



**Ministry of Earth Sciences
India Meteorological Department
Cyclone Warning Division, New Delhi**



FDP (Cyclone) NOC Report Dated 8th December, 2019

Time of Issue: 1200 UTC

Synoptic features:

- Yesterday's depression over coastal Somalia and neighborhood moved westwards, weakened into a well marked low pressure area over north Somalia & adjoining Ethiopia by 1200 UTC of 7th December. Moving further westwards, it lay as a low pressure area over Ethiopia at 0000 UTC of 8th December and became insignificant thereafter.
- Yesterday's low pressure area over southeast Arabian Sea and adjoining equatorial Indian Ocean lay as a well marked low pressure area over southeast & adjoining southwest Arabian Sea at 0000 UTC of 8th December, 2019 and concentrated into a depression at 0900 UTC of 8th over southwest Arabian Sea near latitude 9.4°N and longitude 62.2°E, about 970 km east-southeast of Socotra Island (Yemen) and 1540 km west-southwest of Kochi. It is very likely to intensify into a deep depression during next 24 hours. It is very likely to move west-northwestwards till 9th December morning and then westwards during subsequent 48 hours.
- A trough in easterlies runs over southwest Bay of Bengal off Sri Lanka coast upto 0.9 km above mean sea level

Dynamical and thermodynamical features

Sea Surface Temperature (SST):

Sea Surface Temperature is around 25-28°C over north, westcentral and western part of southwest Arabian Sea. It is 28-30°C over rest of Arabian Sea.

It is around 26-27°C over north BoB and adjoining westcentral BoB. SST is around 27-30°C over rest of BoB.

Tropical Cyclone Heat Potential (TCHP):

Tropical Cyclone Heat Potential (TCHP) is less than 50 kJ/cm² over the north, westcentral and southwest Arabian Sea with higher values over the rest area. There are areas with values more than 100 kJ/cm² over southeast Arabian Sea and also over equatorial Indian Ocean.

Tropical Cyclone Heat Potential (TCHP) is less than 50 kJ/cm² over the north and adjoining westcentral BoB. It is around 60-80 kJ/cm² over rest BoB.

Relative Vorticity:

Cyclonic relative vorticity of value $100 \times 10^{-5} \text{ s}^{-1}$ is seen over the system region in southeast Arabian Sea.

Low level Convergence:

Positive lower level convergence of value $20 \times 10^{-5} \text{ s}^{-1}$ is seen over the area of Depression.

Upper level Divergence:

Positive upper level divergence of value $20 \times 10^{-5} \text{ s}^{-1}$ is seen around the depression area over southwest Arabian Sea.

Wind Shear:

Wind shear is low (10-15 knots) over system area.

Wind Shear Tendency:

The wind shear tendency is negative or neutral over the system area in southeast Arabian Sea.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs roughly along 12°N over BoB and Arabian Sea.

Satellite observations based on INSAT imagery:**Arabian Sea:-**

As per the satellite imagery of 0900 UTC on 08th December, 2019, the intensity of the vortex over southwest and adjoining southeast Arabian Sea is T 1.5. Associated broken low to medium clouds with embedded intense to very intense convection lies over southwest and adjoining southeast Arabian Sea between lat 8.5⁰N to 14.5⁰N and long 60.0⁰E to 67.0⁰E. Minimum cloud top temperature is minus 93 deg C.

Bay of Bengal & Andaman Sea:

According to 0900 UTC satellite imagery, scattered low/medium clouds with embedded moderate to intense convection lies over southwest BoB.

Large scale features**M.J.O. Index:**

MJO index is in Phase 2 with amplitude near to 1. It is likely to remain in the same phase for next 5-6 days with amplitude more than 1.

