

Weather in India

WINTER SEASON (January-February 2016)†

1. Introduction

The winter season comprising January & February of 2016, in general had been mild in terms of temperature realized over major parts of India. Except a brief spell of *severe cold wave / cold wave & cold day** occurrence over parts of northwest, central and adjoining east India during 22nd - 26th January, major part of the season witnessed *above normal* night & day temperatures.

With the shift of the Inter Tropical Convergence Zone towards the equator resulting in a consistent reduction in rainfall, the northeast monsoon rains had ceased over Tamil Nadu, Kerala and adjoining parts of Andhra Pradesh and Karnataka on 7th January, 2016. Subsequently the easterly wave activity over the Indian region also remained subdued other than the periods *viz.*, 17-22 January, 11-12 February and 26-29 February. during which the troughs in easterlies caused moisture incursion and convective rainfall events over parts of south peninsula.

The mid-latitude westerly regime remained in the High index phase during major part of the season. As a result, though the frequency of Western Disturbances (WDs) affecting the northern latitudes remained high (as is evident from Tables 2 & 3), the precipitation realized from these systems had been subdued. In this flow regime also there was a brief period in which the Low index phase caused a large amplitude trough in the mid-latitude westerlies to interact constructively with an easterly wave trough resulting in precipitation (including isolated Hailstorms) over parts of central, north & east India during 16th - 20th January.

This winter, the core of Sub-Tropical Westerly Jet (STWJ) was seen oscillating between a wide range of Latitudes, *viz.*, 09° N and 34° N. However, owing to the reasons specified above, the cumulative rainfall remained below normal over major parts of the country outside some sub-divisions of peninsular and northeast India which received *excess/normal* rainfall.

Stable atmospheric conditions often caused prevalence of dense to very dense Fog over parts of northern plains nearly all through the month of January and early part of February.

**Definitions of terms in italics other than sub-titles are given in Appendix*

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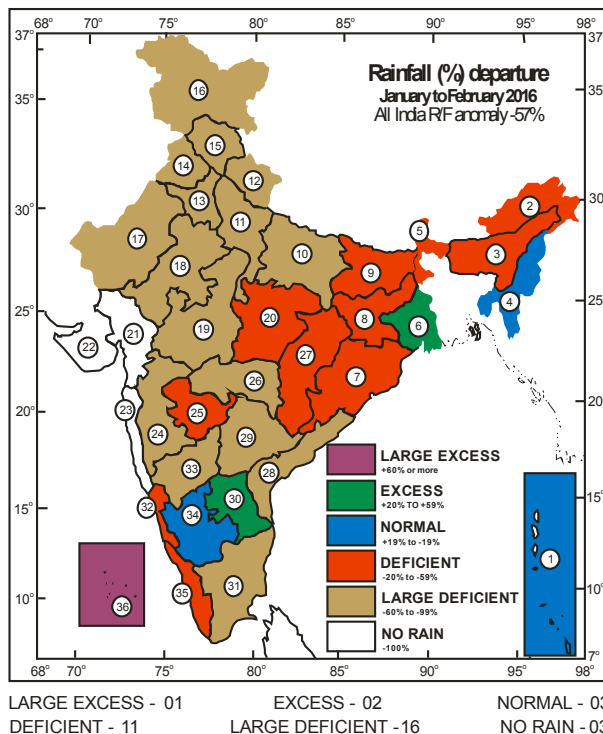


Fig. 1. Sub-divisionwise rainfall percentage departures for the season Jan-Feb 2016. Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

1 6	7 -41	13 -96	19 -62	25 -57	31 -89
2 -30	8 -45	14 -75	20 -37	26 -66	32 -47
3 -26	9 -57	15 -71	21 -100	27 -57	33 -77
4 3	10 -77	16 -63	22 -100	28 -86	34 -4
5 -54	11 -88	17 -77	23 -100	29 -88	35 -20
6 37	12 -67	18 -91	24 -61	30 22	36 102

This season, no intense low pressure system formed over the Indian region. However, one low pressure area formed over Equatorial Indian Ocean and adjoining south Andaman Sea and one induced low pressure area formed over Pakistan and adjoining areas of Punjab and northwest Rajasthan during the second week of February.

2. Seasonal rainfall (January-February)

The monthly and seasonal sub-divisionwise rainfall (actual, normal & percentage departure) are given in

TABLE 1
Sub-divisionwise rainfall (mm) for each month and season as a whole (January-February, 2016)

S. No.	Meteorological Sub-divisions	January			February			Season		
		Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)
1.	A. & N. Islands	72.0	53.7	34	15.8	29.2	-46	87.8	82.9	6
2.	Arunachal Pradesh	30.0	50.1	-40	73.6	98.0	-25	103.6	148.1	-30
3.	Assam & Meghalaya	18.5	16.4	13	16.9	30.5	-45	34.6	46.9	-26
4.	Naga., Mani., Mizo. and Tri.	7.8	13.7	-43	37.7	30.3	24	45.5	44.0	3
5.	Sub-Himalayan West Bengal & Sikkim	20.7	26.6	-22	7.1	33.7	-79	27.9	60.3	-54
6.	Gangetic West Bengal	9.9	13.5	-27	37.4	20.9	79	47.3	34.4	37
7.	Orissa	2.2	10.8	-79	16.6	21.0	-21	18.8	31.8	-41
8.	Jharkhand	14.3	16.1	-11	4.1	17.3	-76	18.4	33.4	-45
9.	Bihar	9.3	13.3	-30	0.6	9.7	-94	9.9	23.0	-57
10.	East Uttar Pradesh	5.4	16.8	-68	1.2	12.1	-90	6.6	28.9	-77
11.	West Uttar Pradesh	2.1	18.2	-89	2.0	15.1	-87	4.0	33.3	-88
12.	Uttaranchal	5.4	52.1	-90	29.2	54.1	-46	34.6	106.2	-67
13.	Haryana, Chandigarh & Delhi	0.0	17.8	-99	1.1	15.1	-92	1.2	32.9	-96
14.	Punjab	6.5	25.2	-74	6.0	24.3	-75	12.5	49.5	-75
15.	Himachal Pradesh	18.6	97.5	-81	38.4	98.0	-61	57.1	195.5	-71
16.	Jammu & Kashmir	34.4	95.7	-64	44.4	117.2	-62	78.8	212.9	-63
17.	West Rajasthan	0.1	2.9	-96	1.6	4.5	-65	1.7	7.4	-77
18.	East Rajasthan	0.6	5.6	-90	0.4	4.9	-92	1.0	10.5	-91
19.	West Madhya Pradesh	5.0	8.5	-41	0.2	5.1	-96	5.2	13.6	-62
20.	East Madhya Pradesh	20.2	20.0	1	2.1	15.3	-86	22.3	35.3	-37
21.	Gujarat region	0.0	0.8	-100	0.0	0.3	-100	0.0	1.1	-100
22.	Saurashtra & Kutch	0.0	0.4	-100	0.0	0.2	-100	0.0	0.6	-100
23.	Konkan & Goa	0.0	0.1	-100	0.0	0.2	-100	0.0	0.3	-100
24.	Madhya Maharashtra	0.0	1.1	-100	0.7	0.8	-8	0.7	1.9	-61
25.	Marathawada	0.0	3.8	-100	3.1	2.9	-3	2.9	6.8	-57
26.	Vidarbha	0.7	10.2	-93	5.2	7.0	-26	5.9	17.2	-66
27.	Chattisgarh	5.9	10.7	-45	3.2	10.6	-70	9.1	21.3	-57
28.	Coastal Andhra Pradesh	1.7	8.3	-79	0.9	10.4	-92	2.6	18.7	-86
29.	Telangana	1.1	5.8	-80	0.2	5.5	-96	1.4	11.3	-88
30.	Rayalaseema	8.1	3.0	169	0.0	3.6	-100	8.1	6.6	22
31.	Tamil Nadu	2.5	17.5	-86	0.8	13.4	-94	3.3	30.9	-89
32.	Coastal Karnataka	0.5	0.7	-32	0.0	0.2	-100	0.5	0.9	-47
33.	North interior Karnataka	0.3	2.2	-86	0.6	1.7	-65	0.9	3.9	-77
34.	South interior Karnataka	3.7	1.4	165	0.5	3.0	-83	4.2	4.4	-4
35.	Kerala	3.0	8.7	-66	16.4	14.7	5	19.4	24.3	-20
36.	Lakshadweep	59.6	20.8	187	12.1	14.7	-18	71.7	35.5	102

