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Cyclonic storms & depressions over the north Indian Ocean during 2023

1. Introduction

During 2023, in all 9 intense low pressure systems formed over the Indian Seas. These include; three extremely severe cyclonic storm (MOCHA, BIPERJOY, TEJ), 1 very Severe Cyclonic Storms (HAMOON), 2 Severe Cyclonic Storms (MIDHILI, MICHAUNG), 1 Deep Depressions and 2 Depressions. Out of these 9 systems, 6 systems formed over the Bay of Bengal and 3 over Arabian Sea. One Depression and 1 Extremely Severe Cyclonic Storm formed over Bay of Bengal Pre monsoon season. Monsoon Season witnessed one Deep Depression and 1 Extremely severe cyclonic storm over Arabian sea and One deep depression over Bay of Bengal. One very Severe Cyclonic Storm and 2 Severe Cyclonic Storm formed over Bay of Bengal and 1 Extremely Severe Cyclonic Storm formed over Arabian sea in Post monsoon season.

The details of these systems are summarised in Table 1 and the tracks are shown in Fig.1 (The tracks and intensities presented here are based on the provisional best track, subject to finalisation by the Track Finalisation committee).

2. Details of the systems during 2023

2.1. *Depression over southeast and adjoining southwest Bay of Bengal (30th January to 2nd February 2023)*

2.1.1. Under the influence of cyclonic circulation over east equatorial Indian ocean and adjoining southeast Bay of Bengal, a **low pressure area** formed over the same region in the morning of 27th Jan. It lay over southeast Bay of Bengal and adjoining east equatorial Indian ocean with the associated cyclonic circulation extending upto mid tropospheric levels. It persisted there on 28th Jan. It lay as **a well marked low pressure area** over the same region in the morning of 29th Jan. and then persisted over the same region till 29th Jan. evening. It moved west-northwestwards and concentrated into a **Depression** and lay centered over southeast and adjoining southwest Bay of Bengal near Lat. 7.7°N / Long. 87.2°E at 0300 hrs UTC of 30th Jan. It moved nearly west-northwestwards and lay centered over southwest and adjoining southeast Bay of Bengal near Lat. 8.0°N / Long. 86.0°E at 1200 hrs UTC of 30th Jan. It further moved nearly west-northwestwards and lay centered over southwest Bay of Bengal near Lat. 8.2°N / Long 84.7°E at 0000 hrs UTC of 31st Jan. It further moved nearly west-northwestwards and lay centered over the same region near Lat. 8.4°N / Long. 84.3°E at 0300 hrs UTC of 31st Jan. It persisted over the same region near Lat. 8.6°N / Long. 83.5°E at 1200 hrs UTC of 31st Jan. It moved west-southwestwards and lay centered over the same region near Lat. 8.2°N / Long. 82.6°E at 0300 hrs UTC of 1st Feb. It moved slowly westwards and lay centered over the same region near Lat. 8.2°N / Long. 82.3°E at 1200 hrs UTC of 1st Feb. It moved west-southwestwards and **crossed Sri Lanka coast between Batticaloa and Trincomalee near Lat. 7.8°N / Long. 81.6°E during 2200 to 2300 UTC of 1st Feb. (0330 to 0430 hours IST of the 2nd)as a depression**. Thereafter, it continued to move west-southwestwards lay centered over Sri Lanka near Lat. 7.6°N / Long. 81.4°E at 0000 hrs UTC of 2nd Feb. It further moved southwestwards and lay centered over south Sri Lanka near Lat. 7.2°N / Long. 81.1°E at 0300 hrs UTC of 2nd Feb. It further moved southwestwards and lay centered over the same region near Lat. 6.3°N / Long. 80.3°E at 1200 hrs UTC of 2nd Feb. It moved southwestwards and weakened into a well-marked low pressure area over Comorin and adjoining Gulf of Mannar and west coast of Sri Lanka at 1800 hrs UTC of 2nd Feb. and then lay over the same region with the associated cyclonic circulation extending upto mid-tropospheric levels. It lay as a low pressure area over Comorin area on 3rdFeb evening and then persisted over the same region with the associated cyclonic circulation extending upto 3.1 km above m. s. l. which became less marked at 1200 hrs UTC of 4th Feb. However, the associated cyclonic circulation extending upto 3.1 km above m. s. l. became less marked on 5th.

2.1.2. *Other features observed*

The lowest estimated central pressure was 1004 hPa and estimated maximum sustained surface wind speed (MSW) was 25 knots during the depression.

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TABLE 1

Brief Summary of cyclonic storms and depressions over the Indian Seas and neighbourhood during 2023

S. No.	Category	Life Period	Place/Time of landfall	Lowest Estimated central Pressure (hPa)	Max. wind Estimated (kts)	C.I. No..
1	Depression over southeast and adjoining southwest Bay of Bengal	30th Jan.– 2nd Feb.	Crossed Sri Lanka coast between Batticaloa and Trincomalee near latitude 7.8° N and longitude 81.6° E during 2200 to 2300 UTC of 1st Feb (0330 to 0430 hours IST of the 2nd Feb) as a **depression.**	1004	25	1.5
2	Extremely Severe Cyclonic Storm 'MOCHA' over Bay of Bengal	9th - 15th May	Crossed North Myanmar – Southeast Bangladesh coasts between KYAUKPYU (Myanmar) and Cox's Bazar (Bangladesh) close to North of Sittwe (Myanmar) near latitude 20.3 and longitude 92.8 during 0700 0900 UTC (1230 1430 hrs IST) of 14th May as **ESCS.**	938	115	6.0
3	Extremely Severe Cyclonic Storm over Arabian Sea 'BIPARJOY'	6th - 19th June	Crossed Saurashtra & Kutch and adjoining Pakistan coasts between Mandvi (Gujarat) and Karachi (Pakistan) close to Jakhau Port (Gujarat) near latitude 23.28° N and longitude 68.56° E during 1700 hours UTC and 1800 hours UTC. 15 Jun. as **VSCS.**	958	90	5.0
4	Deep Depression over northeast Bay of Bengal	1st - 3rd Aug	Crossed Bangladesh coast near latitude 21.9° N and longitude 90.3° E close to east of Khepupara, during 1000 to 1100 UTC on 1st Aug. as **deep depression**	988	30	2.0
5	Depression over eastcentral Arabian Sea	30th Sept. - 1st OCT	Crossed South Konkan coast between Panjim and Ratnagiri during 1500 1700 UTC of 30th Sept. as **depression**	1000	25	1.5
6	Extremely Severe Cyclonic Storm "TEJ" over the Arabian Sea	20th – 24th October	Crossed Yemen coast close to south of Al Ghaidah between 2100 UTC and 2200 UTC of 24th Oct. near Lat.15.9 N/ Long 52.2 E) as a **Severe Cyclonic Storm**	964	95	5.0
7	Very Severe Cyclonic Storm HAMOON" over westcentral Bay of Bengal	21st – 25th October	Crossed Bangladesh coast to the south of Chittagong near Lat. 21.9° N / Long. 91.9° E between 2100 hrs UTC and 2200 hrs UTC of 24th Oct. as a **Cyclonic Storm**	984	65	4.0
8	Severe Cyclonic Storm "MIDHILI" over Bay of Bengal	15th– 18th November	Crossed Bangladesh coast close to east of Patuakhali near 22.3 deg N/90.5 deg E during 0900 1000 UTC of 17th November as a **Severe Cyclonic Storm**	996	50	2.5
9	Severe Cyclonic Storm "MICHAUNG" over Bay of Bengal	1st – 6th December	Crossed South Andhra Pradesh coast close to south of Bapatla during 0700 0900 UTC (1230 1430 IST) of 5th December near Lat 15.7 deg. N and Lon 80.3 deg. E as a **severe Cyclonic Storm**	986	55	3.5

TABLE 2

Storms / Depressions statistics 2023

Name of the system	Winter	Pre-Monsoon			Monsoon				Post-Monsoon			Total
	Jan - Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Over the Bay of Bengal												
Depressions/deep depressions	1	-	-	-	-	-	1	-	-	-	-	**2**
Cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	**-**
Severe cyclonic storms	-	-	-	-	-	-	-	-	-	1	1	**2**
Very severe cyclonic storms	-	-	-	-	-	-	-	-	1	-	-	**1**
Extremely severe cyclonic storms	-	-	-	1	-	-	-	-	-	-	-	**1**
Super cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	-
Land Depression												
Depressions/deep depressions	-	-	-	-	-	-	-	-	-	-	-	-
Over the Arabian Sea												
Depressions/deep depressions	-	-	-	-	-	-	-	1	-	-	-	**1**
Cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	-
Severe cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	-
Very severe cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	-
Extremely severe cyclonic storms	-	-	-	-	1	-	-	-	1	-	-	**2**
Super cyclonic storms	-	-	-	-	-	-	-	-	-	-	-	-
Grand total (Nos.)	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**2**	**1**	**1**	**9**

TABLE 3

Ships Observations during 1st January to 31st December, 2023

Call Sign	Date/ Time (UTC)	Position of the Ship		Wind		Pressure
		Lat. (Deg. N)	Long. (Deg. E)	Dir. (Deg.)	Speed (kts)	PPPP (hPa)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) Extremely Severe Cyclonic Storm 'MOCHA' over Bay of Bengal - (9th May to 15th May 2023)						
3FOS8*	090900	5.5	84.3	230	17	1006.8
7KDL*	090900	5.5	87.6	290	18	1005.5
V7A5139*	090900	6.1	93.4	180	16	1009.8
3FOS8*	091800	5.5	80.8	270	20	1009.8
7KDL*	091800	5.5	91.6	230	21	1005.8
7KDL*	100000	5.5	93.0	220	23	1006.3
V7A5139*	100000	5.9	87.3	260	26	1007.3
7KHY*	101800	5.4	84.9	240	26	1007.7
9V6814*	101800	5.3	80.6	270	20	-
7KHY	110000	5.4	86.3	300	33	1007.2
7KHY	110600	5.4	87.6	250	24	1010.7
9V6814	110600	5.5	83.3	230	25	1011.3
9V6814	111200	5.5	84.7	270	37	1010.3
7KHY	111800	5.3	90.2	250	24	1008.1
2EIF7	121800	5.6	82.6	230	20	1015.4
2E2032	121800	5.5	84.3	260	24	1008.9
9VFV4	131200	5.5	87.4	270	19	1006.4

