

Weather in India

WINTER SEASON (January-February 2018)†

1. Introduction

The winter season, 2018, was marked by *severe cold wave/cold wave** and *cold day* conditions over Northern, northwestern and eastern parts of India. However these cold wave conditions were confined to the month of January only. *Dense to very dense* fog prevailed over northern, northwestern and eastern parts of the country during January and February.

The equatorward shifting of Inter Tropical Convergence Zone (ITCZ) together with the prevalence of dry weather over southern peninsular India indicated the cessation of North East Monsoon rains over Tamil Nadu & Puducherry, Kerala and adjoining parts of Andhra Pradesh and Karnataka from 15th January, 2018.

During the winter season India experienced a pre-dominantly dry weather. However Andaman & Nicobar Islands was the only sub-division that received *large excess* rainfall throughout the season. Apart from Andaman & Nicobar Islands parts of Marathwada and Vidarbha, Arunachal Pradesh and Jammu & Kashmir also received *normal to excess* rainfall during the various periods of the season. For the winter season 2018, rainfall for the country as a whole was 38% of its Long Period Average (LPA) value. The area weighted rainfall for the season this year was 15.4 mm. It was third lowest since 1901 after the years 2000 (8.2 mm) and 1902 (10.6 mm).

A low pressure area formed over the Bay of Bengal in the month of January. It formed over southeast Bay of Bengal and adjoining south Andaman Sea on 6th January and became less marked on 9th January.

2. Seasonal Rainfall (January-February)

The monthly and seasonal sub-division wise rainfall (actual, normal & percentage departure) are given in 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 1, *normal* in 1, *deficient* in 10, *large deficient* in 22 and *no rain* in 1 sub-division. The

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

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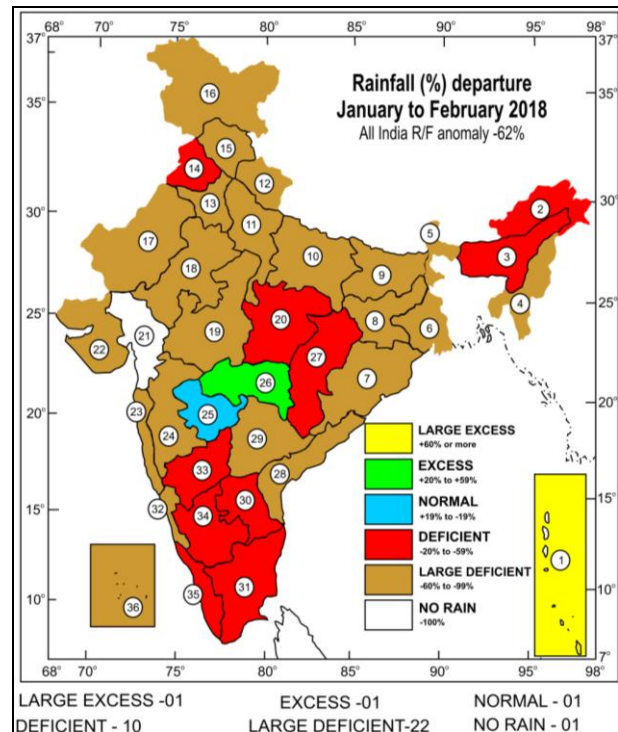


Fig. 1. Sub-division wise rainfall percentage departures for the season Jan-Feb 2018. Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

1 145	7 -99	13 -68	19 -74	25 02	31 -46
2 -33	8 -88	14 -51	20 -44	26 20	32 -81
3 -51	9 -98	15 -72	21 -100	27 -41	33 -52
4 -71	10 -84	16 -62	22 -99	28 -99	34 -29
5 -72	11 -80	17 -97	23 -99	29 -83	35 -30
6 -94	12 -68	18 -98	24 -94	30 -30	36 -64

percentage departures falling under various categories viz. *large excess*, *excess*, *normal*, *deficient*, *large deficient* and *no rain* are shown in Fig. 1.

3. Monthly features

3.1. January

3.1.1. Low pressure areas

One low pressure area formed over the Indian Sea during the month. A low pressure area (6-9 January)

TABLE 1
Sub-divisionwise rainfall (mm) for each month and season as a whole (January-February, 2018)

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	167.3	53.7	212	36.2	29.2	24	203.5	82.9	145
2.	Arunachal Pradesh	30.9	50.1	-38	67.7	98.0	-31	98.6	148.1	-33
3.	Assam & Meghalaya	5.9	16.4	-64	17.1	30.5	-44	23.0	46.9	-51
4.	Naga., Mani., Mizo. and Tri.	6.0	13.7	-56	6.7	30.3	-78	12.7	44.0	-71
5.	Sub-Himalayan West Bengal & Sikkim	2.5	26.6	-90	14.4	33.7	-57	16.9	60.3	-72
6.	Gangetic West Bengal	0.0	13.5	-100	2.2	20.9	-89	2.2	34.4	-94
7.	Orissa	0.0	10.8	-99	0.4	21.0	-98	0.4	31.8	-99
8.	Jharkhand	0.0	16.1	-100	3.8	17.3	-78	3.8	33.4	-88
9.	Bihar	0.0	13.3	-100	0.4	9.7	-96	0.4	23.0	-98
10.	East Uttar Pradesh	0.7	16.8	-96	4.1	12.1	-66	4.8	28.9	-84
11.	West Uttar Pradesh	1.9	18.2	-89	4.8	15.1	-68	6.7	33.3	-80
12.	Uttaranchal	17.5	52.1	-66	16.3	54.1	-70	33.7	106.2	-68
13.	Haryana, Chandigarh & Delhi	5.0	17.8	-72	5.4	15.1	-65	10.4	32.9	-68
14.	Punjab	9.4	25.2	-63	14.7	24.3	-40	24.1	49.5	-51
15.	Himachal Pradesh	9.2	97.5	-91	46.4	98.0	-53	55.5	195.5	-72
16.	Jammu & Kashmir	4.4	95.7	-95	75.5	117.2	-36	80.0	212.9	-62
17.	West Rajasthan	0.2	2.9	-92	0.0	4.5	-99	0.3	7.4	-97
18.	East Rajasthan	0.1	5.6	-98	0.1	4.9	-99	0.2	10.5	-98
19.	West Madhya Pradesh	0.0	8.5	-99	3.5	5.1	-31	3.5	13.6	-74
20.	East Madhya Pradesh	0.0	20.0	-100	19.7	15.3	29	19.7	35.3	-44
21.	Gujarat region	0.0	0.8	-100	0.0	0.2	-100	0.0	1.0	-100
22.	Saurashtra & Kutch	0.0	0.1	-100	0.0	0.2	-99	0.0	0.3	-99
23.	Konkan & Goa	0.0	0.1	-100	0.0	0.0	-90	0.0	0.1	-99
24.	Madhya Maharashtra	0.0	1.1	-100	0.1	0.8	-85	0.1	1.9	-94
25.	Marathawada	0.0	3.8	-100	6.9	3.0	131	6.9	6.8	2
26.	Vidarbha	0.0	10.2	-100	20.6	7.0	194	20.6	17.2	20
27.	Chattisgarh	0.0	10.5	-100	12.3	10.3	19	12.3	20.8	-41
28.	Coastal Andhra Pradesh	0.1	8.3	-99	0.1	10.4	-99	0.2	18.7	-99
29.	Telangana	0.0	6.2	-100	2.1	5.7	-64	2.1	11.9	-83
30.	Rayalaseema	0.0	3.0	-100	4.6	3.6	28	4.6	6.6	-30
31.	Tamil Nadu	6.3	17.5	-64	10.6	13.4	-21	16.8	30.9	-46
32.	Coastal Karnataka	0.0	0.7	-100	0.2	0.2	-14	0.2	0.9	-81
33.	North interior Karnataka	0.0	2.2	-100	1.9	1.7	10	1.9	3.9	-52
34.	South interior Karnataka	0.0	1.4	-100	3.1	3.0	4	3.1	4.4	-29
35.	Kerala	2.0	8.7	-76	15	15.6	-4	17.1	24.3	-30
36.	Lakshadweep	10.7	20.8	-48	2.1	14.7	-86	12.8	35.5	-64