Note : Amounts less than 0.1 mm are rounded off to zero.

TABLE 2
Details of the weather systems during January 2016

S. No.	System	Duration	Place of initial location	Direction of Movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Western disturbances /eastward moving systems						
(i) Upper air cyclonic circulation						
1.	Upto Mid tropospheric levels	3 - 5	Afghanistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 6
2.	Do	12 - 13	Afghanistan and adjoining Pakistan	Do	Jammu & Kashmir and adjoining Pakistan	It lay initially as a trough in mid & upper tropospheric levels on 9 & 10. A trough lay aloft with its axis at 5.8 kms a.s.l. on 12 and became less marked on 13. The WD as a cyclonic circulation moved away on 14
3.	Do	24 - 27	Eastern parts of Iran and adjoining Afghanistan	East-northeast	Jammu & Kashmir and neighbourhood	Moved away on 28
(ii) As a trough						
1.	Upto Mid tropospheric levels	5 - 9	Along Long. 55° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	East-northeast	Along Long. 80° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	It moved away on 10
2.	Mid & upper tropospheric levels	13 - 15	Do	Do	Along Long. 72° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away on 16
3.	do	17 - 21	Along Long. 58° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 84° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	It was feeble on 17. Moved away on 22
4.	Upto Mid tropospheric levels	28 - 31	Along Long. 50° E to the north of Lat. 22° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 72° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away on 1 February
(iii) As an Induced cyclonic circulation						
1.	At lower levels	1	North Rajasthan and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 2
2.	Do	4 - 5	Pakistan and adjoining Rajasthan	Northeast	North Rajasthan and neighbourhood	It moved away on 6
3.	Do	6 - 7	West Rajasthan and neighbourhood	Do	North Rajasthan and neighbourhood	Became less marked on 8
4.	Upto lower tropospheric levels	11 - 13	Central Pakistan and neighbourhood	East	Haryana and adjoining Punjab	Became less marked on 14
5.	Upto mid tropospheric levels	14 - 15	Punjab and adjoining areas of Pakistan and north Rajasthan	Do	Haryana and neighbourhood	Became less marked in the evening of 15
6.	Do	18 - 19	Central Pakistan and adjoining areas of Punjab and west Rajasthan	Do	Do	Became less marked on 20
7.	At lower levels	26 - 27	North Rajasthan and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 28
8.	Upto lower tropospheric levels	29 - 31	Central Pakistan and adjoining Rajasthan	East	Punjab and neighbourhood	Became less marked in the evening of 31
(B) Other upper air cyclonic circulations						
1.	Upto lower tropospheric levels	11 - 13	Tripura and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 14

TABLE 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2.	Upto Lower tropospheric levels	14 - 20	Madhya Maharashtra and neighbourhood	East	North Chhattisgarh and adjoining areas of Jharkhand and Odisha	It lay embedded in a trough in the lower level easterlies (system III (2) during 14 & 15 Became less marked on 21
3.	Do	17 - 18	Southwest Bay of Bengal off Sri-Lanka coast	West	Southwest Bay of Bengal off Tamil Nadu coast	Became less marked on 19
4.	Do	20 - 21	Lakshadweep area and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 22
5.	Upto mid tropospheric levels	21 Jan - 2 Feb	Meghalaya and neighbourhood	Do	Do	Became less marked on 3 February
6.	Upto lower tropospheric levels	22 - 29	Maldives-Comorin area	West	Maldives & Lakshadweep area	Became less marked on 30
7.	Do	28 - 31	Southwest Bay of Bengal and adjoining Sri-Lanka coast		Comorin-Maldives area and neighbourhood	Became less marked on 1 February
(C) Trough in easterlies						
1.	At mean Sea level	5 - 6	Southwest Bay of Bengal and neighbourhood	West	Southwest Bay of Bengal off Sri-Lanka coast	Became less marked on 7
2.	At lower levels	14 - 15	South interior Karnataka to southwest Madhya Pradesh	Stationary	<i>In-situ</i>	Became less marked on 16
3.	At mean Sea level	18 - 19	Southeast Arabian Sea	Do	Do	Became less marked on 20
4.	Upto lower tropospheric levels	22 - 24	Southwest Bay of Bengal off Sri-Lanka coast	Do	Do	Became un-important on 25
5.	At mean Sea level	24 Jan - 3 Feb	Equatorial Indian Ocean and adjoining Malay Peninsula	West	Southwest Bay of Bengal and adjoining Sri-Lanka coast	Became less marked on 4 February
(D) Other troughs						
1.	At lower levels	31 Jan	East Bihar to northwest Bay of Bengal across Gangetic West Bengal	Stationary	<i>In-situ</i>	Became less marked on 1 February

Table 1. Also representative amounts of rainfall on a day-to-day basis are given in Table 4. Out of the 36 met-subdivisions of India, the seasonal rainfall was *large excess* in 1; *excess* in 2, *normal* in 3, *large deficient* in 16; *deficient* in 11 and *no rain* in 3 sub-divisions. The percentage departures falling under various categories, viz., *large excess*, *excess*, *normal*, *deficient*, *large deficient* and *no rain* are shown in Fig. 1.

Climatologically, the WDs moving from west to east move to northeast India after traveling across the northern states viz., Jammu & Kashmir, Punjab, Haryana, Himachal Pradesh and Uttarakhand. On interacting with the regional synoptic situations and topography of the region, these systems give rise to precipitation over northwest and northeastern parts of the country during winter season. The rainfall during the season was below normal.

3. Monthly features

3.1. January

3.1.1. Storms and depressions

No intense low pressure system formed over the Indian seas during the month.

3.1.2. Weather and associated synoptic features

As given in Table 2, 15 WDs (including 3 upper air cyclonic circulations, 8 induced cyclonic circulations, and 4 troughs in westerlies), 7 upper air cyclonic circulations, 5 troughs in easterlies and one trough at lower levels formed which affected the weather over the country during the month of January.

