MAUSAM, **57**, 4 (October 2006), 701-718

Weather in India

POST MONSOON SEASON (October to December 2005)†

1. Introduction

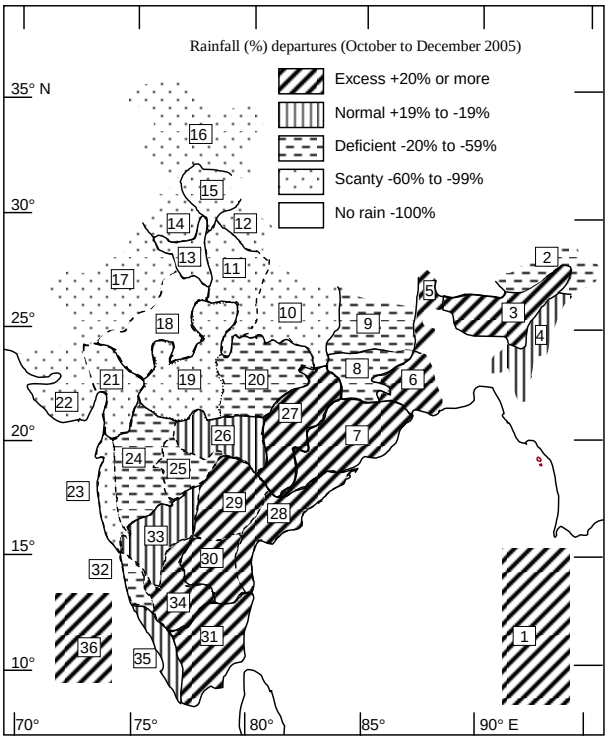
The post monsoon season 2005 was exceptional due to the *excess** rainfall activity over the sub-divisions all along the east coast and also due to the heavy rainfall incidents and flood situations in the northeast monsoon rainfall regime. The rainfall over Tamil Nadu, which is the main beneficiary of the northeast monsoon, broke many of the past records, as many stations including Chennai city (200 cm) recorded rainfall against the seasonal normal rainfall of 75 cm for the first time in the recorded history.

Southwest monsoon withdrew from the entire country on 11 October. Subsequently, northeast monsoon rains commenced over Tamil Nadu, Kerala and adjoining parts of Karnataka and Andhra Pradesh on 12 October, 8 days ahead of the normal date. During the season, the northeast monsoon rainfall was *excess* in Tamil Nadu, coastal Andhra Pradesh, Rayalaseema and south interior Karnataka and *normal* in Kerala.

In the season, there were in all 5 cyclonic disturbances but no system intensified into a severe storm mainly owing to strong vertical wind shear. All the systems (2 Cyclonic Storms, 2 Deep Depressions and 1 Depression) formed over the Bay. Though a similar trend of weakening of systems over the ocean before crossing the land, as noticed in the current decade continued, two of them made landfall. The details of the systems and tracks are given in the sections 3 and Fig. 2 respectively.

2. Seasonal rainfall (October-December)

Out of the 36 meteorological sub-divisions, rainfall was: *excess* in 12 *viz*., Andaman & Nicobar Islands, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Chattisgarh, coastal Andhra Pradesh, Telangana, Rayalaseema, Tamil Nadu, south interior Karnataka and Lakshadweep; *normal* in 4, *viz*., Nagaland-Manipur-Mizoram-Tripura, Vidarbha, north interior Karnataka and Kerala; *deficient* in 7, *viz*., Arunachal Pradesh, Jharkhand, Bihar, east Madhya Pradesh, Madhya Maharashtra, Marathwada and coastal Karnataka and was *scanty* in 12 sub–divisions, *viz*., east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, west Rajasthan, west Madhya Pradesh, Gujarat Region, Saurashtra & Kutch and Konkan & Goa. The remaining one sub–division *viz*., east Rajasthan remained mainly dry during the season. Sub-divisionwise percentage departures of seasonal rainfall are given in Fig. 1 and also in Table 1.



Excess – 12 Normal – 04 Deficient – 07 Scanty – 12 No Rain - 01

Fig. 1. Sub-divisionwise seasonal rainfall departure from normal (%) for Post monsoon season (October to December 2005). Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

1	28	**7**	57	**13**	–95	**19**	–98	**25**	–27	**31**	79
2	–26	**8**	–49	**14**	–98	**20**	–56	**26**	16	**32**	–22
3	20	**9**	–44	**15**	–99	**21**	–97	**27**	24	**33**	–08
4	–03	**10**	–66	**16**	–79	**22**	–95	**28**	57	**34**	59
5	59	**11**	–95	**17**	–97	**23**	–60	**29**	69	**35**	03
6	120	**12**	–73	**18**	–100	**24**	–23	**30**	99	**36**	25

* Definition of terms in '*Italics*' (other than sub-headings) are given in Appendix

†*Compiled by* : N. Jayanthi, R. R. Lele and S. Sunitha Devi, Meteorological Office, Pune – 411 005, India

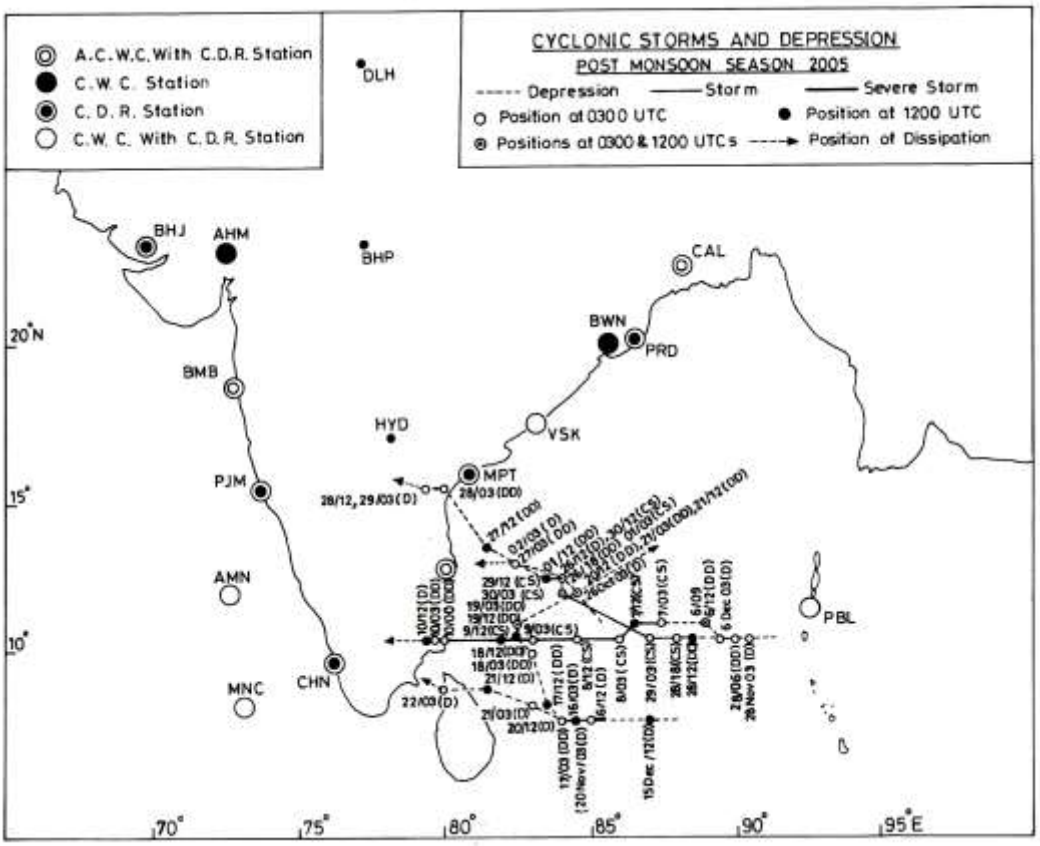


Fig. 2. Tracks of cyclonic storms and depressions during the period October to December 2005

Unlike the last year, northwest India received comparatively less rainfall due to the western disturbances being rather dry systems. But the high amplitude westerly troughs which penetrated even into much lower latitudes gave rise to sufficient upper level divergence to the eastern side, aiding the enhanced rainfall activity along the east coast.

3. Monthly features

3.1. *October*

3.1.1. *Withdrawal of southwest monsoon*

Though there was some delay in the initial phase of withdrawal of southwest monsoon, it took place at a faster pace in October. It withdrew from entire northwest India on 1 October, most parts of north and central India by 6 October, northeast India and northern parts of peninsular India by 10 October and from the entire country, Bay of Bengal and Arabian Sea on 11 October, 4 days ahead of the normal date.

3.1.2. *Commencement of northeast monsoon rains*

Subsequent to the withdrawal of southwest monsoon rains, northeast monsoon rains commenced over Tamil Nadu, Kerala and adjoining areas of Karnataka and Andhra Pradesh on 12 October.

