India Meteorological Department
Ministry of Earth Sciences
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Issued on 19.09.2024

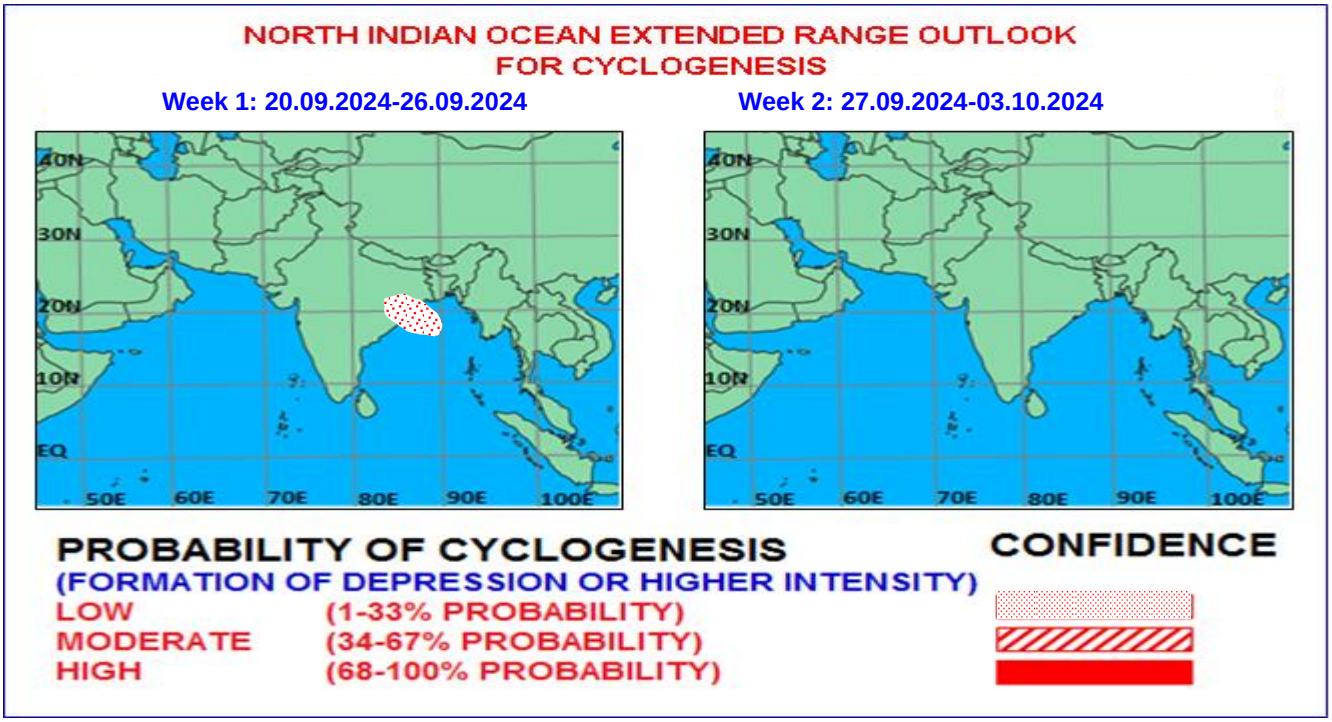

Fig. 1: Graphical Cyclogenesis over north Indian Ocean during next two weeks

I. Environmental features:

The Madden Julian Oscillation (MJO) index is currently in Phase 6 with an amplitude more than 1. According to the forecasts by various models, it is likely to move eastward through phases 6 and 7 during the first week without any significant variation in the amplitude. However, the GEFS ensemble members indicate slow propagation of MJO index compared to the ECMWF ensemble members. The MJO reaching phase 7 at the end of first week, is likely to reach up to phase 1 across phase 8 as per the ECMWF forecasts. But the GEFS ensemble portray slow progress up to phase 8. Thus, MJO phase and amplitude are not favourable towards enhancement of convective activity over the North Indian Ocean (NIO) region during the first week and it would become gradually favourable during the second week.