TABLE 2 (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
DDOR2	131800	5.8	82.3	240	31	1009.5
9V3820	140000	5.7	88.6	260	18	1009.2
9VFV4	140000	5.6	90.8	240	15	1007.4
TBWUK75	141800	5.5	85.0	250	22	1010.2
VRZK9	150000	5.8	86.3	260	15	1011.7
TBWU	151800	5.5	81.5	260	21	1010.2
(B) Extremely Severe Cyclonic Storm 'BIPARJOY' over Arabian Sea (6th June to 19th June 2023)						
VTTR9*	060000	21.6	61.9	220	25	1005.0
VRQX5	061200	8.6	71.4	220	20	1012.0
AWWB	061200	8.4	76.3	300	31	1005.5
VR9E7	070000	21.5	63.8	260	17	1014.2
VROX5	071800	8.0	68.8	250	20	1013.0
7KIZ	080600	8.0	70.0	230	22	1010.3
VRQX5	080600	6.4	12.0	230	36	1014.0
9HY7	090600	6.4	21.8	220	18	1009.4
9HA5180	091800	9.3	64.9	250	20	1006.9
OYGN2	100600	6.4	13.4	240	35	1006.5
AUTP	101800	15.4	68.8	270	78	1004.0
AUTP	110600	15.2	67.2	230	48	1007.5
V7A5141	110000	13.6	71.2	220	26	1002.5
KAOU	120000	12.1	67.9	240	24	1002.7
TBW4K9	120600	9.7	68.4	240	39	1006.3
IBWUQ96	131200	12.1	60.8	230	30	1000.9
V7TM2	130600	16.4	70.1	220	32	1004.2
9V9926	141200	9.5	60.7	230	35	1007.0
TBWUK33	141800	8.9	60.6	230	23	1014.9
9V5241	150600	10.1	65.1	230	20	1010.0
TBWUK33	151800	14.9	60.6	240	30	1009.8
9V5241	160000	12.0	60.0	220	32	1007.0
TBWUK33	160600	17.8	60.6	230	35	1005.8
9V9450	170000	15.6	73.2	250	17	1007.4
(C) Extremely Severe Cyclonic Storm "TEJ" over the Arabian Sea (20th to 24th October, 2023)						
VRVI3*	200000	14.5	60.5	50	17	1011.7
VRVI3	210000	18.1	60.5	050	15	1014.7
V7A6073	220600	10.1	65.2	110	09	1016.7
2ICI4	230000	9.3	60.3	140	10	1011.4
VR005	230600	10.5	65.2	030	05	1001.0
3EPU6	240000	11.3	62.7	050	19	1008.
D) Very Severe Cyclonic Storm "HAMOON" over westcentral Bay of Bengal (21st to 25th October 2023)						
9V7931	211200	14.3	94.3	040	06	1011.0
9V7931	220000	17.1	93.1	140	09	1012.0
E) Severe Cyclonic Storm "MIDHILI" over the Bay of Bengal (15th to 18th November, 2023)						
Nill						
F) Severe Cyclonic Storm "MICHAUNG" over the Bay of Bengal (1st to 6th December, 2023)						
ONKK	050600	9.3	88.7	230	09	1009.0
ONKK	060600	12.0	84.3	180	10	1011.0

* Observations during Depression\deep Depression

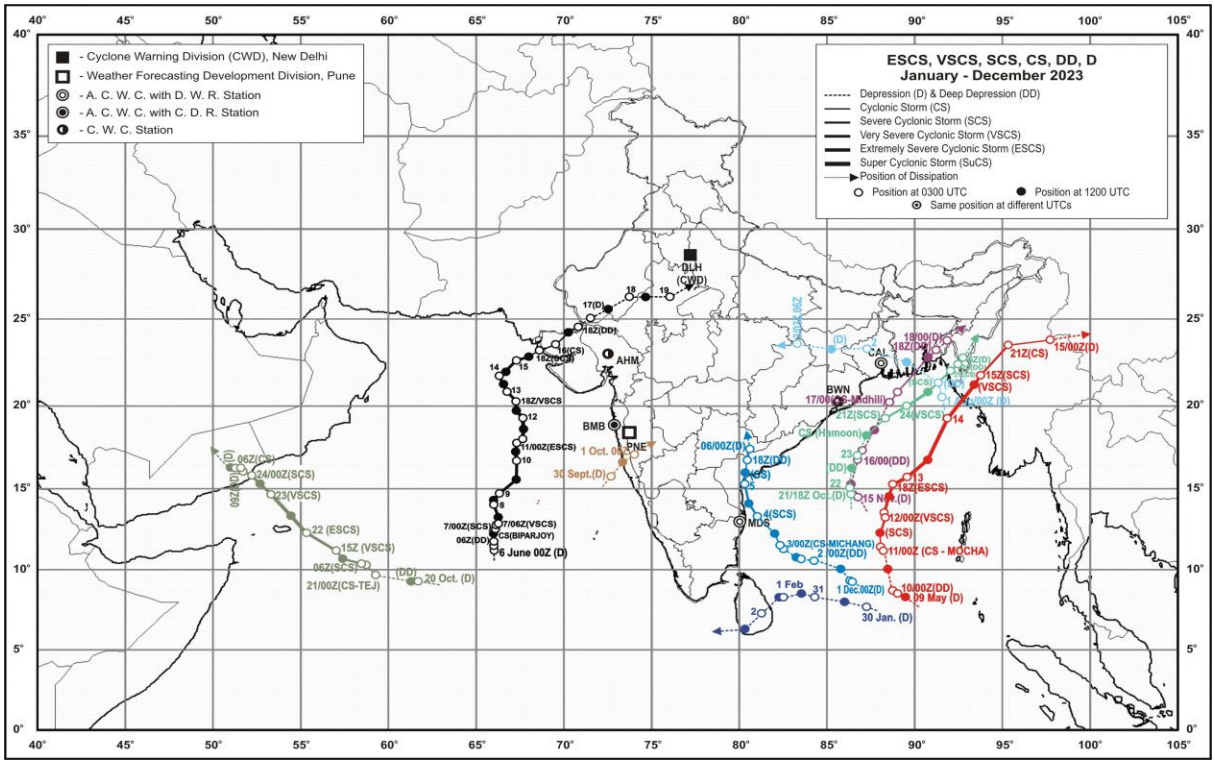

Fig. 1. Tracks of storms and depressions over during the year 2023

Rainfall associated with the depression: Light to moderate rainfall occurred at isolated places & heavy rainfall at isolated places over costal Tamil Nadu on 1st February. Light to moderate rainfall at a few places with heavy to very heavy rainfall at isolated places occurred over south Tamil Nadu and adjoining south Kerala on 2nd February.

2.1.3. *Weather and damage caused*

No damage was reported in association with this system over Sri Lanka and Tamil Nadu, India.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0300 hrs UTC of from 2nd - 3rd February are given below:

2nd February, 2023

Tamil Nadu	Vedaranyam-7

3rd February, 2023

Tamil Nadu, Puducherry & Karaikal	Oothu (Dist Tirunelveli) 16, Nalumukku (Dist Tirunelveli) 13, Kakkachi (Dist Tirunelveli) 12, Velankanni & Needamangalam 10 each, Nannilam, Nagapattinam & Tiruvarur 9 each, Tirupoondi 8 & Thirukuvalai each and Mannargudi, Adirampatnam, Vettikadu, Kodavasal, Neivasal Thenpathi, Ayyampettai, Orthanad & Devakottai 7 each.

2.2. *Extremely Severe Cyclonic Storm 'MOCHA' over Bay of Bengal (9th May to 15th May 2023)*

2.2.1. Under the influence of cyclonic circulation lay over southeast Bay of Bengal and neighbourhood, a low-pressure area formed over southeast Bay of Bengal and adjoining south Andaman sea with the associated cyclonic circulation extended upto mid tropospheric levels on 8th May. It became a well-marked low pressure area over the same region at 0000 hrs. UTC of 9th May and then persisted over the same region. It further concentrated into a **Depression** and lay centered over southeast Bay of Bengal near Lat. 8.3° N / Long. 89.5° E at 1200 hrs UTC of 9th May. It moved west-northwestward and intensified into a **Deep Depression** and lay centered over the same region near Lat. 8.5°N / Long. 89.0° E at 0000 hrs UTC of 10th May. It further moved northwestward and lay centered over the same region near Lat. 8.8° N / Long. 88.9° E at 0300 hrs UTC of 10th May. It moved north-northwestwards and lay centered over the same region near Lat. 10.0° N / Long. 88.4° E at 1200 hrs UTC of 10th May. It further moved north-northwestwards and intensified into a **Cyclonic Storm "Mocha" pronounced as "Mokha"** and lay centered over the same region near Lat. 11.2° N / Long 88.1° E at 0000 hrs UTC of 11th May. It moved north-northwestwards and lay centered over the same region

near Lat. 11.4° N / Long 88.0° E at 0300 hrs UTC of 11th May. It further moved northwards and intensified into a **Severe Cyclonic Storm** and lay centered over the same region near Lat 12.2° N / Long. 88.0° E at 1200 hrs UTC of 11th May. It moved northwards and intensified into a **Very Severe Cyclonic Storm** and lay centered over central and adjoining southeast Bay of Bengal near Lat. 13.2° N / Long. 88.1° E at 0000 hrs UTC of 12th May. It then moved north-northeastwards and lay centered over the same region near Lat. 13.6° N / Long. 88.2° E at 0300 hrs UTC of 12th May. It moved north-northeastwards and lay centered over central Bay of Bengal near lat. 14.0° N / Long. 88.3° E at 0600 hrs UTC of 12th May. It moved north-northeastwards and lay centered over the same region near Lat. 14.6° N / Long. 88.6° E at 1200 hrs UTC of 12th May. It moved nearly north-northeastwards and intensified into a **Extremely Severe Cyclonic Storm** over eastcentral Bay of Bengal and lay centered near Lat. 15.1° N / Long. 88.8° E at 1800 hrs UTC of 12th May. It moved nearly northeastwards and lay centered over the same region near Lat. 15.7° N / Long. 89.5° E at 0300 hrs UTC of 13th May. It moved nearly northeastwards lay centered over the same region near Lat. 16.4° N / long. 90.3° E at 0900 hrs UTC of 13th May. It moved nearly north-northeastwards and lay centered near Lat. 16.9° N / Long. 90.8° E at 1200 hrs UTC of 13th May. It further moved nearly north-northeastwards and lay centered over northeast and adjoining eastcentral Bay of Bengal near Lat. 18.7° N / Long. 91.5° E at 0000 hrs UTC of 14th May which further moved nearly north-northeastward and lay centered over the same region near Lat. 19.3° N / Long. 91.9° E at 0300 hrs UTC of 14th May. It moved north-northeastwards and **crossed north Myanmar-southeast Bangladesh coasts between Kyaukpyu (Myanmar) and Cox's Bazar (Bangladesh) close to north of Sittwe (Myanmar) near Lat 20.25° N / Long. 92.75° E as an Extremely Severe Cyclonic Storm during 0700 to 0900 hrs UTC of 14th** May**.** It lay centered over coastal Myanmar near Lat. 20.5° N / Long. 92.9° E at 0900 hrs UTC of 14th May. It moved north-northeastwards and weakened into a **Very Severe Cyclonic Storm** and lay centred over Myanmar near Lat.21.1° N / Long. 93.3° E at 1200 hrs UTC of 14th May. It further moved north-northeastwards and weakened into a **Severe Cyclonic storm** and lay centred over Myanmar near Lat. 21.8° N / Long. 93.8° E at 1500 hrs UTC of 14th May which further moved north-northeastwards and weakened into a **Cyclonic Storm** and lay centred over Myanmar near Lat. 23.5° N / Long. 95.3° E at 2100 hrs UTC of 14th May. It moved east- northeastwards and rapidly weakened into a **Depression** and lay centred over Myanmar near Lat. 23.9° N / Long. 97.8° E at 0000 hrs UTC of 15th May and then moved southeastwards and weakened into a w**ell-marked low pressure area** which lay centered over northeast Myanmar at 0300 hrs UTC of 15th May. It further weakened into a low pressure area and lay centred over the same area at 0900 hrs UTC of 15th May and then became unimportant for Indian region.

