

# Weather in India

## WINTER SEASON (January-February 2011)†

### 1. Introduction

The winter season of 2011 started with a below normal temperature epoch in the month of January, following a relatively normal minimum temperature pattern realized in December 2010, in terms of the night temperature records. However, the severe cold experience did not get prolonged, as it was confined to the month of January alone. The *severe cold wave*\* conditions abated and the frequency as well as the extent of *cold wave* reduced substantially during February, owing to the successive passage of western disturbances across the northern parts of the country.

The weather produced by the easterlies over the southern peninsula reduced considerably towards the second fortnight of January. This led to the cessation of northeast monsoon rains over Tamilnadu, Kerala and adjoining parts of Andhra Pradesh and Karnataka on 17 January.

A Depression formed over the southwest Bay of Bengal on 2 February which was short lived and weakened in situ. Apart from this, no other intense low pressure system formed during the season. The western disturbances, easterly waves and interaction between the easterly and westerly troughs controlled the overall weather during the season.

Dense fog conditions prevailed over northern parts of India during the first two weeks of January and on few days in the month of February.

### 2. Seasonal rainfall (January-February)

The seasonal sub-division wise rainfall (actual, normal and percentage departure) are given in Table 1. The percentage departures falling under various categories *viz.*, *excess*, *normal*, *deficient*, *scanty* and *no rain* are shown in Fig. 1.

Climatologically, the western disturbances moving from west to east move to northeast India after traveling across the northern states *viz.*, Jammu & Kashmir, Punjab, Haryana, Himachal Pradesh and Uttarakhand. These western disturbances, on interacting with local circulation

\* Definition of words in italics other than the subtitles is given in Appendix.

†Compiled by : A. B. Mazumdar, Medha Khole and Sunitha Devi S., Meteorological Office, Pune – 411 005, India

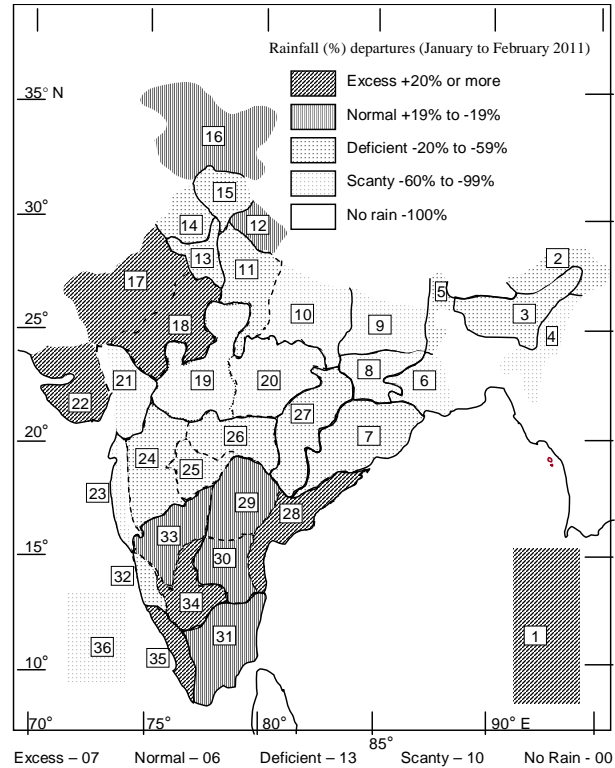


Fig. 1. Sub-divisionwise seasonal rainfall departure from normal (%) for winter season (January to February 2011). Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

<b>1</b>	267	<b>7</b>	-34	<b>13</b>	-35	<b>19</b>	-89	<b>25</b>	-22	<b>31</b>	14
<b>2</b>	-50	<b>8</b>	-81	<b>14</b>	-26	<b>20</b>	-94	<b>26</b>	-46	<b>32</b>	-46
<b>3</b>	-56	<b>9</b>	-62	<b>15</b>	-32	<b>21</b>	-86	<b>27</b>	-33	<b>33</b>	6
<b>4</b>	-73	<b>10</b>	-65	<b>16</b>	7	<b>22</b>	221	<b>28</b>	21	<b>34</b>	96
<b>5</b>	-56	<b>11</b>	-52	<b>17</b>	73	<b>23</b>	-99	<b>29</b>	-14	<b>35</b>	174
<b>6</b>	-84	<b>12</b>	-6	<b>18</b>	24	<b>24</b>	-23	<b>30</b>	4	<b>36</b>	-78

features and topography of the region, give rise to precipitation over northwest and northeastern parts of the country during winter season. As per the seasonal scenario, the impact of western disturbances remained confined to the extreme northern parts of Jammu & Kashmir and Uttarakhand. As such, these systems gave rise to precipitation mainly over Jammu & Kashmir and Uttarakhand, resulting in *deficient* rainfall situation over the remaining region. Easterly-Westerly interaction gave rise to precipitation in the last two weeks of February which made up the seasonal deficit of rainfall over major parts of the country.

**TABLE 1**  
**Sub-divisionwise rainfall (mm) for each month and season as a whole (January-February 2011)**

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	222.5	53.7	314	81.9	29.2	180	304.4	82.9	267
2.	Arunachal Pradesh	37.6	50.1	-25	36.8	98.0	-62	74.4	148.1	-50
3.	Assam & Meghalaya	9.0	16.4	-45	11.5	30.5	-62	20.5	46.9	-56
4.	Naga., Mani., Mizo. and Tri.	7.9	13.7	-43	4.2	30.3	-86	12.1	44.0	-73
5.	Sub-Himalayan West Bengal & Sikkim	7.1	26.6	-73	19.3	33.7	-43	26.4	60.3	-56
6.	Gangetic West Bengal	2.6	13.5	-81	2.8	20.9	-87	5.4	34.4	-84
7.	Orissa	0.3	10.8	-97	20.7	21.0	-1	21.0	31.8	-34
8.	Jharkhand	5.3	16.1	-67	1.1	17.3	-94	6.4	33.4	-81
9.	Bihar	2.6	13.3	-80	6.1	9.7	-38	8.7	23.0	-62
10.	East Uttar Pradesh	1.7	16.8	-90	8.4	12.1	-30	10.1	28.9	-65
11.	West Uttar Pradesh	0.8	18.2	-96	15.3	15.1	2	16.1	33.3	-52
12.	Uttaranchal	26.2	52.1	-50	73.3	54.1	35	99.5	106.2	-6
13.	Haryana, Chandigarh & Delhi	0.6	17.8	-96	20.8	15.1	38	21.5	32.9	-35
14.	Punjab	3.6	25.2	-86	33.0	24.3	36	36.6	49.5	-26
15.	Himachal Pradesh	35.1	97.5	-64	98.5	98.0	0	133.5	195.5	-32
16.	Jammu & Kashmir	39.9	95.7	-58	188.9	117.2	61	228.9	212.9	7
17.	West Rajasthan	0.0	2.9	-100	12.8	4.5	185	12.8	7.4	73
18.	East Rajasthan	0.0	5.6	-99	13.0	4.9	166	13.0	10.5	24
19.	West Madhya Pradesh	0.0	8.5	-100	1.5	5.1	-71	1.5	13.6	-89
20.	East Madhya Pradesh	0.1	20.0	-99	2.0	15.3	-87	2.1	35.3	-94
21.	Gujarat region	0.0	0.8	-100	0.2	0.3	-49	0.2	1.1	-86
22.	Saurashtra & Kutch	0.0	0.4	-100	1.9	0.2	863	1.9	0.6	221
23.	Konkan & Goa	0.0	0.1	-100	0.0	0.2	-99	0.0	0.3	-99
24.	Madhya Maharashtra	0.0	1.1	-100	1.5	0.8	83	1.5	1.9	-23
25.	Marathawada	0.0	3.8	-100	5.3	3.0	78	5.3	6.8	-22
26.	Vidarbha	0.0	10.2	-100	9.2	7.0	32	9.2	17.2	-46
27.	Chattisgarh	0.1	10.7	-99	14.2	10.6	34	14.3	21.3	-33
28.	Coastal Andhra Pradesh	1.9	8.3	-77	20.7	10.4	99	22.6	18.7	21
29.	Telangana	0.0	5.8	-99	9.7	5.5	76	9.7	11.3	-14
30.	Rayalaseema	0.1	3.0	-95	6.8	3.6	88	6.9	6.6	4
31.	Tamil Nadu	7.5	17.5	-57	27.8	13.4	107	35.3	30.9	14
32.	Coastal Karnataka	0.0	0.7	-100	0.5	0.2	141	0.5	0.9	-46
33.	North interior Karnataka	0.2	2.2	-90	3.9	1.7	131	4.1	3.9	6
34.	South interior Karnataka	0.1	1.4	-94	8.6	3.0	185	8.6	4.4	96
35.	Kerala	20.6	8.7	136	46.1	15.6	196	66.7	24.3	174
36.	Lakshadweep	5.1	20.8	-75	2.8	14.7	-81	7.9	35.5	-78

