	-78	1.0	0.3	248	1.3	5.1	-75	2.5	6.4	-60
22.	Saurashtra & Kutch	0.1	1.2	-90	0.5	0.2	169	2.4	2.5	-5	3.0	3.9	-22
23.	Konkan & Goa	0.3	0.0	-100	0.5	2.7	-82	26.9	34.3	-21	27.7	37.0	-25
24.	Madhya Maharashtra	24.4	2.7	802	7.5	8.9	-16	29.8	26.2	14	61.7	37.8	63
25.	Marathawada	79.0	5.7	1285	11.9	6.5	84	7.0	18.1	-61	97.9	30.3	223
26.	Vidarbha	49.6	12.0	314	2.6	7.7	-66	4.0	11.2	-64	56.3	30.9	82
27.	Chattisgarh	19.2	13.3	44	16.2	13.8	17	25.5	18.1	41	60.8	45.2	35
28.	Coastal Andhra Pradesh	6.5	11.1	-42	7.5	21.8	-66	84.8	64.1	32	98.7	97.0	2
29.	Telangana	47.7	9.4	408	10.0	16.5	-39	70.5	30.9	128	128.3	56.8	126
30.	Rayalaseema	13.9	6.5	114	8.4	19.9	-58	52.2	55.6	-6	74.5	82.0	-9
31.	Tamil Nadu	8.1	18.3	-56	8.3	42.3	-80	139.1	67.5	106	155.5	128.1	21
32.	Coastal Karnataka	2.6	4.1	-37	31.6	28.1	13	156.8	146.6	7	191.1	178.8	7
33.	North interior Karnataka	29.2	5.2	462	26.4	25.6	3	93.0	54.3	71	148.7	85.1	75
34.	South interior Karnataka	17.7	8.5	109	46.7	43.8	7	130.5	92.9	40	195.0	145.2	34
35.	Kerala	17.9	30.4	-41	95.7	109.5	-13	251.0	239.8	5	364.5	379.7	-4
36.	Lakshadweep	4.4	11.8	-63	14.9	48.9	-70	57.4	171.7	-67	76.7	232.4	-67

TABLE 2

Details of the weather systems during March 2014

S. No.	System	Duration	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**) *Western disturbances/eastward moving systems*						
(*i*) *As upper air cyclonic circulations*						
1.	Mid & upper tropospheric levels	7 – 12	Northeast Afghanistan and adjoining Pakistan	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 13. A trough aloft with its axis at 5.8 kms a.s.l. along Long. 72° E, to the north of Lat. 30° N. on 12
2.	Upto 3.6 kms a.s.l.	14 – 16	Northeast Afghanistan and adjoining north Pakistan	Eastnortheast	Do	Moved away on 17
3.	Mid tropospheric levels	20 – 23	Around Long. 55° E, to the north of Lat. 35° N	Northeast	Do	Moved away on 24
4.	Do	22 – 26	Do	Do	Jammu & Kashmir and adjoining Pakistan	Moved away on 27. A trough aloft in mid-upper tropospheric levels was seen on 22 and 23
5.	Do	27 –29	Northeast Afghanistan and adjoining Pakistan	Do	Jammu & Kashmir and adjoining north Pakistan	Moved away on 30. It initially lay as a trough in mid & upper tropospheric westerlies on 25 & 26. A trough persisted aloft with its axis at 5.8 kms a.s.l. along Long. 67° E and along Long. 68° E to the north of Lat. 30° N. on 27 & 28 respectively. The trough aloft became unimportant on 29
(*ii*) *As an induced cyclonic circulations*						
1.	Lower tropospheric levels	3 – 4	South Pakistan and adjoining west Rajasthan	Northeast	West Uttar Pradesh and adjoining areas of Uttarakhand	Less marked on 5
2.	Do	17 – 18	Central Pakistan and adjoining Rajasthan	East	Haryana and adjoining west Uttar Pradesh	Moved away on 19
3.	Up to 3.1 kms a.s.l.	21 – 23	Central Pakistan and neighbourhood	Do	East Rajasthan and adjoining west Madhya Pradesh	Merged with the wind discontinuity extended from Lakshadweep area to west Madhya Pradesh on 24
4.	Lower levels	24 – 26	Do	Do	Haryana and neighbourhood	Less marked on 27
5.	Lower tropospheric levels	28	West Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 29
(*iii*) *As and induced low pressure area*						
1.	Low pressure area	10 – 11	Central Pakistan and adjoining west Rajasthan	East	Northwest Rajasthan and neighbourhood	It formed under the influence of a induced cyclonic circulation extending upto 0.9 km a.s.l. over west Rajasthan and neighbourhood. Less marked on 12. However, the associated induced cyclonic circulation extending upto lower tropospheric levels lay over Haryana and neighbourhood on 12; over Haryana and adjoining Uttarakhand on 13 and became less marked on 14

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(*iv*)	*As a trough*					
1.	Mid & upper tropospheric levels	2 – 6M	Long. 60° E, to the north of Lat. 35° N (at 5.8 km a.s.l.)	Eastnortheast	Long. 73° E, to the north of Lat. 20 ° N	Moved away on 6
2.	Do	8 – 10	Long. 62° E, to the north of Lat. 30° N (at 5.8 km a.s.l.)	Southeast	Long. 66° E, to the north of Lat. 20 ° N	Merged with cyclonic circulation over Jammu & Kashmir on 11
3.	Do	13 – 14	Long. 52° E, to the north of Lat. 35° N (at 5.8 km a.s.l.)	East	Long. 57° E, to the north of Lat. 35° N (at 5.8 km a.s.l.)	Became unimportant on 15
4.	Do	15 – 20	Long. 45° E, to the north of Lat. 20° N (at 5.8 km a.s.l.)	Northeast	Long. 87° E, to the north of Lat. 25° N (at 5.8 km a.s.l.)	Less marked on 21
5.	Lower levels	14 – 15	Arunachal Pradesh to north Bay of Bengal	Oscillatory	Arunachal Pradesh to northwest Bay of Bengal	Less marked on 16
6.	Do	25	Haryana and neighbourhood to Marathwada across west Madhya Pradesh	Stationary	*In situ*	Less marked on 26
7.	Mid & upper tropospheric levels	31 March – 3 April	Long. 45° E, to the north of Lat. 30° N (at 5.8 km a.s.l.)	Northeast	Long. 75° E, to the north of Lat. 32° N (at 5.8 km a.s.l.)	Moved away on 4 April
(**B**)	*Other upper air cyclonic circulations*					
1.	Mid tropospheric levels	3 – 4	Chhattisgarh and neighbourhood	Stationary	*In situ*	Less marked on 5
2.	Between lower & Mid tropospheric levels	1 – 3	Jharkhand and adjoining north Odisha	West	Odisha and neighbourhood	Less marked on 4
3.	Lower tropospheric levels	4 – 7	Goa- Karnataka coast	Northnorth-west	East central Arabian Sea off Maharashtra coast	Became unimportant on 8
4.	Lower levels	4 – 6	Comorin – Maldives area	Northwest	Lakshadweep-Maldives area	Became unimportant on 8
5.	Lower tropospheric levels	5 – 6	Gujarat Region and neighbourhood	Do	Southeast Rajasthan and neighbourhood	Less marked on 7
6.	Do	6	Bangla Desh and adjoining Tripura	Stationary	*In situ*	Less marked on 7
7.	Lower levels	9	Odisha and adjoining Gangetic West Bengal	Do	Do	Less marked on 10
8.	Do	9	North coastal Andhra Pradesh and neighbourhood	Do	Do	Less marked on 10
9.	Lower tropospheric levels	10 – 16	South Gujarat and neighbourhood	North and then east	Odisha and neighbourhood	Less marked on 17
10.	Between lower & Mid tropospheric levels	17 –19	Bangla Desh and adjoining Sub-Himalayan West Bengal & Sikkim	Quasi-stationary	Sub-Himalayan West Bengal & Sikkim to Odisha as a trough (at 0.9 km a.s.l.)	Less marked on 20. It lay as a trough at 0.9 km a.s.l. on 19 extended from Sub-Himalayan West Bengal & Sikkim to Odisha
11.	Mid tropospheric levels	20 – 22	Sub-Himalayan West Bengal & Sikkim and neighbourhood	-	Bangla Desh and neighbourhood	Less marked on 23
12.	Lower levels	19 – 21	Sri Lanka and neighbourhood	West	Lakshadweep-Maldives area	Less marked on 22. It initially lay as a trough of low at mean sea level over south Andaman Sea and neighbourhood on 16; over southeast Bay of Bengal and neighbourhood on 17 and over southwest Bay of Bengal off Sri Lanka coast on 18
13.	Lower tropospheric levels	20 – 28	South Chhattisgarh and adjoining Odisha		Sub-Himalayan West Bengal & Sikkim and neighbourhood	Less marked on 29

