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Weather in India

POST MONSOON SEASON (October - December 2015)†

1. Introduction

The post monsoon season, also known as the cyclone season, witnessed the formation of four intense low pressure systems this year. Two Extremely Severe Cyclonic Storms (ESCSs) 'Chapala' & 'Megh' formed over Arabian Sea and one each Deep Depression (DD) formed over the Bay of Bengal and the Arabian Sea. There had been only three other years, *viz*., 1902, 1940 & 1971 in the recorded history (1891-2014) during which, two Cyclonic Storms of such severe intensity formed over Arabian Sea during Post Monsoon Season.

Out of the four intense systems, only one Deep Depression that formed over the southwest Bay of Bengal crossed the Indian coast and caused death and damage to life, crops and property. The other three formed over Arabian Sea moved away from the Indian coast.

Tracks of these systems are given in Fig. 2. Further details are available in the article on 'Cyclones & Depressions over the north Indian Ocean 2015' published in the July 2016 issue of Mausam.

Southwest monsoon withdrew from the entire country on 19th October. The northeast monsoon rains commenced over Peninsular India on 28th October and ceased on 7th January, 2016. The El-Nino indicators maintained a strong warm phase all through the season. The convectively active phase of Madden-Julian Oscillation also contributed to *active* / *vigorous** northeast monsoon conditions, especially over Tamil Nadu during November. Chennai (Tamil Nadu) witnessed record breaking 24 hour rainfall event on 1st December, leading to devastating flood in and around the city.

This post monsoon season remained as one of the warmest season since 1901. Both the maximum and minimum temperatures were above normal for most parts of the country.

*Cold wave conditions** prevailed over north and central parts of India during the second half of December. Also Dense fog affected normal life in parts of India especially in the month of December.

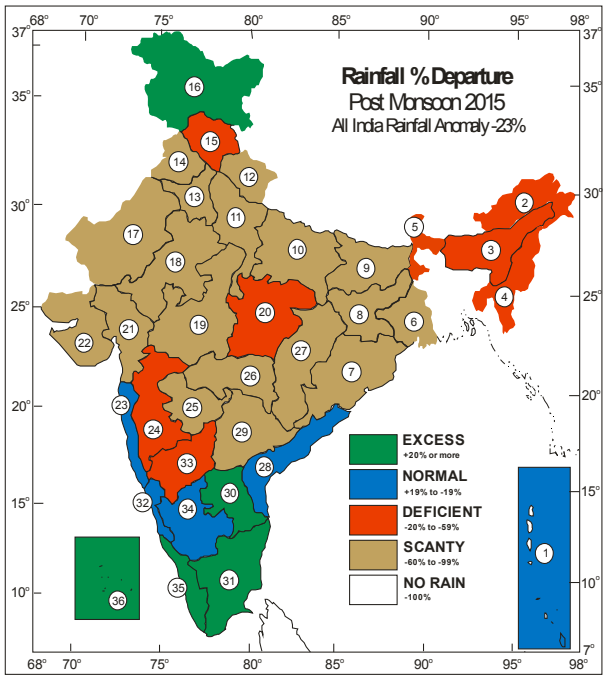

Fig. 1. Sub-divisionwise seasonal rainfall departure from normal (%) for Post monsoon season (October to December 2015). Sub-divisions are indicated by number on the map & bold letters in legend. The rainfall anomaly values for these 36 sub-divisions are indicated below :

1	-11	**7**	-68	**13**	-79	**19**	-77	**25**	-76	**31**	52
2	-52	**8**	-72	**14**	-75	**20**	-30	**26**	-91	**32**	5
3	-53	**9**	-87	**15**	-49	**21**	-93	**27**	-74	**33**	-53
4	-46	**10**	-72	**16**	25	**22**	-84	**28**	-15	**34**	19
5	-55	**11**	-79	**17**	-88	**23**	-15	**29**	-78	**35**	27
6	-76	**12**	-71	**18**	-77	**24**	-40	**30**	78	**36**	67

Major weather related disasters that occurred over the country during this period were related to the Deep Depression formed over southwest Bay of Bengal and exceptionally heavy rainfall events over Tamil Nadu, apart from cold wave and fog.

2. Seasonal rainfall (October-December)

The meteorological sub-division wise rainfall percentage departures from normal are given in Fig. 1 and Table 1.

* *Definitions of terms in italics (other than subtitles) are given in Appendix.*

†*Compiled by* : Sunitha Devi S., A. P. Kundale and P. N. Chopade, WFDD, Pune – 411 005, India

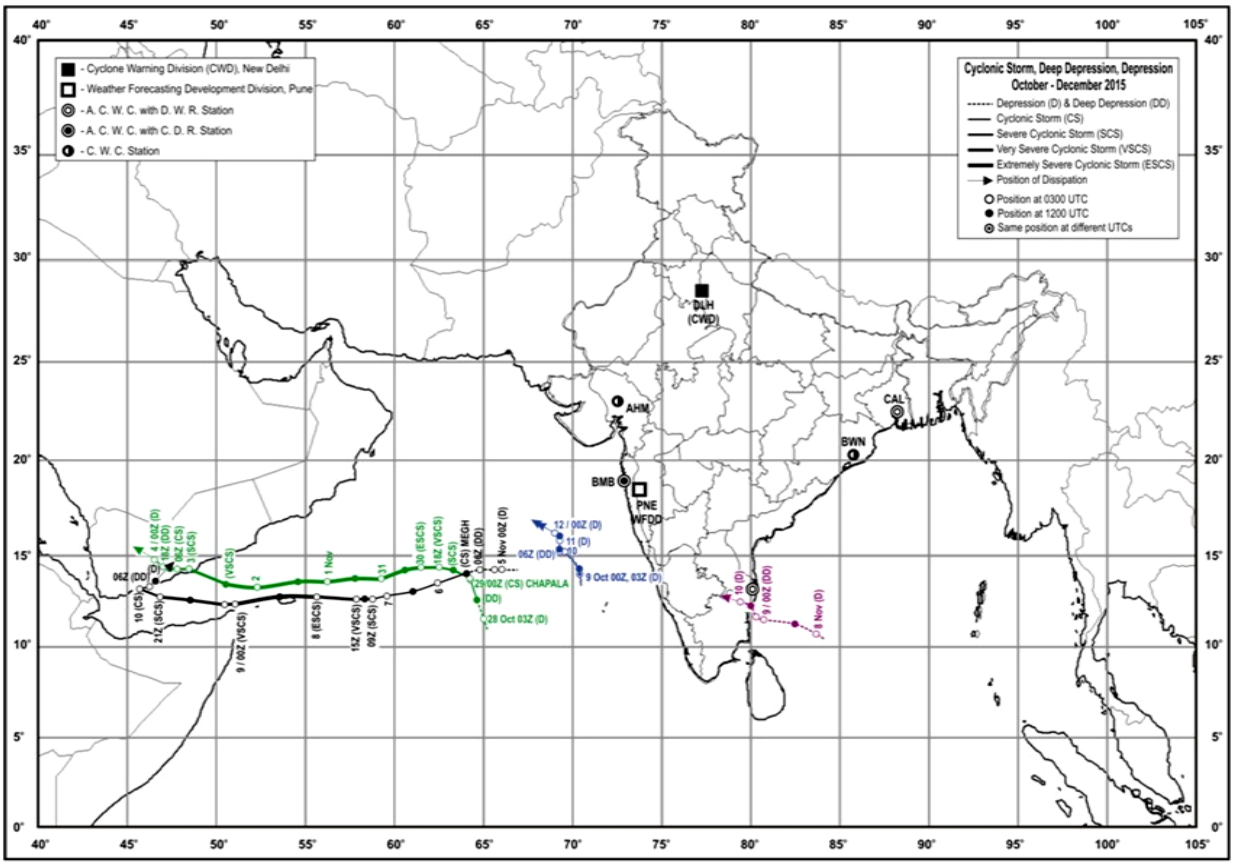

Fig. 2. Cyclones and depressions during post-monsoon season 2015

During the season, rainfall activity was substantially above normal over the northeast monsoon's core region, *viz*., south peninsula whereas over the country as a whole it was *deficient*. Except for the sub-divisions Andaman & Nicobar Islands, Jammu & Kashmir, Konkan & Goa, Coastal Andhra Pradesh, Tamil Nadu, south interior Karnataka, Kerala and Lakshadweep Islands which received *excess/normal* rainfall, the remaining sub-divisions received *deficient/scanty* rainfall.

3. Monthly features

3.1. *October*

3.1.1. *Withdrawal of southwest monsoon*

The southwest monsoon (SWM) withdrew from the entire country on 19th October, 4 days later than the normal date of 15th October. An account on the withdrawal of southwest Monsoon 2015 is provided in the seasonal summary of Southwest Monsoon published in the last issue of Mausam.

3.1.2. *Commencement of northeast monsoon rains*

The active cyclogenesis of Indian Sea kept the Inter Tropical Convergence Zone (ITCZ) disorganized and north of its normal position. With the formation of a low pressure area over southwest Bay of Bengal on 25th, rainfall activity over Northeast Monsoon (NEM) core region increased and thus led to the commencement of NEM on 28th October, 2015, 8 days later than the normal date of 20th October.

3.1.3. *Storms and depressions*

Two intense low pressure systems ESCS 'Chapala' (28th October - 4th November) and DD (9 - 12 October) formed over Arabian Sea during the month. This storm which almost took a westward course, did not affect the Indian region. The DD formed over the Arabian Sea led to moisture incursion along the west coast and, thus stalled the further withdrawal of SWM. The system dissipated *in situ* due to dry air intrusion from the northwest and western pats of Arabian Sea.