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

TABLE 2
Details of the weather systems during January 2018

S. No.	System	Duration	Place of initial location	Direction of Movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Low pressure area						
1.	Low pressure area	6-9 (Morning)	South east Bay of Bengal and adjoining south Andaman Sea	West	Equatorial Indian Ocean and adjoining central parts of south Bay of Bengal	It lay initially as a trough of low at mean sea level over south Andaman Sea and adjoining southeast Bay of Bengal Bay of Bengal off Sri-Lanka - Tamil Nadu coasts. It again lay as a trough at mean sea level over southwest Bay of Bengal on 9 th till 16 th over equatorial Indian Ocean. Became less marked on 17 th
(B) Western disturbances /eastward moving systems						
<i>(i) Low pressure area</i>						
1.	Low Pressure area	23	West Rajasthan and adjoining Pakistan	Stationary	<i>In situ</i>	Initially it lay as a cyclonic circulation over Iran and neighbourhood on 20, with a trough lay aloft with axis at 7.6 km a.s.l. Low became less marked on 24. Associated cyclonic circulation extending upto 5.8 kms a.s.l. with a trough aloft with its axis at 7.6 kms a.s.l. System moved away east-northeastwards on 25
<i>(ii) Upper air cyclonic circulation</i>						
1.	Between 3.1 and 3.6 km a.s.l.	4-19	East Afghanistan and adjoining north Pakistan	Northeast wards	Jammu & Kashmir and neighbourhood	Moved away northeastwards.
2.	At 3.1 km a.s.l.	8	East Afghanistan and adjoining Pakistan	Stationary	<i>In situ</i>	Merged with another western disturbance along Long. 65° E and north of Lat. 35° N on 10
3.	Do	19-21	South Afghanistan and neighbourhood	East-northeast	Northeast Jammu & Kashmir and neighbourhood	The WD moved away on 21. It lay initially as a cyclonic circulation with a trough aloft in mid and upper tropospheric westerlies which moved away northeastwards
4.	Do	27-29	North Pakistan and neighbourhood	East-northeast-wards	Do	Moved away east northeastwards
5.	Upto 9.5 km a.s.l.	27-31	Iraq and neighbourhood	East	Eastern parts of Iran and neighbourhood	It lay as a trough at 3.1 km a.s.l. on 30. Moved away northeastwards
6.	Between 3.1 & 3.6 kms a.s.l.	16-17	north Afghanistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	A trough lay aloft with axis at 5.8 km a.s.l. It moved away northeastward on 18. W.D. moved away on 19
<i>(iii) As a trough</i>						
1.	Mid & upper tropospheric levels	3-4	Along Long. 55° E to the north of Lat. 34° N (axis at 5.8 kms a.s.l.)	East	Along Long. 90° E to the north of Lat. 24° N (axis at 5.8 kms a.s.l.)	Moved away eastwards

