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Weather in India

POST-MONSOON SEASON (October to December 2000)*

1. Introduction

During the post-monsoon season of 2000, two cyclonic storms (15-19 and 25-28 October 2000) and two very severe cyclonic storms (26-30 November and 23-28 December 2000) formed over the Bay of Bengal. No cyclonic storm formed over the Arabian Sea. Track of the storms and the depression are shown in Fig. 1.

Southwest (summer) monsoon withdrew from the entire country on 25 October 2000. Northeast monsoon rain commenced over Tamil Nadu & Pondicherry, Kerala and adjoining parts of Karnataka and Andhra Pradesh on 2 November. The northeast monsoon rainfall (October-December) over Rayalaseema, north interior Karnataka and south interior Karnataka was normal (departure from normal rainfall is + 19 to –19%) and in coastal Andhra Pradesh, Tamil Nadu & Pondicherry, coastal Karnataka and Kerala it was deficient (departure from normal rainfall is –20 to –59%). Northeast monsoon rain ceased in Tamil Nadu & Pondicherry, Kerala and adjoining parts of Karnataka and Andhra Pradesh on 6 January 2001.

Rainfall activity was subdued in other parts of the country.

2. Seasonal rainfall (October-December)

Seasonal rainfall was normal in 4, deficient in 13 and scanty (departure from normal rainfall is between –60% to –99%) in 18 meteorological sub-divisions.

Rainfall was normal in Nagaland, Manipur, Mizoram & Tripura, Rayalaseema, north interior Karnataka and south interior Karnataka; deficient in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Konkan & Goa, Madhya Maharashtra, Marathwada, coastal Andhra Pradesh, Tamil Nadu, coastal Karnataka, Kerala and Lakshadweep and was scanty over the rest of the 18 meteorological sub-divisions. Seasonal sub-divisionwise percentage rainfall departures are given in Fig. 2 and percentage departures in Table 1.

3. Monthly features

3.1. *October*

3.1.1. *Withdrawal of southwest monsoon*

Southwest monsoon withdrew from west Rajasthan and some parts of Kutch on 13 September as against the normal date of 15 September. It further withdrew from Madhya Pradesh by 4 October (with a delay of only 1 day), from northeastern states (5 days delay) and Orissa (3 days delay) by 13 October and from Maharashtra by 23 October (with a delay of 20 days). It withdrew from the entire country by 25 October with a delay of 10 days.

3.1.2. *Onset of northeast monsoon*

Northeast monsoon rain commenced over Tamil Nadu & Pondicherry, Kerala and adjoining parts of Karnataka and Andhra Pradesh on 2 November.

3.1.3. *Storms / depressions*

During the month of October, two cyclonic storms formed over the Bay of Bengal. Details are presented below:

3.1.3.1. *Cyclonic storm over the Bay of Bengal (15-19 October 2000)*

Under the influence of a well-marked low pressure area over east-central Bay and adjoining parts of southeast Bay, a depression formed over eastern parts of west-central Bay at 0000 UTC of 15, near Lat. 14.5° N/Long. 88.5° E, about 650 km southeast of Visakhapatnam. It intensified into a deep depression at 1800 UTC of 15, near Lat. 14.5° N/Long. 86.5° E. The deep depression further intensified into a cyclonic storm at 0000 UTC of 17, near Lat. 14.0° N/Long. 84.5° E. Moving in a westerly direction, it weakened into a deep depression at 0300 UTC of 18, near Lat. 14.0° N/ Long. 83.5° E and into a depression at 1800 UTC of 18, near Lat. 14.5° N/Long. 82.5° E. The depression further weakened into a well-marked low pressure area at 0900 UTC of 19 over sea, off south Andhra-north Tamil Nadu coast.

*Compiled by : V. Thapliyal, D. S. Desai and V. Krishnan, Meteorological Office, Pune, India

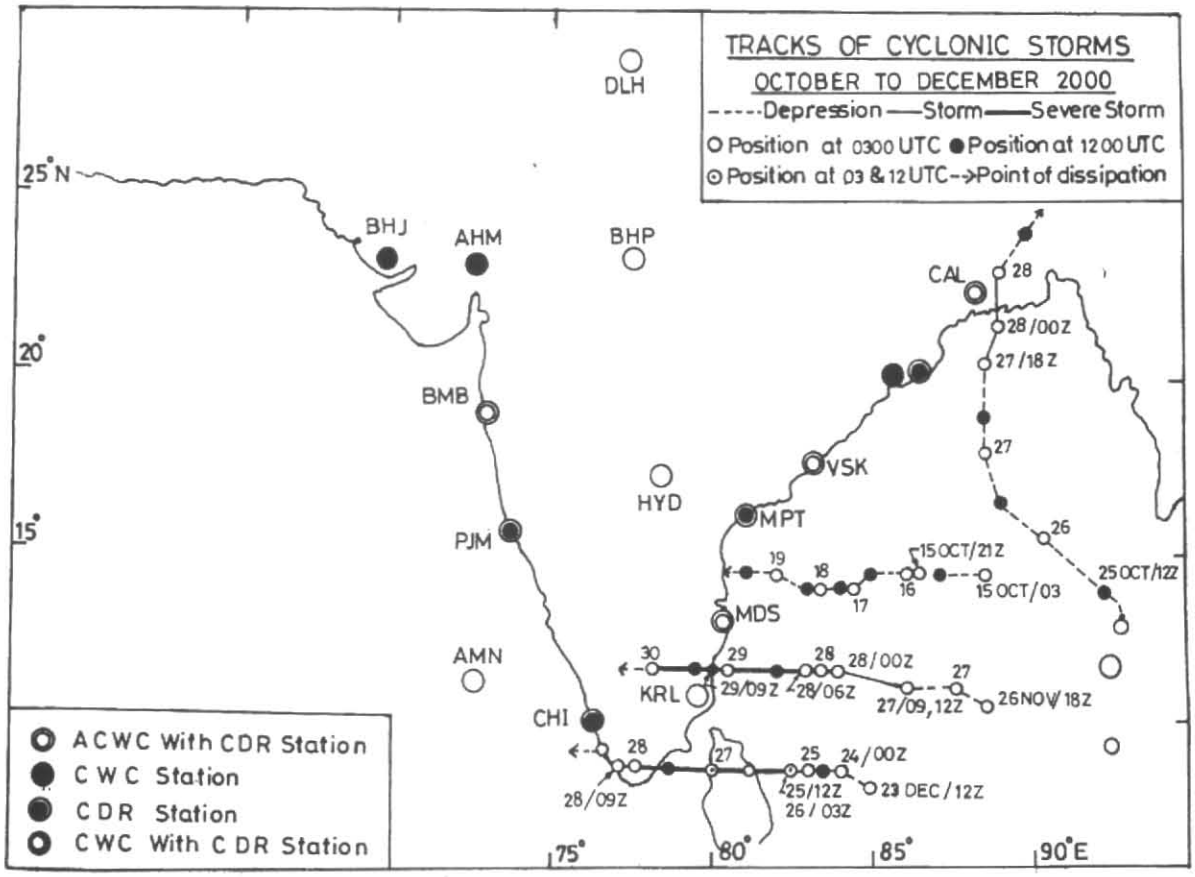

Fig. 1. Tracks of cyclonic storms during the period October to December 2000

The maximum intensity of the system reported by ICI on Dvorak's scale was T 2.5 from 0000 UTC of 17 to 0000 UTC of 18.