TABLE 1

Sub-divisionwise rainfall (mm) for each month and season as a whole (October-December, 2015)

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	252.1	296.7	-15%	236.3	253.7	-7%	129.9	145.5	-11%	618.3	695.9	-11%
2.	Arunachal Pradesh	56.1	183.0	-69%	32.5	45.8	-29%	40.3	38.4	5%	128.8	267.2	-52%
3.	Assam & Meghalaya	63.9	154.8	-59%	13.1	28.4	-54%	15.1	11.8	28%	92.2	195.0	-53%
4.	Naga., Mani., Mizo. and Tri.	110.9	179.8	-38%	4.4	50.7	-91%	12.2	12.5	-3%	127.5	243.0	-48%
5.	Sub-Himalayan West Bengal & Sikkim	51.1	154.2	-67%	23.8	20.3	17%	9.0	10.8	-17%	83.9	185.3	-55%
6.	Gangetic West Bengal	30.9	129.3	-76%	2.1	23.3	-91%	5.7	7.5	-24%	38.6	160.1	-76%
7.	Orissa	24.7	111.6	-78%	6.2	27.7	-78%	15.6	4.8	226%	46.5	144.1	-68%
8.	Jharkhand	22.3	75.2	-70%	0.2	9.9	-98%	3.8	6.5	-42%	26.3	91.6	-71%
9.	Bihar	8.9	64.8	-86%	0.0	6.9	-99%	0.0	5.8	-100%	9.0	77.5	-88%
10.	East Uttar Pradesh	11.9	49.2	-76%	0.5	4.5	-90%	5.0	6.7	-26%	17.3	60.4	-71%
11.	West Uttar Pradesh	6.7	42.1	-84%	2.1	4.7	-56%	2.8	7.6	-63%	11.6	54.4	-79%
12.	Uttarakhand	16.6	58.6	-72%	2.3	9.7	-76%	7.2	21.3	-66%	26.2	89.6	-71%
13.	Haryana, Chandigarh & Delhi	3.7	17.6	-79%	2.3	4.9	-53%	0.2	6.9	-97%	6.2	29.4	-79%
14.	Punjab	9.2	22.0	-58%	0.8	5.7	-87%	0.7	13.3	-95%	10.6	41.0	-74%
15.	Himachal Pradesh	17.3	42.5	-59%	13.1	20.3	-35%	25.9	45.4	-43%	56.3	108.2	-48%
16.	Jammu & Kashmir	87.2	38.9	124%	37.9	33.0	15%	39.3	59.9	-34%	164.4	131.8	25%
17.	West Rajasthan	1.3	5.4	-76%	0.1	2.5	-98%	0.0	1.6	-100%	1.4	9.5	-86%
18.	East Rajasthan	4.7	16.9	-72%	1.1	7.4	-86%	0.9	3.3	-74%	6.6	27.6	-76%
19.	West Madhya Pradesh	10.9	34.4	-68%	0.3	11.0	-97%	1.0	7.7	-86%	12.3	53.1	-77%
20.	East Madhya Pradesh	38.3	37.5	2%	1.2	9.9	-88%	0.9	10.4	-91%	40.4	57.8	-30%
21.	Gujarat region	2.2	23.7	-91%	0.4	9.5	-96%	0.0	1.7	-99%	2.6	34.9	-93%
22.	Saurashtra & Kutch	4.4	17.9	-76%	0.3	10.3	-97%	0.0	0.8	-100%	4.7	29.0	-84%
23.	Konkan & Goa	98.5	121.0	-19%	28.0	22.3	26%	0.0	5.3	-100%	126.6	148.6	-15%
24.	Madhya Maharashtra	48.6	79.0	-38%	16.4	22.7	-28%	0.1	6.1	-99%	65.0	107.8	-40%
25.	Marathawada	19.5	72.3	-73%	4.8	21.2	-77%	0.0	8.1	-100%	24.3	101.6	-76%
26.	Vidarbha	7.0	59.6	-88%	0.0	13.2	-99%	0.2	9.0	-98%	7.3	81.8	-91%
27.	Chattisgarh	18.0	62.3	-71%	0.6	8.8	-93%	1.5	5.8	-73%	20.1	76.9	-74%
28.	Coastal Andhra Pradesh	61.8	193.2	-68%	192.0	106.6	80%	23.7	27.6	-14%	277.5	327.4	-15%
29.	Telangana	22.1	92.2	-76%	2.3	21.6	-89%	1.4	5.5	-74%	25.8	119.3	-78%
30.	Rayalaseema	94.1	129.4	-27%	264.1	66.1	299%	31.6	23.7	33%	389.8	219.2	78%
31.	Tamil Nadu	132.6	180.2	-26%	379.8	170.0	123%	152.8	88.0	74%	665.3	438.2	52%
32.	Coastal Karnataka	164.1	189.5	-13%	102.1	59.6	71%	7.3	13.7	-47%	273.5	262.8	4%
33.	North interior Karnataka	61.2	112.0	-45%	5.6	27.3	-79%	1.8	6.0	-71%	68.5	145.3	-53%
34.	South interior Karnataka	105.1	147.7	-29%	136.4	49.2	177%	4.4	12.7	-66%	245.9	209.6	17%
35.	Kerala	309.9	292.3	6%	223.2	150.9	48%	79.5	37.5	112%	612.6	480.7	27%
36.	Lakshadweep	165.4	157.1	5%	230.7	117.7	96%	159.0	58.8	170%	555.1	333.6	66%

TABLE 2

Details of the weather systems during October 2015

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*						
1.	Extremely Severe Cyclonic storm (Chapala)	28 Oct - 4 Nov (0000 UTC)	Southeast Arabian Sea and adjoining areas of southwest & central Arabian Sea centred near Lat. 11.5° N/ Long. 65.0° E	West	Near Lat.14.8° N/ Long. 46.5° E, 50 kms northeast of Ataq (Yemen)	Became well marked low pressure area over the Yemen on 4 morning. Details are given in the article on Storms & Depressions over the north Indian Ocean-2015
(**B**) *Deep depression/Depression*						
1.	Deep Depression	9 - 12	East central Arabian Sea centred near Lat. 14.0° N/ Long. 70.3° E	North-northwest	Near Lat.16.1° N/ Long. 69.0° E, 520 kms west-northwest of Goa	Details are given in the article on Storms & Depressions over the north Indian Ocean - 2015
(**C**) *Well low pressure area/low pressure area*						
1.	Well marked low pressure area	7 - 9	North Bay of Bengal and neighbourhood	North	Myanmar and adjoining areas of Mizoram and Tripura	It formed under the influence of cyclonic circulation extending upto mid tropospheric levels over east central Bay of Bengal and neighbourhood. It moved away eastwards and became un-important on 10
2.	Low pressure area	25 - 28	Southwest Bay of Bengal off Sri Lanka coast	East	Southwest Bay of Bengal and adjoining Sri Lanka	It formed under the influence of a cyclonic circulation over Sri Lanka and neighbourhood. The low pressure area became less marked on 29
(**D**) *Western disturbances /eastward moving systems*						
(*i*) *Upper air cyclonic circulation*						
1.	Upto Mid tropospheric levels	3 - 4	North Afghanistan and neighbourhood	Northeast	North Pakistan and neighbourhood	Moved away northeastwards on 5
2.	Do	10 - 13	Northeast Afghanistan and adjoining Pakistan	Do	Eastern parts of Jammu & Kashmir	Moved away east-northeastwards on 14
3.	Do	14 - 15	North Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away east-northeastwards on 16
4.	Do	24 Oct - 2 Nov	Do	East-south	South Madhya Pradesh and neighbourhood	It initially lay as a trough in mid & upper tropospheric westerlies extended along Long. 55° E to the north of Lat. 25° N (axis at 5.8 kms a.s.l.) on 23. A trough aloft during 26 - 29 October. The Cyclonic circulation became less marked on 3 November
(*ii*) *As a trough*						
1.	Upto Mid tropospheric levels	5 - 7	Along Long.62° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Northeast	Along Long.72° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	The feeble WD moved away northeastwards on 8
2.	Mid & upper tropospheric levels	15 - 20	Along Long.50° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Do	Moved away northeastwards on 21. It lay as a cyclonic circulation extending upto mid tropospheric levels with a trough aloft on 18 & 19

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3.	Mid & upper tropospheric levels	21 - 23	Along Long. 55° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Northeast	Along Long.70° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away northeastwards on 24
(*iii*)	*As an Induced cyclonic circulation*					
1.	Upto lower tropospheric levels	24 - 26	Central Pakistan and neighbourhood	East	North Rajasthan and neighbourhood	Became less marked on 27
(**E**)	*Other upper air cyclonic circulations*					
1.	Upto lower tropospheric levels	12 - 16	South Tamil Nadu and neighbourhood	West	Maldives area and neighbourhood	Moved away westwards on 17
2.	Do	15 - 18	South Andaman Sea and neighbourhood	Do	Southwest and adjoining southeast Bay of Bengal	Became less marked on 19
3.	At Lower levels	16 - 20	Comorin area and adjoining south Tamil Nadu	Do	Lakshadweep area and neighbourhood	Moved away westwards on 21
4.	Upto Lower tropospheric levels	17 - 20	Tripura and neighbourhood	Stationary	*In situ*	Became un-important on 21
5.	At Lower levels	21 - 22	Comorin area and neighbourhood	West	Lakshadweep-Maldives area	It merged with the trough at mean sea level over southeast Arabian Sea and neighbourhood [I (1)] on 23
6.	Upto mid tropospheric levels	22 - 24	Andaman Sea and neighbourhood	Do	South Andaman Sea and neighbourhood	Became less marked on 25
7.	Upto Lower tropospheric levels	27 - 29	Northwest Madhya Pradesh and neighbourhood	South	West Madhya Pradesh and neighbourhood	Became less marked on 30
(**F**)	*Trough in easterlies*					
1.	Between 3.1 & 4.5 kms a.s.l.	16 - 17	Southwest Bay of Bengal to west central Bay of Bengal off north Andhra Pradesh coast	Stationary	*In situ*	Became less marked on 18
2.	Upto mid tropospheric levels	30 Oct - 1 Nov	From southwest Bay of Bengal to west central Bay of Bengal	West	Lakshadweep area to Nagaland-Manipur-Mizoram-Tripura across Kerala	Became less marked on 2 November
(**G**)	*Other troughs/wind discontinuity*					
1.	Between 3.1 & 4.5 kms a.s.l.	10 - 15	Eastern parts of Bihar to north coastal Andhra Pradesh across Jharkhand and Odisha	Oscillatory	Gangetic West Bengal to west central Bay of Bengal off Andhra Pradesh coast	It lay as a cyclonic circulation extending upto mid tropospheric levels during 12-14. The trough became less marked on 16.
2.	Upto Mid tropospheric levels	31 Oct	East Bihar to Telangana	Stationary	*In situ*	Became less marked on 1 November
(**H**)	*East-west shear zone*					
1.	Mid tropospheric levels	1 - 6	Along Lat. 11° N	Oscillatory	Along Lat. 14° N	Became less marked on 7