2.2.2. *Other features observed*

The estimated maximum sustained surface wind speed (MSW) was 115 knots at 1800 UTC of 13th May and maintained it's peak intensity till 0000 UTC of 14th May. The estimated central pressure during this period was 938 hPa with pressure drop of about 66 hPa.

2.2.3. *Weather and damage caused*

As per media reports from Myanmar (Associated Press Television News, 19th May), the ESCS MOCHA caused 145 deaths in Myanmar. It caused widespread flash floods and power outages, extensive damage to buildings, cell phone towers, trees etc. in Myanmar. The adjoining areas of southeast Bangladesh also received the impact of "MOCHA". Many houses were damaged and trees fell because of strong winds and heavy rainfall. However, no death was reported from Bangladesh. In India, No damage has been reported from Andaman & Nicobar Islands. However, Mizoram state received the burnt from "ESCS MOCHA". Three deaths were reported from Mizoram due to landslides caused by heavy rain and strong winds over Mizoram.

2.3. *Extremely Severe Cyclonic Storm 'BIPARJOY' over Arabian Sea (6th June to 19th June 2023)*

2.3.1. Under the influence of cyclonic circulation lay over southeast Arabian sea, a **low-pressure area** formed over the same region with the associated cyclonic circulation extended upto mid-tropospheric levels on 5th June evening. It concentrated into a **Depression** over the same region and lay centered near Lat. 11.3° N / Long. 66.0° E at 0000 hrs UTC of 6th June. It then lay centered near Lat. 11.5° N / Long. 66.0° E over the same region at 0300 hrs UTC of 6th June. It moved nearly northwards and further intensified into a **Deep Depression** and lay centered over southeast and adjoining eastcentral Arabian sea near Lat. 11.9° N / Long. 66.0° E at 0600 hrs UTC of 6th June. It continued to move nearly northwards and intensified into a **Cyclonic Storm "Biparjoy" (pronounced as "Biporjoy")** and lay centered over eastcentral and adjoining southeast Arabian sea near Lat. 12.1° N / Long. 66.0° E at 1200 hrs UTC of 6th June. It further moved nearly northwards and intensified into a **Severe Cyclonic Storm** and lay centered over the same region near Lat. 12.6° N / Long. 66.1° E at 0000 hrs UTC of 7th June. It moved nearly north-northeastwards and lay centered over the same region near Lat. 12.7° N / Long.

66.2° E at 0300 hrs UTC of 7th June. It further moved nearly north-northeastwards and intensified into a **Very Severe Cyclonic Storm** and lay centered over the same region near Lat. 12.8° N / Long. 66.3° E at 0600 hrs UTC of 7th June. It moved nearly northwards and lay centered over the same region near Lat. 13.3°N / Long. 66.2° E at 1200 hrs UTC of 7th June. It further moved nearly northwards and lay centered over the same region near Lat. 14.0° N / Long. 66.0° E at 0300 hrs UTC of 8th June. It further moved nearly northwards and lay centered over the same region near Lat. 14.4° N / Long. 66.0° E at 1200 hrs UTC of 8th June. It moved slowly north-northeastwards and lay centered over the same region near Lat. 14.8° N / Long. 66.4° E at 0300 hrs UTC of 9th June. It moved northeastwards and lay centered over the same region near Lat. 15.5° N / Long. 67.1° E at 1200 hrs UTC of 9th June. It moved nearly northwards and lay centered over the same region near Lat. 16.5° N / Long. 67.4° E at 0000 hrs UTC of 10th June. It further moved nearly northwards and lay centered over the same region near Lat. 16.7° N / Long. 67.4° E at 0300 hrs UTC of 10th June. It again moved nearly northwards and lay centered over the same region near Lat. 17.1° N / Long. 67.3° E at 1200 hrs UTC of 10th June. It moved north-northeastwards and intensified into an **Extremely Severe Cyclonic Storm** and lay centered over the same region near Lat. 17.9° N / Long. 67.4° E at 0000 hrs UTC of 11th June. It moved north-northeastwards and lay centered over the same region near Lat. 18.0° N / Long. 67.6° E at 0300 hrs UTC of 11th June and moved nearly northwards and lay centered over the same region near Lat. 18.6° N / Long. 67.7° E at 1200 hrs UTC of 11th June. It moved northwards and lay centered over the eastcentral and adjoining northeast Arabian sea near Lat. 19.2° N / Long. 67.7° E at 0000 hrs UTC of 12th June. It further moved northwards and lay centered over the same region near Lat. 19.4° N / Long. 67.7° E at 0300 hrs UTC of 12th June. It moved nearly northwestwards and lay centered over the same region near Lat. 19.9° N / Long. 67.3° E at 1200 hrs UTC of 12th June. It weakened into a **Very Severe Cyclonic Storm "Biparjoy" (pronounced as "Biporjoy")** over northeast and adjoining eastcentral Arabian sea near Lat. 20.1° N / Long. 67.2° E at 1800 hrs UTC of 12th June. It moved north-northwestwards and lay centered over the same region near Lat. 20.6° N / Long. 67.0° E at 0000 hrs UTC of 13th June. It further moved nearly north-northwestwards and lay centered over the same region near Lat. 20.9° N / Long. 66.9° E at 0300 hrs UTC of 13th June. It moved nearly northwestwards and lay centered over northeast Arabian sea near Lat. 21.0° N / Long. 66.7° E at 0600 hrs UTC of 13th June. It moved nearly north-northwestwards and lay centered over the same region near Lat. 21.3° N / Long. 66.5° E at 1200 hrs UTC of 13th June. It moved nearly northwards and lay centered over the same region near Lat. 21.9° N / Long. 66.3° E at 0000 hrs UTC of 14th June. It moved slowly northwards and lay centered over the same region near Lat. 21.9° N / Long. 66.3° E at 0300 hrs UTC of 14th June. It moved nearly northeastwards and lay centered over the same region near Lat. 21.9° N / Long. 66.5° E at 0900 hrs UTC of 14th June. It moved east-northeastwards and lay centered over the same region near Lat. 22.0° N / Long. 66.7° E at 1200 hrs UTC of 14th June. It moved north-northeastwards and lay centered over the same region near Lat. 22.5° N / Long. 67.0° E at 0000 hrs UTC of 15th June. It further moved north-northeastwards and lay centered over the same region near Lat. 22.6° N / Long. 67.1° E at 0300 hrs UTC of 15th. It moved east-northeastwards and lay centered over the same region near Lat. 22.8° N / Long. 67.6° E at 0900 hrs UTC of 15th June. It moved nearly eastwards and lay centered over the same region near Lat. 22.9° N / Long. 68.0° E at 1200 hrs UTC of 15th June. It moved northeastwards and **crossed Saurashtra, Kutch and adjoining PakUTCan coasts between Mandvi (Gujarat) and Karachi (PakUTCan) close to Jakhau Port (Gujarat) between 1700 to 1800 hrs UTC of 15th June** and weakened into a **Severe Cyclonic Storm** over Saurashtra and Kutch at 1800 hrs UTC of 15th June. Continuing to move northeastwards, it lay centered over Saurashtra and Kutch near Lat. 23.6° N / Long. 69.2° E at 0000 hrs UTC of 16th June. It moved east-northeastwards and further weakened into a **Cyclonic Storm** and lay centered over the same region near Lat. 23.4° N / Long. 69.5° E at 0300 hrs UTC of 16th June. It moved nearly northeastwards and lay centered over the same region near Lat. 23.9° N / Long. 70.0° E at 0900 hrs UTC of 16th June. It moved nearly northeastwards and lay centered over Kutch and adjoining PakUTCan near Lat. 24.2° N / Long. 70.3° E at 1200 hrs UTC of 16th June. It moved northeastwards and lay centered over southeast PakUTCan, adjoining southwest Rajasthan and Kutch near Lat. 24.5° N / Long. 70.7° E at 1500 hrs UTC of 16th June. It moved nearly northeastwards and weakened into a **Deep Depression** and lay centered over the same region near Lat. 24.6° N / Long. 70.9° E at 1800 hrs UTC of 16th June. It moved east-northeastwards and lay centered over southwest Rajasthan, adjoining Gujarat and southeast PakUTCan near Lat. 24.7° N / Long. 71.2° E at 0000 hrs UTC of 17th June. It moved northeastwards and lay centered over the same region near Lat. 25.0° N / Long. 71.5° E at 0300 hrs UTC of 17th June. It moved northeastwards and lay centered over southwest Rajasthan and adjoining Gujarat near Lat. 25.3° N / Long. 71.9° E at 0600 hrs UTC of 17th June. It moved east-northeastwards and weakened into a **Depression** and lay centered over south Rajasthan and adjoining north Gujarat near Lat. 25.6° N / Long. 72.5° E at 1200 hrs UTC of 17th June. It moved east-northeastwards and lay centered over central parts of south Rajasthan and neighbourhood near Lat. 25.8° N / Long. 72.8° E at 1800 hrs UTC 17th June. It

moved east-northeastwards and lay centered over the same region near Lat. 26.2° N / Long. 73.8° E at 0300 hrs UTC of 18th June. It moved nearly eastwards and lay centered over central parts of east Rajasthan near Lat. 26.3° N / Long. 74.7° E. at 1200 hrs UTC of 18th June It moved nearly eastwards and weakened and lay centered as a **well marked low pressure area** over central parts of northeast Rajasthan and neighbourhood at 0300 hrs UTC of 19th June. It lay over northeast Rajasthan, adjoining areas of northwest Madhya Pradesh and southwest Uttar Pradesh on 19th evening. It further weakened into a **low pressure area** which lay over northwest Madhya Pradesh, adjoining areas of northeast Rajasthan and southwest Uttar Pradesh and then lay over southwest Uttar Pradesh, adjoining areas of northwest Madhya Pradesh and northeast Rajasthan with the associated cyclonic circulation extending upto middle tropospheric levels on 20th morning. It lay over central Uttar Pradesh with the associated cyclonic circulation extended upto middle tropospheric levels on 20th evening and then perssisted over the same region.

2.3.2. *Other features observed*

Maximum sustained wind speed and estimated central pressure: The system reached its peak intensity of 90 knots at 0000 UTC of 11th June and maintained it's peak intensity till 1500 UTC of 12th June. The estimated central pressure during this period was 958 hPa with pressure drop of about 40 hPa at the centre.