3.1.3. *Storms and depressions*

There was no cyclonic storm formed during the month and only a Deep Depression formed during 26 – 29 October over the southwest Bay. The details are given below :

3.1.3.1. *Deep Depression over the southwest Bay (26–29 October)*

A low pressure area formed over southwest and adjoining west–central Bay on 25. It concentrated into a Depression and lay centred near Lat. 12.0° N / Long. 84.5° E at 0300 UTC of 26 and near Lat. 12.5° N / Long. 84.0° E at 1200 UTC of 26. It subsequently intensified into a Deep Depression over the same area at 1800 UTC

TABLE 1

Sub-divisionwise rainfall (mm) for each month and season as a whole (October-December 2005)

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	306	305	0	303	236	28	285	159	79	894	700	28
2.	Arunachal Pradesh	152	166	–8	25	42	–41	4	35	–90	181	244	–26
3.	Assam & Meghalaya	219	154	43	8	25	–67	1	11	–92	229	191	20
4.	Naga., Mani, Mizo. and Tri.	170	145	17	9	40	–77	10	10	5	190	195	–3
5.	Sub-Himalayan West Bengal & Sikkim	285	155	84	6	18	–66	**	10	–96	292	183	59
6.	Gangetic West Bengal	343	130	163	2	23	–89	5	6	–14	351	159	120
7.	Orissa	220	120	83	13	28	–52	7	6	34	241	153	57
8.	Jharkhand	38	86	–56	1	11	–87	12	5	161	51	101	–49
9.	Bihar	38	69	–45	5	5	–9	1	4	–73	44	78	–44
10.	East Uttar Pradesh	17	52	–66	0	4	–100	3	6	–44	21	62	–66
11.	West Uttar Pradesh	1	40	–97	**	4	–91	1	7	–90	2	51	–95
12.	Uttaranchal	18	56	–67	3	9	–65	2	22	–91	23	87	–73
13.	Haryana, Chandigarh & Delhi	0	16	–100	1	5	–73	0	7	–100	1	27	–95
14.	Punjab	**	21	–98	**	5	–94	0	15	–100	1	41	–98
15.	Himachal Pradesh	1	46	–97	**	20	–99	**	46	–99	1	111	–99
16.	Jammu & Kashmir	13	36	–63	18	32	–43	**	84	–99	32	153	–79
17.	West Rajasthan	0	4	–100	**	3	–89	0	2	–100	**	9	–97
18.	East Rajasthan	0	15	–100	0	7	–100	0	4	–100	0	26	–100
19.	West Madhya Pradesh	1	32	–97	0	13	–100	**	7	–99	1	52	–98
20.	East Madhya Pradesh	21	39	–45	1	12	–88	3	9	–64	26	59	–56
21.	Gujarat region	1	22	–95	0	11	–100	0	2	–100	1	35	–97
22.	Saurashtra & Kutch	1	14	–92	0	11	–100	0	1	–100	1	26	–95
23.	Konkan & Goa	54	105	–49	0	26	–100	**	4	–99	54	135	–60
24.	Madhya Maharashtra	82	71	15	0	28	–100	**	6	–99	82	105	–23
25.	Marathwada	70	67	5	0	22	–100	0	7	–100	70	96	–27
26.	Vidarbha	85	53	60	0	15	–100	2	7	–71	87	75	16
27.	Chattisgarh	101	67	50	1	10	–95	**	5	–96	101	82	24
28.	Coastal Andhra Pradesh	387	197	97	95	104	–8	30	26	17	512	326	57
29.	Telangana	181	84	115	2	21	–89	2	5	–59	185	110	69
30.	Rayalaseema	281	121	132	97	66	47	44	24	81	423	212	99
31.	Tamil Nadu	271	181	49	348	165	110	153	85	80	772	432	79
32.	Coastal Karnataka	166	179	–7	31	66	–53	4	14	–69	201	258	–22
33.	North interior Karnataka	120	103	17	5	28	–83	**	6	–95	125	137	–8
34.	South interior Karnataka	249	139	80	61	48	27	7	13	–43	318	200	59
35.	Kerala	251	292	–14	202	164	23	63	43	45	515	499	3
36.	Lakshadweep	164	153	7	218	117	87	27	59	–54	410	329	25

** Rainfall amount from 0.1 to 0.4 mm; amounts less than 0.1 mm are rounded off to 0.

TABLE 2

Details of the weather systems during October 2005

S. No. (1)	System (2)	Duration (3)	Place of first location (4)	Direction of movement (5)	Place of final location (6)	Remarks (7)
(**A**)	*Depressions*					
1	Deep Depression	26 – 29	Southwest Bay	Northwest	South coastal Andhra Pradesh and neighbourhood	It crossed south Andhra coast close to Ongole by 0800 UTC of 28 and weakened into a depression. Details are given in the text
(**B**)	*Low pressure areas*					
1.	Well-marked low pressure area	9 – 15	Central parts of south Bay and adjoining west central Bay	Northwest	South Madhya Maharashtra, north interior Karnataka and adjoining Konkan & Goa	It was first seen as a trough of low on 8. Though became less marked on 16, the associated upper air cyclonic circulation has an anomalous northeastward movement, which led to the formation of the following low pressure area
2.	Low pressure area	21 – 22	Orissa, Gangetic West Bengal and neighbourhood	Stationary	*In situ*	Associated upper air cyclonic circulation persisted there till 23 and became less marked on 24
3.	Do	12 – 19	Southeast and adjoining east central Arabian Sea	West	Southwest and adjoining west central Arabian Sea	Moved away westwards on 20
4.	Do	18 – 21	Southwest and adjoining west central Bay	Northwest	Coastal Andhra Pradesh and adjoining west central Bay	Formed under the influence of an upper air cyclonic circulation over the southeast Bay and adjoining Andaman Sea during 14 to 17. Even after the dissipation of the low pressure area, the upper air cyclonic circulation persisted over coastal Andhra Pradesh and adjoining Telangana till 23
5.	Do	23 – 24	Tamil Nadu and neighbourhood	Westnorthwest	Lakshadweep area and adjoining southeast and east central Arabian Sea	Formed under the influence of an upper air cyclonic circulation over Tamil Nadu and adjoining Kerala on 22. Though became less marked on 25, the associated upper air cyclonic circulation lay over east central Arabian Sea off south Maharashtra – Goa coasts till 26
(**C**)	*Western disturbances /Eastward moving systems*					
(*i*)	*Upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	2 – 9	North Pakistan and neighbourhood	Northeast	Eastern parts of Jammu & Kashmir	Moved away on 10
2.	Do	10 – 21	Western parts of Jammu & Kashmir and neighbourhood	East	Do	Moved away on 22
3.	Do	22 – 29	North Pakistan and adjoining Jammu & Kashmir	Northeast	Do	Moved away on 30
4.	Do	29 Oct – 2 Nov	Northeast Afghanistan and adjoining north Pakistan	Northeast	Do	Moved away on 3 November
(*ii*)	*Trough in westerlies*					
1.	Mid and upper tropospheric levels	20 – 22	Along Long. 78° E	East	Along Long. 80° E	Became less marked on 23

TABLE 2 (*Contd*.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**D**)	*Other upper air cyclonic circulations*					
1.	Between 3.1 & 4.5 km a.s.l.	4 – 6	Telangana and neighbourhood	Westnorthwest	Telangana and adjoining Marathwada	Became less marked on 7
2.	Upto lower tropospheric levels	5 – 8	North Andaman Sea and neighbourhood	West	Southeast and adjoining southwest Bay	Merged with the upper air cyclonic circulation associated with a low pressure area on 9
3.	Upto 3.6 km a.s.l.	7 – 10	Gangetic West Bengal, Jharkhand and neighbourhood	Northwest	Bihar and neighbourhood	Seen as a trough in the lower levels on 11 & 12 and became less marked on 13
4.	Do	17 – 19	South Gujarat and adjoining northeast Arabian Sea	Drifted southwards	East central Arabian Sea, adjoining coastal Karnataka and neighbourhood	Became less marked on 20
5.	Between 3.1 & 4.5 km a.s.l.	15 – 17	Central parts of Uttar Pradesh and neighbourhood	Northwest	West Uttar Pradesh and neighbourhood	Became less marked on 18
6.	Between 1.5 & 3.6 km a.s.l.	26	West Bengal & Sikkim and neighbourhood	Northeast	Assam & Meghalaya and neighbourhood	Moved away on 27

of 26. Moving in a northwesterly direction, it lay centred near Lat. 13.0° N / Long. 82.5° E at 0300 UTC and near Lat. 13.5° N / Long. 81.5° E at 1200 UTC of 27. Subsequently moving in a northnorthwesterly direction, it lay centred near Lat. 15.5° N / Long. 80.0° E, close to Ongole at 0300 UTC of 28. It crossed south Andhra coast close to Ongole by 0800 UTC of 28, weakened into a Depression and lay centred about 50 km west of Ongole at 1200 UTC of 28. It remained practically stationary over there on 29 morning and weakened into a well marked low pressure area over south coastal Andhra Pradesh and neighbourhood in the same evening. It further weakened into a low pressure area over the same region on 30, lay as a trough of low extending from south coastal Andhra Pradesh to south Tamil Nadu on 31 October and became less marked thereafter.

The system caused widespread rainfall activity with heavy to very heavy falls at a few places on 28 & 29 October in coastal Andhra Pradesh and at isolated places in Tamil Nadu.

The chief amounts of rainfall in cms are :

Coastal Andhra Pradesh

28 Oct 2005 : Kavali 35, Nellore 26, Sompeta 14, Mondas 11.

29 Oct 2005 : Kavali 8, Visakhapatnam AP 7.

Tamil Nadu

28 Oct 2005 : Tiruvallur 27, Redhills 24, Ponneri 20, Chennai 16, Tambaram 13.

29 Oct 2005 : Kalwakurthy 17, Porumammala and Cumbum 13 each.

Most of the damage were due to heavy rain causing floods, breaching of tanks and damage to railway tracks in Andhra Pradesh. Number of deaths reported in Andhra Pradesh was 18. The districts affected were Nellore, Prakasam, Guntur and Krishna in coastal Andhra Pradesh and Chittoor, Cuddapah, Kurnool in Rayalaseema and

Nalgonda in Telangana. More than 1000 houses collapsed, 44 tanks were breached and lakhs of hectares of paddy fields and fish ponds got submerged in various coastal districts of Andhra Pradesh.

As per the media reports, about 60 deaths were reported in Tamil Nadu due to heavy rain, floods, wall collapse, electrocution and lightning. Many low lying areas of the Cauvery delta region were inundated and damaged.

3.1.4. *Weather and associated synoptic features*

Table 2 gives the summary of synoptic features for the month of October 2005.

Southwest monsoon was *vigorous* on 2 days in Sub–Himalayan West Bengal & Sikkim and *active* on 1 to 2 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, coastal Andhra Pradesh and Kerala. Subsequently, northeast monsoon was *vigorous* on 6 days each in coastal Andhra Pradesh and Rayalaseema and *active* on 1 day each in Tamil Nadu and Kerala.

