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Cyclones and depressions over the north Indian Ocean during 2014*

1. Introduction

During 2014, in all 8 intense low pressure systems formed over the Indian Seas. These include; two Very Severe Cyclonic Storms (VSCSs HudHud, and Nilofar), one Cyclonic Storm (CS Nanauk), and five Depressions/Deep Depressions. Out of these eight systems, five systems formed over the Bay of Bengal, two over the Arabian Sea and one over land. One each Depression formed over the Bay of Bengal during the winter and pre-monsoon season. Monsoon Season witnessed the formation of one CS (Nanauk) over the Arabian Sea, one Deep Depression (DD) over the Bay of Bengal and one Depression over land. Post-monsoon season was cyclogenically active with successive formations of three intense low pressure areas *viz*., VSCS HudHud and a Depression over the Bay of Bengal and VSCS Nilofar over the Arabian Sea.

The tracks/intensity of these systems is given in Fig. 1. A brief history and monthly distribution are given in Tables 1 & 2. The relevant ship and buoy observations are given in Table 3. Detailed season wise descriptions of these systems are given below:

2. Details of the systems

2.1. *Depression over the Bay of Bengal (4 - 7 January, 2014)*

2.1.1. Under the influence of a trough of low at mean sea level and a cyclonic circulation aloft, a low pressure area formed over southeast & adjoining southwest Bay of Bengal on 2nd. Associated cyclonic circulation extended upto 2.1 kms a.s.l. It lay as a well marked low pressure area over southwest Bay of Bengal and neighbourhood on 3rd and concentrated into a Depression, centred within half a deg. of Lat. 8.5° N / Long. 83.5° E, about 470 kms southeast of Nagapattinam and 250 kms east of Trincomalee (Sri Lanka) at 0300 UTC of the 4th. It moved northwestwards and lay centred within half a deg. of Lat. 9.0° N / Long. 83.0° E about 410 kms southeast of Nagapattinam and 200 kms east-northeast of Trincomalee (Sri-Lanka) at 1200 UTC of the 4th. It moved west-northwestwards and lay over southwest Bay of Bengal near Lat. 9.3° N / Long. 82.0° E, about 290 km southeast of Nagapattinam and 210 kms east-southeast of Jaffna (Sri Lanka) at 0300 UTC of the 5th and moving westwards, lay centred near Lat. 9.3° N / Long. 81.5° E about 250 kms southeast of Nagapattinam and 90 kms northeast of Trincomalee (Sri-Lanka) at 1200 UTC of 5th. It further moved west-northwestwards and lay centred near Lat. 9.4° N / Long. 81.0° E, close to Sri Lanka coast and about 200 km south-southeast of Nagapattinam at 0300 UTC of the 6th. It moved southwestwards and crossed Sri Lanka coast near Lat. 9.2° N and Long. 80.8° E between 0500 and 0600 UTC and lay centred over Sri Lanka, near Lat. 9.0° N / Long. 80.7° E about 90 kms east of Mannar at 0600 UTC of the same day and further moved southwestwards and lay centred over Sri Lanka, near Lat. 8.8° N / Long. 80.6° E, about 90 km east southeast of Mannar at 1200 UTC of 6th. It moved southwestwards and lay centred over Sri Lanka, near Lat. 8.0° N and Long. 80.0° E, about 55 kms east-southeast of Puttalam at 0000 UTC of the 7th. It weakened into a well marked low pressure area and lay over Sri Lanka and adjoining Gulf of Mannar, at 0300 UTC of the same day. It lay as a low pressure area over Comorin area and neighbourhood with associated cyclonic circulation extending upto 3.6 kms a.s.l. on 8th. The low pressure area over Comorin area and neighbourhood became less marked on 9th. However, the associated cyclonic circulation extending upto lower tropospheric levels lay over Lakshadweep area and neighbourhood on 9th and moved away westwards on 10th evening.

The observational summary is given in Table 1.

2.1.2. *Other features observed*

The lowest Estimated Central Pressure (ECP) was 1004 hPa from 1200 UTC of 5th to 0000 UTC of 6th. The maximum estimated mean wind speed was 25 kts during the same period. The lowest observed pressure of 1001.2 hPa was reported by Ship AUVI (9.7/82.8) at 0000 UTC of 5th, when the system was to the west of the ship. The system moved initially west northwest and then west to southwestward direction.

2.1.3. *Weather and damage caused*

The system caused rainfall at isolated places over Tamil Nadu with rather heavy rainfall over south Tamil Nadu on 7th and 8th January. No damage was reported.

* *Compiled by* : Medha Khole and S. Sunitha Devi, Meteorological Office, Pune – 411 005, India.

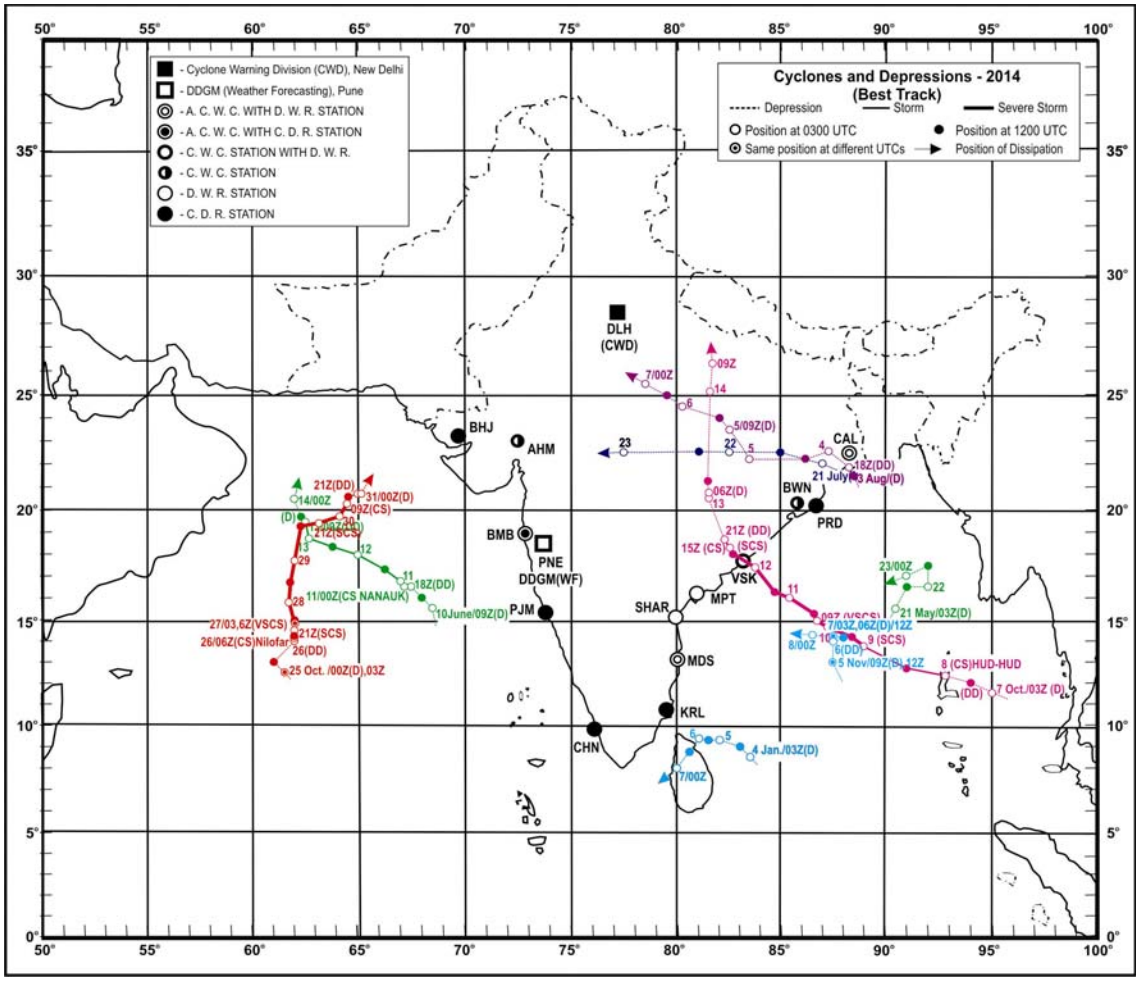

Fig. 1. Tracks of storms and depressions over North Indian Ocean (NIO) during the year 2014

Chief amounts of rainfall are

07 January, 2014

Tamil Nadu & Puducherry	:	Vedaranniyam 4

08 January, 2014

Tamil Nadu & Puducherry	:	Rameswaram 5, Manimutharu 4, Kanyakumari, Tondi and Vedaranniyam 3 each, Pamban, Nagercoil, Nanguneri, Sivaganga, Ottapadiram, Papanasam, R.S.Mangalam, Radhapuram, Tirupuvanam, Ambasamudram, Srivaikuntam, Palayamkottai and Cheranmahadevi 2 each

2.2. Depression over the Bay of Bengal (21 May - 23 May, 2014)

2.2.1. A trough of low extended from north Andaman Sea to southwest Bay of Bengal on 16th. Also, an upper air cyclonic circulation extending upto 4.5 kms a.s.l. lay over south Andaman Sea and neighbourhood on 17th. It persisted on 18th and lay over Andaman Sea and adjoining central Bay of Bengal on 19th. Under its influence, a low pressure area formed over east central Bay of Bengal and neighbourhood, on 19th evening & persisted there on 20th. Associated cyclonic circulation extended upto mid tropospheric levels on 20th. It concentrated into a Depression over east central Bay of Bengal and lay centred at 0300 UTC of 21st near Lat. 15.5° N and Long. 90.5° E, about 490 kms north-northwest of Port Blair, 620 kms west-southwest of Yangon (Myanmar) and 650 kms south-southwest of Cox's Bazar (Bangla Desh) on 21st. It moved north-