Realised wind at different stations of Saurashtra and Kutch during landfall: Dwarka reported 130 kmph, Kandla 115 kmph, Sikka 111 kmph and Mundra Port 102 kmph.

The system caused heavy to extremely heavy rainfall over Gujarat region and Saurashtra and Kutch on 13th and during 15th to **18th** June, over Rajasthan during 16th to 20th June and heavy to very heavy rainfall over Madhya Pradesh during on 19th to 21st June

2.3.3. *Weather and damage caused*

As per available reports, no death was reported from Gujarat, 7 deaths were reported from Rajasthan due to heavy rain related incidents associated with Biparjoy cyclone.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0830 hours UTC of date the 13th - 20th June:

13th June:

Saurashtra & Kutch	Sutrapada (dUTC Gir Somnath) 21, Veraval (dUTC Gir Somnath) 20, Keshod (dUTC Junagadh) 20, Mendarda (dUTC Junagadh) 19, Malia (dUTC Junagadh) 18, Mangrol(j) (dUTC Junagadh) 14, Talala (dUTC Gir Somnath) 13, Vanthali (dUTC Junagadh) 12, Manavadar (dUTC Junagadh) 11, Junagarh_aws (dUTC Junagadh) 10, Junagadh (dUTC Junagadh) 8, Porbandar (dUTC Porbandar) 8, Upleta (dUTC Rajkot) 8, Visavadar (dUTC Junagadh) 7, Bhanvad (dUTC Devbhoomi Dwarka) 7, Kutiana (dUTC Porbandar) 7.

14th June:

Saurashtra & Kutch	Khambhalia (dUTC Devbhoomi Dwarka) 12, Okha (dUTC Devbhoomi Dwarka) 11, Kalyanpur (dUTC Devbhoomi Dwarka) 7, Dwarka (dUTC Devbhoomi Dwarka) 7, Upleta (dUTC Rajkot) 7, Jamjodhpur (dUTC Jamnagar) 7.

15th June: Nil

16th June:

Gujarat Region	Wav (dUTC Banaskantha) 8,
Saurashtra & Kutch	Gandhidham (dUTC Kutch) 20, Kandla Airport (dUTC Kutch) 16, Dwarka (dUTC Devbhoomi Dwarka) 15, Anjar (dUTC Kutch), Bhuj (dUTC Kutch) & Mundra (dUTC Kutch) 13 each, Okha (dUTC Devbhoomi Dwarka) 11, Kandla New (dUTC Kutch) & Khambhalia (dUTC Devbhoomi Dwarka) 10 each, Jamjodhpur (dUTC Jamnagar) 9, Kalyanpur (dUTC Devbhoomi Dwarka) 8, Jamnagar (dUTC Jamnagar), Naliya (dUTC Kutch) & Kalavad (dUTC Jamnagar) 7 each. 13

17th June

Saurashtra & Kutch	Okha (dUTC Devbhoomi Dwarka) 23, Anjar (dUTC Kutch) 22, Mandvi(k) (dUTC Kutch) 22, Bhachau (dUTC Kutch) 21, Mundra (dUTC Kutch) 19, Rapar (dUTC Kutch) 19, Nakhatrana (dUTC Kutch) 17, Kandla New (dUTC Kutch) 17, Jamnagar (dUTC Jamnagar) 16, Gandhidham (dUTC Kutch) 15, Khambhalia (dUTC Devbhoomi Dwarka) 13, Bhuj (dUTC Kutch) 13, Kandla Airport (dUTC Kutch) 12, Lodhika (dUTC Rajkot) 11, Lakhpat (dUTC Kutch) 10, Kalavad (dUTC Jamnagar) 10, Chuda (dUTC Surendranagar) 10, Wankaner (dUTC Morbi) 9, Jodia (dUTC

	Jamnagar) 9, Rajkot (dUTC Rajkot) 9, Tankara (dUTCMorbi) 8, Morbi (dUTC Morbi) 8, Dhrol (dUTC Jamnagar) 7, Abdasa (dUTC Kutch) 7, Targhadia (dUTC Rajkot) 7, Chotila (dUTC Surendranagar) 7, Halvad (dUTC Morbi) 7, Jamnagar (dUTC Jamnagar) 7.
Gujarat Region	Vadgam 11, Dhanera 11, Dantiwada 10, Deodar 9, Radhanpur 9, Vadali 9, Harij 9, Santalpur 8, Poshina 8, Bhabhar 8, Visnagar 8, Deesa 8, Suigam 8, Khedbrahma 8, Sami 7, Satlasana 7, Dantewadaaws 7, Dharoi Colony 7, Palanpur 7,
West Rajas-than	Mt. Abu (Sirohi) 21, Sedwa (Barmer) 14, Mounntabu Tehsil (Sirohi) 13, Raniwada (Jalore) 11, Bidasra (Churu) 8 and Reodar (Sirohi) 7.
East Rajas-than	Mounntabu Tehsil 13, Reodar 7.

18th June:

Gujarat Region	Amirgadh (dUTC Banaskantha) 21, Danta (dUTC Banaskantha) 17, Dhanera (dUTC Banaskantha) 16, Dantiwada (dUTC Banaskantha) 15, Poshina (dUTC Sabarkantha) 15, Palanpur (dUTC Banaskantha) 14, Santalpur (dUTC Patan) 13, Deesa (dUTC Banaskantha) 13
Rajas-than	Mounntabu (Sirohi) 36, Chitalwana (Jalore) 34, Raniwada (Jalore) 32, Jalore (Jalore) 32, Sheoganj (Sirohi) 31, Sanchore (Jalore) 30, Jaswantpur (Jalore), 29, Sumerpur (Pali) 27, Chotan (Barmer) 27, Dhorimanna (Barmer) 26, Rani (Pali) 25, Reodar (Sirohi) 24, Bali (Pali) 24, Siwana (Barmer) 24, Bagoda (Jalore) 23, Jawai Dam (Pali) 23, Abu Road (Sirohi) 20, Pali (Pali) 20, Samdari (Barmer) 20, Sedwa (Barmer) 19, Dhanau (Barmer) 18, Balotra (Barmer) 18, Desuri (Pali) 18, Pindwara (Sirohi) 18, Bhinmal (Jalore) 17, Deogarh (Rajsamand) 15, Guddamalan (Barmer) 14, Marwar (Pali) 13, Junction Pachbhadra (Barmer) 13, Sirohi (Sirohi) 13, Kubhalgarh (Rajsamand) 12, Gadhbor (Rajsamand) 12, Gogunda (Udaipur) 12, Bhadrajun (Jalore) 11, Ahore (Jalore) 10, Kotda (Udaipur) 10, Nokda (Barmer) 9, Jodhpur (Jodhpur) 9, Luni (Jodhpur) 9, Kalyanpur (Barmer) 9, Sindhari (Barmer) 9,Jodhpur (Jodhpur) 9, Rohat (Pali) 9, Baitu (Barmer) 8, Sayla (Jalore) 8, Sojat (Pali) 8, Amet (Rajsamand) 7, Ramsar (Barmer) 7, Todgarh (Ajmer) 7

19th June:

Gujarat Region	Danta (dUTC Banaskantha) 13, Amirgadh (dUTC Banaskantha) 9, Khedbrahma (dUTC Sabarkantha) 8, Vijaynagar (dUTC Sabarkantha) 7,
East Rajas-than	Sheoganj (dUTC Sirohi) 35, Nagrarfort (dUTC Tonk) 31, Deogarh (dUTC Rajsamand) 27, Kumbhalgarh (dUTC Rajsamand) 25, Amet (dUTC Rajsamand) 24, Rajsamand (dUTC Rajsamand) 22, Ajmer Tehsil (dUTC Ajmer) 16, Reodar (dUTC Sirohi) 15, Srinagar (dUTC Ajmer) 15, Pushkar (dUTC Ajmer) 15, Deoli (dUTC Tonk) 15, Nainwa (dUTC Bundi) 14, Mandal (dUTC Bhilwara) 13, Ajmer (dUTC Ajmer) 13, Tonk Tehsil (dUTC Tonk) 13, Piplu (dUTC Tonk) 13, Kekri (dUTC Ajmer) 12, Nasirabad (dUTC Ajmer) 11, Railmagra (dUTC Rajsamand) 11, Pindwara (dUTC Sirohi) 11, Abu Road (dUTC Sirohi) 11, Gegal (dUTC Ajmer) 11, Jawaja (dUTC Ajmer) 11, Tatgarh (dUTC Ajmer) 10, Bhinay (dUTC Ajmer) 9, Bhim (dUTC Rajsamand) 9, Kishangarh (dUTC Ajmer) 9, Niwai (dUTC Tonk) 9, Jahazpur (dUTC Bhilwara) 9, Nathdwara (dUTC Rajsamand) 9, Sahada (dUTC Bhilwara) 9, Raipur (dUTC Bhilwara) 9, Uniara / Aligarh (dUTC Tonk) 8, Asind (dUTC Bhilwara) 8, Gogunda (dUTC Udaipur) 8, Arai (dUTC Ajmer) 8, Todaraisingh (dUTC Tonk) 8, Sirohi (dUTC Sirohi) 8, Geola (dUTC Ajmer) 8, Sarwar (dUTC Ajmer) 8, Mangliawas (dUTC Ajmer) 7, Rashmi (dUTC Chittorgarh) 7, Pisagan (dUTC Ajmer) 7, Hurda (dUTC Bhilwara) 7, Kotda (dUTC Udaipur) 7, Tonk Vanasthali (dUTC Tonk) 7, Malpura (dUTC Tonk) 7, Hindoli (dUTC Bundi) 7, Vijaynagar (dUTC Ajmer) 7.
West Rajas-than	Desuri (dUTC Pali) 38, Sumerpur (dUTC Pali) 28, Erinpura/jawai Dam (dUTC Pali) 24, Bali (dUTC Pali) 19, Ahore Sr (dUTC Jalore) 17, Marwar Junction (dUTC Pali) 14, Jalore (dUTC Jalore) 9, Jaswantpura (dUTC Jalore) 8, Merta City (dUTC Nagaur) 8, Bilara (dUTC Jodhpur) 7, Pali (dUTC Pali) 7.
West Madhya Pradesh	Ratlam 7

20th June:

East Rajas-than	Dholpur Tehsil (dUTC Dholpur) 19, Ajmer (dUTC Ajmer) 15, Banera (dUTC Bhilwara) 12, Kishangarh (dUTC Ajmer) 11, Ajmer Tehsil (dUTC Ajmer) 11, Nasirabad (dUTC

Ajmer) 11

West Madhya Pradesh	Ater (dUTC Bhind) 14, Morena (dUTC Morena) 13, Gormi (dUTC Bhind) 12, Ambah (dUTC Morena) 12, Badoda (dUTC Sheopur) 10,
West Uttar Pradesh	Khairagar 13.