TABLE 2 (*Contd*.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
14.	Lower levels	26 – 28	Northwest Madhya Pradesh and neighbourhood	Southeast	Central parts of Madhya Pradesh and neighbourhood	Less marked on 29
15.	Do	31 March – 2 April	Assam & Meghalaya and neighbourhood	Stationary	*In situ*	Less marked on 3 April. It initially lay as a trough in the lower levels extended from Arunachal Pradesh to north Odisha across Gangetic West Bengal on 30
(**C**)	*Troughs in easterlies*					
1.	Lower level	10	Lakshadweep area to north interior Karnataka	Stationary	*In situ*	Less marked on 11
2.	Do	14	Lakshadweep area to south Gujarat across east central Arabian Sea	Do	Do	Less marked on 15
3.	Do	16	Comorin area to north Madhya Maharashtra across Kerala and interior Karnataka	Do	Do	Less marked on 17
4.	At mean sea level	19	Lakshadweep area to south Gujarat coast	Do	Do	Less marked on 20
5.	Lower level	21	Lakshadweep-Maldives area to south Konkan & Goa	Do	Do	Less marked on 22
6.	Do	25 – 26	Comorin area to north interior Karnataka	Oscillatory	Lakshadweep area to north interior Karnataka	Less marked on 27
7.	Do	29 –30	Lakshadweep area to south interior Karnataka	Stationary	*In situ*	Less marked on 31
(**D**)	*Trough / wind discontinuity*					
1.	Lower tropospheric levels.	1	Northwest Madhya Pradesh and adjoining southwest Uttar Pradesh	Stationary	*In situ*	Less marked on 2
2.	Lower levels	12 – 13	Northwest Madhya Pradesh and neighbourhood to Madhya Maharashtra	East	East Madhya Pradesh and adjoining Chhattisgarh to Madhya Maharashtra across Vidarbha and Marathwada	Less marked on 14
3.	Do	6 – 9	Rayalaseema to southeast Rajasthan across Madhya Maharashtra and Gujarat Region	West	Lakshadweep area to south Gujarat across east central Arabian Sea	Less marked on 10
4.	Do	17	Odisha and neighbourhood to south Maharashtra across south Chhattisgarh and Vidarbha	Stationary	*In situ*	Less marked on 18
5.	Do	20	South Chhattisgarh and adjoining Odisha to north interior Karnataka	Do	Do	Less marked on 21
6.	Do	22 – 24	Comorin area to south interior Karnataka across south Tamil Nadu and Kerala	North	Lakshadweep area to west Madhya Pradesh across interior Karnataka and Marathwada	Less marked on 25
7.	Do	27 – 28	Central parts of Madhya Pradesh and neighbourhood to coastal Karnataka across interior Maharashtra	Oscillatory	Central parts of Madhya Pradesh and neighbourhood to north interior Karnataka across interior Karnataka	Less marked on 29
8.	Lower tropospheric levels.	31 Mar – 2 Apr	North Odisha to south Tamil Nadu across Telangana and interior Karnataka	Do	North Odisha to south Tamil Nadu across Andhra Pradesh	Less marked on 3 April

TABLE 3

Details of the weather systems during April 2014

S. No.	System	Duration	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**) *Western disturbances/eastward moving systems*						
(*i*) *As upper air cyclonic circulations*						
(1)	Mid tropospheric levels	6 – 8	North Pakistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	Initially it lay as a trough on 4 & 5. A trough aloft persisted during 6, 8 & 9. The WD moved away on 9
(2)	Upto 3.1 kms a.s.l.	11 – 13	Northeast Afghanistan and adjoining Pakistan	Do	Do	Moved away on 14. Initially it lay as a trough extending upto mid tropospheric levels on 10
(3)	Do	15 – 20	Do	Do	Jammu & Kashmir	Moved away on 21. Initially it lay as a trough on 14. A trough persisted aloft during 16 – 20
(4)	Do	20 – 22	North Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away on 23 evening. A trough aloft on 22
(5)	Do	30 Apr – 1 May	Do	Do	Do	The feeble WD moved away on 2 May
(*ii*) *As induced cyclonic circulation*						
1.	Lower levels	2	Northeast Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 3
2.	Lower tropospheric levels	6 – 7	South Pakistan and neighbourhood	East	West Rajasthan and adjoining areas of Punjab and Haryana	Less marked on 8
3.	Lower levels	12 – 14	Central Pakistan and adjoining west Rajasthan	Do	Haryana and adjoining west Uttar Pradesh	Less marked on 15
4.	Do	20 – 21	Central Pakistan and neighbourhood	Do	South Pakistan and adjoining west Rajasthan	Less marked on 22
5.	Lower tropospheric levels	24 – 26	South Pakistan and adjoining west Rajasthan	Northeast	Central Pakistan and adjoining west Rajasthan	Less marked on 27
(*iii*) *As induced low pressure*						
1.	Low pressure area	17	Central Pakistan and adjoining west Rajasthan	Stationary	*In situ*	Less marked on 18. It lay as an induced cyclonic circulation on 16. However, the associated cyclonic circulation persisted upto 19 and became less marked on 20
(*iv*) *Troughs in westerlies*						
1.	Lower levels	1 – 2	Assam & Meghalaya and neighbourhood to Gangetic West Bengal	Stationary	*In situ*	Less marked on 3
2.	Lower tropospheric levels	4 – 5	Bangla Desh and neighbourhood to north Andhra Pradesh across Gangetic West Bengal and Odisha	Do	Do	Less marked on 6

TABLE 3 (*Contd*.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Lower levels	25 – 27	From cyclonic circulation over Sub-Himalayan West Bengal & Sikkim and neighbourhood to north interior Karnataka across Jharkhand, Chhattisgarh, Vidarbha and Telangana	West	From cyclonic circulation over Sub-Himalayan West Bengal & Sikkim and neighbourhood to north Odisha across Gangetic West Bengal	Less marked on 28
4.	Lower levels	10	Arunachal Pradesh to northeast Bay of Bengal across Assam and east Bangla Desh	Stationary	*In situ*	Less marked on 11
5.	Mid & Upper tropospheric levels	24 – 26	Long. 55° E to the north of Lat. 25° N (at 5.8kms a.s.l.)		Long. 72° E to the north of Lat. 25° N	Moved away northeastward on 27
(6)	Lower tropospheric levels	28	East Assam to Gangetic West Bengal and neighbourhood	Do	*In situ*	Less marked on 29
(**B**)	*Other upper air cyclonic circulations*					
1.	Lower levels	1	Southeast Rajasthan and neighbourhood	Stationary	*In situ*	Less marked on 2
2.	Do	3	Jharkhand and neighbourhood	Do	Do	Less marked on 4
3.	Do	4 – 5	East central Arabian Sea off south Maharashtra- Goa coasts	East	Konkan & Goa and neighbourhood	Less marked on 6
4.	Lower tropospheric levels	4 – 19	Bangla Desh and neighbourhood	Oscillatory	Sub-Himalayan West Bengal & Sikkim and neighbourhood	Less marked on 20
5.	Do	6 – 9	Assam & Meghalaya and neighbourhood	Stationary	*In situ*	Less marked on 10
5.	Do	7 – 9	Lakshadweep- Maldives area	West	Southeast Arabian Sea and adjoining Lakshadweep area	Became unimportant on 10
6.	Do	9 – 13	Chhattisgarh and neighbourhood	Stationary	*In situ*	Less marked on 14
7.	Lower levels	11	Eastern parts of Assam & adjoining Arunachal Pradesh	Do	Do	Less marked on 12
8.	Lower tropospheric levels	14 – 22	West Madhya Pradesh and adjoining east Rajasthan	East	Odisha and adjoining south Chhattisgarh	Less marked on 23
9.	Do	17 – 27	Assam & Meghalaya	Do	Eastern parts of Assam neighbourhood	Less marked on 28
10.	Lower levels	22 – 23	Comorin and neighbourhood	Stationary	*In situ*	Less marked on 24
11.	Lower tropospheric levels	27 – 29	Eastern parts of Bihar and adjoining Sub-Himalayan West Bengal & Sikkim		Bangla Desh and adjoining West Bengal	Less marked on 30
12.	Do	28 – 29	Southeast Madhya Pradesh and neighbourhood	West	Marathwada and neighbourhood	Less marked on 30
13.	Mid tropospheric levels	29 – 30 April	East Assam and neighbourhood	Do	Do	Less marked on 1 May
14.	Lower tropospheric levels	30 April	North Madhya Pradesh and neighbourhood	Do	Do	Less marked on 1 May

TABLE 3 (*Contd*.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**C**) *Troughs in easterlies*						
1.	At lower levels	3 – 5	Comorin area to south Andhra Pradesh across Tamil Nadu	West	Comorin area to south interior Karnataka across Tamil Nadu and Kerala	Less marked on 6
2.	Do	9 – 10	From cyclonic circulation over Chhattisgarh and neighbourhood to south Tamil Nadu across Vidarbha, Telangana, Rayalaseema and south interior Karnataka	Quasi-stationary	Chhattisgarh to Marathwada across Marathwada	Less marked on 11
3.	Do	11 – 14	From cyclonic circulation over Chhattisgarh and neighbourhood to south Tamil Nadu across Vidarbha, Telangana and interior Karnataka	West	From cyclonic circulation over west Madhya Pradesh and adjoining east Rajasthan to Comorin area across Marathwada, interior Karnataka and interior Tamil Nadu	Less marked on 15
4.	Do	15	Comorin area to south Konkan & Goa across Tamil Nadu and interior Karnataka	Stationary	*In situ*	Less marked on 16
5.	Do	28	Comorin area to south Konkan & Goa across interior Tamil Nadu and coastal Karnataka	Do	Do	Less marked on 29
(**D**) *Troughs / wind discontinuity*						
1.	Lower levels	3	From cyclonic circulation over Jharkhand and neighbourhood to north coastal Andhra Pradesh	Stationary	*In situ*	Less marked on 4
2.	Do	6 – 7	Central parts of Madhya Pradesh to south Tamil Nadu across Vidarbha, Marathwada and interior Karnataka.	Do	Do	Merged with the trough extended from Sub-Himalayan West Bengal & Sikkim and neighbourhood to north interior Karnataka on 8.
3.	Do	11 – 14	From cyclonic circulation over Chhattisgarh and neighbourhood to south Tamil Nadu across Vidarbha, Telangana and interior Karnataka	West	From cyclonic circulation over west Madhya Pradesh and adjoining east Rajasthan to Comorin area across Marathwada, interior Karnataka and interior Tamil Nadu	Less marked on 15
4.	Do	10	Comorin area to east central Arabian Sea	Stationary	*In situ*	Less marked on 11. An embedded cyclonic circulation off Karnataka coast on 10
5.	Do	16 Apr – 7 May	From east Rajasthan to south Tamil Nadu across west Madhya Pradesh, Madhya Maharashtra and interior Karnataka	Oscillatory	From cyclonic circulation over northwest Madhya Pradesh to well marked low pressure area over south Kerala and neighbourhood across Marathwada and interior Karnataka	-