TABLE 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2.	Mid tropospheric levels	9-14	Along Long. 65° E to the north of Lat. 35° N	East	Along Long. 67° E to the north of Lat. 25° N	Became less marked on 14. It lay as an upper air cyclonic circulation over north Pakistan and neighbourhood with a trough aloft on 13. The trough aloft moved away northeastwards
3.	Mid & upper tropospheric levels	31 Jan - 6 Feb	Along Long. 56° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	Northeast	Over Jammu & Kashmir and adjoining north Pakistan	Moved away northeastwards
<i>(iv) As induced cyclonic circulation</i>						
1.	Upto lower tropospheric level	4-6	Central Pakistan and adjoining west Rajasthan	North	Haryana and neighbourhood	Became less marked on 6
2.	At 1.5 km a.s.l.	17	Punjab and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 18
3.	Upto 1.5 km a.s.l.	22-23	Central Pakistan and adjoining Punjab and north west Rajasthan	Do	Do	Merged with the trough aloft at 5.8 km a.s.l. on 23
4.	Upto 0.9 km a.s.l.	30	West Rajasthan and neighbourhood	Do	Do	Became less marked on 31
<i>(C) Other upper air cyclonic circulations</i>						
1.	Upto lower tropospheric levels	1-2	East Uttar Pradesh and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 3
2.	Between 2.1 & 3.6 km a.s.l.	3	Sub-Himalayan West Bengal & Sikkim and adjoining Assam	Do	Do	Became less marked on 4
3.	Upto Lower tropospheric levels	2-3	South Gujarat and neighbourhood	North	North Gujarat and neighbourhood	Became less marked on 4
4.	Upto 2.1 km a.s.l.	4	Eastern parts of Bangladesh	Stationary	<i>In situ</i>	Became less marked on 5
5.	At 1.5 km a.s.l.	6	East Assam and neighbourhood	Do	Do	Became less marked on 7
6.	Between 3.1 and 3.6 km a.s.l.	5-6	Southeast Arabian Sea off Kerala coast	West	Southeast Arabian Sea off south Kerala coast	Became less marked on 7
7.	Upto 2.1 km a.s.l.	7-10	West Assam and neighbourhood	East	Mizoram and neighbourhood	Became less marked on 11
8.	Upto lower tropospheric levels	7-8	Coastal Karnataka and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 9
9.	At 3.1 km a.s.l.	8-9	Northeast Assam and neighbourhood	Do	Do	Became less marked on 10
10.	Upto 3.1 km a.s.l.	9-10	Maldives and neighbourhood	Do	Do	Moved away westwards
11.	Do	11-17	Bangla Desh and neighbourhood	East	Mizoram, Tripura neighbourhood	Moved away eastwards
12.	Between 1.5 and 3.1 km a.s.l.	16-17	Malay peninsula and adjoining Andaman Sea	Stationary	<i>In situ</i>	Became less marked on 18
13.	Upto 2.1 km a.s.l.	17-18	Lakshadweep area and neighbourhood	Quasi-Stationary	Maldives area and neighbourhood	Became less marked on 19
14.	Upto 3.1 km a.s.l.	17	Southwest Bay of Bengal off Tamil Nadu coast	Stationary	<i>In situ</i>	Became less marked on 18
15.	At 0.9 km a.s.l.	18-20	Southwest Rajasthan and neighbourhood	East	East Rajasthan and neighbourhood	Became less marked on 21

TABLE 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
16.	Between 1.5 and 2.1 km a.s.l.	19-22	Sub-Himalayan West Bengal	East	East Bangladesh and neighbourhood	Became less marked on 23
17.	At 3.1 km a.s.l.	18	South interior Karnataka and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 19
18.	Upto 0.9 km a.s.l.	19-21	North Kerala coast and neighbourhood	West	Lakshadweep and neighbourhood	Became less marked on 22
19.	At 1.5 km a.s.l.	23	Southwest Bay of Bengal off north Tamil Nadu	Stationary	<i>In situ</i>	Became less marked on 24
20.	Do	24-26	Southeast Arabian Sea off Kerala coast	Do	Do	Became less marked on 27
21.	At 3.1 km a.s.l.	25-28	Sikkim and neighbourhood	East	Meghalaya and neighbourhood	Became less marked on 29
22.	Upto 0.9 km a.s.l.	25-28	South interior Karnataka and neighbourhood	North	North interior Karnataka and neighbourhood	Became less marked on 29
23.	At 1.5 km a.s.l.	27-28	Lakshadweep and neighbourhood	Stationary	<i>In situ</i>	Moved away westwards
24.	At 0.9 km a.s.l.	27	Southwest Bay of Bengal off Tamil Nadu coast	Do	Do	Became less marked on 28
25.	Between 1.5 and 3.1 km a.s.l.	28-30	Malay Peninsula and adjoining south Andaman Sea	Do	Do	Became less marked on 31
26.	Upto 0.9 km a.s.l.	29	East Bihar and neighbourhood	Do	<i>In situ</i>	Became less marked on 30
27.	Upto 1.5 km a.s.l.	31 Jan-4 Feb	East Bihar and adjoining Sub-Himalayan west Bengal	Northeastwards	East Bangladesh and neighbourhood	Became less marked on 3 February
(D) Trough in easterlies						
1.	Upto 1.5 km a.s.l.	1-2	Southwest Bay of Bengal to west central Bay of Bengal off Tamil Nadu and Andhra Pradesh coast	Stationary	<i>In situ</i>	Became less marked on 3
(E) Other troughs						
1.	At mean sea level	5	Southwest Bay of Bengal off Sri Lanka coast	Stationary	<i>In situ</i>	Became less marked on 6
2.	Do	4-5	Maldives - Lakshadweep area	Quasi-Stationary	Lakshadweep area and adjoining southeast Arabian Sea	Became less marked on 7
3.	Do	11-17	Southeast Bay of Bengal and adjoining Nicobar Islands	West	Equatorial Indian Ocean and adjoining central parts of south Bay of Bengal	Became less marked on 18
4.	Do	14-15	Maldives area to north Maharashtra coast	Do	Maldives area to east central Arabian Sea	Became less marked on 16
5.	Do	18-22	Malay peninsula and adjoining south Andaman Sea	Do	Southwest Bay of Bengal and adjoining Sri Lanka	Became less marked on 23
6.	At 0.9 km a.s.l.	19	East Bihar and Bangladesh	Stationary	<i>In situ</i>	Became less marked on 20
7.	Do	20-25	From the cyclonic circulation over Lakshadweep area to Karnataka coast	West	Lakshadweep area to southeast Arabian Sea off Kerala coast	Seen as a trough at mean sea level from Maldives area to northeast Arabian Sea off south Gujart coast on 22, moved away on 25

TABLE 2 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
8.	At mean sea level	25-31	Southeast Bay of Bengal and neighbourhood	West	Equatorial Indian Ocean and adjoining southwest Bay of Bengal off south Sri-Lanka coast	Became less marked on 1 February
9.	Upto 3.1 km a.s.l.	21 Jan-1 Feb	Do	South	Equatorial Indian ocean	It initially lay as a cyclonic circulation over Malay peninsula and adjoining south Andaman Sea
10.	At mean sea level	30	Lakshadweep and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 31
11.	Do	31 Jan-7 Feb	Maldives area and neighbourhood	Quasi-stationary	Maldives area to east central Arabian Sea off coastal Karnataka	Moved away westwards on 8 th . The embedded cyclonic circulation became less marked on 2

formed over southeast Bay of Bengal and adjoining Andaman Sea on 6th of January. This system remained over the equatorial Indian Ocean and adjoining central parts of south Bay of Bengal during 6-9 January. It caused *widespread to fairly widespread* rainfall over Andaman & Nicobar Islands.

3.1.2. Weather and associated synoptic features

As given in Table 2, 11 Western Disturbances (WDs) (including one low pressure area, 6 upper air cyclonic circulations, 3 troughs in westerlies and 1 induced cyclonic circulation), 29 upper air cyclonic circulations, 8 troughs of low, 2 troughs in easterlies formed and affected the weather over the country during the month of January.