2.4. *Deep Depression over northeast Bay of Bengal (1st Aug to 3rd Aug 2023)*

2.4.1. Under the influence cyclonic circulation westcentral and adjoining northwest Bay of Bengal off north Andhra Pradesh-south Odisha coasts, a **low pressure area** formed over the same region on 24th Jul. evening. It intensified into a **well marked low pressure area** over the same region on 25th Jul. morning and then persisted over the same region with the associated cyclonic circulation extending upto 7.6 km above m. s. l. on 25th Aug. It persisted there on 26th Jul. It lay over south Odisha, adjoining north coastal Andhra Pradesh and neighbourhood on 27th Jul. morning and then weakened into a low pressure area over the same region with the associated cyclonic circulation extended upto 7.6 km above m.s. l. on 27th Jul. It lay over interior Odisha and adjoining Chhattisgarh on 27th Jul. evening and lay over north Odisha and neighbourhood on 28th Jul. morning which then became less marked. However, the associated cyclonic circulation lay over north Odisha, adjoining areas of Gangetic West Bengal and Jharkhand which extended upto 5.8 km above m. s. l. tilting southwards with height on 28th Jul. It lay over Gangetic West Bengal and adjoining north Odisha on 29th Jul. morning. Under its influence, a low pressure area formed over north Odisha and adjoining south Gangetic West Bengal coast with the associated cyclonic circulation extending upto 5.8 km above m. s. l. tilting southwestwards with height on 29th Jul. It lay over northwest Bay of Bengal and adjoining north Odisha and West Bengal coasts with the associated cyclonic circulation extended upto 7.6 km above m. s. l. tilting southwestwards with height on 30th Jul. It lay as a well marked low pressure area over central parts of north Bay of Bengal on 31st Jul morning and then persisted with the associated cyclonic circulation extending upto 9.5 km above m. s. l on 31st July. It then concentrated into a **Depression** and lay centered over northeast Bay of Bengal near Lat. 20.5° N / Long. 91.5° E at 0000 hrs UTC of 1st Aug. It moved north-northwestwards and intensified into a **Deep Depression** and lay centred over the northeast Bay of Bengal off Bangladesh coast near Lat. 21.2° N / Long. 91.2° E at 0300 hrs UTC of 1st Aug. It moved west-northwestwards and **crossed Bangladesh coast near Lat. 21.9° N / long. 90.3° E close to east of Khepupara during 1000 to 1100 hrs UTC as a deep depression of 1ST Aug.** Continuing to move west-northwestwards, it lay centred over coastal Bangladesh and neighbourhood near Lat. 22.5° N / Long. 89.5° E at 1200 hrs UTC of 1st Aug. It further moved west-northwestwards and lay centred over Gangetic West Bengal near Lat. 23.1° N/Long. 87.2° E, close to Bankura (West Bengal) at 0000 hrs UTC of 2nd Aug. It continued to move west-northwestwards and lay centred over the same region near Lat. 23.2° N / Long. 87.1° E, close to Bankura (West Bengal), about 70 km east-southeast of Purulia (West Bengal) at 0300 hrs UTC of 2nd Aug. It moved west-northwestwards and lay centred over Gangetic West Bengal and adjoining Jharkhand near Lat. 23.3° N / Long. 86.3° E at 0600 hrs UTC of 2nd Aug. It moved westwards and weakened into a **Depression** over Jharkhand and lay centred near Lat. 23.3° N / Long. 85.1° E at 1200 hrs UTC of 2nd Aug. It moved westwards and lay centred over Jharkhand and adjoining north Chhattisgarh near Lat. 23.3° N / Long. 84.1° E at 1800 hrs UTC of 2nd Aug. It moved west-northwestwards and lay centred over north Chhattisgarh and neighbourhood near Lat. 23.4° N / Long. 83.4° E at 0000 hrs UTC of 3rd Aug. It moved west-northwestwards and lay centred over the same region near Lat.23.5° N / Long. 83.1° E at 0300 hrs UTC of 3rd Aug. It remained practically stationary and weakened into a **well marked low pressure area** over the same region at 1200 hrs UTC of 3rd Aug. It lay over north Chhattisgarh, adjoining northeast Madhya Pradesh-southeast Uttar Pradesh at 0000 hrs UTC of 4th Aug. and then weakened into a **low pressure area** over northeast Madhya Pradesh and neighbourhood with the associated cyclonic circulation extending upto 7.6 km above m. s. l. on 4th Aug. It persisted there on 5th which became less marked on 6th.

2.4.2. *Other features observed*

The estimated central pressure was 988 hPa during 0300 UTC of 1st Aug. to 0600 UTC of 2nd Aug. and maximum sustained wind speed was 30 knots during 0300 UTC of 1st Aug. to 0300 UTC of 2nd Aug.

It is seen that light to moderate rainfall occurred at isolated places & heavy to very heavy rainfall at isolated places over costal Odisha, costal Andhra Pradesh & West Bengal on 1st August. Light to moderate rainfall at a few places with heavy to very heavy rainfall at isolated places occurred over Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh and Odisha on 2nd August.

2.4.3. *Weather and damage caused*

No damage was reported in association with this system.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0830 hours UTC of date the 1st Aug. to 3rd Aug.:

1st August	Bhubaneswar 26, Satyabadi 11, Kantapada 10, Tihidi 10, Bhuban 10, Bhandaripokhari 9, Puri 9, Chandbali 9, Pipili 9, Jatni 9, Cuttack 8, Rairangpur 8, Rajkanika 8, Barpalli 7, Lahunipara 7, Banki 7, Udala 7, Gop 7, Tigiria 7
2nd August	Boudhgarh 39, Jujumura 36, Rairakhol 35, Karanjia 30, Sharpada 28, Birmaharajpur 27, Thakurmunda 26, Ullunda 26, Athmalik 23, Rajkishorenagar 23, Binika 23, Agalpur 22, Phiringia 22, Khairamal 22, Joshipur 22, Sonepur 21, Dunguripalli 21, Raruana 21, Baliguda 21, Sukruli 21, K Nuagaon 21, Phulbani 21, Salebhatta 20, Madanpur Rampur 19, Kirmira 19, Kolabira 19, Kusumi 19, Telkoi 19, Jamda 19, Bijepur 19, Khaira 19, Tensa 17, Bolangir 17, Swam Patna 17, Gaisilet 17, Ambadola 17, Kantamal 16, Oupada 16, Pallahara 16, Bangamunda 16, Laikera 16, Tarva 16, Belgaon 15, Keonjhargarh 15, Angul 15, Kaptipada 15, Barpalli 15, Daitari 15, Chakapad 15, Talcher 15, Banspal 15, Bhawanipatna 15, Bhuban 15, Bahalda 15, Soro 14, Harabhanga 14, Naktideul 14, Komna 14, Balasore 14, Kotagarh 14, Bhograi 13, Khajuripada 13, Chendipada 13, Nh5 Gobindpur 13, Sohela 13, Tikabali 13, Hindol 13, Rajghat 13, Gudvela 13, Kantapada 12, Loisingha 12, Narla 12, Ghatagaon 12, Padmapur 12, Basudevpur 12, Padampur 12, Raikia 12, Danagadi 12, Joda 12, Lanjigarh 12, Hatadihi 11, Rengali 11, Bijatala 11, Rasagovindapur 11, Jamankira 11, Champua 11, Udala 11, Remuna 11, Jenapur 11, Ghasipura 11, Kalinga 11, Deogaon (District: Bolangir) 11, Rairangpur 10, Parjang 10, Jhumpura 10, Turekela 10, Bahanga 10, Nawana 10, Jharbandh 10, Sukinda 10, Anandpur 10, Reamal 10, Tikarpara 9, Muruda 9, Golamunda 9, Paikmal 9, Bargarh 9, Bonth 9, Nilgiri 9, Karlamunda 9, Kesinga 9, Harichandanpur 9, Kankadahad 9, Altuma 9, Kamakhyanagar 9, Batagaon 9, Gop 9, Titlagarh 9, Gondia 8, Tiring 8, Banarpal 8, Patnagarh 8, Jajpur 8, Daringibadi 8, Chandikhol 8, Jajpur Pto 8, Korei 8, Bari 8, Dharmagarh 8, Nawapara 8, Bangiriposi 8, Ambabhona 7, Sinapali 7, Th Rampur 7, Saintala 7, G Udayagiri 7, Barmul 7, Barkote 7, Banaigarh 7, Gania 7, Khariar 7, Betanati 7, Bhandaripokhari 7, Junagarh 7, Banki 7, Lahunipara 7, Boden 7, Akhuapada 7, Kotraguda 7, Belpada 7, Bhadrak 7, Atabira 7, Jaipur 7, Samakhunta 7, Balipatna 7
3rd August	Kutra 20, Panposh 19, Rourkela 18, Mandiradam 17, Rajgangapur 16, Baragaon 15, Binika 14, Nawana 13, Lephripara 12, Dharakote 12, Karlamunda 11, Birmaharajpur 10, Narsinghpur 10, Kantamal 10, Rampur 10, Kirmara 10, Bamra 10, Balishankara 10, Dhankauda 9, Hemgiri 9, Lakhanpur 9, Gania 9, Deogaon 9, Barmul 9, Athamalik 9, Lamataput 9, Kanhia 9, Padampur 9, Padmapur 9, Tangarpali 9, K. Nuagaon 9, Nandapur 9, Sundergarh 8, Jharsuguda 8, Komna 8, Lathkata 8, Sambalpur 8, R.K.Nagar 8, Bhapur 8,Harabhanga 7, Naktideul 7, Jharbandh 7, Banarpal 7, Patnagarh 7, Nuagaon 7, Gudvela 7, Banspal 7, Titilagarh 7, Talcher 7 Burla 7, Batagaon 7.

2.5. *Depression over eastcentral Arabian Sea (30th Sept. to 1st Oct. 2023)*

2.5.1. Under the influence of cyclonic circulation over north coastal Karnataka and neighbourhood, a **low pressure area** formed over eastcentral Arabian sea off south Konkan-Goa coasts on 29th Sept. morning and then persisted over the same region with the associated cyclonic circulation extending upto 7.6 km above m.s. l. on 29th Sept. It lay as a **well marked low pressure area** over the same region on 30th Sept. morning and intensified into a **Depression** over the same region and lay centred near Lat. 15.9° N / Long. 72.8° E at 0300 hrs UTC of 30th Sept. It moved north-northeastwards and lay centered over eastcentral Arabian sea close to south Konkan coast, near Lat. 16.6° N / Long. 73.2° E at 1200 hrs UTC of 30th Sept. It moved nearly northeastwards and **crossed south Konkan coast between Panjim (Goa) and Ratnagiri (Maharashtra) during 1500-1700 hrs UTC of 30th Sept.** It moved east-northeastwards and lay centered over south Konkan near Lat. 17.0° N / Long. 74.0° E at 0000 hrs UTC of 1st Oct. It moved northeastwards and weakened into a **well-marked low pressure area** over south Madhya Maharashtra and neighbourhood at 0300 hrs UTC of 1st Oct. It lay as a **low pressure area** over the same region on 2nd Oct. morning and then became less marked. However, the remnant associated cyclonic circulation lay over central parts of Madhya Maharashtra extending between 4.5 and 7.6 km above m.s. l. on 2nd Oct. which became less marked on 3rd Oct.