TABLE 3
Details of the weather systems during February 2016

S. No.	System	Duration	Place of initial location	Direction of Movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Well marked low/Low pressure area						
1.	Low Pressure area	9 - 16	Equatorial Indian Ocean and adjoining south Andaman Sea	West	Central Parts of south Bay of Bengal and adjoining Equatorial Indian Ocean	Initially lay as a trough of low at mean Sea level on 8 & 9 and later during 17- 23
(B) Western disturbance as induced low pressure area						
1.	Low pressure area	11	Pakistan and adjoining areas of Punjab and northwest Rajasthan	Stationary	<i>In-situ</i>	Initially it lay as an induced cyclonic circulation extending upto 0.9 km a.s.l. on 10. It became less marked in the evening of 11
(C) Western disturbances/eastward moving systems						
(i) Upper air cyclonic circulation						
1.	Upto mid & upper tropospheric levels	8 - 13	Western parts of Iran and neighbourhood	East	Eastern parts of Jammu & Kashmir and neighbourhood	Moved away northeastwards in the evening of 13
2.	Upto Mid tropospheric levels	16 - 19	Northeast Iran and neighbourhood	Do	Southeast Iran and neighbourhood	A trough extended aloft during 17 - 19. The cyclonic circulation lay as a trough in mid & upper tropospheric westerlies with its axis at 5.8 kms a.s.l. on 20 & 21 and moved away on 22
3.	Do	29 Feb - 7 Mar	Western parts of Iran and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away on 8 March. A trough lay aloft extending upto upper tropospheric levels
4.	Do	26 Feb - 1 Mar	Eastern parts of Assam and neighbourhood.	Do	Tripura and neighbourhood	Became less marked on 2 March
(ii) As trough in westerlies						
1.	Mid & upper tropospheric levels	3 - 8	Along Long. 50° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	East	Along Long. 82° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	It lay as a cyclonic circulation extending upto mid tropospheric levels with a trough aloft with its axis at 5.8 kms a.s.l. during 5-7. Moved away on 9. However the associated induced cyclonic circulation persisted on 12 & 13
2.	At lower levels	9 - 10	From Sub-Himalayan West Bengal & Sikkim to south Odisha	Quasi-Stationary	From Sub-Himalayan West Bengal & Sikkim to coastal Odisha	Became less marked on 10 evening. A cyclonic circulation lay embedded over West Bengal and neighbourhood on 9 and became less marked on 10
3.	Mid & upper tropospheric levels	12 - 15	Along Long. 54° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	East	Along Long. 72° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards on 16
4.	Do	15 - 16	Along Long. 60° E to the north of Lat. 23° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 68° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards on 17
5.	At lower levels	12 - 13	Marathwada to coastal Karnataka across interior Karnataka	Do	Haryana and neighbourhood to north interior Karnataka across east Rajasthan, west Madhya Pradesh and Marathwada	Became less marked on 14

TABLE 3 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
6.	At lower levels	12	From eastern parts of Bihar to south Odisha across Gangetic West Bengal	Stationary	<i>In-situ</i>	Became less marked on 13
7.	Do	14 - 15	From western parts of Assam to north Chhattisgarh across West Bengal & Jharkhand	Quasi-Stationary	From Assam to Vidarbha across Gangetic West Bengal, Jharkhand and Chhattisgarh	Became less marked on 16. (A cyclonic circulation lay embedded on 14 & 15)
8.	Do	22	From the cyclonic circulation over Assam & Meghalaya and neighbourhood to northwest Bay of Bengal	Stationary	<i>In-situ</i>	Became less marked on 23
9.	Upto lower tropospheric levels	24 - 25	From Assam & Meghalaya to Vidarbha	Quasi-stationary	Assam to Gangetic West Bengal	A cyclonic circulation lay embedded over Gangetic West Bengal and adjoining Jharkhand on 24. Became less marked on 25
10.	Mid & upper tropospheric levels	25 - 26	Along Long. 55° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	East	Along Long. 62° E to the north of Lat. 35° N (axis at 5.8 kms a.s.l.)	Feeble on 26 and moved away east-northeastwards on 27
11.	Do	28 - 29	Along Long. 62° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 72° E to the north of Lat. 35° N (axis at 5.8 kms a.s.l.)	The feeble WD moved away northeastwards on 1 March
<i>(iii) As an Induced cyclonic circulation</i>						
1.	Upto lower tropospheric levels	5 - 7	Central Pakistan and neighbourhood	East	Northeast Rajasthan and adjoining areas of Haryana & west Uttar Pradesh	Became less marked on 8
2.	At lower level	15	Central Pakistan and adjoining Rajasthan and Punjab	Stationary	<i>In-situ</i>	Became less marked on 16
3.	Upto lower tropospheric levels	18 - 20	Central Pakistan and adjoining west Rajasthan	East	North Rajasthan and adjoining areas of Haryana & Punjab	Became less marked on 21
<i>(D) Other upper air cyclonic circulations</i>						
1.	At lower level	3	Lakshadweep area and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 4
2.	Upto lower tropospheric levels	14	West Uttar Pradesh and adjoining areas of Haryana & Uttarakhand	Do	Do	Became less marked in the evening of 14. Initially it lay as an induced cyclonic circulation system [I (b) 1] on 12 & 13
3.	Do	6 - 8	Tripura and neighbourhood	West	Tripura and adjoining Bangla Desh	Became less marked on 9
4.	Do	8	North Chhattisgarh and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 9
5.	Upto mid tropospheric levels	16 - 17	North Rajasthan and neighbourhood	East	Punjab and neighbourhood	Became less marked on 18
6.	Upto lower tropospheric levels	16 - 17	Tripura and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 18
7.	Do	12 - 17	Lakshadweep area and neighbourhood	Do	Do	Became less marked on 18
8.	Do	19	Meghalaya and neighbourhood	Do	Do	Became less marked on 20

TABLE 3 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
9.	Upto lower tropospheric levels	20 - 22	Bangla Desh and adjoining areas of Assam	East	Assam & Meghalaya and neighbourhood	Became less marked on 23
10.	At lower levels	23	Gangetic West Bengal and neighbourhood	Stationary	<i>In-situ</i>	Became less marked on 24
11.	Upto lower tropospheric levels	23 - 24	South Chhattisgarh and neighbourhood	Do	Do	It lay embedded in the trough III (b) (9) on 24 and became less marked on 25
12.	At lower level	24	Bangla Desh and neighbourhood	Do	Do	It lay embedded in the trough III (b) (9) on 24 and became less marked on 25
13.	Do	24 - 25	Lakshadweep area and neighbourhood	Do	Do	Became less marked on 26
14.	Upto lower tropospheric levels	25	Vidarbha and adjoining areas of Marathwada and Telangana	Do	Do	It merged with the trough in lower level easterlies on 26
15.	Do	26	Southwest Madhya Pradesh and neighbourhood	Do	Do	It lay embedded in the trough in lower level easterlies [V (7)]. Became less marked on 27
16.	Do	27	Southern parts of Bihar and neighbourhood	Do	Do	Became less marked on 28
(E) Trough in easterlies						
1.	At mean Sea level	4 - 11	Southeast Bay of Bengal and neighbourhood	West	Comorin area to southeast Arabian Sea off Karnataka coast	Became less marked on 12
2.	Do	6 - 8	South Andaman Sea and neighbourhood	Do	Central parts of south Bay of Bengal and neighbourhood	Became less marked on 9
3.	At lower levels	15 - 16	Cyclonic circulation over Lakshadweep area and neighbourhood to south Gujarat Region across coastal Karnataka and Konkan & Goa	Quasi-stationary	Cyclonic circulation over Lakshadweep area and neighbourhood to north Maharashtra	Became less marked on 17
4.	At mean Sea level	17 - 23	Southwest Bay of Bengal off south Sri-Lanka coast	West	Maldives and adjoining Comorin area	Became less marked on 24. Associated cyclonic circulation extending upto mid tropospheric levels persisted during 10-17 and became less marked on 18
5.	Upto lower tropospheric levels	18 - 19	From southeast Arabian Sea to southwest Rajasthan	Quasi-stationary	From southeast Arabian Sea to north Rajasthan	Became less marked on 20
6.	At lower levels	24 - 28	Equatorial Indian Ocean and adjoining south Andaman Sea	West	Equatorial Indian Ocean and adjoining areas of southwest Bay of Bengal & Sri-Lanka	Became less marked on 29. Initially it lay as a cyclonic circulation extending upto mid tropospheric levels over Malaya peninsula and adjoining equatorial Indian Ocean on 22 & 23
7.	At lower levels	26 Feb - 1 Mar	From north interior Karnataka to east Rajasthan across Madhya Maharashtra and west Madhya Pradesh	Oscillatory	From southern parts of Konkan & Goa to south Gujarat region	A cyclonic circulation lay embedded over southwest Madhya Pradesh and neighbourhood on 26 and became less marked on 27. The trough lay as a cyclonic circulation extending upto 1.5 kms a.s.l. over Gujarat and adjoining south Rajasthan on 2 March and became less marked on 3 March