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

**TABLE 2**  
**Details of the weather systems during January 2011**

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
<b>(A) Low pressure area</b>						
1.	Low Pressure Area	11-13	Southwest Bay of Bengal	Stationary	<i>In situ</i>	Less marked on 14.  It was first seen as a trough of low over southeast Bay of Bengal on 2 Jan. It lay over southwest Bay of Bengal during 4-6 and over southwest Bay of Bengal and adjoining Sri Lanka during 7-10.  The associated cyclonic circulation extending upto 3.1 km a.s.l. lay over southwest Bay of Bengal and adjoining Sri Lanka coast on 14 and 15. It lay over Comorin area and neighbourhood on 16 and became less marked on 17.
<b>(B) Western disturbances/eastward moving systems</b>						
<i>(i) Upper air cyclonic circulations</i>						
1.	Up to 3.6 kms a.s.l.	6 - 9	North Pakistan & adjoining Jammu & Kashmir	Northeast	Jammu & Kashmir and neighbourhood	Moved away on 10
2.	Up to 3.1 kms a.s.l.	11 - 18	Jammu & Kashmir and adjoining North Pakistan	Eastnortheast	Do	Moved away on 19
3.	Up to 4.5 kms a.s.l.	19 - 23	North Pakistan and adjoining Jammu & Kashmir	Northeast	Do	Moved away on 24
4.	Up to Mid tropospheric level	23 - 26	North Pakistan & neighbourhood	Do	Eastern parts of Jammu & Kashmir	Moved away on 27
5.	Do	28 - 31	North Pakistan & adjoining Jammu & Kashmir	Do	Jammu & Kashmir	Moved away on 1 February
<i>(ii) Induced upper air cyclonic circulations</i>						
1.	Up to 4.5 km a.s.l.	8 - 9	Haryana & neighbourhood	Northeast	Uttarakhand & neighbourhood	Less marked on 10
2.	Upto Lower tropospheric level	13 - 14	West Rajasthan & neighbourhood	Stationary	<i>In situ</i>	Less marked on 15
3.	Do	29 - 30	Central Pakistan & neighbourhood	Northeast	Haryana & neighbourhood	Less marked on 31
<i>(iii) Troughs in westerlies</i>						
1.	Mid and upper tropospheric levels	14 - 16	Along Long. 63° E, to the north of Lat. 30° N (at 5.8 kms a.s.l.)	Northeast	Long. 80° E, to the north of Lat 25° N	Moved away on 17

**TABLE 3**  
**No. of days of rainfall intensity distribution over the country during January & February 2011**

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

EHR – Extreme Heavy Rain, VHR – Very Heavy Rainfall, HR – Heavy Rain

TABLE 4

Dates of occurrence of cold wave/severe cold wave and various categories of minimum temperatures – January 2011

No.	Sub-division Name	Dates (Number of days)						
		Severe cold wave	Cold wave	Cold Day	Appreciably to markedly below normal	Below normal	Above normal	Appreciably to markedly above normal
2.	Arunachal Pradesh					20 (1)		
3.	Assam & Meghalaya	18 (1)	10, 18, 21, 23-24, 26(6)		15, 19, 28-29 (4)	5-13, 16, 20-22 (13)	1, 5, 7, 17 (4)	2, 27, 30-31 (4)
4.	Naga., Mani, Mizo and Tri.		12, 15, 17-19, 21, 24, 26, 30 (9)	14 (1)	16, 22, 28-29 (4)	7, 15, 17, 19, 21 (5)	1, 6, 8, 13 (4)	9, 10, 27 (3)
5.	S. H. W. B. & Sikkim		13, 16-18, 28 (5)	14 (1)	3-4, 10, 12-14, 17-19 (9)	6-9, 11, 15-16, 20-24, 28, 30 (14)	2 (1)	7 (1)
6.	Gangetic West Bengal	12 (1)	12, 22 (2)		3-4, 6-7, 10-11, 13-14, 18-19 (10)	8-9, 15, 17, 21-23 (7)	2, 16, 30 (3)	26-27 (2)
7.	Orissa	5, 8, 11-12 (4)	4, 6-13, 17-19 (12)		3-4, 9, 13-15, 18-19, 21-23 (11)	5, 15-17, 20, 24 (6)		26-27, 30-31 (4)
8.	Jharkhand	4, 5, 8, 12, 18 (5)	2-3, 6-9, 11-13, 17, 19, 22 (12)		2-4, 10, 13-14, 17-23 (13)	15, 17, 24, 28 (4)	1, 16, 27, 29 (4)	25, 30-31 (3)
9.	Bihar	4-5, 7, 9, 12 (5)	10-14, 17-19 (8)	3, 8, 11 (3)	2-4, 6, 8-10, 13-14, 18-23 (15)	5-6, 15, 17, 28 (5)	16, 27, 30-31 (4)	1 (1)
10.	East Uttar Pradesh	4, 9-13 (6)	3, 5, 7-9, 12-14, 17, 19-21, 29(13)	6, 11, 14, 17 (4)	4, 10, 18, 21-23, 28-29 (8)	3, 5-6, 14, 16-20, 31 (10)	15, 24, 30 (3)	1, 15, 25-26 (4)
11.	West Uttar Pradesh	4, 9, 11-12 (4)	3, 5-10, 13, 17, 19, 28-29 (12)	1-2, 11 (3)	4, 6, 10, 12, 18, 22, 29 (7)	2-3, 5, 14, 16-21, 27-28 (12)	1, 15, 24 (3)	15, 25 (2)
12.	Uttarakhand		16 (1)	12 (1)	6, 10, 26 (3)	2, 9, 11, 20, 24, 27, 31 (7)	3, 7-8, 30 (4)	15 (1)
13.	Haryana, Chandigarh & Delhi	9 (1)	6-7, 12, 18, 25 (5)	1-6, 8, 10-11, 13, 28 (11)	4, 6, 10, 12, 18, 25, 28-29 (8)	5, 9, 13, 16, 20-21, 27, 31 (8)	3, 22-23, 30 (4)	2, 14-15 (3)
14.	Punjab		7-9, 12, 16, 18-19, 25, 31 (9)	1-6, 9-11, 13, 17, 28 (12)	6, 10, 12, 17, 23, 25-26, 28-29 (9)	8-9, 16, 20-21, 24, 27 (7)	3, 22, 30 (3)	2, 4, 14-15 (4)
15.	Himachal Pradesh		16 (1)	5 (1)	23, 25 (2)	26 (1)	3, 13 (2)	4, 10 (2)
16.	Jammu & Kashmir		9, 12(J), 16, 18(J), 19 (5)		3-4, 20, 22-25 (7)	5-6, 10, 11(Jammu), 16-17, 21, 26-28 (10)	8, 11(Kashmir), 30 (3)	13-15 (3)
17.	West Rajasthan	4, 6-8 (4)	6, 9-11, 16-17 (6)	1, 10 (2)	1-2, 4-6, 10, 16-17 (8)	3, 9, 11, 15, 27 (5)	31 (1)	1, 12-14, 20-25, 30 (11)
18.	East Rajasthan	4-5, 9 (3)	3, 7, 10-11, 16-17 (6)	1, 10 (2)	1-2, 4, 6, 8, 10, 16-17 (8)	3, 9, 11-12, 19, 28 (6)	20, 24 (2)	1, 14-15, 22-23, 25, 30 (7)
19.	West Madhya Pradesh	3-9, 11 (8)	1-3, 7, 9-13, 16-21, 27 (16)		1, 4, 10, 16-17, 20, 22 (8)	2, 19, 21, 23, 28 (5)	23-25, 31 (4)	14-15, 26 (3)
20.	East Madhya Pradesh	4-12 (9)	1-3, 7-9, 11-12, 16, 21(10)		1, 4, 10, 16-18, 22 (7)	2, 13, 20-21, 23, 27-28 (7)	23, 25, 29-30 (4)	14-15, 24, 26 (4)
21.	Gujarat Region		17 (1)		1, 7-8, 11, 17 (5)	2, 6, 8-10, 12-13, 16, 18, 26, 29 (11)	19-20, 23, 25, 28, 30-31 (7)	4, 14-15, 21-22, 24-25, 27, 29 (9)

TABLE 4 (Contd.)

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

### 3. Monthly features

#### 3.1. January

##### 3.1.1. Weather and associated synoptic features

As given in Table 2, a low pressure area over the Bay of Bengal and 9 systems in westerlies (including 5 upper air cyclonic circulations, 3 induced cyclonic circulations and 1 trough in mid and upper tropospheric levels) affected the weather over the country.

The resultant sub-division wise spatial rainfall distribution and frequency of *heavy* and *very heavy* rainfall are given in Table 3.

##### 3.1.2. Monthly rainfall

The sub-division wise percentage departures of monthly rainfall are given in Table 1. Principal amounts of rainfall during the month of January are given in Table 7.