2.5.2. *Other features observed*

The estimated central pressure was 1002 hPa and maximum sustained wind speed was 25 knots during the system.

The spatial distribution of rainfall during 28th Sep to 04th Oct clearly showed the rainfall belts over Goa, Kerala, Maharashtra & Kerala region due to the depression. It also indicates higher rainfall activity in the southwest sector of the system.

2.5.3. *Weather and damage caused*

No damage was reported in association with this system.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0300 hrs UTC of from 30th Sept.-2nd Oct.:

Konkan & Goa

28 Sep	Lanja 13; Kudal and Canacona 9; Sangameshwar Devrukh 7;
29 Sep	Dabolim N.a.s. Navy 12; Margao 11; Mormugao Pmo IMD 10; Panjim 8; Ponda and Mapusa 7;
30 Sep	Mapusa 13; Margao 11; Ponda, Pernem, Canacona and Quepem 10 each; Panjim, Dodamarg, Dabolim N.a.s. Navy and Sanguem 9 each; Sawantwadi 8; Kudal and Mormugao Pmo IMD 7.
1 Oct	Ratnagiri 13; Roha & Sudhagad Pali 12; Sawantwadi 9; Mapusa, Pernem and Murud 8; Tala, Dodamarg and Sanguem 7;
2 Oct	Sangameshwar Devrukh 16; Wakwali ARG 13; Poladpur & Mandangad 12; Khed 11; Ratnagiri 10; Shriwardhan & Dapoli ARG 9; Harnai IMD 8; Chiplun, Guhagarh & Lanja 7;

2.6. *Extremely Severe Cyclonic Storm "TEJ" over the Arabian Sea (20th to 24th October, 2023)*

2.6.1. The **low pressure area** over southeast and adjoining eastcentral Arabian sea moved nearly westwards and lay over southeast and adjoining southwest Arabian sea at 0300 hrs UTC of 19th Oct. It persisted over the same region on 19th Oct. evening. It moved nearly westwards and lay as a **well marked low pressure area** over southwest Arabian Sea at 1800 hrs UTC of 19th Oct. It then concentrated into a **Depression** and lay centered over southwest Arabian sea near Lat. 9.3° N / Long. 61.7° E at 0300 hrs UTC of 20th Oct. It moved west northwestwards and intensified into **Deep Depression** and lay centered over the same region near Lat. 9.4° N / Long. 61.3° E at 1200 hrs UTC of 20th Oct. It moved west northwestwards and intensified into a **Cyclonic Storm "Tej" (pronounced as Tej)** and lay centered over the same region near Lat 9.9° N / Long. 59.4° E. at 0000 hrs UTC of 21st Oct. It moved west northwestwards and lay centered over the same region near Lat. 10.1° N / Long. 58.8° E at 0300 hrs UTC of 21st Oct. It moved west northwestwards and intensified into a **Severe Cyclonic Storm** and lay centered over the same region near Lat. 10.2° N / Long. 58.3° E at 0600 hrs UTC of 21st Oct. It moved northwestwards and intensified into a **Very severe Cyclonic Storm** and lay centered over the same region near Lat. 11.1° N / Long. 57.0° E at 1500 hrs UTC of 21st Oct. It further moved northwestwards and lay centered over the westcentral and adjoining southwest Arabian Sea near Lat. 12.0° N / Long. 56.0° E at 0000 hrs UTC of 22nd Oct. It further intensified into an **Extremely Severe Cyclonic Storm;** moved northwestwards and lay centered over the same region near Lat. 12.3° N / Long. 55.4° E at 0300 hrs UTC of 22nd Oct. It moved northwestwards and lay centered over the same region near Lat. 12.6° N / Long. 55.1° E at 0600 hrs UTC of 22nd Oct. It moved northwestwards and lay centered over westcentral Arabian sea near Lat. 13.3° N / Long. 54.4° E at 1200 hrs UTC of 22nd Oct. It continued to move northwestwards and weakened into a **Very Severe Cyclonic Storm** and lay centered over westcentral Arabian sea near Lat. 14.6° N / Long. 53.2° E about 230 km north northwest of Socotra (Yemen). at 0300 hrs UTC of 23rd Oct. It moved north northwestwards and lay centered over the westcentral Arabian sea very close to Yemen coast near Lat. 15.8°N / Long. 52.3° E at 1800 hrs UTC of 23rd. Oct. It **crossed Yemen coast near Lat. 15.9° N / Long. 52.2° E close to south of Al Ghaidah between 2100 hrs UTC and 2200 hrs UTC of 24th Oct. as a Very Severe Cyclonic Storm** with maximum sustained wind speed reaching 125-135 kmph gusting to 150 kmph. It then continued to move north westward and weakened into a **Severe Cyclonic Storm** and lay centered over coastal Yemen near Lat. 15.9° N / longitude 52.1° E at 0000 hrs UTC of 24th Oct. It moved west northwestward and lay centered at 0830 hrs UTC of 24th over the same region near Lat. 16.0° N / Long. 51.8° E. It moved west northwestward and weakened into a **Cyclonic Strom** and lay centered over Yemen, near Lat. 16.1° N / Long. 51.5° E at 0600 hrs UTC of 24th Oct. It moved west northwestwards and weakened into a **Deep Depression** and lay centered over Yemen near Lat. 16.1° N / Long. 51.3° E at 0900 hrs UTC of 24th Oct. It moved west northwestward and weakened into a **Depression** and lay centered over Yemen near Lat. 16.2° N / Long. 51.0° E at 1200 hrs UTC of 24th Oct. It moved west northwestward and weakened into a **well marked low pressure area** over the same region at 1500

hrs UTC of 24th Oct. It further moved west northwestwards and weakened into a **low pressure area** over the same region at 0000 hrs UTC of 25th Oct. with the associated cyclonic circulation extending upto mid tropospheric levels and then became unimportant.

2.6.2. *Other features observed*

Estimated Central Pressure (hPa) was 964 hPa with pressure drop of about 44 hPa during 0300 to 1800 hrs UTC of 22th Oct. The estimated maximum sustained surface wind speed was 95 kts during during 0300 to 1800 hrs UTC of 22th Oct. Estimated the MSW of 120 130 kmph gusting to 145 kmph (65 knots gusting to 75 knots) were observed during landfall.

2.6.3. *Weather and damage caused*

As per media reports from Yemen, ESCS TEJ caused 2 deaths in Yemen. It caused widespread floods and power outages, extensive damage to buildings, cell phone towers, trees *etc*. in Yemen.

2.7. *Very Severe Cyclonic Storm "HAMOON" over westcentral Bay of Bengal (21st to 25th October 2023)*

2.7.1. Under the influence of cyclonic circulation in lower tropospheric levels over southeast Bay of Bengal, a **low pressure area** formed over southwest and adjoining southeast Bay of Bengal on 20th morning. It then persisted over the same region till 20th Oct. evening with the associated cyclonic circulation extending upto mid tropospheric levels. It lay over southeast and adjoining eastcentral Bay of Bengal at 0000 hours UTC of 21st Oct. It moved northwestwards and lay as a **well marked low pressure area** over southeast and adjoining central Bay of Bengal at 0300 hrs UTC of 21st Oct. It moved slowly northwestwards and lay over westcentral and adjoining south Bay of Bengal at 0900 hours UTC of 21st. It further moved slowly northwestwards and concentrated into a **Depression** and lay centered over westcentral Bay of Bengal near Lat. 14.7°N / Long. 86.4°E at 1800 hrs UTC of 21st Oct. It moved west northwestwards and lay centered at 0830 hrs UTC of 22nd Oct.over the same region near Lat. 15.0° N / Long. 86.2° E. It moved nearly northwards and lay centered at 1130 hrs UTC of 22nd over the same region near Lat. 15.3° N / Long. 86.2° E. It moved nearly northwards and intensified into a **Deep Depression** and lay centered over the same region near Lat. 16.2° N / Long. 86.4° E at 1200 hrs UTC of 22nd Oct. It moved northeastwards and lay centered over westcentral Bay of Bengal near Lat. 16.7° N / Long. 86.7° E at 0000 hrs UTC of 23rd Oct. It moved northeastwards and lay centered over the same region near Lat. 17.0° N / Long. 86.8° E at 0300 hrs UTC of 23rd Oct. It moved north northeastwards and intensified into a **Cyclonic Storm "Hamoon" (pronounced as Hamoon)** and lay centered over the same region near Lat. 18.3° N / Long. 87.3° E at 1200 hrs UTC of 23rd Oct. It moved north northeastwards and lay centered over northwest and adjoining westcentral Bay of Bengal near Lat. 18.7° N / Long. 87.6° E at 1500 hrs UTC of 23rd Oct. It further moved northeastwards and intensified into a **Severe Cyclonic Storm** and lay centered over northwest Bay of Bengal near Lat. 19.3° N / Long. 88.4° E at 2100 hrs UTC of 23rd Oct. It moved east northeastwards and intensified into a **Very Severe Cyclonic Storm** and lay centered over northwest and adjoining northeast Bay of Bengal near Lat. 20.0°N / Long. 89.5° E at 0300 hrs UTC of 24th Oct. It moved east northeastwards and lay centered over the northeast and adjoining northwest Bay of Bengal near Lat. 20.6° N / Long. 90.2° E at 0900 hrs UTC of 24th Oct. It moved northeastwards and weakened into a **Severe Cyclonic Storm** and lay centered over northeast Bay of Bengal near Lat. 20.9° N / Long. 90.8° E at 1200 hrs UTC of 24th Oct. It moved northeastwards and weakened into a **Cyclonic Storm** and **crossed Bangladesh coast to the south of Chittagong near Lat. 21.9° N / Long. 91.9° E between 2100 hrs UTC and 2200 hrs UTC of 24th Oct. as a Cyclonic Storm** with wind speed of 75 85 kmph gusting to 95 kmph and then lay centered over coastal Bangladesh near Lat. 22.2° N / Long. 92.2° E at 0000 hrs UTC of 25th Oct. It moved nearly northeastwards and weakened into a **Deep Depression** and lay centered over southeast Bangladesh and adjoining Mizoram near Lat 22.4° N / Long. 92.4° E at 0300 hrs UTC of 25th Oct. It moved nearly north northeastwards and weakened into a **Depression** and lay centered over Mizoram near Lat. 22.7° N / Long. 92.7° E at 0600 hrs UTC of 25th Oct. It moved nearly north northeastwards and weakened into a **well marked low pressure area** and lay centered over north Mizoram and adjoining Manipur & Myanmar at 1200 hrs UTC of 25th Oct. which became less marked on 26th morning. However, the associated cyclonic circulation over north Myanmar and neighbourhood extending upto 3.1 km above m. s. l. persisted on 26th Oct. which became less marked on 27th.

2.7.2. *Other features observed*

Estimated lowest Central Pressure (hPa) was 985 hPa and estimated maximum sustained surface wind speed was 65 kts on 24th Oct.

