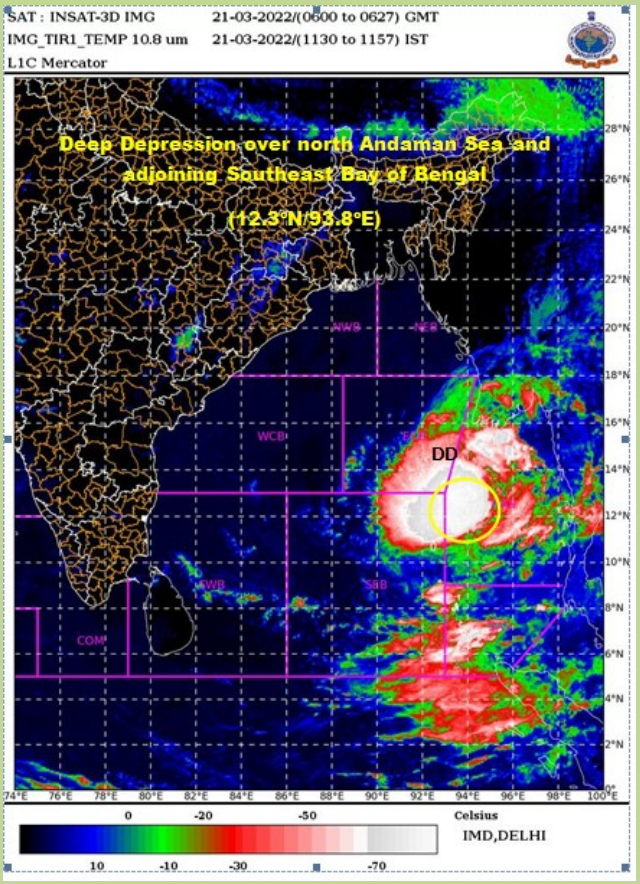
GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
INDIA METEOROLOGICAL DEPARTMENT

Deep Depression over Bay of Bengal (20th-23rd March, 2022): A Report



INSAT-3D enhanced Colored IR imagery based on 0600 UTC of 21st March

Cyclone Warning Division

India Meteorological Department

New Delhi

March 2022

Deep Depression over southeast Bay of Bengal and adjoining South Andaman Sea during 20th-23rd March, 2022

1. Introduction

A cyclonic circulation formed over central parts of south Bay of Bengal (BOB) & adjoining Equatorial Indian Ocean (EIO) on 10th March, 2022. It persisted over EIO & adjoining southeast BOB during 13th-15th March. Under its influence, a low pressure area formed over EIO and adjoining southwest BOB by 1200 UTC(1730 IST) of 15th March, 2022. It lay as a well-marked low pressure area over southeast BoB and adjoining south Andaman Sea at 0000 UTC(0530 IST) of 19th March. The well marked low pressure area concentrated into a depression at 0000 UTC (0530 IST) of 20th March, over southeast BoB and adjoining south Andaman Sea. The depression then moved nearly northwards and intensified into a deep depression around 0000 UTC (0530 IST) of 21st March over north Andaman Sea and adjoining southeast BoB. The deep depression further moved northwards and crossed Myanmar coast during 0800-0900 UTC (1330-1430 IST) of 22nd March near lat. 16^0N and long. 94.2^0E with maximum sustained wind speed (MSW) of 30 knots (kt) gusting to 40 kt. It then continuing to move nearly northwards and weakened into a depression over coastal Myanmar and adjoining eastcentral BoB around 1200 UTC (1730 IST) of 22nd March and emerged into eastcentral BoB for some time and again crossed Myanmar coast during 1900-2000 UTC of 22nd (0030-0130 IST) 0f 23rd March near lat. 17.8^0N and long. 94.5^0E with MSW of 25 kt gusting to 30 kt as a depression. The depression continuing to move nearly northwards and weakened into a well marked low pressure area at 0300 UTC (0830 IST) of 23rd March over Myanmar and into a low pressure area at 0900 UTC (1430 IST) of the same day and became less marked at 0000 UTC (0530 IST) of 24th March 2022 over the same region. The observed track and best track parameters of the system are presented in Fig. 1a and table 1. The translational speed and direction of movement of the system is depicted in Fig. 1b.

2. The salient features of the system were as follows:

- Climatologically, formation of depression over southeast BoB and adjoining south Andaman Sea was a rare phenomenon. In the past based on the data during March of 1891-2020, only 7 cyclonic disturbances developed over the BoB and out of these none crossed Myanmar coast (Fig.2).
- The track length of the deep depression during 20th -23rd March, 2022 was 1057 km. The life period (D to D) of the system was 75 hours against the average of 52 hours for depressions over the BoB in the pre-monsoon season during 1990-2013. It moved with 12-hour average translational speed of 14.4 kmph against the average of 13.0 kmph for depressions over the BoB in the pre-monsoon season based on data of 1990-2013.
- The Velocity Flux, Accumulated Cyclone Energy (a measure of damage potential) and Power Dissipation Index (a measure of loss) were 3.5 $X10^2$ knots, 0.89 X 10^4 $knots^2$ and 0.25 $X10^6$ $knots^3$ respectively.
- IMD commenced pre-genesis forecast of track and intensity from the stage of low-pressure area on 17th March (3 days prior to formation of depression over southeast BoB on 20th March and 5 days prior to actual landfall over Myanmar on 22nd March).
- A total of 17 national bulletins, 4 special messages with formation of LPA, 8 press release and 17 RSMC bulletins were issued in association with this system.

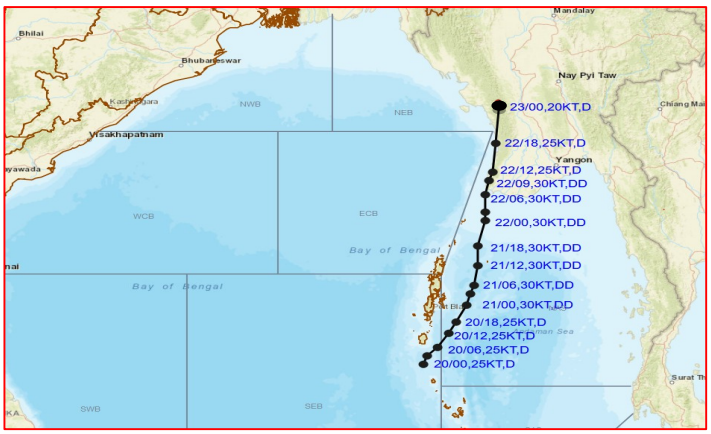


Fig: 1a: Best track of deep depression over Bay of Bengal and adjoining Andaman Sea during 20th – 23rd March, 2022

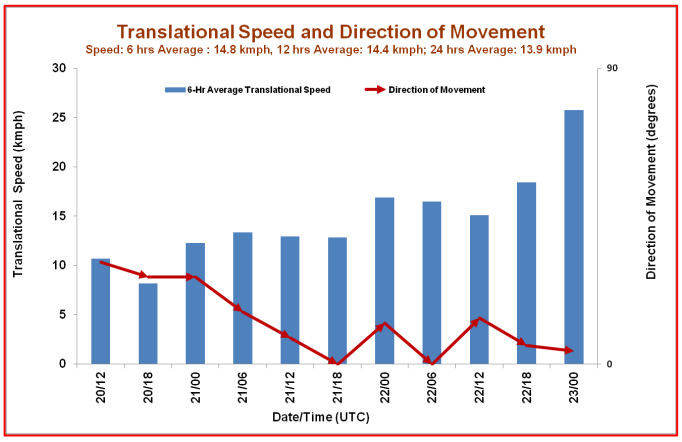


Fig. 1b: Six hourly average translational speed and direction of movement

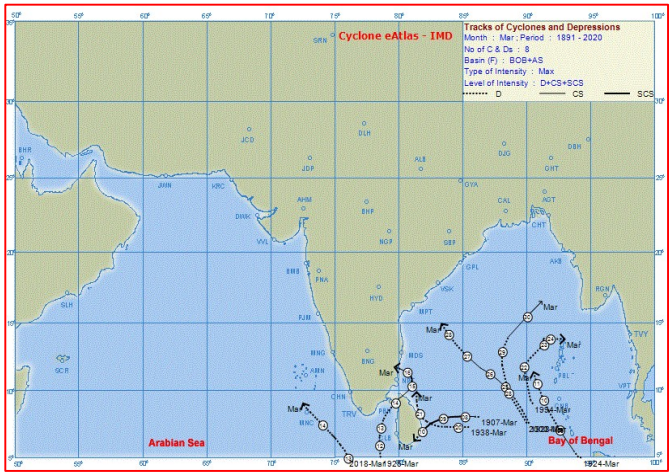


Fig: 2 Tracks of cyclonic disturbances in the month of March during 1891-2020

Table1: Best track positions and other parameters of the Deep Depression over the southeast Bay of Bengal during 20 March- 23 March, 2022

Date	Time (UTC)	Centre lat.^{0} N/ long.^{0} E		C.I. NO.	Estimated Central Pressure (hPa)	Estimated Maximum Sustained Surface Wind (kt)	Estimated Pressure drop at the Centre (hPa)	Grade
20.03.2022	0000	09.8	92.5	1.5	1002	25	3	D
	0300	10.1	92.6	1.5	1002	25	3	D
	0600	10.4	92.9	1.5	1002	25	3	D
	1200	10.9	93.2	1.5	1002	25	3	D
	1800	11.3	93.4	1.5	1001	25	4	D
21.03.2022	0000	11.9	93.7	2.0	1000	30	5	DD
	0300	12.3	93.8	2.0	1000	30	5	DD
	0600	12.6	93.9	2.0	1000	30	5	DD
	1200	13.3	94.0	2.0	1000	30	5	DD
	1800	14.0	94.0	2.0	1000	30	5	DD
22.03.2022	0000	14.9	94.2	2.0	1000	30	5	DD
	0300	15.2	94.2	2.0	1000	30	5	DD
	0600	15.8	94.2	2.0	1000	30	5	DD
		Crossed Myanmar coast during 0800-0900 UTC near 16^{0}N/94.2^{0}E with maximum sustained wind speed of 30 kt gusting to 40 kt						
	0900	16.3	94.3	-	1000	30	5	DD
	1200	16.6	94.4	-	1001	25	4	D
	1800	17.6	94.5	1.5	1002	25	3	D
		Crossed Myanmar coast during 1900-2000 UTC near 17.8^{0}N/94.5^{0}E with maximum sustained wind speed of 25 kt gusting to 30 kt						
	0000	19.0	94.6	-	1003	20	3	D
23.03.2022	0300	Weakened into a well marked low pressure area over Myanmar						