TABLE 1

Brief Summary of cyclonic storms and depressions over the Indian seas and neighbourhood during 2014

S. No.	Category	Life Period	Place / Time of landfall	Lowest Estimated central Pressure (hPa)	Max. wind (Estimated/ observed) (kts)	Highest "T" No.
1.	Depression	4-7 Jan	Sri Lanka coast near Lat. 9.2° N/Long. 80.8° E between 0500 & 0600 UTC of 6 January	1004	25	1.5
2.	Depression	21-23 May	Weakened into well marked low pressure area over central Bay of Bengal at 0300 UTC of 23 May	1000	25	1.5
3.	Cyclonic Storm (Nanauk)	10-14 Jun	Weakened into well marked low pressure area over northwest and adjoining west central Arabian Sea at 0300 UTC of 14 June	986	45	3.0
4.	Land Depression	21-23 Jul	Weakened into a well marked low pressure area over west Madhya Pradesh and neighbourhood at 0300 UTC of 23 July	986.6	15	-
5.	Deep Depression	3-7 Aug	Coastal areas of Gangetic West Bengal near(21.9° N / 88.3° E) at 1800 UTC of 3 August	988	14	-
6.	VSCS (Hud Hud)	7-14 Oct	Crossed Andaman Islands close to Long Islands (12.4° N / 92.9° E) between 0300 & 0400 UTC of 8 October and north Andhra Pradesh coast over Vishakhapatnam near (17.7° N / 83.3° E) between 0630 & 0730 UTC of 12 October	950	100	5.0
7.	VSCS (Nilofar)	25-31 Oct	Northeast Arabian Sea off Gujarat coast at 0300 UTC of 31 October	950	110	5.5
8.	Deep Depression	5-8 Nov	West central Bay of Bengal at 0300 UTC of 8 November	998	30	2.0

TABLE 2

Storms / Depressions statistics 2014

	Winter	Pre-monsoon			Monsoon				Post-monsoon			
Name of the system	Jan - Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
					Over the Bay of Bengal							
Depressions/Deep Depressions	1	-	-	1	-	-	1	-	-	1	-	4
Cyclonic Storms	-	-	-	-	-	-	-	-	-	-	-	-
Severe Cyclonic Storms	-	-	-	-	-	-	-	-	-	-	-	-
Very Severe Cyclonic Storms	-	-	-	-	-	-	-	-	1	-	-	1
Super Cyclonic Storms	-	-	-	-	-	-	-	-	-	-	-	-
Total	1	-	-	1	-	-	1	-	1	1	-	5
					Land Depression							
Depressions	-	-	-	-	-	1	-	-	-	-	-	1
					Over the Arabian Sea							
Depressions/Deep Depressions	-	-	-	-	-	-	-	-	-	-	-	-
Cyclonic Storms	-	-	-	-	1	-	-	-	-	-	-	1
Severe Cyclonic Storms	-	-	-	-	-	-	-	-	-	-	-	-
Very Severe Cyclonic Storms	-	-	-	-	-	-	-	-	1	-	-	1
Super Cyclonic Storms	-	-	-	-	-	-	-	-	-	-	-	
Grand Total	1	-	-	1	1	1	1		2	1	-	8

TABLE 3

Ships' Observations during 1st January to 31st December, 2014

Call Sign	Date/Time (UTC)	Position of the Ship		Wind		Pressure PPPP (hPa)
		Lat. (°N)	Long. (°E)	Dir. (Degree)	Speed (Kts)	
(A) Cyclonic Storm (Nanauk) over the Arabian Sea (10 – 13 June 2014)						
ONAI*****	101200	19.6	67.1	080	18	996.0
SMGW*****	101200	14.4	57.2	210	27	1002.5
A8SD3*	101800	19.7	70.4	140	20	1002.0
3EJI4*	101800	19.7	70.4	220	20	1006.0
ONAI	110000	17.0	69.6	160	45	993.0
A8RL5	110000	13.4	64.2	260	35	1000.0
DDZB2	110300	9.9	66.2	230	32	1005.4
3EJI4	110600	13.2	68.0	250	28	1005.0
3EJI4	120300	14.3	65.7	250	29	1001.2
3EJI4	121200	14.85	64.5	240	34	1001.0
TWBUK48	121200	17.9	69.0	220	25	-
SHIP	130600	12.4	61.8	230	55	1004.2
3EJI4	130600	15.3	63.5	220	35	-
3EJI4*	131200	15.3	63.1	220	30	1004.0
(B) Very Severe Cyclonic Storm (Hudhud) over the Bay of Bengal (8 – 13 October, 2014)						
A8S08*****	070600	8.5	91.7	270	19	1006.0
VVFH	081800	13.8	82.0	230	33	1008.8
AUYR	110600	14.8	83.1	340	4	1000.3
AUYR	111200	14.3	83.0	300	58	1003.1
AUYQ	111200	15.0	82.4	240	28	999.1
(C) Very Severe Cyclonic Storm (Nilofar) over Arabian Sea (25 – 30 November, 2014)						
WDE8265*****	250000	12.4	60.2	330	20	1001.0
D5BA9*****	250000	17.7	59.5	70	40	1009.1
WDE8265*****	251200	13.4	56.7	340	22	1004.1
D5BA9*****	251200	16.2	56.6	030	18	1008.4
DFKM2	260600	11.8	57.2	320	13	1011.3
TBWUK59	260600	17.7	57.7	040	20	1010.7
VRCF6	261200	14.2	54.0	340	11	1010.9
V2004	261200	10.2	54.7	300	13	1010.0
V7UT6	261200	19.5	60.0	050	24	1022.0
DFKM2	261200	11.2	58.7	290	16	1008.0
WKPM	270000	14.4	70.0	140	16	1008.0
WLMK	270000	14.0	52.0	030	9	1012.0
TBWUK59	270000	22.2	60.5	040	20	1012.4
VRCF6	270600	12.5	59.4	240	12	1009.9
DFKM2	270600	9.3	63.3	240	18	1011.0

TABLE 3 (*Contd.*)

Call Sign	Date/Time (UTC)	Position of the Ship		Wind		Pressure
		Lat. (°N)	Long. (°E)	Dir. (Degree)	Speed (Kts)	PPPP (hPa)
DFKM2	271200	9.0	65.0	250	19	1008.5
DANV	280300	21.2	62.1	090	30	1010.0
PDGS	280300	21.2	63.9	100	22	1011.5
BATFR28	280300	16.5	68.7	160	25	1010.8
WLMQ	280600	14.0	51.6	280	6	1012.5
BATFR28	280900	14.9	67.9	160	20	1008.8
PDGS	280900	19.7	64.7	140	35	1010.8
BATFR28	281200	14.4	67.4	170	18	1008.8
DGHX	281200	22.9	61.8	080	20	1010.0
BATFR10	290300	16.2	55.5	-	-	1010.6
DANV	290300	18.0	65.5	160	31	1009.5
PDGS	290300	15.0	63.7	180	40	1007.7
BATFR28	290300	13.1	63.7	190	30	1009.9
PCIH	291200	20.2	67.9	120	12	1010.0
DANV	291200	16.8	67.3	140	15	1008.0
DGHX	291200	18.0	68.0	140	15	1009.1
BATFR28	291200	13.1	61.2	220	23	1006.9
DJDS2	291200	23.1	63.0	090	20	1010.5
WDF6832	291200	15.4	54.5	220	22	1007.3
BATFR28	292100	13.2	59.0	310	10	1008.8
BATFR28	300300	13.5	57.5	300	14	1010.7
DGZL	300300	13.8	54.0	320	7	1011.5
BATFR28	300900	13.8	56.0	300	9	1009.5
DHQS	300900	10.2	65.6	250	7	1010.0
9HA3474	301200	20.8	62.7	010	25	1006.1
PCIH	301200	24.2	61.5	080	15	1010.5
DGZL	301200	13.1	56.7	300	10	1009.0
WMCU*	302100	23.2	67.0	120	16	1008.0
WMCU*	310000	22.4	67.4	140	36	1007.0
9HSJ7*	310000	24.0	61.4	050	7	1011.5
DGZL	310000	12.0	60.1	310	3	1008.5

***** Observation during Depression/Deep Depression

northeastwards and lay centered at 1200 UTC of 21st over the same region, within half a degree of Lat. 16.5° N and Long. 91.0° E, about 560 kms north-northwest of Port Blair. It remained practically stationary and lay centred at 0300 UTC of 22nd over east central Bay of Bengal within half a degree of Lat. 16.5° N and Long. 92.0° E, about 540 kms north-northwest of Port Blair. It moved north-northeastwards and lay centered at 1200 UTC of 22nd over the same region, within half a degree of Lat. 17.5° N and Long. 92.0° E. Then it moved southwestwards and weakened into a well marked low pressure area over central Bay of Bengal at 0300 hours UTC of 23rd. It

persisted there on 24th and lay over west central and adjoining northwest Bay of Bengal off south Odisha and north Andhra Pradesh coasts on 25th; over south coastal Odisha and neighbourhood on 26th and over Odisha and neighbourhood on 27th morning. It lay as a low pressure area over eastern parts of Jharkhand and adjoining areas of Gangetic West Bengal on 27th evening. It lay over eastern parts of Bihar and neighbourhood on 28th morning. Associated cyclonic circulation extended upto mid tropospheric levels. It became less marked on 29th. However, associated cyclonic circulation extending upto 1.5 kms a.s.l. lay over Assam & Meghalaya and neighbourhood on 29th and became less marked on 30th May.