Estimated lowest central pressure was 996 hPa from 0600 UTC to 1200 UTC of 17.

Under the influence of this system widespread rainfall with isolated heavy rain occurred over coastal areas of Andhra Pradesh and Orissa. As the system weakened over the sea itself, no damage to life and property was reported.

Exceptionally heavy rainfall reported (in cm) are given below :

17 October : Sompeta 13, Mandasa 11, Palasa 8, Pathapatnam 6.

18 October : Kaikalur 8, Amlapuram 7.
Orissa : Mohendragarh 7.

19 October : Yellamanchili 12, Visakhapatnam AP & Annapalli 6 each.

3.1.3.2. *Cyclonic storm over the Bay of Bengal (25-28 October 2000)*

A low pressure area formed over Andaman Sea in the morning of 24 October 2000. It concentrated into a depression at 0900 UTC of 25, near Lat. 13.5° N/ Long. 93.0° E. Moving in a northwesterly direction, it intensified into a deep depression at 0300 UTC of 27, near Lat. 18.0° N/ Long. 88.5° E. Moving in a northerly direction, it further rapidly intensified into a cyclonic storm at 1800 UTC of 27, near Lat. 20.5° N/Long. 88.5° E. It crossed Bangladesh coast east of Sagar Island between 0100 and 0300 UTC of 28 and weakened into a deep depression near Lat. 22.5°N/Long. 89.0° E at 0300 UTC of 28. It further weakened into a depression at 1200 UTC of 28 near Lat. 23.5° N/Long. 90.5° E. The depression weakened into a well marked low pressure area in the morning of 29 over Bangladesh and adjoining Assam & Meghalaya.

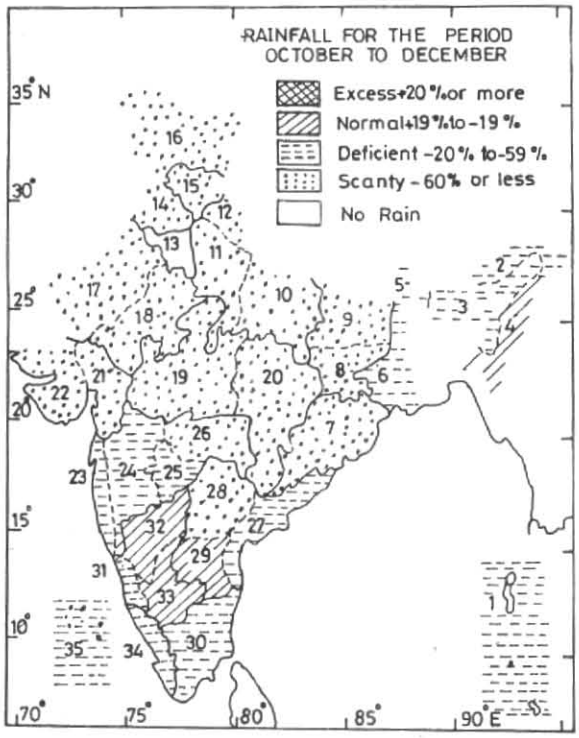

Fig. 2. Sub-divisionwise seasonal rainfall departure from normal (%) for Post monsoon season (October to December 2000). Number on the map & bold letters in legend indicates sub-divisions

1	−21	**8**	−72	**15**	−87	**22**	−91	**29**	−10
2	−24	**9**	−84	**16**	−67	**23**	−20	**30**	−29
3	−46	**10**	−98	**17**	−84	**24**	−23	**31**	−27
4	9	**11**	−99	**18**	−95	**25**	−51	**32**	−6
5	−44	**12**	−96	**19**	−95	**26**	−87	**33**	12
6	−47	**13**	−97	**20**	−96	**27**	−57	**34**	−27
7	−76	**14**	−95	**21**	−76	**28**	−70	**35**	−37

The maximum intensity of the system reported by ICI on Dvorak's scale was T 2.5 from 1800 UTC of 27 to 0000 UTC of 28.

In association with this system, widespread rainfall occurred in Andaman & Nicobar Islands. Squally winds of 50-60 kmph were experienced in north and south 24 Paraganas districts of Gangetic West Bengal as per press reports. Widespread rainfall with isolated heavy falls occurred over Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Assam & Meghalaya on 27, 28 and 29. Principal amounts of rainfall (in cm) are given below :

28 October : Bashirhat 12, Canning Town 11, Deganga 9, Baraipur 8, Calcutta AP and Digha 7 each, Kohima 6.

29 October : Shillong 11.

The system severely affected six of the seven districts of the state of Meghalaya. It caused extensive damage to infra-structure, standing crops and plantation. Hundreds of houses were damaged rendering thousands of people homeless. It also caused loss of a large number of livestock. The preliminary estimate of total damage was of the order of Rs. 60 crores.

As per press reports, in Gangetic West Bengal on 28 October, two irrigation dams and an embankment was damaged in Pathor Pratima and Gobordhan in south 24 Paraganas districts and Sandeshkali in north 24 Paraganas district. Many mud huts collapsed in south and north 24 Paraganas districts and one child was injured in north 24 Paraganas district.

3.1.4. *Weather and associated synoptic features*

Table 2 gives details of synoptic features for the month of October 2000.

Southwest monsoon was vigorous (rainfall more than 4 times the normal with minimum 8 cm along the west coast and 5 cm elsewhere in atleast two stations in the sub-division) on 1 to 3 days in Nagaland, Manipur, Mizoram & Tripura, Rayalaseema, north interior Karnataka and south interior Karnataka . It was active (rainfall more than 1 ½ to 4 times the normal with minimum 5 cm along the west coast and 3 cm elsewhere in atleast two stations in the sub-division) on 5 days each in Rayalaseema and Kerala and on 1 to 3 days in Arunachal Pradesh, Sub-Himalayan West Bengal & Sikkim, coastal Andhra Pradesh and coastal and south interior Karnataka.

Heavy (rainfall amount more than 6.5 cm and less than 12.5 cms over one or two stations in the sub-division) to very heavy (rainfall amount more than 12.5 cm over one or two stations in the sub-division) rainfall occurred on 11 days in Tamil Nadu and on 1 to 3 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Orissa, coastal Andhra Pradesh, Telangana, coastal Karnataka, north interior Karnataka, south interior Karnataka and Kerala.