3.1.3. Monthly rainfall

Out of the 36 met-subdivisions of India, the month's rainfall was *large excess* in 1, *deficient* in 3, *large deficient* in 16, sub-divisions and *no rain* in 16 sub-divisions. During the month, rainfall activity over the country as a whole was below normal. Except Andaman & Nicobar Islands, all the remaining sub-divisions received *deficient/large deficient or no rainfall*. Andaman & Nicobar Islands received nearly three times the normal rainfall.

In the month of January dry weather prevailed over major parts of the country except the Andaman and Nicobar Islands which received rainfall nearly all through the month due to the formation of low pressure area over the southeast Bay of Bengal and adjoining south Andaman Sea as well as the trough of lows that existed throughout the month over southeast Bay of Bengal and adjoining

Andaman Sea. It received *widespread, fairly widespread and scattered* rainfall during the first fortnight while scattered to isolated rainfall during the latter half of the month.

The presence of the cyclonic circulations over northeast regions led to *scattered/ isolated* rainfall over the northeast regions. The passage of the WDs across northern parts of India caused isolated rainfall over Jammu & Kashmir and Himachal Pradesh and northern parts of India during the first half of the month. The Cyclonic circulations over Lakshadweep area and neighbourhood caused rainfall over Kerala and adjoining area while the cyclonic circulation over Rajasthan and neighbourhood led to rainfall over there.

3.1.4. Temperature

The gradual change of the high index phase to low index phase of the mid latitude circulation led to the development of cold waves in the first week of the month. The frequent passages of the WDs also facilitated the establishment of *severe cold wave and cold wave conditions* over the North and North western region and the adjoining central parts. Subsequent to the passage of the WDs temperatures over Uttar Pradesh, Bihar, Madhya Pradesh, Gangetic West Bengal, Odisha, Haryana, Chandigarh & Delhi, Punjab, Himachal Pradesh and Vidarbha dropped sharply over the region owing to the cold and dry air advection from the north. This led to the drop in temperatures to sub-zero level and severe *cold day* conditions and *cold day* conditions were also reported over north, northwestern and eastern regions of the country.

Severe cold wave conditions prevailed on 1 to 3 days over some parts of Rajasthan, Bihar, east Madhya

TABLE 3
Details of the weather systems during February 2018

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>(i) Upper air cyclonic circulation</i>						
1.	At 3.1 km a.s.l.	8-12	Eastern parts of Iran and adjoining Afghanistan	East	Pakistan and adjoining east Afghanistan	A trough lay aloft with its axis at 5.8 km a.s.l. along Long. 55° E and to the north of Lat. 32° N. The WD lay as a trough in mid and upper tropospheric westerlies
2.	Upto 9.5 km a.s.l.	19-22	Western parts of Iran and neighbourhood	Do	Along Long. 78° E to the north of Lat. 35° N	It lay as a trough in westerlies. It moved away east northeast wards on 23
3.	Upto 3.1 km a.s.l.	22-26	Do	Do	North Pakistan and adjoining Jammu & Kashmir	A trough lay aloft. It moved away northeastwards on 27
<i>(ii) As trough in westerlies</i>						
1.	Mid and upper tropospheric levels	1-3	Along Long. 52° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	Northeast	Along Long. 62° E to the north of Lat. 30° N (axis at 3.1 kms a.s.l.)	Merged with the western disturbance over Jammu & Kashmir and adjoining north Pakistan on 4 February
2.	Do	4-6	Along Long. 55° E to the north of Lat. 34° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 60° E to the north of Lat. 15° N (axis at 5.8 kms a.s.l.)	Moved northeastwards on 7
3.	Do	7-8	Along Long. 65° E to the north of Lat. 25° N (axis at 5.8 kms a.s.l.)	Do	North Pakistan and neighbourhood	Moved away east northeast wards on 9. Initially it lay as a cyclonic circulation from 8-12 over Pakistan and adjoining east Afghanistan
4.	Do	13-16	Along Long. 64° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 94° E to the north of Lat. 22° N (axis at 5.8 kms a.s.l.)	Moved away northeastwards
5.	At 3.1 km a.s.l.	13-17	Along Long. 72° E to the north of Lat. 28° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 84° E to the north of Lat. 32° N (axis at 5.8 kms a.s.l.)	Moved away northeastwards
6.	Between 3.1 and 3.6 km A.s.l.	19-20	Along Long. 87° E to the north of Lat. 25° N (axis at 5.8 kms a.s.l.)	Stationary	<i>In situ</i>	Moved away northeastwards
7.	Mid and upper tropospheric levels	26-28	Along Long. 55° E to the north of Lat. 25° N (axis at 5.8 kms a.s.l.)	Northeast	Along Long. 70° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards
<i>(iii) Induced Cycir</i>						
1.	At 1.5 km a.s.l.	5	Punjab and adjoining Haryana	Stationary	<i>In situ</i>	Became less marked on 6
2.	Do	6	Central Pakistan and adjoining Punjab	East	Haryana and neighbourhood	Became less marked on 7
3.	At 0.9 km a.s.l.	7	Punjab and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 8
4.	Upto 2.1 km a.s.l.	10-13	South Pakistan and neighbourhood	Northeast	Northeast Rajasthan and neighbourhood	Became less marked on 14
5.	Upto 1.5 km a.s.l.	24-25	North west Rajasthan and neighbourhood	Northwest	Haryana and neighbourhood	Became less marked on 26