**TABLE 5**  
**Details of the weather systems during February 2011**

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
<b>(A) Depression</b>						
1	Depression	2	Southwest Bay of Bengal (6.5/82.5)	Northwest	Southwest Bay of Bengal & adjoining Sri Lanka	Less marked in the early morning of 3
<b>(B) Western Disturbances/eastward moving systems</b>						
<i>(i) Upper air cyclonic circulations</i>						
1.	Upto mid tropospheric levels	1 - 8	North Pakistan and neighbourhood	Northeast	Jammu & Kashmir	Moved away on 9
2.	Up to 4.5 kms a.s.l	9 - 10	North Pakistan and adjoining Jammu & Kashmir	Do	Do	Moved away on 11
3.	Do	11 - 17	North Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away on 18
4.	Up to 3.6 kms a.s.l	19 - 23	Pakistan and adjoining Jammu & Kashmir	Do	Jammu & Kashmir and neighbourhood	Moved away on 24
5.	Do	23 - 27	North Pakistan and adjoining Jammu & Kashmir	Do	Jammu & Kashmir and neighbourhood	Moved away on 28
6.	Upto Mid tropospheric levels	27 - 5	North Pakistan and neighbourhood	Do	Do	
<i>(ii) Induced cyclonic circulations</i>						
1.	Upto 1.5 kms a.s.l	13 - 16	West Rajasthan and neighbourhood	Northeast	Haryana , west Uttar Pradesh and neighbourhood	Less marked on 17
2.	Up to 3.1 kms a.s.l	21 - 22	Haryana and adjoining west Uttar Pradesh	Do	Uttarakhand and neighbourhood	Moved away on 23
2.	Between 1.5 - 3.1 kms a.s.l	21 - 23	West Rajasthan and neighbourhood	Do	-	Less marked on 24
<i>(iii) Troughs in the westerlies</i>						
1.	Lower level (0.9 km a.s.l)	5 - 6	Uttarakhand to west Rajasthan across Haryana	Stationary	<i>In situ</i>	Less marked on 7
2.	Mid & upper tropospheric levels	5 - 8	Long. 63° E, to the north of Lat 25° N. (at 5.8 kms a.s.l)	East	Long. 76° E to the north of Lat. 25° N	Moved away on 9
3.	Do	15 - 16	Long. 63° E, to the north of Lat 20° (at 5.8 kms a.s.l)	Do	Long. 73° E, to the north of Lat. 20°	Less marked on 17
<b>(C) Other cyclonic circulations</b>						
1.	Upto 3.1 kms a.s.l	1	Sri Lanka & neighbourhood	Stationary	<i>In situ</i>	Merged with circulation associated with the low pressure area over the southwest Bay of Bengal on 2
2.	Upto 3.6 kms a.s.l	1	Commorin & adjoining Maldives-Lakshadweep areas	Do	Do	Less marked on 2

TABLE 5 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Upto 2.1 kms a.s.l.	21 - 23	Nagaland-Manipur-Mizoram-Tripura & neighbourhood	West	Assam & Meghalaya and neighbourhood	Less marked on 24
4.	Upto 0.9 kms a.s.l.	18 - 22	Kerala & adjoining Lakshadweep area	Stationary	<i>In situ</i>	Less marked on 23
5.	Do	19 - 21	Chattisgarh and neighbourhood	Do	Do	Less marked on 22
6.	Upto 1.5 kms a.s.l.	23	Southwest Bay of Bengal & adjoining Sri Lanka coast	Do	Do	Less marked on 24
<b>(D) Trough in the easterlies</b>						
1.	Lower level	1 - 2	Maldives – Lakshadweep area to south Konkan & Goa	Quasi stationary	Lakshadweep area to south Konkan & Goa	Less marked on 3
2.	Trough of low (Mean Sea Level)	10 - 16	Southwest Bay of Bengal	West	Commorin area and neighbourhood	Less marked on 17
3.	Trough of low (Mean Sea Level)	15	Southeast Bay of Bengal	Stationary	<i>In situ</i>	Less marked on 16
4.	Trough of Low (Mean Sea Level)	23 Feb - 4 Mar	Southeast Bay of Bengal	Oscillatory	Commorin area and neighbourhood	Less marked on 5
5.	Lower level	27 Feb - 3 Mar	south Tamil Nadu to Madhya Maharashtra across interior Karnataka	West	Lakshadweep area to coastal Karnataka	Less marked on 4
<b>(E) Other Troughs</b>						
1.	Trough / wind discontinuity at 0.9 km a.s.l	25 - 26	North Chhattisgarh to south Tamil Nadu across Vidarbha and interior karnataka	Oscillatory	Bihar to south Tamil Nadu across Jharkhand, Chhattisgarh, Telangana and Rayalaseema	Less marked on 27

The typical winter pattern which prevailed over the country gave rise to dry weather over northern parts of peninsular India and central India during the month. Rainfall activity was subdued all over the country except in Kerala which received *excess* rainfall. Southern parts of peninsular India received rainfall only during the northeast monsoon regime. Rainfall occurred at isolated places over south Peninsular India with some heavy to very heavy falls in Tamil Nadu and Kerala during the first week owing to an easterly wave trough (31 Dec - 4 Jan). (This system is described in Post Monsoon season 2010). There was no system in easterlies during this month which contributed to significant rainfall.

In general, rain/snow occurred over the northwestern states due to passage of western disturbances during the middle and towards the end of the month.

### 3.1.3. Temperature

The dates of occurrence of *cold waves* and dates on which the minimum temperature remained *appreciably to markedly above/below normal* as well as *above/below normal* are given in Table 4. Same date appearing in two different columns of sub-divisions may be reckoned as occurrence of that category over parts of the sub-divisions. Minimum temperatures were normal for the rest of the days. It may be noted that *cold wave to severe cold wave* conditions prevailed over major parts of the country all through the month.

The month's and the season's lowest minimum temperature over the plains was minus 2.9° C recorded at Bikaner Airport (Rajasthan) on 7 January 2011.



TABLE 6

Dates of occurrence of cold wave/severe cold wave and various categories of minimum temperatures – February 2011

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

TABLE 6 (Contd.)

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

### 3.1.4. *Disastrous weather events and damage*

*Cold / severe cold wave* claimed 133 lives in Uttar Pradesh, 45 in Jharkhand, 22 in Madhya Pradesh, 12 in Jammu & Kashmir, 5 in Chhattisgarh and 1 in Bihar during January. Dense fog affected the Rail, Air and Road traffic in north India and also disrupted air and rail traffic in Jammu & Kashmir and Himachal Pradesh. Orissa experienced coldest winter as snowfall was reported in Sundergarh and Keonjhar districts. Thunderstorm and strong winds killed 2 in Assam and 1 in Kerala and also caused extensive damage to houses, communication, roads and crops.

Heavy snowfall and inclement weather had cut off Kashmir valley from the rest of the world, as the highway remained closed and flights were cancelled. Leh in Jammu & Kashmir reported minus 23.6°C on 2 January and Mount Abu in Rajasthan reported minus 4.4°C on 4 January. Higher reaches of Jammu & Kashmir and Himachal Pradesh continued to remain under the grip of severe cold

towards the later part of the month, with Kargil, Keylong, Leh etc, reporting minimum temperatures less than minus 15°C all through the period.

## 3.2. *February*

### 3.2.1. *Storms and Depressions*

#### 3.2.1.1. *Depression over the Bay of Bengal (2 February)*

In association in the deep trough in easterlies over the southeast Bay of Bengal a low pressure area on 1 February over the southwest Bay of Bengal off Sri Lanka coast in the evening and concentrated into Depression at 0900 UTC of 2<sup>nd</sup> February 2011 and lay centred near Lat. 6.5° N / Long. 82.5° E, about 100 km southeast of PoHuvil (Sri Lanka). Remaining practically stationary, it weakened into a well marked low pressure area at 0000 UTC of 3 February and lay over the southwest Bay of Bengal & adjoining