Very Heavy rain occurred on 3 to 5 days in Assam & Meghalaya, West Bengal & Sikkim, Orissa, coastal Andhra Pradesh and Tamil Nadu and on 1 to 2 days in Telangana, Rayalaseema, interior Karnataka and Kerala. *Heavy rain* occurred on: 15 days in south interior Karnataka; 8 to 10 days in Tamil Nadu and Kerala; 3 to 7 days in Arunachal Pradesh, Assam & Meghalaya, Orissa, Konkan & Goa, Madhya Maharashtra, Chattisgarh, Andhra Pradesh and coastal Karnataka and on 1 to 2 days in Andaman & Nicobar Islands, Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, Bihar and north interior Karnataka.

Rain or thundershowers occurred either *at most places* or *at many places* on: 16 days in Andaman & Nicobar Islands, 8 to 12 days in Sub-Himalayan West Bengal & Sikkim, Orissa, interior Karnataka and Lakshadweep; 4 to 7 days in Arunachal Pradesh, Assam & Meghalaya, Gangetic West Bengal, Konkan & Goa, Madhya Maharashtra, Chattisgarh, coastal Andhra Pradesh, Telangana and coastal Karnataka and on 1 to 3 days in Nagaland-Manipur-Mizoram-Tripura, Jharkhand, Bihar, east Madhya Pradesh, Marathwada, Vidarbha, Rayalaseema, Tamil Nadu and Kerala.

3.1.5. *Monthly rainfall*

Monthly rainfall was: *excess* in 11 meteorological subdivisions *viz*., Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Orissa, Vidarbha, Chattisgarh, coastal Andhra Pradesh, Telangana, Rayalaseema, Tamil Nadu and south interior Karnataka; *normal* in 9 *viz*., Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Madhya Maharashtra, Marathwada, coastal Karnataka, north interior Karnataka, Kerala and Lakshadweep; *deficient* in 4 *viz*., Jharkhand, Bihar, east Madhya Pradesh and Konkan & Goa and *scanty* in 9 *viz*., east Uttar Pradesh, west Uttar Pradesh, Uttaranchal, Punjab, Himachal Pradesh, Jammu & Kashmir, west Madhya Pradesh, Gujarat region and Saurashtra & Kutch. There was no rain in the remaining 3 met. Sub-divisions *viz*., Haryana, west Rajasthan and east Rajasthan. The sub–divisionwise percentage departures from normal and significant amounts of rainfall are given respectively in Tables 1 & 5.

3.1.6. *Temperature*

Day temperatures were *appreciably* to *markedly above normal* on: 8 to 11 days in Jammu & Kashmir and Rajasthan; 4 to 7 days in Himachal Pradesh, Madhya Pradesh, Saurashtra & Kutch and Konkan & Goa and on 1 to 2 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa, Jharkhand, Bihar, Uttar Pradesh, Uttaranchal, Haryana, Vidarbha, Chattisgarh, coastal Andhra Pradesh, Tamil Nadu, coastal Karnataka and Kerala and were; *above normal* on: 16 days in west Madhya Pradesh; 12 to 15 days in east Uttar Pradesh, Himachal Pradesh, Rajasthan, Gujarat region and Madhya Maharashtra; 8 to 11 days in Assam & Meghalaya, Gangetic West Bengal, Haryana, Jammu & Kashmir, east Madhya Pradesh, Saurashtra & Kutch, Chattisgarh and Kerala; 4 to 7 days in Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Orissa, Jharkhand, Bihar, west Uttar Pradesh, Uttaranchal, Konkan & Goa and coastal Karnataka and on 1 to 3 days in Punjab, Marathwada, Vidarbha, Andhra Pradesh and interior Karnataka. They were *appreciably* to *markedly below normal* on: 4 to 6 days in Assam & Meghalaya, West Bengal & Sikkim, Orissa, Andhra Pradesh, Tamil Nadu and north interior Karnataka and on 1 to 2 days in Nagaland-Manipur-Mizoram-Tripura, Jharkhand, Bihar, east Uttar Pradesh, Jammu & Kashmir, Madhya Maharashtra, Marathwada, Vidarbha, Andhra Pradesh, south interior Karnataka and Kerala and were *below normal* on: 8 to 10 days in Punjab and Madhya Maharashtra; 4 to 7 days in Orissa, Bihar, Uttaranchal, Haryana, west Rajasthan, Marathwada, Vidarbha, coastal Andhra Pradesh, Rayalaseema and south interior Karnataka and on 1 to 3 days in Arunachal Pradesh, Assam & Meghalaya, West Bengal & Sikkim, Jharkhand, east Uttar Pradesh, Jammu & Kashmir, east Rajasthan, Madhya Pradesh, Gujarat State, Chattisgarh, Telangana, Tamil Nadu, coastal & north interior Karnataka and Kerala.

The month's highest maximum temperature in the plains of the country was 40° C recorded at Ganganagar (west Rajasthan) and Bhuj (Saurashtra & Kutch) on 10 and 16 & 18 October respectively.

Night temperatures were *appreciably* to *markedly below normal* on : 4 to 6 days in Rajasthan and Gujarat Region and on 1 to 3 days in east Uttar Pradesh, Haryana, Punjab, Jammu & Kashmir, Rajasthan, west Madhya Pradesh, Gujarat region, Konkan & Goa, Madhya Maharashtra and Marathwada and were; *below normal* on: 8 to 12 days in Haryana, Punjab, Jammu & Kashmir, Gujarat region and Madhya Maharashtra and on 4 to 7 days in Jharkhand, Rajasthan, west Madhya Pradesh, Konkan & Goa, Marathwada, Vidarbha and Tamil Nadu and on 1 to 3 days in Arunachal Pradesh, Assam & Meghalaya, West Bengal & Sikkim, Orissa, Bihar, Uttar Pradesh, Uttaranchal, Himachal Pradesh, east Madhya Pradesh, Saurashtra & Kutch, Chattisgarh, Telangana and interior Karnataka. They were *appreciably* to *markedly above normal* on: 4 to 6 days in Nagaland-Manipur-Mizoram-Tripura, Rajasthan, east Madhya Pradesh and Saurashtra & Kutch and on 1 to 3 days in Assam & Meghalaya, Gangetic West Bengal, Orissa, Jharkhand, Bihar, Uttar Pradesh, Uttaranchal, Haryana, Himachal Pradesh, Jammu & Kashmir, Rajasthan, west Madhya Pradesh, Gujarat region, Madhya Maharashtra, Marathwada, Vidarbha, Chattisgarh and Telangana and were *above normal* on: 8 to 12 days in Bihar, east Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Saurashtra & Kutch, Chattisgarh, Telangana; 4 to 7 days in Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Orissa, Jharkhand, Himachal Pradesh, Jammu & Kashmir, Gujarat region, Konkan & Goa, Madhya Maharashtra, coastal Andhra Pradesh, Rayalaseema and Tamil Nadu and on 1 to 3 days in Arunachal Pradesh, Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal, west Uttar Pradesh, Uttaranchal, Punjab, Marathwada, Vidarbha, coastal & south interior Karnataka and Kerala.

The month's lowest minimum temperature in the plains of the country was 11° C, recorded at Amritsar (Punjab) and Jaipur (east Rajasthan) on 22 and 29 October 2005 respectively.

3.1.7. *Disastrous weather events and associated damage*

Apart from the havoc created by the Deep Depression in Andhra Pradesh and Tamil Nadu, flood due to heavy rains also brought about damage to life and property in the southern states. More than 80 people lost their lives, several roads and highways were breached and about 600 huts were damaged in Tamil Nadu due to floods, heavy rain and strong winds. About 20 people lost their lives and 28 houses got damaged in Kerala due to heavy rains. Also flood damaged a bridge and about 20 people were washed away in Kerala. Unprecedented heavy rains in Bangalore caused the death of about 15 people and also many houses were collapsed in Karnataka.

3.2. *November*

3.2.1. *Storms and Depressions*

One Depression (20 – 22 November) and a Cyclonic Storm 'Baaz' (28 November – 2 December) formed during the month. Both the systems formed over the Bay of Bengal. Details of the systems are given below :

3.2.1.1. *Depression over the southwest Bay (20–22 November 2005)*

A trough of low at sea level lay over the southeast Bay and adjoining south Andaman Sea on 14. It organised into a low pressure area over there on 15 and lay over: the southeast Bay on 16 & 17, the southeast and adjoining southwest Bay on 18 and over the southwest Bay on 19. Subsequently, it concentrated into a Depression and lay centred near Lat. 8.0° N / Long. 84.5° E at 0300 UTC of 20 and near Lat. 8.0° N / Long. 84.0° E at 1200 UTC of 20. Moving in a westnorthwesterly direction, it lay near Lat. 8.5° N / Long. 83.0° E at 0300 UTC of 21 and near Lat. 9.0° N / Long. 81.5° E at 1200 UTC of 21. Then it moved westwards, crossed north Sri Lanka coast in the early morning (0000 UTC) and lay centred near Lat. 9.0° N / Long 80.0° E at 0300 UTC of 22. It weakened into a well marked low pressure area over Gulf of Mannar and neighbourhood on 22 evening and persisted there on 23. It weakened into a low pressure area while moving across Tamil Nadu and lay over the southeast Arabian Sea and adjoining Lakshadweep area on 24; the southeast Arabian Sea on 25 and over the southeast and adjoining east central Arabian Sea during 26 November to 1 December. It became less marked on 2 December.

The maximum estimated wind speed was 25 kts. The maximum intensity based on Satellite imageries was T 1.5 from 1200 UTC of 19 to 0000 UTC of 23.

The system gave rise to *heavy* to *very heavy rainfall* over Tamil Nadu and Rayalaseema on 22 & 23 November. Fairly wide spread to wide spread rainfall activity was realised from 22 to 24 in these sub-divisions.