3.1.5. *Monthly rainfall*

Monthly rainfall was excess in 4, normal in 5, deficient in 8 and scanty in 16 meteorological sub-divisions. There was no rain in remaining 2 meteorological sub-divisions. Rainfall was excess in Nagaland, Manipur, Mizoram & Tripura, Rayalaseema, north interior Karnataka and south interior Karnataka; normal in Andaman & Nicobar Islands, Konkan & Goa, Madhya Maharashtra, coastal Karnataka and

TABLE 1

Sub-divisionwise rainfall (mm) for each month and season as a whole (October-December 2000)

S. No.	Meteorological sub – divisions	October			November			December			Season		
		Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)	Actual (mm)	Normal (mm)	Dep. (%)
1.	A. & N. Islands	347	320	8	157	253	-38	86	171	-50	590	744	-21
2.	Arunachal Pradesh	75	121	- 38	40	24	68	4	11	-64	119	156	-24
3.	Assam & Meghalaya	86	159	- 46	19	27	-32	1	10	-88	106	197	-46
4.	Naga., Mani, Mizo. and Tri.	199	150	33	9	32	-73	0	9	-100	208	191	9
5.	Sub-Himalayan West Bengal & Sikkim	59	143	-59	35	17	105	0	6	-95	93	165	-44
6.	Gangetic West Bengal	70	117	-40	3	19	-83	0	3	- 100	74	139	-47
7.	Orissa	35	120	-71	2	29	-92	0	6	-93	38	155	-76
8.	Jharkhand	28	84	-67	0	12	-100	0	5	-100	28	100	-72
9.	Bihar	12	64	- 81	0	8	-100	0	3	- 100	12	75	-84
10.	East Uttar Pradesh	1	48	-98	0	5	-98	0	6	-99	1	59	-98
11.	West Uttar Pradesh	0	34	-99	0	4	-99	0	8	-99	0	47	-99
12.	Uttaranchal	1	59	-98	2	8	-76	0	25	-99	4	93	-96
13.	Haryana, Chandigarh & Delhi	0	19	-100	1	3	-87	1	8	-95	1	30	-97
14.	Punjab	0	22	-100	0	4	-94	2	15	-88	2	41	-95
15.	Himachal Pradesh	0	43	-99	9	13	-32	3	39	-93	12	95	-87
16.	Jammu & Kashmir	1	32	-96	13	28	-55	25	56	-56	39	117	-67
17.	West Rajasthan	1	5	-80	1	1	-67	0	3	-99	2	9	-84
18.	East Rajasthan	1	14	-95	0	4	-99	0	4	-95	1	22	-95
19.	West Madhya Pradesh	3	33	-91	0	15	-99	0	7	-99	3	55	-95
20.	East Madhya Pradesh & Chattisgarh	2	50	-95	0	11	-97	0	9	-100	3	70	-96
21.	Gujarat region	9	27	-68	0	9	-100	1	2	-69	9	37	-76
22.	Saurashtra & Kutch	2	16	-86	0	10	-100	0	1	-76	2	26	-91
23.	Konkan & Goa	111	113	-2	1	25	-94	5	9	-42	117	147	-20
24.	Madhya Maharashtra	72	71	1	9	29	-71	3	7	-64	83	108	-23
25.	Marathwada	38	57	-33	2	19	-89	1	9	-90	41	85	-51
26.	Vidarbha	9	45	-80	0	16	-100	0	11	-97	9	72	-87
27.	Coastal Andhra Pradesh	90	191	-53	27	98	-73	19	23	-17	135	311	-57
28.	Telangana	24	75	-68	3	19	-82	2	6	-63	30	101	-70
29.	Rayalaseema	146	115	27	24	73	-68	23	26	-14	192	214	-10
30.	Tamil Nadu	109	195	-44	149	194	-23	84	88	-5	341	478	-29
31.	Coastal Karnataka	187	196	-5	12	70	-83	7	16	-60	205	283	-27
32.	North interior Karnataka	121	97	24	4	29	-85	1	8	-84	127	134	-6
33.	South interior Karnataka	202	147	37	16	52	-69	19	13	50	237	212	12
34.	Kerala	217	297	-27	81	166	-51	71	43	65	369	506	-27
35.	Lakshadweep	142	163	-13	56	102	-45	11	69	-84	209	334	-37

TABLE 2

Details of the weather systems during October 2000

S. No. (1)	System (2)	Period (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(A)	*Cyclonic Storm*					
1.	Cyclonic Storm	15-19	East-central Bay and adjoining parts of southeast Bay	Westerly to northwesterly	West-central Bay off south Andhra-north Tamil Nadu coasts.	Under the influence of a well-marked low pressure area over east-central Bay and adjoining parts of southeast Bay, a depression formed over eastern parts of west-central Bay at 0000 UTC of 15, near Lat. 14.5° N/Long. 88.5° E, about 650 km southeast of Visakhapatnam. It intensified into a deep depression at 1800 UTC of 15, near Lat. 14.5° N/Long. 86.5° E. The deep depression further intensified into a cyclonic storm at 0000 UTC of 17, near Lat. 14.0° N/Long. 84.5° E. Moving in a westerly direction, it weakened into a deep depression at 0300 UTC of 18, near Lat. 14.0° N/ Long. 83.5° E and into a depression at 1800 UTC of 18, near Lat. 14.5° N/Long. 82.5° E. The depression further weakened into a well-marked low pressure area at 0900 UTC of 19 over sea, off south Andhra-north Tamil Nadu coast
2.	Cyclonic storm	25 - 28	Andaman Sea	Northerly to northnorth-westerly	Bangladesh and adjoining Assam & Meghalaya	A low pressure area formed over Andaman Sea in the morning of 24 October 2000. It concentrated into a depression at 0900 UTC of 25, near Lat. 13.5° N/ Long. 93.0° E. Moving in a northwesterly direction, it intensified into a deep depression at 0300 UTC of 27, near Lat. 18.0° N/ Long. 88.5° E. Moving in a northerly direction, it further rapidly intensified into a cyclonic storm at 1800 UTC of 27, near Lat. 20.5° N/ Long. 88.5° E. It crossed Bangladesh coast east of Sagar Island between 0100 and 0300 UTC of 28 and weakened into a deep depression near Lat. 22.5° N/ Long. 89.0° E at 0300 UTC of 28. It further weakened into a depression at 1200 UTC of 28 near Lat. 23.5° N/ Long. 90.5° E. The depression weakened into a well marked low pressure area in the morning of 29 over Bangladesh and adjoining Assam & Meghalaya
(B)	*Low pressure area*					
1.	Low Pressure area	8 – 15	Western parts of east-central Arabian Sea	Westerly	West-central Arabian sea and neighbourhood	Moved away westwards
2.	Low pressure area	9 – 10	West-central Bay off south Andhra coast	Stationary	*In situ*	Associated cyclonic circulation extended upto mid tropospheric levels. It persisted over west-central Bay off south Andhra coast till 11 and became less marked on 12
(C)	*Trough of low pressure area*					
1.	Sea level chart	19 – 24	East-central Arabian Sea off Karnataka coast and adjoining Lakshadweep area	Quasi-stationary	Maharashtra coast to Kerala coast	
2.	Sea level chart	21- 23	West-central Bay and adjoining southwest Bay off south Andhra-Tamil Nadu coast	Stationary	*In situ*	It was seen as a cyclonic circulation over the same area on 22 & 23