3. Brief life history

3.1. Genesis

Under the influence of a cyclonic circulation over central parts of BoB & adjoining EIO a low pressure area formed over EIO and adjoining southwest BoB at 0300 UTC of 16th March. On 16th March, the sea surface temperature (SST) was around 29-30^{0}C over southeast and adjoining eastcentral BoB. Tropical cyclone heat potential (TCHP) was around 60-80 KJ/cm^2 over the same region. The Madden Julian Index (MJO) lay in phase 3 with amplitude more than 1. The phase and amplitude of MJO was conducive for enhancement of convective activity over the BOB. The feeble westerlies (1-3 mps) and equatorial Rossby waves were prevailing over south BOB. Low level vorticity was 50x10^{-6} s^{-1} around system centre. Vertically it was extending up to 500 HPA level. Low level

convergence was $10x10^{-5}$ s^{-1} to the northwest of system centre and 20 $x10^{-5}$ s^{-1} to the southeast of system centre. Upper level divergence was around 30 $x10^{-5}$ s^{-1} to the northwest of system centre. A large zone of positive divergence 05-20 $x10^{-5}$ s^{-1} was also prevailing over southeast BOB. Wind shear was moderate (15-20 knots) around the system centre with decreasing trend (becoming 05-10 knots) over south and adjoining central BOB.

It became well-marked low pressure area (WML) over southeast BoB and adjoining south Andaman Sea at 0300 UTC of 19 March, SST was around 29-30^{0}C over Andaman Sea, southeast and adjoining eastcentral BOB. Tropical cyclone heat potential was around 60-80 KJ/cm^2 over the same region became less than 50 KJ/cm2 over north BOB. The MJO index lay in phase 3 with amplitude more than 1. The phase and amplitude of MJO was conducive for enhanced convection and hence cyclogenesis over the BOB during next 3 days. Strong westerlies, Kelvin waves and equatorial Rossby waves were prevailing over the region which could favour the genesis. Low level vorticity increased at 0000 UTC primarily due to diurnal variations. However, at 0300 UTC it was about $50x10^{-6}$ s^{-1} (no change in previous 24 hours) to the southeast of system centre with vertical extension up to 500 hPa level. Low level convergence increased and was around $20x10^{-5}$ s^{-1} to the east of system centre. Upper level divergence increased and was around $30x10^{-5}$ s^{-1} to the southeast of system centre. Strong equatorward outflow was also seen in upper levels. Vertical wind shear was moderate (15-20 knots) around the system centre with decreasing trend (becoming 10-15 knots) along the track of the system.

At 0000UTC of 20 March, the WML concentrated into a Depression over southeast BoB and adjoining Andaman Sea under the influence of favourable environmental conditions. The sea surface temperature was around 29-30^{0}C over Andaman Sea, southeast and adjoining eastcentral BOB. Tropical cyclone heat potential was around 60-80 Kj/cm^2 over the same region became less than 50 Kj/cm^2 over north BOB. The MJO index lay in phase 3 with amplitude more than 1. Strong westerlies, Kelvin waves and equatorial Rossby waves were prevailing over the region which could favor the genesis and intensification. Low level vorticity was about 50 $x10^{-6}$ s^{-1} around the system centre with vertical extension up to 500 HPA level. Low level convergence was $10x10^{-5}$ s^{-1} to the northeast of system centre. Upper level divergence was around $20x10^{-5}$ s^{-1} around the system centre. Strong equatorward outflow was also seen in upper levels. Vertical wind shear was moderate (15-20 kts) around the system centre with decreasing trend (becoming 10-15 knots) along the system's track.

3.2. Intensification and movement:

Under the influence of a ridge lying to the north and associated anticyclonic circulation to the northeast of system centre, the depression moved north-northeastwards and into a Deep Depression at 0000 UTC of 21st March over north Andaman Sea under the similar favourable conditions. Sea surface temperature was around 29-30^{0}C over Andaman Sea, southeast and adjoining eastcentral BOB. Tropical cyclone heat potential was around 60-80 KJ/cm^2 over the same region and became less than 50 KJ/cm^2 over north BOB. The MJO index lay in phase 3 with amplitude more than 1. The phase and amplitude of MJO on previous day could enhanced the convection over the BoB and hence it helped in intensification. Low level vorticity increased significantly from $50x10^{-6}$ s^{-1} to $150x10^{-6}$ s^{-1} in previous 6 hours and lay around the system centre with vertical extension up to 500 hPa level. Low level convergence was $20x10^{-5}s^{-1}$ in northeast sector of the system centre. Upper level divergence was around $20x10^{-5}$ s^{-1} also at northeast of the system centre. Vertical wind shear was moderate (15-20 knots) around the system centre with decreasing trend (becoming 10-15 knots) along the system's track.

Continuing to move north-northeastwards, it crossed Myanmar coast during 0800-0900 UTC near lat. 16^0N and long. 94.2^0E with maximum sustained wind speed of 30 kt gusting to 40 kt. Moving in the same direction, it weakened into a Depression over coastal Myanmar at 1200 UTC of 22 March. Low level vorticity in previous 6 hours remains around 70-80x10^{-6} s^{-1} to the south of system centre with vertical extension up to 500 hPa level. Low level convergence was 30x10^{-5} s^{-1} around system centre. Upper level divergence was around 10 x10^{-5} s^{-1} around system centre. Vertical wind shear was moderate to high (15-20 knots) around the system centre. Upper tropospheric ridge has seen near 19^0N.

It then moved nearly northwards and emerged into eastcentral BoB for some time and again crossed Myanmar coast during 1900-2000 UTC of 22nd (0030-0130 IST) 0f 23rd March near lat. 17.8^0N and long. 94.5^0E with MSW of 25 kt gusting to 30 kt as a depression. The depression continuing to move nearly northwards and weakened into a well marked low pressure area at 0300 UTC (0830 IST) of 23rd March over Myanmar and into a low pressure area at 0900 UTC (1430 IST) of the same day and became less marked at 0000 UTC (0530 IST) of 24th March 2022 over the same region.

4. Monitoring through satellite and radar:

India Meteorological Department (IMD) maintained round the clock watch over the north Indian Ocean and the system was monitored since 15th March. The system was monitored with the help of available satellite observations from INSAT 3D and 3DR, polar orbiting satellites and available ships & buoy observations in the region. Various numerical weather prediction models run by Ministry of Earth Sciences (MoES) institutions, global models and dynamical-statistical models were utilized to predict the genesis, track, landfall and intensity of the system. A digitized forecasting system of IMD was utilized for analysis and comparison of various models' guidance, decision making process and warning products generation.

4.1 Detailed feature observed through Satellites:

Typical INSAT-3D IR, visible, enhanced colored and cloud top brightness temperature imageries during life cycle of the system are presented in Fig. 3. As per INSAT 3D imagery at 0300 UTC of 16 March, scattered to broken low and medium clouds with embedded intense to very intense convection over Equatorial Indian Ocean and adjoining central parts of south BOB over area between latitude 2.5^0N & 9.0^0N and longitude 82.0^0E & 89.0^0E in association with low pressure area. Minimum cloud top temperature is -93°C.

At 0300 UTC of 19th March, the convection organized and the area of intense convection lay in northeast sector. Intensity of the system is characterized as T 1.0. Broken low and medium clouds with embedded intense to very intense convection lay over southeast BoB and adjoining Andaman Sea between latitude 5.0^0N & 11.0^0N and longitude 89.0^0E & 97.0^0E in association with well marked low pressure area over the region. The minimum cloud top temperature has decreased from - 84°C to - 93°C.

At 0300 UTC of 20th March, the intensity of the system was CI 1.5. Associated broken low and medium clouds with embedded intense to very intense convection lay over southeast BoB and adjoining south Andaman Sea between latitude 6.0^0N & 13.0^0N and longitude 90.0^0E & 97.0^0E. The minimum CTT was -93^0C. Very intense convection lay in southeast sector of the system center.

At 0000 UTC of 21 March, it lay as Deep Depression and the intensity of the system was characterized as CI 2.0. Associated broken low and medium clouds with embedded intense to very intense convection lay over Andaman Sea and adjoining southeast BoB

between latitude 10.0^{0}N & 15.0^{0}N and longitude 91.0^{0}E & 97.0^{0}E and Andaman & Nicobar islands. Minimum cloud top temperature was around -93^{0}C. Intense convection lay in east sector of the system centre.

At 1200 UTC of 22th March, it lay as Depression over coastal Myanmar. Associated broken low and medium clouds with embedded intense to very intense convection lay over east central BoB and adjoining north Andaman Sea off south Myanmar coast between latitude 14.5°N & 19.0°N and longitude 91.0°E & 95.0°E and over Arakan Coast & Gulf Of Martaban of south Myanmar. Minimum cloud top temperature was around -93 °C.

At 0300 UTC of 23rd March, it lay as low pressure area. Scattered low and medium clouds with embedded moderate to intense convection lay over southeast BoB, Andaman Sea and Arakan Coast.

