



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



FDP (Cyclone) NOC Report Dated 07th December, 2019

Time of Issue: 1200 UTC

Synoptic features:

- Yesterday's cyclonic storm "PAWAN" (pronounced as PAVAN) moved west-southwestwards during past 24 hours and crossed Somalia coast near Latitude 7.4°N and Longitude 49.6°E during 0730 to 0830 hrs IST of today, the 07th December 2019 as a cyclonic storm with a wind speed of 60-70 kmph gusting to 80 kmph. Moving further westwards, it weakened into a deep depression and lay centered at 0830 hrs IST of 07th December, 2019 over coastal Somalia and neighborhood near latitude 7.4°N and longitude 49.5°E. It is very likely to continue to move nearly westwards and weaken into a depression during next 06 hours and into a well marked low pressure area during the subsequent 12 hours.
- A low pressure area formed over southeast Arabian Sea and adjoining equatorial Indian Ocean in the early morning (0530 hrs IST) of today, the 7th December, 2019. It persisted over the same region in the morning (0830 hrs IST) of today. It is likely to become more marked during next 24 hours. There is low probability for the system to concentrate into a depression during subsequent 24 hours.

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 close to west coast of India 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 $50 \times 10^{-5} \text{ s}^{-1}$ is seen over the system region in southeast Arabian Sea.

Low level Convergence:

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

Upper level Divergence:

Positive upper level divergence of value $40 \times 10^{-5} \text{ s}^{-1}$ is seen around the centre of the cyclonic storm over southwest Arabian Sea.

Wind Shear:

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

Wind Shear Tendency:

The wind shear tendency is positive over the system area in southeast Arabian Sea.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs roughly along 13°N over BoB and Arabian Sea.

Satellite observations based on INSAT imagery:

Arabian Sea:-

As per the satellite imagery of 0600 UTC on 06th December, 2019, broken low to medium clouds with embedded intense to very intense convection lies over southeast Arabian Sea and adjoining equatorial Indian Ocean between lat 4.0⁰N to 10.0⁰N and long 62.5⁰E to 69.0⁰E in association with the low level circulation over the area. Minimum cloud top temperature is minus 93 deg C

Bay of Bengal & Andaman Sea:

According to 0600 UTC satellite imagery, scattered low/medium clouds with embedded intense to very intense convection lies over central parts of extreme south BoB and adjoining equatorial Indian Ocean.

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 close to 1.

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

- (i) Tropical Cyclone (Belna) located near 9.6°S/47.4°E at 0600 UTC of 7th with a maximum sustained wind speed of 85 knots. It is likely to move south-southwestwards with gradual intensification and reach maximum intensity of 115 knots by 0800 UTC of 8th and cross west coast of Mozambique and weaken gradually.
- (ii) Tropical Cyclone (Ambali) located near 12.0°S/62.9°E at 0600 UTC of 7th with a maximum sustained wind speed of 75 knots. It is likely to move southwestwards with gradual weakening and will become a tropical depression by 0000 UTC of 10th.

NWP Input for FDP Cyclone based on 0000 UTC of today

IMD-GFS T-1534:

- (i) Depression over north Somali coast at 00 UTC of 7th December.
- (ii) A LOPAR seen over southeast Arabian Sea on 8th which becomes a WML on 9th and becomes less marked on 10th.
- (iii) A third LOPAR is seen to form over south Andaman Sea and adjoining southeast BoB and equatorial Indian Ocean on 16th which becomes a CS on 17th December.

IMD-GEFS:

- (i) Indicates the remnant of the CS over southwest Arabian Sea (AS) as a depression over Somali coast.
- (ii) A small LOPAR is seen over southeast Arabian Sea on 7th and 8th December which becomes less marked by 9th.

IMD-WRF:

- (i) Indicates the remnant of the CS over southwest Arabian Sea over coastal Somalia.
- (ii) A small LOPAR is seen over Maldives and adjoining Lakshadweep area on 7th which becomes less marked on 8th.

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:

- (i) The remnant of the CS over SW Arabian Sea seen over Somali coast as a LOPAR at 0000 UTC of 7th December.
- (ii) This model is not indicating any more system in the NIO region during the forecast period.

ECMWF:

- (i) The remnant of the depression over southwest Arabian Sea seen over Somali coast.
- (ii) A LOPAR is seen over southeast Arabian Sea on 7th and 8th; becomes less marked on 10th.
- (iii) Another LOPAR forms over Maldives area on 15th which becomes a depression on 17th over southeast Arabian Sea.

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 :

- i) A depression is seen over Somalia coast on 7th which becomes less marked on 8th.
- ii) A LOPAR is seen over southeast Arabian Sea which is seen to move westwards without any significant intensification to reach Somalia coast on 10th December.
- iii) Another LOPAR is seen over south Andaman Sea and adjoining southeast BoB which is seen to move westward without much intensification till 09th.

Dynamical statistical models**IMD Genesis Potential Parameter (GPP):**

The area of significant zone of GPP over southwest Arabian Sea is seen to cross Somali coast in the early hours of 07th December. Another significant GPP zone is seen over southeast Arabian Sea on 7th which moves in a near westward direction and becomes insignificant by 11th.

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:

Considering the environmental conditions, the low level relative vorticity is about $50 \times 10^{-5} \text{sec}^{-1}$ over the low pressure area. The lower level convergence is about $20 \times 10^{-5} \text{s}^{-1}$ and the upper level divergence is about $40 \times 10^{-5} \text{s}^{-1}$ over the system area. The system lies in an area with low to moderate (10-15 knots) vertical wind shear. The upper tropospheric ridge runs roughly along 14° N over the system area. Sea surface temperature is about 29°C and tropical cyclone heat potential is 90-100 kJ/cm² over the area of the system. As the system is lying in a favourable environmental condition the system is likely to become more marked during next 24 hours. Many of the numerical models agree with the above prognosis.

Probability of cyclogenesis over Bay of Bengal and Andaman Sea during next 120 hours:

24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS
Nil	Nil	Nil	Nil	Nil

Probability of cyclogenesis over Arabian Sea during next 120 hours:

24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS
Nil	Low	Moderate	Nil	Nil

Advisory: No IOP area for the next 5 days