TABLE 3 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(B) Other upper air cyclonic circulations						
1.	Upto 1.5 km a.s.l.	2-5	Bay of Bengal off south Tamil Nadu coast	Quasi-stationary	Southwest Bay of Bengal off south Sri Lanka	Became less marked on 6
2.	Do	4	Southern parts of east Madhya Pradesh	Stationary	<i>In situ</i>	Became less marked on 5
3.	Do	5-6	Sub-Himalayan West Bengal and neighbourhood	South	Northern parts of Bangladesh and neighbourhood	Initially lay as a trough extending up to 1.5 km a.s.l. on 4
4.	Upto 3.1 km a.s.l.	2-4	North interior Karnataka and neighbourhood	North	South Maharashtra and neighbourhood	Became less marked on 5
5.	At 1.5 km a.s.l.	7	Konkan and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 8
6.	Upto 0.9 km a.s.l.	10	West Rajasthan and neighbourhood	Do	Do	Became less marked on 11
7.	Do	9	Jharkhand and adjoining areas of north Odisha and Gangetic West Bengal	Do	Do	Became less marked on 10
8.	Upto 0.9 km a.s.l.	11-13	South Maharashtra and neighbourhood	East	Marathwada and neighbourhood	Became less marked on 14
9.	Upto 1.5 km a.s.l.	11-14	East Bangladesh and neighbourhood	Do	Nagaland-Manipur-Mizoram-Tripura and neighbourhood	Became less marked on 15
10.	Upto 0.9 km a.s.l.	8	Southwest Madhya Pradesh and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 9
11.	Upto 3.1 km a.s.l.	14	Gujarat region and neighbourhood	Do	Do	Became less marked on 15
12.	At 3.1 km a.s.l.	16-22	South interior Karnataka and neighbourhood.	North	Konkan and neighbourhood	It lay as a trough in lower level easterlies extending upto 0.9 km a.s.l. (from east central Arabian Sea off Goa coast to north Maharashtra coast) on 20 and again as a cyclonic circulation over Konkan and neighbourhood at 0.9 km a.s.l. on 21. It merged with the trough in easterlies at 0.9 km a.s.l. (from Lakshadweep area to north Madhya Maharashtra across coastal Karnataka and south Konkan)
13.	Upto 0.9 km a.s.l.	20-28	Northeastern parts of Bangladesh and neighbourhood	East	Eastern parts of Bihar to Manipur	Seen as a trough from east Bihar to south Bangladesh (22 Feb-1 March). Became less marked on 1 March
14.	Upto 2.1 km a.s.l.	22-23	Southwest Bay of Bengal off south Tamil Nadu Sri Lanka coast	Stationary	Southwest Bengal and adjoining Sri Lanka	Became less marked on 24
15.	Upto 0.9 km a.s.l.	24	Southwest Bay of Bengal off south Sri Lanka coast	Do	<i>In situ</i>	Became less marked on 25
16.	Do	25	North Chhattisgarh and neighbourhood	Do	Do	Became less marked on 26
17.	At 0.9 km a.s.l.	28 Feb-2 March	South Pakistan and adjoining southwest Rajasthan and north Gujarat	East	Southwest Rajasthan and neighbourhood	Became less marked on 2

TABLE 3 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
18.	Upto 0.9 km a.s.l.	28 Feb-1 March	Northeast Odisha and adjoining Gangetic west Bengal and Jharkhand	Stationary	<i>In situ</i>	Became less marked on 1 March
(C) Trough in easterlies						
1.	Upto 0.9 km a.s.l.	14	Lakshadweep area	Stationary	<i>In situ</i>	Became less marked on 15
2.	Upto 1.5 km a.s.l.	17	Southwest Bay of Bengal off Sri Lanka coast	Do	Do	Became less marked on 18
3.	At 0.9 km a.s.l.	22	Lakshadweep area to north Madhya Maharashtra	Do	Do	Became less marked on 23
(D) Other troughs/Wind discontinuity						
1.	At mean sea level	3	Nicobar Islands and neighbourhood	Stationary	<i>In situ</i>	Became less marked on 4
2.	Do	6-9	Southwest Bay of Bengal	South	Southwest Bay of Bengal and adjoining south Sri Lanka	Became less marked on 10
3.	Do	9-13	Southeast Arabian Sea off Kerala coast	Stationary	<i>In situ</i>	Became less marked on 14
4.	Do	13	Southeast Bay of Bengal and adjoining equatorial Indian ocean	Do	Do	Became less marked on 14
5.	Do	16-25	Southeast Arabian Sea to east central Arabian Sea off south Maharashtra coast	Oscillatory	Southeast Arabian Sea off Kerala coast to south Maharashtra coast	Became less marked on 26
6.	Do	21 Feb-1 March	South Andaman Sea	West	Equatorial Indian Ocean and adjoining south Sri Lanka	An embedded cyclonic circulation extended upto 0.9 km a.s.l. during 27-1March. Trough became less marked on 2
7.	Upto 0.9 km a.s.l.	25-26	Lakshadweep area to west Madhya Pradesh	Oscillatory	From Kerala coast to south Maharashtra	Became less marked on 27
8.	At mean sea level	28 Feb-2 March	Southeast Arabian Sea off Kerala coast to Maharashtra coast	Stationary	<i>In situ</i>	Became less marked on 3 March

Pradesh, east Uttar Pradesh, Gangetic West Bengal, Haryana Chandigarh & Delhi and Odisha.

Cold wave conditions prevailed on 11 to 15 days over some parts of Odisha, Bihar and Rajasthan, on 7 to 5 days over some parts of Gangetic West Bengal, Madhya Pradesh, Uttar Pradesh and Haryana, Chandigarh & Delhi and on 1 to 4 days over Punjab, Haryana, Chandigarh, Delhi, Himachal Pradesh, Jammu & Kashmir, Uttarakhand, Himachal Pradesh, Vidarbha. *Severe cold day* conditions prevailed on 14-16 days over some parts of Bihar and east UP and on 1 to 4 days over some parts of Uttar Pradesh and Punjab. *Cold day conditions* prevailed on 6-8 days over some parts of Sub-Himalayan West Bengal & Sikkim, Uttar Pradesh and Bihar and on 1-5 days over some parts of Tripura, Gangetic West Bengal, Uttarakhand, Haryana, Chandigarh & Delhi and Punjab.

The minimum temperatures were *normal to below normal* over most parts of India in the first two weeks as well as the last week of January. They were *normal to above normal* during the third week. The minimum temperatures were *appreciably below normal to below normal* over Gangetic west Bengal, Odisha, Jharkhand, Bihar, Uttar Pradesh and peninsular India all through the month. The temperature remained *appreciably above normal* in the first week over Nagaland, Manipur, Mizoram & Tripura sub-division. It was also *appreciably to markedly above normal* over Gujarat region, Saurashtra & Kutch, Konkan & Goa and Madhya Maharashtra.

The month's and the season's lowest minimum temperature over the plains of the country was 0° C recorded at Sikar (east Rajasthan) on 16th January, 2018.