TABLE 3

Details of the weather systems during November 2015

S. No.	System	Duration	Place of initial Location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**) *Cyclonic storm*						
1.	Extremely Severe Cyclonic storm (Megh)	5 - 10(1200 UTC)	East central Arabian Sea centred near Lat. 14.1° N/ Long. 66.0° E	West	Coastal Yemen centred near Lat. 13.6° N/ Long. 46.5° E	Became well marked low pressure area over Yemen and neighbourhood on 10 evening. Details are given in the article on Storms & Depressions over the north Indian Ocean 2016
(**B**) *Deep depression/depression*						
1.	Deep Depression	8 - 10	Southwest Bay of Bengal centred near Lat. 10.7° N/ Long. 83.7° E	West-northwest-west	North Tamil Nadu near Lat. 12.4° N/ Long. 79.3° E	Details are given in the article on Storms & Depressions over the north Indian Ocean 2016
(**C**) *Well marked low/low pressure area*						
1.	Low pressure area	12 - 13	Southeast Arabian Sea and adjoining Lakshadweep areas	North	Central and adjoining south Arabian Sea	It formed under the influence of a cyclonic circulation over Kerala and neighbourhood. It became less marked on 14. However, the associated cyclonic circulation persisted on 14 and became un-important on 14 evening
2.	Well marked low pressure area	13 - 18	Southeast Bay of Bengal and neighbourhood	Northwest	West central Bay of Bengal off Andhra Pradesh coast	It formed under the influence of a trough of low at mean sea level and cyclonic circulation aloft over southeast Bay of Bengal. It became less marked on 18 evening. However, the associated cyclonic circulation extending upto mid tropospheric levels persisted upto 18 and became less marked on 19
3.	Low pressure area	19 - 23	Lakshadweep area and neighbourhood	West	East central Arabian Sea and neighbourhood	It formed under the influence of a cyclonic circulation over Tamil Nadu and neighbourhood. It became less marked on 24. Associated cyclonic circulation extended upto mid tropospheric levels
(**D**) *Western disturbances /eastward moving systems*						
(*i*) *Upper air cyclonic circulation*						
1.	Upto mid tropospheric levels	1 - 5	Afghanistan and neighbourhood	East northeast	Jammu & Kashmir and adjoining north Pakistan	Moved away east northeastwards on 6. A trough aloft with its axis at 5.8 kms a.s.l. during 4 - 6 and moved away northeastwards on 7
2.	Do	7 - 10	North Pakistan and neighbourhood	Do	Jammu & Kashmir and neighbourhood	Moved away east northeastwards on 11
3.	Do	14 - 16	Eastern parts of Afghanistan and adjoining Pakistan	Do	North Pakistan and neighbourhood	Moved away east northeastwards on 16 evening
4.	Do	16 - 17	Afghanistan	Do	Afghanistan and adjoining Pakistan	Moved away east northeastwards on 18
5.	Do	22 - 27	Afghanistan and neighbourhood	Do	Eastern parts of Jammu & Kashmir and neighbourhood	Initially it lay as a trough in mid & upper tropospheric westerlies on 20 & 21. It moved away east-northeastwards on 28
6.	Do	28 Nov - 2 Dec	Eastern parts of Iran	Do	Jammu & Kashmir and neighbourhood	Moved away east northeastwards on 3 December

TABLE 3 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(*ii*) *Trough in westerlies*						
1.	Mid & upper tropospheric levels	2 - 3	Along Long. 50° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	East	Along Long. 53° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	It merged with the WD [(III (a) 1] on 4
2.	Do	11 - 14	Along Long.48° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 72° E to the north of Lat. 32° N (axis at 5.8 kms a.s.l.)	Moved away east northeastwards on 14 evening. A trough aloft with its axis at 5.8 kms a.s.l. on 15 & 16
3.	Do	22 - 24	Along Long. 64° E to the north of Lat. 22° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 65° E to the north of Lat. 20° N (axis at 9.6 kms a.s.l.)	Became less marked on 25
4.	Do	28 Nov - 4 Dec	Along Long.56° E to the north of Lat. 33° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 92° E to the north of Lat. 20° N (axis at 5.8 kms a.s.l.)	Moved away eastwards on 5 December
(*iii*) *As an Induced cyclonic circulation*						
1.	Upto lower tropospheric levels	4 - 6	Central Pakistan and neighbourhood	East	Haryana and neighbourhood	Became less marked on 7
2.	Do	23	West Rajasthan and adjoining Pakistan	Stationary	*In situ*	Became less marked on 24
3.	Upto mid tropospheric levels	26 - 29	Central Pakistan and adjoining west Rajasthan	East	Southeast Uttar Pradesh and adjoining north Madhya Pradesh	Became less marked on 30
(**E**) *Other upper air cyclonic circulations*						
1.	Upto lower tropospheric levels	1 - 4	North coastal Andhra Pradesh and neighbourhood	South	West central Bay of Bengal off Andhra Pradesh coast	Became less marked on 5. It lay embedded in the trough extended from Lakshadweep area to Nagaland-Manipur-Mizoram-Tripura on 1
2.	Do	2	Tripura and neighbourhood	Stationary	*In situ*	Became less marked on 3
3.	Do	5 - 6	Lakshadweep area and neighbourhood	Do	Do	Became less marked on 7
4.	Upto mid tropospheric levels	11 - 14	East Bangla Desh and neighbourhood	East	Tripura and neighbourhood	Became less marked on 15
5.	Upto lower tropospheric levels	14	Lakshadweep area and neighbourhood	Stationary	*In situ*	Became less marked on 15
6.	Do	18 - 19	Meghalaya and neighbourhood	East	Meghalaya and adjoining Nagaland-Manipur-Mizoram-Tripura	Became less marked on 20
7.	Do	17	Southeast Arabian Sea off south Karnataka and Kerala	Stationary	*In situ*	Became less marked on 18
8.	Upto mid tropospheric levels	24 - 26	South Andaman Sea and neighbourhood	West	Southeast Bay of Bengal and neighbourhood	It lay aloft the trough of low over southeast Bay of Bengal and neighbourhood on 27

TABLE 3 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
9.	Upto lower tropospheric levels	30 Nov - 1 Dec	Central Pakistan and neighbourhood	East	Punjab and neighbourhood	Became less marked on 2 December. It lay as an induced cyclonic circulation on 30 November
10.	Do	28 Nov - 2 Dec	Vidarbha and adjoining south Madhya Pradesh	Do	Southeast Rajasthan and adjoining west Madhya Pradesh	It lay as a trough extending upto 1.5 kms a.s.l. from east Uttar Pradesh to southwest Madhya Pradesh on 3 and became less marked on 4 Dec.
(**F**)	*Trough in easterlies*					
1.	At mean Sea level	20 –– 27	From low pressure area over Lakshadweep area and neighbourhood to northeast Arabian Sea	West	Southwest Arabian Sea and neighbourhood	Moved away westwards on 28.
2.	Do	21 - 23	Southwest Bay of Bengal off Sri-Lanka coast	Do	Maldives and adjoining Lakshadweep	It moved westwards and merged with the above trough from southeast Arabian Sea to south Gujarat Region on 24. A cyclonic circulation extending upto 2.1 kms a.s.l. lay aloft on 22
3.	Do	23 - 24	Southwest Bay of Bengal and adjoining Equatorial Indian ocean	Do	Southwest Bay of Bengal and adjoining Sri Lanka	Became un-important on 25. A cyclonic circulation extending upto 1.5 kms a.s.l. lay aloft on 24
4.	Do	27 - 29	Southeast Bay of Bengal and neighbourhood	Do	Southwest Bay of Bengal and adjoining Sri Lanka	It merged with the trough over southwest Bay of Bengal and neighbourhood and the cyclonic circulation aloft became less marked on 30
(**G**)	*North-south trough*					
1.	Upto mid tropospheric levels	17	Along Long.83° E to the north of Lat. 23° N (axis at 5.8 kms a.s.l.)	Stationary	*In situ*	Became un-important on 18
2.	Do	17	East Bihar to Bangla Desh across Gangetic West Bengal	Do	Do	Became un-important on 18
3.	Do	27	South Haryana to southwest Madhya Pradesh	Do	Do	Became less marked on 28

3.1.4. *Other synoptic features and associated weather*

Table 2 gives a summary of the synoptic features for the month of October 2015. The sub-division wise percentage departures of rainfall from normal and significant amounts of rainfall are given in Tables 1 & 5 respectively.

A well marked low pressure area (7^{th} - 9^{th} October) formed over north Bay of Bengal. Its northward movement caused active monsoon conditions over northeastern sub-divisions. The presence of a couple of cyclonic circulations over the Arabian Sea and a shear zone over south peninsular India during the first week caused *excess* rainfall over Konkan & Goa, Madhya Maharashtra, Rayalaseema, Tamil Nadu, Karnataka, Kerala and Lakshadweep Islands. The second half of October witnessed a change in atmospheric circulation pattern with southward retreat of ITCZ and reversal of lower tropospheric winds from southwesterly to northeasterly. Active Western Disturbances (WD) during the third week led to *excess/normal* rainfall over Uttarakhand, Punjab, Himachal Pradesh and Jammu & Kashmir.

SWM was *vigorous* on 1 day in coastal and north interior Karnataka and *active* on 1 to 3 days in Arunachal Pradesh, Assam & Meghalaya, Nagaland-Manipur-Mizoram-Tripura, Sub-Himalayan West Bengal & Sikkim, Konkan & Goa, Madhya Maharashtra, Rayalaseema, Tamil Nadu, coastal & south interior Karnataka and Kerala.

The NEM was *active* for 1 day in Kerala.