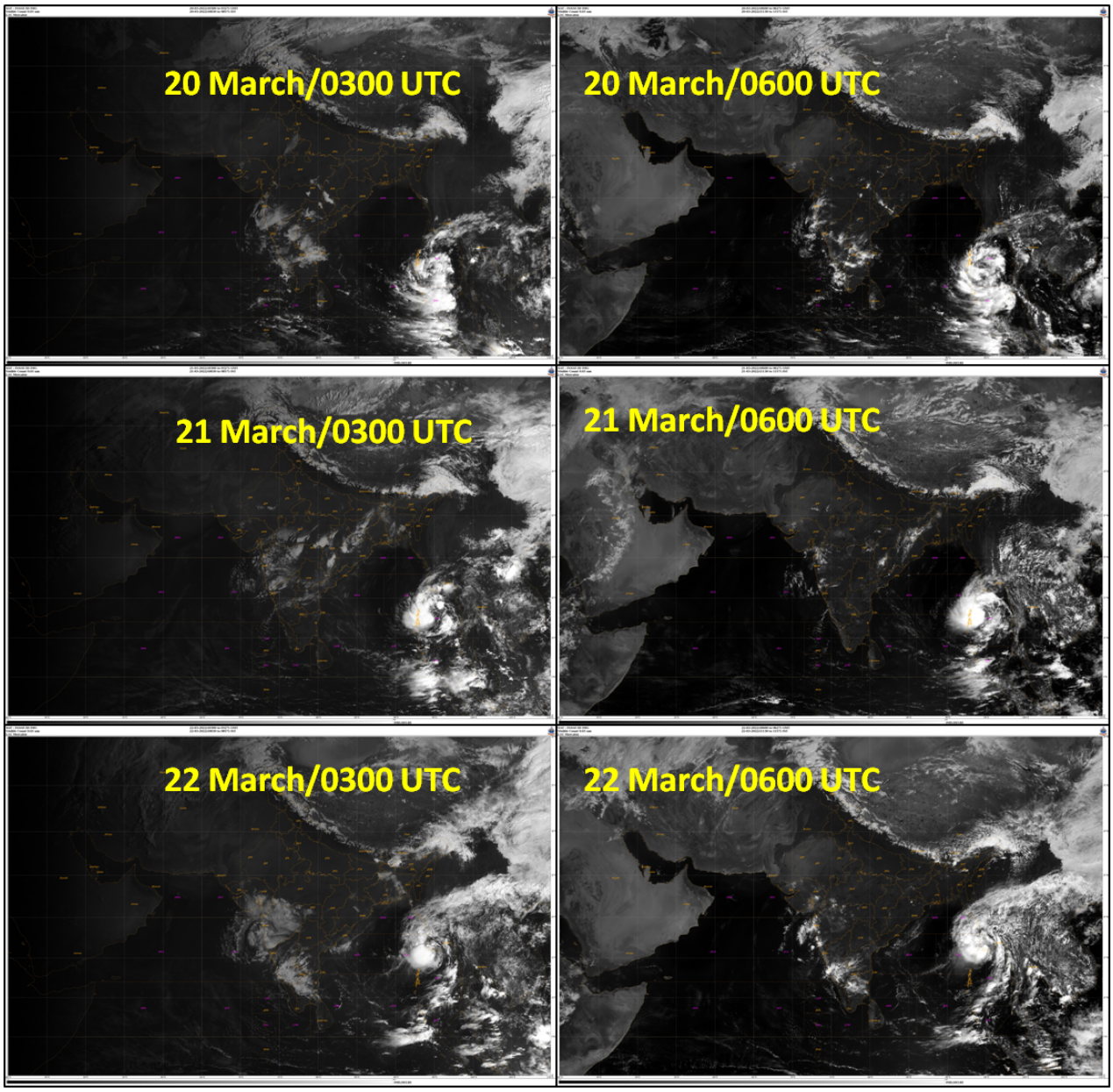


Fig.3(i): INSAT-3D Vis imageries of Deep Depression(20-23rd March, 2022)

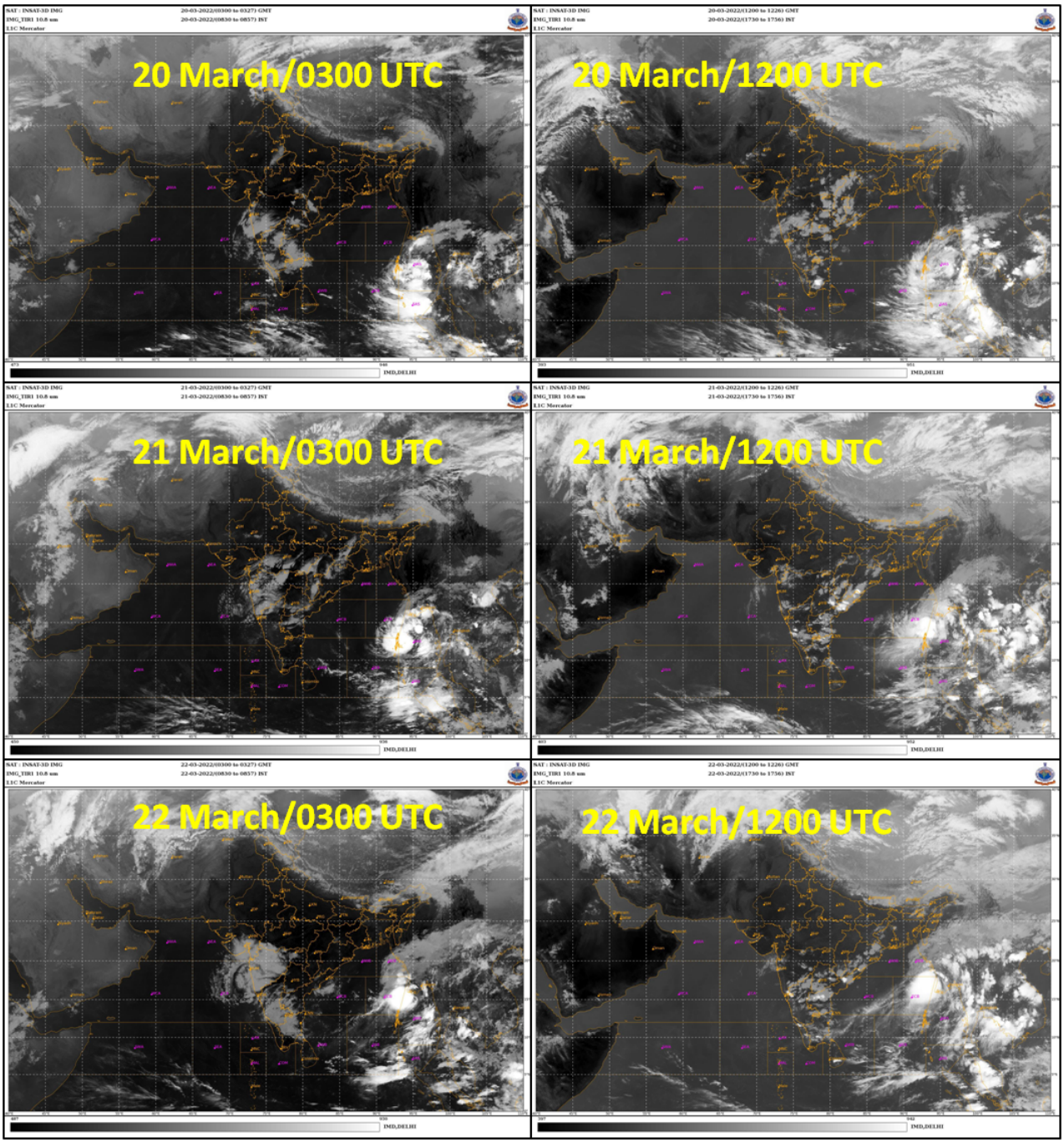


Fig. 3(ii): INSAT-3D IR imageries of deep depression during 20th -23rd March, 2022

