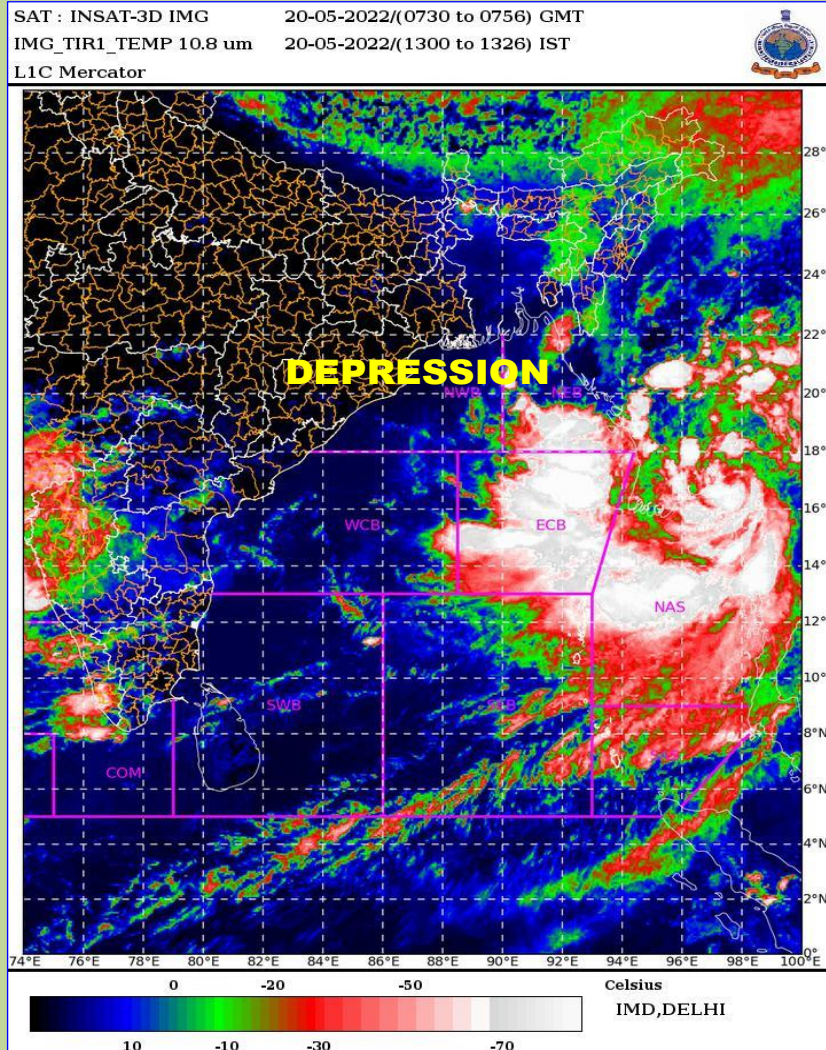




**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
INDIA METEOROLOGICAL DEPARTMENT**

**Depression over Bay of Bengal
(20th-21st May, 2022): A Report**



INSAT-3D enhanced Colored IR imagery based on 0730 UTC of 20th May

**Cyclone Warning Division
India Meteorological Department
New Delhi
May 2022**

Depression over Bay of Bengal (20th-21st May, 2022)

1. Introduction

A cyclonic circulation formed over Gulf of Martaban and adjoining Myanmar in the morning at 0300 UTC (0830 IST) of 19th May, 2022. Under its influence, a low-pressure area formed over the same region in the evening at 1200 UTC (1730 IST) of 19th May. It became a well marked low pressure area at 0000 UTC (0530 IST) of 20th May. Favorable environmental conditions ensued and it concentrated into a depression over the same region at 0300 UTC (0830 IST) of 20th May. It moved north-northeastwards and crossed south Myanmar coast close to Mawlamyine near latitude 16.53°N and longitude 97.46°E during 0800 & 0900 UTC (1330 & 1430 IST) of 20th May. Continuing to move north-northeastwards, it weakened into a well marked low pressure area over northwest Thailand and adjoining Myanmar at 0000 UTC (0530 IST) of 21st May. The observed track and best track parameters of the system are presented in Fig. 1 and Table 1.

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

- During the period 1961-2021 in the month of May, 11 cyclonic disturbances (CDs) crossed Myanmar coast with 8 as cyclonic storms. Tracks of these systems are presented in Fig. 2. Prior to this only one depression in 1966 crossed region closer to this track.
- The system had a very brief life period of 18 hours with a track length of about 120 km.
- It developed under the influence of southwest monsoon surge over the Bay of Bengal (BoB) region.
- It developed very close to Myanmar coast about 40 km southwest of Mawlamyine, Myanmar at 0300 UTC and crossed land within next 6 hours.

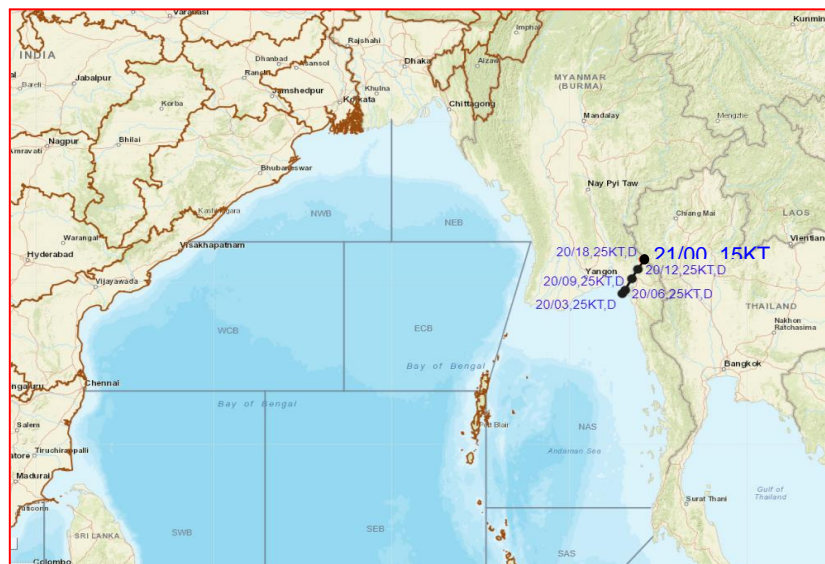


Fig.1a: Observed track of depression over Bay of Bengal during 20th-21st May, 2022

