

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

### **I. Environmental features:**

Madden Julian Oscillation (MJO) index is currently in phase 2 with amplitude greater than 1. It would move across phases 2, 3 & 4 during the forecast period with amplitude remaining greater than 1. Thus, MJO would support cyclogenesis (formation of Depression) over the Bay of Bengal (BoB) during the entire forecast period and the Arabian Sea (AS) during first half of week 1.

NCICS based forecast for equatorial waves indicates that during week 1, easterly winds (1 to 3mps) are likely over South Andaman Sea & South BoB; westerly winds (1-3mps) are likely over South Andaman Sea & adjoining Thailand along with Equatorial Rossby Waves (ERW). Over the Arabian Sea (AS), Easterly winds (1-3mps) are likely over Southeast AS & Westerly winds over South & Central AS alongwith MJO over Southwest AS. During the later part of week 1, enhanced westerly winds (7-9mps) are likely over South BoB & South Andaman Sea alongwith ERW and MJO and Easterly winds (1-3mps) are likely over Central BoB. Similarly over the AS, strong westerly winds (7-9mps) alongwith ERW and MJO are likely over Southeast & adjoining Southwest AS and strong easterly winds (5-7mps) are likely over the Eastcentral AS. Similar features are likely to persist over both the basins during first half of week 2. During the later half of week 2, strong westerly winds (7-9mps) alongwith MJO are likely over south BoB and westerly winds (1-3mps) over southeast & eastcentral AS. Thus, equatorial waves are likely to contribute towards cyclogenesis during week 1 & first half of week 2 over BoB and over the AS during later half of week 1 to first half of week 2.

Sea surface temperature (SST) is 29-30°C over South & adjoining Central BoB. SST is 27-28°C over Central & North BoB. SST is 30-31°C over Lakshadweep & Southeastern AS. 30-31°C over Southeast & Eastcentral AS & 29-30°C over Western part of AS. Tropical cyclone Heat potential (TCHP) is more than 100KJ/cm<sup>2</sup> Southeast & South Andaman Sea and 60-70KJ/cm<sup>2</sup> over remaining parts of BoB. Over the AS, the TCHP is 60-70KJ/cm<sup>2</sup> over Southeast & adjoining Eastcentral AS. The TCHP is less than 50KJ/cm<sup>2</sup> over Western parts

of AS & along the West coast of India. Thus, sea conditions are also favourable for cyclogenesis over the southeast BoB and southeast AS.

## II. Model Guidance:

Most of the models including IMD GFS, NCEP GFS, ECMWF and ECMWF ensemble are indicating likely emergence of a cyclonic circulation into south Andaman Sea around 25<sup>th</sup> with formation of low pressure area around 26<sup>th</sup> over south Andaman Sea. These models are also indicating formation of depression over south BoB during 26<sup>th</sup> – 30<sup>th</sup> (IMD around 26<sup>th</sup>, NCEP GFS on 27<sup>th</sup> and ECMWF around 30<sup>th</sup> but over southwest BoB). GFS group of models are also indicating further intensification of this system into a severe cyclonic storm. Regarding movement, GFS of models are indicating initial west-northwestwards movement till 28<sup>th</sup> towards central BoB followed by north-northeastwards movement towards Bangladesh coast. ECMWF is however indicating west-northwestwards movement towards westcentral BoB till 2<sup>nd</sup> December and gradual northeastwards recurvature thereafter. NCUM group of models are not indicating any significant system over the BoB. IMD GPP is indicating a significant potential zone for cyclogenesis during 26<sup>th</sup>-30<sup>th</sup> starting from south Andaman Sea with initial west-northwestwards movement till 28<sup>th</sup> and then north-northeastwards movement. NCUM is not indicating any significant cyclonic disturbance over the BoB during the period. However, it is indicating a cyclonic circulation/low pressure area over central parts of south AS during 29<sup>th</sup> November to 1<sup>st</sup> December. IMD GFS is also indicating another cyclonic circulation over south Andaman Sea on 29<sup>th</sup> November, with intensification into a depression over southeast BoB on 1<sup>st</sup> December and nearly west-northwestwards movement and significant intensification. The extended range model IMD CFS V2 is also indicating 40-50% probability of cyclogenesis over Andaman Sea and Southeast & adjoining eastcentral BoB and 40-50% probability of cyclogenesis over southeast AS during week 1. During week 2, 30-40% probability of cyclogenesis is likely over south Andaman Sea and southeast BoB.

**Legends:** 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, European Centre for Medium Range Weather Forecasting, GPP: Genesis Potential Parameter, National Centre for Environment Prediction (NCEP) GFS, ECMM: ECMWF multi model, GEFS: GFS ensemble, NEPS: NCUM ensemble prediction system, CNCUM: Coupled NCUM, CPC: Climate Prediction Center, NWS: National Weather Service.