TABLE 7

## Principal amounts of rainfall (in cm) over different stations for the months of January and February 2011

Date	January	February
1.	Baldwara 8, Piravam 6, Palampur 5, Angadipuram & Mussoorie 4 each, Bageshwar (Thmo), Basar, Champawat, Konni, Kumarakam, Mukteshwar, Naina Devi, Nainital & Vaikom 3 each, Almora, Baijnath, Bhoranj, Budaun, Kalpa, Minicoy, Nighasan, Pantnagar, Perinthalamanna, Phoolbagh, Pithoragarh, Punalur & Thiruvananthapuram 2 each, Ballia, Bambasa, Banjar, Bareilly PBO, Bhatwari, Bilaspur AWS, Chapra, Deoprayag, Dhundhi, Forbesganj, Hut Bay, Idukki, Kanjirappally, Kotdwara, Mancompu, Muhammdi, Munnar KSEB, Nancowary, Nedumangad, Neyyattinkara, Pauri, Peermade To, Rudraprayag, Sahabad, Thakurdwara & Tharali 1 each	Carnicobar IAF 1
2.	Thuckalay 13, Nedumangad & Tuting 4 each, Boothapandi, Idukki, Kuzithurai & Nagarkoil 3 each, Eraniel, Mylaudy & Tezu 2 each, Aryankavu, Ayikudi, Bahalpur, Daporijo, Deomali, Hut Bay, Khowang, Margherita, Nancowary, Passighat, Pechiparai, Punalur, Reckong Peo AWS & Sivagiri 1 each	Car Nicobar 2
3.	Thuckalay 7, Ambasamudram, Aryankavu & Car Nicobar 4 each, Coonoor, Mylaudy & Sethiyathope 3 each, Ayikudi, Chidambaram, Cuddalore, Eraniel, Gingee, Jayamkondan, Manimuthar, Minambakkam, Neyyattinkara, Parangipettai & Sriperumbudur 2 each, Anna University, Attur, Colachel, Dgp Office, Hut Bay, Kanyakumari, Kufri AWS, Kundha, Pondicherry, Sherkottah, Tenkasi & Thammanpatti 1 each	Hut Bay & Nancowary 5 each
4.	Hut Bay 6, Kavali 5, Neyyattinkara 4, Konni 3, Kandukur, Kottayam, Long Island, Mudukulathur, Perumpavur, Port Blair & Punalur 2 each, Coonoor, Kozha, Kufri AWS, Tada & Thuckalay 1 each	Long Island & Port Blair 3 each, Hut Bay & Keylong 1 each
5.	Cuddalore 10, Jayamkondan 7, Chidambaram 5, Alangudi, Dindigul, K.M.Koil, Kodavasal, Nannilam, Needamangalam, Orathanadu, Pandavaiyar Head, Thanjavur, Thiruvaidaimarudhur & Tiruvarur 4 each, Parangipettai, Tirumayam & Valangaiman 3 each, Karaikal, Kumbakonam, Mannargudi, Mayiladuthurai, Papanasam, Pudukkottai, Sethiyathope, Sirkali, Tiruvaiyaru, Vallam & Vanur 2 each, Adiramapatinam, Aranthangi, Car Nicobar, Kandarvakottai, Karaikudi, Karambakudi, Kollidam, Madukur, Marungapuri, Nagapattinam, Perungalur, Pondicherry, Thirupattur, Thuraiyur, Tirukattupalli, Tirumanur, Tiruvadanai, Viluppuram, Vridhachalam & Watrap 1 each	Long Island 4
6.	Nancowary 4, Carnicobar IAF & Kozha 2 each	Gulmarg R.S. & Pahalgam 3 each, Badarwah, Banihal, Batote, Kupwara & Shalimar Agro 2 each, Manali, Port Blair, Srinagar & Tissa 1 each
7.	Car Nicobar 17, Nancowary 7, Hut Bay & Maya Bandar 6 each, Port Blair 5, Thiruvananthapuram AP 4, Long Island & Piravam 3 each, Kanjirappally, Mancompu & Thodupuzha 2 each, Kollam Rly 1	Batote 6, Banihal, Manali & Pahalgam 4 each, Gulmarg R.S., Keylong, Saloni & Sangla 3 each, Batala, Kalpa, Kupwara, Seobagh & Tissa 2 each, Badarwah, Katra, Khairi, Madhopur, Mandi, R S Dam Site, Reckong Peo AWS, Shahpur Kandi, Shalimar Agro & Srinagar 1 each
8.	Maya Bandar 9, Mancompu & Thodupuzha 5 each, Kayamkulam & Nancowary 4 each, Carnicobar IAF, Haripad & Konni 3 each, Hut Bay, Idukki & Kumarakam 2 each, Kollam Rly, Nedumangad, Port Blair & Punalur 1 each	Gulmarg R.S. 15, Batote, Khairi, Madhopur, Malakpur & Pathankot IAF 9 each, Shahpur Kandi 7, R S Dam Site & Saloni 6 each, Guler, Kahu, Salern AWS & Tissa 5 each, Anandpur Sahib, Banihal, Dharmasala, Kalpa, Karsog, Manali, Mukerian & Nagrota Surian 4 each, Barthin, Dasuya, Dehra Gopipur, Deoprayag, Kukernag, Naina Devi, Nurpur / Jassur, Pahalgam, Sainj AWS & Uttar Kashi 3 each, Amb, Ambala IAF, Badarwah, Baijnath, Bajura AWS, Baldwara, Bangana, Bhatwari, Bhuntar Aero, Bilaspur AWS, Champawat, Dunda, Ghamroor, Ghumarwin, Gurudaspur, Jhandutta, Jogindarnagar, Kasol, Kupwara, Malsisar SR, Mehre (Barsar), Mungeshpur, Munsiyari, Nadaun, Nangal, Pandoh, Patti, Pauri, Purola, Rampur Bushar, Ranikhet (G), Reckong Peo AWS, Rohru, Roopnagar AWS, Ropar, Sangla, Sundarnagar, Tehri & Una

TABLE 7 (Contd.)

Date	January	February
		2 each, Adampur IAF, Amritsar, Arki, Bageshwar (Thmo), Balachaur, Barkot, Bhoranj, Bhuhana SR, Chelsea School AWS, Dehra Dun, Delhi Ridge, Garhshankar, Guhla, Haldwani, Halwara IAF, Jagadhari, Jhunjhunu, Joshimath, Kandaghat, Karnal, Katra, Keylong, Mukteshwar, Nainital, Nalagarh, Narela, Narnaul, Nauni AWS, Pachhad, Palam, Pantnagar, Paonta, Phoolbagh, Pitampura, Pithoragarh, Quazi Gund, Rajgarh, Renuka / Dadhau, Rohtak, Roorkee, Rudraprayag, Samrala, Simla, Solan, Srinagar, Sujanpur Tira, Tharali & Udampur (IAF) 1 each
9.	Punalur 3, Dhundhi, Imphal, Long Island & Solangnala 1 each	Banihal & Batote 13 each, Badarwah & Quazi Gund 8 each, Gulmarg R.S. 7, Kukernag & Pahalgam 5 each, Anantnag, Kathua, Kupwara, Periyar Dam & Srinagar 4 each, Awantipur IAF, Kanjirappally, Mangan, Neyyattinkara & Shalimar Agro 3 each, Jammu & Konibal 2 each, Carnicobar IAF, Deomali, Katra, Kufri AWS, Kukumsheri AWS, Nedumangad & Udampur (IAF) 1 each
10.	Alapuzha 3, Port Blair 2, Lengpui & Tuting 1 each	Kochi I.A.F. 8, Alapuzha & Kuzithurai 4 each, Piravam 3, Katra, Majitar, Tuting & Vaikom 2 each, Badarwah, Banihal, Batote, Car Nicobar, Khanitar, Kukernag, Melabazar / Motunga, Murti, Pahalgam, Srinagar Aero & Udampur (IAF) 1 each
11.	NIL	Nancowary 3, Birpur 1
12.	Maya Bandar 3, Nancowary 2	NIL
13.	NIL	Bhang & Nancowary 5 each, Manali 4, Dhundhi 3, Jhungi, Kalpa, Karsog, Patsio, Reckong Peo AWS & Saloni 1 each
14.	Port Blair 1	Banihal 8, Purola 7, Dhundhi 6, Manali, Pokhran & Solangnala 5 each, Joshimath, Mussoorie, Phalodi, Seobagh & Tissa 4 each, Barkot, Bhatwari, Bhuntar Aero, Pauri, Saloni, Udaipur & Uttar Kashi 3 each, Bajura AWS, Balotra SR, Bhang, Bhopalgarh SR, Bhoranj, Chamoli, Deoprayag, Dharmsala, Dunda, Fatehgarh, Kalpa, Khairi, Lunkaransar, Pachpadra, Ramgarh, Ramgarhshekhathan SR, Rampur Bushar, Reckong Peo AWS, Rohru & Sangla 2 each, Bikaner Tehsil SR, Carnicobar IAF, Chelsea School AWS, Chhachhrauli, Chirawa, Churu, Churu Tehsil SR, Deoband, Dungargarh, Fatehpur, Hissar, Jagadhari, Jhunjhunu, Jind, Jodhpur, Jogindarnagar, Kandaghat, Karnaprayag, Kasauli, Keertinagar, Kolayat Magra, Kufri AWS, Kumarsain, Malsisar SR, Munsiyari, Nohar SR, Nokha, Nurpur / Jassur, Pachhad, Pandupuram AWS, Pantnagar, Patsio, Pungal SR, Roorkee, Rudraprayag, Shahpur Kandi, Simla, Solan, Tehri, Tharali & Theog 1 each
15.	Dhundhi 6, Banihal, Batote, Bharwain, Dharmsala, Keylong, Poonch, Solangnala & Srinagar 5 each, Badarwah, Baldwara, Bangana, Ghumarwin, Gulmarg R.S., Hamirpur, Kukernag, Manali, Pahalgam, Patsio & Quazi Gund 4 each, Bhang, Bhoranj, Dehra Gopipur, Gund, Jhandutta, Khairi, Konibal, Mehre (Barsar), Nadaun, Nangal, Nurpur / Jassur, Palampur & Tissa 3 each, Amb, Anantnag, Awantipur IAF, Baijnath, Balachaur, Barthin, Bhuntar Aero, Derabassi (BAS), Ghamroor, Gohar, Guler, Jogindarnagar, Kalpa, Kupwara, Munsiyari, Nagrota Surian, Naina Devi, Purola, R S Dam Site, Rajouri, Seobagh, Sujanpur Tira, Sundarnagar & Una 2 each, Anandpur Sahib, Bajura AWS, Barkot, Bilaspur AWS, Dunda, Jhungi, Jubbil, Kandaghat, Karsog, Kathua, Katra, Kumarsain, Madhopur, Mandi, Nauni AWS, Paonta, Rajgarh, Saloni, Sangla, Sangraha, Shahpur Kandi, Solan & Udampur (IAF) 1 each	Chamoli, Nasirabad, Raipur SR & Una 5 each, Hamirpur, Iglas, Khairi & Manali 4 each, Aligarh, Amb, Baldwara, Bharatpur Tehsil SR, Bhim, Chomu, Dehra Gopipur, Karnaprayag, Karsog, Kishangarh, Mangliawas SR, Mozamabad SR, Nayanagar / Beawar, Palampur, Pauri, Pushkar SR, Rudraprayag, Sikrai, Tatgarh SR, Tehri, Uttar Kashi & Viratnagar SR 3 each, Abdasa, Ajmer, Ajmer Tehsil SR, Arai SR, Asind, Baijnath, Bangana, Beir SR, Bharatpur, Bhiwapur, Bhoranj, Car Nicobar, Chaksu, Dausa, Deoprayag, Desuri, Dharmsala, Dunda, Gurudaspur, Hathras, Jaipur Aero, Jaswantpura, Jhunjhunu, Joshimath, Karauli, Keertinagar, Kekri SR, Kotputli, Malpura, Masuda SR, Munsiyari, Nadaun, Nadbai, Naliya, Narnaul, Nawalgarh, Nawanshahr, Neemkathana SR, Parbatsar, Pisagan SR, Rajgarh, Ranikhet (G), Sahaswan, Salern AWS, Seobagh, Srimadhampur, Srinagar SR, Sujanpur Tira, Todabhim & Udaipur-Wati 2 each, Adampur IAF, Ahore SR, Almora, Alwar SR, Anandpur Sahib, Arki, Atrauli, Bageshwar (Thmo), Baheri, Bajura AWS, Balotra SR, Bansur, Bapouli, Barkot, Barmer Tehsil SR, Barthin, Bassi, Baswa, Bawal, Behror, Bhatwari, Bhinay SR, Bhopalgarh SR, Bhuhana SR, Bhuntar Aero, Bilara, Bilari, Bisauli, Budhana, Champawat, Chelsea School AWS, Chirawa, Chotan,