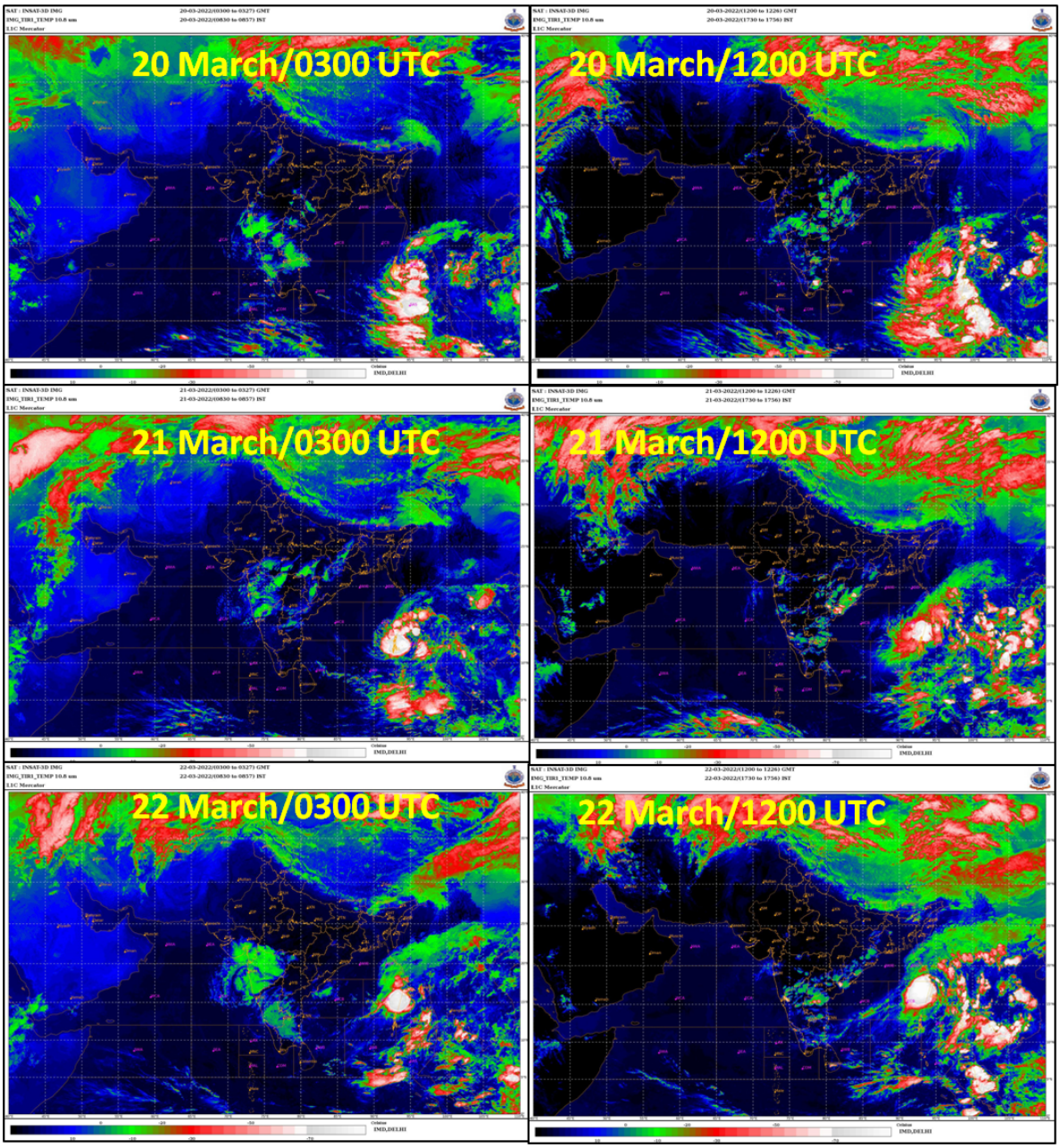


Fig. 3(iii): INSAT-3D coloured imageries of deep depression (20th-23rd March, 2022)

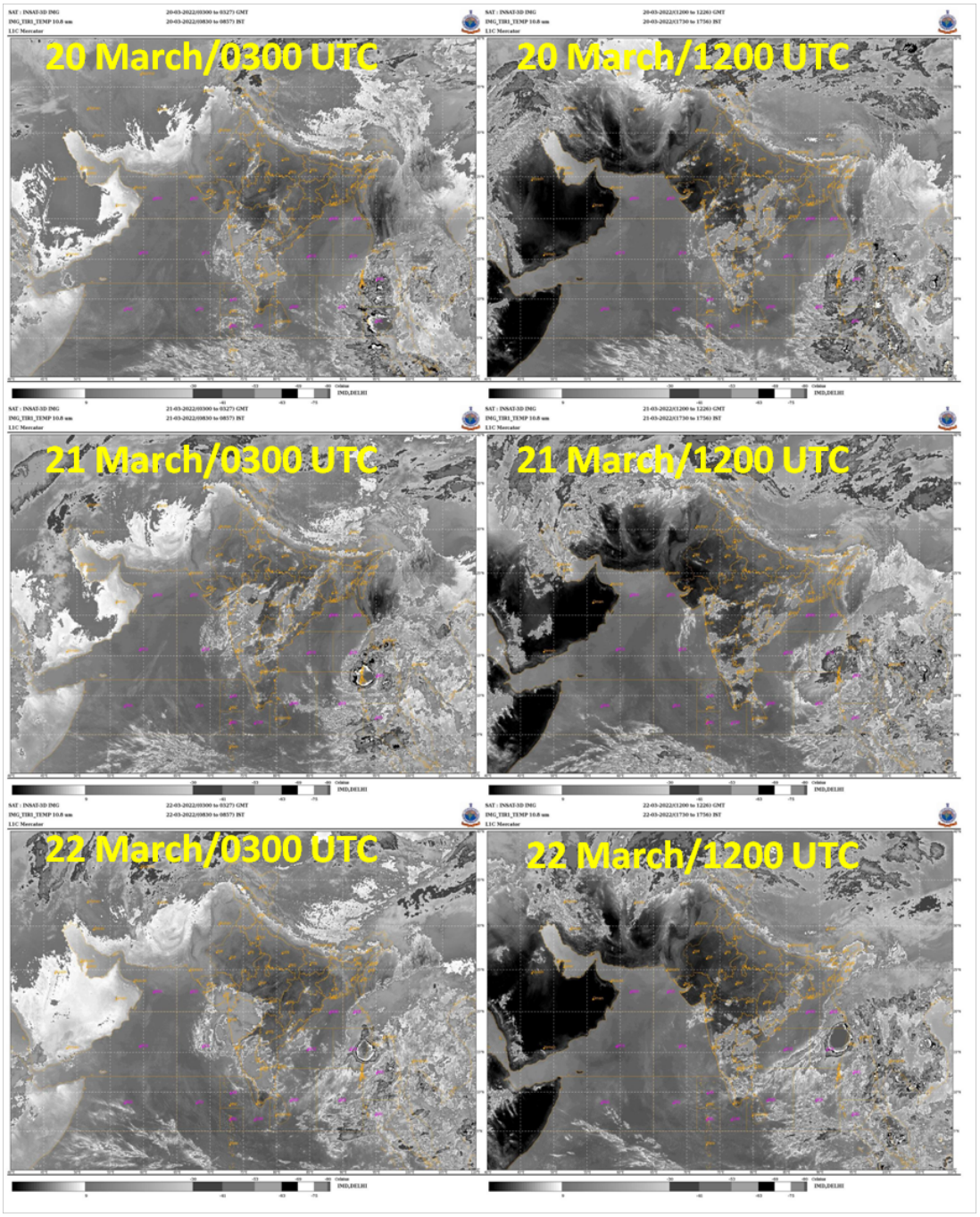


Fig. 3(iv): INSAT-3D BD imageries of deep depression during 20th -23rd March, 2022

The SCATSAT (METOP-B) imageries during 20-22 March 2022 is provided in Fg.4. These ASCAT imageries indicated stronger wind in the southern sector of the system. These winds were in agreement with the intensity of the system.

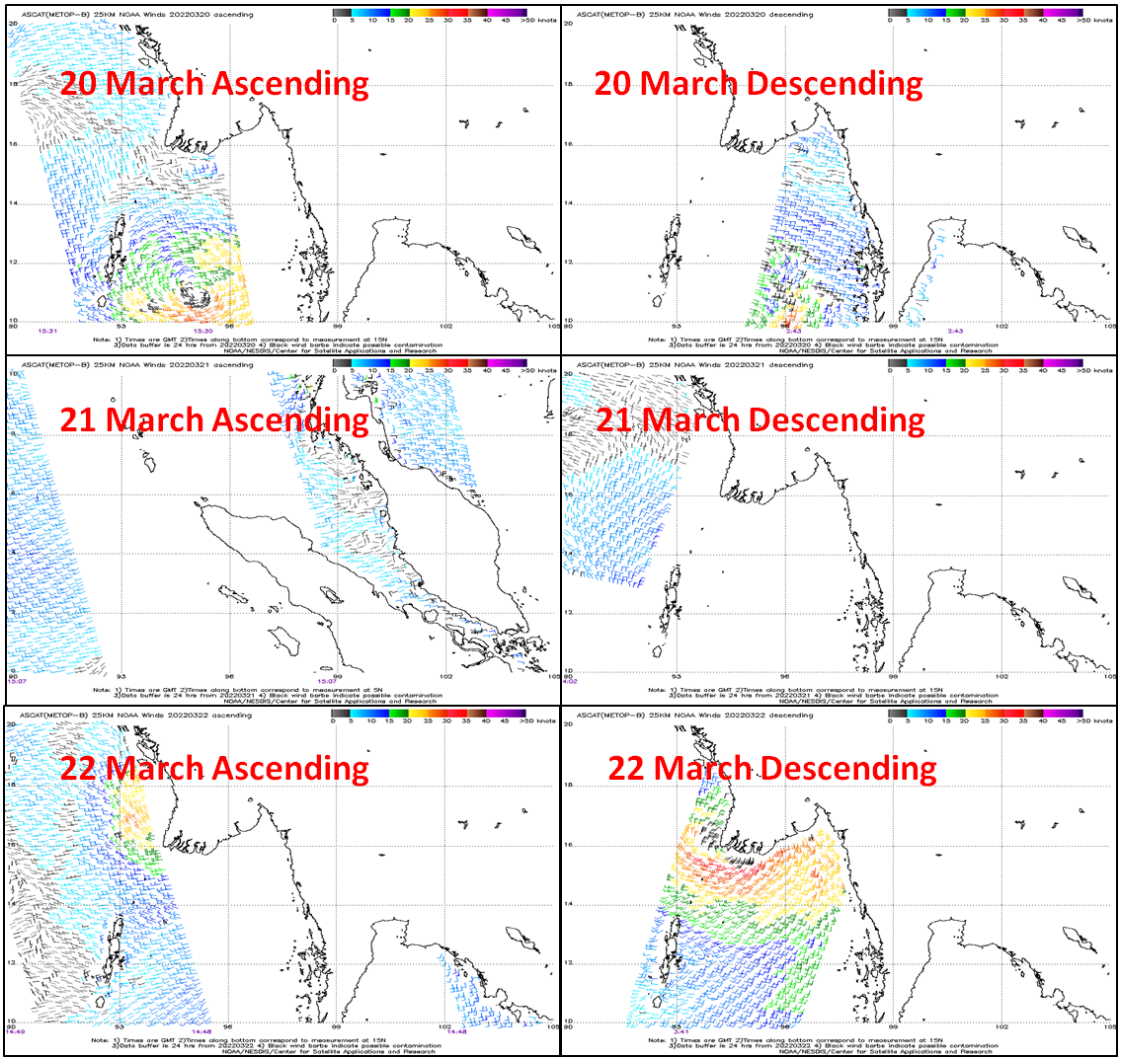


Fig.4: ASCAT imageries during Deep Depression (20 -22 March, 2022)

5. Dynamical features

IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10 m, 850, 500 and 200 hPa levels on 0000 UTC of 19th March are presented in Fig.5. The analysis field of IMD GFS at 0000 UTC of 19th – 23rd March indicated a low pressure area over southeast Bay and adjoining south Andaman Sea with vertical extension upto 500 hPa level. West-southwesterly winds prevailed in the upper level indicating east-northeastwards movement.

