



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



FDP (Cyclone) NOC Report Dated 25th October, 2019

Time of Issue: 1200 UTC

Synoptic features:

- The Depression (D) over eastcentral Arabian Sea moved east-northeastwards and intensified in to Deep Depression (DD) over the same region yesterday evening. Moving north-northeastwards, it further intensified into Cyclonic Storm (Kyarr) and lay centred at 0300 UTC of today, the 25th October, 2019 near latitude 16.0°N and longitude 71.6°E. It moved north-northwestwards, intensified into a **Severe Cyclonic Storm** and lay centred at 1730 hrs IST of today, the 25th October, 2019 near latitude 16.3°N and longitude 71.7°E over eastcentral Arabian Sea, about 190 km nearly to the west of Ratnagiri (Maharashtra), 330 km south-southwest of Mumbai (Maharashtra) and 1870 km east-southeast of Salalah (Oman). It is very likely to move west-northwestwards towards Oman coast during next 5 days. It is very likely to intensify into a Very Severe Cyclonic Storm during next 12 hours and further intensify into an extremely severe cyclonic storm during the subsequent 36 hours.

Dynamical and thermodynamical features

Surface Temperature (SST):

SST is 29-30°C over east-central & southeast Arabian Sea (AS) and Gulf of Oman, 28-29°C over rest AS, except over west central & southwest AS off Oman and Somalia coasts where it is 26- 27°C.

SST is 30 - 32°C over north and adjoining east-central Bay of Bengal (BOB) & Myanmar coast and 29- 30°C over the rest of BOB.

Tropical Cyclone Heat Potential (TCHP):

TCHP is 80-100 kJ/cm² over southeast & adjoining central AS, 100-110 kJ/cm² over west equatorial Indian Ocean (IO). It is < 40 kJ/cm² over most parts of north & west-central AS and Oman – Yemen coasts.

TCHP is 110-130 kJ/cm² over west-central & southwest BOB, 100-110 kJ/cm² over north Andaman Sea and east-central BOB and 60-80 kJ/cm² elsewhere over the BOB.

Relative Vorticity:

An area of cyclonic relative vorticity at 850 hPa of 250 X10⁻⁶s⁻¹ is seen over east-central AS around the centre of the Cyclonic Storm (CS).

Cyclonic relative vorticity at 850 hPa is mostly anti-cyclonic over the BOB.

Low level Convergence:

Lower level convergence is about 20 – 30 x 10⁻⁵s⁻¹ over east-central AS around the centre of the CS.

Lower level convergence of about 10-20 x 10⁻⁵s⁻¹ is seen over west-central & north BOB.

Upper level Divergence:

A zone of upper level divergence of 10 - 20x10⁻⁵ s⁻¹ is seen over east-central AS, over the system centre and convergence of 05 - 10x10⁻⁵ s⁻¹ over north & west-central AS.

Upper level divergence of 10 - 20x10⁻⁵ s⁻¹ is seen over southwest, west-central & north BOB.

Wind Shear:

Wind shear is 10-15 knots over central AS, and increasing to the north as well as to the south. Wind shear is 05-10 knots over major parts of the BOB, except over southwest and adjoining west-central BOB, where it is 20-30 knots.

Wind Shear Tendency:

The wind shear is in decreasing tendency over east- central and northeast AS and increasing over south AS.

It is increasing over southwest BOB off Tamil Nadu coast and decreasing elsewhere over the BOB.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs roughly along 17°N over the AS and an anticyclone is prevailing over north BOB.

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

According to 0900 UTC satellite imagery, vortex (Kyarr) over east-central AS & neighbourhood is centered near 16.3N/71.8E with intensity T 3.0. Curve band pattern associated broken low/medium clouds with embedded intense to very intense convection prevails over east-central AS between Lat 14.0N to 17.5N and Long 70.5E to 73.5E (minimum CTT is minus 93 deg C) .'

Bay of Bengal & Andaman Sea:-

According to 0900 UTC satellite imagery, scattered low/medium clouds with embedded intense to very intense convection prevails over northwest & south BOB, Tenasserim coast and mod to intense convection over west-central BOB and southwest Andaman Sea.

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

MJO index is in Phase 2 (western Indian Ocean) with amplitude more than 1. It will continue in same phase with reduction in amplitude for next 2 days and enter into Phase 3 (eastern Indian Ocean) with subdued amplitude thereafter.

Storms and Depression over South China Sea/ South Indian Ocean: None over south China Sea and over south Indian Ocean.

Typhoon 22W "Bualoi" is continued over Pacific Ocean.

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

(i) Indicates : Very Severe Cyclonic Storm (VSCS) over east-central AS, off Maharashtra coast on 25th, Extremely SCS (ESCS) over east-central AS, away from Maharashtra coast on 26th, ESCS over east-central & adjoining west-central AS on 27th, ESCS over west-central and adjoining east-central AS on 28th, ESCS over west-central AS on 29th & 30th, ESCS over west-central AS, off Oman coast on 31st, VSCS over west-central AS off Oman coast on 31st and become less marked on 1st November.