TABLE 7 (Contd.)

Date	January	February
		Danta Ramgarh, Deeg SR, Dehra Dun, Deoband, Fatehpur, Ganaur, Geola SR, Ghumarwin, Gohana, Gohar, Govindgarh SR, Guler, Gunnaur, Jagdishpur AWS, Jaitran, Jatusana, Jawaja, Jhandutta, Jodhpur, Jubbal, Kalpa, Kandaghat, Kasauli, Kathumer, Keylong, Kharkoda, Khetri, Kiroli, Kotkasim SR, Kufri AWS, Kumarsain, Kumher SR, Lachmangarh, Lakhapat, Loharu, Makrana SR, Malakhera SR, Mandawar, Mandi, Mansa, Marwar Junction, Morni, Mukteshwar, Mungeshpur, Mussoorie, Nagrota Surian, Nahan, Nainital, Najibabad (T), Nancowary, Narela, Narkanda AWS, Nokha, Nurpur / Jassur, Pachhad, Pahari SR, Phagi, Phagwara, Pilani, Pithoragarh, Purola, Rajgarh, Ramgarh SR, Rohat SR, Rohru, Rohtak, Roorkee, Rupbas, Safidon, Saloni, Sambhal, Sangla, Sangraha, Sangrur, Sapotra, Sarwar, Sedwa SR, Sikar, Sikar Tehsil SR, Simla, Solan, Sonapat, Sundarnagar, Sunibhaji, Thanagazi, Tharali, Theog, Tizara SR, Todaraisingh SR, Udaipur & Vijaynagar SR 1 each
16.	Dhundi 5, Gohar, Joshimath & Rohru 4 each, Manali, Palampur, Qazi Gund & Uttar Kashi 3 each, Ambasamudram, Bajura AWS, Banjar, Bhatwari, Dharmasala, Dholai, Jogindarnagar, Khairi, Manimuthar, Pamban, Pandoh, Rameswaram, Rampur Bushar, Rudraprayag, Sujapur Tira & Sunibhaji 2 each, Bageshwar (Thmo), Baijnath, Barkot, Barthin, Bhang, Bhoranj, Bhuntar Aero, Bilaspur AWS, Champawat, Dehra Dun, Dunda, Ghumarwin, Jhandutta, Jubbal, Kalpa, Keertinagar, Kheronighat, Konibal, Mandi, Mehre (Barsar), Naina Devi, Pahalgam, Palayamkottai, Patsio, Pauri, Purola, Rajgarh, Ramanathapuram, Sainj AWS, Saloni, Sangraha, Seobagh, Solan, Solangnala, Sundarnagar, Tezu, Tharali, Toothukudi & Tuting 1 each	Dhuri 8, Anandpur Sahib, Barthin, Bhoranj, Carnicobar IAF & Jogindarnagar 7 each, Balachaur, Palampur & Una 6 each, Baldwara, Hamirpur, Manali, Nasirabad, Samrala, Srinagar SR & Sujapur Tira 5 each, Amb, Bangana, Champawat, Dharmasala, Ghumarwin, Gohar & Mandi 4 each, Aligarh, Baijnath, Bayana, Bilaspur AWS, Bisauli, Chomu, Degana, Kasol, Keylong, Munsiyari, Nainital, Nawanshahr, Ramgarhshekhata SR, Ranikhet (G), Seobagh, Sikar, Sikar Tehsil SR, Sundarnagar & Tapukara 3 each, Agra Aero (IAF), Almora, Amritsar, Arai SR, Bageshwar (Thmo), Baheri, Banjar, Bareilly PBO, Bari, Beir SR, Bhiwani, Bhuntar Aero, Bilari, Cherrapunji, Chirawa, Dehra Gopipur, Delhi University, Deoprayag, Garhshankar, Gegal SR, Hoshiarpur, Jafarpur, Joshimath, Kahu, Kaimganj, Kaiserganj, Karauli, Kasganj, Kathumer, Khair, Khalilabad, Makrana SR, Malsisar SR, Mewat AWS, Mukteshwar, Mustfabad, Najafgarh, Nawalgarh, Nayanagar / Beawar, Nighasan, Pandoh, Pauri, Pitampura, Pithoragarh, Pusa, Rampur, Roopnagar AWS, Ropar, Rupbas, Sahaswan, Salem AWS, Sardhana, Sports Complex & Todabhim 2 each, Adampur IAF, Ajmer, Aliganj, Atrauli, Baghpat, Bahraich, Bajura AWS, Bambasa, Beberu, Bharatpur, Bharatpur Tehsil SR, Bhuhana SR, Bilgram, Bopani AWS, Budaun, Chaksu, Chhata, Danta Ramgarh, Dataganj, Datia, Dausa, Dhampur, Dhaurahara, Dholpur, Etah, Gautam Buddha Nagar, Geola SR, Gulmarg R.S., Guwahati, Haidargarh, Haldwani, Hardoi, Harpur, Hassanpur, Hathras, Hissar, Jagdishpur AWS, Jalaun, Jalesar, Jasrana, Jatusana, Jhanjharpur, Jubbal, Kaman, Kandaghat, Karnaprayag, Keertinagar, Kekri SR, Khairagar, Khetri, Kota-Aero, Kotdwara, Kumher SR, Lachmangarh, Lodi Road, Malakhera SR, Malihabad, Mandkola, Mauranipur, Meerut, Morni, Nagar SR, Nagina, Narkanda AWS, Narnaul, Nawa, Nimarana, Orail, Palam, Palwal, Pantnagar, Phagi, Phoolbagh, Pilani, Ramgarh SR, Rudraprayag, Safdarjung, Safipur, Sahabad, Saharanpur, Sarmathura SR, Sarwar, Sheopor, Shikohabad, Sonapat, Sultanpur, Talwandi Sabo, Tarabganj, Tehri, Tezu, Thakurdwara, Thanagazi, Tharali, Theog, Tizara SR, Tuting, Uchana, Vijaynagar SR & Williamnagar 1 each
17.	Tuting 5, Majbat 4, Udaipur 3, Amraghat, Dholla Bazar, Kailashahar, Mangan, Margherita & Passighat 2 each, Chaparmukh, Chelsea School AWS, Cherrapunji, Dharmnagar / Panisagar, Dharmatal, Gangtok, Gharmura, Goalpara, Golaghat, Guwahati, Imphal, Karimganj, Kohima, Lakhipur, Majitar, Manimuthar, Mohanbari, Murti, Nalbari, Phek, Puthimari, Rangia, Silchar, Tadong & Tezu 1 each	Tuting 12, Amb & Charcharia 4 each, Bansgaon, Chatia, Dhubri, Hata, Manali, Pauri, Ramnagar & Uttar Kashi 3 each, Basua, Bhalukpong, Bhatwari, Biswan, Budaun, Cherrapunji, Dehra Dun, Gangtok, Gorakhpur, Jogindarnagar, Khairi, Khonsa, Madhwapur, Majbat, Mangan, Mussoorie, Nawanshahr, Puthimari, Rudraprayag, Sahebganj, Sunibhaji, Tadong, Tehri & Williamnagar 2 each, Aie Nh Xing, Alipurduar (CWC), Aya Nagar, Bagdogra IAF, Bahalpur, Bajura AWS, Balan, Baldwara, Balurghat, Barapani, Bareilly PBO, Barkot, Barobhisha, Barpeta, Beki Road, Bridge, Bhimnagar, Bhuntar Aero, Birpur, Chakia, Champasari, Chengmari / Diana, Chepan, Cherrapunji, Chhibramau, Cooch Behar, Deomali, Deoprayag, Dhaurahara, Dholla Bazar, Domeriaganj, Dunda, Forbesganj, Galgalia, Ghosi, Gohar, Guwahati, Haldwani, Hardoi,