TABLE 4

Some representative amounts of rainfall in cm for January and February 2016 (1 cm and above)

Date	Some representative amounts of rainfall in cm for January and February 2016 (1 cm and above)
1 Jan	Mangan 1
2 Jan	Nil
3 Jan	Nancowry 2
4 Jan	Gulmarg 2, Kupwara 1
5 Jan	Kupwara and Gulmarg 3 each, Tissa, Udaipur and Kukumsheri AWS 2 each, Pahalgam, Keylong, Gund, Saloni, Baramulla AWS, Shalimar AGRO, Srinagar IAF, Anantnag, Banihal, Harran AWS, Srinagar AGRO AWS, Pahalgam AWS, Srinagar, Manali, Quazigund, Chamba AWS, Rambagh AWS and Batote 1 each
6 Jan	Baramulla AWS and Pahalgam AWS 1 each
7 Jan	Nil
8 Jan	Kupwara, Shimla, Manali and Gund 1 each
9 Jan	Mangan 4, Roing, Drf, Melabazar / Matunga and Tuting 3 each, Goibargaon, Itanagar, Dibrugarh AP, N. Lakhimpur, Numaligarh, Dhekiajuli, Anini AWS and Naharlagun 2 each, Tangla, Chauldhowaghat, Neamatighat, Tezpur, Tezu, Manali, Jorhat, Deomali, Panbari, Dhemaji AWS, Passighat, Majbhat, Seo Bagh, Sarahan and Karimganj 1 each
10 Jan	Anini AWS, Melabazar / Matunga, Majbhat, Jorhat and Goibargaon 2 each, Drf, Numaligarh, Jharnapani, Teliamura, Tezpur, Lumding, Tuting, Panbari, Chengmari / Diana, Tawang AWS, B P Ghat, Golaghat Cwc, Jia Bharali N T Xing, Itanagar, Sivasagar, Naharlagun, Along AWS and Barpathar 1 each
11 Jan	Nil
12 Jan	Nil
13 Jan	Samrala 3, Hoshiarpur AWS and Nawanshahar AWS 2 each, Balachaur AWS, Kapurthala AWS Ii, Jalandhar AWS, Adampur ARG, Nagaur Tehsil, Amritsar IAF, Ludhiana, Balachaur, Amritsar AWS, Hoshiarpur and Anandpur Sahib 1 each
14 Jan	Nil
15 Jan	Nil
16 Jan	Jia Bharali N T Xing, Itanagar, Mangan, Tuting, Miao, Majbhat and Along AWS 1 each
17 Jan	Nancowry 13, Nainpur 2, Amarwara, Chindwara - AWS, Seoni, Seoni - AWS, Lakhnadon, Bichhia, Betul and Betul - AWS 1 each
18 Jan	Thodupuzha, Kottayam, Umariya and Umariya - AWS 2 each, Agathi, Lakhnadon and Deori 1 each
19 Jan	Amini Divi and Kavaratti 5 each, Enamakal 4, Damoh, Damoh - AWS, Garhakota, Buxwaha and Chanderi 3 each, Vellanikkara, Umariya, Umariya - AWS, Nagode, Lateri, Bhopal, Shajapur, Bhopal - AWS -Arg, Shajapur - AWS, Chahtarpur - AWS, Ujjain, Ujjain - AWS, Hatta, Sagar, Sagar - AWS, Rehli, Mahroni and Sehore - AWS 2 each, Sironj, Tikamgarh, Panna - AWS, Tikamgarh - AWS, Kukshi, Sohagpur - AWS, Manohar Thana, Mahidpur, Sonkatch, Agathi, Satna, Satna - AWS, Simula, Begumganj, Rewa, Rewa - AWS, Hindgir, Manatu, Chachoda, Narsingarh, Tarana, Kotma, Katni - AWS, Raisen, Raisen - AWS, Badnawar, Rajgarh, Vidisha - AWS, Gudh, Kareli, Joshipur, Patan, Karanjia, Attarra, Bagli, Ganjbasoda, Mungaoli, Maihar, Umrer, Khajuraho, Tenughat, Periyar, Kuru, Thakurmunda, Lalitpur, Rajnagar, Salwani / Silvani, Kurwai, Baran, Shahabad, Ashoknagar - AWS, Bengaluru Kial and Mandla - AWS 1 each
20 Jan	Kavaratti 6, Garhwa 5, Tilpara Barrage, Rajauli, Maihar, Dhanora, Raidih, Berhampore, Bodh Gaya and Nawada 4 each, Jamshedpur, Chenari, Dondilohara, Mungeli, Sriniketan, Satgaon, Sidhi, Sidhi - AWS, Katoria, Suri Cwc, Berhampore AWS, Colgaon, Ballari AWS, Gaya AP and Bhupalpalle 3 each, Jhajha, Rampurhat (Drms), Tekari, Bishrampur, Rewa, Rewa - AWS, Bihpur, Panagarh AP, Jamshedpur AP, Dudhi, Gudh, Dumka, Sarath, Suryagadha, Nandadih, Dumri, Katghora, Ghorawal, Pallari / Palari, Bhagalpur, Messenjore, Deo, Lakhisarai, Dehri, Hanumana, Mahasamund, Durgapur, Singanamala, Kudathini, Daltonganj, Makhdumpur, Churk, Bilaspur, Robertsganj, Pavagada, Narsingarh, Damoh, Satna, Damoh - AWS, Satna - AWS, Pavagada AWS, Malda, Sono, Jarmindi, Koner, Garhi, Williamnagar, Y N Hoskote, Aurangabad, Rafiganj and Anantpur 2 each, Maheshpur, Singrauli - AWS, Moharo,

TABLE 4 (Contd.)