TABLE 4

Details of the weather systems during May 2014

S. No.	System	Duration	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Depression*					
1.	Depression	21 – 22	Near Lat. 15.5° N / Long. 90.5° E over east central Bay of Bengal 490 kms north-northwest of Port Blair.	Northeast and then northwest	Near Lat. 17.5° N / Long. 92.0° E over east central Bay of Bengal	Under the influence of the cyclonic circulation over Andaman Sea and adjoining central Bay of Bengal a low pressure area formed over east central Bay of Bengal and neighbourhood on 19 evening and concentrated into a Depression on 21. It weakened into a well marked low over central Bay of Bengal on 23, and as a low pressure area over eastern parts of Jharkhand and adjoining areas of Gangetic West Bengal on 27 morning. It became less marked on 29. Associated cyclonic circulation extended upto mid tropospheric levels
(**B**)	*Low pressure area*					
1.	well marked Low pressure area	4 – 9	Sri Lanka and neighbourhood	West	North interior Karnataka and neighbourhood	It lay as a trough of low over southwest Bay of Bengal on 2 & 3. It became well marked on 6 and weakened on 7 evening and became less marked on 10. However, associated cyclonic circulation extended upto mid tropospheric levels
(**C**)	*Western disturbances / eastward moving systems*					
(*i*)	*As upper air cyclonic circulations*					
1.	Mid-tropospheric levels	1– 7	Western parts of Afghanistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 8. A trough aloft observed during 3-5
2.	Do	6 – 15	East Iran and adjoining Afghanistan	East northeast	Do	Moved away on 16. A trough aloft with its axis at 5.8 kms a.s.l. on 6
3.	Do	15 – 22	West Afghanistan and adjoining east Iran	Northeast	Eastern parts of Jammu & Kashmir	Moved away on 23. It lay as a trough with its axis at 5.8 kms a.s.l. on 20 and 22. A trough aloft on 21
4.	Do	22 eve – 24	Afghanistan and neighbourhood	Do	Eastern parts of Jammu & Kashmir and neighbourhood	Moved away on 25
5.	Do	25 – 28	Central Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away on 28 evening
6.	Do	30 May – 2 Jun	North Pakistan and neighbourhood	Do	Eastern parts of Jammu & Kashmir	Moved away on 3 June
(*ii*)	*As induced cyclonic circulations*					
1.	Lower levels	3 – 5	Punjab and adjoining central Pakistan	East	Haryana and neighbourhood	Moved away on 6
2.	Do	4	Central Pakistan and adjoining west Rajasthan	Stationary	*In situ*	Less marked on 5
3.	Do	9 –14	Central Pakistan and west Rajasthan	East	Haryana and adjoining west Uttar Pradesh and Uttarakhand	Less marked on 15
4.	Lower tropospheric levels	17–19	Central Pakistan and adjoining west Rajasthan	Do	Punjab and neighbourhood	Less marked on 20
5.	Do	23 – 26	Haryana and neighbourhood	Quasi-stationary	Haryana and neighbourhood	Less marked on 27

TABLE 4 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
6.	Lower tropospheric levels	30 May – 1 June	Northwest Rajasthan and neighbourhood	East	West Uttar Pradesh and neighbourhood	Less marked on 2 June
(*iii*)	*Troughs in westerlies*					
1.	Mid and upper tropospheric levels	7	Long. 91° E to the north of Lat. 25° N	Stationary	Long. 91° E to the north of Lat. 25° N	Moved away on 8
2.	Lower tropospheric levels	8 – 9	From cyclonic circulation over central parts of Madhya Pradesh to Marathwada	Do	*In situ*	Less marked on 10
3.	Do	8	Sub-Himalayan West Bengal & Sikkim to northwest Bay of Bengal	Do	Do	Less marked on 9
4.	Do	11 – 15	Cyclonic circulation over Sub-Himalayan West Bengal & Sikkim to Odisha across Gangetic West Bengal	Oscillatory	Sub-Himalayan West Bengal & Sikkim to north Bay of Bengal	Less marked on 16. It lay between 2.1 kms & 5.8 kms a.s.l. on 15
5.	Lower levels	21 – 22	From cyclonic circulation over Sub-Himalayan West Bengal & Sikkim to centre of Depression over north Bay of Bengal		Sub-Himalayan West Bengal & Sikkim and neighbourhood to Odisha across Gangetic West Bengal	Less marked on 23
6.	Do	29	From cyclonic circulation over west Uttar Pradesh and adjoining areas of Haryana and east Rajasthan to south Madhya Pradesh	Stationary	*In situ*	Less marked on 30
(**D**)	*Other cyclonic circulations*					
1.	Mid tropospheric levels	2 – 3	South Rajasthan and adjoining Gujarat Region	Stationary	*In situ*	Less marked on 4
2.	Lower tropospheric levels	2	North Haryana and neighbourhood	Do	Do	Less marked on 3
3.	Do	4	Sub-Himalayan West Bengal & Sikkim	Do	Do	Less marked on 5
4.	Lower levels	3 – 10	Southeast Uttar Pradesh and neighbourhood	West	Central parts of Madhya Pradesh	Less marked on 11
5.	Do	8	East Assam and neighbourhood	Stationary	*In situ*	Less marked on 9
6.	Lower tropospheric levels	9 – 14	Sub-Himalayan West Bengal & Sikkim	West	Sub-Himalayan West Bengal & Sikkim and adjoining east Bihar	Less marked on 15. It lay embedded in the trough extended from Bihar to Assam on 9
7.	Lower levels	12	West Uttar Pradesh and adjoining Uttarakhand	Stationary	*In situ*	Less marked on 14
8.	Lower tropospheric levels	13 – 19	Assam & Meghalaya	Do	Do	Less marked on 20
9.	Do	14 – 15	North Rajasthan and neighbourhood	Do	Do	Less marked on 16
10.	Do	14	Southwest Bay of Bengal and neighbourhood	Do	Do	Less marked on 15
11.	Lower levels	15	North Gujarat and adjoining south Rajasthan	Do	Do	Less marked on 16
12.	Mid tropospheric levels	17	Lakshadweep area and neighbourhood	Do	Do	Less marked on 18
13.	Lower levels	18 – 20	Chhattisgarh and neighbourhood	West	Southeast Madhya Pradesh and neighbourhood	Less marked on 21
14.	Do	20 – 24	Sub-Himalayan West Bengal & Sikkim and neighbourhood	Stationary	*In situ*	Less marked on 25. It lay as a trough at 0.9 km a.s.l. extending from Sub-Himalayan West Bengal & Sikkim to Odisha with embedded cyclonic circulation over Odisha on 19

TABLE 4 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
15.	Between Mid & Upper tropospheric levels	22	Lakshadweep and neighbourhood	Stationary	*In situ*	Less marked on 23
16.	Lower levels	23	Nagaland-Manipur-Mizoram-Tripura and adjoining northeast Assam & Meghalaya	Do	Do	Less marked on 24
17.	Lower tropospheric levels	23 – 24	South Chhattisgarh and adjoining Odisha	Northeast	North Chhattisgarh and neighbourhood	Less marked on 25
18.	Lower levels	26 –29	Southwest Rajasthan and neighbourhood	Do	West Uttar Pradesh and adjoining Haryana and east Rajasthan	Merged with the east west trough on 30
19.	Do	28	South Chhattisgarh and neighbourhood	Stationary	*In situ*	Less marked on 29
20.	Between Lower & Mid tropospheric levels	30	Southwest Bay of Bengal and adjoining areas of south Tamil Nadu and Sri Lanka	Do	Do	Less marked on 31
(**E**)	*East–West shear zone/trough*					
1.	Lower levels	9	Bihar to Assam	Stationary	*In situ*	A cyclonic circulation lay embedded over Sub-Himalayan West Bengal & Sikkim on 9. The trough became less marked on 10
2.	Lower tropospheric levels	30 – 31	West Uttar Pradesh to Assam	Do	Do	Less marked on 1 June. A cyclonic circulation extending upto 1.5 kms a.s.l. lay embedded on 30 & 31. It persisted on 1 & 2 and became less marked on 3
(**F**)	*Other Trough / wind discontinuity*					
1.	Lower levels	6	Bihar to Assam & Meghalaya across Sub-Himalayan West Bengal & Sikkim	Stationary	*In situ*	Less marked on 7
2.	Lower tropospheric levels	8 – 9	From low pressure over southeast Arabian Sea off north Kerala coast to southern parts of Maharashtra	West	From low pressure over north interior Karnataka and neighbourhood to Lakshadweep area	Less marked on 10
3.	Lower levels	11 – 13	South Chhattisgarh to Comorin area across Telangana, Rayalaseema and interior Tamil Nadu	Stationary	*In situ*	Less marked on 14
4.	Do	15 – 20	South Chhattisgarh to Rayalaseema	West	Cyclonic circulation over southeast Madhya Pradesh and neighbourhood to Lakshadweep across Telangana, Rayalaseema, south interior Karnataka and Kerala	Less marked on 21
5.	Do	24 – 26	From cyclonic circulation over north Chhattisgarh and neighbourhood to Rayalaseema	Do	From cyclonic circulation associated with well marked low pressure area to south interior Karnataka across Andhra Pradesh	Less marked on 27
6.	Do	27 – 28	Telangana to south Tamil Nadu across Rayalaseema	Oscillatory	South Chhattisgarh to south Tamil Nadu across Telangana and interior Karnataka	Less marked on 29
7.	Do	29	North interior Karnataka to Lakshadweep area across south interior Karnataka	Stationary	*In situ*	Less marked on 30
8.	Do	31 May – 5 Jun	Chhattisgarh to coastal Andhra Pradesh	West	Southwest Madhya Pradesh to north interior Karnataka across Marathwada and south Madhya Maharashtra	Less marked on 6