2.7.3. *Weather and damage caused*

As per media reports from Bangladesh, VSCS Hamoon caused 3 deaths in Bangladesh. It caused widespread floods and power outages, extensive damage to buildings, cell phone towers, trees *etc*. in Bangladesh.

2.8. *Severe Cyclonic Storm "MIDHILI" over the Bay of Bengal (15th to 18th November, 2023)*

2.8.1. Under the influence of cyclonic circulation over Andaman Nicobar Islands and adjoining areas of Andaman and southeast Bay of Bengal extending upto upper tropospheric levels, a **low pressure area** formed over southeast Bay of Bengal and adjoining Andaman Nicobar Islands on 14th Nov. at 0000 hrs UTC. It persisted over the same region. It moved west northwestwards with the associated cyclonic circulation extending upto upper tropospheric levels. It lay as **a well marked low pressure area** over southeast and adjoining central Bay of Bengal at 1200 hrs UTC of 14th Nov. and then it lay over westcentral and adjoining areas of eastcentral and south Bay of Bengal at 0000 hrs UTC of 15th Nov. with the associated cyclonic circulation extending upto upper tropospheric levels. It further moved west northwestwards and concentrated into a **Depression** and lay centred over westcentral Bay of Bengal near Lat. 14.5° N / Long. 86.8° E at 0830 hrs UTC of 15th Nov. It moved northwestwards and lay centred over the same region near Lat 14.7° N / Long 86.5° E at 0600 hrs UTC on 15th Nov. and then moved north northwestwards and lay centred over the same region near Lat 15.3° N / Long 86.4° E at 1200 hrs UTC on 15th Nov. It further moved north northeastwards and intensified into a **Deep Depression** and lay centred over westcentral Bay of Bengal near Lat 16.9° N / Long 86.8° E at 0000 hrs UTC on 17th Nov. It further moved north northeastwards and lay centred over westcentral Bay of Bengal near Lat. 17.4° N / Long. 87.0° E at 0300 hrs UTC on 16th Nov. It further moved north northeastwards and lay centred over westcentral Bay of Bengal near Lat. 17.9° N / Long. 87.3° E at 0600 hrs UTC on 16th Nov. and then moved north northeastward and lay centred over northwest and adjoining westcentral Bay of Bengal near Lat. 18.6° N / Long. 87.7° E at 1200 hrs UTC on 16th Nov. It further moved north northeastwards and lay centred at over northwest Bay of Bengal near Lat. 19.1° N / Long. 88.0° E 1800 hrs UTC on 16th Nov. It moved north northeastwards and intensified into a **Cyclonic storm "Midhili" (pronounced as "Midhili")** and lay centered over northwest Bay of Bengal near Lat. 20.1° N / Long. 88.5° E at 0000 hrs UTC on 17th Nov. It further moved north northeastwards and lay centered over northwest and adjoining northeast Bay of Bengal near Lat. 20.8° N / Long. 89.0° E at 0300 hrs UTC on 17th Nov. It moved north northeastwards and concentrated as **severe cyclonic storm** and lay centered over northeast and adjoining northwest Bay of Bengal close to Bangladesh coast near Lat. 21.8° N / Long. 90.0° E at 0900 hrs UTC on 17th Nov. It moved north northeastwards and **crossed Bangladesh coast near Khepupara during 0900 to 1000 hrs UTC of 17th Nov. It then continued to move north northeastwards across the islands of Bangladesh weakened as a Cyclonic Storm** and lay centered over coastal Bangladesh near Lat. 22.8° N / Long. 90.8° E at 1200 hrs UTC on the 17th Nov. Further it moved north northeastwards and weakened into a **Deep Depression** and lay centered over Tripura and adjoining Bangladesh near Lat. 23.3° N / Long. 91.3° E at 1800 hrs UTC on 17th Nov. It moved northeastwards, weakened into a **Depression** and lay centered over Tripura and adjoining Bangladesh and Mizoram near Lat. 23.7° N / Long. 91.7° E at 0000 hrs UTC on 18th Nov. It moved northeastwards and weakened into a **low pressure area** over north Tripura and neighbourhood at 0300 hrs UTC on the 18th Nov.which became less marked on the evening of 18th.

2.8.2. *Other features observed*

Estimated lowest Central Pressure (hPa) was 986 hPa and estimated maximum sustained surface wind speed was 50 kts at 0900 UTC of 17th Nov.

2.8.3. *Realized Weather*

According to an official report in Tripura, the storm fully damaged 12 houses, severely damaged 72 houses and partly damaged 255 houses. The cyclone accompanied by rainfall also damaged crops in various parts of the state but luckily there was no report of any loss of life. The total loss occurred by the cyclonic storm could not be ascertained till the last information came in. Sources said, Sadar is one among the 23 sub divisions to receive the highest rainfall on Friday 17 Nov. All the rivers were flowing below the expected flood level till Saturday evening. Meanwhile, moderate to dense fog occured at isolated pockets over all districts of Tripura till morning of November 19.

As per media reports from Bangladesh, Cyclone Midhili wreaked havoc across the coastal districts of Chattogram, Cox's Bazar, Noakhali, Feni, and Lakshmipur, damaging crops, primarily affecting Aman paddy and winter vegetables. It caused widespread floods and power outages, extensive damage to buildings, cell phone towers, trees etc. in Bangladesh.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0300 hrs UTC for 18 Nov.

18 Nov:

Tripura	Kvk South 15; Amarpur 14; Kanchanpur 13; Lengpui, Kvk Dhalai, Gokulpur AWS and Agartala AP 11; Lawngtlai ARG, Sonamura, Arundhutinagar and Lembuchhera10; Kolasib ARG and Dharmanagar/Panisagar 9; Udaipur and Khowai 8; Kamalpur, Serchip (hydro),

Saiha ARG, Bishalgarh and Kailashahar AP 7.

2.9. *Severe Cyclonic Storm "MICHAUNG" over the Bay of Bengal (1st to 6th December, 2023)*

2.9.1. Under the influence cyclonic circulation south Andaman sea and adjoining Thailand, a **low pressure area** formed over south Andaman sea and adjoining Malacca strait on 27th Nov. It moved westwards and lay over south Andaman sea on 28th Nov. and lay over south Andaman sea and adjoining southeast Bay of Bengal on evening of 28th Nov. and then lay as a **well marked low pressure area** over the same region. It lay over southeast Bay of Bengal and adjoining south Andaman sea on the morning of 29th Nov. and then persisted over the same region on 29th Nov. It moved west northwestwards and lay over southeast Bay of Bengal at 0300 hrs UTC of 30th Nov. It moved west northwestwards and concentrated into a **Depression** and lay centered over southeast and adjoining southwest Bay of Bengal near Lat. 9.1° N / Long. 86.4° E at 0000 hrs UTC on 1st Dec. It moved northwestwards and lay centered over the same region near Lat. 9.3° N / Long. 86.2° Eat 0300 hrs UTCof 1st Dec. It moved west northwestwards and lay centered over southwest Bay of Bengal near Lat. 10.0° N / Long. 85.7° E at 1200 hrs UTC on 1st Dec. It further moved west northwestwards and intensified into a **Deep Depression** and lay centered over the same region near Lat. 10.5° N / Long. 84.1° E at 0000 hrs UTC on 2nd Dec. It moved west northwestwards and lay centered over the same region near Lat. 10.6° N / Long. 83.6° E at 0300 hrs UTC on 2nd Dec. It moved west northwestwards and lay centered over the same region near Lat. 10.7° N / Long. 83.2° E at 0600 hrs UTC on 2nd Dec. It moved west northwestwards and lay centered over the same region near Lat. 10.9° N / Long. 83.1° E at 1200 hrs UTC on 2nd Dec. It further moved northwestwards and intensified into a **Cyclonic Storm "MICHAUNG" (pronounced as MIGJAUM)** and lay centered over the same region near Lat. 11.4° N / Long. 82.5° E at 0000 hrs UTC on 3rd Dec. It moved northwestwards and lay centered over the same region near Lat. 11.5° N / Long. 82.4° E at 0300 hrs UTC on 3rd Dec. It moved northwestwards and lay centered over the same region near Lat. 11.8°N / Long . 82.2° E at 0600 hrs UTC on 3rd Dec. It moved north northwestwards and lay centered over the same region near Lat. 12.4° N / Long. 81.9° E at 1500 hrs UTC on 3rd Dec. It moved north northwestwards and lay centered over the southwest and adjoining westcentral Bay of Bengal near Lat. 13.0° N / Long. 81.4° E at 2100 hrs UTC on 3rd Dec. It moved northwestwards and lay centered over westcentral and adjoining southwest Bay of Bengal off south Andhra Pradesh and adjoining north Tamil Nadu coast near Lat. 13.2° N / Long. 81.2° E at 0000 hrs UTC on 4th Dec. It moved northwestwards and further intensified into a **Severe Cyclonic Storm** and lay centered over the same region near Lat. 13.3° N / Long. 81.0° E at 0300 hrs UTC on 4th Dec. It moved northwestwards and lay centered over westcentral Bay of Bengal off south Andhra Pradesh coast near Lat. 14.0° N / Long. 80.5° E at 1200 hrs UTC on 4th Dec. It moved northwards and lay centered over westcentral Bay of Bengal off south Andhra Pradesh coast near Lat. 14.9° N / Long. 80.2° E at 0000 hrs UTC on 5th Dec. It moved northwards and lay centered over the same region near Lat. 15.2° N / Long. 80.25° E at 0300 hrs UTC on 5th Dec. It moved northwards and **crossed south Andhra Pradesh coast close to south of Baptla during 0700 to 0900 hrs UTC on 5th Dec as a Severe Cyclonic Storm with maximum sustained wind speed of 90 100 kmph.** It lay centered over south coastal Andhra Pradesh near Lat. 15.8° N / Long. 80.3° E at 0900 hrs UTC on 5th Dec. It moved nearly northwards and weakened into a **Cyclonic Storm** at 1000 hrs UTC and lay centered over south Coastal Andhra Pradesh near Lat. 16.0° N / Long. 80.3° E at 1200 hrs UTC on 5th Dec. It moved northwards and lay centered over central coastal Andhra Pradesh near Lat. 16.4° N / Long. 80.4° E at 1500 hrs UTC on 5th Dec. It moved nearly northwards and weakened into a **Deep Depression** over central Coastal Andhra Pradesh and lay centered over central coastal Andhra Pradesh near Lat. 16.8° N / Long. 80.4° E at 1800 hrs UTC on 5th Dec. It moved nearly northwards and weakened into a **Depression** and lay centered near Lat. 17.4° N / Long. 80.5° E over northeast Telangana and adjoining south Chhattisgarh south interior Odisha Coastal Andhra Pradesh at 0000 hrs UTC on 6th Dec. It further weakened into a **well marked low pressure area** over the same region and the associated cyclonic circulation extended upto 5.8 km above m. s. l. on 6th Dec.

2.9.2. *Other features observed*

Estimated lowest Central Pressure (hPa) was 986 hPa and estimated maximum sustained surface wind speed was 55 kts during 1200 to 1500 UTC of 4th Dec.