TABLE 4

Some representative amounts of rainfall in cm for January and February 2018 (1 cm and above)

Date	Some representative amounts of rainfall in cm for January and February 2018 (1 cm and above)
1 Jan	Sullurpeta and Nancowry 1 each
2 Jan	Khowai, Lengpui, Nancowry, Haflong and Aizawal 1 each
3 Jan	Car Nicobar and Nancowry 5 each, Car Nicobar IAF, Hut Bay and Maya Bandar 4 each, Kamalpur and Jharnapani 2 each, Lumding, Kiphire AWS, Bokajan, Kohima and Roing 1 each
4 Jan	Maya Bandar and Port Blair 4 each, Nancowry 3, Hut Bay, Long Islands and Tuting 2 each, Shillong AWS, Shillong and Along AWS 1 each
5 Jan	Nancowry 4, Maya Bandar and Hut Bay 3 each, Port Blair and Car Nicobar 1 each
6 Jan	Car Nicobar IAF 8, Hut Bay, Maya Bandar and Tuting 3 each, Nancowry, Long Islands and Port Blair 2 each, Badatighat and Car Nicobar 1 each
7 Jan	Maya Bandar 6, Along AWS 2, Tuting, Roing, Long Islands and Nancowry 1 each
8 Jan	Kuzhithurai 2, Minicoy 1
9 Jan	Nil
10 Jan	Karaikal 10, Chidambaram 9, Sethiathope and Nagapattinam 5 each, Anaikaranchatram (Kollid), Nannilam and Sirkali 4 each, Needamangalam, Tiruvarur, Mayiladuthurai, Trangambadi, Srimushnam, Aduthurai AWS, Thiruvaidaimaruthur, Tiruvaiyaru and Thiruthuraiipoondi 3 each, Vallam, Kumbakonam, Vedaranniyam, Valangaiman, Parangipettai, Thanjavur, Mannargudi, Kodavasal, Papanasam, Tirukattupalli and Pandavaayar Head 2 each, Jayamkondam, Keeranur, Madukkur, Pattukottai, Thuvakudi Imti, Tiruchirapalli AP, K.M.Koil, Thirumanur, Grand Anaicut, Cuddalore, Kodaikanal, Gandarvakottai, Orthanad and Tirumayam 1 each
11 Jan	Anaikaranchatram (Kollid) 10, Sirkali and K.M.Koil 7 each, Chidambaram 6, Mayiladuthurai, Chidambaram AWS and Sethiathope 5 each, Jayamkondam and Papanasam 4 each, Tozhudur, Tiruvarur, Srimushnam, Sendurai, Venbavur and Vedaranniyam 2 each, Perambalur, Nagapattinam, Parangipettai, Chatrapatti (Odanchatra), Thanjavur, Thammampatty, Car Nicobar IAF, Aduthurai AWS, Virudachalam and Valangaiman 1 each
12 Jan	Arimalam and Tirumayam 1 each
13 Jan	Nil
14 Jan	Nil
15 Jan	Nil
16 Jan	Long Islands 2, Maya Bandar 1
17 Jan	Vadakara 2, Thalasserry 1
18 Jan	Nancowry 2, Car Nicobar IAF 1
19 Jan	Nancowry 1
20 Jan	Nil
21 Jan	Nancowry 5, Car Nicobar IAF 3, Car Nicobar 2
22 Jan	Car Nicobar IAF 2, Nancowry 1
23 Jan	Hut Bay 4, Port Blair 3, Nancowry 1
24 Jan	Chamoli 5, Karnal, Jalandhar AWS, Tibri, Gairsain, Sangraha, Jakholi, Rajgarh, Jollygrant, Champawat, Chaukhtutia, Hoshiarpur, Mussoorie, Dehra Dun, Gurudaspur, Dharchula, Bhatwari, Salem AWS, Bharwain and Ludhiana 3 each, Ghamroor, Barkot, Kapkot, Tajewala, Hoshiarpur AWS, Karsog, Pithoragarh, Kaithal, Jallundur, Nangal, Nainital, Joshimath, Uttar Kashi, Bhatinda, Samrala, Nagrota Surian, Uttar Kashi Cwc, Ghansali, Amb, Mukerian, Tehri, Pauri, Kapurthala AWS II, R L Bbmb, Ukhimath, Assandh, Patiala, Dwarhat, Solan, Dharampur, Mukteswar, Nahan, Rudraprayag, Mansa, Sunibhaji, Deoprayag, Haldwani, Karnaprayag, Sadhaura, Gandaspur AWS, Nohar, Dharmasala, Aghar, Una, Jammu IAF, Srinagar, Malakpur, Ranikhet (G), Tehri Cwc, Nawanshahr, Patiala Rev and Mehre (Barsar) 2 each, Bajaura AGRO, Sangrur, Kahu, Rohru, Jind, Nawanshahr AWS, Phagwara, Shimla AP, Banjar, Mawana, Gangolihat, Bawal, Guhla, Radaur, Dasuya, Berthin AGRO, Ghumarwin, Gohar, Paonta, Renuka / Dadhau, Kasauli, Nilokheri, Arki, Munyari, Tiuni, Dehra Gopipur, Hamirpur, Kangra AP, Shimla, Bhuntar AP, Naina Davi, Pandoh, Bageshwar (Thmo), Nazibabad, Ganaur, Kalayat, Morni, Naraingarh, Fatehgarh Sahib AWS, Khanna, Moga AWS, Nabha, Bajura AWS, Bangana F, Bangana R, Guler, Mashobra AGRO, Nurpur / Jassur, Samba AWS, Hardwar, Sundernagar, Basar, Nighasan, Didihat, Jaspur, Anandpur Sahib, Barnala, Seo Bagh, Sarkaghat, Moradabad, Kharar, Barthin, Hissar, Jhandutta, Chandigarh AWS, Indri, Kurukshetra, Pehowa, Rohtak AWS, Balachaur AWS, Barnala ARG, Batala, Bharmaur, Jammu City, Sunam, Bharari, Phoolbagh, Nawabganj, Purola, Adampur, Israna, Karnal Rev, Mustafabad, Madhopur, Sangrur AWS, Sujapur Tira, Dhansa, Nadaun, Katra, Samba, Amini Divi, Sitapur, Bhognipur, Derapur, Bijnor, Nagina, Gharaunda, Jafarpur AWS, Narwana, Panipat, Samalkha, Sonapat, Narela, Garhshankar, Ropar, Sirhind, Talwandi Sabo, Taran Taran, Baijnath, Rampur Bushar and Moga 1 each

TABLE 4 (Contd.)