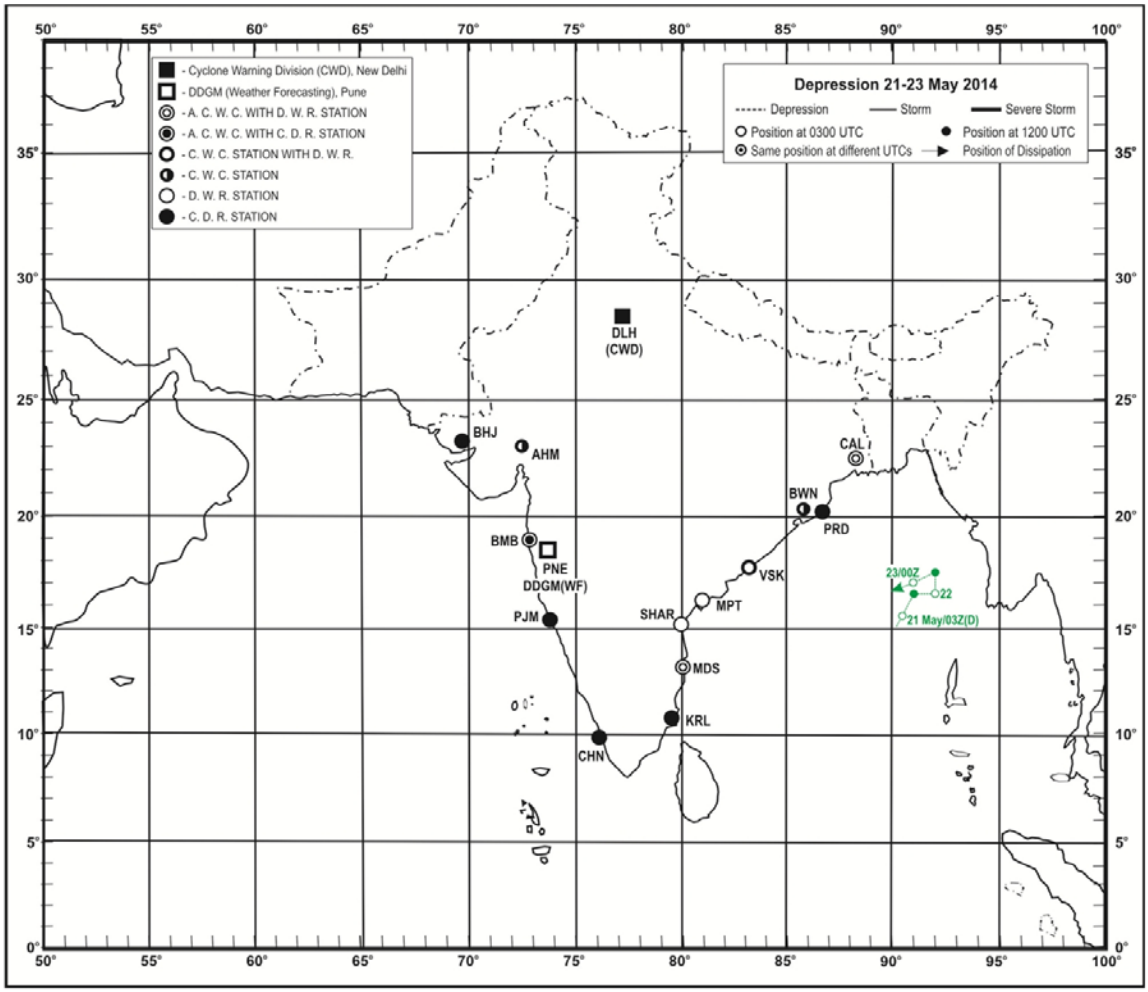

Fig. 2. Track of the Depression during Pre-Monsoon Season 2014

The passage of WDs and induced systems and the presence of warm and moist tropical air in the lower tropospheric levels over the peninsular India led to precipitation in the form of Hailstorms over major parts of the country during the last week of February till the first fortnight of March. The conditions which led to the development of super cell thunderstorms which in turn caused large and thus destructive hailstones to reach the surface over parts of peninsular and adjoining central India are briefly depicted below.

From the last week of February, an anomalously amplified Low Index phase continued in the mid-latitude circulation regime. The resultant strong vertical wind shear and upper level divergence over the Indian region, aided by the presence of warm and moist tropical air in the lower troposphere, created conducive conditions for the development of convective cells. Also, the strong upper level wind associated with the sub-tropical westerly Jet stream caused the Convective Available Potential Energy (CAPE) to be at its maximum and the high Upward Vertical Velocities (UVVs) in the updraft helped the suspended hailstones to grow to a larger size thereby causing unprecedented damage over parts of peninsular and central India. The met-subdivisions, *viz*., Punjab, Haryana, Himachal Pradesh and Uttar Pradesh also witnessed the hailstorm activity at isolated places during the second week of March.

A change over from Low index to High index phase in mid latitude circulation caused reduction in rainfall activity and increase of day maximum temperatures during the later half of March. The subdued easterly waves and the presence of an anticyclone caused the day maximum temperatures to cross the 40 °C mark over the peninsular India towards the end of March.

TABLE 5

Some representative amounts of rainfall in cm for the months March, April and May 2014 (5 cm and above)

Date	March	April	May
1.	Kunda, Soraon, Banda, Phoolpur Alb and Manjhanpur 7 each, Beberu 6, Patti, Sirathu, Metpalli, Pithoragarh, Thenkasi and Pratapgarh T 5 each	Nil	Periyar and Punalur 8 each, Kalingpong and Mettupatti 7 each, Illayangudi and Eraniel 6 each, Kanjirappally, Alappuzha, Kurudamannil, Idukki, Nagercoil, Kudulu, Hadagalli and Sivagiri 5 each
2.	Nadaun 16, Amroha 6, Thiruvananthapuram AP, Sangrur, Nawabganj Tehsil and Satgaon 5 each	Poonampet PWD 7, Uchangidurga 6	Amrapara 12, Rongo 10, Sankalan and Mangan 9 each, Baghdogra AP, Gangtok and Neora 7 each, Damthang 6, Belthangady, Raighar ARG, Vitla ARG, H Dkote, Tadong, Quilandi, Shirali, Bhatkal, Nilkund ARG, Baghmara AWS and Jalpaiguri 5 each
3.	Cheranmahadevi 13, Metpalli and Venkatapuram 6 each, Uttamapalayam and Warangal AP 5 each	Nil	Halli Mysore 8, Jamshedpur, Neyyattinkara and Kamudhi 7 each, Sivagiri and Thuckalay 6 each, Madapur, Kamudhi ARG, Dharwad PTO, Uthagamandalam, Eraniel, Bhagamandala and Navalgund 5 each
4.	Mulug 10, Nanguneri 8, Mednoor and Zalki Cross 7 each, Basawakalyan and Sangareddy 5 each	Cherrapunji 5	Cooch Behar 13, Krishnarajpet, Kudulu, Goalpara AWS, Baruipur AGRO - AWS and Hosdurg 9 each, Goalpara Cwc, Kodavasal, Nelogi, Kamudhi, Falakata and Mylaudy 7 each, Hasimara and Goalpara 6 each, Domohani, Gajoldoba, Peraiyur, Harangi, Rajapalayam, Aie Nh Xing, Jayapura, Subramanya, Kajolgaon AWS, Watrap, Harinkhola Madapur, Periyar, Alipurduar CWC, Majbhat and Dhubri 5 each
5.	Pattamundai 16, Danagadi ARG, Kendrapara, Chandikhol ARG and Dhenkanal 9 each, Derabis ARG 8, Joshipur, Jhumpura and Khandapara 7 each, Joda ARG, Korei ARG and Basudevpur AWS 6 each, Ambabhona, Nayagarh, Bari ARG, Jenapur Srivaikuntam, Thakurmunda, Garadapur ARG and Akhuapada 5 each	Nil	Nedumangad, Kharagpur (I.I.T) and Kalaikunda 8 each, Thrissur, Gohar, Kohima, Nuagada ARG, Vellanikkara and Kuzhithurai 7 each, Sechu AWS, Eraniel, Goalpara and Chandigarh 6 each, Midnapore, Chidambaram AWS, Midnapore CWC, Kanjirappally, Raikia ARG, Vilathikulam, Maharajganj, Mohanpur, Sirkali, Kohima AWS, Chidambaram, Mahabalipuram, Virudachalam, Anaikaranchatram (Kollid), K.M.Koil, Ibrahimpatnam and Enamakkal 5 each
6.	Lonar and Hayyal B 7 each, Bellary AWS, Konni, Raichur and Shorapur 5 each	Nil	Tadong 12, Rongo and Gangtok 9 each, Hosanagar and Mayiladuthurai 7 each, Muthupet 6, Karaikal, K.M.Koil, Ramanathapuram, Sethiathope, Kovilankulam, Cuddalore, Ramtek, Manamelkudi, Karnal Rev and Colachel 5 each
7.	Mettupalayam and R. Udaigiri 10 each, Palakonda 9, Similiguda AWS, Nuagada ARG Begur, Veeragattam and Kashinagar 6 each, Deolgaon Raja, Risod, and Thali 5 each	Pahalgam 7, Kupwara, Kailashahar and Quazigund 6 each, Banihal, Anantnag, Anantnag AWS, Katra and Shopian AWS 5 each	Papanasam 30, Manimutharu u u 27, Ambasamudram 23, Nanguneri 17, Cheranmahadevi 15, Kanyakumari 12, Colachel, Anaikaranchatram (Kollid) and Kamudhi 11 each, Kuzhithurai, Thiruvananthapuram, Cherrapunji, Mylaudy and Aryankavu 10 each, Thenkasi, Nagercoil, Thiruvananthapuram AP, Cherrapunji (Rkm), Chidambaram, Neyyattinkara, Bukkapatna, Pechiparai and Thuckalay 9 each, Kottayam, Sirkali, Srivaikuntam, Palayamkottai, Paramakudi, Kamudhi ARG, Nedumangad, Varkala, Aravakurichi, Teliamura, Karambakudi, Parangipettai and Mulanur 8 each, Kayathar ARG, Kayamkulam Agri, Radhapuram, Sivagiri, Kangeyam, Kollam Rly, Shencottah, Roing, Paramathivelur, Hosanagar Punalur, Chengannur, Pamban, Mawsynram, Bhoothapandy, Chottabekra and Kozha 7 each, Illuppur, Kothagiri, Uttamapalayam, Nalbari / Pagladia, Sankarankoil, Adirampattinam, Silchar, K.M.Koil, Satankulam, Pattukottai, Kodaikanal, Kumarakom, Ghatagaon, B P Ghat, Lakhipur, Manash Nh Xing, Macharla, Alangudi, Arimalam, Kanjirappally, Kayamkulam, Kumargram, Mancompu, Karkala, Denkanikottai, Ottapadiram, Cherthala, Mavelikara and Panbari 6 each, Haflong, Tinsukia, R. Udaigiri, Rayakottah, Amraghat, Aie Nh Xing, Dharapuram, Arantangi, Pudukottai, R. S. Mangalam, Thiruchuzhi, Chatrapatti (Odanchatra), Eraniel, Drf, Melabazar / Matunga, Kalugumalai, Ketti, Marandahalli, Beky Rly.Bridge, Mayiladuthurai, Barpeta, Annapurnaghat, Bahalpur, Perungalur, Srimushnam, Peravurani, Manamelkudi, Pollachi, Tondi, Dholai, Sethiathope,

