



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



FDP (Cyclone) NOC Report Dated 29th November, 2019

Time of Issue: 1200 UTC

Synoptic features:

- A trough in easterlies runs between 0.9 km & 1.5 km over southwest Bay of Bengal off Srilanka and Tamilnadu coasts.
- A low pressure area is likely to form over Equatorial Indian Ocean and adjoining southwest Arabian Sea during next 48 hours.

Dynamical and thermodynamical features

Sea Surface Temperature (SST):

Sea Surface Temperature is around 26-28°C over westcentral Arabian Sea and north Arabian Sea and western parts of southwest Arabian Sea. It increases to 28-30°C over eastcentral and southeast Arabian Sea. There is a very small pocket of values around 25°C over northeast AS.

SST is around 26-28 °C over most parts of north BoB and adjoining WC BoB. It is between 28 - 30°C over rest BoB with higher values over eastcentral and south BoB.

Tropical Cyclone Heat Potential (TCHP):

Tropical Cyclone Heat Potential (TCHP) is 20-50 kJ/cm² over north Arabian Sea, westcentral, adjoining eastcentral and western parts of southwest Arabian Sea. Over southeast Arabian Sea it is of value 80-100 kJ/cm². There are areas of values more than 100 kJ/cm² southeast Arabian Sea, off Kerala coast & Lakshadweep area and also over equatorial Indian Ocean.

TCHP is around 30-50 kJ/cm² over north BoB and adjoining westcentral BoB. It is around 80-90 kJ/cm² over rest of the BOB.

Relative Vorticity:

No significant areas of cyclonic relative vorticity seen over BoB, rather anti-cyclonic vorticity prevails over major parts of the BoB.

Cyclonic relative vorticity of value 10-50x10⁻⁵ s⁻¹ seen over equatorial Indian Ocean to the south of southwest Arabian Sea.

Low level Convergence:

An area of positive lower level convergence of value 5-10x10⁻⁵ s⁻¹ is seen over southwest BoB. Areas of positive lower level convergence of value 10-15x10⁻⁵ s⁻¹ is seen over equatorial Indian Ocean to the south of southwest Arabian Sea and 5-10x10⁻⁵ s⁻¹ over Maldives area.

Upper level Divergence:

An area of positive upper level divergence of value 5-10x10⁻⁵ s⁻¹ is seen over southwest BoB and adjoining equatorial Indian Ocean.

An area of positive upper level divergence of value 10-20x10⁻⁵ s⁻¹ is seen over west equatorial Indian Ocean to the south of southwest Arabian Sea.

Wind Shear:

Wind shear is high over north, central and southwest Arabian Sea and low to moderate over southeast Arabian Sea and adjoining equatorial Indian Ocean.

Wind shear is high over north and adjoining central BoB. It is low to moderate over rest BoB and south Andaman Sea and adjoining equatorial Indian Ocean.

Wind Shear Tendency:

The wind shear tendency is negative or neutral over entire BoB.

It is negative or neutral over most parts of Arabian Sea.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs roughly along 14°N over BoB and roughly along 12°N over Arabian Sea.

Satellite observations based on INSAT imagery:

Arabian Sea:-

As per the satellite imagery at 0600 UTC of 29th November, 2019, scattered low to medium clouds with embedded intense to very intense convection lies over south and adjoining westcentral Arabian Sea and moderate to intense convection is seen over eastcentral Arabian Sea.

Bay of Bengal & Andaman Sea:

According to 0600 UTC satellite imagery, scattered low/medium clouds with embedded intense to very intense convection lies over south BoB and moderate to intense convection lies over south and central Andaman Sea.

Large scale features

M.J.O. Index:

MJO index is in Phase 1 with amplitude near to 1. It is likely to remain in the same phase for next 3-4 days and move to Phase -2 thereafter.

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

NWP Input for FDP Cyclone based on 0000 UTC of today

IMD-GFS T-1534: Indicates a low pressure area over equatorial Indian Ocean and adjoining southwest Arabian Sea during 29th November to 04th December, which becomes less marked thereafter. In the meantime, the mirror system in south Indian Ocean intensifies into a CS by 02nd December and moves southwestwards.

IMD-GEFS: Indicates development of a Low Pressure area (Lopar) over equatorial IO to the south of southwest Arabian Sea (AS) on 29th and 30th November which becomes less marked on 01st December. The twin of this system over the south IO is seen to intensify while moving southwestwards.

IMD-WRF: Indicate a Low Pressure area over north equatorial Indian Ocean and adjoining southwest Arabian sea during 29-30 November.

NCMRWF-NCUM: Indicates a low pressure area over equatorial Indian Ocean and adjoining southwest Arabian Sea on 29th November, which becomes a depression on 4th and a CS on 5th over southwest Arabian Sea. Moving nearly northwards initially and then north-northeastwards to cross Oman coast on 8th and weakens thereafter. Its twin system over south Indian Ocean also is seen to intensify while moving in a south-southwestward direction.

NCMRWF-UM-Regional Model: Indicates development of no low pressure system for the next 3 days.

NEPS Model: Indicates a low pressure area over equatorial Indian Ocean and adjoining southwest Arabian Sea on 29th November, which becomes a depression on 4th and a CS on 5th over southwest Arabian Sea. Moving nearly northwards initially and then north-northeastwards to cross Oman coast on 8th and weakens thereafter. Its twin system over south Indian Ocean also is seen to intensify while moving in a south-southwestward direction, becoming a depression on 02nd and a CS on 3rd December.

ECMWF: Indicates a low pressure area over equatorial Indian Ocean and adjoining southwest Arabian Sea on 01st December which becomes a depression on 2nd December off Somali coast. It becomes unimportant by 6th December. On 02nd December another LOPAR forms over southeast Arabian Sea, which becomes a depression on 3rd and CS during 04-05 December. It

becomes less marked on 6th. Yet another LOPAR is seen over southwest Arabian Sea on 8th and 9th December.

NCEP-GFS: Indicates development of a low pressure area on 29th November which becomes a WML on 30th and a depression on 04th December over southwest Arabian Sea and adjoining equatorial Indian Ocean, close to Somali coast. It starts weakening from 5th December and becomes less marked thereafter.

ARP-Meteo France : A low pressure area is seen over equatorial Indian Ocean and adjoining southwest Arabian Sea on 29th and 30th December. However, the twin system over south Indian Ocean is seen to intensify further. Another LOPAR form over Lakshadweep area on 01st and it becomes WML on 02nd December.

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

An area of significant zone of GPP is seen to develop over southwest Arabian Sea during 29th November to 02nd December, which is seen to become insignificant by 03rd December. Another significant GPP zone is to develop over southwest BoB and adjoining equatorial Indian Ocean on 03rd December and persists till 06th December.

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:

Amongst the NWP models considered, most of them including IMD GFS, GEFS, NCEP GFS, NCUM, NEPS and ECMWF are indicating development of a low pressure area over equatorial Indian Ocean and adjoining southwest Arabian Sea during 29th/ 30th November. Among these, ECMWF, NCEP GFS and NCUM& NEPS are indicating further intensification of the system to a depression during 02nd to 04th December. Except for NCUM and NEPS, no other model is indicating the system to further intensify into a CS. All these models are indicating that the twin system over south Indian Ocean to intensify into a cyclonic storm.

The development of a low pressure area over southwest Arabian Sea and its possible intensification needs to be monitored.

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	Nil	Nil	Low	Low

Advisory: No IOP area for the next 5 days