TABLE 7 (Contd.)

Date	January	February
		Hasimara, Hayaghat, Jorhat, Joshimath, Jubbal, Kandaghat, Karnaprayag, Karsog, Kasauli, Keertinagar, Khalilabad, Khanitar, Kheri Lakhimpur, Kodawanpur / C.BII, Kokrajhar, Madhopur, Maharajganj, Majitar, Manash Nh Xing, Mankapur, Margherita, Marsrakh, Mathabhanga, Melabazar / Motunga, Motihari, Muhammdi, Naharkatia, Naharlagun, Nainital, Nalbari, Nauni AWS, Nawabganj, Nighasan, North Lakhimpur, Padrauna, Paonta, Passighat, Pathankot IAF, Patiala, Pawayan, Pharenda, Phulparas, Rajpura, Rampur Bushar, Rangia, Ranikhet (G), Rauni AWS, Salimpur, Saloni, Sandhol, Saulighat, Seobagh, Shahpur Kandi, Simla, Singla Bazar, Solan, Sonbarsa, Suar, Sultanpur, Sundarnagar, Tezu & Tissa 1 each
18.	Dhundhi 2	Tuting 7, Silchar 3, Cherrapunji, Itanagar, Kailashahar & Shillong 2 each, Amarpur, Cherrapunji, Chhamonu, Halflong, Jorhat, Kheronighat, Khawai & Passighat 1 each
19.	Gangtok & Tuting 1 each	Khandapara 3, Alipingal, Mahedi / Mehshi & Nayagarh 2 each, Ahiri, Basar, Bhalukpong, Bhopalpatnam, Kurnool, Soro & Tuting 1 each
20.	Tezu 1	Naraj 11, Bijapur & Cuttack 7 each, Balasore & Mundali 6 each, Berhampur, Ghatagaon, Nilgiri & Pallahara 5 each, Bhubaneswar Aero, Jaipur, Swam-Patna & Udala 4 each, Bramhapuri, Hindol, Kurkheda, Naktideul, Purushottampur, Rairangpur, Rajghat & Srungavarapukota 3 each, Balimundali, Bhopalpatnam, Chendipada, Digha, Jaleswar, Keonjhar, Komarada, Mohana, Narsinghpur, Nh5 Gobindpur, Ranpur, Sironcha, Sorada & Warora 2 each, Alipore, Arjuni Morgaon, Armoor, Baripada, Batagaon, Bhadravati, Bhograi, Gondpipri, Gunupur, Jagdalpur, Kalaikunda (IAF), Kamakshyanagar, Kharapur (I.I.T), Koyyalagudem, Krishnaprasad, Lakhandur, R.Udaigiri, Rajura, Ramgundam, Salur, Seobagh, Soro, Thakurmunda & Visakhapatnam AP 1 each
21.	Patsio 1	Athgarh, Kosagumda & Srungavarapukota 7 each, Daspalla & Narayanpur 6 each, Chhatrapur, Dhenkanal, Ghatagaon, Kalingapatnam, Khandapara, Kondagaon & Talcher 5 each, Athmalik, Gunupur, Janjgir, Kalinga, Kuhi, Mahendragarh, Mundali, Nimpara, Rajnandgaon, Tikabali & Umakote 4 each, Angul, Aska, Bijapur, Bissem-Cuttack, Chamorshi, Cheepurupalli, Dongargarh, Gondpipri, Gopalpur, Gudari, Itchapuram, Junagarh, Naraj, Parvatipuram, Phulbani, R.Udaigiri, Sakti, Sukinda, Tangi, Thakurmunda & Tikarpara 3 each, Alipingal, Altuma CWC, Baswa, Bhanupratappur, Bhiwapur, Champa, Delhi University, Durg, Etapalli, Hyderabad A.P., Jind, Kotagarh, Kotraguda, Mandasa, Mandira Dam, Mohana, Nagbhir, Narsinghpur, Paralakhemundi, Pathalgaon, Pitampura, Rajura, Sambalpur, Sindewahi, Sironcha, Sompeta, Surangudi, Telkoi, Tohana, Turekela & Vilathikulam 2 each, Ahiri, Akhuapada, Alwar SR, Amer SR, Anandpur, Arjuni Morgaon, Barkot, Barmul, Bawal, Bayana, Bhatinda, Bhawanipatna, Bhiwani, Bhubaneswar Aero, Bilaspur, Chimur, Cuttack, Dausa, Deogaon, Deori, Dhone, Dubwali, Hindol, Hissar, Jashpurnagar, Jatusana, Jenapur, Jeypore, Kaithal, Kalayat, Kamakshyanagar, Kashinagar, Kathumer, Kendrapara, Keonjhar, Komarada, Koraput, Laikera, Lodi Road, Mahwa, Malsisar SR, Mana-Raipur-Ap, Mohadi, Muktsar, Mungeli, Nagar SR, Narwana, Nimarana, Owk, Palasa, Pandupuram AWS, Pusa, Raipur, Ranikhet (G), Rattia, Rayagada, Rudraprayag, Safdarjung, Sakoli, Simga, Siwani, Sorada, Sports COMplex, Sundargarh, Swam-Patna, Titlagarh, Tuting, Viratnagar SR & Virudhunagar 1 each
22.	NIL	Thally 15, Arani 11, Sholagiri 9, Marandahalli 8, Boothapandi 7, Addanki, Denkanikottai, Punalur & Vijayawada A.P. 6 each, Ambur, Kakinada, Masulipatnam Cdr, Pechiparai, Pennagaram, Periyakulam, Rayalpadu, Tada, Thiruvananthapuram & Walajapet 5 each, Gudur, Kaveripakkam, Krishnagiri, Nalgonda, Ongole,

TABLE 7 (Contd.)