The chief amounts of rainfall in cms are :

Rayalaseema

22 Nov 2005 : Tirupathi 8.

23 Nov 2005 : Tirupathi 21, Gundur 13, Puttur 9, Atmakur & Pakala 8 each.

Tamil Nadu

21 Nov 2005 : Vedaranniyam 9.

22 Nov 2005 : Parangipettai & Panruti 22 each, Chidambaram 13, Vedaranniyam 10, Cuddalore & Pondicherry 9 each.

23 Nov 2005 Toludur 17, Panruti, Ulundurpet 15, Dindigul, Srimusham & Virudhachalam 14 each.

3.2.1.2. *Cyclonic Storm 'Baaz' over the southeast Bay (28 November – 2 December 2005)*

Under the influence of an upper air cyclonic circulation a low pressure area formed and persisted over the south Andaman Sea and adjoining Tenasserim coast on 25 & 26. It lay over the south Andaman Sea and adjoining southeast Bay on 27 morning and became well marked in the evening. Subsequently, it concentrated into a Depression and lay centred at 0300 UTC of 28, near Lat. 10.5° N / Long. 90.5° E. Intensifying into a Deep Depression, it lay centred near Lat. 10.5° N / Long. 90.0° E at 0600 UTC and near Lat. 10.5° N / Long. 88.5° E at 1200 UTC of 28. Continuing it's westward movement, it further intensified into a Cyclonic Storm (Baaz) and lay centred near Lat. 10.5° N / Long. 88.0° E at 1800 UTC of 28 and near Lat. 10.5° N / Long. 87.0° E at 0300 UTC of 29. Then it moved northwestwards and lay centred near Lat. 12.0° N / Long. 84.0° E at 1200 UTC of 29 & at 0300 UTC of 30 and near Lat. 12.5° N / Long. 84.0° E at 1200 UTC of 30 November & 0300 UTC of 1 December. Moving slowly westwards, it weakened into a Deep Depression and lay centred near Lat. 12.5° N / Long. 83.5° E at 1200 UTC of 1 December and further into a Depression, centred near Lat. 13.0° N / Long. 82.5° E at 0300 UTC of 2. Subsequently it weakened into a well marked low over southwest and adjoining west central Bay off north Tamil Nadu- south Andhra coasts on 2 evening and lay over southwest Bay and adjoining north Tamil Nadu on 3 morning. It further weakened into a low pressure area over north Tamil Nadu and adjoining coastal Andhra Pradesh on 3 evening and became less marked on 4.

The lowest estimated central pressure was 1000 hPa. The maximum estimated wind speed was 45 kts. The maximum intensity based on satellite imageries was T 3.0 from 0300 UTC of 29 to 0400 UTC of 30. Due to the absence of any consistent well defined cloud bands, RADAR centre could not be fixed by both the DWR imageries of Chennai and SHAR.

Though the system weakened over the sea, later as a low pressure area, it gave rise to *widespread* to *fairly widespread* rainfall activity with *isolated heavy* to *very heavy rainfall* over Andhra Pradesh and Tamil Nadu.

The chief amounts of rainfall in cms are :

Andhra Pradesh

03 Dec 2005 : Tada 18, Tirupathi 8.

04 Dec 2005 : Rapur 28, Nellore 8.

Tamil Nadu

03 Dec 2005 : Tambaram 31, Chennai 28, Thiruvallur 23, Arakonam 21, Sriperumbudur 18, Chengalpattu & Redhills 18 each, Tiruttani 14, Poondi 13.

04 Dec 2005 : Pullambadi 18, Parangipettai, Tindivanam, Vandavasi & Vallam 13 each.

05 Dec 2005 Vallam 13, Erode 9, Tuticorin 8.

According to press reports heavy rains caused floods in Nellore, Chittoor and Cuddapah districts of Andhra Pradesh. It claimed the lives of 11 people, breached 27 Tanks and marooned many villages in these districts. The system, after weakening into a well marked low pressure area, caused widespread rain with scattered heavy falls on subsequent 4 days, causing inundation of low lying areas over Tamil Nadu. As per the press reports, 10 deaths were reported and 3.29 lakh hectares of standing crops were damaged in Nagapattinam, Tiruchirapalli, Sivaganga, Cuddalore and Tiruvarur districts.

TABLE 3

Details of the weather systems during November 2005

S. No.	System	Duration	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Cyclonic storm/depression*					
1.	Depression	20 – 22	Southwest Bay	Northwest and west	Gulf of Mannar and neighbourhood	It was initially seen as a trough of low at sea level over southeast Bay and adjoining Andaman Sea on 14. As a low pressure area it gave rise to very heavy rainfall over Tamil Nadu and Rayalaseema. Details are given in the text
2.	Cyclonic storm (Baaz)	28 Nov – 2 Dec	Southeast Bay	West, northwest and west	Southwest and adjoining west central Bay off north Tamil Nadu – south Andhra coasts	The low pressure area was formed under the influence of an upper air cyclonic circulation which persisted over south Andaman Sea and adjoining Tenasserim coast on 25 & 26. After weakening over the Ocean, it gave rise to flood situations in both Tamil Nadu and Andhra Pradesh
(**B**)	*Low pressure areas*					
1.	Low pressure area	4 – 10	Central parts of south Bay	West	Lakshadweep area and adjoining southeast Arabian Sea	Less marked on 11. Associated upper air cyclonic circulation persisted till 15 and became less marked on 16
2.	Do	9	Southwest Bay off Tamil Nadu coast	Quasi–stationary	*In situ*	It lay as a trough of low over there during 10 to 13 and became less marked on 14
(**C**)	*Western disturbances /Eastward moving systems*					
(*i*)	*Upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	2 – 7	North Pakistan and adjoining Jammu & Kashmir	Northeast	Eastern parts of Jammu & Kashmir	Moved away on 8
2.	Do	7 – 10	Do	Do	Do	Moved away on 11
3.	Do	9 – 17	North Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away on 18
4.	Upto mid tropospheric levels	17 – 24	North Pakistan and adjoining Jammu & Kashmir	Do	Eastern parts of Jammu & Kashmir	Moved away on 25
5.	Do	24 Nov – 4 Dec	Do	Do	Do	Moved away on 5 December
6.	Upto lower tropospheric levels	19 – 25	Bangladesh and neighbourhood	Do	Arunachal Pradesh and adjoining Assam & Meghalaya	Seen as a trough in the lower level westerlies along Long. 90° E on 18. Moved away on 26
(*ii*)	*Induced systems*					
1.	Induced cyclonic circulation in the lower levels	25 Nov – 4 Dec	Central Pakistan and neighbourhood	Northeast	Himachal Pradesh and adjoining Uttaranchal	Became less marked on 5 December
(**D**)	*Other upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	2 – 5	Tamil Nadu and adjoining areas of coastal Andhra Pradesh and southwest Bay	West	Southeast Arabian Sea and adjoining Lakshadweep area	Became less marked on 6
2.	Do	6 – 12	South Andaman Sea and adjoining southeast Bay	Northnorthwest	North Andaman Sea and adjoining east central Bay	Became less marked on 13

TABLE 4

Details of the weather systems during December 2005

S. No.	System	Duration	Place of first location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**)	*Storm/Depression*					
1.	Cyclonic storm (Fanoos)	6 – 10	Southeast Bay	West	South Tamil Nadu and neighbourhood	The low pressure area was formed under the influence of an upper air cyclonic circulation over south Andaman Sea and neighbourhood on 4. Caused very heavy rains over Tamil Nadu during 11 to 13. Details are given in the text
2.	Deep depression	15 – 21	Southeast Bay	West, northnorthwest and northeast	Southwest and adjoining west central Bay	The low pressure area formed from a trough of low over southeast Bay and adjoining south Andaman Sea on 13. The system recurved northeastwards and hence did not affect the weather over the land areas much. Details are given in text
(**B**)	*Western disturbances/Eastward moving cyclonic circulations*					
(*i*)	*Upper air cyclonic circulations*					
1.	Upto mid tropospheric levels	4 – 7	North Pakistan and adjoining Jammu & Kashmir	Northeast	Eastern parts of Jammu & Kashmir	Moved away on 8
2.	Do	8 – 13	Do	Do	Jammu & Kashmir and neighbourhood	Moved away on 14
3.	Do	14 – 19	Do	Do	Do	Moved away on 20
4.	Do	20 – 24	North Pakistan and neighbourhood	Do	Eastern parts of Jammu & Kashmir and neighbourhood	Moved away on 25
5.	Do	25 – 31	North Pakistan and adjoining Jammu & Kashmir	Do	Jammu & Kashmir and neighbourhood	Moved away on 1 January 2006
6.	Do	31 Dec – 4 Jan	North Pakistan and neighbourhood	Do	Do	Moved away on 5 January 2006
(*ii*)	*Induced systems*					
1.	Cyclonic circulation upto lower tropospheric levels	9 – 14	Northwest Rajasthan and neighbourhood	Do	Uttaranchal and neighbouring areas	Became less marked on 15
2.	Cyclonic circulation between 1.5 & 3.1 km a.s.l.	22 – 24	Punjab and neighbourhood	Eastnortheast	Uttaranchal and adjoining west Uttar Pradesh	Became less marked on 25
3.	Cyclonic circulation upto 3.1 km a.s.l.	31 Dec – 4 Jan	Northwest Rajasthan and neighbourhood	East	Haryana and neighbourhood	Became less marked on 5 January 2006
(*iii*)	*Troughs in westerlies*					
1.	Trough in mid & upper tropospheric westerlies	20 – 26	Along Long. 68° E, north of Lat. 20° N	Northeast	Along Long. 80° E.	Moved away on 27
(**D**)	*Troughs in easterlies*					
1.	Trough of low at sea level	26 Dec – 6 Jan	South Andaman Sea and neighbourhood	West	Southwest Bay off Tamil Nadu coast	Became less marked on 7 January 2006
2.	Do	31 Dec – 19 Jan	South Andaman Sea	Do	Southwest Bay	Became less marked on 20 January 2006

3.2.2. *Weather and associated synoptic features*

Summary of the synoptic systems for the month of November 2005 are given in Table 3.

Northeast monsoon was *vigorous* on 1 to 3 days in coastal Andhra Pradesh, Rayalaseema, Tamil Nadu and Kerala and *active* on 2 to 3 days in Tamil Nadu and Kerala.