Date	Some representative amounts of rainfall in cm for January and February 2016 (1 cm and above)
	Jammalamadugu, Duvvur, D. P. Ghat, Meja, Rasoolabad, Kalyandrug, Hunterganj, Vaishali, Ramagiri, Tadpatri, Chandil, Jahanabad, Bijepur, Chatra, Ghatsila, Hiranpur, Mohanpur, Pakur, Khanpur, Surajpur, Deoghar, Tiring, Kusumanchi, Jujumura ARG, Karchhana, Safipur, Katni - AWS, Ekangersarai, Lucknow AP, Raju Palem, Agathi, Gheropara, Mohania, Kondapuram, Godda, Tilaiya, Bhabhua, Balod, Bathalapalle, Barpalli ARG, Dunguripalli, Pathargama, Daudnagar, Bara, Handia, Madhugiri, Settur, Gangtok, Chaibasa, Chapra, Tarabganj, Saraipali, Penu Konda, Kudra, Dhona, Namthang, Islampur, Ballia, Kanpur AP, Peapally, Bankura, Bijapur, Atmakur, Bilhaur, Kunda, Unnao Tehsil, Bemetara, Kambadur, Aspari, Tadong, Pendra, Atmakurwrgl, Asansol Cwc, Hazaribagh, Amarkantak, Ambikapur, Mawsynram, Hisua, Nagode, Gooty, Sohagpur - AWS, Barkote, Chenna Kothapalle, Gyanpur, Mirzapur Tehsil, Honakere, Tantloi, Raigarh, Barhiya, Alur, Owk, Vempalle, Pushparajgarh, Dharmavaram, Agalpur ARG, Gaisilet ARG, Naktideul, Banka, Sitapur, Chunar, Haidargarh, Hasanganj, Kanpur Teh, Karwi, Phoolpur Teh, Soraon, Kalpi Tehsil, Panna - AWS, Nawabpet, Kurnool, Dhubri, Kansabati Dam, Rajnagar, Chennur, Gudurwrgl, Sevoke, Ghatagaon, Dhamtari and Simhadripuram 1 each
21 Jan	Puri 12, Chapad and Minicoy 4 each, Vempalle, Bhimnagar, Rajapalayam, Forbesganj, Jaleswar, Arani, Araria, Gudur, Simhadripuram, Pipili and Kakatpur 3 each, Mahedi / Mehshi, Kheronighat, Proddutur, Kamalapuram, Kuppam, Jammalamadugu, Nellore, Raju Palem, Podalakur (Arg), Chhatrapur, Satyabadi ARG, Berhampur, Durgachak and Cherrapunji 2 each, Kondapuram, Muddanur, Thakurmunda, Jharnapani, Duvvur, Kohima, Jowai AWS, Wokha AWS, Madhwapur, Kadapa, Utukuru AP, Chilamathur, Tuting, Dillighat, Ramagiri, Kadiri, Pamidi, Rayalpadu, Rajghat, Tadimarri, Sompeta, Eturnagaram, Lunding, Nongstain AWS, Palamaner, Mawsynram, Sriniketan, Tawang AWS, Toofanganj ARG, Berhampore AWS, Astaranga ARG, Pulivendla, Amadagur, Bathalapalle, Gorantla, Lepakshi, Khowai, Owk, Baghmara AWS, Kadiri AP, R.K.Pet, Vaniyambadi and Penu Konda 1 each
22 Jan	Mettupalayam 22, Coonoor and Coonoor PTO 4 each, Nedumangad, G Bazar and Chamarajanagar PTO 2 each, Narsapur, Amalapuram, Barobhisha, Kolar Gold Field, Champasari, Saiha AWS, Guwahati AP, Chamarajanagar AWS, Chintamani PTO and Along AWS 1 each
23 Jan	Nancowry 10, Sathanur Dam 3, Coonoor 2, Dibrugarh AP, Deomali and Coonoor PTO 1 each
24 Jan	Nil
25 Jan	Papanasam 3, Ambasamudram and Dillighat 2 each, Ramanathapuram 1
26 Jan	Tezpur 5, Sargur and Port Blair 2 each, Long Islands and Nancowry 1 each
27 Jan	Port Blair 5, Cherthala 3, Hut Bay, Long Islands, Chaparmukh, Kanjirappally and Vaikom 2 each, Maya Bandar, Sivasagar, Kayamkulam Agri and Mangan 1 each
28 Jan	Car Nicobar IAF and Car Nicobar 4 each, Soro, Diamond Harbour and Bahalpur 1 each
29 Jan	Nancowry 9, Hut Bay 3, Taran Taran, Kupwara, Car Nicobar IAF and Gulmarg 1 each
30 Jan	Bhuntar AP, Bajaura Nicra, Bajura AWS, Kotkhai and Sarahan 3 each, Batote, Seo Bagh, Nancowry, Gohar, Gulmarg, Banihal, Jogindarnagar, Kufri AWS, Shimla, Banjar, Cheslea School AWS, Sunibhajji, Rajouri, Kumarsain and Amritsar IAF 2 each, Sujapur Tira, Rohru, Manali, Jhandutta, R L B bmb, Nadaun, Mandi, Ghamroor, Bijahi, Aghar, Kupwara, Kalpa, Bilaspur AWS, Jubbal, Sarkaghat, Mehre (Barsar), Banganar, Purola, Dehra Gopipur, Rampur Bushar, Kandaghat, Bhoranj, Karsog, Saloni, Arki, Katra, Munsyari, Jammu IAF, Gund, Sundernagar, Barthin, Kahu, Joshimath, Una, Amritsar AWS, Banganaf, Janjehli, Pandoh, Samba, Uttar Kashi Cwc, Shimla AP, Shalimar AGRO, Amb, Mukerian, Uttar Kashi, Raya, Dalhousi Alha AWS, Rajgarh, Baderwah, Pahalgam and Kheri 1 each
31 Jan	Nancowry 2, Gund, Gulmarg, Quazigund and Batote 1 each
1 Feb	Bajaura Nicra, Bajaura AGRO and Bajura AWS 1 each
2 Feb	Nil
3 Feb	Nil
4 Feb	Car Nicobar 2, Jajpur 1
5 Feb	Nil
6 Feb	Nil

TABLE 4 (Contd.)