The NCICS based forecast indicates the westerly winds (1-5 mps) are weak over south & central parts of Arabian Sea (AS) & Bay of Bengal (BoB) and over peninsular India during first week. The weak easterly winds (1-5 mps) are simultaneously noticed over northern parts of BoB & north Indian Plains. Equatorial Rossby Waves (ERW) as well as Kelvin Waves are absent over the region during the first week except during the beginning of the second week when ERW appears over south Andaman, extreme south of BoB and AS adjoining equatorial North Indian Ocean. At the end of the first week and during week 2, westerly winds (3-7 mps) are strengthening marginally over south & central parts of BoB & AS. However, the easterly winds (3-5 mps) over northern parts of the region do not show a similar revival. The zonal winds and wave activities over the NIO region do not support convective activity during entire forecast period except at the end of week 1 and during week 2.

The sea surface temperature over the entire BoB is 28-32^{0}C. The values of SST remain within the same range over entire AS except western sectors of westcentral and southwest AS near coasts of Oman, Yemen and Somalia where the Sea is colder (SST ~ 24-28^{0}C). Tropical Cyclone Heat Potential (TCHP) is high (>100 KJ/cm^2) over westcentral BoB, north BoB near coastal areas and southern parts of south BoB adjoining equatorial North Indian Ocean. Higher

values of TCHP (> 100 KJ/cm^2) are found in central parts of south AS. The values are less than 50 KJ/cm^2 over the rest of AS.

Considering all the environmental features, it is inferred that the conditions are likely to become favorable in the development of cyclonic disturbances over the region at the end of the first week and during the second week over north & central BoB.

II. Model Guidance:

Most of the models (ECMWF, IMD GFS, NCEP GFS, NCUM) are indicating the formation of a low pressure area over north and adjoining central Bay of Bengal around 23rd September with a northwestward movement across northwest Bay of Bengal off Odisha coast. The GFS group of models indicates that the system is likely to form over northwest and adjoining central BoB and move towards Odisha coast as a well marked low pressure area. IMD GFS does not indicate any further intensification. But NCEP GFS indicates an intensification of the system into a depression on 25th September to reach Odisha coast on the same day. The ECMWF model predicts low pressure area a bit early on 22nd over northeast BoB and further a well marked low pressure area over northwest BoB and across the Odisha coast on 23rd September. Thereafter, the model suggests weakening of the system over interior Odisha. The NCUM model shows the formation of low pressure area over northeast BoB and adjoining south Bangladesh region on 22nd September. The model forecasts indicate nearly westward movement of the system as a well marked low pressure area across northwest BoB and adjoining Gangetic West Bengal – north Odisha coasts on 23rd September. Thereafter, the model is weakening the system into a low pressure area over interior Odisha and neighbourhood.

As per the models forecast, it can be inferred that a low pressure area over is likely to form over north BoB by 23rd September. While moving move west-northwestwards over northwest BoB, it is likely to become more marked. Thereafter, it is likely to Odisha coast on 23rd September. After crossing the coast, it is likely to weaken and become a low pressure area over interior Odisha around 24th September.

The 850 hPa mean wind field of IMD CFS V2 system indicates a feeble cyclonic circulation over North Andaman Sea & adjoining eastcentral BoB off Myanmar coast during the first week. But no well-established monsoon trough can be seen in the mean wind field. The anomaly wind field also indicates a cyclonic circulation over the north Andaman Sea off Myanmar coast during week 1. An anticyclone is predicted by the model over Gangetic west Bengal & Jharkhand area. The mean wind of the second week predicts a significant cyclonic circulation over Telangana & Vidarbha region. However, the anomaly wind field for the second week shows a cyclonic circulation over costal Maharashtra and adjoining northeast & eastcentral AS. The model indicates a very low (10-20%) probability of cyclogenesis over North BoB during first week. The model also indicates low probability (20-40%) over north and adjoining central BoB during week 2. The ECMWF ensemble forecast Model also indicates moderate to high (40-70%) probability over the region extending from north BoB to central India during week 1 and low probability (10-20%) of cyclogenesis over North BoB and northeast AS during week 2.