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(D)	*Embedded cyclonic circulations*					
1.	Mid tropospheric levels	4 – 9	South Andaman coast and neighbourhood	Easterly	North Laksha-dweep area off Kerala coast	
(E)	*Other cyclonic circulations*					
1.	Lower tropospheric levels	5 – 7	North Pakistan and neighbourhood	Northeasterly	Jammu & Kashmir and neighbourhood	Moved away northeastwards
2.	Lower levels	6 – 10	South Gujarat coast and neighbourhood	Northwesterly	Gujarat region and adjoining south Rajasthan	
3.	Lower tropospheric levels	8 – 12	North Andaman Sea and neighbourhood	Stationary	*In situ*	
4.	Mid tropospheric levels	11 eve. - 12 mor.	Southwest and adjoining southeast Bay	Quasi - Stationary	Central and adjoining Bay of Bengal	Merged with the low pressure area over central and adjoining Bay of Bengal
5.	Lower levels	19 – 21	Northwest Uttar Pradesh and neighbourhood	Northeasterly	Plains of west Uttar Pradesh and adjoining hills of west Uttar Pradesh	Moved away northeastwards
6.	Lower levels	12 – 13	South Maharashtra coast and neighbourhood	Stationary	*In situ*	
7.	Mid tropospheric levels	13 – 14	Off Karnataka coast	Stationary	*In situ*	
8.	Do	22 – 24	Andaman Sea and adjoining Tenasserim coast	Easterly	South Andaman Sea and adjoining southeast Bay	Merged with the low pressure area over Andaman Sea
9.	Do	30 Oct-1 Nov	Andaman Sea	Stationary	*In situ*	
10.	Do	31 Oct–6 Nov	Southwest Bay off Tamil Nadu coast	Southerly	South Tamil Nadu coast and adjoining parts of Sri Lanka	A trough from this system ran to north interior Karnataka on 4
(F)	*East-west troughs*					
1.	Mid tropospheric levels	5 – 7	Peninsular India along 14° N	Stationary	*In situ*	
2.	Mid tropospheric levels	8 – 14	North Lakshadweep area, north Tamil Nadu, south-central Bay and then to north Andaman Sea	Quasi-stationary	Karnataka coast, centre of well-marked low pressure area and then to north Andaman Sea and neighbourhood	
3.	Lower levels	23 – 25	Along Lat. 13° N over Peninsula	Southerly	Along Lat. 10° N over Peninsula	
(G)	*Troughs in westerlies*					
1.	Mid and upper troposphere	26 – 27	Long. 88° E, north of Lat. 21° N	Stationary	*In situ*	
(H)	*Other troughs*					
1.	Lower levels	6 – 12	Gangetic West Bengal to Arunachal Pradesh	Quasi-stationary	Sub-Himalayan West Bengal & Sikkim to northwest Bay	
(I)	*Western Disturbances*					
1.	As upper air system	22 – 26	Central Pakistan and adjoining Punjab and west Rajasthan	Northeasterly	Hills of west Uttar Pradesh and adjoining Himachal Pradesh	Moved away northeastwards

TABLE 3

Details of the weather systems during November 2000

S. No. (1)	System (2)	Period (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(A)	*Cyclonic storm*					
1.	Very severe cyclonic storm	26 – 30	Andaman Sea and adjoining southeast Bay	Westerly	Tamil Nadu	Under the influence of a cyclonic circulation, a well-marked low pressure area formed over south Andaman Sea and adjoining southeast Bay in the morning of 26 November 2000. It concentrated into a depression at 0300 UTC of 26 near Lat. 8.5° N/ Long. 91.5° E. It further intensified into a deep depression at 1500 UTC of 26, near Lat. 10.0° N/ Long. 90.0° E. Moving in a westerly direction, it rapidly intensified into a cyclonic storm at 0900 UTC of 27, near Lat. 11.0° N/ Long. 86.5° E. The cyclonic storm further intensified into a severe cyclonic storm at 0000 UTC of 28, near Lat. 11.5° N/ Long. 84.0° E. It moved further westwards and intensified into a very severe cyclonic storm and lay near Lat. 11.5° N/83.0° E at 0600 UTC of 28. It crossed north Tamil Nadu coast near Cuddalore at 1130 UTC of 29 as a very severe cyclonic storm and weakened into a severe cyclonic storm close to Cuddalore around 1200 UTC of 29 near Lat. 11.5° N/ Long. 80.0° E. It rapidly weakened into a cyclonic storm at 1800 UTC of 29 near Lat. 11.0° N/ Long. 78.5° E and into a deep depression at 0300 UTC of 30 near Lat. 11.5° N/ Long. 78.0° E, very close to Salem. It further weakened into a depression at 0600 UTC of 30 near Lat. 11.5° N/ Long. 77.0° E. The depression further weakened into a well-marked low pressure area over Tamil Nadu in the same evening
(B)	*Western disturbances*					
1.	As an upper air system	13 eve – 15	Northwest Rajasthan and adjoining Pakistan	Northeasterly	Jammu & Kashmir and neighbourhood	Moved away northeastwards
2.	Do	18 – 20	North Pakistan and neighbourhood	Do	North Pakistan and adjoining Jammu & Kashmir	Do
3.	Do	21 – 25	Do	Do	Jammu & Kashmir and neighbourhood	Do
4.	Do	25 – 26	North Pakistan and adjoining Jammu & Kashmir	Do	Do	Do
(C)	*Induced cyclonic circulations*					
1.	Lower tropospheric levels	18 – 22	Punjab and neighbourhood	Northeasterly	Uttar Pradesh and neighbourhood	A trough from this system ran to west Madhya Pradesh on 19
2.	Lower levels	22 – 25	North Rajasthan and neighbourhood	Northeasterly	Punjab and neighbourhood	Moved away northeastwards across Uttaranchal
(D)	*Embedded cyclonic circulation*					
1.	Lower tropospheric levels	20 – 21	North Lakshadweep area and neighbourhood	Stationary	*In situ*	
2.	Mid tropospheric levels	21 – 25	North Sri Lanka and neighbourhood	Westerly	Southeast Arabian sea and adjoining Lakshadweep area	Moved away westwards A trough from this system ran to south Maharashtra coast on 23

TABLE 3 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(E)	*Other cyclonic circulations*					
1.	Mid tropospheric levels	1 – 4	Kerala coast and neighbourhood	Quasi - stationary	South Kerala coast and neighbourhood	
2.	Lower levels	4 – 7	South Andaman Sea and neighbourhood	Easterly	Southeast Bay and neighbourhood	
3.	Mid tropospheric levels	7 – 8	Off north Andhra – south Orissa coast	Stationary	*In situ*	
4.	Lower levels	8 – 10	Northwest Rajasthan and adjoining parts of Pakistan	Northeasterly	Jammu & Kashmir and neighbourhood	Moved away northeastwards across Jammu & Kashmir
5	Do	10 – 15	North Bangladesh and neighbourhood	Easterly	Gangetic West Bengal and neighbourhood	
6	Lower tropospheric levels	28 – 29	Northwest Rajasthan and adjoining Punjab	Easterly		Moved away eastwards
(F)	*East-west troughs*					
1.	Lower tropospheric levels	24 – 27	Southeast Arabian Sea and adjoining Lakshadweep area to south Andaman Sea across Tamil Nadu and southwest Bay	Stationary	*In situ*	
(G)	*Other troughs*					
1.	Lower levels	5 – 21	Lakshadweep area to Maharashtra coast	Quasi-stationary	Lakshadweep area to south Maharashtra coast	
2.	Lower tropospheric levels	13 – 15	Southwest Bay off Tamil Nadu coast	Stationary	*In situ*	
3.	Lower levels	15 – 24	South Andaman Sea and neighbourhood	Stationary	*In situ*	Merged with the cyclonic circulation over south Andaman Sea
4.	Do	18 – 24	Southwest Bay off Sri Lanka coast	Easterly	North Sri Lanka to Commorin area	

Lakshadweep; deficient in Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Marathwada, coastal Andhra Pradesh, Tamil Nadu and Kerala and scanty in Orissa, Jharkhand, Bihar, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Himachal Pradesh, Jammu & Kashmir, west Rajasthan, east Rajasthan, west Madhya Pradesh, east Madhya Pradesh & Chhattisgarh, Gujarat region, Saurashtra & Kutch, Vidarbha and Telangana. There was no rain in Haryana and Punjab. The significant amounts of rainfall (cm) during the month are given in Table 5.