TABLE 4

Details of the weather systems during December 2015

S. No.	System	Duration	Place of initial Location	Direction of movement	Place of final location	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**A**) *Well marked low/low pressure area*						
1.	Low pressure area	3 - 6	Southwest Bay of Bengal and adjoining Sri Lanka off Tamil Nadu coast	West	Comorin area and neighbourhood	Initially it lay as a trough of low at mean Sea level with a cyclonic circulation aloft during 29 November - 2 December. After organizing as a low pressure area, it again lay as a trough of low with cyclonic circulation aloft during 7-13 and became less marked on14
(**B**) *Western disturbances/eastward moving systems*						
(*i*) *Upper air cyclonic circulation*						
1.	Mid tropospheric levels	3 - 5	North Afghanistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	The feeble system moved away east-northeastwards on 6
2.	Do	6 - 11	Western parts of Iran and neighbourhood	Do	North Pakistan and neighbourhood	Moved away east northeastwards on 12. However, the trough aloft with its axis at 5.8 kms a.s.l. persisted upto 12 and became less marked on 13
3.	Do	15 - 17	Do	Do	North Pakistan and adjoining Jammu & Kashmir	The WD with the trough aloft moved away east northeastwards on 18
4.	Do	20	North Pakistan and adjoining Jammu & Kashmir	Stationary	*In situ*	Moved away with the trough aloft on 21
5.	Do	25 - 28	Afghanistan and neighbourhood	Northeast	Jammu & Kashmir and neighbourhood	Moved away east-northeastwards on 29
6.	Do	31 Dec 2015 - 2 Jan 2016	Do	Do	Eastern parts of Jammu & Kashmir	Moved away northeastwards on 2 January, 2016
(*ii*) *As a trough*						
1.	Mid tropospheric levels	13 - 14	Along Long. 68° E to the north of Lat. 35° N (axis at 5.8 kms a.s.l.)	Northeast	Along Long. 71° E to the north of Lat. 32° N (axis at 5.8 kms a.s.l.)	The feeble WD moved away northeastwards on 15
2.	Do	18 - 19	Along Long. 65° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 76° E to the north of Lat. 32° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards on 20
3.	Do	21 - 24	Along Long. 62° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 78° E to the north of Lat. 32° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards on 25
4.	Do	29 - 30	Along Long. 62° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Do	Along Long. 72° E to the north of Lat. 30° N (axis at 5.8 kms a.s.l.)	Moved away east-northeastwards on 31
(*iii*) *As an induced cyclonic circulation*						
1.	Upto lower tropospheric levels	9 - 11	Central Pakistan and adjoining west Rajasthan	East	Haryana and neighbourhood	Became less marked on 12
2.	Do	17	North Rajasthan and adjoining areas of Punjab and Haryana	Stationary	*In situ*	Became less marked on 18
3.	Between 1.5 & 3.1 kms a.s.l.	22	Punjab and neighbourhood	Do	Do	Became less marked on 23

TABLE 4 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(**C**)	*Other upper air cyclonic circulations*					
1.	Between lower & mid tropospheric levels	2 - 3	Interior Tamil Nadu and neighbourhood	West	Kerala and adjoining Lakshadweep area	Became less marked on 4
2.	Upto lower tropospheric levels	3	Bangla Desh and neighbourhood	Stationary	*In situ*	Became less marked on 4
3.	Upto mid tropospheric levels	7 - 10	Assam and neighbourhood	East	Nagaland-Manipur-Mizoram-Tripura and neighbourhood	Became less marked on 11
4.	Do	11 - 19	Comorin area and neighbourhood	West	Southeast Arabian Sea and neighbourhood	Became un-important on 20
5.	Upto lower tropospheric levels	11 - 13	Bangla Desh and neighbourhood	East	Assam & Meghalaya and neighbourhood	Became less marked on 14
6.	Upto lower tropospheric levels	14	Comorin area and adjoining Sri Lanka	Stationary	*In situ*	Became less marked on 15
7.	At lower levels	14	Interior Karnataka and adjoining Marathwada	Do	Do	Became less marked on 15
8.	Upto lower tropospheric levels	15 - 17	Sub-Himalayan West Bengal & neighbourhood	East	Bangla Desh and neighbourhood	Became less marked on 18
9.	Upto mid tropospheric levels	16	Comorin area and adjoining Sri Lanka	Stationary	*In situ*	Became less marked on 17
10.	Upto lower tropospheric levels	18 - 21	Southwest Bay of Bengal off south Sri Lanka coast	West	Southeast Arabian Sea and adjoining Lakshadweep area	Became un-important on 22
11.	Upto mid tropospheric levels	20 Dec 2015 - 7 Jan 2016	Meghalaya and neighbourhood	East	Tripura and neighbourhood	Became less marked on 8 January, 2016
12.	Upto lower tropospheric levels	20 - 25	Gujarat and adjoining southwest Madhya Pradesh	Do	South Chhattisgarh and neighbourhood	Became less marked on 26
13.	Do	21- 22	Sri Lanka and neighbourhood	West	Lakshadweep area and neighbourhood	Became less marked on 23
14.	At lower levels	29	Maldives area and neighbourhood	Stationary	*In situ*	Became less marked on 30
15.	Do	30	Comorin and neighbourhood	Do	Do	Became less marked on 31
(**D**)	*Trough in easterlies*					
1.	At mean sea level	6 - 9	Southwest Bay of Bengal off Tamil Nadu coast	Oscillatory	From Comorin area to southwest Bay of Bengal off north Tamil Nadu coast	Became less marked on 10
(**E**)	*North-south trough*					
1.	At lower levels	12 - 14	Bihar to Chhattisgarh across Jharkhand	Oscillatory	Bihar to south Chhattisgarh across Jharkhand	It lay as a cyclonic circulation over Odisha and neighbourhood extending upto 0.9 km a.s.l. on 15 and became less marked on 16
2.	Upto lower tropospheric levels	18	From east Uttar Pradesh to eastern parts of Vidarbha across east Madhya Pradesh	Stationary	*In situ*	Became less marked on 19
3.	Upto mid tropospheric levels	25	From east Bihar to south Odisha	Do	Do	Became less marked on 26

3.1.5. *Temperature*

The overall subdued rainfall activity during the month kept the maximum and minimum temperatures *above normal* over most parts of the country. The maximum temperatures were *above normal to appreciably above normal* for many days over most parts of the country except during the last few days of the month when some sub-divisions of east, north and central India exhibited *below normal* temperatures.

The minimum temperatures were *near normal* for most of the days except during mid days when the temperatures were *above normal* and *below normal* for few days over parts of north India during the initial and later part of the month.

No *heat wave/cold wave* condition occurred during the month.

The month's highest maximum temperature was 41.4 °C recorded at Churu (west Rajasthan) on 4th October 2015 and the lowest minimum temperature was 09.5 °C recorded at Damoh (east Madhya Pradesh) on 30th October, 2015 in the plains of the country.

3.1.6. *Disastrous weather events and associated damage*

As per press reports, rain related incidents claimed 2 lives each in Maharashtra, Andhra Pradesh and Tamil Nadu. Flash flood related incidents claimed 1 life in Karnataka. Lightning claimed 41 lives in Maharashtra, 12 in Karnataka, 7 in Tamil Nadu, 6 in Telangana, 3 in Uttar Pradesh and 1 in Andhra Pradesh.

3.2. *November*

3.2.1. *Storms and Depressions*

Two intense low pressure systems formed during the month of which, one formed as ESCS 'Megh' (5th - 10th) over the Arabian Sea and the other as Deep Depression (8th - 10th) over the Bay of Bengal. The Storm moving in westward direction increased the rainfall activity along the west coast. The formation of a DD over the southwest Bay of Bengal gave *scattered* to *widespread* rainfall over south Peninsula region, with *vigorous* NEM activity, particularly over Rayalaseema, Tamil Nadu and south interior Karnataka.

3.2.2. *Other synoptic features and associated weather*

A summary of the synoptic systems for the month of November 2015 is given in Table 3. The sub-division wise percentage departure of rainfall from normal and the significant amounts of rainfall during the month are given in Tables 1 & 5 respectively.

The formation of intense pressure systems and an easterly wave trough kept the rainfall activity confined to NEM regime and along the west coast during the first two weeks. Apart from these systems, three low pressure areas also formed during the month. Of these, two formed over the south Bay of Bengal (during 13-18 and 19-24 November) and one low pressure area formed over the Arabian sea (during 12-14). The two low pressure areas over the Bay of Bengal caused *active to vigorous* NEM over the east coast of peninsular India.

Rainfall activity outside the NEM core region was mainly due to active WD and other perturbations in mid latitude westerlies during the first half of the month. In the second half, the confluence of easterly and westerly wind regimes extended the rainfall belt upto northern parts of peninsular India during the third week. The formation of a trough of low at mean sea level over Southwest Bay of Bengal caused *active to vigorous* NEM conditions over Tamil Nadu and the formation of a cyclonic circulation over northern parts of central India caused *isolated to scattered* rainfall over central and northern plains towards the end of the month.

The northeast monsoon was *vigorous* on 8 days over Rayalaseema, 5 days over south interior Karnataka, 4 days over Tamil Nadu, 3 days over Coastal Karnataka, 2 days over Coastal Andhra Pradesh and for one day over Kerala. It was *active* for 9 days over Tamil Nadu, 5 days over Kerala, 4 days over Rayalaseema and one day over south interior Karnataka.

3.2.3. *Temperature*

No *cold wave* condition occurred during the month.

Maximum temperature were *above normal* over most parts of the country outside parts of northern/northwestern and parts of southeast peninsular India where it were *below normal*. Minimum temperatures were *above normal* almost throughout the country.

The month's lowest minimum temperature over the plains of the country was 7.2 °C, recorded at Kanpur (east Uttar Pradesh) and Damoh (east Madhya Pradesh) on 19th November, 2015.

3.2.4. *Disastrous weather events and associated damage*

As per media reports, rain related incidents/ floods claimed 195 lives in Tamil Nadu and 23 in Andhra Pradesh.