Table 1: Best track positions and other parameters of depression over Gulf of Martaban and adjoining Myanmar (20th-21st May, 2022)

Date	Time (UTC)	Lat.	Long.	C.I. No.	Estimated Central Pressure (hPa)	Estimated Maximum Sustained Surface Wind (kt)	Estimated Pressure drop at the Centre (hPa)	Category
20.05.22	0300	16.3	97.3	1.5	1000	25	4	D
	0600	16.4	97.4	1.5	1000	25	4	D
	Crossed South Myanmar coast close to Mawlamyine (Myanmar) near latitude 16.53°N and longitude 97.46°E between 0800 & 0900 UTC (1330 & 1430 hours IST) of 20th May, 2022 with maximum sustained wind speed of 45-55 gusting to 65 kmph							
	0900	16.8	97.6	1.5	998	25	4	D
	1200	17.1	97.8	1.5	999	25	3	D
	1800	17.4	98	1.5	999	25	3	D
21.05.22	0000	Weakened into a Well Marked Low Pressure Area over Northwest Thailand and adjoining Myanmar at 0000 UTC of 21st May, 2022.						

Knots: kt, 1 kt = 1.85 kmph, Time in IST= Time in UTC + 0530 hrs

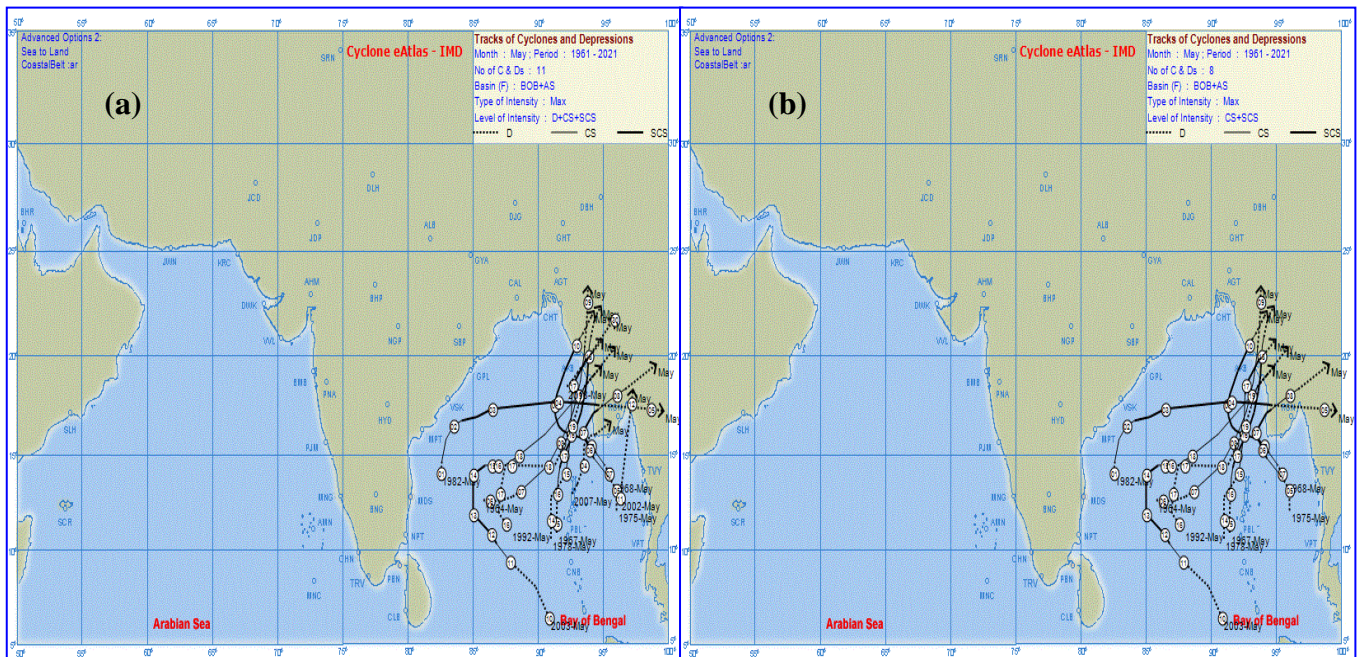


Fig. 2: Track of a) cyclonic disturbances (Depression and above) in the month of May and b) cyclonic storms (MSW ≥34 knots) crossing Myanmar coast during March 1961-2021.

3. Brief life history

3.1. Genesis

Under the influence of a cyclonic circulation over Gulf of Martaban and adjoining Myanmar, a low-pressure area formed over the same region in the evening of 19th May which became a well marked low on 20th May morning. At 0300 UTC of 20th May, sea surface temperature (SST) was around 31-32°C over entire over eastcentral BoB, 31-32°C over adjoining Gulf of Martaban. The ocean heat content (OHC) was >100 KJ/cm² over the region. Low level vorticity was around $100 \times 10^{-6} \text{ s}^{-1}$ near the system centre with vertical extension up to 200 hPa level. Low level convergence was around $30 \times 10^{-5} \text{ s}^{-1}$ and upper level divergence was around $40 \times 10^{-5} \text{ s}^{-1}$ to the southwest of system centre. Wind shear was moderate (15-20 knots) around the system area and was moderate (15-20 knots) along the forecast track over south Myanmar. Under these conditions, the well marked low pressure area over Gulf of Martaban concentrated into a depression at 0300 UTC of 20th May over Gulf of Martaban about 40 km southwest of Mawlamyine.

3.2. Intensification and movement:

Under the influence of strong surge of southwesterly winds over the BoB, the depression over Gulf of Martaban and adjoining Myanmar moved north-northeastwards and crossed South Myanmar coast close to Mawlamyine (Myanmar) near latitude 16.53°N and longitude 97.46°E between 0800 & 0900 UTC of 20th May, 2022 with maximum sustained wind speed of 45-55 gusting to 65 kmph

At 0900 UTC, low level vorticity was around $100 \times 10^{-6} \text{ s}^{-1}$ over south coastal Myanmar with vertical extension up to 500 hPa level. Low level convergence decreased and was about $10-15 \times 10^{-5} \text{ s}^{-1}$ and upper-level divergence was around $30 \times 10^{-5} \text{ s}^{-1}$ to the southwest of system centre. Wind shear was moderate (15-20 knots) around the system area and also along the forecast track. Under the influence of moderate wind shear, the system maintained its intensity over land for next 12 hours and gradually weakened into a well marked low pressure area over Northwest Thailand and adjoining Myanmar at 0000 UTC of 21st May, 2022.

