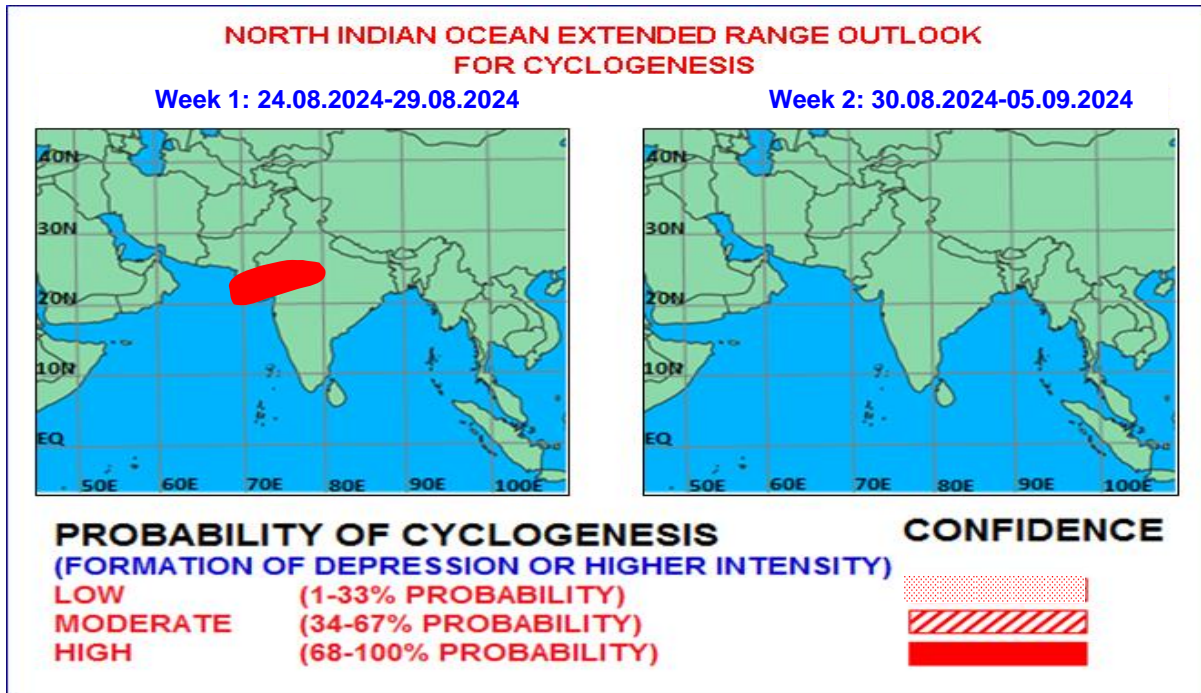


Issued on 24.08.2024



**Fig. 1: Graphical Cyclogenesis over north Indian Ocean during next two weeks**

#### I. Environmental features:

The Madden Julian Oscillation (MJO) index currently entered phase 3 with an amplitude greater than 1. The ensemble members of GEFS indicate large spread and incoherency in their eastward propagation of MJO index. Contrary to that the member's forecasts of ECMWF ensemble show more agreement about the eastward progress of the MJO. However, the MJO signal is likely to move eastward within phase 3 and then in phase 4 while the amplitude is likely to decrease gradually to less than 1 during the first week. The further eastward progress in phase 5 over the Maritime continent during the second week, the models do not show consensus. While the GEFS indicates looping within phase 4, the ECMWF predicts slow eastward movement in phase 5. Though the ensemble prediction systems portray limited spread with synchronous propagation in the forecast duration. Therefore, the MJO index is likely to enhance the convective activity over eastern part of Arabian Sea (AS) during first half the week 1 and over the Bay of Bengal (BoB) during the whole week. The MJO is likely to continue its support to convective activity over BoB during first half of the second week and it will subside gradually thereafter.

The NCICS forecasts indicate significant presence of convectively coupled Equatorial Rossby Waves (ERW) propagating westwards starting from south China Sea and BoB to southeast and eastcentral AS during the first week. The ERW activity is likely to persist over southeast AS during first half of 2<sup>nd</sup> week. The weak westerly winds (1-3 mps) are likely over southern and adjoining central parts of AS and BoB during both the weeks. The intermittent easterly winds (1-3 mps) are likely over northeast India during first half of week 1 and over northern parts of central BoB, central India, and central AS during the second week. The eastward-moving Kelvin Waves (KW) are likely over northern parts of AS and south BoB during week 1. Therefore, the zonal winds and equatorial waves are likely to support convective activities associated with the cyclonic circulations /low pressure areas over northern parts of BoB and northern Plains of India during the first week and over central and adjoining north BoB during the second week.