TABLE 5 (*Contd.*)

Date	March	April	May
			Surangudi, Puttur HMS, Tirupathur, Uthangarai, Itanagar, Kovilpatti, Alappuzha, Ayikudi, Natham, Badatighat, Haflong AWS, Periyakulam and Vilathikulam 5 each
8.	Koratagere, C N Halli and Tumkur 5 each	Batote and Khowai 6 each, Nagarkata, Kurudamannil, Barpathar and Mavelikara 5 each	Chhamonu 25, Kochi AP 19, Panbari 18, Ernakulam South Alathur and Lengpui 17 each, Khowai, Udaipur Enamakkal Gokarna and Ramanathapuram 13 each, Ponnani, Daparijo, Chidambaram, Vaikom, Coonoor and Coonoor PTO 12 each, Aie Nh Xing, Kamudhi, Kanyakumari, Buxaduar, Irinjalakuda, M M Hills, Kayamkulam Agri and Kayamkulam 11 each, Kodavasal, Thrissur and Tiruchendur 10 each, Kollamkode, Mavelikara, Roing, Cherthala, Kunnamkulam, Vadakkancherry, Kodungallur, Kozhikode, Quilandi, Mancompu, Alappuzha, Chalakudi, Jayamkondam and Vellanikkara 9 each, Arundhutinagar, Thoothukudi, Kamudhi ARG, Thrithala, Kozha, Aluva PWD, CIAL Kochi, Miao, Majbhat and Belonia 8 each, Muthupet, Kothagiri, Perambalur, Dillighat, Manash Nh Xing, Dharmanagar / Panisagar, Tiruvarur, Chottabekra, Thiruvidaimaruthur, Kottayam, Aizawal, Kodaikanal, Kailashahar, Kumarakom, Deomali, Jayanti ARG, Surangudi, Melabazar / Matunga, Ottapalam, Beki Mathungari, Sivaganga, Chengannur, Khowang, Matijuri and Rangiya 7 each, Nahar Katia, Kumargram, Thodupuzha, Beky Rly.Bridge, Alangudi, Margherita, Ketti, Mylaudy, Satankulam, K Bridge, Radhapuram, Rongo, Manamadurai, Moranhat, Needamangalam, Uttamapalayam, Pandavaiyar Head, Barpeta, Tirupuvanam, Barobhisha, Ulundurpet, Trichy town, Passighat, Pattambi, Barpeta / Sarbhog AWS, Mannargudi, Thuraiyur, Peermade To and Adirampattinam 6 each, Thiruthuraipoondi, Baghdogra AP, Nanguneri, Uthagamandalam, Chepan, Manimutharu u u, Vedaranniyam, K. M. Koil, R. S. Mangalam, Sonamura, Pamban, Annapurnaghat, Mudukulatur, Karipur, Karimganj, Valangaiman, Tawang AWS, Perumpavur, Drf, Itanagar, Kadaladi, Tiruchirapalli AP, Nannilam, Silchar, Gossaigaon AWS, Perungalur, Virudachalam, Devakottai, Hirekerur, Khanapur, Nalbari / Pagladia, Chettikulam, Illayangudi, Lalgudi, Marakkanam, Hangal, Konni, Bahalpur, Gossaigaon, Agartala AP, Madurai South, Sethiathope, Tadong, Kumbakonam, Tezu, Arantangi, Srivilliputhur, Kirwati and Manjeri 5 each
9.	Jabot 9, Boath and Indi 7 each, Utnoor 6, Kaladgi, Korpana and Kuknoor 5 each	Cherrapunji 17, Cherrapunji (Rkm) 12, Kozhikode, Kurudamannil and Rangiya 7 each, Konni 6, Amraghat, Beky Rly.Bridge and Mudigere 5 each	Thalasserry and Panbari 21 each, Mattanur 20, Barpeta 19, Kalasa 18, Beky Rly. Bridge and Angadipuram 17 each, Perinthalamanna 16, Irikkur, Vadakara, Barpeta / Sarbhog AWS and Kottigehara 15 each, Nalbari / Pagladia, Vythiri and Kannur 14 each, Thrissur, Guttal and Aie Nh Xing 13 each, Taliparamba, Cheruthazham, Virajpet, Bhagamandala, Balehonnur, Napoklu and Tezu 12 each, Cherrapunji, Sandur, Thrithala, Manash Nh Xing, Majbhat, Itanagar, K Bridge, Roing and Pookot 11 each, Rangiya, Ketti, Matijuri, Vellanikkara, Devala and Medikeri 10 each, Aluva PWD, Mudigere, Harangi, Ranebennur Hos, Quilandi, Pattambi, Badatighat, Nilambur, Poonampet PWD, Karipur, Mulki, Namsai, Mani, Vitla ARG, Panambur, Colachel, Sulya and Tavaregere 9 each, Agartala AP, Deodurg, Mananthavady, Kota, Puttur HMS, Kushal Nagar, Annapurnaghat, Udaipur, Channagiri, Belthangady, Dharmasthala, Cherrapunji (Rkm), Pechiparai, Manjeri, Subramanya, Navalgund, Sringeri HMS, Munirabad ARG, Madapur, Nargund, Mangalooru, Khowang, Holalkere, Gangavati HMS, Agumbe, Shivani and Chickmagalur 8 each, Bhadravati, Davangere, Buxaduar, Coonoor, Coonoor PTO, Drf, Hayyal B, Ajjampura R, Uchangidurga, Kothagiri, Sakleshpura, Nagercoil, Tinsukia, Uppinagadi, Kudulu, Karkala, Kuzhithurai, Hosanagar, Jayanti ARG, Santebennur, Tarikere, Dholla Bazar, Karimganj, Koppal PTO, Kirwati, Koppal R, Arasalu, Badami, Mangalooru AP, Hubli R, Dibrugarh AP, Kozhikode, Yellapur, Dharmanagar / Panisagar, Shadnagar, Bantwal, Hulikal ARG, Kodungallur, Puthimari and Vengurla 7 each, Udupi, Hunchadakatte, Hasimara, Uthagamandalam, Rampura, Jayapura, Moranhat, Manki, Dharwad PTO, Honnali, Koppa, Lakhipur, B. Durga, Tezpur, Bhatkal Silchar, Thuckalay, Guledgund, Mudagal, Nanjangud, Dhekiajuli, Marungapuri, Naduvattam, Nedumangad, Beki Mathungari, CIAL Kochi, Ramdurga, Mudubidre, Hadagalli, Kadur, Tentulikhunti ARG, Mannarkad, Perumpavur, Pargi, Periyapatna, Yegati, Mohanbari AWS, Almel ARG, Idukki, Shirali, Belur, Mylaudy, Jagalbet, Medak, Metpalli, Jalahalli, Lingasuguru and Enamakkal 6 each, Vikarabad, Chittapur, Kunnamkulam, Kalwakurthi, Karwar, Kampli, Papanasam, Ernakulam South, Melabazar / Matunga, Shorapur, Sindgi, Begur, Ponnani, Somwarpet T.O., N. Lakhimpur, Shikaripur, Kamardi, Eraniel, Bailhongal, Thirthahalli, Mahbubabad, Mednoor, Nagarkurnool, Kakkeri, Honakere, Punalur, Bagewadi, Davangere PTO, Devara Hippargi, Jia Bharali N T Xing, Gorsoppa, Ambalavayal, Mawsynram, Bishalgarh, Kadra, Kerur, Hagaribommanahalli, Kuknoor, Ponda, Rayadurg, Gokarna, Lingadahalli, Srirangapatna, Miao, Jagtial, Arundhutinagar, Narayanpur HMS, Chitradurga, Margao, Chevella, Siddapura, Thiruvananthapuram AP, Holalur,