4. Monitoring through satellite:

India Meteorological Department (IMD) maintained round the clock watch over the north Indian Ocean (NIO) and the system was monitored well in advance. 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 the INSAT-3D imagery at 0300 UTC OF 20th May 2022, the intensity of the system was C1.5 with a well-defined center in visible image. Associated broken low and medium clouds with embedded intense to very intense convection lay over Gulf of Martaban and adjoining

Myanmar & north Andaman Sea. Minimum cloud top temperature was minus 93°C. Convection further organized during previous 3 hours over the region.

As per the INSAT-3D imagery at 0600 UTC of 20th May 2022, the intensity of the system was CI 1.5 with a well-defined center in visible image. Associated broken low and medium clouds with embedded intense to very intense convection lay over Gulf of Martaban, adjoining south Myanmar & north Andaman Sea, adjoining eastcentral BoB and Arakan coast. Minimum cloud top temperature was minus 93°C. During 0900 UTC of 20th May to 0000 UTC of 21st May, associated broken low and medium clouds with embedded intense to very intense convection lay over south Myanmar, Gulf of Martaban, north Andaman Sea & adjoining eastcentral BoB and Arakan coast. Minimum cloud top temperature is minus 93°C. After landfall, the clouds disorganized and the system weakened gradually.

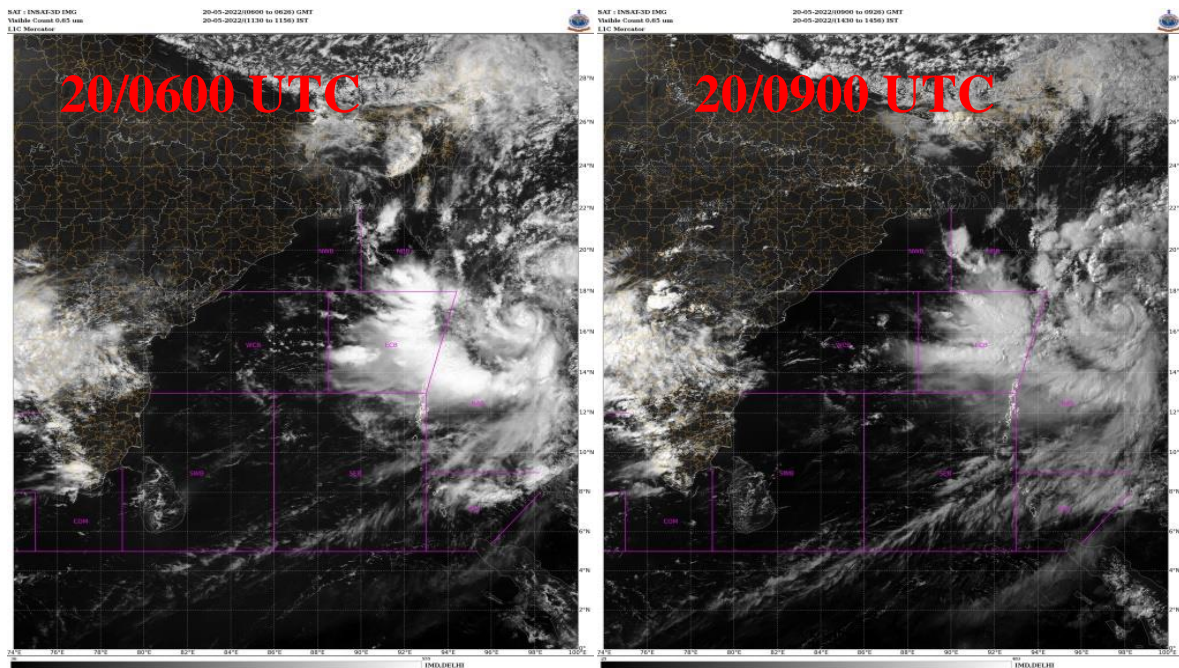


Fig. 3(a): INSAT-3D Visible imageries of depression during 20-21 May, 2022

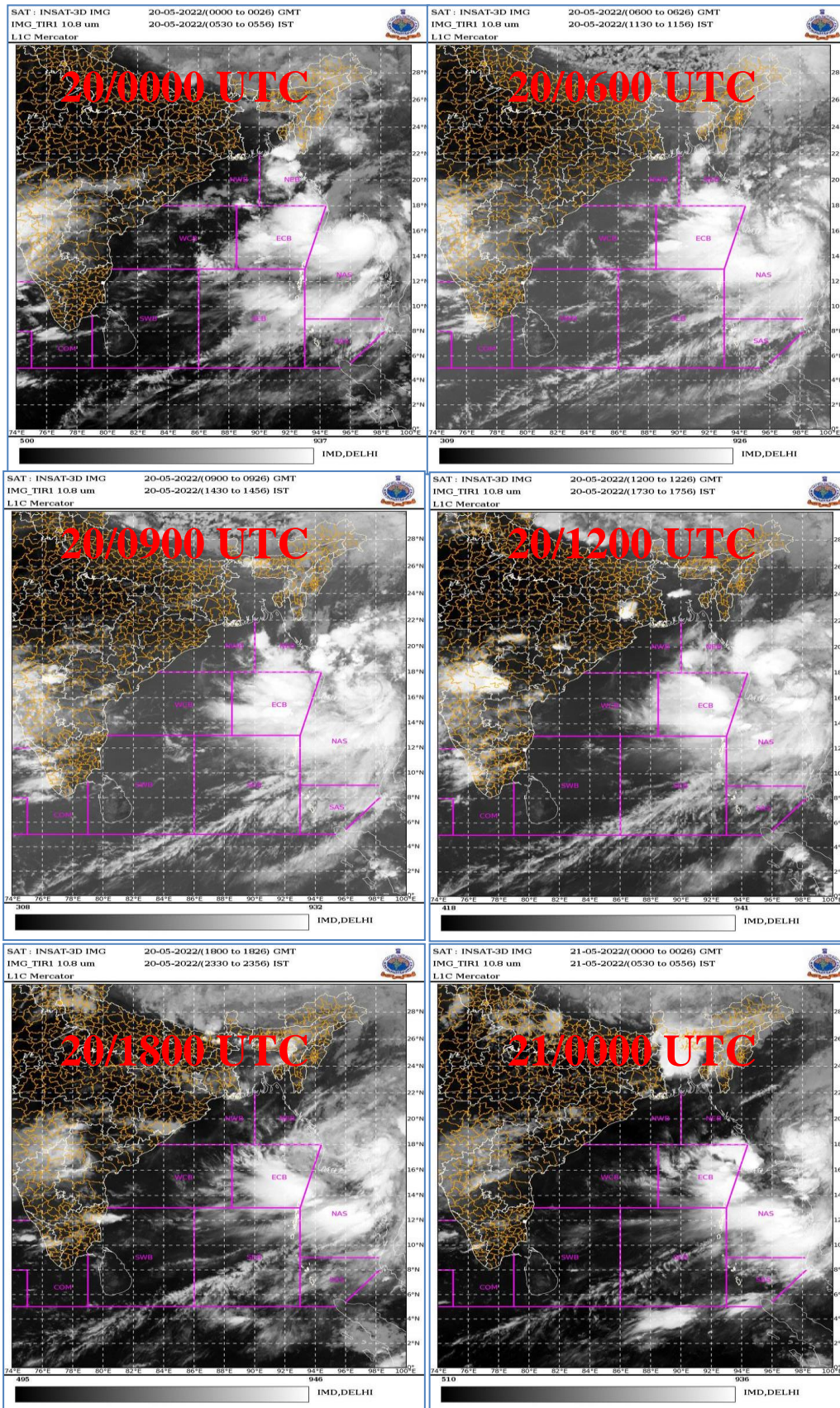


Fig. 3(b): INSAT-3D IR imageries of depression during 20-21 May, 2022

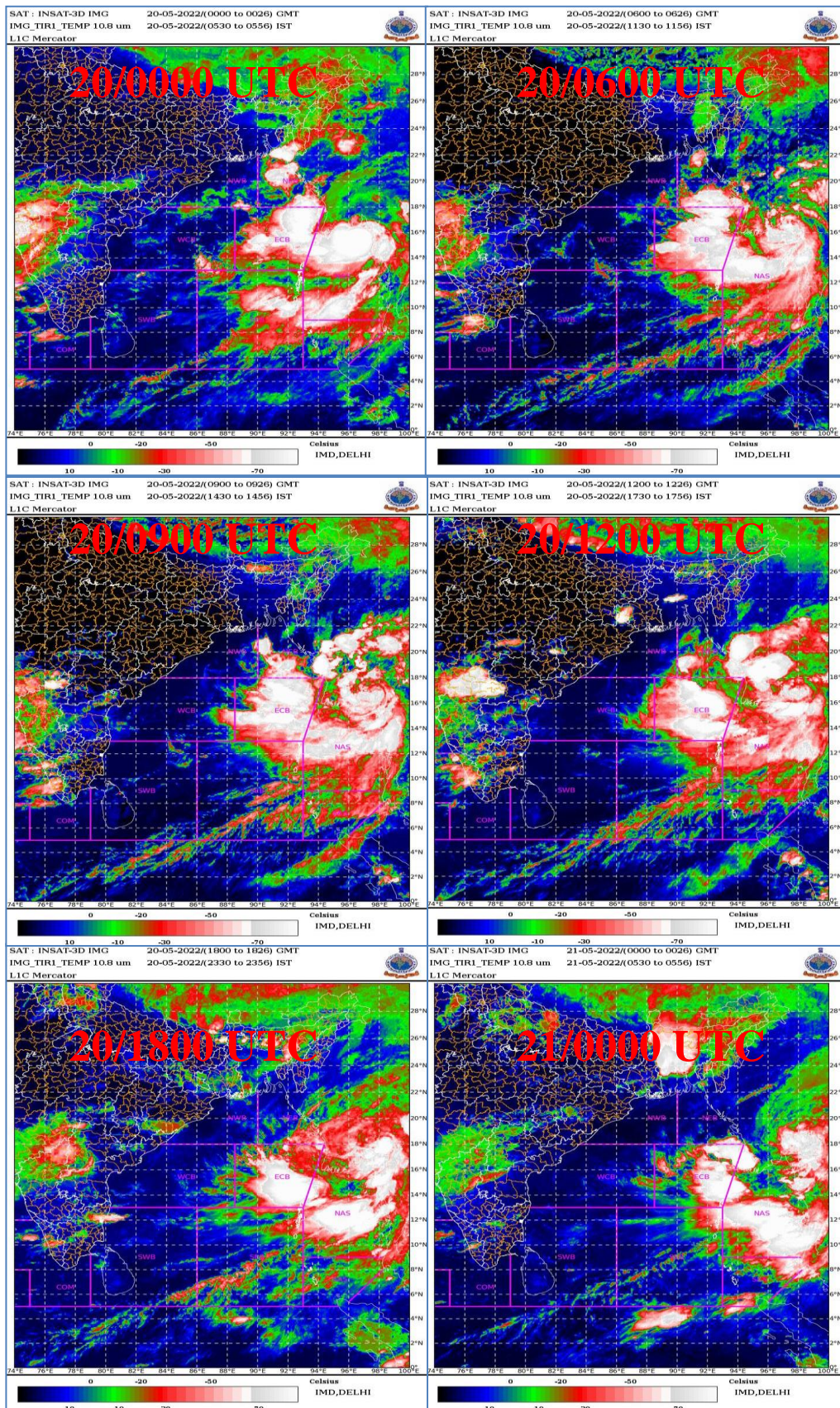


Fig. 3(c): INSAT-3D NHC imageries of depression during 20-21 May, 2022

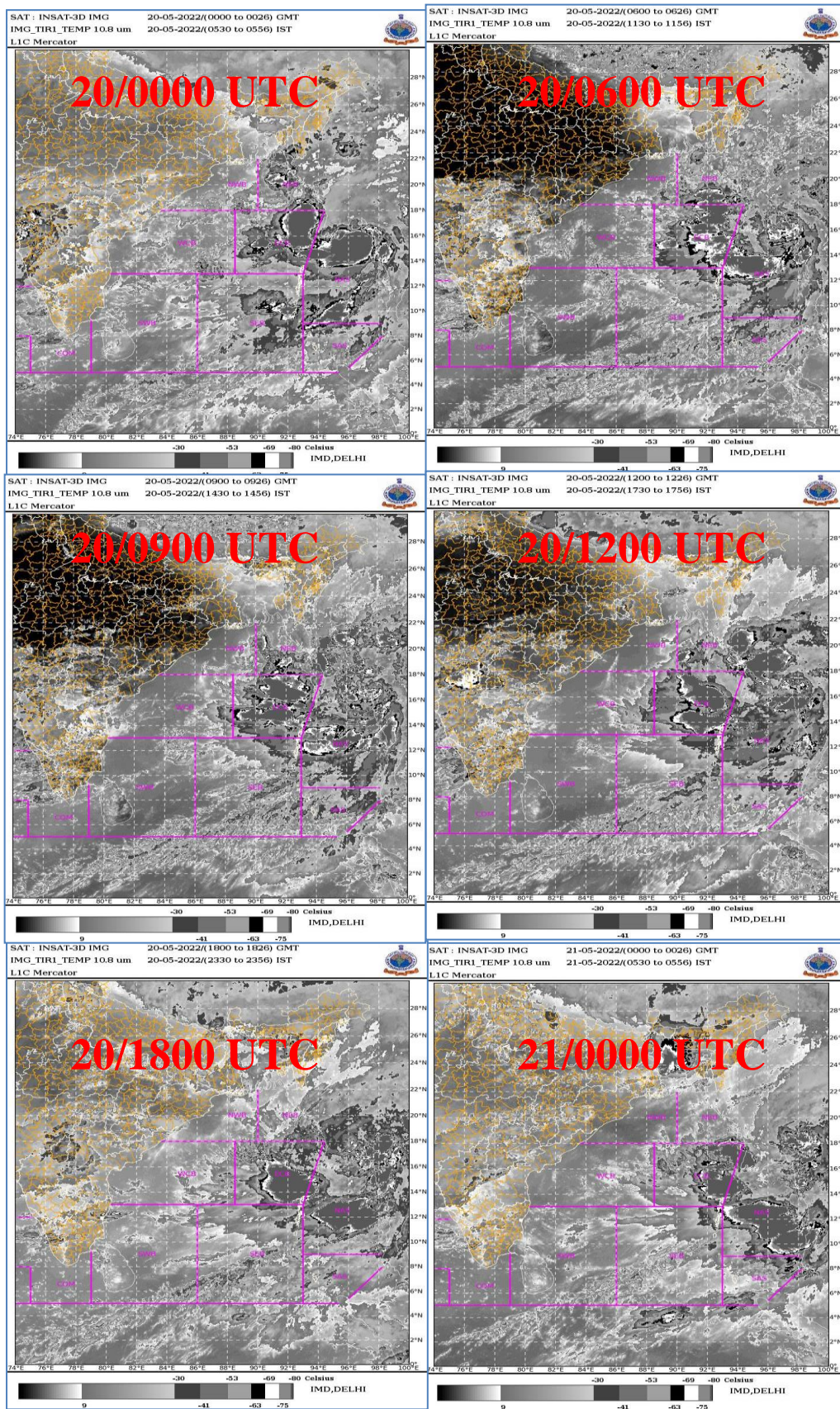


Fig. 3(d): INSAT-3D BD imageries of depression during 20-21 May, 2022

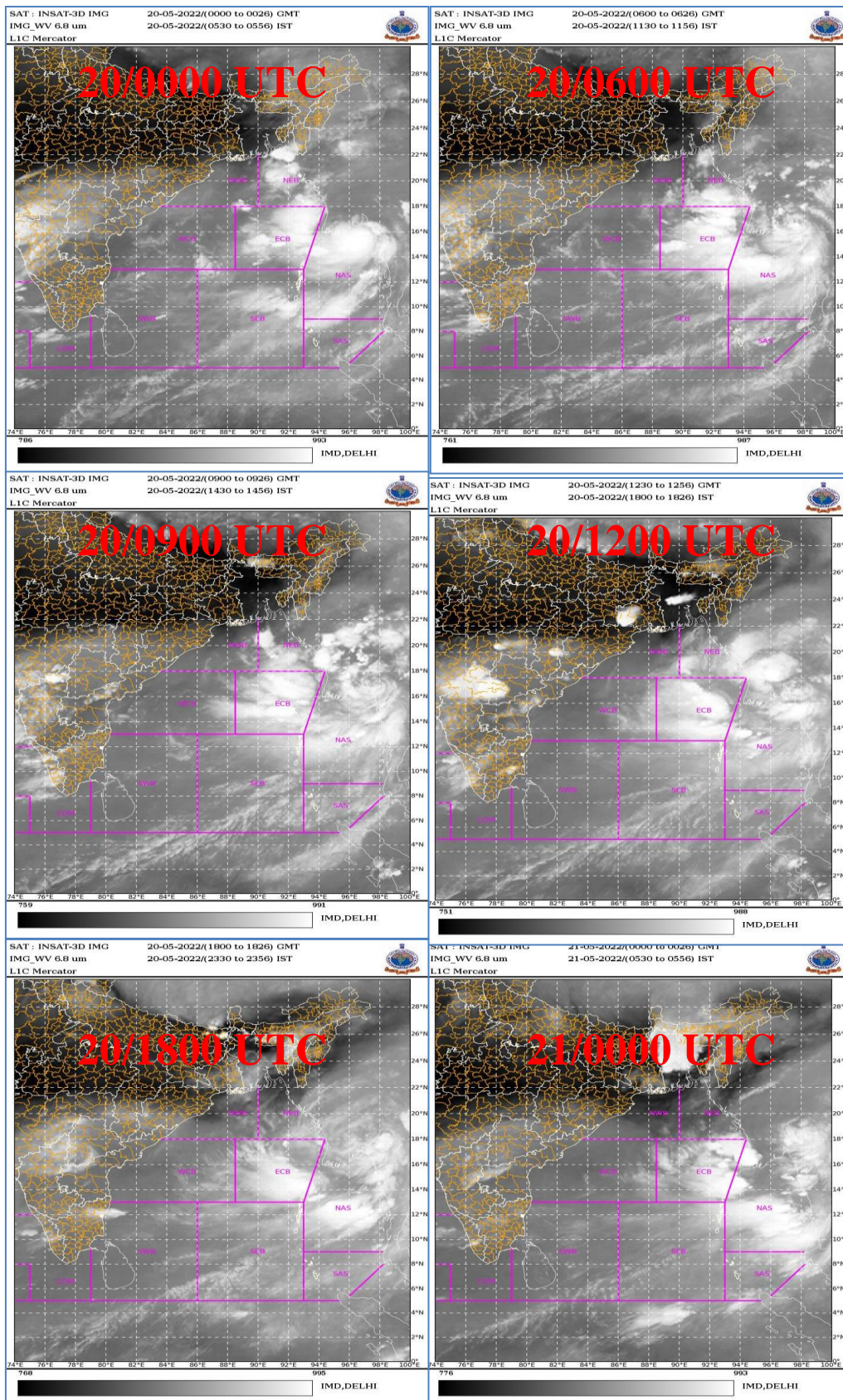


