



**REGIONAL SPECIALISED METEOROLOGICAL CENTRE-
TROPICAL CYCLONES, NEW DELHI
INDIA METEOROLOGICAL DEPARTMENT**



**Deep depression over northwest Bay of Bengal during 12th-15th
September, 2021: Summary**

1. Brief Life History:

- A low pressure area (LPA) formed over eastcentral and adjoining northeast Bay of Bengal (BoB) in the early morning (0530 hrs IST) of 11th September, 2021. It lay as a well marked low pressure area (WML) over northwest and adjoining westcentral BoB in the early morning (0530 hours IST) of 12th.
- Under the favourable environmental and oceanic conditions, it concentrated into a depression over northwest BoB and adjoining Odisha coast in the evening (1730 hrs IST) of 12th.
- Moving west-northwestwards, it intensified into a deep depression over northwest BoB very close to Odisha coast in the early morning (0530 hrs IST) of 13th and crossed north Odisha coast, close to south of Chandbali between 0530 & 0630 hrs IST as a deep depression with maximum sustained wind speed of 30 knots (50-60 kmph).
- Continuing to move further west-northwestwards, it weakened into a depression over north Chhattisgarh & adjoining north interior Odisha in the morning (0830 hrs IST) of 14th and into a WML over northeast Madhya Pradesh & neighbourhood in the early morning (0530 hrs IST) of 15th.
- The observed track of the system is presented in Fig. 1.

2. Salient features:

- i. Deep depression over BoB was the first depression over the north Indian Ocean during the monsoon season, 2021.
- ii. It caused active to vigorous monsoon conditions leading to extremely heavy rainfall at a few places over Odisha on 12th & 13th, at isolated places over Chhattisgarh on 13th and over East Madhya Pradesh on 14th. In conjunction with another low pressure area over Gujarat, extremely heavy rainfall at a few places also occurred over Saurashtra and north Konkan on 13th September. Low level convergence of wind & enhanced moisture incursion from the Bay of Bengal in association with a trough extended eastwards across the system also caused extremely heavy rains at isolated places over West Bengal on 14th September.
- iii. A few of the rainfall amounts such as Astaranga & Kakatpur-53 cm-each, Balikuda-44cm, Kantapada-38cm, Niali-37cm, Puri-34 cm, Gop & Satyabadi-33cm-each, Ragunathpur-32 cm were recorded over Odisha on 12th, Talcher – 39 cm, Birmaharajpur – 37cm, Tikarapara – 35cm in Odisha on 13th and Lodhika – 52cm, Visavadar – 47cm, Kalavad – 41cm in Saurashtra had been exceptionally heavy. These extreme rainfall events caused Flash floods & Urban flood situation in major Districts including Puri, Khorda, Jagatsinghpur, Kendrapara, Subarnapur & Angul in Odisha and Rajkot & Jamnagar in Saurashtra. As per the report from Central Water Commission Mahanadi river is in spate over some parts of Odisha, as on today.

- iv. It had a total life period of 60 hours against the average life period (1990-2013) of 75 hours of deep depression category in monsoon season over the BoB.
- v. The system had track length of about 545 km.

Monitoring:

India Meteorological Department (IMD) maintained round the clock watch over the north Indian Ocean and the system was monitored since 2nd September, about 9 days prior to the formation of LPA over eastcentral & adjoining northeast BoB on 11th and 10 days prior to formation of depression on 12th. The cyclone 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. The system was also monitored by Doppler Weather RADAR (DWR) Paradip (Odisha). 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. Typical satellite and radar imageries at the time of crossing Odisha coast are presented in Fig.2.