Realised wind reported at different stations of Andhra Pradesh :

(*i*) Krishnapatnam Port reported 103 kmph gusting to 115 kmph on 4th December, 2023.

(*ii*) MO Bapatla reported 1400/38kt (75 kmph) at 1430 hours IST on 5th December 2023.

(*iii*) Kavali High Wind Speed Recorder reported 2700/36kts (70 kmph) at 1644 hours IST of 04th December 2023.

Realised wind reported at different stations of Tamil Nadu :

(*i*) High Wind Speed Recorder at Chennai (NBK) recorded wind speed of about 75 kmph (40-45 knots) in gusts during early hours to noon of 04th December 2023.

(*ii*) NBK Anemograph recorded wind speed of 60 70 kmph in gusts during this period.

(*iii*) MBK recorded wind speed of 80-90 kmph in gusts during this period.

(*iv*) NBK AWS 30 kt (56 kmph) on 04th / 14:15 IST.

(*v*) MBK AWS 37 kt (68 kmph) on 04th / 10:30 IST.
(*vi*) Ennore AWS recorded 43 knots (80 kmph) on 04th /19:45 IST (75 kmph) in gusts

2.9.3. *Weather and damage caused*

As per media reports, 17 persons were killed in various incidents associated with "Michaung" in Tamil Nadu and two in Andhra Pradesh. More than 41,000 people were evacuated and temporarily relocated, including 32,158 in Tamil Nadu and 9,500 in Andhra Pradesh. Schools and offices were closed due to heavy rains and flooding in Chennai. In Andhra Pradesh, crop damage and losses were reported due to the flooding of fields.

Chief amounts of 24 hrs rainfall ((≥7cm) ending at 0830 hours UTC of date the 27th Nov. - 20th June 13th June: Saurashtra & Kutch:

It caused heavy rainfall over Nicobar Islands, Tamil Nadu, Andhra Pradesh, Odisha, Jharkhand, Gangetic West Bengal, Telangana and Mizoram

27th Nov. 2023

Andaman & Nicobar Islands	Car Nicobar 8

3rd Dec. 2023

Tamil Nadu & Puducherry	Pallipattu 15; Uthukottai 13; Thenkasi 11; Zone 12 Alandhur & Ponneri 10 each; Tiruttani, Avadi & Wallajah 9 each; Meenambakkam , Anna University, Zone 12 , Meenambakkam, Alandur, Chennai(AP), Zone 14, Perungudi, Oothu, Shencottah, Tiruvallur, Anna University, Zone 12 D156 Mugalivakkam & Thamaraipakkam 8 each; Zone 11 Valasaravakkam, Gundar Dam, Zone 10 Kodambakkam, Zone 14 U41 Perungudi, Nalumukku, Cholavaram, Tambaram, Zone 13 U39 Adyar, Zone 09 Ice House, Papanasam, VIT_Chennai, MGR Nagar, Zone 09 Teynampet & Kakkachi 7 each;
Rayala-seema	Thottambedu 15, Srikalahasti 14, Tirupati Aero 13, Satyavedu 10, Nagari & Tada 9 each, Sullurpeta, Gudur 8 each;
Coastal Andhra Pradesh	Nellore 7

4th Dec, 2023

Rayla-seema	Sullurpeta 20; Tada 19; Gudur 14; Srikalahasti, Thottambedu & Satyavedu 13 each; Nagari 12, Tirupati Aero 7;
Coastal Andhra Pradesh	Nellore 19;
Tamil-nadu, Pudu-cherry & Karaikal	Zone 14 Perungudi 29; Avadi 28; Alandur & Chennai (AP) 25 each; Zone 13 Adyar, Meenambakkam AWS, Zone 12 Meenambakkam, Chennai (N), Puzhal & Cholavaram 23 each; Mahabalipuram, MGR Nagar, Zone 10 Kodambakkam & CD Hospital Tondiarpet 22 each; Zone 11 Valasaravakkam, Zone 15 Sholinganallur, DGP Office, Pallikaranai, Chennai (N), Anna University & Ponneri 21 each; Zone 03 Puzhal, Perambur, Zone 09 Ice House & Red Hills 20 each; Ayanavaram Taluk Office, Taramani, Satyabama Uty, Anna Nagar & VIT_Chennai 19 each, Chennai Collector Office, Sholinganallur), Zone 09 Teynampet, Zone 08 Malar Colony, Ambattur, Anna University, Valasaravakkam, Good Will School Villivakkam, YMCA Nandnam, KVK Kattukuppam, Thamaraipakkam & Kodambakkam 18 each; Gummidipoondi, Tambaram, Ambathur 2 & Kelambakkam 17 each; Zone 06 T.V.K Nagar, Zone 04 Tondiarpet, Chembarapakkam, Teynampet, Tiruvallur, Zone 01 Kathivakkam, ThiruViKa Nagar & Zone 03 Madhavaram 16 each & Uthukottai, Zone 08 Anna Nagar, Sholinganallur, Tirur KVK, Zone 06 Kolathur, Tondairpet, Zone 14 Perungudi & Ennore 15 each, Zone 07 Ambattur, Zone 13 Adyar Eco Park, Zone 05 GCC, Poonamallee,

	Thirukalukundram, Zone 12 Alandhur & Koratur 14 each; Sriperumbudur, Thirupporur, Zone 02 Manali, Zone U39 Adyar & Chembarabakkam 13 each; Mugalivakkam, Kundrathur, Chengalpattu, Zone 15 Uthandi, Royapuram & Zone 07 U18 D81 Vanagaram 12 each; Zone 05 Royapuram & Zone U32 Maduravoyal 11 each; Poondi & Tiruttani 10 each; Thiruvottiyur, Maduranthagam, Thiruvalangadu, Kancheepuram, Uthiramerur & Cheyyur 9 each; Walajabad, Minnal, Arakonam & Marakkanam 8 each; Thiruvottiyur 7

5th Dec, 2023

Tamil Nadu	Poonamallee 34; Avadi 28; KVK Kattukuppam 27; Chennai (N), Chennai(N) AWS & Tambaram 24 each & Mahabalipuram & Zone 09 Ice House 22 each; Royapuram, Zone 13 Adyar, ThiruViKa Nagar, Zone 05 GCC, Zone 10 Kodambakkam & Chembarapakkam_Rev 21 each; Zone 15 Sholinganallur, Taramani, Meenambakkam, Chennai (AP), Kundrathur, Thamaraipakkam, Kodambakkam & Tirur KVK 19 each, Teynampet, Valasaravakkam, Tiruvallur, Anna University & Zone 11 Valasaravakkam 18 each, Uthukottai, NIOT_Pallikaranai, Ponneri, Sriperumbudur & Koratur 17 each; Kelambakkam 16; Cholavaram 15; Thiruvalangadu, Poondi, Alandur & Thirupporur 14 each; Red Hills 13; Zone Alandhur, Tiruttani, Gummidipoondi & Chembarabakkam_CMWSSB 12 each; Thirukalukundram, Pechiparai & Zone 05 Royapuram 11 each; Minnal & Zone 04 Tondiarpet 10 each; Chengalpattu, Zone 12 D156 Mugalivakkam, Wallajah, Perunchani Dam & Tiruttani PTO 9 each; Zone 03 Puzhal, Puthan Dam, Panapakkam 12 & Zone 09 Teynampet 8 each, R.K.Pet, Walajabad, Pallipattu, Vembakkam, Sholingur & Kuzhithurai 7 each;
Coastal Andhra Pradesh	Bapatla 22; Nellore 22; Rapur 21; Atmakur 19; Amalapuram, Addanki & Karamchedu 17 each; Masulipatnam Cdr 16; Kavali 15; Avanigada & Vinjamur 14 each, Udayagiri 13; Ongole 12; Repalle & Kandukur 11 each; Konakanamitla, Gudivada, Santhamaguluru 9 each; Tenali, Kakinada & Yanam 8 each, Marripudi, Veligandla, Mundlamuru, Guntur, Seetharamapuram, Tanuku, Vijayawada & Peddapuram 7 each;
Rayla-seema	Gudur 28; Srikalahasti 24 & Kodur 24 each; Thottambedu, Sullurpeta & Penagaluru 23 each; Tadapati 20; Venkatagiri 18; Satyavedu 14; Nagari & Tirupati Aero 13 each; Rajampet 12; Atlur 9; Badvel 8; Gurramkonda, Kalakada, Sambepalle, Royachoti, Pakala, Pullampeta, Chinnamandem & Cuddapah 7 each

6th Dec, 2023

Telangana	Aswaraopeta 34; Palawancha 25; Chandrugonda 23; Kothagudem 22; Julurpad & Mulakalapalle 20 each, Aswapuram 19; Burgampadu 18 & Bhadrachalam 18 each; Sathupalle 16; Tekulapalle 15; Madhira & Enkuru 14 each; Bonakal 13; Manuguru & Wyra Kvk 12 each; Pinapaka & Thollada 10 each; Konijerla 9; Gundala 8; Venkatapur, Chinthakam & Yellandu 7 each;
Coastal Andhra Pradesh	Bhimadole 24; Kukunoor 22; Narsapuram 21 & Chintalapudi 21; Narsipatnam, Bheemavaram & Koyyalagudem 20 each; Amalapuram, Anakapalle, Kunavaram & Yelamanchili 19 each; Sattenapalle & Palakoderu 18 each; Tanuku 17; Kaikalur, Prathipadu, Santhamaguluru & Polavaram 16 each; Chodavaram, Visakhapatnam, Denkada & Chintur 15 each; Tadepalligudem, Darsi & Kakinada 14 each; Anakapalle, Velairpad, Srungavarapukota & Tiruvuru 13 each; Tuni, Chintapalle, Mentada, Paderu & Nuzvid 12 each; Nandigama, Eluru, Vararamachandrapur, Guntur, Bondapalle, Gajapathinagaram, Vepada & Amaravati 11 each; Vizianagaram, Bheemunipatnam, Mangalagiri, Piduguralla, Araku Valley & Yanam 10 each; Pusapatirega, Peddapuram, Addanki, Gantyada, Mundlamuru & Lam 9 each; Podili, Atchampet, Vijayawada, Garividi & Ranastalam 8 each; Nellimarla, Jangamaheswarapuram, Cheepurupalle, Visakhapatnam & Gudivada 7 each;
Tamil-Nadu	Virudunagar, Ponnamaravathi, Natham, Singampunari, Sathiar, Arimalam 7 each;
Odisha	Pottangi 11; Similiguda 9; Koraput 7.

7th Dec.

Coastal	Yelamanchili (dist Anakapalli) 7,

Andhra Pradesh	Chodavaram (dist Anakapalli) 7, Araku Valley (dist Alluri Sitharamaraju) 7
Gangetic west Bengal	Phulberia 7, Jharkhand: Kharsema 7

8th Dec.

Mizoram	Champhai 8, Lengpui 8, Serchip 7, Lenglui 7
Gangetic West Bengal	Burdwan 7