Very heavy rain occurred on 7 days in Tamil Nadu and on 1 to 3 days in coastal Andhra Pradesh, Rayalaseema and Kerala. *Heavy rain* occurred on 11 days in Tamil Nadu, 4 to 8 days in Andaman & Nicobar Islands, coastal Andhra Pradesh and Kerala and on 1 to 2 days in Orissa, Telangana, Rayalaseema, Karnataka and Kerala.

Rain or thundershowers occurred either *at most places* or *at many places* on 13 days in Andaman & Nicobar Islands, 8 days in Lakshadweep and on 1 to 3 days in Arunachal Pradesh, Sub-Himalayan West Bengal & Sikkim, Jammu & Kashmir, coastal Andhra Pradesh, Rayalaseema, Tamil Nadu and coastal & south interior Karnataka. Also Jammu & Kashmir reported isolated snowfall on 2 days.

3.2.3. *Monthly rainfall*

Monthly rainfall was *excess* in 6 meteorological sub–divisions *viz*., Andaman & Nicobar Islands, Rayalaseema, Tamil Nadu, south interior Karnataka, Kerala and Lakshadweep; *normal* in 2, *viz*., Bihar and coastal Andhra Pradesh; *deficient* in 4, *viz*., Arunachal Pradesh, Orissa, Jammu & Kashmir and coastal Karnataka and *scanty* in 15, *viz*., Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Gangetic West Bengal, Jharkhand, west Uttar Pradesh, Uttaranchal, Haryana, Punjab, Himachal Pradesh, west Rajasthan, east Madhya Pradesh, Chattisgarh, Telangana and north interior Karnataka. There was no rain over the remaining 9 sub–divisions *viz*., east Uttar Pradesh, east Rajasthan, west Madhya Pradesh, Gujarat Region, Saurashtra & Kutch, Konkan & Goa, Madhya Maharashtra, Marathwada and Vidarbha. The significant amounts of rainfall during the month are given in Table 5.

3.2.4. *Temperature*

Cold wave conditions prevailed on 1 to 2 days in Haryana, Punjab, Madhya Maharashtra, Marathwada, Vidarbha and interior Karnataka.

Night temperatures were *appreciably* to *markedly below normal* on : 9 days in Madhya Maharashtra, 8 days in Jharkhand, 4 to 7 days in Orissa, Jammu & Kashmir, Gujarat region, Konkan & Goa, Marathwada, Vidarbha, Telangana, Rayalaseema and coastal & south interior Karnataka and on 1 to 3 days in Bihar, east Uttar Pradesh, Uttaranchal, Haryana, Punjab, Jammu & Kashmir, Rajasthan, Madhya Pradesh, Chattisgarh, coastal Andhra Pradesh, Tamil Nadu and north interior Karnataka and *below normal* on: 17 days in Orissa, 14 days in Madhya Maharashtra, 8 to 10 days in Jharkhand, Gujarat region, Konkan & Goa, Marathwada, Vidarbha, Telangana and Tamil Nadu, 4 to 7 days in Bihar, east Uttar Pradesh, Uttaranchal, Haryana, Punjab, Jammu & Kashmir, Madhya Pradesh, Chattisgarh, coastal Andhra Pradesh, Rayalaseema and coastal & south interior Karnataka and on 1 to 3 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, west Uttar Pradesh and Rajasthan. They were *appreciably* to *markedly above normal* on: 21 days in Rajasthan, 10 to 12 days in west Madhya Pradesh and Saurashtra & Kutch, 4 to 7 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, west Uttar Pradesh, Haryana, east Madhya Pradesh and coastal Karnataka and on 1 to 3 days in Orissa, Jharkhand, east Uttar Pradesh, Punjab, Jammu & Kashmir, Madhya Maharashtra, coastal Andhra Pradesh and Telangana and were *above normal* on: 6 to 8 days in Gangetic West Bengal, east Uttar Pradesh, Madhya Pradesh, Saurashtra & Kutch, coastal Andhra Pradesh, Rayalaseema and south interior Karnataka, 3 to 5 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, west Uttar Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, east Rajasthan, Madhya Maharashtra, Tamil Nadu and coastal Karnataka and on 1 to 2 days in Orissa, Bihar, Uttaranchal, west Rajasthan, Gujarat region, Marathwada, Vidarbha, Chattisgarh, Telangana, north interior Karnataka and Kerala.

Month's lowest minimum temperature in the plains of the country was 3° C recorded at Amritsar (Punjab) on 30 November 2005.

3.2.5. *Disastrous weather events and associated damage*

Heavy rains took a toll of 158 people in Tamil Nadu. Also more than 60,000 hectares of Agricultural land were submerged in flood water, 10 villages were marooned, many trees were uprooted, two buses were washed away, railway tracks were breached and links to southern part of the state were cut off for several days. Continuous heavy rain claimed the lives of 46 people in West Bengal and affected the lives of about 7 lakh people. Due to heavy rain, around 50 houses were flooded in Kerala and a ship berth in Mattancherry warf collapsed.

3.3. *December*

3.3.1. *Storms and Depressions*

One cyclonic storm (6–10 December) and a Deep Depression (15–21 December) formed over the Bay during the month. There was no cyclogenesis over the Arabian Sea. Details of the systems are given below :

3.3.1.1. *Cyclonic Storm 'Fanoos' over the southeast Bay (6–10 December 2005)*

Life cycle

Under the influence of an upper air cyclonic circulation, a low pressure area formed over the south Andaman Sea and neighbourhood on 4. It lay over the southeast Bay and adjoining south Andaman Sea on 5 morning and became well marked over the southeast Bay in the evening. Subsequently, it concentrated into a Depression and lay centred near Lat. 10.5° N / Long. 89.5° E at 0300 UTC of 6. Intensifying into a Deep Depression, it lay centred near Lat. 11.0° N / Long. 89.0° E at 0900 UTC & 1200 UTC of 6. Moving westwards, it further intensified into a Cyclonic Storm (Fanoos) and lay centred at 0300 UTC of 7 near Lat. 11.0° N / Long. 87.5° E and at 1200 UTC near Lat. 11.0° N / Long. 86.5° E. Then it drifted slightly southwestwards and lay centred at 0300 UTC of 8, near Lat. 10.5° N / Long. 86.0° E. Further moving westwards, it lay centred at 1200 UTC of 8, near Lat. 10.5° N / Long. 84.5° E; at 0300 UTC of 9, near Lat. 10.5° N / Long. 83.0° E and at 1200 UTC of 9, near Lat. 10.5° N / Long. 82.0° E. Continuing the westward movement, it weakened into a Deep Depression, which lay centred near Lat. 10.5° N / Long. 80.0° E at 0000 UTC of 10 and crossed south Tamil Nadu coast close to Vedaranniyam at 0530 UTC of 10. It weakened into a Depression and remained practically stationary, close to Vedaranniyam, at 1200 UTC of 10. Moving westwards, it further weakened into a low pressure area and lay over south Tamil Nadu, adjoining Kerala and neighbourhood on 11 morning and became less marked in the evening.

The maximum estimated wind speed was 55 kts. The maximum intensity based on satellite imageries was T 3.5 from 0200 UTC of 8 to 0300 UTC of 10. 'EYE' was observed in the visible imagery at 0900 & 1000 UTC of 9, but due to CCC, the intensity was not upgraded. CDR Karaikal also could locate the centre with fair confidence with an 'open eye' pattern at 1700 UTC of 9.

Fairly widespread rainfall activity, with *isolated heavy* to *very heavy* falls occurred in Tamil Nadu during 11 to 13 December, after the dissipation of the system.

The chief amounts of rainfall in cms are :

11 Dec 2005 : Ramanathapuram 35, Panruti 14, Shenkotta 13, Kamurthi, Mudukulathur & Pamban 12 each, Ambasamudam 10, Sattur 9.

12 Dec 2005 : Manimuthar 19, Ambasamndram 17, Shenkotta 13, Paramakudi 12, Kattumannarkoil 9.

13 Dec 2005 Tiruvallur 29, Poondi 17, Redhills 13, Chengalpattu 12, Panruti, Arakkonam & Pappireddipatti 10 each, Sriperumabudur 9.

As per the media reports, 5 people died due to heavy rain and flood over various parts of Tamil Nadu. About 60 % of the crops were submerged in Thanjavur, Tiruvarur and Nagapattinam districts. Many lakes were breached and roads were damaged. Widespread rainfall activity was also realised in Andaman & Nicobar Islands with isolated heavy falls on 27 & 28 November, during the formative stage of the system.

3.3.1.2. *Deep Depression over the southeast Bay (15 - 21 December 2005)*

A trough of low at sea level organised into a low pressure area over the southeast Bay and adjoining south Andaman Sea on 13. It moved over to the southeast Bay on 14 morning and became well marked over there in the evening. It persisted over the southeast Bay and neighbourhood on 15 morning and subsequently concentrated into a Depression which lay centred near Lat. 8.0° N / Long. 87.0° E at 1200 UTC of 15. Moving westwards, it lay centred near Lat. 8.0° N / Long. 85.0° E at 0300 UTC of 16 and near Lat. 8.0° N / Long. 84.5° E at 1200 UTC of 16. Continuing it's westward movement, it further intensified into a Deep Depression and lay centred at 0300 UTC of 17, near Lat. 8.0° N / Long. 84.0° E. Then it moved westnorthwestwards and lay centred near Lat. 8.5° N / Long. 83.5° E at 1200 UTC of 17. Thereafter, moving northwestwards it lay centred: near Lat. 10.0° N / Long. 83.0° E at 0300 UTC of 18; near Lat.10.5° N / Long. 82.5° E at 1200 UTC of 18 and near Lat. 11.0° N / Long. 82.5° E at 0300 and 1200 UTC of 19. It then started re-curving northeastwards and lay centred at Lat. 11.5° N / Long. 83.5° E at 0300 UTC of 20. Further moving northeastwards, it weakened into a Depression and lay centred near Lat. 12.0° N / Long. 84.5° E during 1200 UTC of 20 to 1200 UTC of 21. It further weakened into a well–marked low pressure area over southwest Bay and adjoining westcentral Bay on 22 morning.