2.2.2. *Other features observed*

The lowest ECP was 1000 hPa from 0000 UTC of 22nd to 0000 UTC of 23rd. The maximum estimated mean wind speed was 25 kts. The lowest observed pressure of 999.9 hPa was reported by Buoy (23981) at 1200 UTC of 22nd, when the system was to its east. The system moved north-northeast initially and then recurved southwestwards and finally in a northwestward direction.

2.2.3. *Weather and damage caused*

Coastal Andhra Pradesh and Odisha received heavy to very heavy rainfall at a few places and West Bengal received heavy to very heavy rainfall at isolated places on 25th and 26th May, 2014.

No damage has been reported due to this depression.

Chief amounts of 24 hrs. Rainfall (more than 1 cm) ending at 0300 UTC from 21st May to 26th May 2014 are given below:

21 May, 2014

Andaman & Nicobar islands	:	Car Nicobar IAF 5, Car Nicobar 4, Hut Bay 3, Port Blair 2.

22 May, 2014

Andaman & Nicobar islands	:	Nancowry 2.

23 May, 2014

Andaman & Nicobar islands	:	Hut Bay 3.

24 May, 2014

Andaman & Nicobar islands	:	Car Nicobar (IAF) 5, Car Nicobar 3.

25 May, 2014

Coastal Andhra Pradesh	:	Parvatipuram, Chodavaram, Anakapalli and Anakapalle (A) 3 each, Bobbili, Srungavarapukota, Tanuku, Itchapuram and Gajapathinagaram 2 each.
Odisha	:	Akhuapada 4, Chandbali, Astaranga ARG and Alipingal 3 each, Ranpur, Nimpara, Puri, Cuttack, Gopalpur, Kendrapara 2 each.
Andaman & Nicobar islands	:	Hut Bay & Port Blair 3 each, Car Nicobar (IAF), Nancowary and Car Nicobar 2 each.

26 May, 2014

Coastal Andhra Pradesh	:	Kalingapatnam 23, Tekkali 20, Pathapatnam 19, Palakonda 15, Veeragattam and Sompeta 11 each, Parvatipuram 10, Komarada 9, Palasa 9, Itchapuram, Bobbili and Cheepurupalli 7 each, Sathenapalli, Mandasa and Macharla 6 each, Salur 5, Ranasthalam, Rentachintala, Gajapathinagaram and Narsipatnam 3 each, Piduguralla, Therlam, Yellamanchili, Vijayanagaram, Bapatla, Bapatla (A) and Addanki 2 each.
Telangana	:	Miryalguda 8, Karimnagar 5, Nalgonda, Bhongir and Huzurabad 4 each, Kampasagar (A) and Ramannapet 3 each, Sultanabad 2.
Odisha	:	Balasore and Gunupur 21 each, NH 5 Gobindpur and Paralakhemundi 20 each, Kashinagar and Pattamundai 19 each, Nuagada ARG 17, Oro, Mahendragarh and Tihidi ARG 16 each, Dhamnagar ARG, Bhubaneswar Aero, R. Udaigiri and Cuttack 14 each, Tirtol ARG, Basudevpur AWS and Niali ARG 13 each, Mahanga ARG, Khandapara, Bonth, Nilgiri, Kotraguda and Athgarh 12 each, Bissem-Cuttack, Muniguda ARG, Betanati ARG, Jagatsinghpur AWS,

Raghunathpur ARG, Salepur ARG, Nischintakoili ARG and Bhadrak AWS 11 each, Bari ARG and Tikabali 10 each, Binjharpur ARG, Rayagada, Akhuapada, Banki ARG, Chandikhol ARG, Purushottampur, Balikuda ARG and Sorada, Derabis ARG and Gudari 9 each, Chandbali, Kendrapara, Bhograi, Mohana, Dhenkanal, Tigiria ARG Tangi, Jenapur and Kashipureach 8 each, Banarpal ARG, Jaipur, Balipatna ARG, Madhabarida, Anandpur, Thakurmunda, Gopalpur, Hindol, Jajpur, Bolagarh ARG, Balimundali, Danagadi ARG, Pur, Daringibadi and Marsaghai ARG 7 each, Aska, Rajkanika, Berhampur, Banpur, Rajghat, Kotagarh, Narsinghpur, Angul, Talcher, Kamakhyanagar and Parjang ARG 6 each, Nayagarh, Baripada and Belaguntha ARG 5 each, Bhawanipatna, Daspalla, Narla ARG, Joshipur, Altuma CWC, Sukinda, Kaptipada ARG, Udala, Kankadahad ARG, Madanpur Rampur and Kujanga 4 each, ARG, Odagaon ARG, Jaleswar, Similiguda AWS, Gania ARG, Jamsolaghat, Garadapur ARG, G Udayagiri AWS, Karanjia, Phiringia ARG, Koraput, Samakhunta AWS, Harabhanga, Bangiriposi, Kaniha ARG, Rairangpur and Tentulikhunti ARG 3 each.

2.2.4. *Satellite and RADAR observations*

The maximum intensity of T1.5 was reported from 0300 of 21 to 1200 UTC 22nd May

2.3. *Cyclonic Storm 'Nanauk' over Arabian Sea (10 - 14 June 2014)*

2.3.1. A cyclonic circulation extending upto mid tropospheric levels embedded in the east-west shear zone lay over east central Arabian Sea and neighbourhood on 8th. Under its influence, a low pressure area formed over east central and adjoining southeast Arabian Sea on 9th. It lay as a well marked low pressure area over east central Arabian Sea on 10th with associated cyclonic circulation extending upto 7.6 kms a.s.l. It concentrated into a Depression and lay centred near Lat. 15.5°N / Long. 68.5° E, about 610 kms southwest of Mumbai and 630 kms south southwest of Veraval at 0900 UTC of 10th. It moved northwestwards and lay centred near Lat. 16.0° N / Long. 68.0° E, about 620 kms southwest of Mumbai and 600 kms south southwest of Veraval at 1200 UTC of 10th. It further moved northwestwards, intensified into a Deep Depression and lay centred near Lat. 16.5° N / Long. 67.5° E, about 630 kms southwest of Mumbai and 570 kms south southwest of Veraval at 1800 UTC of 10th. Then it moved slowly westwards and further intensified into a Cyclonic Storm 'NANAUK' and lay centred near Lat. 16.5° N / Long. 67.2° E, about 660 kms southwest of Mumbai and 590 kms south southwest of Veraval at 0000 UTC 11th. It continued to move slowly northwestwards and lay centred over east central Arabian Sea near Lat. 16.7° N / Long. 67.0° E, about 670 kms west-southwest of Mumbai and 590 kms south southwest of Veraval at 0300 UTC of 11th. Subsequently moving west northwestwards, it lay centred at 1200 UTC of 11th, near Lat. 17.3° N / Long. 66.2° E and lay centred near Lat. 17.3° N / Long. 66.2° E, about 720 kms west southwest of Mumbai and 590 kms southwest of Veraval at 1200 UTC of 11th. It further moved west northwestwards and lay centred over east central and adjoining west central Arabian Sea near Lat. 18.0° N and Long. 65.0° E, about 830 kms west southwest of Mumbai and 650 kms southwest of Veraval at 0300 UTC of 12th. It moved west northwestwards and lay centred over west central and adjoining east central Arabian Sea, near Lat. 18.3° N / Long. 63.9° E, about 940 kms west southwest of Mumbai and 740 kms west southwest of Veraval at 1200 UTC of 12th. It further moved northwestwards and lay centred over west central Arabian Sea, near Lat. 18.7° N and Long. 62.7° E, about 1080 kms west southwest of Mumbai and 850 kms west southwest of Veraval at 0300 UTC of 13th. It moved northnorthwestwards, weakened into a Deep Depression and lay centred over west central Arabian Sea, near Lat. 19.5° N / Long. 62.5° E at 0900 UTC of 13th. It moved north northwestwards and further weakened into a Depression and lay centered over westcentral Arabian Sea near Lat. 19.8° N / Long. 62.4° E, about 1100 kms west northwest of Mumbai and 850 kms west southwest of Veraval at 1200 UTC of 13th. It further moved northwards and lay centred over northwest and adjoining west central Arabian Sea, near Lat. 20.5° N / Long. 62.0° E, about 1160 kms west northwest of Mumbai and 680 kms west southwest of Veraval at 0000 UTC of 14th. It moved northeastwards and weakened into a well marked low pressure area over the same region at 0300 UTC of 14th. It lay as a low pressure area over northeast and adjoining east central Arabian Sea in the early morning of 15th and became less marked in the same morning. However, the associated cyclonic circulation extending upto mid troposhperic levels lay over northeast Arabian Sea on 14th & 15th; over northeast Arabian Sea and adjoining Gujarat coast between 1.5 & 3.6 kms a.s.l. on 16th. It lay over Saurashtra & Kutch and neighbourhood between 1.5 & 4.5 kms a.s.l. on 17th and between 3.1 & 5.8 kms a.s.l. on 18th.

2.3.2. *Other features observed*

The lowest ECP was 986 hPa from 0000 UTC of 12th to 0600 UTC of 12th June. The maximum estimated mean wind speed was 45 kts.

2.3.3. *Weather and damage caused*

Active monsoon conditions prevailed in Kerala on 11th and 12th June and over coastal Karnataka on 13th. Heavy rainfall occurred at isolated places over coastal Karnataka and Kerala during 10-13 June, 2014. Strong wind of 35-45 kmph prevailed along and off south Gujarat and Konkan & Goa coasts during 10 - 14 June, 2014.