The location of Tibetan anti-cyclone in the upper-tropospheric levels along with the orientation of ridge line portray low to moderate shear over central India compared to moderate

to high shear over north Bay of Bengal. The wind direction also suggests west-southwestwards steering on the existing well marked low pressure area over central and west India. A trough in westerlies in mid-upper tropospheric levels is likely to influence weather over northwest and west India during next 3-4 days. Therefore, the approaching trough in westerly is likely to favour intensification and slow down the westerly movement of the system. The magnitude of low level convergence ( $10 \text{ s}^{-1}$ ) and upper level divergence ( $\sim 20 \text{ s}^{-1}$ ) are favourable towards intensification of the well-marked low pressure area over central India. The significant vorticity fields ( $50\text{-}100 \times 10^{-5} \text{ s}^{-1}$ ) associated with the system are seen extending up to mid-troposphere with an increasing trend.

## II. Model Guidance:

Most of the numerical weather prediction models (IMD GFS, NCEP GFS, GEFS, ECMWF, and NCUM) have consensus and indicate that the existing well-marked low pressure area over northeast Madhya Pradesh is likely to move nearly west-southwestwards, intensify into a depression over west Madhya Pradesh on 25<sup>th</sup> August and further into a deep depression over south Rajasthan and adjoining north Gujarat around 27<sup>th</sup> August. Thereafter, different models have different kinds of evolution of the system although they agree with subsequent south-southwestwards movement during next 2 days reaching Saurashtra & Kutch and adjoining south Pakistan coasts. The GFS group of models indicate a bit fast movement and emergence of the system into northeast AS on 28<sup>th</sup> August, The ECMWF and NCUM shows comparatively slow movement and delayed emergence into northeast AS by 30<sup>th</sup> August. The models predict further intensification of the system reaching over northeast AS during initial 24 hours, weakening thereafter and dissipation over the north AS. But the forecasts from various models portray different scenario regarding the peak intensity of the system varying from marginal cyclonic storm (CS) to very severe cyclonic storm (VSCS).

The existing cyclonic circulation over North Bay of Bengal & neighbourhood in the middle tropospheric levels is likely to nearly westwards across Gangetic West Bengal and adjoining Jharkhand & north Odisha during next 2-3 days. The model forecasts are also suggesting that there will be a likely formation of another cyclonic circulation/Low pressure area over central and adjoining north BoB around 29<sup>th</sup> August which will move initially northwestwards towards Odisha.

The weekly mean wind field of IMD Extended Range Forecast (ERF) system indicates a well-established monsoon trough with strong westerly (southwesterly) flow over AS and BoB during both the weeks. The wind anomaly indicates a cyclonic circulation over eastcentral AS off Konkan coast during the first week. The anomaly field also portrays a feeble cyclonic circulation over the Gujarat region and easterly winds covering whole of north and central India during the second week. The model also suggests a moderate to high probability of cyclogenesis (60-70%) over Northern plains of India from Gangetic West Bengal, Jharkhand across Uttar Pradesh and adjoining Madhya Pradesh to north Gujarat region during first and low to moderate probability (20-40%) over central and west India during the second week. The ECMWF model indicates a zone of cyclogenesis with moderate to high probability (60-70%) over Gujarat region and adjoining areas of northeast AS during the first week. The model also furnishes 10-20% probability of cyclogenesis over westcentral BoB during the end and beginning of the second week.

**Legends:** MJO: Madden Julian Oscillation, ERW: Equatorial Rossby Waves, KW: Kelvin Waves, NCICS: North Carolina Institute for Climate Studies (for Equatorial waves Forecast), IMD GFS: India Meteorological Department Global Forecast System, NCUM: National Centre for Medium Range Weather Forecasting Centre (NCMRWF) Unified Model, ECMWF: European Centre for Medium Range Weather Forecasting, ECMF: ECMWF-Ensemble System, ECMM: ECMWF-Ensemble System Bias Corrected, GPP: Genesis Potential Parameter, NCEP GFS: National Centre for Environment Prediction GFS, GEFS: GFS ensemble forecast system, NEPS: NCUM ensemble prediction system, CNCUM: Coupled NCUM, CPC: Climate Prediction Centre, NWS: National Weather Service, INCOIS: Indian National Centre for Ocean Information Services.

### III. Inference:

Considering various environmental conditions and model guidance, it is inferred that there is no probability of cyclogenesis over the North Indian Ocean (NIO) region including the Bay of Bengal (BoB) and the Arabian Sea (AS) during the entire forecast period. However,