3.1.6. *Temperature*

Day temperatures were appreciably (departure from normal is +3° C to + 4° C) to markedly (departure from normal temperature is +5° C to +6° C) above normal on 20 to 28 days in some parts of east Rajasthan, west Rajasthan, west Madhya Pradesh, east Madhya Pradesh & Chattisgarh and Gujarat region; on 10 to 19 days in Orissa, Jharkhand, east Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Saurashtra & Kutch, Madhya Maharashtra, Vidarbha, coastal Andhra Pradesh and

TABLE 4

Details of the weather systems during December 2000

S. No. (1)	System (2)	Period (3)	Place of first location (4)	Direction of movement (5)	Place of dissipation (6)	Remarks (7)
(A)	*Cyclonic storms*					
1.	Very severe cyclonic storm	23 – 28	Central parts of south Bay	Westnorth-westerly	East-central Arabian Sea	Under the influence of the trough in the lower levels which persisted over southwest Bay off Sri Lanka coast from 9, a low pressure area formed over central parts of south Bay in the morning of 23. It rapidly concentrated into a depression at 0300 UTC of 23, near Lat. 8.0° N/ Long. 86.0° E. Moving in a northwesterly direction, it intensified into a deep depression at 0000 UTC of 24, near Lat. 8.0° N/ Long. 84.0° E. At 0300 UTC of 25, it further intensified into a cyclonic storm near Lat. 8.5° N/ Long. 83.0° E. The cyclonic storm intensified into a severe cyclonic storm at 1800 UTC of 25, near Lat. 8.5° N/ Long. 83.0° E. It rapidly intensified into very severe cyclonic storm at 0300 UTC of 26 near Lat. 8.5° N/ Long. 82.5° E. At 1200 UTC of 26, it crossed north Sri Lanka coast and emerged into the Gulf of Mannar. The very severe cyclonic storm weakened into a severe cyclonic storm at 1200 UTC of 27, near Lat. 8.5° N/ Long. 78.5° E and into a cyclonic storm at 2100 UTC of 27 near Lat. 8.5° N/ Long. 78.0° E. It crossed coast south of Tuticorin on early morning hours of 28 December. It further weakened into a deep depression at 0600 UTC of 28 near Lat. 8.5° N/ Long. 77.0° E. The deep depression weakened into a depression at 1200 UTC of 28 near Alapuzha at Lat. 9.0° N/ Long. 76.5° E and further weakened into a low pressure area over east-central Arabian Sea at 0000 UTC of 29
(B)	*Trough of low pressure area*					
1.	Sea level chart	29 Dec 2000-7 Jan 2001	South Andaman Sea	Northerly	Southeast Bay	
2.	Do	31 Dec 2000-1 Jan 2001	South Gujarat coast to Lakshadweep area	Stationary	*In situ*	
(C)	*Western disturbances*					
1.	As an upper air system	4 – 6	North Pakistan and adjoining Jammu & Kashmir	Northeasterly	Jammu & Kashmir & neighbourhood	Moved away northeastwards
2.	Do	7 – 11	Pakistan & neighbourhood	Do	Do	Do
3.	Do	14 – 15	North Pakistan and adjoining Jammu & Kashmir	Do	Do	Do
4.	Do	15 – 19	North Pakistan and neighbourhood	Do	Do	Do
5.	Do	23 – 24	Punjab, Himachal Pradesh and Jammu & Kashmir	Do	Do	Do

TABLE 4 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
6.	As an upper air system	24 – 28	North Pakistan and adjoining Jammu & Kashmir	North easterly	Jammu & Kashmir and neighbourhood	Moved away northeastwards
7.	Do	27 – 31	North Pakistan	Do	Do	Do
8.	As a low pressure area	31 Dec 2000 - 2 Jan 2001	West Rajasthan and adjoining Pakistan	Do	Northern parts of Rajasthan and neighbourhood	Associated cyclonic circulation extended upto mid tropospheric levels It lay as a trough on 1 and 2 Jan. 2001 over northern parts of Rajasthan and neighbourhood.
(D)	*Induced cyclonic circulations*					
1.	Mid tropospheric levels	17 – 19	Punjab & neighbourhood	Northeasterly	Uttaranchal and neighbourhood	Moved away across Uttaranchal
(E)	*Other cyclonic circulations*					
1.	Lower tropospheric levels	2 – 3	North Tamil Nadu coast and adjoining Sri Lanka coast	Stationary	*In situ*	
2.	Do	2 – 3	North Assam & neighbourhood	Do	Do	
3.	Do	8 – 11	Eastern parts of Gulf of Siam	Quasi-Stationary	Gulf of Siam and adjoining Tenasserim coast	
4.	Lower levels	12 – 13	North Assam & neighbourhood	Stationary	*In situ*	
5.	Lower tropospheric levels	14 – 19	Assam & Meghalaya	Easterly	Nagaland and neighbourhood	
6.	Do	30 – 31	Southern parts of west Rajasthan and Gujarat State	Northerly	-	Moved northwards and merged with the western disturbance as a low pressure area (No. 8)
(F)	*East-west trough*					
1.	Mid tropospheric levels	1 – 3	North Lakshadweep area off north Kerala coast to Andaman Sea across southwest Bay	Stationary	*In situ*	
(G)	*Other troughs*					
1.	Lower levels	5 – 8	South Kerala coast to south Maharashtra coast	Stationary	*In situ*	
2.	Do	11 – 14	South Andaman Sea and neighbourhood	Stationary	*In situ*	
3.	Do	16 – 17	Andaman Sea and neighbourhood	Do	Do	
4.	Do	19 – 23	South Andaman Sea and neighbourhood	Do	Do	
5.	Do	25 – 28	Lakshadweep area and neighbourhood	Do	Do	

Telangana and on 2 to 9 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Bihar, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, Konkan & Goa, Marathwada, Rayalaseema and Tamil Nadu. They were appreciably (departure from normal temperature is –3° C to –4° C) to markedly below (departure from normal temperature is –5° C to –6° C) normal on 1 to 2 days in some parts of Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Konkan & Goa, Madhya Maharashtra and coastal Andhra Pradesh. They were generally normal (departure from normal temperature is +1° to –1° C) or above normal (departure from normal temperature is + 2° C) over the rest of the country on rest of the days.

The month's highest maximum temperature in the plains of the country was 42° C recorded at Barmer (west Rajasthan) on 3 and at Naliya (Saurashtra & Kutch) on 4 October 2000.

Night temperatures were appreciably below normal (departure from normal temperature is –3° C to –4° C) on 4 to 6 days in some parts of Gujarat region, Vidarbha, Rayalaseema and Tamil Nadu and on 1 to 3 days in some parts of Assam & Meghalaya, Orissa, Jharkhand, Bihar, east Uttar Pradesh, Punjab, Jammu & Kashmir, east Rajasthan, west Rajasthan, east Madhya Pradesh & Chattisgarh, Saurashtra & Kutch, Madhya Maharashtra, Marathwada, coastal Andhra Pradesh, Telangana and south interior Karnataka. They were appreciably (departure from normal is +3° C to +4° C) to markedly (departure from normal temperature is +5° C to +6° C) above normal on 9 to 14 days in some parts of Haryana, Himachal Pradesh, west Rajasthan, east Rajasthan, west Madhya Pradesh, Gujarat region and Saurashtra & Kutch; on 4 to 8 days in some parts of east Uttar Pradesh, west Uttar Pradesh, east Madhya Pradesh & Chattisgarh, Madhya Maharashtra, Marathwada and Vidarbha and on 1 to 3 days in Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Bihar, Uttaranchal, Punjab, Jammu & Kashmir, Konkan & Goa and Telangana. They were below normal (departure from normal is –2° C) over northern parts of the country on a few day in the middle of the month and in some parts of peninsular India in the last week of the month.