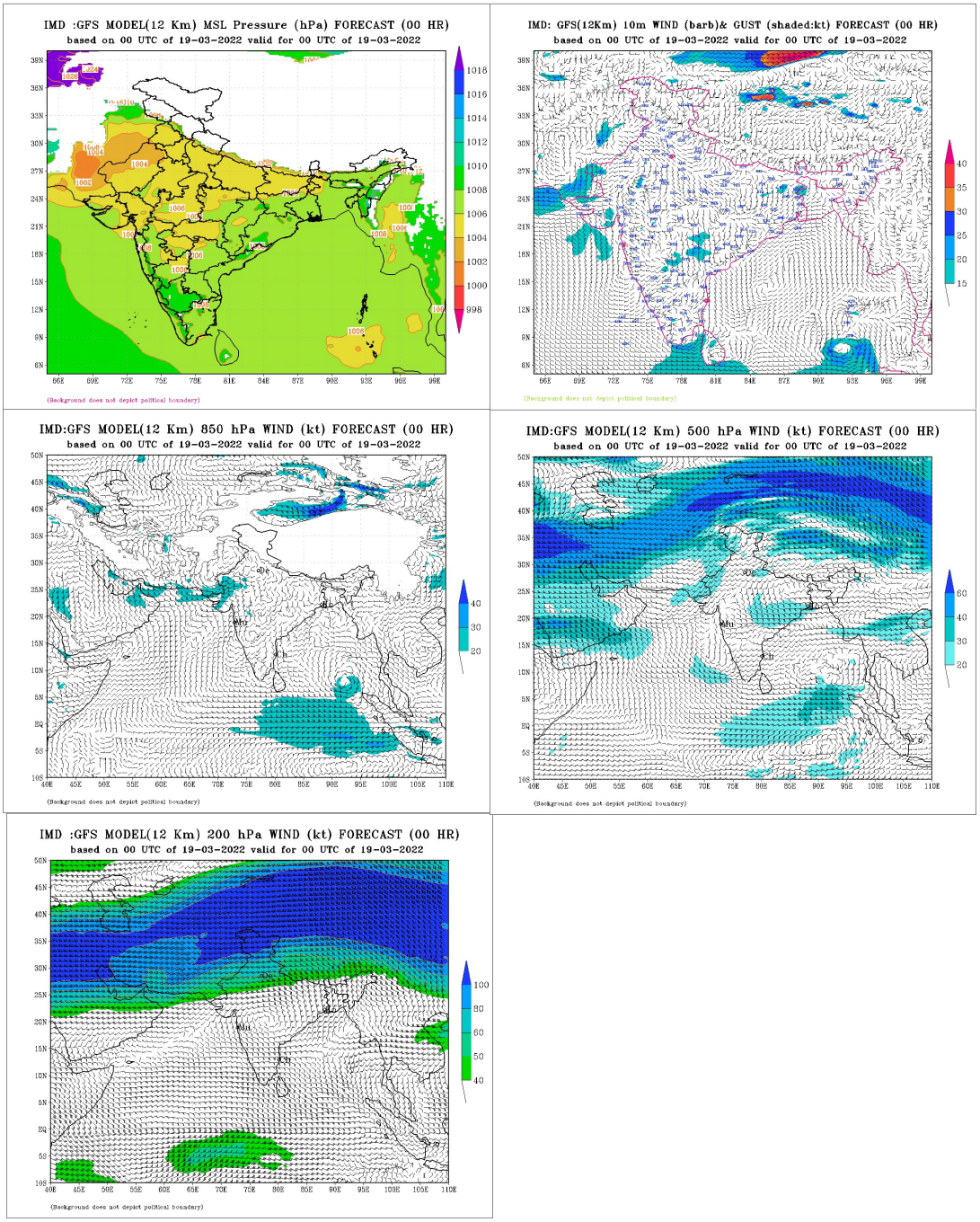


Fig5 (i): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 19th March 2022

The analysis field of IMD GFS at 0000 UTC of 20th March indicated well marked low pressure area over Andaman Sea with vertical extension upto 500 hPa level.

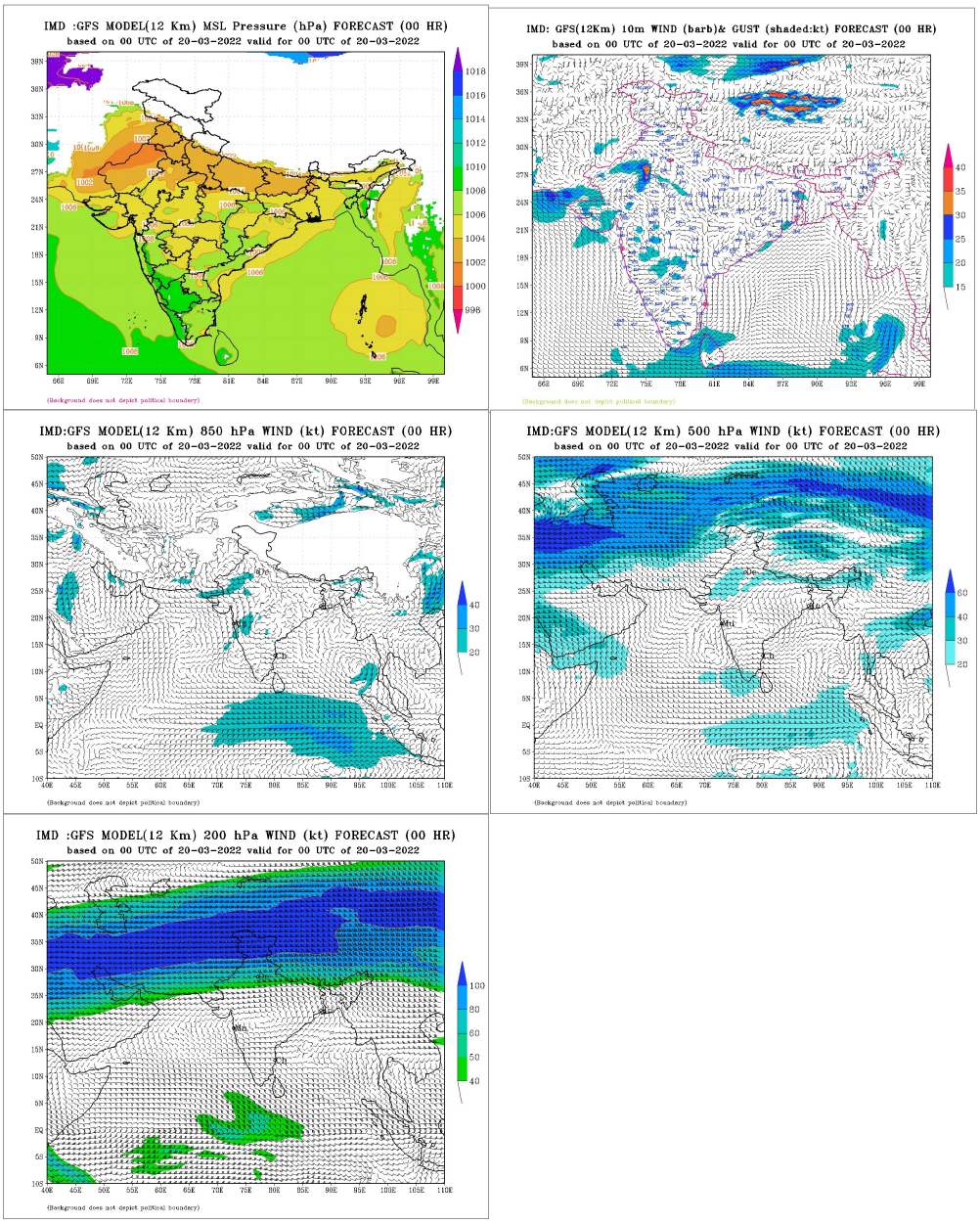


Fig5 (ii): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 20th March 2022

The analysis field of IMD GFS at 0000 UTC of 21st March over north Andaman Sea indicated its north-northeastward movement and intensification into a depression. Hence, the model is underestimated against the actual intensity as on 21st march.