Date	January	February
23. NIL		<p>Palacode &amp; Vellore 4 each, Kamuthi, Kanakapura, Koodalur, Peermade To, Podili, Poondi, R.K.Pet, Sholigur, Sullurpet, Uthamapalayam &amp; Vadipatti 3 each, Bangalore CO, Chodavaram, Hogenakal, Hosur, Idukki, Kashinagar, Kavali, Konni, Kumbakonam, Mangalgi, Minambakkam, Mudukulathur, Munnar KSEB, Nandigama, Narsapuram, Pakala, Piduguralla, Polur, Punganur, Rajampet, Rapur, Rayakottah, Satyavedu, Srinivasapur, Tanuku, Tenali, Thiruvalangadu, Tirupati Aero, Tiruttani &amp; Visakhapatnam AP 2 each, Akot, Anakapalli, Anchetty, Andipatti, Anna University, Atchempet, Atmakur, Bangarpet, Bodinayakanur, Cholavaram, Gangtok, Gudivada, Hirakud, Kadaladi, Kandukur, Kanjirappally, Karaikudi, Kodaikanal, Komarada, Kuppam, Majitar, Malur, Mulbagal, Palakonda, Palamner, Panposh, Parvatipuram, Pondicherry, Redhills, Sathanur Dam, Srialahasthi, Tadong, Theni, Thuckalay, Vaniyambadi, Venkatagiri Town &amp; Yellamanchili 1 each</p>
24. NIL		<p>Dindigul 17, Coonoor 13, Muthupet 10, Arani &amp; Sirkali 9 each, Nungambakkam &amp; Tada 8 each, Chittur 7, Aruppukottai, Chinglepet &amp; Kottayam 6 each, Arakkonam, Kothagiri, Kundha, Madukur, Melalathur, Pattukottai, Puttur, Redhills, Sethiyathope, Sriperumbudur, Sullurpet, Thiruvalangadu, Thiruvalla, Tiruttani &amp; Vandavasi 5 each, Alathur, Cholavaram, Kanchipuram, Kayamkulam, Kollam Rly, Mavelikara, Nedumangad, Ottapalam, Parangipettai, Perumpavur, Satyavedu, Tenkasi, Thiruchuzi, Tiruvarur, Ulundurpet &amp; Vilathikulam 4 each, Alangudi, Angadipuram, Bodinayakanur, Chidambaram, Chittoor, Kamuthi, Ketti, Kodaikanal, Kozha, Manjeri, Mannarkkad, Machilipatnam CDR, Namakkal, Narasaraopet, Orathanadu, Perinthalamanna, Periyakulam, Ponneri, Sattur, Shenkottah, Srimushnam, Thiruvananthapuram, Tindivanam, Vadakkancherry &amp; Valangaiman 3 each, Adiramapatinam, Ayikudi, Cheyyur, Enamakal, Ginge, Hogenakal, K.M.Koil, Karaikal, Kelambakkam, Kochi I.A.F., Kollidam, Mahabalipuram, Manamadurai, Mannargudi, Mayiladuthurai, Mettur Dam, Pandavaiyar Head, Pechiparai, Poonamallee, Poondi, Salem, Sholavandan, Sivakasi, Srivilliputhur, Tarangambadi, Thrissur, Tirukoilur, Virudhunagar, Vridhachalam, Vytteri &amp; Watrap 2 each, Alwaye PWD, Anna University, Atmakur, Bhavani, Chittampatti, Devakottai, Gauribidanur, Gudiyatham, Irinjalakuda, Kalakada, Kanjirappally, Kaveripakkam, Kolar PWD, Konni, Kovilpatti, Krishnagiri, Kuzithurai, Melur, Mettupatti, Mulbagal, Nagapattinam, Nannilam, Ooty, Ottapidaram, Pattembi, Penukonda, Periyar Dam, Rajapalayam, Sankarankoil, Sendamangalam, Sivaganga, Srialahasthi, Surangudi, Thritla, Tirumayam, Tirupuvanam, Tiruvaiyaru, Tiruvallur, Tondabhavi, Varkala, Vedaranyam, Venkatagiri Town &amp; Walajapet 1 each</p>
24. NIL		<p>Aruppukottai, Chengannur, Dhundhi &amp; Pandavapura 6 each, Kanchipuram, T.Narsipur &amp; Venkatagiri Town 5 each, Rahuri 4, Bhagamandala, Chikodi, Coonoor, Kuppady, Mancompu, Manthala, Mavelikara, Mettupalayam, R. S. Mangalam, Sangli, Shenkottah, Solangnala, Sravanabelagola, Srirangapatnam, Thritla, Tiruvallur &amp; Uthiramerur 3 each, Chalakudi, Cheyyar, Dharwad PTO, Gobichettipalayam, Harangi, Kalpa, Kollam Rly, Kottayam, Kozha, Krishnarajpet, Madurai AP, Mahabalipuram, Manali, Mudigere, Nancowary, Nanjangud, P.N. Palayam, Pappireddipatti, Rameswaram, Sankeshwar, Srivilliputhur, Tada, Tissa, Vadipatti &amp; Watrap 2 each, Afzalpur Hms, Alapuzha, Alathur, Gilbarga PTO, Gokak, Halli Mysore, Kalasa, Karipur AP, Kavali, Kayamkulam, Keylong, Khairi, Kochi C.I.A.L., Konni, Krishnarajsagara, Kumarsain, Kundha, M M Hills, Maduranthagam, Mannarkkad, Minicoy, Mominabad, Napoklu, Needamangalam, Ooty, Osmanabad, Pechiparai, Ponnani, Rapur, Saloni, Sholavandan, Shrigonda, Sivakasi, Somwarpet T.O., Sriperumbudur, Tenkasi, Thrissur, Tindivanam &amp; Walajapet 1 each</p>

TABLE 7 (Contd.)

Date	January	February
25.	Car Nicobar 2	Manimuthar 9, Ammathy, P.N. Palayam & Shenkottah 8 each, Chittampatti & Mettupalayam 7 each, Ambasamudram, Pollachi, Punalur, Tenkasi & Thuckalay 5 each, Aryankavu, Balehonur, Kuppady, Marungapuri, Nanguneri & Thirumangalam 4 each, Aruppukottai, Boothapandi, Harangi, Kochi C.I.A.L., Kozha, Madurai AP, Melur, Mettupatti, Mudigere, N. R. Pura, Nedumangad, Nelogi, Periyar Dam & Uthamapalayam 3 each, Ambalavayal, Arasalu, Arsikere R, Carnicobar IAF, Cheranmadevi, Chicholi, Chittapur, Coimbatore AP, Gohar, Hinganghat, Kanjirappally, Krishnarajpet, Malegaon, Mylaudy, Napoklu, Nilakottai, Sedam, Sivagiri, Thiruvananthapuram AP & Turuvekere 2 each, Akola, Andipatti, Bandipura, Bhuntar Aero, Channapatana, Chincholi, Coimbatore, Coonoor, Gobichettipalayam, Gotegaon, Hunsur Tb, Jeewargi, Kalgi, Kalpa, Kandhar, Ketti, Konanur, Koodalur, Kottayam, Lingadahalli, Madikeri PTO, Manali, Multai, Nagarkoil, Nancowary, Narsinghpur, Pachmarhi, Pechiparai, Perumpavur, Poonampet PWD, Radhapuram, Ramgarhshekhatan SR, Samudrapur, Sira, Tandur, Thiruchuzi, Thodupuzha, Tuljapur & Vikarabad 1 each
26.	Badarwah 1	Punalur 5, Kumarsain 4, Dhundhi, Periyar Dam & Solangnala 3 each, Bangalore CO, Bhoranj, Bilaspur AWS, Champa, Dubwali, Gondpipri, Idukki, Julana, Kanjirappally, Nancowary, Port Blair, Sadulsahar SR, T. Narsipur & Tissa 2 each, Aryankavu, Bageshwar (Thmo), Baghpat, Bajura AWS, Bandipura, Bhang, Bhatinda, Bhiwani, Bhuntar Aero, Coimbatore, Coonoor, Deoband, Dharampur, Dhuri, Dunda, Gadchiroli, Ganaur, Ganganagar, Gautam Buddha Nagar, Gohana, Gohar, Guhla, Gurgaon, Gurumittkal, Hakimpet IAF, Hasanpur, Jabalpur-New, Jagdishpur AWS, Jogindarnagar, Kahu, Kaithal, Kalpa, Karnal, Kasauli, Kasol, Khairi, Khol, Konni, Kunda, Kuppady, Kupwara, Malerkotla, Manali, Mansa, Muktsar, Mungeshpur, Nabha, Nagar SR, Narela, Nurpur / Jassur, P.N. Palayam, Pachhad, Pandupuram AWS, Panipat, Patiala, Pendra Road, Pollachi, Rajgarh, Rauni AWS, Rohtak, Safdarjung, Safidon, Saharanpur, Sahlawas, Saloni, Sangrur, Sirsa IAF, Sivagiri, Siwani, Solan, Sonepat, Sports Complex, Sundarnagar, Tadong & Yadgir 1 each
27.	Tuting 4, Hut Bay 3, Nancowary 1	Kochi I.A.F. 14, P. N. Palayam 12, Mettupalayam 7, Chittur & Ottapalam 5 each, Begur & Piravam 4 each, Bandipura, Konni, Kothagiri, Kupwara, M M Hills, Manali, Perumpavur & Varkala 3 each, Annur, Beed, Chamarajnar, Coimbatore, Coimbatore AP, Devala, Gohar, Kanjirappally, Mannarkkad, Mominabad, Mussoorie, Pahalgam, Patoda, Punalur, Shenkottah, Tenkasi, Thiruvananthapuram & Thodupuzha 2 each, Alathur, Aryankavu, Bajura AWS, Banihal, Batote, Bhavani, Bhuntar Aero, Cherthala, Chhibramau, Coonoor, Dabaka, Dharmasala, Erode, Gulmarg R.S., Hamirpur, Kumarapalayam, Mancompu, Nauni AWS, Neyyattinkara, Peermade To, Purola, Sathyamangalam, Seobagh, Shalimar Agro, Srinagar & Thrissur 1 each
28.	Nancowary 4, Passighat 3, Carnicobar IAF & Hut Bay 1 each	Mhaswad 3, Bhokardan, Billoli, Konni, Parbhani, Sillod & Soegaon 1 each
29.	Hut Bay 4, Car Nicobar 2, Nancowary 1	
30.	Car Nicobar 6, Hut Bay, Long Island 3, Nancowary 2, Kulu, Messenjore, Moharo, Port Blair, Ranchi Aero, Tenughat & Tilaiya 1 each	
31.	Hut Bay 6, Jamshedpur, Suri (CWC) & Udala 2 each, Balimundali, Jaipur, Kansabati Dam, Messenjore & Tantloi 1 each	