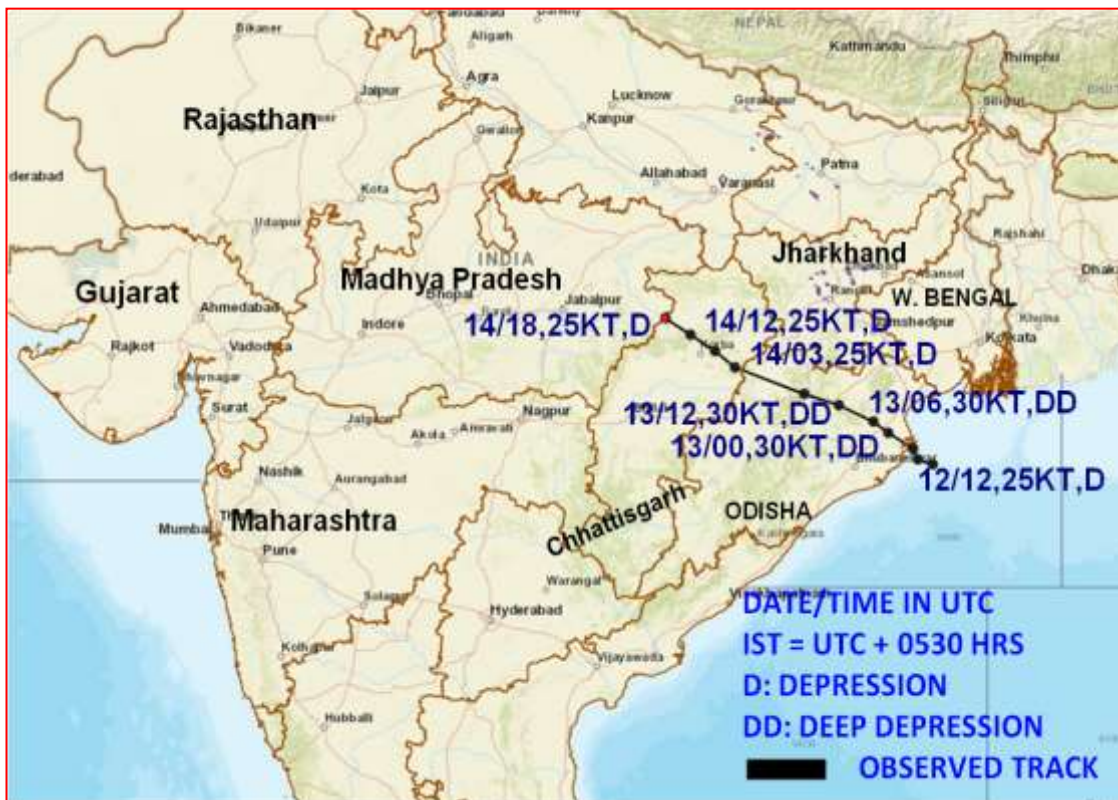


Fig.1: Observed track of deep depression over northwest BoB during 12th-15th Sep, 2021

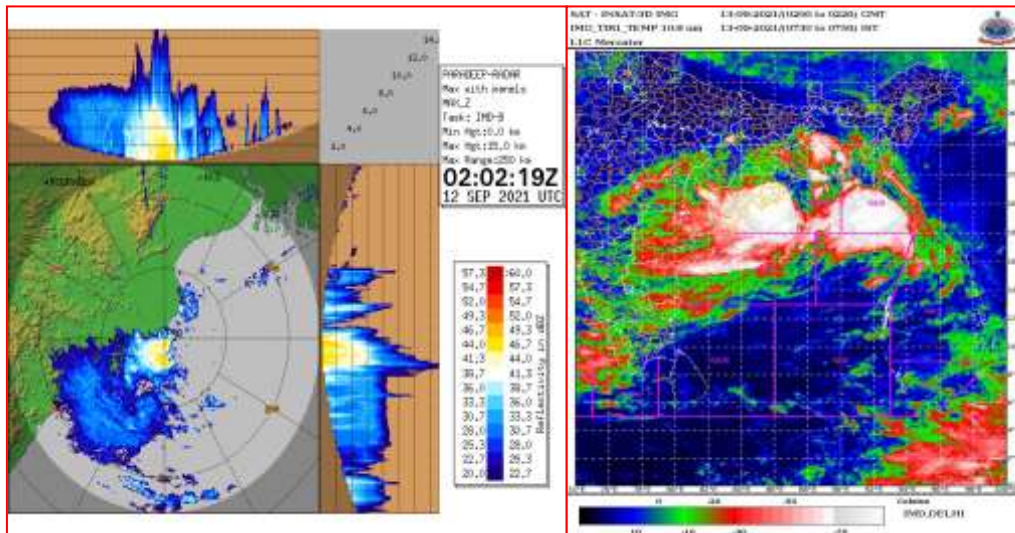


Fig.2: Typical imagery from Doppler weather Radar Paradip and INSAT 3D satellite at the time of crossing the coast on 13th early morning

Genesis, track, landfall and intensity forecast performance:

1. First information about the expected formation of an LPA over BoB was released in the extended range outlook issued by IMD on 2nd September (about 9 days ahead of formation of LPA on 11th)
2. The Tropical Weather Outlook issued at 1200 hours IST of 7th September indicated expected formation of an LPA over north BoB around 11th (about 90 hours prior to formation of LPA). Actually the LPA formed at 0530 hours IST of 11th.
3. The extended range outlook issued on 9th September indicated expected development of depression around 13th September (about 72 hours ahead of formation of depression). Actually depression formed at 1730 hours IST of 12th September.
4. The Tropical Weather Outlook issued at 1200 hours IST of 10th September reiterated that the LPA would form over central and adjoining north BoB on 11th and would concentrate into a depression during subsequent 48 hours. It further indicated that the system would move west-northwestwards towards Odisha coast. The LPA actually formed on 11th, depression on 12th and the system moved west-northwestwards under the influence of a sub-tropical ridge lying to it's north and crossed north Odisha coast on 13th.
5. The first bulletin issued at 2100 hours IST of 12th with the formation of depression, indicated that the system would cross north Odisha coast near Chandbali by early morning of 13th. Actually the system crossed north Odisha coast, close to south of Chandbali between 0530 & 0630 hrs IST of 13th.

Warning Services:

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 13 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. Warnings and advisories for fishermen were issued since 11th September. Frequent updates on social networking sites were also issued since 12th September with the formation of low pressure area to trigger mass response and sensitise masses about the impending disaster in association with the system. 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, West Bengal, Jharkhand, Chhattisgarh, Madhya Pradesh, Haryana, Uttar Pradesh, Gujarat & Maharashtra.