As the cyclone dissipated over the sea, it did not cause any significant damage. However, as the cyclone developed during the full moon day and there was strong wind along west coast of India in association with cyclone and monsoon surge, the tidal waves inundated low lying areas in Konkan, including Mumbai. But no damage has been reported due to this system.

Chief amounts of 24 hrs. Rainfall (5 cm or more) ending at 0300 UTC from 10 to 14 June, 2014 are given below:

10 June, 2014

Coastal Karnataka	:	Kollur 5.
Kerala	:	Enamakkal 7, Vellanikkara 6, Thrissur 5.
Lakshadweep	:	Agathi 8.

11 June, 2014

Coastal Karnataka	:	Gokarna 8, Manki 6, Karwar, Mudubidre and Kadra 5 each.
Kerala	:	Ponnani 12, Thrissur 10, Thrithala, Ernakulam South, Kodungallur and Kochi AP 9 each, Vadakara, Kozhikode, Cherthala and Irinjalakuda 8 each, Mavelikara, Kayamkulam Agri, Manjeri, Kayamkulam, Mancompu, Enamakkal, Irikkur, Vaikom and Vellanikkara 7 each, Alappuzha and Kunnamkulam 6 each, Angadipuram, Kumarakom, Aluva Pwd, CIAL Kochi, Pookot, Chalakudi, Perinthalamanna, Kurudamannil, Pattambi and Kanjirappally 5 each.

12 June, 2014

Coastal Karnataka	:	Mangaluru AP 10, Bantwal and Mudubidre 9 each, Manki, Siddapura and Kollur 8 each, Kundapura and Mani 7 each, Panambur, Bhatkal, Kumta, Honavar, Uppinagadi and Puttur HMS 6 each, Castle Rock, Dharmasthala, Mulki, Shirali, Karkala, Kadra and Belthangady 5 each.
Kerala	:	Ponnani 11, Taliparamba 10, Cheruthazham, Enamakkal and Hosdurg 9 each, Vadakara 8, Kannur, Mancompu and Thalasserry 7 each, Kunnamkulam, Kodungallur, Vaikom and Irikkur 6 each, Quilandi, Ernakulam South, Chengannur, Irinjalakuda, Kozha and Piravam 5 each.
Lakshadweep	:	Agathi 8, Kavaratti 5.

13 June, 2014

Coastal Karnataka	:	Shirali 11, Bhatkal and Manki 9 each, Karkala, Udupi and Karwar 8 each, Honavar, Mangaluru, Panambur, Mani, Bantwal, Mangalooru AP and Gersoppa 7 each, Uppinagadi, Kundapura and Ankola 6 each, Mudubidre, Belthangady, Kumta, Kota, Dharmasthala and Puttur HMS 5 each.
Kerala	:	Cheruthazham 10, Kudulu, Kunnamkulam and Kodungallur 9 each, Vadakara 8, Enamakkal, Kozhikode and Kannur 7 each, Hosdurg and CIAL Kochi 6 each, Thrissur, Thalasserry, Irinjalakuda, Taliparamba and Aluva PWD 5 each.

2.3.4. *Satellite and RADAR observations*

The system was monitored mainly with satellite observations, supported by meteorological buoys and coastal and Island observations.

2.4. *Land Depression over northeastern parts of Odisha and adjoining areas of Gangetic West Bengal (21 - 23 July 2014)*

2.4.1. An upper air cyclonic circulation between 1.5 & 5.8 kms a.s.l. lay over northeast Bay of Bengal and

neighbourhood on 19th. Under its influence, a low pressure area formed over north Bay of Bengal and adjoining areas of Gangetic West Bengal and Odisha and associated cyclonic circulation extended upto 7.6 kms a.s.l. on 20th. It rapidly concentrated into a Depression and lay centred over northeastern parts of Odisha and adjoining areas of Gangetic West Bengal, near Lat. 22° N / Long. 87° E about 50 kms east of Baripada at 0300 UTC of 21st. It moved west northwestwards and lay centred over south Jharkhand and neighbourhood near Lat. 22.5° N / Long. 85.0° E about 100 kms west southwest of Jamshedpur at 1200 UTC 21st. It further moved westwards and lay centred over north Chhattisgarh and neighbourhood near Lat. 22.5° N / Long. 82.5° E about 50 kms southeast of Pendra at 0300 UTC of 22nd and moved westwards and lay centered over east Madhya Pradesh and neighbourhood near Lat. 22.5° N / Long. 81.0° E about 100 kms southeast of Jabalpur at 1200 UTC of 22nd. It further moved westwards and lay centred over west Madhya Pradesh and neighbourhood near Lat. 22.5° N / Long. 77.5° E about 50 kms southeast of Bhopal at 0300 UTC of 23rd and weakened into a well marked low pressure area over the same region by the afternoon of 23rd and persisted there in the same evening. It lay as a low pressure area over northwest Madhya Pradesh and neighbourhood on 24th, lay over southwest Rajasthan and neighbourhood in the evening and merged with the monsoon trough on 25th. However, the associated cyclonic circulation extending upto lower tropospheric levels persisted over southwest Rajasthan and neighbourhood on 25th; lay over northeast Rajasthan and neighbourhood on 26th & 27th; over Punjab and adjoining north Rajasthan on 28th and over Punjab and neighbourhood on 29th & 30th and became less marked on 31st July.

2.4.2. *Other features observed*

The lowest observed Pressure of 986.6 hPa was recorded by AWS station named JAS positioned at 22.8°N / 84.5° E on 1200 UTC of 21st July. Raipur reported wind speed of 15 kts on 0300 UTC of 22nd July.

2.4.3. *Weather and damage caused*

About 10,000 people were evacuated and moved to safer places on 22nd July after the Baitarani river breached its embankment following heavy rain in Odisha's Jajpur district.

About seven people died due to heavy rain in Odisha. Gushing waters washed away the roads while disrupting public transport at many places.

Monsoon was vigorous over Odisha on 21st, over east Madhya Pradesh and Chattisgarh on 22nd and over West Madhya Pradesh, Madhya Maharashtra & Vidarbha on 23rd. it was active over Gangetic West Bengal Vidarbha and Chattisgarh 22nd and over East Madhya Pradesh and Chhattisgarh on 23rd. On 24th, monsoon was vigorous over Gujarat region and Madhya Maharashtra and active over west Madhya Pradesh.

Chief amounts of 24 hrs rainfall (7 cm or more) ending at 0300 UTC from 21st - 23rd July are given below:

21 July, 2014

Gangetic West Bengal	:	Contai 13, SagarIsland AWS 8.
Odisha	:	Anandpur and Nawapara 27 each, Jhorigam ARG and Balasore 26 each, Soro 25, Champua and Pallahara 24 each, Jaipatna 22, Komna and Khaprakhol ARG 21 each, Chandahandi ARG and Ranital AWS 20 each, Ghatagaon and Swam - Patna 19 each, Karanjia 17, Rajghat, Nh5 Gobindpur and Barkote 16 each, Jhumpura, Umarkote, Keongjhargarh, Dabugan ARG, Telkoi, Jharbandh ARG, Joshipur, Bhograi and Nilgiri 15 each, Paikmal, Remuna ARG, Bari ARG and Kaptipada ARG 14 each, Jaleswar, Bonth, Jajpur and Basudevpur AWS 13 each, Raighar ARG, Patnagarh, Kosagumda, Turekela and Jujumura ARG 12 each, Harichandanpur ARG, Lahunipara, Panposh, Danagadi ARG, Bhadrak AWS and Nawana 11 each, Dhamnagar ARG and Belgaon 10 each, Binjharpur ARG, Daitari, Khariar, Kuchinda, Tentulikhunti ARG, Belpada ARG, Chandikhol ARG, Gurundia ARG, Tarva ARG, Rajkanika, Joda ARG, Kashipur, Nawarangpur, Kendrapara, Baripada & Chandbali 9 each, Akhuapada, Derabis ARG, Ranpur, Rairangpur, Kantamal, Chandanpur, Dhenkanal, Junagarh, Reamal, Bolangir, Bamra ARG and Raghunathpur ARG 8 each, Rajgangpur, Betanati ARG, Kotraguda, Nischintakoili ARG, Rengali, Tirtol ARG, Madanpur Rampur, Pattamundai, Ambadola,

	Thakurmunda, Naktideul, Paradip, Birmaharajpur ARG, Jamankira, Lanjigarh, Mandira Dam, Muniguda ARG, Deogarh, Batagaon, Kesinga ARG and Saintala ARG 7 each.

22 July, 2014

Odisha	:	Bijepur 27, Sohela 25, Paikmal 23, Khaprakhol ARG 21, Khariar, Ambabhona, Phiringia ARG and Komna 19 each, Padampur 18, Nawapara 15, Junagarh, Raighar ARG, Jharbandh ARG and Bargarh 13 each, Banaigarh AWS, Patnagarh, Tensa, Keiri AWS and Lahunipara 12 each, Chandahandi ARG, Sinapali ARG & Telkoi 11 each, Jharsuguda AP, Bargaon, Batli ARG, Turekela & Jhorigam ARG 10 each, Deogaon, Gaisilet ARG, Pallahara, Belpada ARG, Binika, Narla ARG, Bhavani P. and Hemgiri 9 each, Deogarh, Jaipatna, Kesinga ARG, Barkote, Dunguripalli, Atabira ARG, Lakhanpur ARG and Reamal 8 each, Bamra ARG, Belaguntha ARG, Titlagarh, Balisankara ARG and Salebhatta ARG 7 each.
Chattisgarh	:	Saraipali 34, Mahasamund 23, Bemetara 21, Arang 19, Simga 18, Bhanupratappur, Bhopalpatnam, Mana AP and Dhamtari 17 each, Baloda Bazar, Raipur and Gariabund 16 each, Durg, Raigarh, Ambagarh Chowki, Kanker and Bijapur 15 each, Dongargarh, Dantewara and Balod 13 each, Deobhog, Sarangarh and Rajnandgaon 12 each, Pali and Kawardha 11 each, Pallari / Palari and Dondilohara 10 each, Kondagaon, Mungeli, Champa, Bilaspur, Janjgir and Pendra 9 each, Rajim 8, Sakti, Katghora, Narayanpur and Dongargaon 7 each.
Vidarbha	:	Deori and Korchi 18 each, Salekasa and Amgaon 17 each, Sadakarjuni and Gondia 14 each, Goregaon 13, Sakoli 11, Tirora, Kurkheda and Lakhani 10 each, Arjuni Morgaon 9, Mohadi, Dhanora, Lakhandur, Bhandara and Pauni 8 each, Desaiganj 7.

