



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



FDP (Cyclone) NOC Report Dated 10th November, 2019

Time of Issue: 1200 UTC

Synoptic features:

- The Very Severe cyclonic storm “BULBUL” (pronounced as Bul bul) over northwest Bay of Bengal (BoB) moved northeastwards, weakened into a Severe Cyclonic Storm and crossed West Bengal coast close to Sunderban Dhanchi forest during night (1500 to 1800 UTC of 9th November, 2019) with a maximum sustained wind speed of 110-120 Kmph gusting to 135 kmph. It then moved east-northeastwards, and further weakened into a Cyclonic Storm over coastal Bangladesh & neighbourhood at 0000 UTC of 10th November. Continuing to move east-northeastwards; weakened into a **Deep Depression** over the same area and lay centered at 0900 of 10th November 2019 over coastal Bangladesh & neighbourhood, near Lat. 22.4°N and Long. 90.1°E, about 50 km north-northwest of Khepupara (Bangladesh), about 220 km east-northeast of Sagar Islands (West Bengal), 140 km east-northeast of Sunderban National Park and 180 km to the east of Kolkata. It is very likely to continue to move east-northeastwards and weaken into a Depression over coastal Bangladesh and neighbourhood during next 09 hours

Dynamical and thermodynamical features

Sea Surface Temperature (SST):

Sea Surface Temperature is around 25-28°C over most parts of central Arabian Sea. It increases to 28-30°C over north Arabian Sea and also over south Arabian Sea.

SST is around 27-28 °C over north BoB. It is around 28 - 30°C over rest BoB.

Tropical Cyclone Heat Potential (TCHP):

Tropical Cyclone Heat Potential (TCHP) is 20-40 kJ/cm² over most parts of central Arabian Sea and north Arabian Sea. There is a narrow strip of value 50-70 kJ/cm² off west coast of India. It is around 80-100 kJ/cm² over south Arabian Sea.

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

Relative Vorticity:

Cyclonic relative vorticity at 850 hPa of value 100 X10⁻⁶s⁻¹ is seen over northwest BoB in association with the Deep Depression over coastal areas of Bangladesh.

Cyclonic relative vorticity at 850 hPa of value 10-20X10⁻⁶s⁻¹ is seen over the eastcentral Arabian Sea off Maharashtra coast.

Low level Convergence:

An area of lower level convergence about 20 x 10⁻⁵s⁻¹ is seen over northeast BoB in association with the Deep Depression over coastal areas of Bangladesh.

No significant positive lower level convergence area is seen over Arabian Sea.

Upper level Divergence:

Upper level divergence of value 20-30x10⁻⁵ s⁻¹ is seen over north BoB.

There is no significant area of positive upper level divergence over Arabian Sea.

Wind Shear:

Wind shear is high over north and central and adjoining south Arabian Sea. It is low to moderate over southern parts of south AS.

Wind shear is low to moderate to over Andaman Sea and south BoB. It is high elsewhere.

Wind Shear Tendency:

The wind shear tendency is positive over north and adjoining westcentral BoB. It is negative or neutral elsewhere.

It is negative over some parts of southeast Arabian Sea and Comorin area. It is positive or neutral over rest Arabian Sea.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs roughly along 17°N over BoB.

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

As per the satellite imagery at 0900 UTC of 10th November, 2019, scattered low to medium clouds with embedded weak to moderate convection lies over northwest Arabian Sea off Kerala coast.

Bay of Bengal & Andaman Sea:-

According to 0900 UTC satellite imagery, scattered low/medium clouds with embedded moderate to intense convection lies over extreme NE BoB, south BoB and South Andaman Sea.

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

MJO index is in Phase 7 with amplitude more than 1. It is likely to remain there for next 2 days and move to phase 8 thereafter.

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

- a) The Tropical Storm "NAKRI" is located at 0600 UTC of 10th near 12.8°N 110.9°E, approximately 274 NM east-northeast of Ho Chi Minh City, Vietnam. Maximum sustained surface winds were estimated at 50 knots. The system is likely to move nearly westwards with marginal weakening and cross Vietnam coast around 13.7° N between around 1800 UTC on 10th November and weaken over Laos and adjoining Cambodia.

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

The SCS on 10th over coastal regions of Bangladesh weakens into a depression over the same region on 11th and becomes less marked subsequently.

IMD-GEFS

The SCS over coastal regions of Bangladesh and adjoining West Bengal coast on 10th and is seen as a depression over coastal regions of Bangladesh and adjoining north BoB on 11th and gradually weakens thereafter.

IMD-WRF

The SCS over coastal regions of Bangladesh on 10th is seen as a Depression over NE BoB on 11th and weakens over the same area subsequently.

NCMRWF-NCUM:

The SCS over Bangladesh coast and adjoining north BoB on 10th November is seen to become unimportant by 0000 UTC of 11th.

NCMRWF-UM-Regional Model:

The SCS over North BoB and adjoining Bangladesh and West Bengal on 10th becomes a LOPAR by 0000 UTC of 11th.

NEPS Model:

The SCS over West Bengal- Bangladesh coasts and adjoining north BoB is seen to weaken rapidly over land.

ECMWF:

The SCS over coastal regions of Bangladesh and adjoining West Bengal and north BoB on 10th is seen to become unimportant by 11th.

NCEP-GFS:

The SCS over Bangladesh-West Bengal coasts and adjoining north BoB on 10th November is seen as a WML over the same area on 11th. It is seen to weaken subsequently.

ARP-Meteo France :

The CS over Bangladesh is seen as a LOPAR over the same area the next day and becomes less marked subsequently.

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

- (i) A small area of significant zone of GPP is seen over north BoB on 10th November, which becomes insignificant the next day.

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 in association with the deep depression decreased and is around $100 \times 10^{-5} \text{ sec}^{-1}$ around the system centre. The lower level convergence also has decreased and is about $20 \times 10^{-5} \text{ s}^{-1}$ to southeast of the system centre and the upper level divergence remains the same and is about $30 \times 10^{-5} \text{ s}^{-1}$ to the southeast of the system centre. The vertical wind shear is high (30-40 knots) over the system centre.

The system is lying underneath the mid-latitude westerlies. Hence, the system is moving east-northeastwards under the influence of west-southwesterly winds in the mid & upper tropospheric levels. The system is experiencing high vertical wind shear which will contribute to further weakening of the system into a depression during next 03 hours. Majority of the NWP models are in agreement with the above analysis

Advisory: No IOP for next 5 days