Fig. 3(e): INSAT-3D WV imageries of depression during 20-21 May, 2022

The SCATSAT (METOP-B) imageries during 20-21 May 2022 is provided in Fig.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.

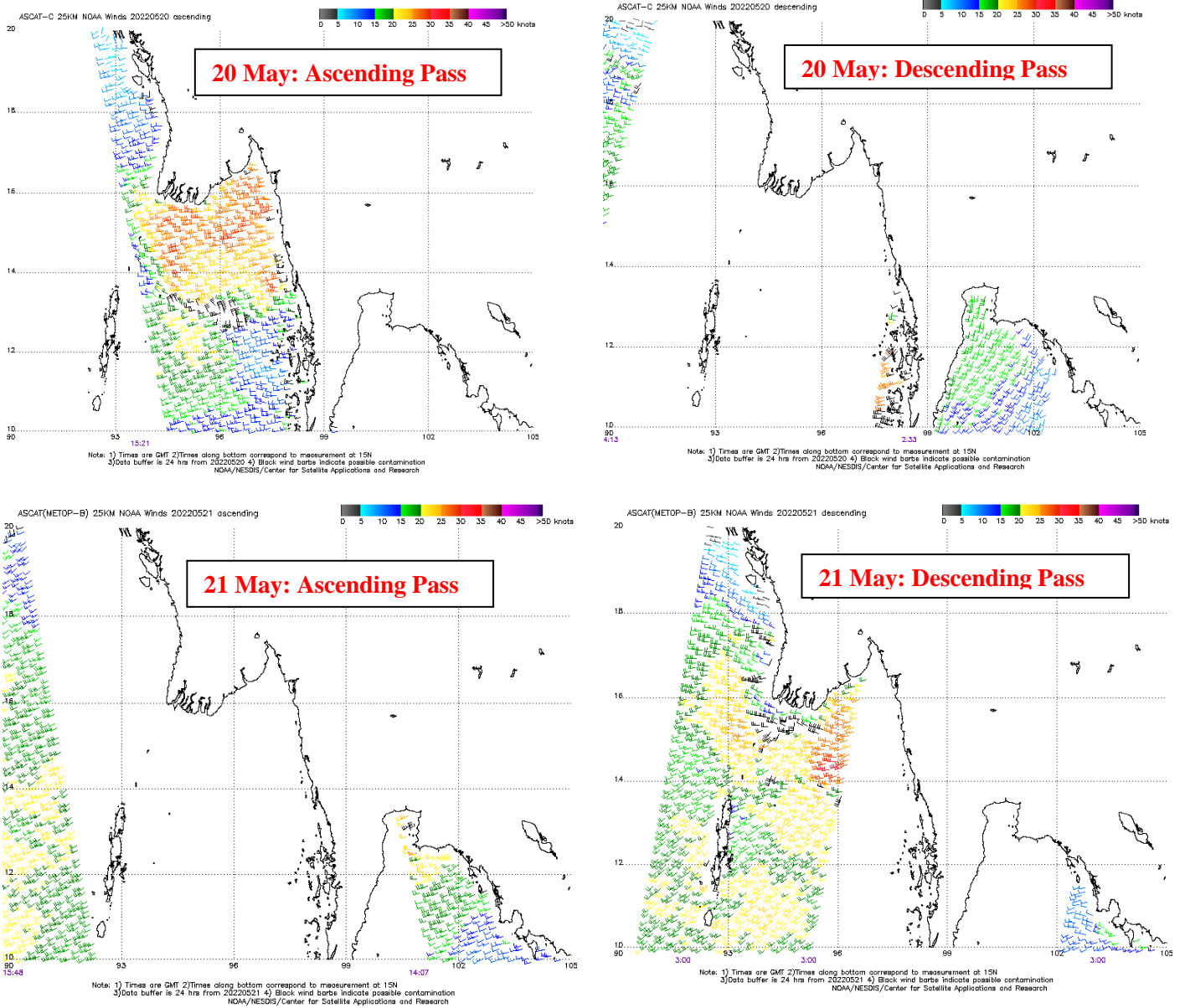


Fig.4: ASCAT imageries during Depression (20-21 May, 2022)

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 20th May are presented in Fig.5. The analysis wind fields on 20th May over Gulf of Martaban and close to the coast indicated the depression. It extended up to the 500 hPa. West-southwesterly winds prevailed in the upper level indicating east-northeastwards movement. However, it could not be captured in the pressure field.