The month's lowest minimum temperature in the plains of the country was 12° C recorded at Udaipur (east Rajasthan) on 25 October 2000.

3.1.7. *Disastrous weather events and associated damages*

Apart from the damages caused due to two cyclonic storms, 33 people (22 in Karnataka, 7 in Assam and 4 in Orissa) died due to incessant heavy rain, lightning and floods etc. Exclusive damage to dwelling houses and horticultural crops in Assam.

3.2. *November*

3.2.1. *Storms/depressions*

During the month of November, only one very severe cyclonic storm formed over the Bay of Bengal. Details are presented below:

3.2.1.1. *Very severe cyclonic storm over the Bay of Bengal (26-30 November 2000)*

Under the influence of a cyclonic circulation, a well-marked low pressure area formed over south Andaman Sea and adjoining southeast Bay in the morning of 26 November 2000. It concentrated into a depression at 0300 UTC of 26 near Lat. 8.5° N/ Long. 91.5° E. It further intensified into a deep depression at 1500 UTC of 26, near Lat. 10.0° N/ Long. 90.0° E. Moving in a westerly direction, it rapidly intensified into a cyclonic storm at 0900 UTC of 27, near Lat. 11.0° N/ Long. 86.5° E. The cyclonic storm further intensified into a severe cyclonic storm at 0000 UTC of 28, near Lat. 11.5° N/ Long. 84.0° E. It moved further westwards and intensified into a very severe cyclonic storm and lay near Lat. 11.5° N/ Long. 83.0° E at 0600 UTC of 28. It crossed north Tamil Nadu coast near Cuddalore at 1130 UTC of 29 as a very severe cyclonic storm and weakened into a severe cyclonic storm close to Cuddalore around 1200 UTC of 29 near Lat. 11.5° N/ Long. 80.0° E. It rapidly weakened into a cyclonic storm at 1800 UTC of 29 near Lat. 11.0° N/ Long. 78.5° E and into a deep depression at 0300 UTC of 30 near Lat. 11.5° N/ Long. 78.0° E, very close to Salem. It further weakened into a depression at 0600 UTC of 30 near Lat. 11.5° N/ Long. 77.0° E. The depression further weakened into a well-marked low pressure area over Tamil Nadu in the same evening.

Maximum intensity of T 5.5 was reported by INSAT Cloud Imageries from 1800 UTC to 2100 UTC of 28. The lowest estimated central Pressure was 978 hPa at the time of landfall. The winds experienced over the central areas were reported to be of the order of 110-120 kmph. ICI reported 'eye' from 0500 UTC to 1800 UTC of 28.

TABLE 5

Principal amounts of rainfall (>3 cm)

Date	October	November	December
(1)	(2)	(3)	(4)
1.	Chennapatna 11, Hoskote 8, Bangalore 7, Port Blair 6, Tirupathi & Ranebennur 5 each, Kozhikode 4, Hut Bay, Champua, Kurnool, Arogyavaram & Punalur 3 each	Narsapur & K. Paramathy 3 each	Thalacherry & Cannur 11 each, Kozhikode 9, Uthagamandalam 4, Mysore 4
2.	Kannur 15, Karkala 13, Mandya & Chickmagalur 11 each, Mangalore 7, Sikanderpur & Madurai 6 each, Baltara, Poladpur, Bangalore, Punalur & Thiruvananthapuram 5 each, Panambur 4, Imphal, Visavadar, Ratnagiri & Tirupattur 3 each	Digha & Kanpur 3 each	Gannavaram 7, Baptala 3
3.	Lakhipur 15, Amraghat 14, Imphal 5, Alapuzha 4, Arogyavaram & Thiruvananthapuram 3 each	Port Blair 5, Nancowry 3	Nellore 10, Adirampattinam9, Cuddalore 4
4.	Kodungalur 7, Minicoy 6, Honnali & Kozhikode 4 each, Kondul, Bihubar, Kankavali, Kolhapur & Tarikere 3 each	Kottayam 4	Nellore 4
5.	Baghdogra, Kagal, Kodaikanal & Chennai 4 each, Hut Bay, Cooch Behar, Jamsolaghat, Dapoli & Perinthalmanna 3 each	Dhaniakhali 3	Hut Bay 3
6.	Chitradurga 4, Imphal & Karaikal 3 each	Nil	Pamban 4, Mavelikara 3
7.	Karipur 11, Chennai 8, Nellore & Chitradurga 6 each, Arogyavaram & Anantpur 4 each, Sullurpet, Tadpatri, Cuddalore & Palakkad 3 each	Gangtok & Kochi 3 each	Nil
8.	Jalna 5, Agartala 4, Hut Bay, Port Blair, Khowang & Pune 3 each	Gajoldoba 5	Gulmarg 3
9.	Chennarayapatna 9, Cuddalore, Karaikal, Kanakapura, Kudligi & Kannur 8 each, Car Nicobar, Bantwal, Gangavati & Bhagamandala 7 each, Passighat, Udupi, Gadag & Chennapatna 6 each, Itanagar 5, Goalpara, Nagapattinam & Mysore 4 each, Maya Bandar, Kondul, Chottabekra, Cooch Behar, Calcutta, Thakurmunda, Bangalore & Chickmagalur 3 each	Nil	Nil
10.	Bagepalli 7, Balukpong, Tadepalligudem & Chennapatna 6 each, Port Blair, Kunnavaram & Yelhanka 5 each, Hut Bay, Dholai, Koregaon & Koilkuntla 4 each, Tezpur, Gangtok, Pune & Agumbe 3 each	Nil	Nil
11.	Khed 10, Gaganbavada 9, Kaikalur & Hakimpet 5 each, Mahabaleshwar & Puttur 4 each, Port Blair, Maya Bandar, Ratnagiri, Pune, Velhe, Wai, Nandigama & Vijayawada 3 each	Cooch Behar 3	Nil
12.	Kudalgi 7, Khalapur 6, Athamalik, Honavar, Mumbai, Pune, Jurala Project, Kurnool, Honavar & Ajjampura 4 each, Seppa, Balukpong, Sami, Wai, Ahmednagar & Mudhol 3 each	Cuddalore 3	Nil
13.	Ramnagra 8, Alipingal & Basaralu 6 each, Balasore & Cuddalore 5 each, Berhampore & Puttur 4 each, Jalpaiguri, Dhadgaon, Nagapattinam, Kollur, Belgaum, Kozhikode & Palakkad 3 each	Gangtok 3	Nil
14.	Gaganbavada 11, Gokak 6, Car Nicobar, Nancowry, Dillighat, Shirahatti & Bailahongal 5 each, Mahabaleshwar, T. G. Halli & Quilandy 3 each	Nil	Nil
15.	Gaganbavada 8, Belgaum 4, Shirala 3	Gangtok 3	Nil
16.	Car Nicobar 6, Mancompu 4	Pamban 3	Hut Bay 5
17.	Alapuzha 8, Puri 6, Thiruvananthapuram 4	Nil	Himmat 12, Mop 8, Kanzal Wan 6, Gulmarg 4, Patisio 3
18.	Kaikalur 8, Visakhapatnam 5, Digha, Kalingapatnam & Cuddapah 4 each, Berhampur, Gopalpur, Kakinada, Belthangady & Mangalore 3 each	Nil	Gulmarg 4