TABLE 5 (*Contd.*)

Date	March	April	May
			Konanur, Hosdurg, Kollur, Sravanabelagola, Manvi, Bevoor, Bydgi, Sedam, Mangaldai AWS, N R Pura, Khanapur, Nuggehalli, Marmugoa, Bhoothapandy, Chalakudi, Bagalkote, Yalburga, Yaragatti, Asifabad and Lokapur Phc 5 each
10.	Shalimar AGRO and Luxettipet 6 each, Parbhani, Banihal, Srinagar, Pahalgam and Chandrapur 5 each	Rapur and Pamidi 6 each, Gooty 5	Cherrapunji 37, Cherrapunji (Rkm) 31, Mawsynram 29, Karimganj 22, Dholai 19, Tadepalligudem and B P Ghat 17 each, Tezu 16, Amraghat and Kakinada 15 each, Nuzvidu 14, Matijuri 13, Silchar 12, Mangalgiri, Tanuku, Kaikalur, Gudivada, Koderu and Rajahmundry 11 each, Koyyalagudem, and Annapurnaghat 10 each, Paderu, Narsapur, Dharmanagar / Panisagar, Peddapuram, Narasapur AP, Peddapuram AP, Namsai, Vijaywada AP, Kothagudam and Mahbubabad 9 each, Chottabekra, Roing, Yellamanchili, Yellandu, Polavaram, and Khowang 8 each, Majbhat, Tuni, Eluru, Tinsukia, Nandigama, Chintapalli and Visakhapatnam 7 each, Anakapalli, Guntur, Bhimavaram, Chintalapudi, Vijayanagaram, Dummugudem, Jia Bharali N T Xing, Harabhanga, Amalapuram and Atchempet 6 each, Bhimunipatnam, Madhira, Nahar Katia, Visakhapatnam AP, Melur, Lakhipur, Moranhat, Mahabaleshwar*, Malkangiri, Narsampet, Kalwakurthi, Chodavaram, Cheepurupalli, Bhimadole, Paralakhemundi, Hanamkonda, Suryapet, Dholla Bazar and Palakonda 5 each
11.	Banihal 8, Jubbal 6, Srinagar, Batote, Shalimar AGRO, Baderwah, Manali, Tissa, Anantnag, Quazigund, Kupwara and Kheri 5 each	Tuting 6	Mawsynram 30, Cherrapunji 23, Namsai 21, Cherrapunji (Rkm) 19, Annapurnaghat 14, Chottabekra 11, Silchar and Silchar AP 10 each, Kailashahar and Roing 9 each, Amraghat 8, Dudda 7, Lakhipur and Itanagar 6 each, Tezu, Haflong, Along AWS, Bari ARG and Shirhatti 5 each
12.	Pahalgam 13, Batote 12, Udhampur IAF and Banihal 11 each, Anantnag 9, Quazigund, Awantipur IAF, Kukernag and Rambagh AWS 8 each, Shalimar AGRO, Katra, Baderwah and Anantnag AWS 7 each, Belawadi, Srinagar and Taoru 6 each, Saloni, Srinagar IAF, Kheri and Dalhousi Alha AWS 5 each	Nil	Roing 17, Bagrakote 15, Murti and Dhubri 13 each, Dhubri CWC, Cooch Behar and Neora 11 each, Chepan, Sevoke, Chengmari / Diana and Belonia 10 each, Tuting and Hasimara 9 each, Rongo, Alipurduar CWC and Nagarkata 8 each, Williamnagar, Passighat, Lengpui, Ketti and Barobhisha 7 each, Beky Rly.Bridge, Uthagamandalam, Mawsynram and Cherrapunji (Rkm) 6 each, Buxaduar, Periyapatna, Williamnagar AWS, Saiha AWS, Mangan and Cherrapunji 5 each
13.	Harran AWS, Kheri and Malangpura AWS 6 each	Chengannur and Chandanpur 6 each, Araku Valley, Enamakkal and Perinthalamanna 5 each	Williamnagar 22, Gossaigaon and Cherrapunji 9 each, Gossaigaon AWS and Cherrapunji (Rkm) 8 each, Dibrugarh AP, Kamalpur, Kamalpur AWS, Mohanbari AWS and Kokrajhar 7 each, Lunkaransar, Moga, Uttamapalayam, Lengpui, Tinsukia, Malsisar, Dharampur and Samayapuram 6 each, Shahpur Kandi, Malakpur, Roing, Chepan, Long Islands, Dalhousi Alha AWS, Khowang, Palacode, Annapurnaghat, Tehri CWC, Loharu, Saloni, Barobhisha, Gharmura, Nahar Katia, Tuting, Majbhat, Tezu and Silchar 5 each
14.	Nil	Daringibadi and Kashinagar 5 each	Vedasandur7, Passighat 6, Cherrapunji, Tinsukia and Rongo 5 each
15.	Nil	Kurudamannil, Quilandi, Kanjirappally and Napoklu 5 each	Tuting 15, Haflong 11, Chauldhowaghat 10, Haflong AWS and Dhemaji AWS 7 each, Karimganj and Vallabhnagar 5 each
16.	Nil	Nil	Tuting 8, N. Lakhimpur and Pedong 7 each, Majitar and Dhemaji AWS 6 each, Khanitar, Chauldhowaghat and Rongo 5 each
17.	Nil	Kosagumda 6, Mavelikara 5	Jia Bharali N T Xing 8, Lodhika and Lodhika ARG 6 each, Majbhat and Gangtok 5 each
18.	Banihal, Dalhousi Alha AWS, Tissa, Gohar, Jogindarnagar, Manali, Kupwara and Batote 5 each	Thiruvananthapuram AP 6, Seoni and Seoni – AWS 5 each	Chepan 6, Kokrajhar, Car Nicobar, Rongo, Car Nicobar IAF and Sravanabelagola 5 each
19.	Nil	Hassan 14, Ketti and Baderwah 8 each, Dalhousi Alha AWS, Kapurthala	Khandapara 8, Williamnagar 7, Jagdalpur 6, Bolagarh ARG 5

TABLE 5 (*Contd.*)

Date	March	April	May
		AWS, Alur, Phangota and Batote 7 each, Chamba, Saloni and Dharmasala 6 each Nagrarfort, Banihal, Chamba AWS, Halli Mysore, Tarantaran AWS, Kangra AP, Mukerian, Palampur, Ranjit Sagar Dam Site, Moga AWS, Shahpur Kandi, Nagrota Surian and Tissa 5 each	
20.	Rayagada 10	Arsikere R 7, Khajuri 5	Panbari 14, Pernem 12, Ramdurga and Car Nicobar 10 each, Gokarna 9, Nh31 Bridge, Begur and Ranipool 8 each, Punalur and Barobhisha 7 each, Canacona, Dharwad PTO, Dodamarg and Saundatti S.F. 6 each, Bailhongal, Car Nicobar IAF, Alipurduar CWC, Parkal, Navalgund, Belgaum (Sambra), Hut Bay, Mathabhanga, Bijapur, Jalpaiguri, Mekhliganj ARG, Domohani and Ranebennur Hos 5 each
21.	Thenkasi, Kottayam and Kanjirappally 7 each, Piravam 6, Periyakulam, Mancompu and Bodinaickanur 5 each	Jaswantpura and Tuting 6 each, Kotda and Gandhinagar 5 each	Uthangarai 13, Panbari, Beki Mathungari and Cherrapunji 12 each, Chatrapatti (Odanchatra) 10, Madhugiri and Cherrapunji (Rkm) 9 each, Chintamani and Kumargram 8 each, Penukonda and Chungthang 7 each, Suttur AWS, Sankalan, Madakasira and Koratagere 6 each, Trichy town, Kallakkurichchi, Kallakurichi ARG, Anjatti, Chintamani PTO, Ramanagara, Car Nicobar IAF, Melabazar / Matunga, N. Lakhimpur, Beky Rly.Bridge, Kanjirappally and Nanjangud 5 each
22.	Nil	Nil	Gokarna 14, Pochampalli 10, Melabazar / Matunga and Lokapur Phc 9 each, Aluva PWD, Sattur and Williamnagar 7 each, Shoolagiri, Canacona, Kanjirappally, Chengmari / Diana, Kumta Seppa, Chauldhowaghat and Panbari 6 each, CIAL Kochi, Chandgad, Passighat, Uthangarai, Lakshmeswar, Chepan, Itanagar, N. Lakhimpur, Barpeta, Drf, Williamnagar AWS, Marandahalli and Haripad 5 each
23.	Nil	Nil	Krishnagiri 10, Barobhisha and Alipurduar CWC 9 each, Gossaigaon and Gossaigaon AWS 8 each, Ranipool, Cherrapunji (Rkm), Mawsynram and Tadong 7 each, Penucondapuram and Cherrapunji 6 each, Barur, Ravangla ARG, Sravanabelagola, Kumargram, Dharmapuri and Dharmapuri PTO 5 each
24.	Sriganganagar Tehsil 6, Ganganagar 5	Alappuzha 6	Nuagada ARG 6, Car Nicobar IAF, Rayakottah, Marandahalli, Kamatchipuram, Gangtok, Tozhudur, Gossaigaon and Jalpaiguri 5 each
25.	Dalhousi Alha AWS 6, Kheri, Williamnagar, Saloni and Chamba 5 each	Paderu 5	Lengpui 8, Belonia, Mayanur and Krishnagiri 7 each, Colachel and Samayapuram 6 each, Padalur, Perambalur, Attur and Mahanga ARG 5 each
26.	Nil	Silchar AP 5	Kalingapatnam 23, Balasore and Gunupur 21 each, Nh5 Gobindpur, Tekkali, and Paralakhemundi 20 each, Pathapatnam, Kashinagar and Pattamundai 19 each, Nuagada ARG 17, Soro, Mahendragarh and Tihidi ARG 16 each, Contai, Pipili and Palakonda 15 each, Dhamnagar ARG, Bhubaneshwar AP, Digha, R.Udaigiri and Cuttack 14 each, Tirtol ARG, Basudevpur AWS and Niali ARG 13 each, Mahanga ARG, Khandapara, Bonth, Nilgiri, Kotraguda and Athgarh 12 each, Veeragattam; Bissem -Cuttack, Muniguda ARG, Betanati ARG, Jagatsinghpur AWS, Raghunathpur ARG, Salepur ARG, Nischintakoili ARG, Bhadrak AWS and Sompeta 11 each, Itanagar, Parvatipuram, Bari ARG and Tikabali 10 each, Binjharpur ARG, Rayagada, Komarada;Akhuapada, Banki ARG, Chandikhol ARG, Digapahandi ARG, Satyabadi ARG, Purushottampur, Motihari, Bagrakote, Balikuda ARG, Palasa, Jaley, Brahmagiri AWS, Derabis ARG, Gudari and Sorada 9 each, Chandbali, Kendrapara, Bhograi, Miryalguda, Mohana, Dhenkanal, Tangi, Tigiria ARG, Jenapur and Kashipur 8 each, Banarpal ARG, Jaipur, Balipatna ARG, Madhabarida, Anandpur, Thakurmunda, Pali, Gopalpur, Itchapuram, Balimundali, Bolagarh ARG, Hindol, Jajpur, Kajolgaon AWS, Bobbili, Danagadi ARG, Puri, Daringibadi, Cheepurupalli, and Marsaghai ARG 7 each, Aska, Gop, Rajkanika, Sathenapalli, Balumath, Berhampur, Mandasa, Banpur, Rajghat, Kotagarh, Krishnaprasad, Narsinghpur, Angul, Belaguntha ARG, Chhatrapur, Kamakhyanagar, Parjang ARG, Talcher and Macharla 6 each, Nayagarh, Baripada, Gossaigaon, Bhanjnagar, Gossaigaon AWS, Bhuban ARG, Kantapada ARG, Raikia ARG, Jagannath Prasad ARG, Ranpur, Barobhisha, Remuna ARG, Rangiya, Mekhliganj ARG, Karimnagar and Salur 5 each
27.	Nil	Nil	Kesinga ARG and Titlagarh 28 each, Bhavani P. 26, Khariar and Rajmahal 25 each, Komna 23, Junagarh 22, Patnagarh 19, Belpada ARG and Khaprakhol ARG