Storms and Depression over South China Sea/ South Indian Ocean:

- (i) Tropical Cyclone (Belna) located near 12.0°S/46.6°E at 0600 UTC of 8th with a maximum sustained wind speed of 90 knots. It is likely to move south-southwestwards with gradual intensification and reach maximum intensity of 110 knots by 0800 UTC of 8th and cross west coast of Mozambique by 1800 UTC of 09th and weaken gradually.
- (ii) 2Tropical Cyclone (Ambali) located near 14.9°S/62.9°E at 0000 UTC of 8th with a maximum sustained wind speed of 35 knots. It is likely to move southwestwards with gradual weakening and will become a tropical depression by 1200 UTC of 8th.

NWP Input for FDP Cyclone based on 0000 UTC of today**IMD-GFS T-1534:**

- (i) A WML seen over southeast Arabian Sea on 8th which becomes a CS on 9th and becomes WML again on 10th and becomes less marked on 11th.
- (ii) Another LOPAR is seen to form over south Andaman Sea and adjoining southeast BoB and equatorial Indian Ocean on 15th which becomes a WML on 18th December over Southwest BoB.

IMD-GEFS:

- (i) A WML is seen over southeast Arabian Sea on 8th December which becomes a D/ CS on 9th and less marked on 10th.
- (ii) Another LOPAR forms over south Andaman Sea and adjoining equatorial Indian Ocean on 16th.

IMD-WRF:

- (i) A WML is seen over southwest Arabian Sea on 8th which becomes a D/CS on 9th and becomes less marked on 10th.

NCMRWF-NCUM:

- (i) This model is not indicating any significant low pressure system in NIO region in the next 10 days.

NCMRWF-UM-Regional Model: Indicates no low pressure system in its domain for next 3days Sea.

NEPS Model: Depression over southwest Arabian Sea seen on 8th and 9th December, which weakens into a WML on 10th and seen close to Somali coast on 11th.

ECMWF:

(i) A LOPAR is seen over southeast Arabian Sea on 8th which moves westwards without intensification.

NCEP-GFS:

- (i) The remnant of the CS over southwest Arabian Sea is seen as a depression over coastal Somalia on 7th which becomes less marked subsequently.
- (ii) A LOPAR is seen over southeast Arabian Sea on 07th; which moving westwards seen as a depression during 9th to 10th; a LOPAR again on 10th near Somali coast; becomes less marked on 11th.

ARP-Meteo France :-

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

The area of significant zone of GPP over southwest Arabian Sea is seen to move in a near westward direction; diminishes on 9th and becomes insignificant by 10th.

IMD NWP products are available at:

<http://nwp.imd.gov.in/bias/gfsproducts.php>

<http://nwp.imd.gov.in/bias/wrf27pro.php>

http://www.rsmcnewdelhi.imd.gov.in/NWP_CYC/Analysis.htm or

http://www.rsmcnewdelhi.imd.gov.in/NWP_CYC/<HH>hrs.htm

<HH> are forecast hours i.e. 24, 48, 72 and etc.

Summary and Conclusion:

The low level relative vorticity increased in past 24 hours and is $150 \times 10^{-5} \text{sec}^{-1}$ around the system centre. The lower level convergence is about $10 \times 10^{-5} \text{s}^{-1}$ around the system center. The upper level divergence is about $20-30 \times 10^{-5} \text{s}^{-1}$ to the southeast of the system center. The vertical wind shear is low to moderate (10-15 knots) over the system area. The upper tropospheric ridge runs along 11°N .

Sea surface temperature over the system area is $29-30^\circ \text{C}$ and it decreases slightly along the forecast track. Tropical cyclone heat potential is $40-60 \text{kJ/cm}^2$ around the system area and becoming $40-50 \text{kJ/cm}^2$ along the forecast track. As the system is lying in a favourable environmental conditions, it is likely to further intensify into a deep depression by 0000 UTC of 9th December.

As the system lies to the south of upper tropospheric ridge and is being steered by middle and upper tropospheric winds, it is very likely to move west-northwestwards till 0000 UTC of 9th December and then westwards during subsequent 48 hours. Many of the numerical models agree with the above analysis.

Advisory: No IOP area for the next 5 days