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
19.	Yellamanchili 12, Visakhapatnam 7, Anakapalli 6, Wanaparthy & Proddatur 5 each, Agartala & Tuni 4 each, Nellore 3	Tondi 8, Adirampattinam 7, Pamban 6, Chennai 5	Nil
20.	Proddatur 8, Bagewadi 7, Muddebihal 6, Kavali, Ongole & Mantralayam 5 each, Machilipatnam, Shirali & Agumbe 4 each, Visakhapatnam, Alur & Malavalli 3 each	Gangtok 7, Dibrugarh, North Lakhimpur & Nagapattinam 3 each	Nil
21.	Chennai 11, Tripattur 8, Pondicherry 5, Vellore 4, Sholapur 3	Nagapattinam, Adirampattinam & Thanjavur 10 each, Vedaranyam, Tuticorin & Palayamkottai 9 each, Alapuzha & Kozhikode 7 each, Tiruchirapalli & Punalur 6 each, Kanyakumari 5, Thiruvananthapuram 4, Cuddalore 3	Kondul & Car Nicobar 4 each
22.	Hut Bay 5, Car Nicobar, Agartala, Salem, Bangalore & Kolar Gold Field 3 each	Tondi & Tiruchirapalli 10 each, Madurai 9, Karaikal & K. Paramathy 5 each, Nagapattinam, Punalur & Minicoy 3 each	Port Blair 3
23.	Bangalore & Yegati 9 each, Ajjampura 8, Dharmasthala & K. R. Sagara 7 each, Nancowry, Karaikal, Magadi, Chennarayapatna & Nagehalli 6 each, Ratnagiri & Karkala 5 each, Nagapattinam & Mysore 4 each, Honavar, Karwar & Agumbe 3 each	Baptla, Adirampattinam, Tuticorin, Cuddalore & Minicoy 3 each	Nil
24.	Hut Bay 5, Tiruchirapalli 3	Vedaranniyam 14, Tondi 6, Nagapattinam 4, Mysore & Minicoy 3 each	Car Nicobar 4
25.	Maya Bandar & Nagapattinam 4 each	Car Nicobar 5	Nil
26.	Kozhikode 3	Hut Bay 5, Car Nicobar & Nancowry 4 each, Kondul 3	Nil
27.	Vengurla 3	Maya Bandar 7, Port Blair 4	Pamban 12, Tondi, Nagapattinam & Adirampattinam 7 each, Karaikal 5.
28.	Calcutta 7, Digha & Paradip 6 each, Shillong & Diamond Harbour 5 each, Agartala 4, Imphal & Krishnanagar 3 each	Nil	Tuticorin 14, Palayamkottai 13, Thanjavur 11, Nagapattinam & Kodaikanal 10 each, Vedaranyam 9, Pamban 8, Tiruchirapalli & Punalur 7 each, Karaikal & Thiruvananthapuram 6 each, Madurai 4, Kanyakumari & Kottayam 3 each
29.	Shillong 11, Kailashshahar 5, Agartala 4, Guwahati, Krishnanagar & Jharsuguda 3 each	Nellore 6, Chennai 3	Pondicherry 9, Cuddalore 7, Karaikal 4
30.	Nil	Nellore 9, Ottapalam 8, Tirupathi 7, Nagapattinam, Adirampattinam & Kavali 6 each, Karaikal 5, Chennai & Palakkad 4 each, Ongole 3	Kondul 4, Tirupathi 3.
31.	Nil	–	Nancowry & Tirupathi 5 each, Tuticorin 3

Cyclone Detecting Radars (CDRs) Chennai and Karaikal reported the centre of the system on the basis of 'eye' from 1350 UTC of 28 to 0450 UTC of 29 and 0800 UTC of 29 to 0300 UTC of 30 respectively.

From the information gathered from the affected people in the coastal areas, it was learnt that lull period lasted for a maximum of 45 minutes on 29 indicating prevalence of 'eye' which was, however, not seen in the satellite and radar images at that time.

The system produced comparatively very less rainfall activity. However, a few stations in the south-west and western sector of the storm received very heavy rainfall during the 24 hours periods of the order of 20 cm and above, the highest being 45 cm at Thozhudhur and 44 cm at Kilarheruvai in Cuddalore district.

Tamil Nadu and Pondicherry were mainly affected. The loss was due to crop damage, uprooting of big trees and partial damages to more than one thousand Kuchha houses and fourteen brick houses due to strong wind. 10 persons in Tamil Nadu and 2 in Pondicherry lost their lives due to wall/building collapse/electrocution. Sugarcane in 100 acres, 30,000 plantain trees, 50,000 plantain saplings also got destroyed in Tamil Nadu. As per press reports, estimated loss in Cuddalore district was about Rs. 20 crores. The system did not cause any damage in coastal Andhra Pradesh. Only Nellore district received significant rainfall and Nellore reported 9 cm of rainfall on 30 November. Damage to crops, plantains and Kutcha houses were also reported from the state of Pondicherry. Total loss is estimated to be about 50 crores as per press report.

3.2.2. *Weather and associated synoptic features*

Details of synoptic features for the month of November 2000 are given in Table 3.

Northeast monsoon was vigorous on 1 day in Kerala. Very heavy rainfall occurred on 5 days in Tamil Nadu and on 1 day in Jammu & Kashmir. Heavy rainfall also occurred on 3 days in Kerala.

3.2.3. *Monthly rainfall*

Monthly rainfall was excess in 2, deficient in 7 and scanty in 21 meteorological sub-divisions. There was no rain in the remaining 5 meteorological sub-divisions. It was excess in Arunachal Pradesh and Sub-Himalayan West Bengal & Sikkim and deficient in Andaman & Nicobar Islands, Assam & Meghalaya, Himachal Pradesh, Jammu & Kashmir, Tamil Nadu, Kerala and Lakshadweep. It was scanty over the rest of the country outside Jharkhand, Bihar, Gujarat region, Saurashtra & Kutch and Vidarbha where there was no rain. The significant amounts of rainfall (cm) during the month are given in Table 5.

3.2.4. *Temperature*

Night temperatures were appreciably to markedly below normal on 1 to 4 days in some parts of Orissa, Jammu & Kashmir, west Rajasthan, east Rajasthan, Gujarat region, Saurashtra & Kutch, Madhya Maharashtra, Vidarbha, coastal Andhra Pradesh, Tamil Nadu and north interior Karnataka. They were appreciably to markedly above normal on 17 to 22 days in some parts of Haryana, Jammu & Kashmir, west Rajasthan, east Rajasthan, west Madhya Pradesh and Saurashtra & Kutch; on 9 to 14 days in some parts of Sub-Himalayan West Bengal & Sikkim, Bihar, east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Punjab and east Madhya Pradesh & Chattisgarh; on 4 to 8 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Himachal Pradesh, Gujarat region, Madhya Maharashtra, Vidarbha, coastal Andhra Pradesh, Telangana, Rayalaseema and south interior Karnataka and on 1 to 3 days in Orissa, Jharkhand, Konkan & Goa, Marathwada, Tamil Nadu, coastal Karnataka, north interior Karnataka and Kerala and were generally above normal or normal over the rest of the country on rest of the days.