The maximum estimated wind speed was 35 kts. The maximum intensity based on satellite imagery was T 2.0

TABLE 5

Representative daily cumulative 24 hrs rainfall amounts during (October – December 2005)

Date	October	November	December
(1)	(2)	(3)	(4)
1	Mazbat 13, Pottangi 7, Kalingapatnam 6, Bangarpet & Maya Bandar 5 each, Umargaon 4, Prodattur, Kolkata, Tadong, Kailashahar & Tezpur 3 each, Tirupattur, Rajkot & Gangtok 2 each, Mumbai 1	Subramanya 11, Namakkal & Gopalpur 8 each, Palacode 7, Purushottampur, Kannur & Kalingapatnam 5 each, Bhubaneswar 4, Alapuzha, Kodaikanal, Valparai, Mysore & Cuttack 3 each, Imphal 2, Periakulam & Nancowry 1 each	Thiruvananthpuram 1
2	Passighat 9, Kalingapatnam 8, Sompeta & Miao 7 each, Puri, Chandbali & Dharamtul 5 each, Paradip 4, Digha, Chennai, Bijapur, Karimganj & Imphal 3 each, Jalpaiguri, Mukteshwar, Baroda, Mahabaleshwar, Parbhani, Chikkanahalli & Maya Bandar 1 each	Sira 12, Annigeri 11, Vallam 10, Keeranur 9, Cannur & Chengam 8 each, Hosur, Pudukottai & Waltair 7 each, Machilipatnam, Salem & Coimbatore 5 each, Panambur & Ongole 4 each, Maya Bandar & Mangalore 3 each, Bangalore, Thiruvananthapuram, Anantpur & Car Nicobar 1 each	Nancowry, Agathi & Amini Divi 1 each
3	Balurghat 40, Kakatpur 17, Alibag 11, Passighat & Dhubri 8 each, Nimapada & Shantiniketan 7 each, Bhubaneswar & Cooch Behar 5 each, Mysore & Agartala 3 each, Mahabaleswar 2, Kolhapur, Konta, Tiruchirapalli, Belgaum & Nancowry 1 each	Madhabarida & Parvathipuram 13 each, Karambakudi 8, Kattumannarkoil & Yelandur 7 each, Visakhapatnam 5, Coimbatore & Nellore 4 each, Medikeri & Tirupattur 2 each, Anantpur, Waltair & Coonoor 1 each	Tambaram 31, Chennai 28, Thiruvallur 23, Tada 18, Chengalpattu & Red Hills 15 each, Tiruttani 14, Poondi 13, Tirupathi 7, Hut Bay, Vellore & Thiruvananthapuram 3 each, Nellore & Pondicherry 1 each
4	Balurghat 20, Tikrikilla 14, Taibpur 12, Nancowry 10, Dhubri & Cooch Behar 9 each, Salem 7, Sangli 6, Jalpaiguri 5, Yercaud & Alibag 3 each, Kolkata, Balasore & Bhagalpur 2 each, Bahraich 1	Port Blair 6, Maya Bandar 4, Alapuzha & Chennai 3 each, Bangalore, Nagapattinam & Karaikal 2 each, Amini Divi, Tondi, Bapatla & Hissar 1 each	Rapur 28, Pullambadi 18, Vallam & Vandavasi 13 each, Tirukattupalli 12, Thanjavur 11, Cuddalore, Pondicherry & Erode 10 each, Nancowry 9, Nellore 8, Vellore 7, Yercaud, Tirupathi & Cuddapah 6 each, Tambaram 5, Tondi & Tiruchirapalli 4 each, Salem 3, Adirampattinam 2, Pamban, Coonoor & Thiruvananthapuram 1 each
5	Cooch Behar & Dhubri 17 each, Alipurduar 15, Jalpaiguri 12, Balurghat & Bangarpet 11 each, Coimbatore 7, Bangalore 6, Kochi 3, Belgaum, Nasik, Arogyavaram & Car Nicobar 2 each, Jagdalpur & Agartala 1 each	Tirupathi 10, Karaikal, Nannilam, Red Hills & Nagapattinam 9 each, Papanasam 8, Kumbakonam, Piravom & Perumbavur 7 each, Coonoor 5, Chennai 4, Nedumbassery, Karipur & Cuddalore 3 each, Coimbatore & Thanjavur 2 each, Pamban & Kodaikanal 1 each	Vallam 13, Erode 9, Tuticorin 8, Port Blair 7, Thanjavur & Maya Bandar 5 each, Car Nicobar 4, Tondi 3, Tirupathi 2, Tuticorin, Kottayam & Palayamkottai 1 each
6	Mathabhanga 30, Jalpaiguri 11, Cooch Behar 9, NH–31 8, Shimoga 7, Mayanur 4, Tenkasi 2, Erode 1	Covelong 15, Karaikal 12, Chennai & Chengalpattu 11 each, Nagapattinam 10, Cuddalore, Tambaram & Chennai 9 each, Pondicherry 8, Minicoy & Nancowry 4 each, Kochi & Coimbatore 2 each, Mangalore & Medikeri 1 each	Port Blair 10, Hut Bay 5, Thiruvananthpuram & Maya Bandar 4 each, Long Islands 3, Kochi, Alapuzha & Car Nicobar 1 each
7	Satyamangalam 8, Visakhapatnam 7, Bhavani Sagar 4, Binika & Shenkottah 3 each, Coonoor 2	Sriperumbudur 17, Karaikal 16, Nagapattinam & Chennai 14 each, Tambaram 11, Ponneri & Red Hills 10 each, Sirkali 8, Thiruvananthapuram & Tirupathi 4 each, Tiruchirapalli 1	Maya Bandar, Port Blair & Long Islands 1 each

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
8	Salem 8, Chouldhowaghat & Tondi 6 each, Cuttack & Bhavani 5 each, Baripada & Thuraiyur 4 each, Erode 3, Ayikudi 2, Chengam 1	Karaikal 31, Nagapattinam 28, Parangipettai 23, Tiruvarur 21, Sirkali 20, Kattumannarkoil 18, Nannilam 16, Cuddalore 13, Pondicherry 9, Adirampattinam, Kottayam & Tirupathi 5 each, Chennai & Nellore 3 each, Tiruchirapalli & Kodaikanal 2 each, Ongole, Long Islands & Maya Bandar 1 each	Hut Bay 1
9	Ahirwalia 16, Nagapattinam 11, Karaikal 9, Hosur 8, Thodupuzha & Tondi 7 each, Tiruchirapalli 6, Tirukattupalli & Vallam 5 each, Tiruchengode & Rasipuram 4 each, Kangeyam & Radhapuram 3 each	Sirkali 11, Kattumannarkoil 10, Parangipettai 9, Kozha 8, Karaikal 7, Kottayam & Cuddalore 5 each, Minicoy & Punalur 4 each, Nagapattinam & Legpui 3 each, Tiruchirapalli & Nellore 2 each, Chennai, Kozhikode & Maya Bandar 1 each	Maya Bandar, Port Blair & Nancowry 1 each
10	Sakaleshpura 7, Udala & Sivakasi 5 each, Ramanathapuram 4, Chennai 2, Sankarankoil 1	Srivaikuntam 9, Lakhipur 3, Jowai 2, Port Blair, Nellore, Tirupathi, Parangipettai, CIAL Kochi & Minicoy 1 each	Sirkali 7, Cuddalore & Vedaranyam 4 each, Tiruchirapalli, Tondi, Adirampattinam, Nagapattinam & Pondicherry 3 each, Karaikal 2, Numgambakkam, Pamban, Kodaikanal, Car Nicobar, Maya Bandar & Hut Bay 1 each
11	Pamban 9, Thodupuzha 8, CIAL Kochi 7, Erode 6, Coimbatore 5, Dindigul 3, Tiruppur 2, Kodaikanal 1	Kochi 6, Palayamkottai 3, Maya Bandar, Nellore & Kaveli 2 each, Pahalgam, Kupwara, Long Islands, Madurai & Minicoy 1 each	Ramanathapuram 35, Varkala 30, Panruti 14, Shenkottah 13, Kamurthi, Mudukulathur & Pamban 12 each, Ambasamudram 10, Sattur 9, Palayamkottai 7, Pondicherry & Kodaikanal 6 each, Tondi & Thiruvananthapuram 5 each, Madurai 3, Chennai & Adirampattinam 1 each
12	Ponneri 14, Thanjavur 11, Chennai & Melur 9 each, Hassan & Dindigul 8 each, Kaveli 7, Tambaram 6, Tiruvallur 5, Vedaranyam 4, Karaikal 3, Tiruchirapalli 1	Konni 9, Mancompu & Pariyanaickanapalayam 7 each, Pamban, Chennai, Thiruvananthapuram & Amini Divi 2 each, Hut Bay, Port Blair & Alapuzha 1 each	Manimuthar 19, Ambasamudram 17, Aryankavu 15, Shenkottah 13, Paramakudi 12, Kattumannarkoil 9, Cheramadevi 8, Nancowry 4, Kodaikanal 3, Alapuzha 2, Madurai, Chennai & M. M. Hills 1 each
13	Chennai 15, Jayapura 14, Sulurpet 13, Nellore & Atmakur 12 each, Mudibidre 11, Gudur 9, Mangalore 6, Khanapura, Mysore & Tirupathi 5 each, Cannur 3, Khammam & Jeypore 2 each	Thalasserry 11, Cannur 10, Thoovaliai, Shenkottah, Hosdurg & CIAL Kochi 9 each, Perumbavur & Nagarcoil 8 each, Coonoor, Pamban & Ramanathapuram 7 each	Tiruvallur 29, Poondi 17, Car Nicobar & Red Hills 13 each, Chengalpattu 12, Panruti, Arakonam & Pappireddipatti 10 each, Sriperumbudur 9, Karaikal & Chennai 3 each, Cuddalore, Nagapattinam, Vellore, Pamban & Arogyavaram 2 each, Coonoor & Kozhikode 1 each
14	Sira 12, Podili 11, Ongole & Tuni 10 each, Lakkavalli & Kakinada 9 each, Yegati & Kurnool 8 each, Allagadda & Madhira 7 each, Dhone & Kaveli 6 each, Bangalore & Srisailam 5 each, Tirupattur, Kolhapur & Pendra 4 each, Karwar & Panjim 3 each, Belgaum, Alapuzha & Kolkata 2 each	Nancowry 11, Thiruvananthpuram 10, Kottayam 9, Kanjirappally 8, Shenkottah & Kochi 7 each, Kozhikode 4, Punalur, Karipur, Amini Divi & Minicoy 2 each	Car Nicobar 9, Ambasamudram 8, Chengalpattu 7, Nancowry 6, Tuticorin 5, Kodaikanal, Cuddalore & Bandipura 4 each, Hut Bay 3, Srirangapatnam & Port Blair 2 each, Salem, Valparai, Long Islands & K. R. Sagar 1 each