TABLE 5

Some representative amounts of rainfall in cm for October, November and December 2015 (7 cm and above)

Date	Some representative amounts of rainfall in cm for October, November and December 2015 (7 cm and above)
1 Oct	Chalakudi 11, Sringeri HMS, Amalapuram, Kota, Bukkapatna, Keeranur and Kamudhi 8 each; Piravam, Peermade To, Siddapura, Kalasa and Agumbe 7 each
2 Oct	Palakoderu 13, Valpoi, Dharwad PTO and Maruteru AP 11 each, Haunsbhavi and Kollegal 9 each, Dodamarg 8, Khanapur, Krishnagiri, Gargoti / Bhudargad, Pochampalli, Mapusa, Holalkere and Lanja 7 each
3 Oct	Hungund and Chengmari / Diana 12 each, Tikkota 11, Ananthrajpeta (Arg), Kelambakkam, Ponneri, Kodur, Khed, Tavaragera and Nagari 9 each, CIAL Kochi and Peermade To 8 each, Chiplun, Satyabama Uty ARG, Nagarkata, Venkatagiri, Pallipattu, Amalapuram, Gurramkonda, Srikalahasti, Ennore AWS, Thottambedu, Bhalukpong and Tirupathi AP 7 each
4 Oct	Pottangi and Harnai 9 each, Thimmajipeta and Palakonda 8 each, Kurupam, Mancompu, Pen, Nagar Kurnool, Tala, Mahabaleshwar, PanvelAgri, Kothagudem and Bhiwandi 7 each
5 Oct	Malur 14, Kunigal and Madhugiri 13 each, Tumakuru and Kerur 12 each, Uthiramerur and Hesaraghatta 10 each, Vijayapura PTO, Bijapur, Holalkere and Haveri Apmc 9 each, Ramdurga, Bilgi (Irri.), Piravam and Kvk Kattukuppam ARG 8 each, B Bagewadi, Arani, Alangudi, Arantangi, Ranebennur (Hos), Hosadurga, Soundatti (S.F), Agali, Vandavasi, Srirangapatna, Rolla, Haliyal, Parasurampura and Kottayam 7 each
6 Oct	Bantwal 13, Mangaluru 11, Mani 10, Sankaridurg and Valpoi 9 each, Arundhutinagar, Kudulu, Polur, Mudubidre, Pattambi, Sabroom, Alangayam and Nilambur 8 each, Mangalooru AP, Mangaluru AP, Tozhudur, Panambur, Kollur, Kannur, Thrithala, Taliparamba and Gorantla 7 each
7 Oct	Vadakara 8, Alangudi, Lengpui, Chengalpattu, Srinivasapura, Thondebhavi and Gharmura 7 each
8 Oct	Thiruvalangadu 12, Gingee and Quilandi 10 each, Kadiri AP 9, Dillighat and Nagari 8 each, Palamaner, Itanagar, Kadiri, Arakonam, Joida, Aizawal and Deomali 7 each
9 Oct	Lower Kothaiyar ARG 14, Pechiparai 13, Thuckalay 12, Mylaudy, Kannur, Bhoothapandy, Taliparamba and Neyyattinkara 11 each, Vadakara 10, Nedumangad, Piravam, Kuzhithurai, Peermade To and Kanjirappally 9 each, Kumarakom, Chengannur and Nagercoil 8 each, Kozhikode, Aryankavu and Varkala 7 each
10 Oct	Annapurnaghat 8, Roing 7
11 Oct	Alipurduar CWC 13, Thiruvalangadu and Mandapalle 9 each, Panchapatti and Thalavadi 8 each, Grand Anaicut, Pulivendla and Arogyavaram 7 each
12 Oct	Thanjavur and Venbavur 14 each, Chatrapatti (Odanchatra) and Sholavandan 13 each, Thuraiyur 12, Bellatti and Mangalapuram 11 each, Yercaud and Viralimalai 10 each, Gobichettipalayam, Vazhapadi, Upper Anaicut, Halebeedu, Tiruppur and Bagaha 9 each, Sendurai 8, Maharajganj, Hosur, Salem, Peraiyur, Krishnarajasagara, Palacode, Papanasam, Anekal, Tirukoilur, Thirukoilur ARG and Katerniaghat 7 each
13 Oct	Aryankavu, Rajapalayam and Sankarankoil 7 each, Ayikudi, Kurudamannil, Haldwani, Tondi and Tumakuru 5 each, Neyyattinkara, Thiruvananthapuram AP, Mancompu, Kuzhithurai, R. S. Mangalam, Punalur, Mavelikara and Matheran 4 each, Kovilpatti, Watrap, Cuttack, Thenkasi, Harehalli Nicra, Shencottah, Sabroom, Pechiparai, Nancowry, Alappuzha, Gersoppa, Kakatpur, Kotdwara, Kamudhi ARG and Hathwa 3 each, Hardwar, Byadgi, Alathur, Krishnanagar, Sanguem, Ambasamudram, Barur, Manimutharu, Krishnanagar, Pattamundai, Port Blair, Haripad, Srivilliputhur, Kalasa, Nilambur, Agartala AP, Keshod, Bhubaneshwar AP, Kalugumalai, Sivagiri, Ghatagaon, Surgana, Tiruvadanai, Hagaribommanahalli, Tribeni / Balmiki, Kothagiri, Tirupuvanam, Dhari and Thiruvananthapuram 2 each, Vikramgad, G Bazar, Illayangudi, Chengannur, Ramanathapuram, Sudhagad Pali, Sattur, Udaipur, Gonda CWC, Amarpur, Khambhalia, Gargoti / Bhudargad, Pochampalli, Mahabaleshwar*, Uthagamandalam AWS, Vilathikulam, Sangameshwar Devrukh, Hogenekal, Kankavli, Srivaikuntam, Varkala, Dehra Dun, Girnadam - FMO, Thodupuzha, Harichandanpur ARG, Kankadahad ARG, Bhore, Namakkal, Lower Kothaiyar ARG, Nedumangad, Kangra AP, Gaganbawada, Peravurani, Lanja, Banki ARG, Raghunathpur ARG, Talala, Ilkal, Napoklu and Dornipadu 1 each
14 Oct	Chalakudi and Sankarankoil 7 each
15 Oct	Bihubar, Kochi AP and Tekkali 9 each, Moranhat and Kurudamannil 8 each, Gohar 7
16 Oct	Swam-Patna 9
17 Oct	Nil
18 Oct	Nagercoil 7, Bhoothapandy 5, Colachel, Swam-Patna, Piravam and Kanyakumari 4 each, Pernem, Dharmasthala, Thuckalay and Mylaudy 3 each, Thenkasi, Karkala, Punalur, Eraniel, Quepem, Talcher, Daringibadi, Dodamarg, Kankavli, Mancompu, Chidambaram AWS, Naraj, Sathupalle, Mayiladuthurai and Kochi AP 2 each, Komarada, Ayikudi, Kudulu, Chidambaram, Tadepalligudem, Srivaikuntam, Ernakulam South, Sirkali, R. Udaigiri, Rosera, Rajapur, Anaikaranchatram (Kollid), Radhapuram, Cuttack, Sukinda, Parangipettai, Nanguneri, Mulde Agri, Mani, Bapatla, Jowai AWS, Sawantwadi, Lower Kothaiyar ARG and Gudibande 1 each
19 Oct	Cherrapunji (Rkm) and Arantangi 7 each
20 Oct	Colachel 7

TABLE 5 (*Contd.*)