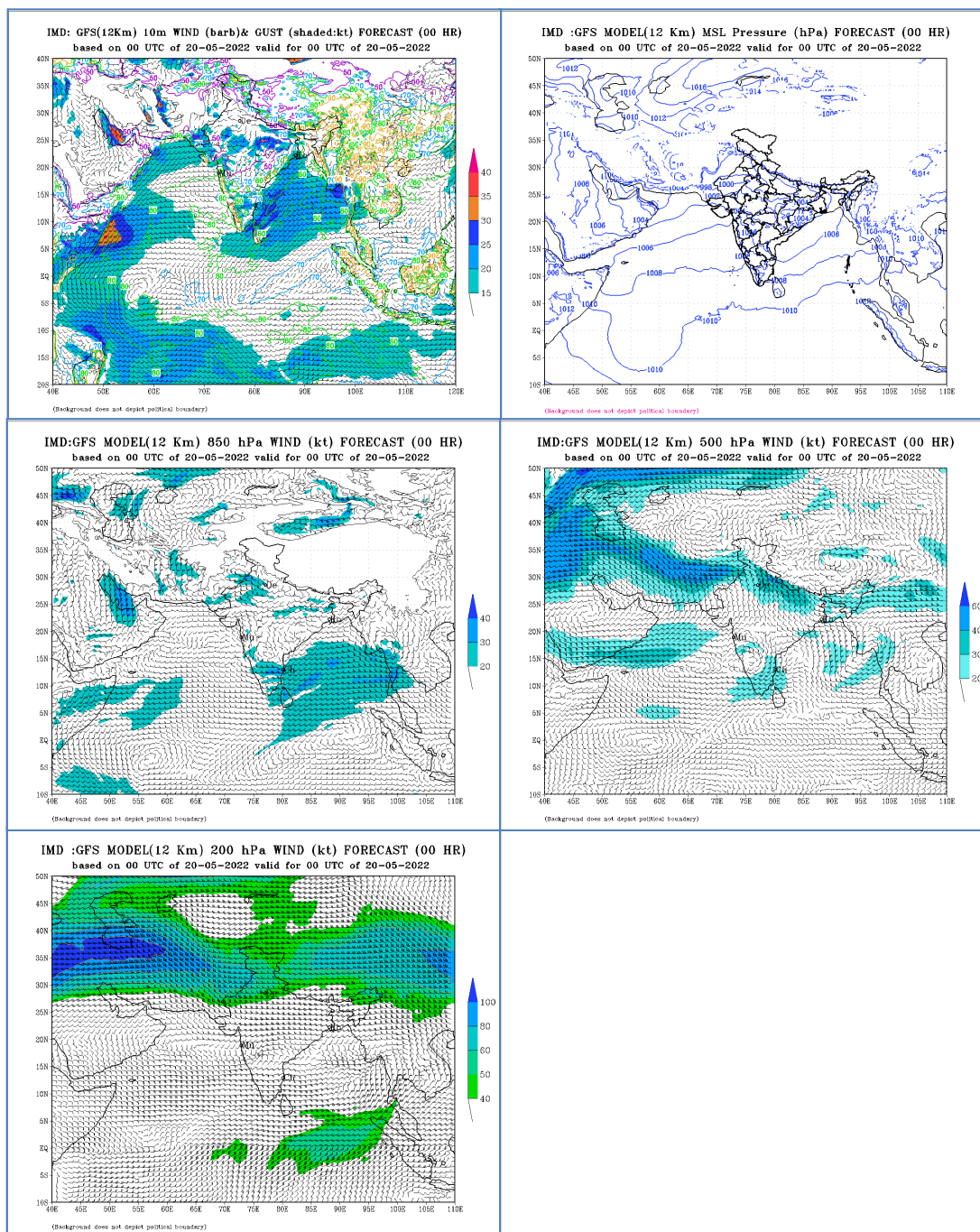


Fig5 (i): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 20th May 2022

The analysis wind fields on 0000 UTC of 21st May indicated the weakening of the system and over land.