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
15	Visakhapatnam 20, Manvi 16, Shahapur & Waltair 15 each, Anakapalle 12, Kembhavi 11, Kakinada 8, Honavar 7, Mahabaleshwar, Parbhani & Pune 5 each, Hyderabad, Kurnool & Akola 4 each, Agathi 3, Panjim 2, Gaya 1	CIAL Kochi 2, Alapuzha & Minicoy 1 each	Nancowry 8, Car Nicobar 4
16	Durg 12, Rajnandgaon 9, Raipur & Parbhani 8 each, Visakhapatnam & Waltair 7 each, Kakinada & Aurangabad 6 each, Ramagundam 5, Agathi 4, Kurnool, Nagpur & Sangli 3 each, Long Islands & Jamshedpur 2 each, Bangalore 1	Maya Bandar 4, Minicoy 1	Nancowry 9, Car Nicobar & Hut Bay 2 each
17	Kaleswaram 26, Tumkur 9, Keonjhargarh & Ramagundam 7 each, Chitradurga 4, Nagpur 3, Bangalore, Jharsuguda & Maya Bandar 2 each, Jamshedpur, Srinagar, Aurangabad, Karwar, Agathi, Silchar & Agartala 1 each	Port Blair 4, Khowang & North Lakhimpur 2 each, Long Islands, Miao, Naharkatia, Chouldhowaghat & Hut Bay 1 each	Car Nicobar 3
18	Talcher 11, Jenapur 10, Indapur 9, Varkala & Krishnanagar 8 each, Ukal 7, Mahabaleshwar, Bangalore & Raipur 6 each, Arogyavaram, Machilipatnam, Cooch Behar & Car Nicobar 3 each, Medak, Cuttack & Hut Bay 2 each, Punalur, Gadag & Kurnool 1 each	Roing 3, Tezu, Passighat, Daporijo, Dhollabazar & Dibrugarh 2 each, Mellabazar, Chouldhowaghat, Bhalukpong, Namsai, Seppa, Ziro, North Lakhimpur & Passighat 1 each	Tada 9, Chennai 6, Nancowry, Cuddalore, Kodaikanal & Nagapattinam 1 each
19	Digha 16, Kolkata 11, Diamond Harbour 10, Canning Town 6, Coonoor & Ratnagiri 5 each, Nellore, Madurai & Khajuraho 4 each, Karwar, Belgaum, Gorakhpur, Mandya & Chandbali 3 each, Malda, Machilipatnam, Ananthapuram & Guwahati 2 each, Imphal, Jamshedpur & Port Blair 1 each	Daporijo 3, Miao, Hut Bay & Port Blair 2 each, Long Islands 1	Red Hills & Tiruvallur 7 each, Chennai 6, Alapuzha 3, Kodaikanal 1
20	Rajghat 30, Baripada 22, Balimundali 19, Jaleswar 17, Digha 14, Paradeep 13, Balasore 12, Haldia 11, Midnapore 10, Bahraich 7, Vellore & Minicoy 6 each, Narsapur & Arogyavaram 5 each, Gadag, Gorakhpur & Kolhapur 3 each, Malda 2, Maya Bandar 1	Port Blair 5, Maya Bandar & Hut Bay 4 each, Long Island 2	Chennai & Nellore 1 each
21	Bhograi 29, Contai 22, Digha 20, Durgachak 13, Paradeep & Diamond Harbour 12 each, Gorakhpur 11, Canning Town 9, Bhadrachalam, Chandbali, Kolkata & Dharamanagar 8 each, Tezu 5, Tuni 4, Mandya, Kudulu & Dhubri 3 each, Bhagalpur, Agathi & Malda 2 each, Jamshedpur 1	Vedaranyam 9, Nagapattinam & Karaikal 5 each, Adirampattinam, Chennai & Tambaram 4 each, Car Nicobar, Tondi & Long Islands 2 each, Hut Bay, Pamban & Thanjavur 1 each	Alapuzha 3
22	Contai 17, Nandigram 15, Puri 13, Tiruchirapalli, Haldia, Gossaigaon & Dhubri 12 each, Chanchal & Tangla 10 each, Digha, Diamond Harbour, Jalpaiguri, Baghdogra & Nalbari 8 each, Seppa 7, Kakinada & Bhalukpong 6 each, Coimbatore, Muzaffarpur & Gorakhpur 5 each, Kochi & Tirupathi 4 each, Maya Bandar 2, Ongole & Belonia 1 each	Parangipettai 22, Chidambaram 13, Vedaranyam 10, Cuddalore & Pondicherry 9 each, Tirupathi 8, Chennai & Karaikal 7 each, Nagapattinam 6, Tiruchirapalli & Nellore 3 each, Arogyavaram, Gangtok & Hut Bay 1 each	Jamshedpur 7, East Singhbhum 6, Jharsuguda 4, K. B. Dam 3, Ramagundam, Pamban, Bankura, Sambalpur & Babery 2 each, Vellore, Kalingapatnam, Imphal, Chandrapur & Durg 1 each
23	Kochi 21, Cherrapunji 18, Baripada 16, Peermade 15, Bangalore & Hut Bay 14 each, Mysore & Jagdalpur 9 each, Haldia & Shillong 8 each, Machilipatnam, Keonjhargarh & Tezpur 7 each, Agartala 6, Tondi 5, Mangalore & Tirupathi 3 each, Minicoy 2, Cooch Behar & Passighat 1 each	Tirupathi 21, Toludur 17, Panruti 15, Dindigul & Srimusham 14 each, Gudur 13, Sathanur Dam 12, Karaikal 7, Thanjavur & Pamban 6 each, Madurai, Nellore, Kaveli & Palayamkottai 5 each, Ariyalur, Tuticorin & Chennai 4 each, Vedaranyam 3, Cuddapah 2, Medikeri & Ongole 1 each	Manamadurai & Tiruppuvanam 11 each, Car Nicobar 5, Manamelkudi 4, Madurai 3, Bhadrachalam, Hut Bay, Deogarh & Wardha 2 each, Maya Bandar, Port Blair, Keonjhargarh, Imphal & Kochi 1 each

TABLE 5 (*Contd.*)

(1)	(2)	(3)	(4)
24	Toludur 16, Diana 15, Nagrakata 11, Madurai 7, Silchar & Kailashahar 5 each, Diamond Harbour 4, Chennai, Bangalore, Alapuzha, Gopalpur, Kolhapur, Hyderabad & Hut Bay 3 each, Minicoy & Tirupathi 2 each, Kottayam 1	Panruti 32, Sholavandan 29, Virudhunagar 28, Palani 27, Dindigul 26, Vallam 25, Thozhudur 24, Mayanur 23, Tiruchirapalli 16, Cuddalore 15, Varkala 14, Karaikal & Kodaikanal 12 each, Nagapattinam 11, Salem 10, Madurai 9, Chennai 6, Pondicherry 4, Car Nicobar 7, Nellore 5, Nancowry 2, Bangalore, Agathi & Tirupathi 1 each	Mirzapur 3, Hut Bay & Allahabad 2 each
25	Chennai 12, Hindol 11, Tiruchirapalli 10, Bandipura 8, Gunupur 7, Kaveli 6, Madurai 5, Hyderabad & Keonjhargarh 3 each, Mysore, Thiruvananthapuram, Gangtok & Digha 1 each	Coonoor 26, Panruti 18, Manaparai & Kothagiri 16 each, Thozhudur 13, Ketti 11, Kundha Bridge 9, Agathi 6, Kodaikanal 5, Thiruvananthapuram, Tirupathi & Kanyakumari 4 each, Tiruchirapalli, Nancowry, Karaikal & Chennai 2 each, Nagapattinam, Nellore, Alapuzha & Nedumbassery 1 each	Nancowry, Hut Bay & Long Islands 1 each
26	Kozha 12, Bangalore 9, Toludur 7, Dharmapuri, Maya Bandar & Long Islands 5 each, Hyderabad 3, Kurnool & Nellore 2 each, Punalur 1	Tiruchendur 10, Tambaram & Thiruvalla 7 each, Sattankulam & Agathi 6 each, Chennai 5, Poondi, Hut Bay & Nancowry 3 each, Car Nicobar & Cuddalore 2 each, Maya Bandar, Minicoy & Vellore 1 each	Car Nicobar 3, Nancowry 1
27	Chennai 27, Red Hills 13, Holaur 12, Ponneri 11, Shimoga 10, Hut Bay 9, Paramakudi 8, Chengalpattu & Mahabaleshwar 7 each, Tirupathi 4, Mandya, Nellore, Paradeep & North Lakhimpur 3 each, Gangtok & Maya Bandar 1 each	Hut Bay 9, Agathi 7, Minicoy, Maya Bandar & Kottayam 5 each, Ambasamudram & Nancowry 4 each, Tambaram, Amini Divi & Car Nicobar 3 each, Cuddalore 2, Port Blair & Long Islands 1 each	Nancowry & Tezu 2 each, Silchar 1
28	Kaveli 35, Tiruvallur 27, Nellore 26, Red Hills 24, Cuddapah 21, Ponneri 20, Chennai 16, Tirupathi 14, Tambaram 13, Poondi 12, Ongole 7, Bapatla 6, Paradeep 4, Nedumbassary 2, Bangalore, Khammam & Panjim 1 each	Port Blair 10, Hut Bay 6, Maya Bandar, Long Islands & Gulmarg 3 each, Kozhikode, Adirampattinam & Car Nicobar 2 each, Cuddalore, Nancowry, Port Blair & Kupwara 1 each	Nil.
29	Kalwakurthy 17, Cumbum 13, Hut Bay 9, Hyderabad & Kaveli 8 each, Visakhapatnam 7, Kurnool 6, Medak 4, Paradeep 3	Eraniel 9, Cherthala 7, Thuckalay 6, Quazigund 4, Thoovalai 3, Alapuzha, Port Blair, Nancowry & Kukernag 2 each, Thiruvananthapuram, Car Nicobar, Hut Bay, Maya Bandar & Srinagar 1 each	Hut Bay 2
30	Kumarakom & Kochi 7 each, Hut Bay 4, Gopalpur 3, Medikeri, Alapuzha & Kakinada 2 each, Hyderabad 1	Thiruvananthapuram & Nancowry 4 each, Car Nicobar 3, Hut Bay 2, Maya Bandar, Thuckalay, Agathi & Quazi Gund 1 each	Port Blair 4, Hut Bay 1
31	Chennai 9, Tiruvannamalai 7, Jeypore 6, Cuttack 5, Kochi, Jagdalpur, Tuni & Kurnool 2 each		Nil