Date	Some representative amounts of rainfall in cm for October, November and December 2014 (7 cm and above)
21 Oct	Nil
22 Oct	Mettupalayam and Cherthala 8 each, Konni, Mavelikara, Majbhat and Mylaudy 5 each, Kozha, Coonoor and Keolari 4 each, CIAL Kochi, Kudulu, Thodupuzha, Alipurduar CWC, Coonoor PTO, Mangalooru AP, Mangaluru AP, Mudukulatur, Kumarakom and Chengannur 3 each, Haripad, Baghdogra AP, Vitla ARG, Chalakudi, Ponnani, Aluva PWD, Vellanikkara, Kanjirappally, Kumarapalayam and Vaikom 2 each, Dharmasthala, Ariyalur, Periyakulam, Mani, Gyalsing AWS, Virudhunagar, Rangiya, Bhanvad, Neyyattinkara, Nalbari / Pagladia, Kurudamannil, Chepan, Balasore, Erode, Kothagiri, Vilathikulam, Quilandi, Mangaluru, Seoni and Seoni – AWS 1 each
23 Oct	Mancompu 13, Mangan and Sivagiri 7 each, Kurudamannil, Perumpavur and Neyyattinkara 5 each, Vaikom, CIAL Kochi, Kozha and Nancowry 4 each, Kottayam, Kanjirappally, Hut Bay, GoalparaCwc, Kodungallur, Bhoothapandy and Rajapalayam 3 each, Chengannur, Kadaladi, Srivaikuntam and Alappuzha 2 each, Thiruvananthapuram, Pechiparai, Tezpur, Chungthang, Kumarakom, Thuckalay, Thiruvananthapuram AP, Goalpara and Dhubri CWC 1 each
24 Oct	Nil
25 Oct	Kurudamannil and Nanguneri 13 each, Ayikudi and Kayamkulam 8 each, Satankulam 7
26 Oct	Nil
27 Oct	Nilambur 7, Nancowry 5, Mudubidre 4, Vinjamur, Karipur, Kannur, Minicoy, Thalasserry, Kayamkulam Agri, Sullurpeta and Auraiya CWC; 2 - Alappuzha, Malegaon, Kunnamkulam, Manjeri, Kayamkulam, Car Nicobar and Mulki 3 each, Tissa, Hut Bay, Taliparamba, Ponneri, Karkala, Car Nicobar IAF, Gund, Nalchha, Red Hills, Dharmasthala, Vadakkancherry, Idukki, Kanpur city, Kanpur AP, Chengannur, Kodungallur, Thikri, Surgana, Ghansore, Lakkireddipalle, Hissar, Kudulu, Satankulam, Kanpur Teh and Manawar 1 each
28 Oct	Machilipatnam and Vallam 9 each, Tambaram and Mettupalayam 7 each
29 Oct	Mylaudy, Ayikudi and Thodupuzha 8 each, Dindori - AWS, Rewa, Rewa - AWS, Belthangadi, Gudh, Uppinangadi, Sidhi, Sidhi - AWS, Krishnarajasagara and Pechiparai 7 each
30 Oct	Papanasam 9, Mahabalipuram and Kamareddy 8 each, Kottigehara 7
31 Oct	Thiruvananthapuram and Thiruvananthapuram AP 11 each, Srivaikuntam, Punalur, Neyyattinkara and Papanasam 10 each, Malkangiri and Thoothukudi 9 each, Nedumangad 8, Balikuda ARG and Colachel 7 each
1 Nov	Visakhapatnam AP 14, Visakhapatnam 13, Balurghat, Anakapalle and M M Hills 10 each, Mannarkad, Tuni and Denkada 9 each, Bheemunipatnam 8, Aranmanaipudur, Karaikudi, Kodaikanal and Tiruchengode 7 each
2 Nov	Eraniel 13, Thondebhavi 11, Kovai / Koyamutthur, Alur and Maduranthagam 10 each, Puttur HMS and Kalingapatnam 9 each, Manamelkudi, Kottigehara, Sakleshpura, Chengalpattu, Nagapattnam and Periyanaickenpalayam 8 each, Dharmasthala, Nagari, Mylaudy, Puri, Tekkali, Kakatpur and Krishnaprasad 7 each
3 Nov	Manki 12, Gurramkonda 10, Bengaluru CO and Bengaluru City 9 each, Tirumayam and Mandapalle 8 each, Bhadravathi, Arogyavaram, Srinivasapura, Bengaluru Hal AP and Bengaluru AP 7 each
4 Nov	Davanagere and Udayagiri 10 each, Thamaraipakkam, Uthiramerur, Sriperumbudur, Channapatna and Gummagatta 9 each, Shikaripur, Chikkanahalli PTO and Kalyandrug 8 each, Poondi, Davanagere PTO, Magadi, Tumakuru, Dharmasthala, Musiri, Halli Mysore, Irikkur, Palasamudram and Krishnarajpet 7 each
5 Nov	K. Paramathy, Nuggehalli and CIAL Kochi 15 each, Erode 14, Satankulam 13, Bhavani, Kamatchipuram and Aluva Pwd 12 each, Chittampatti, Ernakulam South and Perumpavur 11 each, Honakere, Konni, Kanjirappally and Kochi AP 10 each, Kottayam, Perundurai, Thodupuzha, Sivaganga and Kodungallur 9 each, Pollachi, Chittur, Vaikom, Kumarapalayam and Malavalli 8 each, Kurudamannil, Ponnani, Aravakurichi, Peraiyur, Yelandur, Nannilam, Alathur, Kangeyam, Chalakudi, Pattambi, Sivakasi, Sivagiri, Belur, Roing, Dharapuram, Karur, Chatrapatti (Odanchatra), Denkanikottai, Sankarankoil and Vadipatti 7 each
6 Nov	Quilandi 13, Canacona 7
7 Nov	Nagapattnam 19, Sirkali 13, Mannarkad 12, Srivaikuntam and Tiruchendur 9 each, Anaikaranchatram (Kollid) 8, Chidambaram, Ottapalam, Konni, Tiruvarur, Karaikal, Palakkad and Nanguneri 7 each
8 Nov	Papanasam, Karipur and Manimutharu 10 each, Ambasamudram 9, Nagapattnam and Vedaranniyam 8 each, Angadipuram, Perinthalamanna, Lower Kothaiyar ARG, Gudur, Maniyachi and Kurudamannil 7 each
9 Nov	Kvk Kattukuppam ARG, Sirkali and Anaikaranchatram (Kollid) 20 each, Chidambaram AWS, Red Hills, Chembarabakkam and Puzhal ARG 19 each, Chengalpattu and Tambaram 18 each, Karaikal, Mahabalipuram, Chennai AP, Poonamallee and Kelambakkam 17 each, Anna University, Cholavaram and Poonamalle ARG 16 each, Chidambaram, Taramani ARG, Kancheepuram, Anna Uty ARG, Kolapakkam ARG, Cheyyur and Ponneri 15 each, Sriperumbudur, Chembarambakkam ARG, Nagapattnam, Madavaram AWS, Neyveli AWS, Chennai city and Cuddalore 14 each, Dgp Office, Puducherry and Cheyyar 13 each, Mylam AWS, Tirumalla AP, Ennore AWS and Mayiladuthurai 12 each, Thamaraipakkam, Parangipettai and Tiruvallur 11 each, Maduranthagam, Marakkanam, Tiruvarur, Uthiramerur, Nannilam and Vedaranniyam 10 each, Kkl Surakudi Kvk and Thiruthuraipoondi 9 each, Sethiathope, Satyavedu and Satyabama Uty ARG 8 each, Trangambadi (Or) Tranqueb, Thiruvidaimaruthur, Vilupuram, Poondi, Puttur, Kumbakonam, Kodur, Aduthurai AWS, Gingee, Panruti, Arakonam, Srikalahasti, Valangaiman and Tindivanam 7 each

TABLE 5 (*Contd.*)

Date	Some representative amounts of rainfall in cm for October, November and December 2014 (7 cm and above)
10 Nov	Neyveli AWS 48, Panruti 35, Sethiathope and Chidambaram 34 each, Parangipettai 33, Tirumalla AP 30, Yercaud 25, Chidambaram AWS and Venkatagiri 24 each, Kodur 23, Tirukoilur and Thirukoilur ARG 21 each, Ananthrajpeta (Arg) and Gudur 20 each, Virudachalam, Uthangarai, Rapur, Ambur and Sathanur Dam 19 each, Vaniaymbadi, M M Hills, Alangayam and Vilupuram 18 each, Pappireddipatti and Atmakur 17 each, Uthiramerur 16, Pennagaram, Barur, Kalakada, Pullampeta, Sankarapuram, Anaikaranchatram (Kollid), Kallakkurichchi and Harur 15 each, Palacode, Shoolagiri, Penucondapuram and Chittoor 14 each, Pochampalli, Omalur, Mandapalle, Kancheepuram, Pakala, Krishnagiri, Pallipattu, Palamaner and Podalakur (Arg) 13 each, Salem, Tirupathi (AGR), Gingee, Arogyavaram and Rajampet 12 each, Palasamudram, Vellore, Penagaluru, Tirupathi AP, Chengalpattu, Ponneri, Cuddalore, Hogenekal, Santhipuram, Hosur, Thottambedu, Rayalpadu, Gurramkonda, Marandahalli and Ulundurpet 11 each, Nagari, Kuppam, Kaveripakkam, Vinjamur, Melalathur, Punganur, Gudiyatham, Anjatti, Nellore, Satyavedu, Srikalahasti, Rasipuram, Tindivanam, Trangambadi (Or) Tranqueb and Vazhapadi 10 each, Red Hills, Thali, Anekal, Rayakottah, Chembarabakkam, Tiruvallur, Chinnamandem, Denkanikottai, R. K. Pet, Bangarpet, Tiruttani, Mulbagal, Venkatagiri Kota, Kalavai AWS, Thiruvalangadu, Puzhal ARG and Royachoti 9 each, Tada, Sriperumbudur, Cholavaram, Mangalapuram, Attur, Thamaraipakkam and Mettur 8 each, Sullurpeta, Perambalur, Kolar Gold Field, Srinivasapura, Arakonam, Madavaram AWS, Malur, Udayagiri, Shar, Tozhudur, Kanakapura, Yelandur, Thammampatty, Tambaram, Kaveli, Ennore AWS, Poondi, Chennai city, Poonamalle ARG, Sirkali, Chamarajanagar PTO and Poonamallee 7 each
11 Nov	Atmakur 23, Rapur 20, Rajampet 18, Sambepalle 17, Pullampeta 16, Gudur 14, Penagaluru 13, Nancowry 11, Ponnani, Kalakada and Bangarpet 9 each, Royachoti, Ambur and Nellore 8 each, Chinnamandem, Kodur, Nambulipulikunta, Lakkireddipalle and Car Nicobar 7 each
12 Nov	Sriperumbudur, Kancheepuram and Cheyyur 10 each, Atmakur and Arakonam 9 each, Maduranthagam 8, Chennai AP, Natham, Tiruvaiyaru, Chatrapatti (Odanchatra) and Chittoor 7 each
13 Nov	Kancheepuram 34, Puzhal ARG and Red Hills 21 each, Cheyyar 19, Madavaram AWS, Tiruvallur, Hvf Avadi ARG and Kalavai AWS 16 each, Chennai city and Cholavaram 15 each, Dgp Office 14, Anna University, Thamaraipakkam and Anna Uty ARG 13 each, Thiruvalangadu, Poonamallee and Chennai AP 12 each, Chengalpattu, Taramani ARG and Kvk Kattukuppam ARG 10 each, Ennore AWS, Poondi, Satyabama Uty ARG, Uthiramerur and Chembarambakkam ARG 9 each, Ayikudi, Papanasam, Kaveripakkam, Punalur, Udupi, Poonamalle ARG, Ponneri and Ambur 8 each, Chembarabakkam, Sriperumbudur, Thodupuzha and Arani 7 each
14 Nov	Ottapadiram, Uthiramerur, Maniyachi, Srivaikuntam and Mahabalipuram 7 each
15 Nov	Anaikaranchatram (Kollid) and Sirkali 17 each, Mayiladuthurai 11, Parangipettai 10, Trangambadi, Kkl Surakudi Kvk and Chidambaram AWS 9 each, Panruti 8, Kodavasal, Nagapattnam, Cuddalore, Karaikal and Neyveli AWS 7 each
16 Nov	Ponneri 37, Mahabalipuram and Tambaram 33 each, Chengalpattu 32, Thamaraipakkam 31, Puzhal ARG 30, Chembarabakkam, Red Hills and Cholavaram 28 each, Kancheepuram, Marakkanam, Chennai AP and Kelambakkam 27 each, Sullurpeta, Hvf Avadi ARG and Taramani ARG 26 each, Chennai city and Tada 25 each, Madavaram AWS 24, Poonamalle ARG, Dgp Office, Anna Uty ARG, Sriperumbudur and Chembarambakkam ARG 23 each, Poonamallee, Tirupathi AP and Thottambedu 22 each, Maduranthagam, Kolapakkam ARG and Uthiramerur 21 each, Puttur, Satyavedu, Arakonam, Kvk Kattukuppam ARG and Ennore AWS 20 each, Thiruvalangadu, Poondi and Tiruvallur 19 each, Tiruttani and Anna University 18 each, Venkatagiri, Kodur and Pallipattu 17 each, Gudur, Atmakur and Sholingur 16 each, Srikalahasti, Kalavai AWS and Palasamudram 15 each, Kaveripakkam, Tirupathi (AGR), Cheyyar and Vellore 14 each, Vanur, Thirukoilur ARG, Tirukoilur, Satyabama Uty ARG and Nagari 13 each, R. K. Pet, Chittoor and Pakala 12 each, Cheyyur, Puducherry, Puducherry, Kaveli, Ananthrajpeta (Arg), Vilupuram, Nellore, Tindivanam and Alangayam 11 each, Virinjipuram AWS 10, Parangipettai, Rapur, Gingee, Melalathur, Vandavasi and Palamaner 9 each, Gudiyatham 8, Ambur, Cuddalore, Arani, Musiri, Mylam AWS, Pullampeta and Thiruvidaimaruthur 7 each
17 Nov	Venkatagiri 31, Rapur 29, Gudur 25, Atmakur 18, Srikalahasti and Vinjamur 17 each, Penagaluru, Thottambedu and Kaveli 16 each, Kodur 15, Udayagiri, Avanigada and Ananthrajpeta (Arg) 14 each, Badvel and Pullampeta 13 each, Nellore, Repalle and Rajampet 12 each, Kadapa, Utukuru AP, Gudivada and Porumamilla 10 each, Seetharamapuram, Machilipatnam, Tiruttani and Chimakurthi 9 each, Lakkireddipalle, Sholavandan, Vempalle, Tanakal, Karamchedu, Pulivendla, Kadiri, Veligandla and Atlur 8 each, Royachoti, Kadiri AP, Bapatla, Sambepalle, Marripudi, Nambulipulikunta, Thambalapalle, Pallipattu, Gurramkonda, Chittampatti, Narsapur, Arakonam, Sriperumbudur, Addanki, Podili and Kamalapuram 7 each
18 Nov	Gudur 17, Nellore 11, Sivakasi 10, Virudhunagar, Rapur and Kodur 9 each, Rajapalayam 8, Amalapuram and Venkatagiri 7 each
19 Nov	Sankarankoil 14, Rajapalayam and Nellore 12 each, Radhapuram, Palayamkottai and Ayikudi 10 each, Uttamapalayam and Gudalur 9 each, Kalugumalai, Nedumangad and Atmakur 8 each, Tirupathi AP and Peermade To 7 each
20 Nov	Coonoor and Coonoor PTO 13 each, Hvf Avadi ARG and Ketti 12 each, Poondi and Poonamallee 10 each, Kvk Kattukuppam ARG 9, Kothagiri, Tirumayam, Sivagiri, Uthagamandalam and Tiruttani 8 each, K Bridge, Tirumangalam, Amalapuram, Periyakulam AWS, Puducherry and Thammampatty 7 each
21 Nov	Manimutharu u 9, Sullurpeta 8, Nanguneri 7
22 Nov	Udayagiri 10, Illuppur 9, Kadaladi and Puducherry 7