Month's lowest minimum temperature in the plains of the country was 3.8° C recorded at Churu (west Rajasthan) on 29 November 2000.

3.2.5. *Disastrous weather events and associated damages*

Apart from damages caused due to the cyclonic storm, according to press reports, heavy rains took a toll of 13 human lives (10 in Tamil Nadu and 3 in Kerala) due to heavy rain and lightning. 40 people were injured in Tamil Nadu and properties worth 20 crore rupees were damaged.

3.3. *December*

3.3.1. *Storms/depressions*

One very severe cyclonic storm (23-28 December 2000) formed over the Bay of Bengal during the month. Details of which are presented below:

3.3.1.1. *Very severe cyclonic storm over the Bay of Bengal (23-28 December 2000)*

Under the influence of the trough in the lower levels, a low pressure area formed over central parts of south Bay

in the morning of 23. It rapidly concentrated into a depression at 0300 UTC of 23, near Lat. 8.0° N/ Long. 86.0° E. Moving in a northwesterly direction, it intensified into a deep depression at 0000 UTC of 24, near Lat. 8.0° N/ Long. 84.0° E. At 0300 UTC of 25, it further intensified into a cyclonic storm near Lat. 8.5° N/ Long. 83.0° E. The cyclonic storm intensified into a severe cyclonic storm at 1800 UTC of 25, near Lat. 8.5° N/ Long. 83.0° E. It rapidly intensified into a very severe cyclonic storm at 0300 UTC of 26 near Lat. 8.5° N/ Long. 82.5° E. At 1200 UTC of 26, it crossed north Sri Lanka coast and emerged into the Gulf of Mannar. The very severe cyclonic storm weakened into a severe cyclonic storm at 1200 UTC of 27, near Lat. 8.5° N/ Long. 78.5° E and into a cyclonic storm at 2100 UTC of 27 near Lat. 8.5° N/ Long. 78.0° E. It crossed coast south of Tuticorin on early morning hours of 28 December. It further weakened into a deep depression at 0600 UTC of 28 near Lat. 8.5° N/ Long. 77.0° E. The deep depression weakened into a depression at 1200 UTC of 28 near Alapuzha at Lat. 9.0 ° N/ Long. 76.5° E and further weakened into a low pressure area over east-central Arabian Sea at 0000 UTC of 29.

Maximum intensity of T 5.0 was reported by INSAT Cloud Imageries from 1200 UTC to 1500 UTC of 26.

CDR Karaikal gave the storm centre from 0600 to 2100 UTC of 26. It reported 'circular open eye' on 0800, 0900 and 1400 UTC of 26.

In association with the system, widespread rainfall occurred in south Tamil Nadu, Rayalaseema, Pondicherry and Kerala. In association with this system exceptionally heavy rainfall was reported on 28 December by following stations in Tamil Nadu : Senkottah 33 cm, Ramanathapuram 17 cm, Tiruchendur 15 cm, Vilathikulam 14 cm, Tuticorin 14 cm, Ambasamudram 14 cm, Palayamkottai 14 cm.

Three districts of Tamil Nadu state were affected by the storm. In the Ramanathapuram district, 350 houses were reported damaged. The reported damages from the remaining two districts are as below :

Tirunelveli : Cattle head lost – 2, houses damaged – 162 (fully 16, partially 146)

Tuticorin : Cattle heads lost – 3, houses damaged – 318 (fully 65, partially 253). Fishing boats lost – 95, loss to corps – Paddy crops – 281 hectares, Betal – 80 hectares and plantain- 650 hectares.

3.3.2. *Weather and associated synoptic features*

Table 4 gives the details of synoptic features for the month of December 2000.

Northeast monsoon was vigorous on 2 days in Kerala and active on 1 day in Rayalaseema. Rain or snow has occurred at many places on 1 day in Jammu & Kashmir. Very heavy rain occurred on 1 to 2 days in Tamil Nadu, south interior Karnataka and Kerala. Heavy rain also occurred on 6 days in Tamil Nadu and on 1 day each in coastal Andhra Pradesh and Kerala.

3.3.3. *Monthly rainfall*

Monthly rainfall was excess in 2, normal in 3, deficient in 3 and scanty in 22 meteorological sub-divisions. There was no rain in the remaining 5 meteorological sub-divisions.

Rainfall was excess in south interior Karnataka and Kerala; normal in coastal Andhra Pradesh, Rayalaseema and Tamil Nadu; deficient in Andaman & Nicobar Islands, Jammu & Kashmir and Konkan & Goa and was scanty over the rest of the country outside Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharkhand, Bihar and east Madhya Pradesh & Chattisgarh where there was no rain. The significant amounts of rainfall (cm) during the month are given in Table 5.

3.3.4. *Temperature*

Severe cold wave conditions (temperature departure from normal minimum temperature is below –7° C over the regions where normal minimum temperature is more than or equal to 10° C and –5° C where normal minimum temperature is less than 10° C) prevailed on one day in Jammu & Kashmir. Cold wave conditions (temperature departure from normal minimum temperature is –5° C to –6° C over the regions where normal minimum temperature is more than or equal to 10° C and –3° C to –4° C where normal minimum temperature is less than 10° C) also prevailed on 10 to 13 days in some parts of Punjab and Madhya Maharashtra; on 4 to 6 days in some parts of Haryana, west Rajasthan, east Rajasthan, Gujarat region and Vidarbha and on 1 to 2 days in some parts of Orissa, Jharkhand, west Uttar Pradesh, Jammu & Kashmir, west Madhya Pradesh, east Madhya Pradesh & Chattisgarh, Saurashtra & Kutch and Telangana. They were generally below to appreciably below normal in some parts of Orissa, Jharkhand, Gujarat region and over peninsular India throughout the month. They were generally appreciably to markedly above normal in the first week of the month over peninsular India; and over northwestern parts of India in the middle of the month.

They were markedly above normal over most parts of country except northeastern states of India on last day of the month.

Month's and season's lowest minimum temperatures in the plains of the country was 0.1° C recorded at Churu (west Rajasthan) on 3 and 23 December 2000.

3.3.5. *Disastrous weather events*

Apart from the damage caused due to the cyclonic storm, no damages reported during the month.

Note : Due to formation of three new states, *viz.* Jharkhand, Uttaranchal and Chattisgarh in the country, there is change in the names of the meteorological sub-divisions from the month of November 2000. The changes are as follows.

1. Sub-division No. 8- 'Bihar plateau' is now 'Jharkhand'.

2. Sub-division No. 9- 'Bihar plains' is now 'Bihar'.

3. Sub-division No. 11- 'Plains of west Uttar Pradesh' is now 'west Uttar Pradesh'.

4. Sub-division No. 12- 'Hills of west Uttar Pradesh' is now 'Uttaranchal'.

5. Sub-division No. 20- 'east Madhya Pradesh' is now 'east Madhya Pradesh & Chattisgarh'

[Total number of meteorological sub-divisions (35) remains same] .