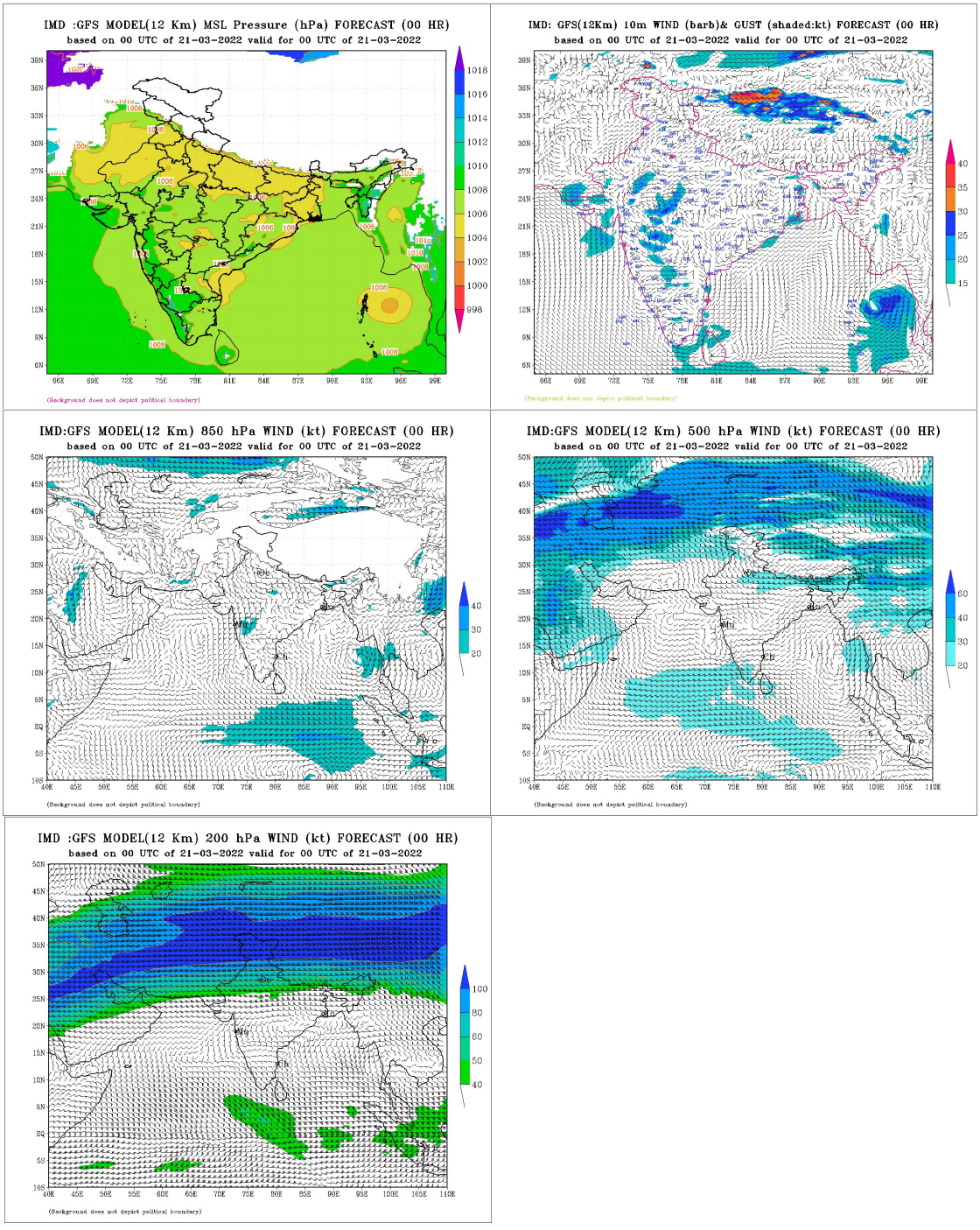


Fig5 (iii): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 21st March 2022

The analysis field of IMD GFS at 0000 UTC of 22nd March indicated it's movement over north Andaman Sea close to south Myanmar coast and indicated intensification into Deep Depression. The model is reasonably estimated the system's intensity against its actual intensity as on 22nd March and also its movement.

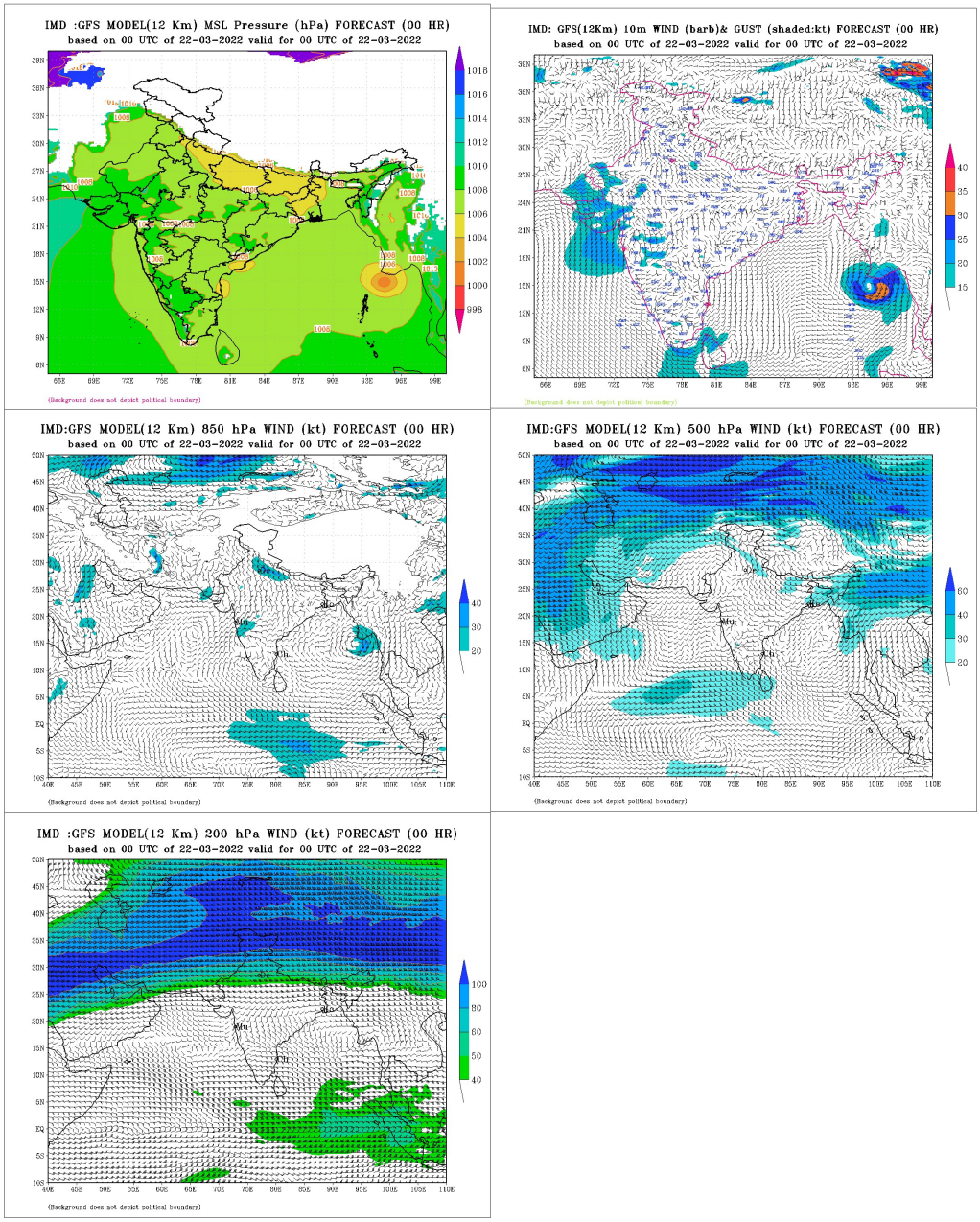


Fig5 (iv): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 22nd March 2022

The analysis field of IMD GFS at 0000 UTC of 23rd March indicated that system crossed the coast and weakened further. The model is in agreement with actual intensity and movement of the system as on 23rd March.

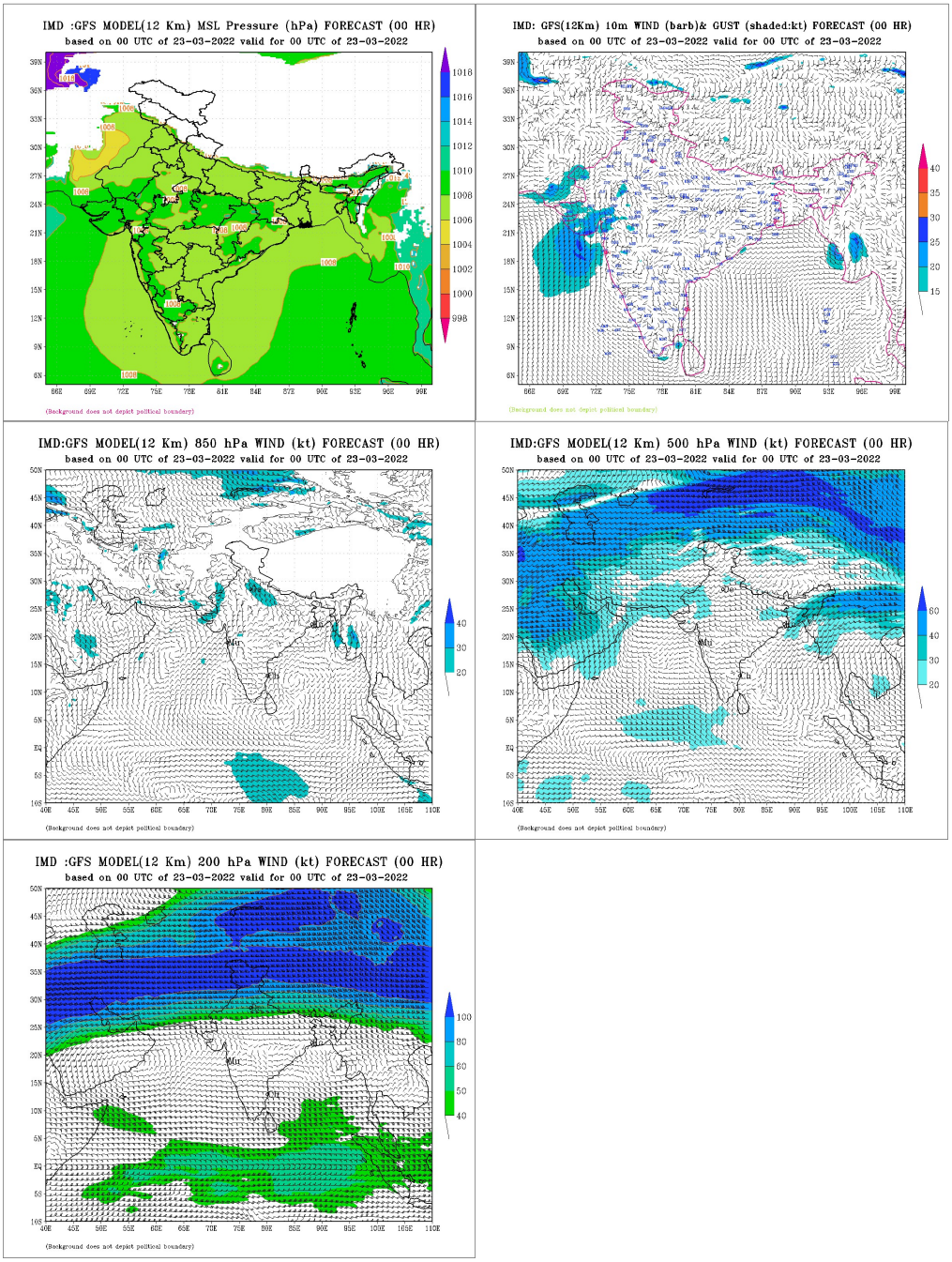


Fig5 (v): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 23rd March 2022

Thus, IMD GFS could capture the genesis, intensity and movement correctly. However, it slightly under estimated the intensity of the system in initial stage on 20th and 21st March.