TABLE 5 (*Contd.*)

Date	Some representative amounts of rainfall in cm for October, November and December 2014 (7 cm and above)
23 Nov	Mayiladuthurai 20, Karaikal 19, Papanasam 15, Cuddalore, Vilupuram, Cheyyur, Trangambadi (Or) Tranqueb and Kkl Surakudi Kvk 14 each, Kodur and Parangipettai 13 each, Kodavasal 12, Rapur, Maniyachi, Panruti, Sirkali, Ananthrajpeta (Arg), Anaikaranchatram (Kollid), Virudachalam, Jayamkondam and Tozhudur 11 each, Nagapattnam, Tiruvarur, Uthiramerur and Aruppukottai 10 each, Pune, Puducherry, Puducherry, Arakonam, K.M.Koil, Pune (Lohogaon), Srikalahasti and Sethiathope 9 each, Mahabalipuram, Ponneri, Vanur, Tiruvaiyaru, Chidambaram AWS, Pullambadi, Tambaram, Kelambakkam, Ottapadiram, Mylam AWS, Thirumanur and Kumbakonam 8 each, Thiruvidaimaruthur, Nannilam, Pattukottai, Venkatagiri, Maduranthagam, Tirupuvanam, Needamangalam, Nagari, Murbad, Chidambaram, Gingee, Sendurai, Papanasam, Pune (Pashan), Manimutharu, Valangaiman, Poondi, Sankarapuram, Tindivanam and Pandavaiyar Head 7 each
24 Nov	Papanasam 18, Tambaram 17, Anna Uty ARG 16, Anna University 15, Chennai AP 14, Kelambakkam, Kalavai AWS, Kancheepuram and Poonamallee 13 each, Mahabalipuram 12, Kolapakkam ARG, Hvf Avadi ARG, Chembarabakkam and Chengalpattu 11 each, Kvk Kattukuppam ARG, Chembarambakkam ARG, Taramani ARG and Kaveripakkam 10 each, Chennai city and Dgp Office 9 each, Agathi and Poonamalle ARG 8 each, Amini Divi, Gudiyatham, Cheyyur, Melalathur, Minicoy, Arakonam, Thiruvalangadu, Palasamudram and Piravam 7 each
25 Nov	Papanasam 10
26 Nov	Cheyyur 7, Marakkanam and Minicoy 5 each, Mahabalipuram and Cherthala 4 each, Kavaratti and Long Islands 3 each, Hut Bay, Port Blair, Kanjirappally and Agathi 2 each, Nancowry, Kelambakkam and Chengalpattu 1 each
27 Nov	Nil
28 Nov	Nil
29 Nov	Car Nicobar IAF 8, Car Nicobar 7
30 Nov	Kodavasal 12, Marakkanam 10, Vanur, Tirupuvanam, Vilupuram, Kaveli, Rapur and Manamelkudi 9 each, Thanjavur, Ayikudi, Tiruvarur and Thirumanur 8 each, Papanasam, Ariyalur, Coonoor, Thenkasi, Ramanathapuram, Tiruvadanai, Papanasam, Coonoor PTO, Karaikudi, Valangaiman and Jayamkondam 7 each
1 Dec	Parangipettai 16, Puducherry and Marakkanam 15 each, Satyavedu, Chengalpattu, Tada and Maduranthagam 13 each, Puttur, Cholavaram, Ponneri and Venkatagiri 11 each, Cheyyur, Chidambaram, Cuddalore, Srikalahasti, Anaikaranchatram (Kollid) and Kvk Kattukuppam ARG 10 each, Vanur and Thottambedu 9 each, Trangambadi (Or) Tranqueb, Neyveli AWS, Sirkali, Pallipattu and Nagari 8 each, Arakonam, Kodur, Tiruttani, Panruti, Tiruvallur, Tirupathi AP, Mahabalipuram, Mylam AWS, Ananthrajpeta (Arg), Kalavai AWS, Thamaraipakkam, Thiruvidaimaruthur, Mayiladuthurai, K. M. Koil and Vilupuram 7 each
2 Dec	Tambaram 49, Chembarabakkam 47, Kvk Kattukuppam ARG 43, Marakkanam 42, Chembarambakkam ARG 41, Chengalpattu and Ponneri 39 each, Sriperumbudur 38, Cheyyur 37, Chennai AP 35, Mahabalipuram and Poonamallee 34 each, Red Hills and Anna Uty ARG 32 each, Taramani ARG 30, Chennai city, Puzhal ARG, Cholavaram and Poonamalle ARG 29 each, Thamaraipakkam and Maduranthagam 28 each, Dgp Office and Hvf Avadi ARG 27 each, Madavaram AWS 26, Ennore AWS 23, Tiruvallur, Anna University and Puducherry 22 each, Poondi and Uthiramerur 19 each, Kancheepuram, Satyavedu and Tada 17 each, Thiruvalangadu 15, Cheyyar, Vanur and Vedaranniyam 14 each, Cuddalore and Vilupuram 13 each, Sullurpeta, Tindivanam and Mylam AWS 12 each, Arakonam and Vandavasi 11 each, Nagari 10, Tiruttani and Gingee 9 each, Kaveripakkam, Thottambedu, Thiruthuraipoondi and Pallipattu 8 each, Tirupathi AP, Nagapattnam, Polur, Srikalahasti, Palasamudram, Kalavai AWS, Kaveli and Parangipettai 7 each
3 Dec	Cuddalore 13, Srivilliputhur 12, Peraiyur and Peermade To 11 each, Valangaiman 9, Panruti 8, Aluva Pwd, Puducherry, Puducherry, Kkl Surakudi Kvk, Mudukulatur, Piravam, Thrithala, Cheranmahadevi and Kadaladi 7 each
4 Dec	Nagapattnam and Cuddalore 9 each, Puducherry and Puducherry 8 each, Tezpur, Cheyyur, Karaikal and Kkl Surakudi Kvk 7 each
5 Dec	Nannilam and Marakkanam 10 each, Panruti and Puducherry 9 each, Cuddalore 8, Neyveli AWS 7
6 Dec	Chengalpattu 16, Panruti and Uthiramerur 13 each, Virudachalam, Mahabalipuram, Parangipettai and Kelambakkam 12 each, Neyveli AWS 11, Cuddalore 10, Tozhudur and Maduranthagam 9 each, Sethiathope 8, Chidambaram, Kvk Kattukuppam ARG and Marakkanam 7 each
7 Dec	Papanasam 13, Cholavaram 7
8 Dec	Karaikal 16, Kodavasal and Papanasam 13 each, Tiruvarur, Nagapattnam and Nannilam 11 each, Mannargudi 9, Pandavaiyar Head 8, Agathi, Needamangalam, Valangaiman, Kkl Surakudi Kvk and Mayiladuthurai 7 each
9 Dec	Vedaranniyam 22, Madukkur 9, Peravurani, Muthupet, Thiruthuraipoondi and Papanasam 8 each, Adirampattinam 7, Manamelkudi, Mylaudy, Alangudi, Nagapattnam and Pattukottai 5 each, Mannargudi, Arantangi, Arimalam, Trangambadi (Or) Tranqueb and Nanguneri 4 each, Karaikal, Pudukottai, Rameswaram, Tirumayam, Orthanad, Mahabalipuram, Kkl Surakudi Kvk, Gandarvakottai, Pamban, Kodavasal, Radhapuram, Thuvakudi Imti, Anaikaranchatram (Kollid), Perungalur, Sirkali and Cheyyur 3 each, Nagercoil, Manimutharu, Ambasamudram, Pandavaiyar Head, Vallam, Tiruvarur, Karambakudi, Kanyakumari, Cheranmahadevi, K. M. Koil, Keeranur, Mayiladuthurai, Bhoothapandy, Chengalpattu, Thuckalay, Satankulam, Colachel, Nannilam, Tondi, Illuppur, Parangipettai, Thanjavur, Needamangalam, Tiruchendur, Tiruchirapalli AP and Thiruvidaimaruthur 2 each, Valangaiman, Palayamkottai, Dindigul, Kumbakonam, Pechiparai, Coonoor, Coonoor PTO, Nedumangad, Devakottai, Chidambaram, Srivaikuntam, Taramani ARG, Karaikudi, Viralimalai, Papanasam, Kuzhithurai, Kothagiri, Tirupathur, Ketti, Nancowry, Uthagamandalam, Eraniel, Jayamkondam, Sethiathope, Srimushnam, Tiruvaiyaru, Illayangudi, Tirukattupalli, Trichy town, Sivaganga, Thiruvananthapuram, R. S. Mangalam, Grand Anaicut, Uthagamandalam AWS, Anna Uty ARG, Punalur and Tambaram 1 each