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 a low probability of cyclogenesis over northwest and adjoining central Bay of Bengal & Odisha coast during the first week.

Accordingly, an upper-air cyclonic circulation is likely over North Andaman Sea and neighbourhood around 21st September. It is likely to move northwestwards and under its influence a low pressure area is likely to form over the northwest and adjoining central Bay of Bengal around 23rd September. Thereafter, it is likely to intensify further and move west-northwestwards across Odisha coast during subsequent 48 hours.

IV. Verification of forecast issued during last two weeks:

(i) **Week 2 updated forecast issued on 5th September for the second week (13.09.2024-19.09.2024)** indicated:

The existing low pressure area over westcentral & adjoining northwest Bay of Bengal off north Andhra Pradesh & south Odisha coasts is very likely to move slowly northwards and become more marked over northwest Bay of Bengal during next 24 hours and likely to intensify further into a depression over northwest Bay of Bengal and adjoining north Odisha-West Bengal coasts during the subsequent two days. Thereafter, it is likely to maintain its intensity and move west-northwestwards across east and central India till the beginning of the second week.

(ii) **Week 1 forecast issued on 12th September for first week (13.09.2024-19.09.2024)** indicated:

(a) The existing depression over Southwest Uttar Pradesh and neighbourhood is likely to continue to move east-northeastwards and maintain its intensity today, the 12th September and weaken gradually thereafter from tomorrow, the 13th September.

(b) Under the influence of an upper-air cyclonic circulation over southeast Bangladesh and neighbourhood at 1200 UTC of 12th September, a low pressure area is likely to form over coastal Bangladesh and adjoining north Bay of Bengal during next 24 hours. Thereafter, it is likely to move slowly west-northwestwards and concentrate into a depression over coastal West Bengal and adjoining northwest Bay of Bengal during subsequent 48 hours.
week.

(iii) **Realised:**

Depression over Northeast Madhya Pradesh (11th Sept – 13th Sept, 2024):

During the week from 6th to 12th September, a low pressure area formed over Westcentral & adjoining Northwest Bay of Bengal off north Andhra Pradesh & adjoining south Odisha became a depression on 8th, a Deep Depression over westcentral and adjoining northwest Bay of Bengal on the same day. It moved northwestwards over land and weakened into a Depression on 9th and a well marked low pressure area over Northeast Madhya Pradesh and neighbourhood on 10th September. It moved nearly north-northwestwards and re-intensified into a depression over Northeast Madhya Pradesh in the morning (0830 hours IST) of the 11th September over the same region. It weakened into a well marked low pressure area over northwest Uttar Pradesh & neighborhood in the morning (0830 hours IST) of the 13th September.

Deep Depression over Northeast Bay of Bengal & adjoining Bangladesh (13th – 16th Sept, 2024):

Under the influence of a cyclonic circulation over southeast Bangladesh and neighbourhood, a low pressure area formed over southeast Bangladesh and neighbourhood in the night of 12th September and lay over the same region in the early morning (0530 hours IST) of the 13th September, 2024. It moved west-northwestwards and lay as a well marked low pressure area over northeast Bay of Bengal and adjoining southeast Bangladesh coast in the morning (0830 hours IST) of the 13th September, 2024.It concentrated into a Depression over northeast Bay of Bengal close to Bangladesh coast in the same evening (1730 hours IST) of the 13th September, 2024. Continuing to move west-northwestwards, it intensified into a Deep Depression over Bangladesh and adjoining Gangetic West Bengal in the early morning (0530 hours IST) of the 14th September 2024, over Gangetic West Bengal and adjoining. It weakened into a Depression over Jharkhand and adjoining north Chhattisgarh in the early morning (0530 hours IST) of the 17th September 2024, over Northeast Chhattisgarh and adjoining Jharkhand. It weakened into a Well Marked Low Pressure Area over northeast Madhya Pradesh and adjoining southwest Uttar Pradesh in the early morning (0530 hours IST) of the 18th September 2024.

The observed satellite-gauge merged analysis of 24 hours accumulated rainfall from 12th September to 18th September, 2024 is shown in Fig. 2.