Date	Some representative amounts of rainfall in cm for January and February 2016 (1 cm and above)
7 Feb	Dharmasala 5, Dharmshala AWS 4, Kotkhai and Palampur 3 each, Kheri, Chamba AWS, Baderwah, Berthin AGRO, Kangra AP, Bhoranj, Jogindarnagar and Aghar 2 each, Balachaur, Sarkaghat, Manali, Bharwain, Batote, Banjar, Baijnath, Deoprayag, Mehre (Barsar), Saloni, Banihal, Gohar, Nagrota Surian, Una, Hamirpur, Mandi, Guler, Sarahan, Bijahi, Nangal, Banganaf, Bharari, Keylong and Sundernagar 1 each
8 Feb	Punalur 7, Uttar Kashi Cwc 5, Uttar Kashi, Barkot, Rajgarh, Sangraha and Gohar 4 each, Dunda, Purola, Bhatwari, Renuka / Dadhau, Rampur Bushar, Mashobra AGRO, Deoprayag, Solan and Dalhousi Alha AWS 3 each, Theog, Landsdown, Cheslea School AWS, Tehri, Shimla, Keertinagar, Munsyari, Banjar, Rudraprayag, Tehri Cwc, Ghumarwin, Bhuntar AP, Pithoragarh, Shimla AP, Rohru, Manali, Paonta and Seo Bagh 2 each, Sundernagar, Bajura AWS, Sunibhajji, Bajaura Nicra, Bijahi, Arki, Pandoh, Kalpa, Dehra Dun, Bajaura AGRO, Jubbal, Saloni, Mandi, Jogindarnagar, Sujanpur Tira, Joshimath, Bilaspur AWS, Dharampur, Janjehli, Kasauli, Jakholi, Barthin, Mukteswar, Karsog, Champawat, Bharwain, Reckong Peo AWS, Sarkaghat, Kahu, Ranikhet (G), Nahan, Nazibabad, Nagina, Mussoorie, Chamoli, Pauri, Baijnath and Kheri 1 each
9 Feb	Rampurhat (Drms) and Sriniketan 3 each, Khowang, Pachhad, N. Lakhimpur, Sarath, Bankura, Simula, Tezpur, Jia Bharali N T Xing and Deomali 2 each, Midnapore Cwc, Chauldhowaghat, Barrackpur IAF, Kansabati Dam, Dibrugarh AP, Mangan, Madhupur, Margherita, Burdwan, Daparijo, Suri Cwc, Panbari, Dumka, Kalyani AGRO - AWS, Tuting, Along AWS, Rangiya, Berhampore, Itanagar, Sivasagar, D. P. Ghat, Tusuma, Malbazar ARG, Badatighat and Bashirhat 1 each
10 Feb	Alappuzha, Dholai and Amraghat 3 each, Margherita, Nedumangad and Wokha AWS 2 each, Dibrugarh AP, Chottabekra, Changlang, Bokajan, Neamatighat, Cherrapunji, Sivasagar, Haflong, Bihubar, Silchar and Deomali 1 each
11 Feb	Ernakulam South 11, Mancompu and Kayamkulam 7 each, Vaikom 6, Cherthala, Lower Kothaiyar ARG, Kochi AP, Kayamkulam Agri and Aluva Pwd 5 each, Piravam 4, Pechiparai, CIAL Kochi and Kumarakom 3 each, Dillighat, Punalur, Mavelikara, Kupwara, Gulmarg, Banihal, Enamakal and Tinsukia 2 each, Batote, Dholla Bazar, Tissa, Tuting, Rajouri, Nahar Katia, C R Patna, Vellanikkara, Roing, Kozha, Amraghat, Kottayam, Quazigund, Tezu, Haripad, Gund, Dibrugarh AP, Chottabekra and Margherita 1 each
12 Feb	Kamalpur, Anantnag, Lower Kothaiyar ARG, Tuting, Kukernag, Belonia, Banihal and Pahalgam AWS 3 each, Awantipur IAF, Pahalgam, Saloni, Gulmarg, Kailashahar, Konibal, Shalimar AGRO, Tissa, Chamba AWS, Srinagar, Quazigund, Srinagar IAF, Harran AWS, Dharmnagar / Panisagar, Baderwah and Rambagh AWS 2 each, Gund, Srinagar AGRO AWS, Raidih, Changlang, Gharmura, Margherita, Batote, Kupwara, Jaipur, Along AWS, Baramulla AWS, Daparijo, Karimganj, B P Ghat and Aniniaws 1 each
13 Feb	Nancowry 14, Sabroom 3, Belonia 1
14 Feb	Sarahan and Tehri 2 each, Bhatwari, Tehri Cwc, Dunda, Deoprayag, Uttar Kashi, Kotkhai, Mussoorie and Barkot 1 each
15 Feb	Minicoy 3, Pahalgam 1
16 Feb	Jamsolaghat and Bangiriposi 4 each, Chandanpur 3, Tiring and Piravam 2 each, Beberu, Baripada, Samakhunta AWS and Chahtarpur - AWS 1 each
17 Feb	Ranchi AP 1
18 Feb	Radhapuram 2, Ajmer, Kanyakumari, Ajmer Tehsil, Mylaudy and Nagercoil 1 each
19 Feb	Anupgarh Tehsil 2
20 Feb	Kandaghat 5, Manali 4, Awantipur IAF, Rajouri, Tissa, Baramulla AWS, Seo Bagh, Batote, Bhuntar AP, Shalimar AGRO, Keylong, Pahalgam, Harran AWS, Banihal, Srinagar, Konibal, Bajaura Nicra, Kalpa, Rambagh AWS, Srinagar AGRO AWS, Anantnag, Quazigund, Gohar and Kupwara 3 each, Joshimath, Katra, Kukernag, Srinagar IAF, Jogindarnagar, Bajaura AGRO, Dharmasala, Jhandutta, Mashobra AGRO, Banjar, Dalhousi Alha AWS, Reckong Peo AWS, Saloni and Kasauli 2 each, Kumarsain, Bharwain, Sriganganagar Tehsil, Rohru, Baderwah, Hamirpur, Karsog, Khadralla, Jammu IAF, Dhuri, Phillaur, Dharmshala AWS, Sarahan, Gulmarg, Barnala, Mukerian, Shimla, Bijahi, Jammu City, Nakodar, Cheslea School AWS, Jubbal, Kufri AWS, Nadaun, Guler, Udampur IAF, Shimla AP, Kheri, Aghar, Banganar, Kangra AP, Bhoranj, Bhatwari, Bhatinda, Banganaf, Mehre (Barsar), Sujanpur Tira, Hanumangarh, Sangaria, Palampur, Gund, Rampur Bushar, Munsyari, Dharampur, Janjehli, Rajgarh, Mandi, Una, Sarkaghat, Amb, Faridkot, Faridkot AWS, Mahurana ARG, Nabha, Samrala, Baijnath, Nurpur / Jassur, Theog and Sundernagar 1 each
21 Feb	Punalur 4, Mussoorie and Tezu 3 each, Tuting, Alappuzha, Bharwain, Manali, Anini AWS, Dibrugarh AP, Bajaura AGRO, Deomali, Cherthala, Bhuntar AP, Margherita and Kumarakom 2 each, Tinsukia, Kotkhai, Perumpavur, N. Lakhimpur, Chauldhowaghat, Munsyari, Dalhousi Alha AWS, Along AWS, Itanagar, Bajura AWS, Gohar, Bijahi, Mashobra AGRO, Pandoh, Joshimath, Baheri, R L Bbmb, Naharlagun, Namsai, Mandi, Sarkaghat, Mukteswar, Miao, Moranhat, Baijnath, Vaikom, Hardwar, Sundernagar, Shimla, Dillighat,

TABLE 4 (Contd.)