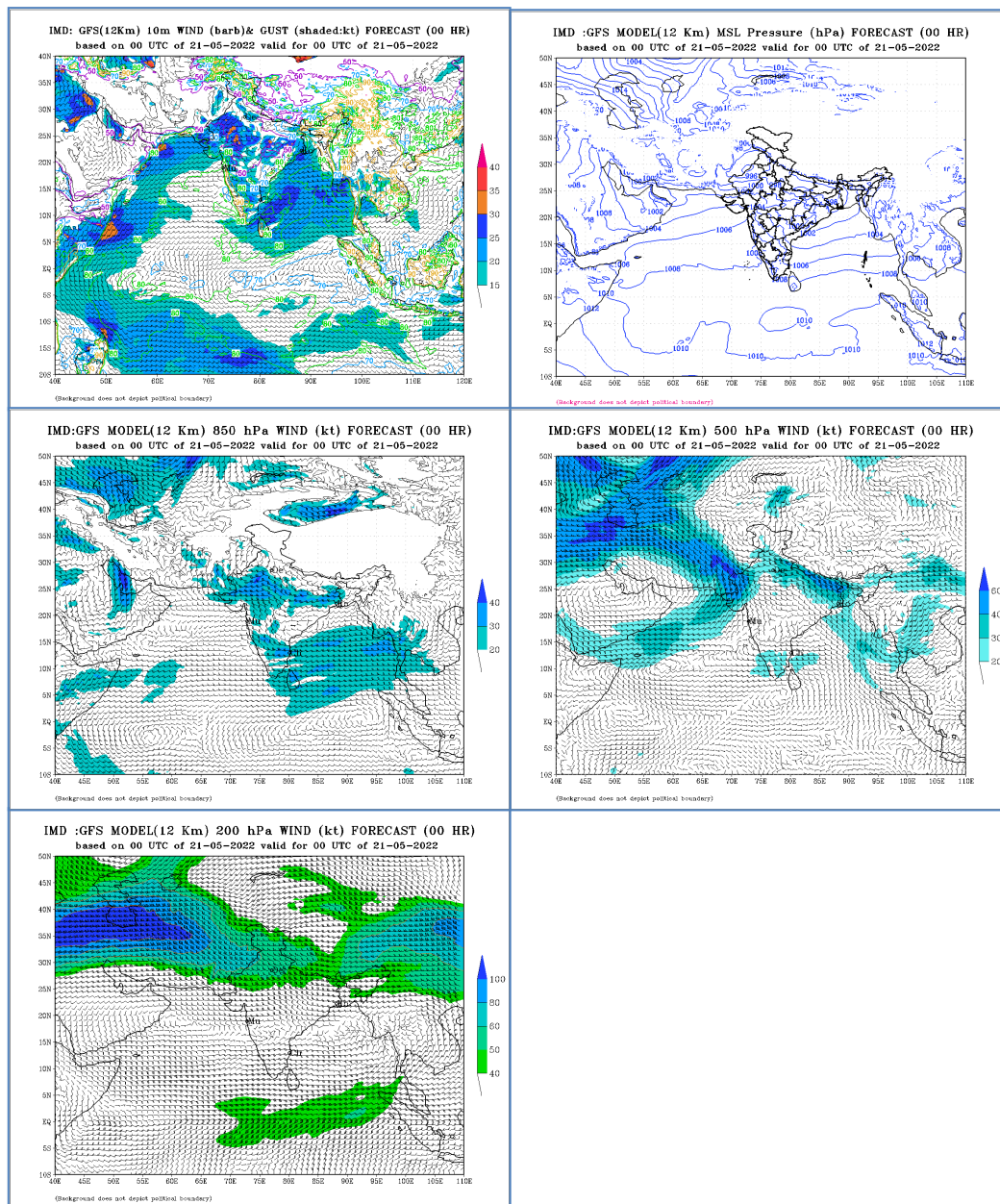


Fig5 (ii): IMD GFS (T1534) mean sea level pressure (MSLP), winds at 10m, 850, 500 and 200 hPa levels based on 0000 UTC of 21st May 2022

7. Damage by Deep Depression

No damage was reported due to Depression.

6. Realized Weather:

6.1 Rainfall:

Under the influence of depression, widespread rainfall occurred mainly over the sea area and Myanmar and adjoining Thailand. Daily rainfall distribution based on merged grided rainfall data of IMD/NCMRWF during 19 March - 25 May, 2022 is shown in fig.6.

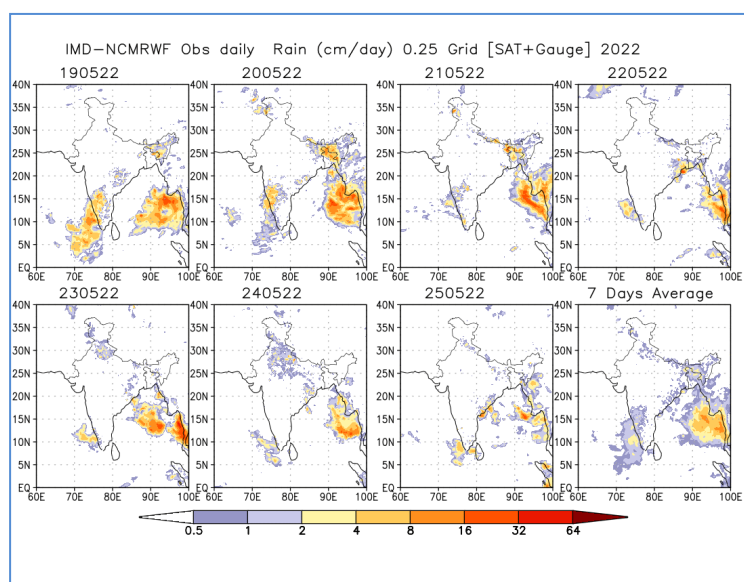


Fig.6: Daily rainfall distribution based on merged gridded rainfall data of IMD/NCMRWF during 19- 25 May, 2022

8. Bulletins issued by IMD

IMD issued regular bulletins to WMO/ESCAP Panel member countries including Bangladesh, Myanmar, Thailand, National & State Disaster Management Agencies of Andaman & Nicobar ,Odisha, Tamil Nadu , Puducherry ,Andhra Pradesh, West Bengal, general public and media. Regular Bulletins every six hourly were issued since formation of depression over northwest BoB. In addition, RSMC New Delhi also issued Press Release and SMS to registered users. A total of 6 national bulletins, 6 RSMC bulletins to WMO/ESCAP Panel member countries, regular Press Release, six hourly SMS were issued. Bulletins issued by Cyclone Warning Division of IMD in association with the system are given in Table 2

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

S. No.	Bulletins	No. of Bulletins	Issued to
1	National Bulletin	6	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
2	RSMC Bulletin	6	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	0	1. Disaster Managers, Media persons by email and uploaded on website

4	Facebook /Twitter	6 times	Highlights uploaded on facebook/twitter since formation of low pressure area.
5	SMS	23698	Sent to general public and fishermen Sent to farmers of Odisha, Andhra Pradesh and West Bengal

10. Summary and Conclusions:

A cyclonic circulation formed over Gulf of Martaban and adjoining Myanmar in the morning at 0300 UTC (0830 IST) of 19th May, 2022. Under its influence, a low-pressure area formed over the same region in the evening at 1200 UTC (1730 IST) of 19th May. It became a well marked low pressure area at 0000 UTC (0530 IST) of 20th May. It concentrated into a depression over the same region at 0300 UTC (0830 IST) of 20th May. It moved north-northeastwards and crossed south Myanmar coast close to Mawlamyine near latitude 16.53°N and longitude 97.46°E during 0800 & 0900 UTC (1330 & 1430 IST) of 20th May. Continuing to move north-northeastwards, it weakened into a well marked low pressure area over northwest Thailand and adjoining Myanmar at 0000 UTC (0530 IST) of 21st May.

11. Acknowledgements:

India Meteorological Department (IMD) and RSMC New Delhi duly acknowledge the contribution from all the stakeholders and disaster management agencies who contributed to the successful monitoring, prediction and early warning service of system. We acknowledge the contribution of all sister organisations of Ministry of Earth Sciences including National Centre for Medium Range Weather Forecasting Centre (NCMRWF), Indian National Centre for Ocean Information Services (INCOIS), National Institute of Ocean Technology (NIOT), Indian Institute of Tropical Meteorology (IITM) Pune, research institutes including Indian Space Research Organisation for their valuable support. The support from various Divisions/Sections of IMD including Area Cyclone Warning Centre (ACWC) Chennai, Kolkata, Cyclone Warning Centre (CWC) Bhubaneswar, Visakhapatnam, The contribution from Numerical Weather Prediction Division, Satellite and Radar Division, Surface & Upper air instruments Divisions, New Delhi and Information System and Services Division and Meteorological Office, Port Blair, IMD is also duly acknowledged.