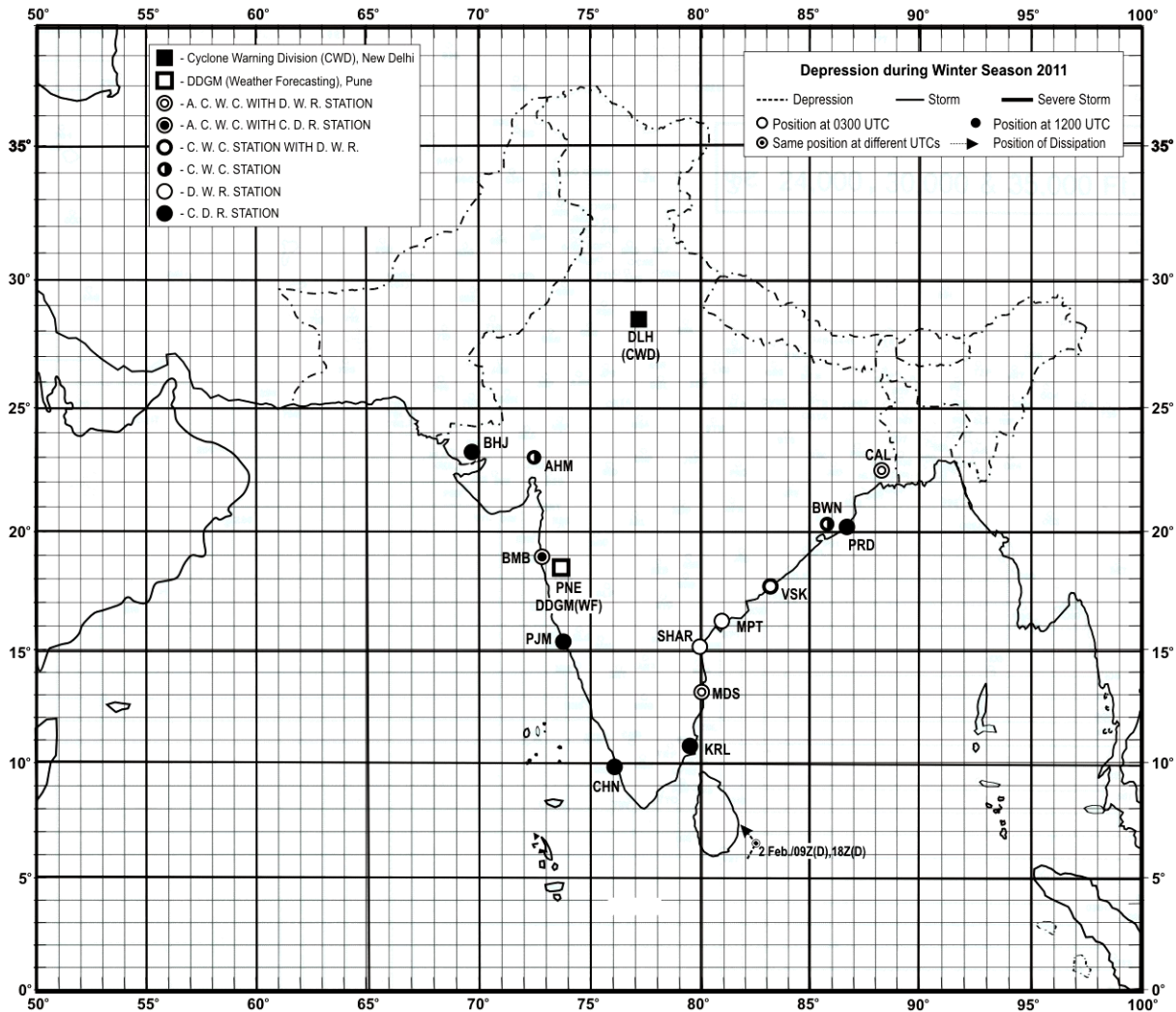


Fig. 2. Track of depression over Bay of Bengal during 2<sup>nd</sup> February 2011

Sri Lanka. It further weakened into a low pressure area over the same region on 4 and persisted there upto the morning of 8 and became less marked in the evening. However, the associated cyclonic circulation extending upto 3.1 km a.s.l. persisted over the same area upto 11 and became less marked on 12. Fig. 2 indicates the position of the system.

Since the system formed over the southern parts of the southwest Bay of Bengal and weakened *in situ*, it did not affect the weather over the country.

3.2.2. Other synoptic features and associated weather

As seen from Table 5, there were 12 western disturbances (including 6 upper air cyclonic circulations, 3 induced cyclonic circulations and 3 troughs in westerlies), 6 upper air cyclonic circulations, 5 troughs in the easterlies

and 1 trough/wind discontinuity which affected the weather over the country during month of February.

The resultant sub-division wise spatial rainfall distribution and frequency of heavy and very heavy rainfall are given in Table 3.

3.2.3. Monthly rainfall

Sub-division wise percentage departure and principal amounts of rainfall for the month of February are given in Tables 1 & 7 respectively.

Major parts of the country outside central, east and northeast India received excess rainfall. Successive passage of western disturbances and induced cyclonic circulations caused fairly widespread rainfall activity over north and western parts of India. Towards the end of the month,

favourable easterly and westerly interaction & north-south wind discontinuity caused rainfall/hailstorm over some parts of eastern, central and peninsular India.

#### 3.2.4. Temperature

February, being a transition period from winter to summer, the weather over most parts of the country is normally very comfortable. This year, owing to the enhanced rainfall activity, *cold wave* conditions occurred only in a few sub-divisions.

The dates of occurrence of *cold waves* and dates on which the minimum temperature remained *appreciably to markedly above/below normal* as well as *above/below normal* are given in Table 6.

During the month, the lowest minimum temperature of 3.5° C was recorded at Imphal (Manipur) on 11 February 2011.

#### 3.2.5. Disastrous weather events and damage

Avalanche claimed the lives of 10 people in Jammu & Kashmir. The Srinagar-Jammu National Highway remained closed as rain/snow blocked vehicular traffic during last week of February. Also lightning and hailstorm claimed 11 lives in Bihar, 1 each in Andhra Pradesh, Karnataka and Kerala. Dense fog enveloped the international airport in New Delhi during the first week and during 17 – 19 February, delaying several flights.

### Appendix

#### Definitions of the terms given in 'Italics'

##### Rainfall

<i>Excess</i>	- percentage departure from normal is + 20 % or more.
<i>Normal</i>	- percentage departure from normal is -19 % to + 19 %.
<i>Deficient</i>	- percentage departure from normal is -20 % to -59 %.
<i>Scanty</i>	- percentage departure from normal is -60 % to -99 %.
<i>At most places</i>	- 76 % or more stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
<i>At many places</i>	- 51% to 75 % stations of a meteorological sub-division reporting at least 2.5 mm rainfall.
<i>At a few places</i>	- 26 % to 50% stations of a meteorological sub-division reporting at least 2.5 mm rainfall.

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

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

*Very heavy rainfall* - rainfall amount 12.5 cm to 24.4 cm.

##### Temperatures

As per the revised criteria for declaring cold wave, the actual minimum temperature of a station is reduced to 'Wind Chill Effective minimum temperature' (WCTn) based on the wind chill factor using the table given in WMO No. 331/ Technical Note No. 123. For declaring cold wave etc. WCTn only is used and when it is  $\leq 10^{\circ}$  C only, cold wave is considered (this criteria does not hold for coastal stations).

*Severe cold wave conditions* - departure of WCT<sub>n</sub> from normal minimum temperature is  $-7^{\circ}$  C or less for the regions where normal minimum temperature is  $\geq 10^{\circ}$  C and  $-6^{\circ}$  C or less elsewhere.

*Cold wave conditions* - departure of WCTn from normal minimum temperature is from  $-5^{\circ}$  C to  $-6^{\circ}$  C where normal minimum temperature  $\geq 10^{\circ}$  C and from  $-4^{\circ}$  C to  $-5^{\circ}$  C elsewhere.

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

*Cold day conditions* maximum day temperature is less than  $16^{\circ}$  C over the plains.

*Markedly below normal* - departure of minimum temperature from normal is from  $-5^{\circ}$  C to  $-6^{\circ}$  C for the region where the normal minimum temperature is  $10^{\circ}$  C or more and from  $-3^{\circ}$  C to  $-4^{\circ}$  C elsewhere.

*Appreciably below normal* - departure of minimum temperature from normal is from  $-3^{\circ}$  C to  $-4^{\circ}$  C for the region where the normal minimum temperature is  $10^{\circ}$  C or more.

*Markedly above normal* - departure of minimum temperature from normal is from  $+ 5^{\circ}$  C to  $+ 6^{\circ}$  C.

*Appreciably above normal* - departure of minimum temperature from normal is from  $+ 3^{\circ}$  C to  $+ 4^{\circ}$  C.

*Above normal* - departure of minimum temperature from normal is  $+ 2^{\circ}$  C.