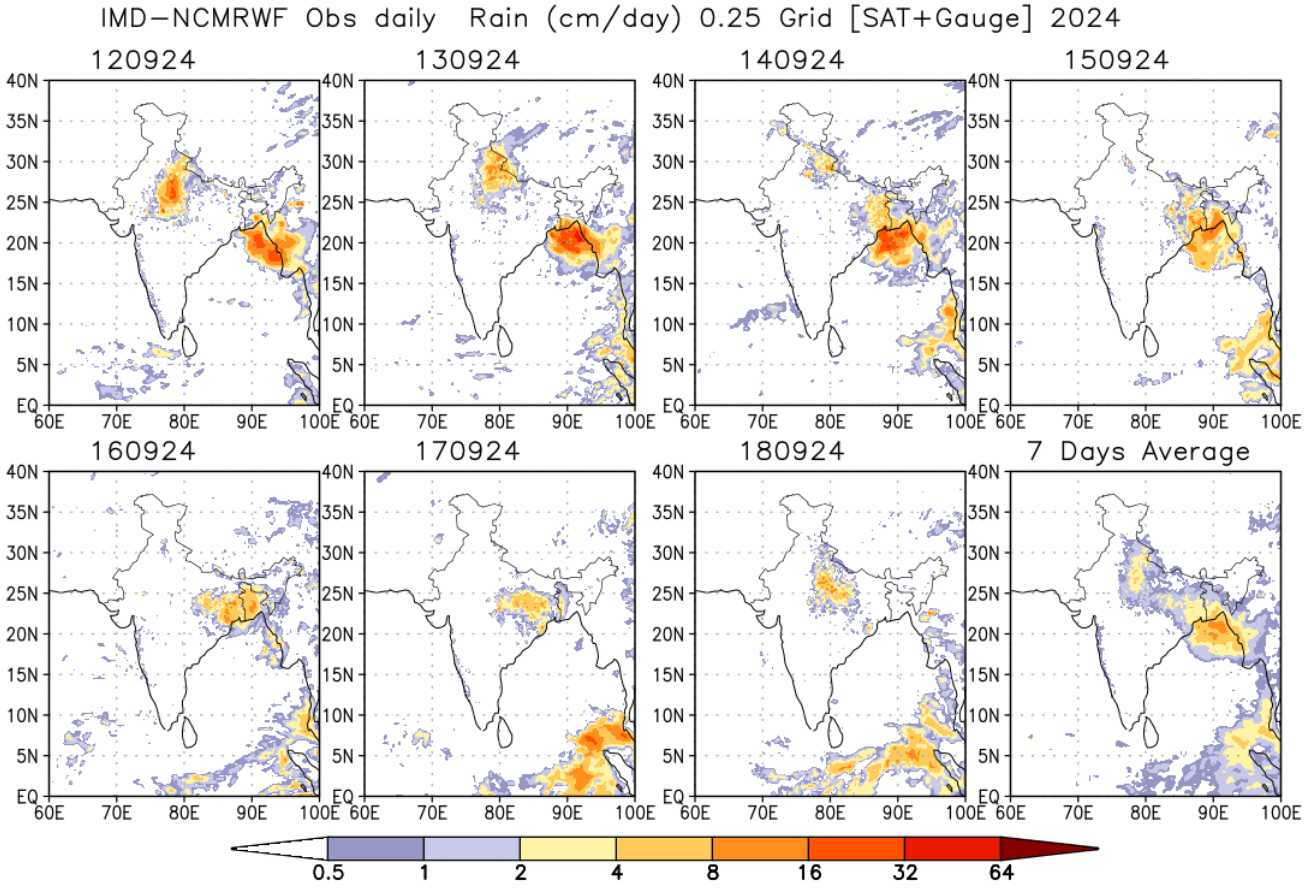

Fig. 3: NCMRWF-IMD satellite gauge merged data plots of realized 24 hours accumulated rainfall from 12thSeptember to 18thSeptember, 2024.

Next update: 26.09.2024