23 July, 2014

Vidarbha	:	Chikhalda 28, Wardha, Ashti and Arvi 20 each, Kharangha and Lakhani 18 each, Tiwsa, Deori, Tirora and Jalgaon Jamod 17 each, Chandur Bazar, Akot, Dharni, Narkheda and Salekasa 16 each, Gondia, Amgaon, Sangrampur, Kurkheda and Goregaon 15 each, Tumsar, Kamptee, Dhamangaon Rlwy, Nagpur AP, Chandur Rlwy, Yeotmal and Warud 14 each, Umrer, Pauni, Katol, Telhara, Desaiganj, Deoli, Anjangaon, Akola, Morsi, Kuhi, Perseoni, Bhandara, Samudrapur and Saoner 13 each, Nandgaonkazi, Arjuni Morgaon, Sadakarjuni, Mauda, Hingna and Mohadi 12 each, Bramhapuri, Ramtek, Hinganghat, Daryapur, Sakoli, Chimur, Lakhandur, Ner, Paratwada, Nagbhir, Bhiwapur and Darwha 11 each, Kalmeshwar and Manora 10 each, Mangrulpir, Karanjalad, Amraoti, Balapur, Barshitakli, Murtajapur and Washim AWS 9 each, Armori, Khamgaon, Malegaon, Selu, Batkuli, Ralegaon and Nandura 8 each, Patur and Kalamb 7 each.
West Madhya Pradesh	:	Khaknar 41, Khandwa and Khandwa - AWS 30 each, Nepanagar 24, Bhainsdehi 21, Betul and Betul - AWS 20 each, Atner 19, Pachmarhi 18, Khirkiya-Arg 16, Multai and Burhanpur 15 each, Chicholi 14, Pandhana 13, Kolaras and Harda - AWS 12 each, Bhikangaon 11, Narsingarh and Bhanpura 10 each, Barwaha, Khilchipur and Sonkatch 9 each, Sarangpur, Shegaon, Khargaon, Kurwai, Khategaon and Udaipura 8 each, Bhopal, Bhopal - AWS - Arg, Shivpuri, Budhni, Shivpuri - AWS, Rajgarh and Harsud - ARG 7 each.
Madhya Maharashtra	:	Mahabaleshwar 25, Gaganbawada 17, Shahuwadi 12, Yaval and Jalgaon 11 each, Raver 10, Paud Mulshi, Bhor, Chopda and Patan 9 each, Shirala, Bodwad, Panhala, Chandgad and Ajra 8 each, Radhanagari, Gargoti/ Bhudargad, Satara, Velhe, Dindori and Vadgaon Maval 7 each.

2.5. *Deep Depression over northwest Bay of Bengal and adjoining coastal areas of West Bengal (3 -7 August 2014)*

2.5.1. A cyclonic circulation between 5.8 & 9.5 kms a.s.l. lay over northwest Bay of Bengal and neighbourhood on 1st August. Under its influence, a low pressure area formed over north Bay of Bengal and neighbourhood on 2nd morning. It lay as a well marked low pressure area over the same region on 3rd morning. It concentrated into a Depression and lay centered over northwest Bay of Bengal and adjoining coastal areas of West Bengal near Lat. 21.5° N and Long. 88.5° E about 80 km southeast of Diamond Harbour at 1200 UTC of 3rd. Moving slightly north-northwestwards it intensified into a Deep Depression and lay centred over coastal areas of Gangetic West Bengal near Lat. 21.9° N / Long. 88.3° E, about 80 kms southeast of Kolkata at 1800 UTC of 3rd. It moved west and lay centred over Gangetic West Bengal and neighbourhood at 0300 UTC of 4th, near Lat. 22.5° N / Long. 87.2° E close to Midnapore. Further moving west northwestwards it lay centered over Jharkhand and adjoining Gangetic West Bengal near Lat. 22.2° N / Long. 86.1° E about 50 kms south of Jamshedpur at 1200 UTC of 4th and over north Chhattisgarh, adjoining Jharkhand and east Madhya Pradesh near Lat. 22.2° N / Long. 83.5° E about 100 kms eastsoutheast of Ambikapur at 0300 UTC of 5th. Further moving west northwestwards, it weakened into a Depression and lay centered over north Chhattisgarh and adjoining east Madhya Pradesh near Lat. 23.5° N / Long. 82.5° E about 150 kms, east of Umaria at 0900 UTC of 5th and over northeast Madhya Pradesh and neighbourhood close to Sidhi near Lat. 24.0° N / Long. 82.0° E at 1200 UTC of 5th. It further moved west northwestwards and lay centered over central parts of north Madhya Pradesh and neighbourhood about 50 kms southeast of Khajuraho, near Lat. 24.5° N / Long. 80.2° E at 0300 UTC of 6th. It remained practically stationary and lay centered over the same region close to Nowgong near Lat. 25.0°N / Long. 79.5°E at 1200 UTC of 6th. Moving slightly west-northwestwards it lay centered over northwest Madhya Pradesh and neighbourhood, near Lat. 25.5° N / Long. 78.5° E, about 50 km. southeast of Gwalior at 0000 UTC of 7th. Continuing the west northwestward movement, it weakened into a well marked low pressure area over northwest Madhya Pradesh and neighbourhood at 0300 UTC. It lay as a low pressure area over northwest Madhya Pradesh and adjoining east Rajasthan in the same evening. It merged with the monsoon trough on 8th. However, the associated cyclonic circulation extending up to mid tropospheric levels lay over northeast Rajasthan and neighbourhood on 8th & 9th, northwest Madhya Pradesh and adjoining southwest Uttar Pradesh on 10th, southwest Uttar Pradesh and neighbourhood on 11th and became less marked on 12th.

2.5.2. *Other features observed*

The lowest ECP was 988 hPa at 1200 UTC of 4th August. The maximum observed wind of 14 kts was recorded by Ranchi at 0300 UTC of 5th.

2.5.3. *Weather and damage caused*

Heavy rain in north Odisha caused flooding of Mahanadi, Baitrani, Budhabalanga and Subarnarekha rivers. In all, 32.9 lakh people across 12 districts were affected and 3.22 lakh hectares of crops were damaged. Across 23 districts nearly 830 villages were marooned. Incessant rains under the influence of the Depression occurred in upper catchment areas of Mahanadi river in Chhattisgarh and Jharkhand.

Monsoon was active to vigorous over Odisha during 3rd to 5th, Madhya Maharashtra and Chhattisgarh on 5th, east Madhya Pradesh on 6th and east Rajasthan and West Madhya Pradesh on 7th August 2014. Active monsoon conditions prevailed in Gangetic West Bengal on 4th and 5th August. Widespread rainfall with extremely heavy rainfall at isolated places occurred over Odisha on 4th and 5th August, Gangetic West Bengal on 4th and east Rajasthan on 7th August. Fairly widespread rainfall with extremely heavy rainfall at isolated places occurred over Madhya Maharashtra on 5th. Widespread rainfall activity with heavy rain at a few places and very heavy rain at isolated places occurred over Vidarbha and Chhattisgarh on 5th, east Rajasthan, east Madhya Pradesh and Chhattisgarh on 6th August and West Madhya Pradesh on 7th August.

Chief amounts of 24 hrs rainfall (7 cm or more) ending at 0300 UTC from 3 to 7 August, 2014 are given below:

3 August, 2014

Odisha	:	Sambalpur and Jujumura ARG 20 each, Binika, Athmalik and Bijepur 15 each, Dabugan ARG, Boudhgarh and Phiringia ARG 13 each, Rajkishorenagar and Kashipur 12 each, Rairakhol, Kantamal, Tarva ARG, Khariar and Birmaharajpur ARG 11 each, Sonepur, Ullunda ARG, Banki ARG and Dunguripalli 10 each, Rajkanika, Barpalli ARG and Khairamal 9 each, Bargarh, Sohela and Chandbali 8 each, Tentulikhunti ARG, Binjharpur ARG, Swam -

		Patna, Khandapara, Patnagarh, Nawapara, Jaipatna and Salebhatta ARG 7 each.