Date	Some representative amounts of rainfall in cm for January and February 2016 (1 cm and above)
	Deoprayag, Tehri, Moradabad, Nainital, Phangota, Nahar Katia, Panbari, Daparijo, Jakholi, Ranjit Sagar Dam Site, Kalpa and Kumarsain 1 each
22 Feb	Tezu 7, Roing 6, Chauldhowaghat, Silchar and B P Ghat 4 each, Tuting, Namsai, Kailashahar, Anini AWS, Passighat and Karimganj 3 each, Dholla Bazar, Dharmanagar / Panisagar, Laxhipur, Khowang and Matijuri 2 each, Kamalpur, Dibrugarh AP, Chottabekra, Haflong, Amraghat, Tinsukia, N. Lakhimpur, Kanjirappally, Dholai and Nahar Katia 1 each
23 Feb	Roing 4, Tuting 3, Tinsukia and Along AWS 2 each, Tezu, Namsai, Dholla Bazar, Dibrugarh AP, Chauldhowaghat, Passighat and Miao 1 each
24 Feb	Kailashahar 5, Serchip (Hydro) 4, Kamalpur and Tuting 3 each, Gharmura, Udala, Lengpui, Khowai and Jaipur 2 each, Nilgiri, Belonia, Saiha AWS, Sonamura, Chottabekra, Teliamura, Balimundali, Sabroom, Ponnani, Aniniaws, Agartala AP, Udaipur, Aizawal, Daparijo and Imphal 1 each
25 Feb	Durgachak 11, Kolkata AP 10, Kolkata and Canning Town 8 each, Bashirhat 7, Diamond Harbour 6, Kailashahar, Barrackpur IAF and Phulberia 5 each, Uluberia, Lumding, Khowai, Kamalpur, Basudevpur AWS and Annapurnaghat 4 each, Gharmura, Chhamonu and Dharmanagar / Panisagar 3 each, Chikkamagaluru PTO, Silchar, Agartala AP and Mangan 2 each, Amraghat, B P Ghat, Chottabekra, Namsai, Burdwan, Periyapatna, Dholai, D.P.Ghat, Udaipur, Tuting, Mohanpur, Dillighat, Laxhipur, Imphal, Moranhat, Midnapore, Bagati (Magra), Midnapore Cwc, Sivasagar, Nahar Katia, Saiha AWS and Kalyani Smo 1 each
26 Feb	Nawana 7, Harichandanpur ARG 5, Kayamkulam, Balimundali and Nh5 Gobindpur 4 each, Alappuzha, Keongihargarh, Kozha, Panposh and Joda ARG 3 each, Joshipur, Jaipur, Tiring, Vaikom, Jhumpura, Digha and Balasore 2 each, Radhapuram, Tikabali, Karanjia, Nilgiri, Mavelikara, Ghatagaon, Telkoi, Udala and Kanjirappally 1 each
27 Feb	Athmalik 9, Kankadahad ARG 7, Ghatagaon, Udala and Uluberia 6 each, Nilgiri, Altuma Cwc, Balasore and Laikera 5 each, Joda ARG, Akhuapada, Bhuban ARG, Khaprakhol ARG, Katghora, Anandpur, Bijepur, Tikarpara, Karanjia, Barkote and Burdwan 4 each, Muzaffarpur, Birmaharajpur ARG, Midnapore Cwc, Keolari, Pauni, Agalpur ARG, Korei ARG, Thakurmunda, Diamond Harbour, Bagati (Magra), Midnapore, Champua, Balimundali, Bargarh, Jaipur, Jenapur, Bonth, Jajpur, Kirmira ARG, Aluva Pwd, Jhumpura, Bamra ARG, Bhanjinar, Chandikhol ARG, Keiri AWS, Sukinda, Barpalli ARG, Samakhunta AWS, Bhadrak AWS, Ullunda ARG, Umrer and Jashpurnagar 3 each, Rajgangpur, Digha, Nawana, Panagarh AP, Asansol Cwc, Bhograi, Perseoni, Durgachak, Kalaikunda, Dunguripalli, Gania ARG, Hindol, Bhiwapur, Kuchinda, Kaptipada ARG, Joshipur, Swam -Patna, Kalyani Smo, Sohela, Tiroda (Arg) and Korba 2 each, Nh5 Gobindpur, Baripada, Belpada ARG, Kuhi, Daitari, Sarangarh, Sonamukhi ARG, Bari ARG, Burla ARG, Bhandara, Mohanpur, Daspalla, Khandapara, Gurundia ARG, Jaleswar, Nawapara, Rajkishorenagar, Balaghat - AWS, Canning Town, Bichhia, Banaigarh AWS, Betanati ARG, Tikabali, Mahasamund, Rajghat, Mauda, Batli ARG, Telkoi, Pendra, Chandanpur, Binika, Ramnad Nicra, Bangiriposi, Keongihargarh, Nayagarh, Bemetara, Lakhandur, Kolkata, Basudevpur AWS, Deogarh, Dhamnagar ARG, Desaiganj and Sadakarjuni 1 each
28 Feb	Bonth 8, Madhabarida 6, Sorada 5, Bhuban ARG and Rayagada 4 each, Dhamnagar ARG, Pusad, Anandpur, Bhadrak AWS, Aska, Chendipada, Jaipur, Kankadahad ARG and Laxhanpur ARG 3 each, Umerkhed, Swam -Patna, Udgir, Korei ARG, Bodhan, Chandbali, Kalaikunda, Ramanathapuram, Chakur, Talcher, Selu, Banarpal ARG, Chandikhol ARG, Jajpur, Tentulikhunti ARG and Berhampur 2 each, Akhuapada, Bari ARG, Dhenkanal, Daitari, Tusuma, Gopalpur, Dunda, Angul, Champua, Basudevpur AWS, Hindol, Ahmedpur, Puri, Pallahara, Deoli and Purushottampur 1 each
29 Feb	Ernakulam South 9, Dhamangaon Rlwy and Kochi AP 6 each, Saoner and Kuhi 4 each, Burdwan, Beed, Pathapatnam, Umrer and Satara 3 each, Atpadi, Deolgaon Raja, Aluva Pwd, Deoli, Chintapalle, Paderu, Krishnanagar, Kalingapatnam, Nagpur AP, Hingna, Patoda and Chikhaldia 2 each, Risod, Piravam, Sindewahi, Gunupur, Punalur, Myladumparaagri, Khanapur, Satankulam, Lonar, Wardha, Karanjilad, Khajuri, Palakonda, Balipatna ARG, Odagaon ARG, Selu, Deobhog, Chandur Bazar, CIAL Kochi, Dahiwadi Man, Kharangha, Mohana and Asansol Cwc 1 each

3.1.3. Monthly rainfall

Out of the 36 met-subdivisions of India, the month's rainfall was large *excess* in 3, *excess* in 1, *normal* in 3, *deficient* in 8, *large deficient* in 16 sub-divisions and *no rain* in 6 sub-divisions.

During the first two weeks, dry weather prevailed in general over major parts of the country. The western Himalayan region and some parts of northern India received *normal/deficient* rainfall with the passage of a series of WDs. In the second week, with the shifting of Inter Tropical Convergence Zone (ITCZ) more towards

equator, the tropical easterlies remained subdued thereby, ceasing the northeast monsoon activity. During the second half of the month, confluence of winds in the lower tropospheric levels, aided by the upper level divergence ahead of a trough in mid & upper tropospheric westerlies caused *scattered to widespread* rainfall and hailstorm at isolated places over parts of central, north & east India. Towards the end of the month, the influence of westerly systems was seen in the form of *scattered to widespread* precipitation over western Himalayan region and *isolated* rainfall over northeast region.

3.1.4. Temperature

The presence of moisture in the lower troposphere from the tropical oceans, together with the High index phase of the mid-latitude westerlies barred the establishment of *cold wave* conditions during the first two weeks of January month. Thereafter in the last week, in association with the Low index phase, cold & dry northwesterly wind intruded over north & central India led to the establishment of *cold/severe cold wave* conditions over major parts of north, central and adjoining parts of peninsular India.