6. Realized Weather:

6.1 Rainfall:

Under the influence of deep depression, rainfall occurred mainly over the sea area throughout the life period. However widespread rainfall occurred over Long Island (13 cm) and Port Blair (5 cm) on 21st March; Coco Island (8 cm) of Myanmar on 22nd March; Nyaungu (6 cm), Sinphyugyun (5 cm), Kyaukphyu (5 cm), Thandwe (6 cm), Maungaung (6 cm) of Myanmar on 23rd March; Pyinoolwin (5 cm), Myingyan (5 cm) of Myanmar on 24th March. Daily rainfall distribution based on merged grided rainfall data of IMD/NCMRWF during 17 March - 23 March, 2022 is shown in fig.6.

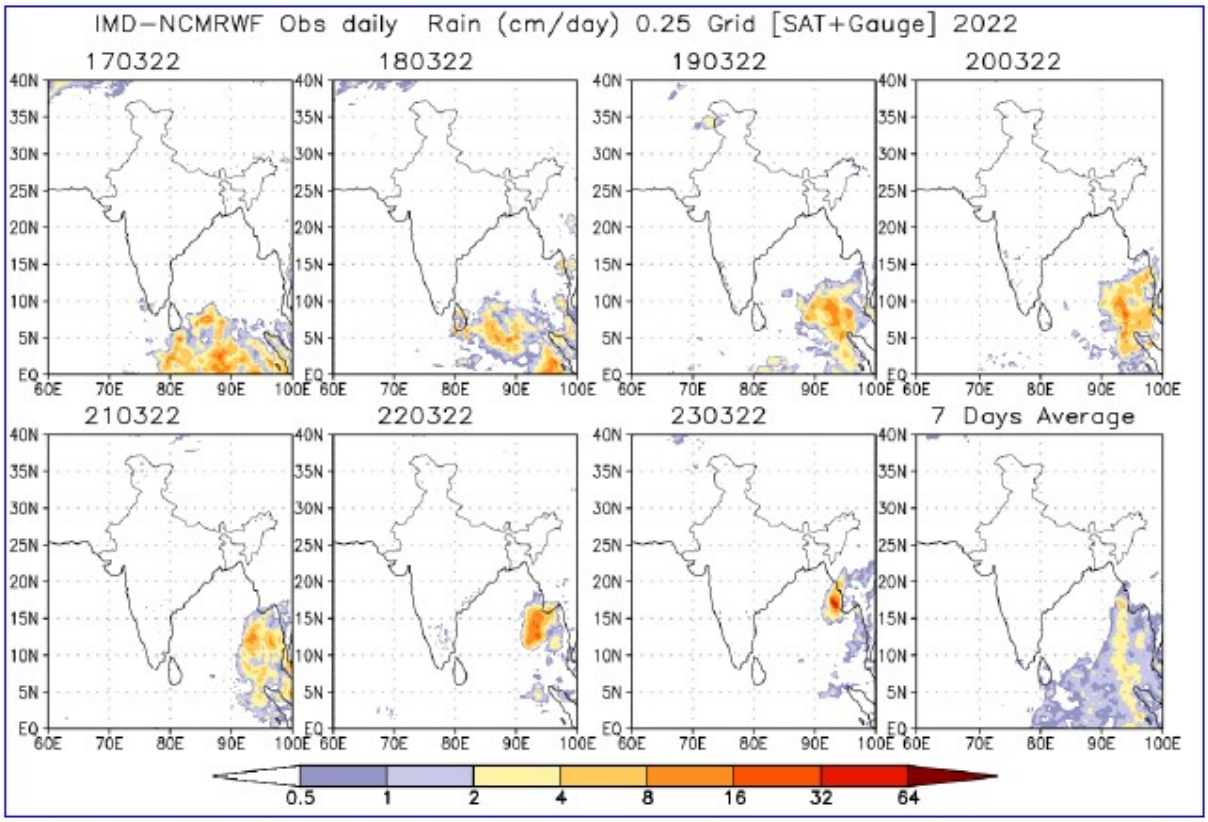


Fig.6: Daily rainfall distribution based on merged grided rainfall data of IMD/NCMRWF during 17 March- 23 March, 2022

7. Performance of NWP models:

Fig.7 shows the multi model IFC-TC-Tracker Forecast from 19 – 21 March 2022. These include multi model ensemble (MME) mean, ECMWF, IMDGFS-EIFS, IMDGFS-GFDL, NCEP-EIFS, NCUM_G_EIFS. It is clear from the picture that most of the models are tracking towards Myanmar coast right from 19th March except ECMWF model which was not showing landfall.