## III. Inference:

Considering all environmental conditions and model guidance, it is inferred that

1. There is likelihood of emergence of a cyclonic circulation over south Andaman Sea and neighbourhood around 25<sup>th</sup> November. Under its influence, a low pressure area is likely to form over south Andaman Sea around 26<sup>th</sup> November. It is likely to move west-northwestwards and intensify into a depression over southeast & adjoining Andaman Sea during middle of week 1 (around 27<sup>th</sup> November). Hence high probability is assigned to cyclogenesis over southeast BoB and adjoining Andaman Sea during week 1.
2. There is a low probability of formation of a cyclonic circulation/low pressure area over southeast and southwest Arabian Sea during later part of week 1.

- There is a low probability of cyclogenesis over southeast Bay of Bengal during first half of week 2.

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

The forecast issued on 9<sup>th</sup> November for week 2 (17.11.2023-23.11.2023) indicated formation of depression over southwest & adjoining westcentral Bay of Bengal during first half of week 2 (around 17<sup>th</sup> November). The forecast issued on 16<sup>th</sup> November for week 1 (17.11.2023-23.11.2023) indicated no cyclonic disturbance over the region.

Actually, on 17<sup>th</sup> November, the cyclonic storm “Midhili” lay over Northwest BoB at 0000 UTC and moving northeastwards, it crossed Bangladesh coast near Khepupara in the evening (around 0900 -1000 UTC) of 17<sup>th</sup> November. Thus, though cyclogenesis was correctly predicted, but it occurred slightly early i.e. on 15<sup>th</sup> itself.

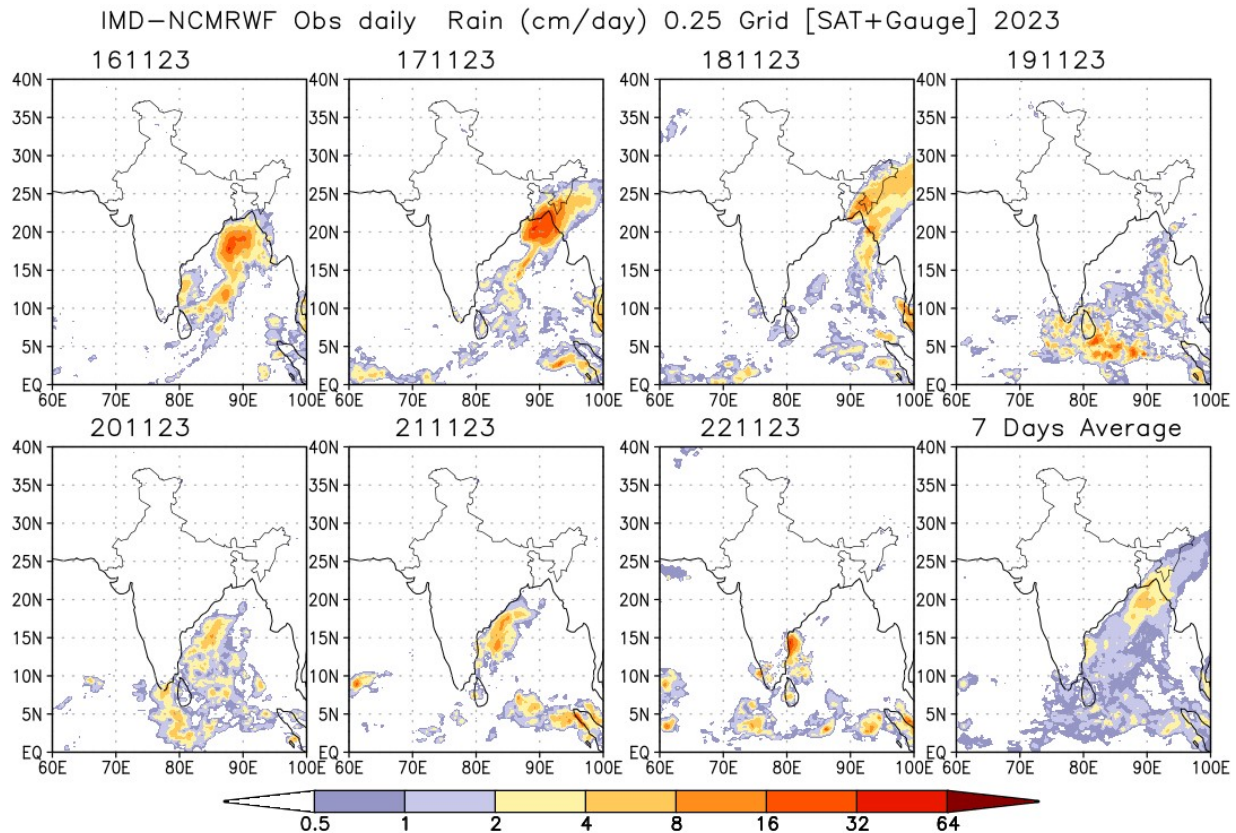


Fig. 2 IMD-NCMRWF satellite-gauge merged data plots during 16<sup>th</sup> – 22<sup>nd</sup> November, 2023

Next update: 30.11.2023