Date	Some representative amounts of rainfall in cm for January and February 2018 (1 cm and above)
25 Jan	Nedumangad 3, Chauldhowaghat, Dholla Bazar, Badatighat, Tuting, Dhemaji AWS and Moranhat 2 each, Namsai, Mylaudy, Dibrugarh AP, Khowang, Tezu, Tinsukia, Mohanbari AWS, Mangan, Miao, Sivasagar, Anini AWS and Damthang 1 each
26 Jan	Basar 1
27 Jan	Naharlagun and Daparijo 2 each, Tuting, Miao, Car Nicobar IAF, Sivasagar and Anini AWS 1 each
28 Jan	Nil
29 Jan	Nil
30 Jan	Nil
31 Jan	Nil
1 Feb	Nancowry 6, Gulmarg 1
2 Feb	Nil
3 Feb	Nancowry 2
4 Feb	Passighat and Port Blair 2 each, Tezu 1
5 Feb	Passighat and Port Blair 1 each
6 Feb	Long Islands 1
7 Feb	Coonoor 3, Palakkad 1
8 Feb	K. Paramathy 8, Vellore and Kallakurichchi 3 each, Tirupathi AP, Tiruttani, Thiruvananthapuram, Erode and N. Lakhimpur 2 each, Salem, Valparai, Kodaikanal and Thiruvananthapuram AP 1 each
9 Feb	1 - Valparai and Passighat each.
10 Feb	Hassan 7, Punalur, Coonoor, Uthagamandalam and Valparai 1 each
11 Feb	Chickmagalur 1
12 Feb	Srinagar IAF, Katra and Karnal 3 each, Nahan, Jammu IAF, Banihal, Solan, Chandigarh, Jammu City, Batote, Dharmasala, Udampur IAF, Baderwah, Chindwara, Ambala, Kathua, Rewa, Sidhi, Umariya, Kukernag and Sagar 2 each, Amritsar IAF, Hoshangabad, Wardha, Nagpur AP, Kapurtala, Pathankot, Quazigund, Gulmarg, Raigarh, Jallundur, Orai, Patiala, Mandla, Manali, Srinagar, Alappuzha, Gondia, Rohtak, Bhiwani and Seoni 1 each
13 Feb	Batote 11, Kukernag 9, Banihal 7, Baderwah and Pahalgam 6 each, Halwara 5, Srinagar IAF, Udampur IAF, Katra, Pathankot, Kathua and Sundernagar 4 each, Chandrapur, Udgir, Dharmasala, Manali and Jammu City 3 each, Rajnandgaon, Kupwara, Bramhapuri, Chandigarh, Jammu IAF, Srinagar, Una, Mandi, Quazigund, Shajanpur, Hardoi, Kalpa, Gulmarg, Adilabad, Nagaon, Patiala, Bhuntar AP, Kapurtala and Rewa 2 each, Bareilly, Yeotmal, Bahraich, Shimla, Durg, Ludhiana, Khajuraho, Moradabad, Solan, Uttar Kashi, Umariya, Munsyari, Ballia, Mandla, Chamoli, Hoshiarpur and Allahabad AP 1 each
14 Feb	Narsingpur and Seoni 3 each, Chindwara, Ambikapur and Mandla 2 each, Mana AP, Rajnandgaon, Durg, Pendra, Jabalpur, Raipur, Betul, Gondia and Ranchi AP 1 each
15 Feb	Passighat, Gangtok and Kalingpong 2 each, Tadong, Rangiya and Golaghat 1 each
16 Feb	Nil
17 Feb	Nil
18 Feb	Nil
19 Feb	Tezu 1
20 Feb	Nil
21 Feb	Nil
22 Feb	Nancowry 3
23 Feb	Car Nicobar IAF 5, Hut Bay and Gangtok 2 each, Tezu, Car Nicobar, Tadong, Nancowry and N. Lakhimpur 1 each
24 Feb	Nancowry 4, Hut Bay 1
25 Feb	Manali 5, Banihal, Baderwah, Joshimath and Quazigund 3 each, Kalpa, Uttar Kashi, Bhuntar AP, Kukernag, Kathua, Gulmarg, Dharchula, Pahalgam, Dharmasala, Nancowry, Shimla and Kupwara 2 each, Chandigarh, Solan, Nahan, Pathankot, Katra, Tehri, Udampur IAF, Nainital, Srinagar, Munsyari, Mandi and Srinagar IAF 1 each

TABLE 4 (Contd.)

Date	Some representative amounts of rainfall in cm for January and February 2018 (1 cm and above)
26 Feb	Kailashahar 3, Cherrapunji and Haflong 2 each, Golaghat, Silchar, Midnapore, Gangtok, Daltonganj and Car Nicobar IAF 1 each
27 Feb	Rangiya and Tezu 2 each, Malda 1
28 Feb	Nil

3.1.5. Damages associated with Disastrous weather events

At least four people were killed and four injured after their car fell into a pond due to low visibility in Rajasthan's Bharatpur district due to the *dense* fog. Due to avalanche, 11 persons died in Kupwara district of Jammu & Kashmir on 5 January. Due to *severe cold wave*, 135 persons were reportedly lost their lives from Uttar Pradesh during the period from 3 to 13 January. Huge amount of *Rabi* crops & many houses were damaged due to hailstorm in Barpeta, Bongaigaon districts of Assam on 4th January.

According to press and media reports due to *dense fog*, around 90 flights were affected/delayed at Delhi airport and 15 trains were cancelled as *cold wave* conditions intensified in Punjab and Haryana on 1 January. Thick fog suspended operations at the Delhi airport for about two hours, delaying several domestic and international flights and nearly 56 trains were delayed and 15 others were cancelled as visibility dropped to zero metres in the early hours of 1 January. Due to *dense fog* 25 flights were cancelled and more than 150 delayed at the Indira Gandhi International Airport, New Delhi on 20th January.

3.2. February

3.2.1. Storms and Depressions

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

3.2.2. Other synoptic features and associated weather

As given in Table 3, 11 WDs (including 4 upper air cyclonic circulation and 7 troughs in westerlies), 22 upper air cyclonic circulations, 3 troughs in the easterlies and 3 troughs/wind discontinuities affected the weather over the country during the month of February.