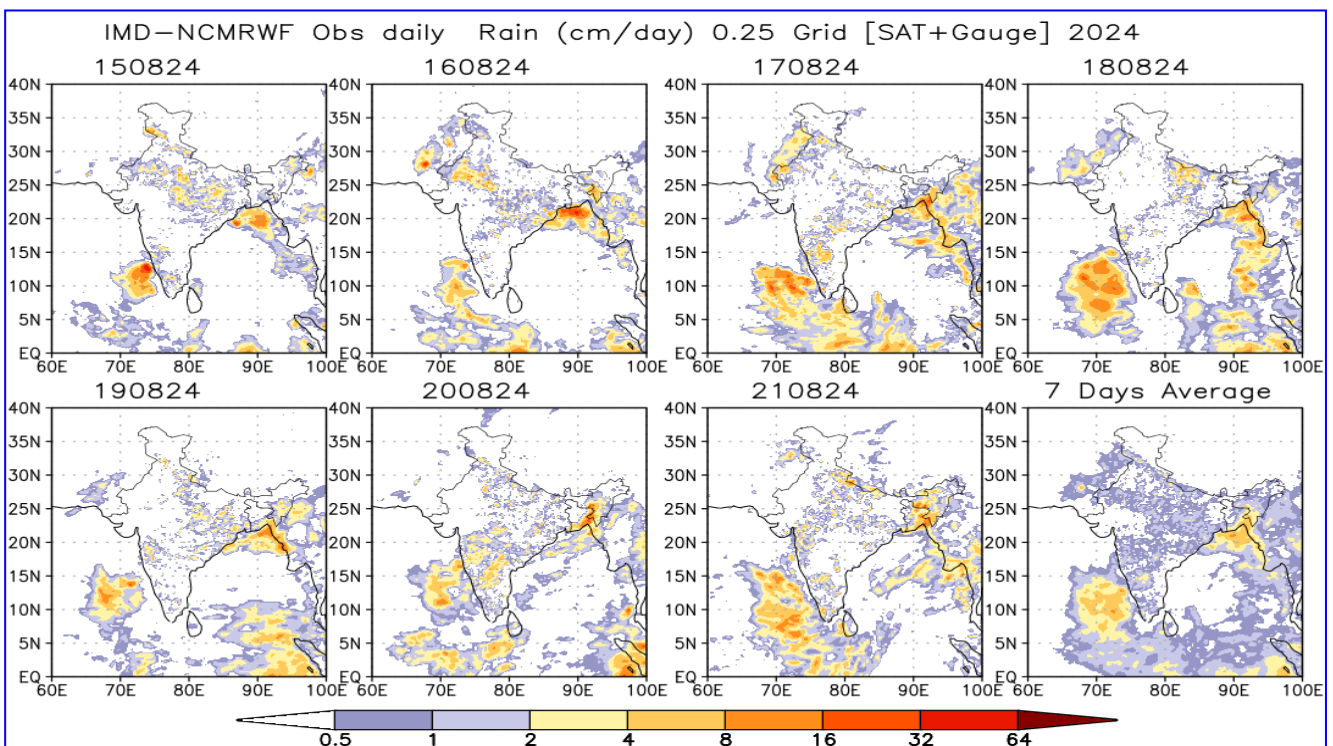
- (i) A well marked low pressure area lay over central parts of north Madhya Pradesh at 1730 hrs IST of today, the 24th August 2024. It is likely to move nearly west-southwestwards, intensify into a depression over west Madhya Pradesh on 25<sup>th</sup> and further into a deep depression over south Rajasthan and adjoining north Gujarat by 27<sup>th</sup> August. Thereafter, it will continue to move nearly west-southwestwards and emerge into northeast Arabian sea off Saurashtra & Kutch and south Pakistan coasts around 29<sup>th</sup> August.
- (ii) The cyclonic circulation in mid-tropospheric levels lay over north Bay of Bengal and neighbourhood. It is likely to move west-northwestwards across Gangetic West Bengal and adjoining North Odisha & Jharkhand during next 2-3 days.
- (iii) There could be the formation of another cyclonic circulation or low pressure area over the central and adjoining north Bay of Bengal around 29<sup>th</sup> August in association with favourable environmental conditions as discussed above.

### IV. Verification of forecast issued during last two weeks:

The forecast issued on 8<sup>th</sup> August for second week (16.08.2024-22.08.2024) indicated no cyclogenesis over the region. The forecast issued on 15<sup>th</sup> August for first week (16.08.2024-22.08.2024) indicated moderate probability of cyclogenesis over Eastern parts of country with nearly west-northwestwards movement.

Actually, a cyclonic circulation formed over South Bangladesh and adjoining Gangetic West Bengal on 15<sup>th</sup> August. It lay as a low pressure area over northwest BoB and adjoining areas of West Bengal and Bangladesh on 16<sup>th</sup>. It moved slowly west-northwestwards, lay over North Bengal & neighbourhood on 21<sup>st</sup> August and persisted over the same region.

The observed satellite-gauge merged analysis of 24 hours accumulated rainfall from 15<sup>th</sup> to 21<sup>st</sup> August, 2024 is shown in **Fig. 2**.



**Fig. 2:** NCMRWF-IMD satellite gauge merged data plots of realized 24 hours accumulated rainfall from 15<sup>th</sup> to 21<sup>st</sup> August, 2024.

**Next update: 29.08.2024**