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

I. Environmental features:

The guidance from the monitoring and various model forecasts indicates that the Madden Julian Oscillation (MJO) is currently in phase 8 with amplitude marginally less than 1. The forecasts of MJO signal by various models (GEFS, CFS, ECMF, ECMM and etc.) although differs from each other in predicting the propagation and phase of MJO, but all model suggest a weak MJO signal with ambiguous retrograding movement back into phase 7 and subsequently in phase 6 during the first week. The forecasts by the members of the ensemble are indicating a random large spread amongst them. The ECMM and ECMF model group show a tendency of eastward movement again in phase 6 during week 2 while weak MJO signal is likely to take a loop with increasing amplitude. The CFS model prediction is very different compared to other models. It suggests an initial looping back movement into phase 7 during week 1 whereas a smooth and regular eastward movement thereafter across phases 8 and 1 and entering into phase 2. However, the model predicts a weak MJO till the end of forecast period. Accordingly, the MJO is not likely to be supportive to the cyclogenesis and will remain neutral in enhancing convective activity over North Indian Ocean (NIO) region during entire forecast period.

The NCICS CFS model indicates easterly wind anomaly (1-5 mps) over south and central Arabian Sea (AS) and over south Bay of Bengal (BoB) and Andaman Sea during week 1 except over a part of south Andaman Sea and southeast BoB adjacent to North Equatorial India Ocean (NEIO) with a feeble westerly wind (1-3 mps). The model indicates that a strong westerly wind anomaly (5-9 mps) is likely to develop over north AS during later half of the week 1. Thereafter, the westerly wind anomaly (3-5 mps) over north AS is likely to decrease gradually during week 2. The Equatorial Rossby Wave (ERW) is likely to appear over northeast AS in the first half and prevail over north AS during the second half of the first week. ERW is likely to remain over northwest AS during first half of week 2. During last few days of the forecast period, ERW is likely to appear over south Andaman Sea and adjoining southeast BoB along with westerly wind anomaly (1-5 mps) over the same region. The low-frequency background waves are likely to be present over southeast AS and Comorin region during the entire forecast period. No other equatorial waves are likely to support the cyclogenesis over NIO region during the forecast period.

However, the environmental condition may support convective activity over north AS during week 1 and over Andaman Sea and adjoining southeast BoB during second half of week 2.

II. Model Guidance:

All models including ECMWF, NCEP-GFS, IMD-GFS, IMD-GEFS, NCUM-G and NEPS models are in consensus and do not indicate any cyclogenesis over North Indian Ocean region including both AS and BoB during next 10 days.

All the circulation features in the lower tropospheric levels suggest predominant anticyclonic flow over south and central Arabian Sea. Consequently, the strong southwesterly wind is likely over north AS during week 1 and likely to continue during first half of week 2 as well. The westerly-southwesterly wind likely to prevail over entire BoB during the next 10 days except for one or two days. A north-south trough is likely to persist across southeast AS, Comorin, Gulf of Mannar and Southwest BoB along and off Tamil Nādu and south Andhra Pradesh coasts during many days of week 1. In the middle of week 1, there is a possibility for the formation of the cyclonic circulation over the region embedded in the trough mentioned above.

The 850 hPa mean wind field of IMD ERF Model indicates an anticyclone over central AS and feeble cyclonic circulation over southwest BoB during week 1. A north-south trough over Indian peninsular region is likely to persists in both the weeks due to prevalent anticyclonic wind flow pattern over both AS and BoB. The model suggests a low probability (20-30 %) of cyclogenesis over a small region in central part of south BoB during week 1 and nil probability over entire NIO during week 2. The 850hPa mean wind and its anomaly field of NCMRWF ERF model are also indicating similar features during both weeks. ECMWF ensemble model indicates a zone with very low probability (~ 10 %) of cyclogenesis over Andaman Sea and adjoining southeast BoB during week 1. The ECMF extended range forecast also suggest similar probability during week 1 and reach up to low probability (20-30 %) over northeast BoB during week 2.

III. Inference:

Considering large-scale environmental features and model guidance, it is inferred that there is no probability of cyclogenesis over North Indian Ocean region during the entire forecast period.

However, a north-south trough in lower tropospheric levels over south peninsular India extending up to Comorin region with embedded upper-air cyclonic circulation is likely to prevail during many days of week 1.

Verification of forecast issued during last two weeks:

The forecast issued on 17th April for week 2 (25thApril – 1st May) indicated nil probability of cyclogenesis (formation of depression) over NIO region. And the forecast issued on 24th April for week 1 (25thApril – 1st May) also not indicated probability of cyclogenesis (formation of depression) over NIO region. However, an upper-air cyclonic circulation is likely to form during week 1 over Comorin area and adjoining south Tamil Nādu region.

Actually, no cyclogenesis has occurred during this period over NIO region. An upper air cyclonic circulation was formed over Comorin area and neighborhood at 1.5 km above mean sea level at 0300 UTC of 28th April and became less marked on 29th April,2025. Another upper air cyclonic circulation was formed over Lakshadweep & neighborhood at 1.5 km above mean sea level at 0300 UTC of 29th April and became less marked on 30th April,2025.

NCMRWF-IMD satellite gauge merged data plots of realized 24 hours accumulated rainfall from, 24th – 30th April, 2025 are presented in **Fig. 2**.



Fig.2: NCMRWF-IMD satellite gauge merged data plots of realized 24 hours accumulated rainfall from 24th to 30th April, 2025.

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, ECMM: ECMWF-Ensemble System Bias Corrected, GPP: Genesis Potential Parameter, NCEP GFS/GEFS/CFS: National Centre for Environment Prediction GFS/GEFSv12/CFSV2, CPC: Climate Prediction Center (for MJO update), IMD-GEFS: GFS ensemble forecast system of IMD, NEPS: NCUM ensemble prediction system, CNCUM: Coupled NCUM, CPC: Climate Prediction Centre, NWS: National Weather Service, INCOIS: Indian National Centre for Ocean Information Services.

Next update: 08.05.2025