TABLE 5 (*Contd.*)

Date	March	April	May
			18 each, Chandanpur and Paikmal 17 each, Padampur 16, Narla ARG, Balasore and Pattamundai 15 each, Loisingha ARG, Saintala ARG, Ambabhona and Lanjigarh 14 each, Bolangir, Nh5 Gobindpur, Tarva ARG and Jharbandh ARG 13 each, Dumri, Kantamal, Bhagalpur and Sabour 11 each, Tenughat, Sonbarsa, Betanati ARG, Banki ARG, Godda, Kotraguda and Ratua ARG 10 each, Dharmagarh ARG, Jajpur, Ballia, Muniguda ARG, Nilgiri, Belsand and Tigiria ARG 9 each, Banka, Hiranpur, Durgachak, Samakhunta AWS, Korei ARG, Tikabali, Bangiriposi, Rajkanika, Akhuapada, Remuna ARG and Rajghat 8 each, Madanpur Rampur, Udala, Ghatsila, Bonth, Gaisilet ARG, Boden ARG, Kaptipada ARG, Thakurmunda, Manihari, Valangaiman, Dhamnagar ARG, Nawapara, Joshipur, Sinapali ARG, Bokaro, Motihari, Mohanpur, Tihidi ARG, Perambalur and Jaipur 7 each, Baripada, Bissem-Cuttack, Basudevpur AWS, Anandpur, Parjang ARG, Dunguripalli, Karanjia, Kashipur, Champua, Turekela, Kumbakonam, Giridih, Bargarh and Jarmindi 6 each, Dibrugarh AP, Karimganj, Kalaikunda, Derabis ARG, Garadapur ARG, Kendrapara, Tirtol ARG, Mohanbari AWS, Jaleswar, Pallahara, Talcher, Hazaribagh, Barkisuriya, Jhajha, Ramgarh, Danagadi ARG, Kolkata, Tirupuvanam, Sethiathope, Balimundali, Bhadrak AWS, Sohela, Soro, Sundargarh, Swam-Patna, Birmaharajpur ARG, Papanasam, Kharagpur (I.I.T), Jenapur, Grand Anaicut, Topchanchi, Tinsukia, Tiruvaiyaru, Kuru, Parbatta, Malda, Chatia, Maheshpur, Chandikhol ARG, Hemgiri and Tilaiya 5 each
28.	Nil	Shikaripur 6, Hosanagar and Balehonnur 5 each	Monghyr 23, Sahebpur Kanal 21, Madhipura 19, Barhiya 18, Manihari, Katihar and Barkisuriya 17 each, Murliganj 16, Udai Kishanganj 15, Kodawanpur / C.Bii 14, Tenughat and Madhupur 13 each Bihar Shrif, Barbigha, and Tilaiya 12 each, Mehgawan, Sheikhpura, Godda, Chintamani and Chatra 11 each, Bhograi, Sapaul, Saraiya and Koratagere 10 each, Bhimnagar, Kursela, Darjeeling, Chintamani PTO, Passighat and Purnea 9 each, Pathargama, Koner, Wanaparthi, Jarmindi, Dumri, Forbesganj, Sirmari B. Pur, Canning Town, Garhi and Araria 8 each, Bhagalpur, Williamnagar, Topchanchi, Banka, Hasanpur, Mawsynram, Rajdhanwar, Nirmali, Chapra, Indrapuri, Kuppam, Madhugiri, Rayalpadu, Baghdogra AP, Tundi, Pattamundai, Galgalia and Phulparas 7 each, Hunterganj, Tikrikilla, Ambabhona, Deoghar, Hisua, Mohanpur, Cherrapunji (Rkm), Minapur, Parbatta, Vaniaymbadi, Chilamattur, Sukiapokhri, Namsai, Barhi, Bijepur and Balumath 6 each, Gaya AP, Kalingpong, Denkanikottai, Thippagondanahalli, Devanhalli, Sabour, Atmakur, Jhajha, Pulivendla, Jia Bharali N T Xing, Dhanbad, Achampet, Panbari, Tekari, Maddur, Soreng ARG, Dudda, Melalathur, Barrackpur IAF, Vaishali, Dhubri CWC, Mehbubnagar, Jaley, Basaralu, Dibrugarh AP, Hesaraghatta ARG, Hessarghatta and Purulia 5 each
29.	Nil	Jhorigam ARG 6, Napoklu and Udala 5 each	Dharapuram and Mawsynram 16 each, Panbari 15, Jalpaiguri, Thakurganj, Domohani and Cherrapunji (Rkm) 14 each, Vedasandur, Gossaigaon and Purnea 13 each, Gossaigaon AWS 12, Barobhisha, Bagrakote and Palakkad 11 each, Gajoldoba, Nagarkata, Nh31 Bridge, Falakata, Chargharia,, Vadakkancherry and Kumargram 10 each, Murti, Chittur, Goalpara, Kunnamkulam, Dinhata ARG, Cherrapunji, Chepan, Minicoy, Neora, Mettupatti and Goalpara AWS 9 each, GoalparaCwc, Rongo, Mathabhanga, Chengmari / Diana, Cooch Behar and Alipurduar CWC 8 each, Kuppady, Siliguri ARG, Alathur, Puttur HMS, Hasimara, Champasari, Kokrajhar, Sevoke, Baghdogra AP, Pedong, Sabroom and Usilampatti 7 each, Aruppukottai, Salur, Kollamkode, Galgalia, Dhubri CWC, Baruipur AGRO - AWS, Namsai, Udumalpet, Kovilankulam, Nuggehalli, Kajolgaon AWS, Ambalavayal, Tiruppur and Kothagiri 6 each, Sravanabelagola, Gokulpur AWS, Ranipool, Sankalan, Diamond Harbour, Udaipur, Buxaduar, Sulya, Jia Bharali N T Xing, Kursela, Barpeta, Jayanti ARG, Manash Nh Xing, Aie Nh Xing, N. Lakhimpur, Chungthang, Igatpuri, Dhubri, Araria, Sholavandan, Virudhunagar, Chitradurga, Kangeyam, Erode, Kadaladi, Vallam, Basaralu and Tarikere 5 each
30.	Nil	Agumbe 9, Vitla ARG and N R Pura 7 each, Haveri APmc and Thyagarathi 6 each, Hangal, Haveri PTO and Shiralkoppa 5 each	Itanagar 12, Jia Bharali N T Xing 10, Chottabekra 9, N. Lakhimpur and Dholai 7 each, Thali, Mysore, Matijuri and Lakhipur 6 each, Amraghat and Bhalukpong 5 each
31.	Tezu 6, Along AWS 5	Nil	Agartala AP 8, Hiranpur and Maheshpur 7 each, Kodawanpur / C.Bii, Bishalgarh and Bankura CWC 6 each, Tandur, Chickmagalur, Arundhutinagar, Amrapara, Tekari, Thali, Rattihalli ARG and Hiriyur HMS 5 each

3.1.2. *Temperature distribution*

(a) *Minimum temperatures*

Cold wave and *cold day* conditions prevailed one day each over Madhya Maharashtra and over Konkan & Goa respectively.