from 0300 UTC of 16 to 0900 UTC of 20. The system features were prominent in DWR Chennai imagery from 0400 to 0900 UTC of 19, so that apparent vortex centres were able to be fixed during the period.

As the system moved away and dissipated over the ocean, it did not cause any significant damage to the east coast. Scattered rainfall was realised on 18 & 19 in Tamil Nadu.

The chief amounts of rainfall in cms are :

18 Dec 2005 : Chennai AP 6.

19 Dec 2005 : Chennai city 6.

3.3.2. *Weather and associated synoptic features*

Table 4 gives the summary of synoptic systems during the month of December 2005.

Northeast monsoon was *vigorous* on 5 days in Tamil Nadu and on 1 day in Rayalaseema. It was *active* on 2 days in Tamil Nadu.

Very heavy rain occurred on 7 days in Tamil Nadu and on 2 days each in coastal Andhra Pradesh and Kerala. *Heavy rain* occurred on 4 to 6 days in Andaman & Nicobar Islands and Tamil Nadu and on 1 day in coastal Andhra Pradesh.

Rain or thundershowers occurred either *at most places* or *at many places* on 15 days in Andaman & Nicobar Islands and on 1 to 2 days in Gangetic West Bengal, Jharkhand and Lakshadweep.

3.3.3. *Monthly rainfall*

Monthly rainfall was: *excess* in 6 meteorological sub-divisions *viz*., Andaman & Nicobar Islands, Orissa, Jharkhand, Rayalaseema, Tamil Nadu and Kerala; *normal* in 3, *viz*., Nagaland-Manipur-Mizoram-Tripura, Gangetic West Bengal and coastal Andhra Pradesh; *deficient* in 4 *viz*., east Uttar Pradesh, Telangana, south interior Karnataka and Lakshadweep and *scanty* in 16 *viz*., Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Bihar, west Uttar Pradesh, Uttaranchal, Himachal Pradesh, Jammu & Kashmir, west Madhya Pradesh, east Madhya Pradesh, Konkan & Goa, Madhya Maharashtra, Vidarbha, Chattisgarh, coastal Karnataka and north interior Karnataka. There was no rain in the remaining 7 sub–divisions *viz*., Haryana, Punjab, west Rajasthan, east Rajasthan, Gujarat region, Saurashtra & Kutch and Marathwada. The significant amounts of rainfall during the month are given in Table 5.

3.3.4. *Temperature*

Cold wave conditions prevailed on: 12 to 16 days in Haryana, Punjab and Rajasthan; 4 to 7 days in west Uttar Pradesh, Jammu & Kashmir, Gujarat Region, Marathwada and Vidarbha and on 1 to 3 days in Orissa, Jharkhand, Bihar, east Uttar Pradesh, west Madhya Pradesh, Saurashtra & Kutch, Madhya Maharashtra, Telangana, Rayalaseema and interior Karnataka.

Night temperatures were *appreciably* to *markedly below normal* on: 20 days in Orissa; 9 to 12 days in Jharkhand, Punjab, Rajasthan, Gujarat State, Konkan & Goa, Telangana and south interior Karnataka; 4 to 8 days in Bihar, Haryana, Jammu & Kashmir, Madhya Pradesh, Madhya Maharashtra, Marathwada, Vidarbha, coastal Andhra Pradesh, Rayalaseema and north interior Karnataka and on 1 to 3 days in Arunachal Pradesh, Gangetic West Bengal, Uttar Pradesh, Chattisgarh, Tamil Nadu and coastal Karnataka. They were *below normal* on: 14 days in east Madhya Pradesh and Madhya Maharashtra; 6 to 10 days in Assam & Meghalaya, Jharkhand, Bihar, Haryana, Jammu & Kashmir, Rajasthan, Madhya Pradesh, Konkan & Goa, Marathwada, Chattisgarh, coastal Andhra Pradesh, Telangana and Tamil Nadu; 3 to 5 days in Orissa, Uttaranchal, Punjab, Gujarat region, Vidarbha, Karnataka and on 1 to 2 days in West Bengal & Sikkim, west Uttar Pradesh, Himachal Pradesh, Rayalaseema and Kerala. They were *appreciably* to *markedly above normal* on : 11 days in coastal Andhra Pradesh; 6 to 10 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Rajasthan, east Madhya Pradesh, Madhya Maharashtra, Vidarbha, Telangana, Rayalaseema; 3 to 5 days in West Bengal & Sikkim, Orissa, Jharkhand, Bihar, east Uttar Pradesh, west Madhya Pradesh, Gujarat region, Marathwada, Chattisgarh, costal Karnataka and on 1 to 2 days in west Uttar Pradesh, Jammu & Kashmir, Saurashtra & Kutch, Konkan & Goa, Tamil Nadu and south interior Karnataka and *above normal* on: 17 days in Tamil Nadu; 7 to 11 days in Saurashtra & Kutch, coastal Andhra Pradesh and Kerala; 3 to 6 days in Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, West Bengal & Sikkim, Orissa, east Uttar Pradesh, Uttaranchal, Himachal Pradesh, Gujarat region, Konkan & Goa, coastal and south interior Karnataka and on 1 to 2 days in Jharkhand, Bihar, west Uttar Pradesh, Jammu & Kashmir, Rajasthan, west Madhya Pradesh and Marathwada.

Month's and season's lowest minimum temperature in the plains of the country was – 0.2° C recorded at Amritsar (Punjab) on 14 December 2005.

3.3.5. *Disastrous weather events*

Apart from the havoc created by the cyclonic storm over Tamil Nadu, heavy rain and flooding continued over there. About 11 people were electrocuted in Tamil Nadu, 23 villages were washed away, standing crops of 3.29 lakh hectares were damaged. Heavy rains damaged about 50 houses in Kerala, 2,200 families were shifted to relief camps and also several coconut trees were uprooted. *Cold wave* claimed 2 lives in northwest India during the month.

Appendix

Definitions of the terms given in '*Italics*'

Rainfall

Excess	- percentage departure from normal is + 20% or more.
Normal	- percentage departure from normal is –19 % to + 19 %.

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

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

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

Very heavy rainfall - rainfall amount 12.5 cm or more.

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

At many places - 51% to 75 % stations of a meteorological sub-division reporting at least 2.5 mm rainfall.

At a few places - 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.

Monsoon activity

(a) Southwest monsoon

Vigorous - rainfall exceeding 4 times the normal with, at least two stations reporting rainfall more than or equal to 8 cm along the west coast and 5 cm elsewhere. Rainfall in that sub-division should be fairly widespread or widespread.

Active - rainfall more than 1½ to 4 times the normal, with at least two stations reporting rainfall more than or equal to 5 cm along the west coast and 3 cm elsewhere. Rainfall in that sub-division should be fairly widespread or widespread.

(b) Northeast monsoon

Vigorous - rainfall exceeding 4 times the normal with at least two stations reporting rainfall more than or equal to 5 cm in coastal Tamil Nadu and south coastal Andhra Pradesh and 3 cm elsewhere in the northeast monsoon region. Rainfall in that sub-division should be fairly widespread or widespread.

Active - rainfall more than 1½ to 4 times the normal, with at least two stations reporting rainfall more than or equal to 3 cm in coastal Tamil Nadu and south coastal Andhra Pradesh and 2 cm elsewhere in the northeast monsoon region. Rainfall in that sub-division should be fairly widespread or widespread.

Temperatures

(a) Maximum / Day temperature

Markedly above normal - departure from normal is +5° C to +6° C (where the normal maximum temperature is 40° C or less).

Appreciably above normal - departure from normal is +3° C to +4° C (where the normal maximum temperature is 40° C or less).

Above normal - departure from normal is +2° C.

Normal - departure from normal +1° C to –1° C.

(b) Minimum / Night temperature

Cold wave conditions - when the wind chill effective minimum temperature (WCT_n) is 10° C or less: For stations whose normal minimum temperature is ≥ 10° C, when the departure from normal is – 5° to – 6° C, and for stations whose normal minimum temperature is less than 10° C when the departure from normal is –4° to –5° C. Also when WCT_n is ≤ 0° C, cold wave is declared irrespective of the departure for those stations whose normal minimum temperature is greater than 0° C.

Markedly below normal - departure from normal is –5° C to 6° C (where the normal minimum temperature is 10° C or more).

Appreciably below normal - departure from normal is between –3° C to –4° C (where the normal minimum temperature is 10° C or more).

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

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