TABLE 5 (*Contd.*)

Date	Some representative amounts of rainfall in cm for October, November and December 2014 (7 cm and above)
10 Dec	Nil
11 Dec	Srivaikuntam 9, Tiruchendur 7
12 Dec	Nil
13 Dec	Nil
14 Dec	Dharmasthala and Vadakkancherry 7 each
15 Dec	Tiruvarur 12, Thiruthuraipoondi 8, Telkoi 7
16 Dec	Piravam 10, Chengannur and Kayamkulam 7 each
17 Dec	Nil
18 Dec	Tiruchendur 7, Srivaikuntam 4, Jamsolaghat and Rairangpur 3 each, Ambasamudram, Nanguneri, Swam-Patna, Satankulam, Tiring, Soro, Papanasam, Bangiriposi, Chandanpur, Kalaikunda, Kankadahad ARG and Midnapore 2 each, Anini, Torpa, Durgachak, Keiri AWS, Kavaratti, Joshipur, Jamankira, Joda ARG, Anandpur, Talcher, Palayamkottai, Bonth, Parjang ARG, Baijnath, Cheranmahadevi, Muniguda ARG, Kolkata AP, Angul, Agathi and Banarpal ARG 1 each
19 Dec	Thoothukudi 12, Thoothukudi Port AWS 10
20 Dec	Papanasam 11, Kanyakumari 8, Mylaudy, Colachel, Nagercoil, Ayikudi, Vedaranniyam and Kayamkulam 5 each, Shencottah, Kalugumalai and Perumpavur 4 each, Nanguneri, Manimutharu, Srungavarapukota, Muthupet, Arimalam, Kottayam, Kayamkulam Agri, Eraniel, Thuckalay, Sivakasi, Ambasamudram, Rameswaram, Sholavandan, Bhoothapandy and Watrap 3 each, Satankulam, Aruppukottai, Tirumayam, Alangudi, CIAL Kochi, Mavelikara, Radhapuram, Rajapalayam, Sivagiri, Aluva Pwd, Vaikom, Thenkasi, Pudukottai, Tirupuvanam, Kodungallur, Mancompu, Srivilliputhur, Pamban, Thiruvananthapuram AP, Manamadurai, Sankarankoil and Virudhunagar 2 each, Tiruchendur, Kovilpatti, Sattur, Manapparai, Cheranmahadevi, Visakhapatnam, Lower Kothaiyar ARG, Arantangi, Nuagada ARG, Illayangudi, Karambakudi, Kovilankulam, Kuzhithurai, Illuppur, Peraiyur, Kodaikanal, Pechiparai, Gudalur, Viralimalai, Vilathikulam, Tiruvadanai, Kkl Surakudi Kvk, Cherthala, Karaikudi, Palayamkottai and Mettupatti 1 each
21 Dec	Nil
22 Dec	Nil
23 Dec	Nil
24 Dec	Nil
25 Dec	Nil
26 Dec	Nil
27 Dec	Nil
28 Dec	Rameswaram 7
29 Dec	Rameswaram and Papanasam 7 each, Pamban 5, Manimutharu 4, Ramanathapuram and Nanguneri 3 each, Shencottah, Ambasamudram, Ramnad Nicra and Cheranmahadevi 2 each, Palayamkottai and Mudukulatur 1 each
30 Dec	Nil
31 Dec	Nil

Apart from human casualties, 500 cattle were killed and around 2000 houses were partially/totally damaged in Andhra Pradesh. In Tamil Nadu northern parts of it were affected, in particular the situation in Cuddalore district was worst. Many low lying areas were inundated. Lightning claimed 3 lives in Tamil Nadu and 1 in Gujarat. Avalanche in Jammu & Kashmir claimed 1 life.

3.3. *December*

3.3.1. *Storms and depressions*

No intense low pressure system formed during the month.

3.3.2. *Weather and associated synoptic features*

Table 4 gives a summary of the synoptic systems during the month of December 2015. The sub-division wise percentage departure of rainfall from normal and the significant amounts of rainfall during the month are given in Tables 1 & 5 respectively.

Last month's trough of low at mean sea level over southwest Bay of Bengal persisted and amplified further over the same region leading to extremely heavy rainfall and flood situation over parts of north coastal Tamil Nadu including Chennai during the first couple of days of December.

The presence of a few cyclonic circulations over northeastern region and an anomalous anti-cyclone along and off the east coast of India led to moisture incursion causing *isolated* to *scattered* rainfall over the sub-divisions in the east and *excess/normal* rainfall over the sub-divisions of the northeast in the mid-month.

The westerly wind regime though followed a high index phase almost all through the month and kept WD activity feeble, its induced cyclonic circulations and troughs in lower levels led to *isolated* rainfall over the north and northwest parts of the country during the month. This subdued rainfall activity also caused the prevalence of cold and dry air over northwest India and adjoining plains leading to occurrence of *cold wave conditions* and fog conditions over the region in the second half of the month.

No intense low pressure system formed during the month. However, a low pressure area formed over southwest Bay of Bengal and adjoining Sri Lanka off Tamil Nadu coast (3-7 December) which moved westwards during the first week of the month enhanced the northeast monsoon activity over Tamil Nadu.

3.3.3. *Temperature*

Maximum temperatures were *appreciably to markedly above normal* over central and peninsular parts of the country for many days of the month. It was *above normal* over most parts of the country except for north and northeastern parts where it was *below normal*.

Minimum temperatures were also *above normal* over most parts of the country except for parts of west and central India where it was *below normal*.

Severe cold wave conditions prevailed on 1 day over Marathwada and Chhattisgarh. *Cold wave* conditions prevailed on 8 days over east Madhya Pradesh; 5 to 7 days over east Uttar Pradesh, and Rajasthan; on 1 to 4 days over Assam & Meghalaya, West Bengal & Sikkim, Odisha, Bihar, Uttarakhand, Haryana, Chandigarh & Delhi, Himachal Pradesh, west Madhya Pradesh, Gujarat State, Marathwada, Vidarbha, Chhattisgarh and Telangana.

Cold day conditions prevailed on 2 days over north Konkan.

'Leh' town recorded minimum temperature of *minus* 16.2 °C on 26th December.

The month's and seasons lowest minimum temperature in the plains of the country was *minus* 0.3 ° C recorded at Amritsar (Punjab) on 25th December, 2015.

3.3.4. *Disastrous weather events and associated damage*

According to media reports, rain related incidents /floods claimed 152 lives in Tamil Nadu, 34 in Andhra Pradesh and 1 in Uttar Pradesh. In Tamil Nadu floods affected around 17.64 lakh people since 1 October, 2015. Landslide in Andhra Pradesh claimed 4 lives. Lightning claimed 9 lives in Uttar Pradesh.

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 during the 24 hours period, ending at 0300 UTC, from 6.5 cms to 12.4 cms.
Very heavy rainfall	- rainfall during the 24 hours period, ending at 0300 UTC, from 12.5 cms to 24.4 cms.
Extremely heavy rain	- rainfall during the 24 hours period, ending at 0300 UTC, 24.5 cms and above.
Heavy snowfall	- 35.6 cm to 64.4 cm.
At most places (Widespread)	- 76 % or more stations of a meteorological sub-division reporting at least 0.1 mms rainfall.
At many places (Fairly widespread)	- 51% to 75% stations of a meteorological sub-division reporting at least 0.1 mm rainfall.
At a few places (Scattered)	- 26% to 50% stations of a meteorological sub-division reporting atleast 0.1 mms rainfall.
At isolated places (Isolated)	- 25% or less stations of a meteorological sub-division reporting at least 0.1 mms 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, 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 is +1 °C to –1 °C.

(b) Minimum / Night temperature

Severe cold wave conditions	- departure of WCT_n from normal minimum temperature is –7 °C or less for the regions where normal minimum temperature is ≥ 10 °C and –6 °C or less elsewhere
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 °C to –6 °C, and for stations whose normal minimum temperature is less than 10 °C when the departure from normal is –4 °C to –5 °C. Cold wave is declared irrespective of the departure for those stations whose normal minimum temperature is greater than 0 °C.
Cold day conditions	For inland plain stations, when the day temperature is less than or equal to 16 °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.