(ii) Indicates: Low pressure area (Lopar) over east equatorial Indian Ocean (IO) on 27th, equatorial IO and adjoining south Sri Lanka on 28th, trough of low over equatorial IO and adjoining Maldives – Lakshadweep area on 29th, 30th & 31st and becomes a D over east central and adjoining southeast AS on 1st November, CS over central AS on 2nd, SCS

over west-central AS on 3rd and VSCS over west-central AS off south Oman – Yemen coasts on 4th November.

IMD-GEFS

- (i) Indicates: VSCS over east-central AS off south Maharashtra coast on 25th, VSCS over east central AS moving away from Maharashtra coast on 26th, VSCS over east-central AS on 27th, ESCS over central AS on 28th, ESCS over west-central AS on 29th & 30th, VSCS over west-central AS off Oman coast on 31st October, CS / D over west-central AS close to south Oman – Yemen coasts on 1st November and trough of low over the region on 2nd November.
- (ii) Indicates: Lopar over southwest BOB on 27th becomes less marked on 28th, a fresh trough of low over equatorial IO & Comorin area on 30th. No further intensification is predicted unlike its deterministic product.

IMD-WRF

- (i) Indicates: VSCS over east-central AS off south Maharashtra coast on 25th, ESCS over east-central AS away from Maharashtra coast on 26th, Super CS (SuCS) over east-central AS on 27th and SuCS over central AS on 28th October.
- (ii) Indicates: Lopar over southwest BOB on 28th October.

NCMRWF-NCUM:

- (i) Product could not be accessed due to some technical problem. However, a summary as provided by NCMRWF is added along with the conclusion.

NCMRWF-UM-Regional Model:

- (i) Indicates : ESCS over east-central AS off Maharashtra coast on 25th & 26th, ESCS over east-central AS on 27th, ESCS over central AS on 28th October.

NEPS Model:

- (i)Indicates : vSCS over east central AS off south Maharashtra Coast on 25th & 26th, ESCS over east-central AS away from Maharashtra Coast on 27th, ESCS over central AS on 28th, ESCS over west-central AS on 29th, ESCS over west-central AS on 30th & 31st October, VSCS over the same area on 1st November and D over Gulf of Oman on 2nd November.

ECMWF:

- (i)Indicates : SCS over east-central AS off Maharashtra coast on 25th, VSCS over east-central AS away from Maharashtra coast on 26th, ESCS over east-central AS on 27th & 28th, ESCS over west central AS on 29th & 30th, VSCS over west-central AS on 31st October, VSCS over west central AS off south Oman coast on 1st & 2nd November, VSCS over Gulf of Oman coast on 3rd November.
- (ii) Indicates: Lopar over east-central and adjoining southeast AS on 1st November, Well Marked Lopar over east-central AS on 2nd and D over central AS on 3rd November.

NCEP-GFS :

- (i) Indicates : VSCS over east central AS on 26th, VSCS over central AS on 27th & 28th, SCS over west-central AS on 29th, SCS over west-central AS close to Oman coast on 30th, D over coastal Yemen on 31st October.
- (ii) Indicates: Lopar over east-central AS on 1st November and WML over wes-central and adjoining southwest AS on 2nd November.

ARP-Meteo France :

- (i) Indicates: ESCS over east-central AS off south Maharashtra - Goa coasts on 25th, ESCS over east-central AS off south Maharashtra coast on 26th, SuCS over east-central AS away from maharsashtra coast on 27th and SuCS over east-central AS on 28th October.

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

- (i) Significant zone of GPP seen over east central AS off south Maharashtra coast on 25th, over east-central AS away from Maharashtra coast on 26th, east-central AS on 27th, west-central AS on 28th & 29th and over west central AS off Oman coast on 30th & 31st October.
- (ii) Significant zone of GPP seen over east equatorial IO and adjoining southwest BOB on 26th & 27th, east equatorial IO on 28th & 29th, southwest BOB off Tamil Nadu coast on 30th, southeast AS and adjoining Lakshadweep area on 31st October and over east-central and adjoining southeast AS on 01st November.

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 SCS over east central Arabian Sea is very likely to intensify further and move west-northwestwards towards Oman coast with gradual intensification during next 5 days.
- As per NCUM_G (and NCUM_R) tracks the CS Kyarr would track -
 - slightly northwards up to 26th Oct 2019 and then track westward up until 30th Oct 2019 (28th Oct 2019).
 - NCUM_G shows peak intensity on 00UTC on 30th Oct (951hpa/75knots)
 - NCUM_R shows peak intensity on 00UTC on 28th Oct (932hpa/97knots)
 - 12UTC on 26thOct (62knots) to 12UTC on 27th Oct (97 knots) indications of RI
- The MJO lies in the phase 2 with amplitude greater than 1. It will remain in the same phase during next 2 days with diminishing amplitude and move over to phase 3 thereafter. Positive Indian Ocean Dipole and overall sea surface temperature > 29°C and TCHP > 80 kJ/cm⁻² over major parts of south & central AS & BOB are favourable factors for cyclogenesis as well as further intensification of systems over north IO at present.
- IMD GFS and GPP indicate probable formation of a D over east-central and adjoining southeast AS around 1st November. NEPS also suggest probable formation of a CS over east-central and adjoining southeast AS on 1st November. ECMWF predicts formation of a Lopar over this region on 1st November and its northwestward movement and further intensification into D on 3rd November.

Advisory: No IOP for next 5 days.