3.2.3. Monthly rainfall

The rainfall activity during this month over the country as a whole was very subdued. Sub-divisions from

central and peninsular India *viz.* East Madhya Pradesh, Chhattisgarh, Marathwada, Vidarbha, Rayalaseema, North Interior Karnataka, South Interior Karnataka, Coastal Karnataka, Kerala and Andaman & Nicobar Island received *large excess/excess or normal* rainfall. During the month, out of 36 meteorological sub-divisions, two subdivisions (Marathwada & Vidarbha) received *large excess* rainfall, 3 received *excess* rainfall, 5 received *normal* rainfall, 8 received *deficient* rainfall and 17 sub-divisions received *large deficient* rainfall. One sub-division (Gujarat Region) did not receive any rain (Fig. 1). Table 1 shows the sub-division wise rainfall statistics for February 2018.

In the month of February most of the sub-divisions experienced dry weather except Andaman & Nicobar Islands which received *large excess* rainfall in the first and last week of the month due to the presence of the troughs of low over Nicobar Islands and neighbourhood. Most sub-divisions experienced dry weather for major part of the month, except during the second week. The second week of February saw the passage of active WDs causing *widespread to fairly widespread* rain/snowfall activity over Northern regions and Arunachal Pradesh. The thunderstorm activity in this week brought about *isolated/scattered to fairly widespread* rainfall accompanied with hailstorms over Vidarbha, Marathwada, Chhattisgarh and east Madhya Pradesh during 11-12 February. South Peninsular India too received isolated to scattered rainfall over most sub-divisions during this week due to the troughs of lows and the cyclonic circulations over the regions.

3.2.4. Temperature

The minimum temperatures were above normal over most parts of the country, except some parts of south peninsula and adjoining eastern region. It was appreciably to markedly above normal over Jammu & Kashmir, Himachal Pradesh, north Uttarakhand, West Rajasthan, Saurashtra & Kutch, Gujarat state and adjoining North Madhya Maharashtra, North West Madhya Pradesh and over parts of West Rajasthan and North Gujarat region.

The lowest minimum temperature recorded during the month over the plains was 0.1° C at Pantnagar (Uttarakhand) on 10th February.

Cold wave conditions prevailed at *isolated* pockets over Punjab, Haryana and north Rajasthan for a day.

The maximum temperature for the month of February for most sub-divisions was *above normal* except peninsular India where it was *normal*. The maximum temperatures were *markedly above normal* in Jammu & Kashmir. They were *appreciably to markedly above normal* over the Northern, northwestern and central subdivisions. The third week of the month showed normal maximum temperatures over most sub-divisions due to the occurrences of thunderstorms over various regions of the country. The high Index phase of mid latitude circulation regime and subdued tropical easterly waves over the Indian seas caused the remaining parts of the mainland, outside western Himalayan region and northeast India to be less humid and devoid of clouds. Hence, the maximum temperatures showed significant rise over the northern regions.

Heat wave conditions prevailed in some parts of coastal Saurashtra and at isolated pockets of Konkan on 27th & 28th February.

3.2.5. Damages associated with disastrous weather events and damage

According to media reports four pilgrims were crushed under a passenger train as *dense fog* caused poor visibility in Bihar on 3rd February.

Avalanche claimed 7 lives in Baramulla & Kupwara districts of Jammu & Kashmir during different incidences on 2, 16 and 24 February. Four persons were killed and many birds perished from Bhandara, Jalna and Washim districts of Maharashtra due to hailstorm during 11 to 13 February. 6 persons reportedly died in Uttar Pradesh on 12th February due to lightning.

Due to the hailstorm three lives were lost and crops *viz.* grapes, cotton, green gram and wheat were severely damaged in Jalna district over central Maharashtra, Marathwada and parts of Vidarbha on 12th. Hailstorms also affected other districts of Maharashtra like Aurangabad, Akola, Amravati, Beed, Bhandara, Buldhana, Chandrapur, Dhule, Hingoli, Jalgaon, Jalna, Latur, Osmanabad, Parbhani and Washim where severe damage to Rabi crops (Gram, Wheat, Onion, Chilly), including fruits (Mango, Orange, Banana, Grapes, Papaya) & vegetables were reported. Many houses were also damaged due to hailstorm. On 12th February, damage to Wheat, Potato & other crops was reported in Uttar Pradesh due to hailstorm. Due to fog, 10 trains were cancelled in Delhi on 5th February. Jammu-Srinagar highway remained closed due to snowfall in Bannihal on 12th.

Appendix

Definitions of the terms given in '*Italics*'

Rainfall

<i>Large Excess</i>	- percentage departure from normal rainfall is + 60% or more
<i>Excess</i>	- percentage departure from normal rainfall is + 20% to +59%
<i>Normal</i>	- percentage departure from normal rainfall is +19% to -19%
<i>Deficient</i>	- percentage departure from normal rainfall is -20% to -59%
<i>Large Deficient</i>	- percentage departure from normal rainfall is from - 60 % to -99%
<i>No rain (NR)</i>	- -100%

Temperatures

Cold Wave

Cold wave is declared when minimum temperature is 10 °C or less for stations over the plains and 0 °C or less for hilly regions

(a) *Based on Departure*

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

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

<i>Cold Wave</i>	- When minimum temperature is ≤ 04 °C
<i>Severe Cold Wave</i>	- When minimum temperature is ≤ 02 °C

(c) *Cold Day*

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

<i>Cold day</i>	- Maximum Temperature Departure is -4.5 °C to -6.4 °C
<i>Severe Cold day</i>	- Maximum Temperature Departure is < -6.4 °C

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 $+1.5^{\circ}\text{C}$

Markedly above normal - departure of minimum temperature from normal is $+5^{\circ}\text{C}$ or more

Appreciably above normal - departure of minimum temperature from normal is from $+3.1^{\circ}\text{C}$ to $+5^{\circ}\text{C}$

Above normal - departure of minimum temperature from normal is $+1.6^{\circ}\text{C}$ to 3.0°C

Heat Wave - When the maximum temperature of a station reaches at least 40°C for plains; at least 30°C or more for hilly regions and at least 37°C or more for coastal stations; and when the departure from normal is $+4.5^{\circ}\text{C}$ to $+6.4^{\circ}\text{C}$; satisfied by at least 2 stations in a meteorological sub-division for consecutive 2 days

Fog

Dense Fog - When the visibility is between 50–200 m

Very Dense Fog - When the visibility is between < 50 m