Night temperatures generally remained *normal to appreciably below normal* over most parts of India during the first two weeks of the month because of passage of series of western disturbances and widespread thunderstorm/hailstorm activity over central and peninsular India. This activity remained confined to northern and eastern parts of India which resulted in the rise in night temperatures which remained *normal* to *above normal* over most parts and *appreciably above normal* over northeastern parts towards the end of the month.

The month's and the season's lowest minimum temperature over the plains was 4.8 °C, recorded at Amritsar (Punjab) on 2 March, 2014.

(b) *Maximum temperatures*

Severe heat wave conditions prevailed on one day over Gangetic west Bengal and *heat wave* conditions prevailed on 1 to 3 days over Gangetic West Bengal, Odisha and Coastal Andhra Pradesh.

The continuation of rainfall/hailstorm activity over major parts of the country kept the day maximum temperatures *below normal* over most parts of the country outside northeastern states and coastal & northwestern parts during the initial half of March. As this rainfall activity reduced, the day maximum temperatures increased over central and western parts of India and as the easterly wave subdued, the day maximum temperatures crossed the 40 °C mark over the south peninsular India towards the end of the month.

Day temperatures were *appreciably below to markedly below normal* for most of the days during the first half of the month over most parts of the country outside northeastern parts where it remained *above normal*. The subdued rainfall/convective activity during the second half led to rise in day temperatures to be *above normal* over most parts outside parts of western Himalayan region where it was *below normal* owing to the continued passage of western disturbances.

The month's highest maximum temperature was 43.5 °C, recorded at Bhira (Konkan & Goa) on 30 March, 2014.

3.1.3. *Disastrous weather events and damage*

According to media and other disaster reports, avalanche/Landslide and snowfall related incidents claimed 17 lives in Jammu & Kashmir. Thunderstorm/lightning/squall/hailstorm and rain related incidents claimed 28 lives in Maharashtra, 15 in Karnataka, 10 in Andhra Pradesh, 4 in Meghalaya and 3 in West Bengal. Apart from loss of lives, the hailstorm activity left damaged agriculture crops in 57217 hectares and 28000 hectares of horticulture, 1400 livestock and 500 houses in Andhra Pradesh whereas harvested crops and standing crops over more than 800 acres in 15 villages, several houses and communication systems were damaged in Karnataka. In Maharashtra, hailstorm affected 29 districts and damaged crops in13 lakh hectares.

3.2. *April*

3.2.1. *Weather and associated synoptic features*

The details of the weather systems during the month are given in Table 3 and the principal amounts of rainfall are given in Table 5.

Perturbations in mid latitude westerlies caused *scattered to fairly widespread* precipitation with heavy falls at isolated places over parts of western Himalayan region and *isolated/ fairly widespread* rainfall over parts of northeastern states all through the month. The presence of north-south trough/wind discontinuity and confluence of winds in the lower tropospheric levels caused thundershowers at *isolated* to *scattered* places over south peninsular and central parts of India towards the latter half of April.

3.2.2 *Temperature distribution*

Severe Heat wave conditions prevailed on one day each over Assam & Meghalaya (Guwahati recorded an all time high of 40.6 °C on 24th April, 2014. Past record was: 40.1 °C on 17th April 1999 & 40.3 °C on 1st May, 1960) and Gangetic West Bengal. Heat wave conditions prevailed on 7 days over Gangetic West Bengal and on 1 to 3 days over Arunachal Pradesh, Assam & Meghalaya, Odisha, Bihar, west Rajasthan, Gujarat state and Vidarbha.

Hot Day conditions prevailed on one day each over west Rajasthan, Gujarat State and Konkan & Goa.

Occurrence of *fairly widespread* precipitation over the western Himalayan and adjoining regions and convective rainfall activity over peninsular and central parts of India kept the day temperatures at *near normal*

values for most of the days over major part of India except for first few days when the isotherm of temperatures higher than 40 °C was seen over south peninsula and adjoining central India during the first week. This temperature trend continued during the second and a few initial days of third week as well. However, a few subdivisions in the east and northeast India showed *appreciably to markedly above normal* day temperatures. From the later part of third week, the lull in the passage of disturbances in the westerlies caused the increase in day temperatures which then rose to above *normal* values over northwest and central India.

The month's highest maximum temperature over the plains was 46.8 °C recorded at Barmer (West Rajasthan) on 29 April, 2014.

3.2.3. *Disastrous weather events*

According to media and other disaster reports, Thunderstorms /lightning/hailstorm/rain related incidents claimed 40 lives in Karnataka, 9 in West Bengal, 7 in Maharashtra, 5 each in Bihar and Gujarat, 3 each in Andhra Pradesh, Karnataka, Rajasthan and Tamil Nadu and 1each in Tripura and Kerala. Heat wave claimed 4 lives in West Bengal and 1 in Odisha. Hailstorm related incidents displaced 200 families and damaged 1200 houses fully/partially in Tripura. Dust-storm in Uttar Pradesh claimed 27 lives and damaged electric poles and houses.

3.3. *May*

3.3.1. *Weather and associated synoptic features*

(a) *Advance of southwest monsoon*

During 17 - 18 May, an easterly wave trough embedded in the northern hemispheric equatorial convergence zone developed into a cyclonic circulation over south Andaman Sea and neighbourhood. Associated with this, the low level cross equatorial monsoon flow strengthened over the region resulting in the advance of southwest monsoon over most parts of Andaman Sea and some parts of southeast Bay of Bengal on 18th May and remaining parts of Andaman Sea, some more parts of southeast Bay of Bengal and some parts of southwest and east central Bay of Bengal on 19th. Thus, the southwest monsoon current reached over south Andaman Sea 2 days before normal date of 20th May. It further advanced into remaining parts of southeast Bay of Bengal, some more parts of southwest and east central Bay of Bengal and some parts of west central and northeast Bay of Bengal on 23rd May. Pre-dominance of the mid-latitude westerly regime and large scale subsidence over the Arabian Sea caused a hiatus in the further advance of monsoon till end of May.

(b) *Other synoptic features and rainfall*

The details of weather systems during the month are given in Table 4 and the principal amounts of rainfall are given in Table 5.

During the first half of May, the formation of a well marked low pressure area over Comorin area and neighbourhood and stronger than normal easterlies over south peninsular India region, the presence of north-south/wind discontinuity and consecutive passage of systems in westerlies caused widespread rainfall over most parts of India. The formation of depression during 21-23 May over east central Bay of Bengal; its *in-situ* weakening and movement of the remnant low pressure area caused *scattered* to *fairly widespread* rainfall over northeastern states of India.

3.3.2. *Temperature distribution*

Severe Heat wave conditions prevailed on one day each in Gangetic West Bengal, Odisha and Bihar. *Heat wave* conditions prevailed on 8 to 9 days in some parts of Gangetic West Bengal and Odisha; 5 to 7 days in some parts of Bihar, west Rajasthan, Vidarbha and Coastal Andhra Pradesh and on one to three days in Uttar Pradesh, Haryana, east Rajasthan, Madhya Pradesh and Saurashtra & Kutch.

The day temperatures were in general *appreciably* to *markedly above normal* over eastern parts and *appreciably* to *markedly below normal* over north India outside central and peninsular India where *near normal* temperatures prevailed.

The month's as well as the season's highest maximum temperature of 47.2 °C was recorded at Barmer (west Rajasthan) on 28 May, 2014.

3.3.3. *Disastrous weather events and damage*

According to media and other disaster reports, Thunderstorm / lightning / heavy rain / floods / Landslide/ squall related incidents claimed 36 lives in Karnataka, 23 in Andhra Pradesh, 14 in West Bengal, 12 in Assam, 11 in Tamil Nadu, 10 in Maharashtra, 9 each in Odisha & Haryana, 8 in Kerala, 7 in Jharkhand and 6 in Uttar Pradesh. *Severe heat wave*/*Heat wave conditions* claimed 46 lives in Odisha.

Appendix

Definitions of the terms given in '*Italics*'

Temperatures

(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.

(b) *Minimum/night temperatures*

Severe cold wave conditions Departure of WCTn from normal minimum temperature is –7° C or less for the regions where normal minimum temperature is > 10° C and –6° C or less elsewhere.

Cold wave conditions - Departure of WCTn from normal minimum temperature is from –5° C to –6° C where normal minimum temperature is ≥10° C and from –4° C to –5° C elsewhere.

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

Cold Day conditions - Maximum day temperature is less than 16° C over the plains.

Markedly below normal - Departure of minimum temperature from normal is from –5° C to –6° C for the region where the normal minimum temperature is 10° C or more and from –3° C to –4° C elsewhere.

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.

Below normal - Departure from normal is –2° C.

Normal - Departure from normal is +1° C to –1° 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.

Above normal - Departure of minimum temperature from normal is + 2° C.

Rainfall

Excess - Percentage departure from normal is + 20% or more.

Normal - Percentage departure from normal is +19% to –19%.

Deficient - Percentage departure from normal is –20% to –59%.

Scanty - Percentage departure from normal is –60% to –99%.

Extremely heavy rain - Rainfall amount 24.5 cms and above.

Very heavy rain - Rainfall amount from 12.5 cms to 24.4 cms.

Heavy rain - Rainfall amount from 6.5 cms to 12.4 cms.

Heavy snowfall - 35.6 cm to 64.4 cm.

At most places (widespread) - 76% or more stations of a meteorological sub-division reporting at least 2.5 mms rainfall.

At many places (Fairly widespread) - 51% to 75% stations of a meteorological sub-division reporting at least 2.5 mms rainfall.

At a few places (Scattered) - 26% to 50% stations of a meteorological sub-division reporting at least 2.5 mms rainfall.

At isolated places (Isolated) - 25% or less stations of a meteorological sub-division reporting at least 2.5 mms rainfall.