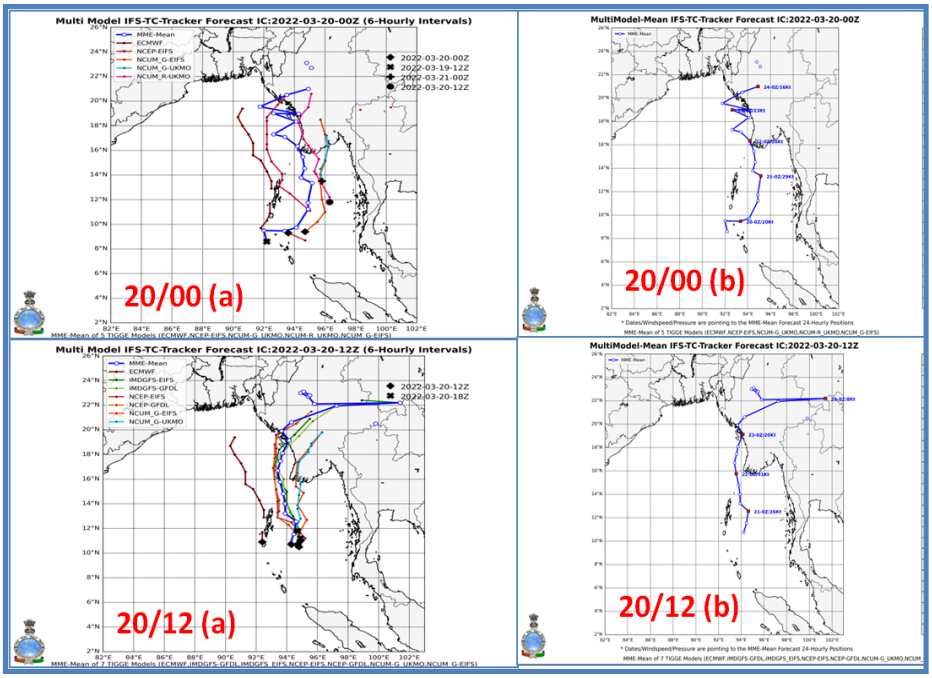


Figure 7 (a). Multi Model IFS-TC-Tracker Forecast IC:2022-03-19

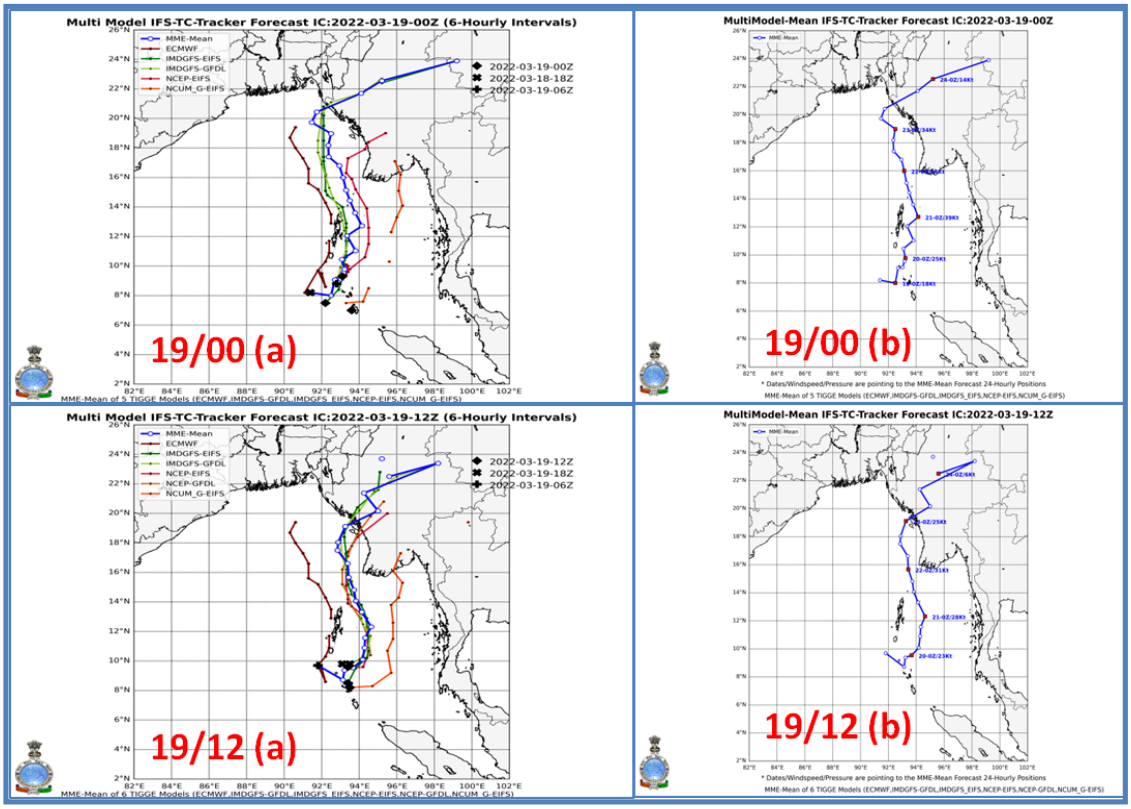


Figure 7(b). Multi Model IFS-TC-Tracker Forecast IC:2022-03-20

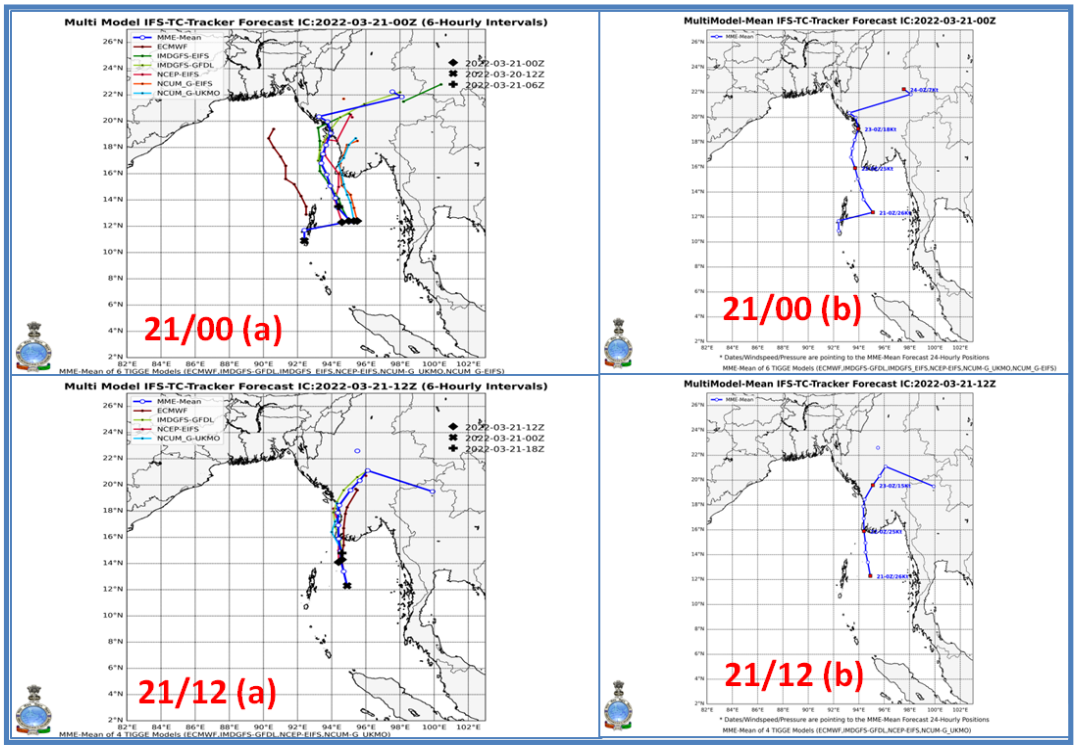


Figure 7(c). Multi Model IFS-TC-Tracker Forecast IC:2022-03-21

All the models suggested in general northward movement and landfall over north Myanmar coast initially. However, 24 hrs ahead, there was consensus and reasonably accurate forecast of landfall point in Myanmar.

8. Damage by Deep Depression

No damage was reported in India due to Deep Depression. There was reported damages in Myanmar as shown in the figure below.

Fig. 9: (a) Place at Andaman & Nicobar (b) Shelter home at Laputta Township in Myanmar, (c) & (d) Mawlamyinegyun Township in Myanmar

9. Bulletins issued by IMD

IMD issued regular bulletins to WMO/ESCAP Panel member countries including Bangladesh and Myanmar, National & State Disaster Management Agencies of Andaman & Nicobar, Odisha, Tamil Nadu, Puducherry, Andhra Pradesh, West Bengal, Kerala general public and media. Regular Bulletins every six hourly were issued since formation of depression over Andaman Sea. In addition, RSMC New Delhi also issued Press Release and SMS to registered users.

IMD continuously monitored the BoB region and issued warnings to all concerned at central and state level since 2nd September, even before the formation of any cyclonic circulation over the region. A total of 17 national bulletins, 11 RSMC bulletins to WMO/ESCAP Panel member countries, regular Press Release, six hourly SMS to coastal population including fishermen and farmers were issued. Regular bulletins were issued at National level by Cyclone Warning Division and at State level by concerned Meteorological Centres of IMD for the states of Odisha, Tamil Nadu, Puducherry, Andhra Pradesh, West Bengal, Kerala & Andaman & Nicobar.

IMD issued regular warning bulletins to the concerned central and state disaster management authorities and press & media. It can be found that the occurrence of heavy rainfall in association with the system could be predicted well in advance.

Bulletins issued by Cyclone Warning Division of IMD in association with the system are given in Table 2

Table 2(a): Bulletins issued by Cyclone Warning Division, IMD, New Delhi

S. No.	Bulletins	No. of Bulletins	Issued to
1	National Bulletin	17	1. IMD's website 2. FAX and e-mail to Control Room NDM, Ministry of Home affairs, Control Room NDMA, Cabinet Secretariat, Minister of Sc. & Tech, Secretary MoES, DST, HQ Integrated Defence Staff, DG Doordarshan, All India Radio, DG-NDRF, Director Indian Railways, Indian Navy, IAF, Administrator, Andaman & Nicobar Islands, Chief Secretary: Odisha, Tamil Nadu , Puducherry ,Andhra Pradesh, West Bengal, Kerala
2	RSMC Bulletin	17	1. IMD's website 2. All WMO/ESCAP member countries through GTS and E-mail. 3. Indian Navy, IAF by E-mail
3	Press Release	4	1. Disaster Managers, Media persons by email and uploaded on website

4	Facebook /Twitter	17 times	Highlights uploaded on facebook/twitter since formation of low pressure area.

Table-2(b): Bulletins issued by Cyclone Warning Centre (CWC) Visakhapatnam / ACWC Kolkota/CWC Bhubaneswar

S. N.	Type of Bulletin	Number of Bulletins		
		CWC Visakhapatnam	ACWC Kolkota	CWC Bhubaneswar
1.	Sea Area Bulletins	NIL	5	NA
2.	Coastal Weather Bulletins	7	5	12
3.	Fishermen Warnings issued	12	5	20
4.	Port Warnings	4	4	12
5.	Heavy Rainfall Warning	1	6	11
6.	Gale Wind Warning	NIL	4	07
7.	Storm surge warning	NIL	NIL	NIL
8.	Information & Warning issued to State Government and other Agencies	NIL	6	11
9.	SMS/ Whatsapp (message in group)	1789	5000	>20763

9. Operational Forecast Performance

9.1. Genesis, track, landfall and intensity forecast performance:

i. The extended range outlook issued on 10th March (5 days prior to formation of LPA) indicated development of a cyclonic circulation over the central parts of south BoB around 14th March leading to enhanced convective activity over the region. Actually, under the influence of a cyclonic circulation over southwest Bay of Bengal, a low pressure area formed over southwest BoB on 15th March.

ii. The tropical weather outlook issued on 16th March (96 hours prior) indicated the formation of depression over Andaman Sea and adjoining southeast BoB 20th March and movement towards Myanmar.

iii. The extended range outlook issued on 17th March (72 hours prior to formation of depression) indicated likely formation of depression over Andaman Sea and adjoining southeast BoB on 20th March and movement towards Myanmar.

iv. Actually, depression formed over southeast BoB on 20th March and moved nearly north-northeastwards and crossed Myanmar coast on 22nd March.

9.2. Realised Weather Verification

The forecasted rainfall, wind speed and storm surge against the reported values are given in table 3.

9.2.1. Rainfall

Forecasted the Extremely heavy rainfall north Andaman Islands against the reported widespread rainfall Long Island and Port Blair.

9.2.2. Realised Wind

Wind speed of 30-35 knots was reported in Ayeyarwady Delta areas,Myanmar against the forecast of 30 kt gusting to 40 kt.

9.2.3. Storm Surge:

2 to 3 feet above the normal tide was reported in Myanmar coast at the time of landfall.

Table 3: Forecasted and reported rainfall, wind and storm surge due to deep depression during 20th-23rd march 2022.

	Forecasted	Reported
Rainfall	Extremely heavy rainfall north Andaman Islands on 21st March	Very heavy rainfall occurred over Long Island (13 cm) and Port Blair (5 cm) on 21st March
Wind speed	30 kt gusting to 40 kt in Ayeyarwady Delta areas,Myanmar.	30-35 knots was reported in Ayeyarwady Delta areas,Myanmar
Storm surge	2 – 3 feet	About 3 feet

10. Summary and Conclusions:

A cyclonic circulation formed over central parts of south Bay of Bengal (BOB) & adjoining Equatorial Indian Ocean (EIO) on 10th March, 2022. It persisted over EIO & adjoining southeast (SE) BOB during 13th-15th March. It lay over EIO & adjoining southwest BOB at 0300 UTC of 15th March, 2022. Under its influence, a low pressure area formed over EIO and adjoining southwest BOB at 1200 UTC 15th March. It lay as a well-marked low pressure area over southeast BoB and adjoining south Andaman Sea at 0000 UTC of 19th March. It concentrated into a depression at 0000 UTC of 20th March, over southeast BoB and adjoining south Andaman Sea. It intensified into a deep depression at 0000 UTC of 21st March over north Andaman Sea and adjoining southeast BoB. It crossed Myanmar coast during 0800-0900 UTC of 22nd March near 16^0N/94.2^0E with maximum sustained wind speed of 30 kt gusting to 40 kt as a deep depression. It weakened into a depression over coastal Myanmar and adjoining eastcentral BoB at 1200 UTC of 22nd March. It emerged into sea for some time and again crossed Myanmar coast during 1900-2000 UTC of 22nd March near 17.8^0N/94.5^0E with maximum sustained wind speed of 25 kt gusting to 30 kt as a depression. It weakened into a well marked low pressure area at 0300 UTC of 23rd March, over Myanmar and into a low pressure area at 0900 UTC of 23rd and became less marked at 0000 UTC of 24th March 2022 over the same region.

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