4 August, 2014

Gangetic West Bengal	:	Digha 31, Contai 20, Contai and Sagar 16 each, SagarIsland AWS 14, Nandigram 11.
Odisha	:	Sambalpur 34, Jujumura ARG 29, Nh5 Gobindpur and Balasore 23 each, Bhograi and Soro 21 each, Lakhanpur ARG 20, Thakurmunda 19, Nilgiri and Burla ARG 18 each, Jaipur, Basudevpur AWS, Athmalik, Bonth, Binika and Kaptipada ARG 17 each, Atabira ARG, Remuna ARG, Rajkishorenagar and Barmul 16 each, Rairakhol, Hirakud, Udala, Tikarpara and Joshipur 15 each, Danagadi ARG, Jaleswar, Bhuban ARG and Pallahara 14 each, Bhadrak AWS, Kankadahad ARG, Rairangpur and Altuma CWC 13 each, Korei ARG, Ambabhona, Anandpur, Banki ARG, Bargarh and Nawana 12 each, Akhuapada, Telkoi, Rajghat, Kotagarh, Nimpara, Tensa and Kamakhyanagar 11 each, Tihidi ARG, Bijepur, Jagatsinghpur AWS, Kashipur, Ullunda ARG, Narsinghpur, Dhamnagar ARG, Gaisilet ARG, Jaipatna, Sukinda and Balimundali 10 each, Birmaharajpur ARG, Junagarh, Jajpur, Daitari, Deogaon, Umarkote, Jhorigam ARG, Khairamal, Jenapur, Gania ARG, Batagaon, Kendrapara and Pattamundai 9 each, Boden ARG, Nischintakoili ARG, Tiring, Boudhgarh, Derabis ARG, Chandanpur, Mundali, Narla ARG, Barpalli ARG, Betanati ARG, Mohana and Nuagada ARG 8 each, Jhumpura, Binjharpur ARG, Dunguripalli, Garadapur ARG, Tarva ARG, Kantamal, Keongjhargarh, Hindol, Bari ARG, Hemgiri, Kolabira ARG, Tirtol ARG, Swam - Patna, Khandapara, Cuttack, Chandbali, Karanjia, Rajkanika, Dhenkanal, Niali ARG, Batli ARG, Raghunathpur ARG, Raighar ARG and Rengali 7 each.

5 August, 2014

Odisha	:	Pallahara 40, Kuchinda 32, Barkote 29, Tensa and Naktideul 28 each, Sambalpur and Burla ARG 27 each, Deogarh, Jujumura ARG and Jamankira 26 each, Hirakud, Deogaon and Batagaon 25 each, Keiri AWS and Ambabhona 24 each, Kirmira ARG, Kolabira ARG and Atabira ARG 22 each, Bargarh, Athmalik and Banaigarh AWS 21 each, Lahunipara, Bargaon and Bijepur 20 each, Reamal 19, Swam – Patna 18, Karanjia, Rengali, Telkoi and Sundargarh 16 each, Laikera, Rairakhol, Thakurmunda, Keongjhargarh and Jhumpura 15 each, Banki ARG, Sohela, Khariar, Rajkishorenagar and Chandahandi ARG 14 each, Gurundia ARG, Ghatagaon, Sinapali ARG, Bamra ARG, Batli ARG and Joshipur 13 each, Kaniha ARG, Rajgangpur, Kaptipada ARG, Hemgiri, Joda ARG and Chandanpur 12 each, Nawana, Jharsuguda AP, Tikarpara and Junagarh 11 each, Boudhgarh, Champua, Barmul and Kankadahad ARG 10 each, Barpalli ARG, Jhorigam ARG, Balisankara ARG, Boden ARG, Gania ARG, Chendipada, Jaipur, Khandapara, Mandira Dam, Narsinghpur, Bangiriposi and Binika 9 each, Kotagarh, Parjang ARG, Komna, Belgaon, Harichandanpur ARG, Birmaharajpur ARG, Lanjigarh, Udala, Bhavani P., Remuna ARG, Phulbani, Ambadola and Daitari 8 each, Harabhanga, Ullunda ARG, Padampur, Tigiria ARG, Kantamal, Nischintakoili ARG, Raighar ARG, Betanati ARG, Panposh, Altuma CWC, Balimundali, Dunguripalli, Daspalla, Daringibadi, Khairamal, Titlagarh, Dharmagarh ARG and NH5 Gobindpur 7 each.
Chattisgarh	:	Saraipali 16, Dhamtari 15, Deobhog and Bhanupratappur 13 each, Balod and Manendragarh 12 each, Ambagarh Chowki 11, Bilaspur and Sarangarh 10 each, Champa, Janjgir and Dondilohara 9 each, Kanker and Sakti 8 each, Janakpur, Katghora and Pali 7 each.
Vidarbha	:	Korchi 17, Deori and Sadakarjuni 12 each, Amgaon 11, Goregaon and

Gondia 9 each, Kurkheda 8, Salekasa 7.

2.6. *Very Severe Cyclonic Storm (Hud Hud)over the Bay of Bengal (7 -14 October 2014)*

2.6.1. A cyclonic circulation extending upto mid tropospheric levels lay over Gulf of Siam and neighbourhood on 5th. Under its influence, a low pressure area formed over Tenasserim coast and adjoining Andaman Sea on 6th. It lay over north Andaman Sea and neighbourhood on 6th evening. It lay as a well marked low pressure area over the same region in the early morning of 7th which subsequently concentrated into a Depression and lay centred near Lat. 11.5° N / Long. 95.0° E, about 250 kms east southeast of Long Islands at 0300 UTC of 7th. It moved west northwestwards and intensified into a Deep Depression and lay centered near Lat. 12.0° N / Long. 94.0° E, about 130 kms east southeast of Long Islands at 1200 UTC of 7th. It moved west-northwestwards and further intensified into Cyclonic Storm 'HUDHUD' and lay centered close to Long Islands near Lat. 12.3º N / Long. 92. 9º E at 0300 UTC of 8th and crossed Andaman Islands close to Long Islands between 0300 & 0400 UTC of 8th. It continued to move west northwestwards and lay centred at 1200 UTC of 8th over southeast Bay of Bengal, near Lat. 12.8° N / Long. 91.0° E and further intensified into a Severe Cyclonic Storm over east central Bay of Bengal and lay centered near Lat. 13. 8º N / Long. 89. 0º E about 750 kms southeast of Gopalpur and east-southeast of Visakhapatnam at 0300 UTC of the 9th and lay centered over westcentral and adjoining eastcentral Bay of Bengal near Lat. 14. 1º N / Long. 88. 4º E at 1200 UTC of the 9th. Then it moved generally west-northwestwards and lay centered near Lat. 14. 7º N / Long. 87. 2º E over westcentral Bay of Bengal at 0300 UTC of 10th. Subsequently it moved northwestwards and further intensified into a Very Severe Cyclonic Storm near Lat. 15.0º N / Long. 86.8º E, about 470 kms east-southeast of Vishakhapatnam and 520 kms south-southeast of Gopalpur at 0900 UTC of 10th / and lay centred near Lat. 15. 2º N / Long. 86.7º E at 1200 UTC of 10th. It moved northwestwards and then westwards and lay centred near Lat. 16.0° N / Long. 85.4° E, about 300 kms southeast of Vishakhapatnam and 380 kms south-southeast of Gopalpur at 0300 UTC of 11th. Then it moved west-northwestwards and lay centred near Lat. 16. 2º N / Long. 84. 8ºE at 1200 UTC of 11th. It then moved generally northwestwards and lay centred near Lat. 17.4° N / Long. 83.8° E, about 60 kms east-southeast of Vishakhapatnam at 0300 UTC of 12th. Further moving west-northwestwards it crossed north Andhra Pradesh coast over Vishakhapatnam between 0630 & 0730 UTC of 12th. Further moving northwestwards it weakened into a Severe Cyclonic Storm and lay centred over north Andhra Pradesh near Lat. 18. 0º N / Long. 82. 7º E, about 140 kms south-southeast of Jagdalpur and 65 kms northwest of Vishakhapatnam at 1200 UTC of 12th. It further moved north northwestwards and weakened into a Cyclonic Storm over north Andhra Pradesh and adjoining south Odisha, near Lat. 18.3° N / Long. 82.5° E, about 115 kms south-southeast of Jagdalpur and 85 kms northwest of Vishakhapatnam at 1500 UTC of 12th. Further moving northwestwards it weakened into a Deep Depression over south Chhattisgarh and neighbourhood, near Lat. 18.7° N and Long. 82.3° E, about 190 kms south of Raipur at 21 UTC of 12th. Then it moved northwards and lay centred over the same region, near Lat. 20.5° N and Long. 81.5° E, about 90 kms south of Raipur at 0300 UTC of 13th. Moving generally northwards, it further weakened into a Depression and lay centred near Lat. 20.7°N / Long. 81.5°E, about 60 kms west-northwest of Raipur at 0600 UTC of 13th and near Lat. 21.3°N / Long. 81.0° E at 1200 UTC of 13th. Subsequently moving north-northeast and then northeastwards, it lay centred over east Uttar Pradesh, near Lat. 25.1° N / Long. 81.6° E, about 80 kms west-southwest of Varanasi at 0300 UTC of 14th. It moved north-northwestwards and lay centred over east Uttar Pradesh and neighbourhood, near Lat. 26.3° N / Long. 81.8° E, close to north of Fursatganj at 0900 UTC of 14th and further moving northwards, weakened into a well marked low pressure area over east Uttar Pradesh and neighbourhood on the same evening. It became less marked on 15th morning.

2.6.2. *Other features observed*

The lowest ECP was 950 hPa from 0000 UTC of 12th to 0600 UTC of 12th. The maximum estimated mean wind speed was 100 kts. The system moved in a west northwestward direction over the sea area and then northwestwards at the time of landfall. After weakening as a cyclonic storm it moved north- northwestwards and finally in the northward direction. The lowest observed pressure of 950.3 hPa was reported by Visakhapatnam at 0700 UTC (at the time of landfall) of 12th. The maximum sustained wind speed of 70 kts was reported by Visakhapatnam at 0500 UTC of 12th

2.6.3. *Weather and damage caused*

Vigorous monsoon conditions prevailed over Odisha on 12th and 13th, Jharkhand on 13th, Chattisgarh on 13th & 14th, East Madhya Pradesh on 14th and over Sub-Himalayan West Bengal & Sikkim on 15th. Active monsoon conditions prevailed in Gangetic West Bengal on 13th. The VSCS HUDHUD caused heavy to very heavy rainfall at isolated places over Andaman & Nicobar Islands, heavy to very heavy rainfall at a few places with isolated extremely heavy rainfall over North Andhra

Pradesh and South Odisha, heavy to very heavy rainfall at a few places in Chhattisgarh, East Uttar Pradesh, East Madhya Pradesh, isolated heavy to very heavy rainfall over Jharkhand and Bihar and isolated heavy rainfall over Sub-Himalayan West Bengal.