Severe cold wave conditions prevailed on 1 to 3 days in some parts of Odisha, Vidarbha and Chhattisgarh. *Cold wave* conditions prevailed on 1 to 2 days in some parts of east Rajasthan, Madhya Pradesh, Gujarat Region, Marathwada and Chhattisgarh. *Severe cold day* conditions prevailed on 1 to 2 days in some parts of east Uttar Pradesh, Punjab and Madhya Pradesh and *cold day* conditions prevailed on 1 to 3 days in some parts of Bihar, Uttar Pradesh, Haryana, Chandigarh & Delhi, Punjab and east Rajasthan.

Maximum temperature was above normal over most parts of the country except for some parts of northern/northeastern region. It was appreciably above normal over parts of Jammu & Kashmir and adjoining Himachal Pradesh and above normal over most parts of peninsula, central and western region. However, it was below normal over parts of Punjab and adjoining West Rajasthan, East Uttar Pradesh, Sikkim and Gangetic West Bengal,

Minimum temperature was also above normal over most parts of north, northwest, west, and some parts of peninsular India.

Analogous to December 2015, Kashmir valley continued to reel under extreme cold. Many places, viz.; Kargil IAF (minus 15.6 °C on 24th), Leh (minus 14.7 °C, on 10th) Pahalgam (minus 5.8 °C on 15th),

Srinagar (minus 4.4 °C on 19th) and Gulmarg (minus 6.0 °C, on 19th) reported sub-zero temperatures.

The month's and the season's lowest minimum temperature over the plains of the country was 0.7 °C recorded at Chandigarh (Haryana, Chandigarh & Delhi) on 23rd January, 2016.

3.1.5. Disastrous weather events and damage

According to press and media reports, heavy snowfall and avalanche in Jammu & Kashmir claimed 6 lives. *Cold wave* claimed 4 lives in West Bengal and 2 each in Uttar Pradesh and Rajasthan. Poor visibility and thick fog affected normal life and air/train services in north India and claimed 5 lives in Uttar Pradesh.

3.2. February

3.2.1. Storms and depressions

No intense low pressure system formed over the Indian Seas during the month. However, a low pressure area formed over south Bay of Bengal in the second week of the month and though lasted for almost a week, it did not produce much weather over the Indian region. Also, one short-lived induced low pressure area formed over Pakistan and adjoining areas of Punjab and northwest Rajasthan

3.2.2. Other synoptic features and associated weather

As given in Table 3, 19 WDs (including 1 induced low pressure area, 4 upper air cyclonic circulations, 3 induced cyclonic circulations and 11 troughs in westerlies), 16 upper air cyclonic circulations and 7 troughs in the easterlies formed which affected the weather over the country during the month of February.

3.2.3. Monthly rainfall

Out of the 36 met-subdivisions, the month's rainfall was *large excess* in 1, *excess* in 1, *normal* in 4, *deficient* in 6 and *large deficient* in 19 sub-divisions. There was *no rain* in 5 sub-divisions.

During the month, rainfall activity over the country as a whole was very subdued. Except for some subdivisions of eastern/northeastern region and south peninsula which received *excess/normal* rainfall, most parts of the country received *deficient/large deficient /no rainfall*.

The passage of active WDs caused *widespread* to *fairly widespread* precipitation over western Himalayan region, east and northeast region and *isolated* rainfall over plains of north and central India. The perturbations in the easterlies led to *isolated* rainfall over parts of south peninsular India in the mid of February. Towards the end of the month, confluence of lower tropospheric westerlies with the moist outflow from an anticyclone over the Bay of Bengal caused scattered to fairly widespread convective rainfall over east India and a trough in the lower level easterlies superposed by jet speed winds in the upper troposphere caused isolated to scattered Thunderstorms / Hailstorms over northern parts of peninsular India and adjoining central India.

3.2.4. Temperature

February, being a transition period from winter to summer, the weather over most parts of the country during the month is normally very comfortable.

However, this year the maximum and minimum temperatures were above normal with substantially above normal during second fortnight of the month. No *Cold wave conditions* prevailed almost throughout the month.

An anomalously located lower tropospheric anticyclone caused the day maximum temperatures to cross the 40 °C mark in parts of Odisha on 20th and parts of Telangana and north interior Karnataka on 23rd, viz., Anantapur (40.3 °C on 23rd), Nizamabad (40.6 °C, on 23rd), and Gulbarga (40.3 °C on 23rd).

During the month, the lowest minimum temperature recorded over the plains of the country was 2.4 °C at Amritsar (Punjab) on 1st & 17th February, 2016.

Disastrous weather events and damage

According to press and media reports, Avalanche/landslide at Siachen glaciers claimed life of 10 soldiers in Jammu & Kashmir. Lightning claimed 1 life each in Marathwada and Telangana. Hailstorm over Madhya Maharashtra, Marathwada and Vidarbha led to damage of standing crops and mango plantation in around 40000 hectares of land in various parts of State. It claimed 5 lives.

Appendix

Definitions of the terms given in '*Italics*'

Snowfall

Light Snowfall - 10.4 cm or less

Moderate Snowfall - 10.5 to 64.4 cm
Heavy - 64.5 cm to 115.5 cm
Very heavy - 115.6 to 204.4 cm.
Extremely Heavy - ≥ 204.5 cm

Rainfall

Very light - 0.1 to 2.4 mm
Light - 2.5 to 15.5 mm
Moderate - 15.6 to 64.4 mm
Heavy - 64.5 to 115.5 mm
Very heavy - 115.6 to 204.4 mm
Extremely Heavy - ≥ 204.5 mm
Large Excess - percentage departure from normal rainfall is + 60% or more
Excess - percentage departure from normal rainfall is + 20% to +59%
Normal - percentage departure from normal rainfall is +19% to -19%
Deficient - percentage departure from normal rainfall is -20% to -59%
Large Deficient - percentage departure from normal rainfall is from - 60 % or less
No rain (NR) - -100%

Temperatures

Cold Wave - [As per the criteria with effect from 1st January, 2016]

It should be based on the actual minimum temperature of a station.

Cold Wave is considered when minimum temperature of a station is 10 °C or less for plains and 0 °C or less for Hilly regions.

Based on Departure

Cold Wave - Negative Departure from normal is 4.5 °C to 6.4 °C
Severe Cold Wave - Negative Departure from normal is more than 6.4 °C

(a) *Based on Actual Minimum Temperature (For plain stations only)*

Cold Wave - When minimum temperature is ≤ 04 °C
Severe Cold Wave - When minimum temperature is ≤ 02 °C

(b) Cold Day

It is considered when minimum temperature is 10 °C or less for plains and 0 °C or less for Hilly regions

Cold day - Maximum Temperature Departure is -4.5 °C to -6.4 °C

Severe Cold day - Maximum Temperature Departure is < -6.4 °C

Cold Wave conditions for coastal stations

When minimum temperature departure is -4.5 °C or less over a station, "Cold Wave" may be described if the minimum temperature is 15 °C or less.

Cold day/cold wave or heat wave/warm night should be described, if conditions are satisfied simultaneously.

Markedly below normal - departure of minimum temperature from normal is from -5 °C or less.

Appreciably below normal - departure of minimum temperature from normal is from -3.1 °C to -5 °C.

Below normal - departure from normal is -1.6 °C to -3.0 °C.

Normal - departure from normal is -1.5 °C to +1.5 °C.

Markedly above normal - departure of minimum temperature from normal is + 5 °C or more.

Appreciably above normal - departure of minimum temperature from normal is from +3.1 °C to +5 °C.

Above normal - departure of minimum temperature from normal is + 1.6 °C to 3.0° C.