The VSCS, 'HUDHUD' mainly affected North Andhra Pradesh and adjoining south Odisha. In Andhra Pradesh, 46 people lost their lives, and 43 were injured. About 41269 houses were damaged .Thousands of animal including poultry/duck perished. 237854 Hectares of land was submerged.

Chief amounts of 24 hrs rainfall (7 cm or more) ending at 0300 UTC from 7th to 14th are given below:

8 October, 2014

Andaman and Nicobar Islands	:	Port Blair 21, Long Islands 15.

12 October, 2014

Andhra Pradesh	:	Itchapuram 14, Visakhapatnam AP and Kalingapatnam 12 each, Visakhapatnam 11, Pusapatirega, Vizianagaram and Ranasthalam 10 each, Nellimarla, Tekkali and Palasa Mandal (ARG) 9 each, Sompeta, Palasa and Cheepurupalli 8 each, Mandasa, Denkada and Garividi 7 each, Palakonda and Bhimunipatnam 6 each, Araku Valley, Pathapatnam and Therlam 5 each.
Odisha	:	Mahendragarh 12, Basudevpur (AWS) 11, Tihidi (ARG) and Marsaghai (ARG) 10 each, Garadapur (ARG) and Paradeep 9 each, Paralakhemundi and Udala 8 each, Tirtol (ARG), Jaipur, Berhampur, Nischintakoili (ARG) and Bhuban (ARG) 7 each.

13 October, 2014

Andhra Pradesh	:	Gantyada 38, Srungavarapukota 34, Nellimarla 24, Gajapathinagaram 22, Pusapatirega, Bondapalle, Garividi, Palakonda and Denkada 19 each, Anakapalle (a) and Salur 18 each, Vepada 16, Mentada and Seethanagaram 15 each, Merakamudidam 14, Araku Valley (ARG), Vizianagaram and Parvatipuram 13 each, Jiyyamma Valasa, Bobbili and Palasa 12 each, Ranasthalam, Cheepurupalli, Veeragattam and Garugubilli 11 each, Balajipeta, Therlam, Mandasa and Tekkali 9 each, Komarada and Palasa Mandal (ARG) 8 each, Tuni, Kurupam and Kalingapatnam 8 each.
Odisha	:	R. Udaigiri 26, Pottangi and Kalinga 24 each, Mahendragarh 23, Mohana 22, Similiguda (AWS) 21, Malkangiri 18, Tikarpara 17, Nuagada (ARG), Chandanpur, G. Udayagiri (AWS) and Daringibadi 17 each, Belaguntha (ARG) and Khandapara 16 each, Kashipur, Jhorigam (ARG), Raikia (ARG) and Barmul 15 each, Tikabali 14, Banki (ARG) and Rayagada 13 each, Jhumpura 12, Bhanjnagar, Digapahandi (ARG), Ghatagaon, Danagadi (ARG) and Nayagarh 11 each, Tentulikhunti (ARG), Kantapada (ARG), Jagannath Prasad (ARG), Madhabarida, Keonjhargarh, Banpur and Daspalla 10 each, Narsinghpu, Phiringia (ARG), Rajkishorenagar, Odagaon (ARG), Hindol, Bissem-Cuttack, Aska, Paralakhemundi, Nawana, Joda (ARG), Koraput, Betanati (ARG) and Sorada 9 each, Jeypore, Angul and Bangiriposi 8 each, Gunupur, Rairakhol, Kashinagar, Gania (ARG), Chandahandi (ARG), Harabhanga, Tigiria (ARG), Umarkote, Sukinda, Talcher each, Naktideul and Samakhunta (AWS) 7 each
Chhattisgarh	:	Sukma 17, Narayanpur and Jagdalpur 8 each, Kondagaon 7.
Jharkhand	:	Jamshedpur 15, Hazaribagh and Jamshedpur Aero 12 each, Ramgarh and Ghatsila 9 each, Ranchi Aero and Chandil 8 each.

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Andhra Pradesh	:	Denkada 19, Cheepurupalli 12, Garividi 10, Pathapatnam 9.

Odisha	:	R. Udaigiri 19, Paralakhemundi 11, G. Udayagiri (AWS and Nuagada (ARG) 8 each.
Chhattisgarh	:	Manendragarh and Pendra Road 17 each, Pali 15, Kawardha 12, Janakpur and Katghora 11 each, Simga and Mungeli 9 each, Bilaspur and Bemetara 8 each, Janjgir and Durg 7 each.
East Uttar Pradesh	:	Patti, Pratapgarh and Chhatnag 13 each, Bara, Koraon, Salempur and Karchhana 12 each, Phoolpur, Kunda, Allahabad Sadar and Akbarpur 11 each, Allahabad 10, Soraon, Mau Tehsil, Handia, Meja and Sultanpur Obsy 9 each, Faizabad, Varanasi/Bab Aero, Jaunpur (CWC), Haraiya each, Rae Bareli (CWC), Beberu, Fursatganj, Ayoadhya, Sultanpur (CWC) and Tarabganj 7 each.
East Madhya Pradesh	:	Amarkantak 28, Sidhi (AWS) 19, Kotma and Hanumana 18 each, Pushpajgarh and Maihar 16 each, Anuppur (AWS) 13, Rewa (AWS), Sohagpur (AWS) and Gudh 11 each, Jaithari, Bichhia and Satna (AWS) 10 each, Dindori (AWS) 9, Malanjkhand 8, Nagode and Umaria (AWS) 7 each.

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Bihar	:	Tribeni/Balmiki 18, Sheohar 17, Sonbarsa 16, Dhengbridge 15, Gaunaha 14, Lalbegiaghat and Saulighat 12 each, Ramnagar and Chanpatia 11 each, Kamtaul and Chatia 10 each, Jainagar and Ahirwalia 7 each.
East Uttar Pradesh	:	Maharajganj 15, Bansi (CWC), Regoli and Pharenda 12 each, Gorakhpur, Hata and Kakrahi 11 each, Birdghat 10, Domeriaganj, Basti (CWC), Utarala and Bansgaon 9 each, Khalilabad, Sardanagar and Chanderdeepghat 8 each, Ayoadhya, Mukhlispur, Chandauli and Katerniaghat 7 each.
Sub-Himalayan West Bengal & Sikkim	:	Bagdogra 8.

2.6.4. *Satellite and RADAR observations*

At the genesis stage, the system was monitored mainly with satellite observations, supported by meteorological buoys and coastal and island observations. DWR Visakhapatnam monitored the system from 0330 hrs IST of 11th October till 1020 hrs IST of 12th October.

2.7. *Very Severe Cyclonic Storm (Nilofar) over the Arabian Sea (25 - 31 October, 2014)*

2.7.1. A cyclonic circulation extending upto 0.9 km a.s.l., over interior Tamil Nadu and adjoining Kerala persisted there on 16th. It lay over Lakshadweep and adjoining Kerala on 17th. It lay as a trough of low at mean sea level and extended from Lakshadweep area to east central Arabian Sea off Goa coast on 18th; from Lakshadweep area to south Maharashtra coast with an embedded cyclonic circulation extending upto 5.8 kms a.s.l. over Lakshadweep area on 19th and from southeast Arabian Sea and adjoining Lakshadweep area to east central Arabian Sea off Maharashtra coast with the embedded cyclonic circulation over Lakshadweep area persisting upto 5.8 kms a.s.l. on 20th. Under its influence, a low pressure area formed over southeast Arabian Sea and neighbourhood on 21st. It persisted there on 22nd. Associated cyclonic circulation extended upto mid tropospheric levels. The low pressure area over southeast Arabian Sea and neighbourhood lay as a well marked low pressure area over southeast and adjoining east central Arabian Sea on 23rd and over west central and adjoining areas of south and east central Arabian Sea on 24th. It concentrated into a Depression and lay centered over west central and adjoining southwest Arabian Sea near Lat. 12.5º N / Long. 61. 5º E at 0000 UTC of 25th. It remained practically stationary and lay centered near Lat. 12. 5º N / Long. 61. 5º E, about 1400 kms west-southwest of Mumbai and 940 kms east-southeast of Salalah (Oman) at 0300 UTC of 25th. It moved northwestwards and lay centred near Lat. 13. 0º N / Long. 61. 0º E, about 1420 kms west-southwest of Mumbai and 860 kms east-southeast of Salalah (Oman) at 1200 UTC of 25th. It moved nearly northeastwards, intensified into a Deep Depression and lay centred near Lat. 14.0° N / Long. 62.0° E, about 1270 kms west-southwest of Mumbai and 910 kms eastsoutheast of Salalah (Oman) at 0300 UTC of 26th. It moved slightly northwards and further intensified into Cyclonic Storm (Nilofar) and lay centred near Lat. 14.1° N / Long. 62.0° E, about 1270 kms west-southwest

of Mumbai at 0600 UTC of 26th. It slightly moved further northwards and lay centered near Lat. 14.2° N / Long. 62.0° E, about 1240 kms southwest of Naliya (Gujarat) and 1300 kms south-southwest of Karachi (Pakistan) at 1200 UTC of 26th. It moved further northwards and intensified into a Severe Cyclonic Storm and lay centred near Lat. 14.5° N / Long. 62.0° E, about 1180 kms southwest of Naliya (Gujarat) and 1245 kms south-southwest of Karachi (Pakistan) at 2100 UTC of 26th. It further moved slightly northwards and lay centered over westcentral Arabian Sea near Lat. 14.9° N / Long. 62.0° E, about 1170 kms southwest of Naliya (Gujarat) and 1230 kms south-southwest of Karachi (Pakistan) at 0300 UTC of 27th. It remained practically stationary and further intensified into a Very Severe Cyclonic Storm and lay centred near Lat. 14.9° N / Long. 62.0° E, about 1170 kms southwest of Naliya (Gujarat) and 1230 kms south-southwest of Karachi (Pakistan) at 0600 UTC of 27th. It moved slightly northwards and lay centred near Lat. 15.0° N / Long. 62.0° E, about 1165 kms southwest of Naliya (Gujarat) and 1220 kms south-southwest of Karachi (Pakistan) at 1200 UTC of 27th. It moved north-northwestwards and lay centred near Lat. 15.8° N / Long. 61.7° E, about 1110 kms southwest of Naliya (Gujarat) and 1150 kms south-southwest of Karachi (Pakistan) at 0300 UTC of 28th October. Then it moved nearly northwards, intensified further and lay centred near Lat. 16.7° N / Long. 61.8° E, about 1030 kms southwest of Naliya (Gujarat) and 1070 kms south-southwest of Karachi (Pakistan) at 1200 UTC of 28th. It continued to move nearly northwards until the early morning of 29th and then started recurving north-northeastwards and lay centred near Lat. 18.7° N / Long. 62.0° E, about 870 kms west-southwest of Naliya (Gujarat) and 870 kms south-southwest of Karachi (Pakistan) at 0300 UTC of the 29th and near Lat. 19.2° N / Long. 62.2° E, about 820 kms west-southwest of Naliya (Gujarat) and 810 kms south-southwest of Karachi (Pakistan) at 1200 UTC of the 29th. Then it moved northeastwards, weakened into a Severe Cyclonic Storm over west-central Arabian Sea and neighbourhood near Lat. 19.4° N / Long. 63.1° E, about 730 kms southwest of Naliya (Gujarat) and 740 kms south-southwest of Karachi (Pakistan) at 2100 UTC of the 30th October. It further moved northeastwards and lay centered over central and adjoining northeast Arabian Sea near Lat. 19.8° N / Long. 64.1° E, about 620 kms west-southwest of Naliya (Gujarat) and 650 kms south-southwest of Karachi (Pakistan) at 0300 UTC of the 30th October. It moved east-northeastwards and weakened into a Cyclonic Storm and lay centred near Lat. 20.2° N / Long. 64.5° E, about 560 kms southwest of Naliya (Gujarat) and 590 kms south-southwest of Karachi (Pakistan) at 0900 UTC of the 30th October. Thereafter it moved northeastwards and lay centred over northeast Arabian Sea near Lat. 20.5° N / Long. 64.6° E, about 530 kms southwest of Naliya (Gujarat) and 550 kms south-southwest of Karachi (Pakistan) at 1200 UTC of the 30th October. It weakened into a Deep Depression and lay centred over northeast Arabian Sea near Lat. 20.7° N / Long. 65.0° E, about 490 kms southwest of Naliya (Gujarat) and 520 kms south-southwest of Karachi (Pakistan) at 2100 UTC of the 31st October. It further weakened into a Depression and lay centred over northeast Arabian Sea, near Lat. 20.7° N / Long. 65.1° E, about 480 kms southwest of Naliya (Gujarat) and 510 kms south-southwest of Karachi (Pakistan) at 0000 UTC of 31st October. It continued to move northeastwards and further weakened into a well-marked low pressure area over northeast Arabian Sea off north Gujarat coast at 0300 UTC of 31st October. It lay as a low pressure area over northeast and adjoining northwest Arabian Sea on 1st November and became less marked on 2nd. However, associated cyclonic circulation extending upto mid tropospheric levels over northeast and adjoining northwest Arabian Sea persisted there upto 2nd and became less marked on 3rd.

2.7.2. *Other features observed*

The lowest ECP was 950 hPa at 1800 UTC of 28th. The maximum estimated wind speed was 110 kts during the same period. The track of the system was unique, as it initially moved northwestward on the day of formation and then re-curved northeastwards. It further moved nearly northwards very slowly upto 29th evening and then east-northeastwards.

2.7.3. *Weather and damage caused*

Konkan & Goa experienced widespread rain with heavy rainfall at isolated places on 25th and widespread rain with heavy to very heavy rainfalls at a few places on 26th.

No damage has been reported due to this system.

Rainfall amounts more than 7cm, during 24 hrs recorded at 0300 UTC of respective dates are given below:

25 October, 2014

Konkan & Goa	:	Margao 12.

26 October, 2014

Konkan & Goa	:	Margao 29, Marmugao 14, Mapusa 14, Panjim 14, Ponda 12, Dabolim N.A.S.-Navy 11, Quepem 11,

Madhya Maharashtra	:	Sanguem 10, Pernem 8, Vengurla 7. Chandgad 7.

2.7.4. *Satellite and RADAR observations*

Its maximum intensity of T.5.5 was reported within next 6 hours from 28th/1200 UTC. Cyclone Detection Radar (CDR) Bhuj could monitor the system on 31st October.

2.8. *Deep Depression over the Bay of Bengal (5 - 8 November 2014)*

2.8.1. A trough of low at mean sea level lay over south Andaman Sea and adjoining Tenasserim coast on 2nd. It persisted there with a cyclonic circulation aloft extending upto 3.1 kms a.s.l. on 3rd. It organised into a low pressure area over southeast Bay of Bengal and neighbourhood on 4th. It lay as a well marked low pressure area over the same region on 5th morning. Associated cyclonic circulation extended upto 7.6 kms a.s.l. It subsequently concentrated into a Depression and lay centred at 0900 UTC of 5th November over central and adjoining southeast Bay of Bengal, near Lat. 13.0° N / Long. 87.5° E. It remained practically stationary and lay centred at 1200 UTC of 5th November near Lat. 13.0° N /Long. 87.5° E, about 580 kms west-northwest of Port Blair. It moved north-northwestwards and intensified into a Deep Depression and lay centered over westcentral Bay of Bengal near Lat. 14.0° N / Long. 87.5° E about 670 kms west-northwest of Port Blair, 580 kms southeast of Visakhapatnam and 700 kms south-southeast of Paradip at 0300 UTC of 6th. It moved slightly northwestwards and lay centred over the same region, near Lat. 14.1° N / Long. 88.0° E at 1200 UTC of 6th. It remained practically stationary over west central Bay of Bengal and lay centred near Lat. 14.2° N / Long. 87.5° E about 750 kms east-southeast of Ongole and 560 kms southeast of Visakhapatnam at 0300 UTC of 7th November. It remained practically stationary and weakened into a Depression and lay centred near Lat. 14.2° N / Long. 87.5° E at 0600 UTC of 7th and lay centred over the same region near Lat. 14.2° N / Long. 87.5° E at 1200 UTC of 7th, about 750 kms east-southeast of Ongole and 560 kms southeast of Visakhapatnam. It moved west northwestwards and lay centred near Lat. 14.3° N / Long. 86.5° E, about 700 kms east-southeast of Ongole and 510 kms southeast of Visakhapatnam at 0000 UTC of 8th. It further moved westwards and weakened into a well marked low pressure area over west-central Bay of Bengal on 8th morning. It lay over west-central Bay of Bengal and adjoining coastal areas of Andhra Pradesh on 9th and became less marked on 10th. However, associated cyclonic circulation extending upto mid tropospheric levels persisted over south Andhra Pradesh and adjoining west central Bay of Bengal from 8th to 10th and became less marked on 11th.

2.8.2. *Other features observed*

The lowest ECP was 998 hPa from 0300 UTC to 1200 UTC of 6th. The maximum estimated wind speed was 30 kts during 0300 UTC of 6th to 0300 UTC of 7th. It initially moved northwards and then northwestwards. The Buoy 23459 reported the lowest observed m.s.l. pressure of 1001.4 hPa at 0000 UTC of 6th. The maximum wind speed of 25 kts was reported by the buoy 23459 at 0000 UTC of 6th.

2.8.3. *Weather and damage caused*

Under the influence of the Deep Depression, light to moderate rainfall occurred at a few places over Andaman Islands during 4th - 6th November and over Andhra Pradesh on 9th & 10th November.

No damage has been reported due to this system.

Rainfall amounts more than 1cm, recorded at 0300 UTC of respective dates are given below:

4 November, 2014

Andaman and Nicobar Islands	:	Port Blair 4, Mayabandar 3, Nancowary, Hut Bay and Long Island 2 each.

5 November, 2014

Andaman and Nicobar Islands	:	Port Blair 4, Mayabandar, Hut Bay and CarNicobar 2 each

6 November, 2014

Andaman and Nicobar Islands	:	Mayabandar 2.

9 November, 2014

Andhra Pradesh	:	Bapatla 2, Ongole, Kavali 2 each.

10 November, 2014

Andhra Pradesh	:	Kakinada, Peddapuram, Yerragundapalem, Makloor,

	Mahbubnagar-Aswaraopeta, Mulakalapalle, Makthal and Wanaparth 3 each, Dharpalle Nagar, Kurnool, Nizamabad, Maganoor and Bhadrachalam 2 each.

2.8.4. *Satellite observations*

The maximum intensity of T.2.0 was reported based on satellite imageries on 0830 UTC of 6th.