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

FDP (Cyclone) NOC Report Dated 18 October, 2019

Time of Issue: 1200 UTC

Synoptic features:

- The Low Pressure Area over southeast Arabian Sea & adjoining Lakshadweep area now lies over southeast Arabian Sea & adjoining areas of Lakshadweep and eastcentral Arabian Sea with the associated cyclonic circulation extending upto 5.8 km above mean sea level. It is likely to become more marked over eastcentral Arabian Sea around 20th October..

Dynamical and thermodynamical features

Surface Temperature (SST):

SST is around 29-30°C over entire BOB with higher values over most parts of central BOB and north Andaman Sea around 30-32°C.
SST is more than 28°C over most parts of westcentral Arabian Sea and western parts of southwest Arabian Sea, except over small area over western parts of westcentral Arabian Sea, where it is between 26-28 °C. It is around 29-30°C to the east of 63°E.

Tropical Cyclone Heat Potential (TCHP):

TCHP is around 70-90 kJ/cm^2 over entire BoB and Andaman Sea, except some pockets in central and south BOB, where it is around 100-120 kJ/cm^2. It is less than 50 kJ/cm^2 over extreme northern parts of north Bay of Bengal and along the coastal region.
TCHP is below 50kJ/cm^2 over northwest and most parts of westcentral and adjoining southwest Arabian Sea. It is 70-80 kJ/cm^{2}over remaining parts of AS. There are areas of value more than 100 kJ/cm^2 over south Arabian Sea.

Relative Vorticity:

There are no significant zones of positive relative vorticity at 850 hPa is 50X10^{-6}s-1 over BoB and Andaman sea.
A nearly circular area of positive vorticity of values around 20-40X10^{-5}s-1 is seen over southeast AS and adjoining Lakshadweep area. It is positive over most parts of south as well as central Arabian Sea.

Convergence:

A small area of positive lower level convergence of about 5 x 10^{-5}s^{-1} is seen over over southern parts of southeast BOB.
A circular area of lower level convergence of 10 x 10^{-5}s^{-1} lies over Lakshadweep and adjoining southeast Arabian Sea.

Divergence:

No areas of significant upper level divergence area seen over BoB.
A zone of positive upper level divergence of 10-20x10^{-5} s-1 is seen over southeast and adjoining eastcentral Arabian Sea.

Wind Shear:

Wind shear is 5-10 knots over central & south BoB and Andaman Sea and is increasing towards north.

Wind shear is 5-10 knots over central and adjoining south AS and is increasing towards southern and northern parts of AS.

Wind Shear Tendency:

The wind shear tendency is mostly negatve or neutral over most parts BOB and Andaman Sea except for a small area near Gulf of Martaban.

The shear tendency is increasing or neutral over most parts of AS except for some parts of central and southwest AS.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs along 17.0°N over BOB Region.

Satellite observations based on INSAT imagery:

Bay of Bengal & Andaman Sea:-

According to 0600 UTC satellite imagery, scattered low/medium clouds with moderate to intense convection is seen over central and south BOB and also over Andaman Sea.

Arabian Sea:-

According to 0600 UTC satellite imagery, scattered low/medium clouds with embedded intense to very intense convection is seen over southeast and Lakshadweep area in association with low level circulation (LLC) over the area.

Large scale features

M.J.O. Index:

MJO index is in Phase 1 with amplitude more than 1. It will continue in same phase with amplitude greater than 1 for next 2 days and will 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

IMD-GFS

The analysis of IMD-GFS T-1534 model charts based on 0000 UTC of 18th October, 2019 shows a low pressure area/ extended low pressure area over Arabian sea, throughout the forecast period.

IMD-GEFS

The analysis of IMD-GEFS model charts based on 0000 UTC of 18th October, 2019 shows an extended low pressure area/low pressure over eastcentral and adjoining southeast Arabian Sea during the entire forecast period.

IMD-WRF

The WRF model forecasts based on 18/00 analysis shows a low pressure area (LOPAR) over eastcentral Arabian Sea on 20th which becomes well marked the next day.

NCMRWF-NCUM: The analysis of model forecast charts based on 0000 UTC of 18th October, 2019 shows a low pressure area on 21st over eastcentral Arabian Sea, which becomes well marked on 22nd and 23rd and a depression close to Maharashtra coast on 24th and a Cyclonic storm off Mumbai on 25th. It is seen to cross coast close to Mumbai on 26th and weakens thereafter.

NCMRWF-UM-Regional Model: The 00UTC forecast based on 00/18 UTC analysis indicate a low pressure area over SE and adjoining eastcentral Arabian Sea during 20th to 21st.

NEPS Model: The analysis of model forecast charts based on 0000 UTC of 18th October, 2019 shows an extended low pressure area over eastcentral and adjoining southeast Arabian Sea, during 18th to 20th , which becomes a low on 21st and a well marked low pressure area (WML)

over eastcentral Arabian Sea on 22th, and a depression on 23rd, a cyclonic storm on 24th off Maharashtra coast. Thereafter it is seen close to Mumbai coast on 25th.

ECMWF: ECMWF forecast gives indication of a low pressure system on 26th over eastcentral AS, which is seen as a depression area during 27th to 28th.

NCEP-GFS : Model suggests no low pressure area over north Indian Ocean region for the next 10 days.

ARP-Meteo France ARP:Nil

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

The Genesis Potential Parameter (GPP) analysis and forecasts based on 0000 UTC of 18th October 2019 shows a significant GPP zone developing over southeast Arabian Sea on 18th, which becomes insignificant on 19th. Another zone is seen over southwest BOB on 22nd which moves in a northwest direction and cross Andhra Pradesh coast on 24th.

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:

There is a large divergence amongst various models forecasts. IMD GFS and its ensemble is forecasting low pressure area over Arabian Sea during the forecast period, but they are not indicating any intensification of the low pressure area. On the other hand NCEP GFS do not suggest formation of any low pressure system over NIO for the next 10 days, whereas, ECMWF, and NCUM group of models suggest formation of the low pressure area over Arabian sea with further intensification, but the day of formation varies. ECMWF is indicating the low pressure area to form on 26th October and intensification into a depression on 27th. NCUM and its ensemble indicate formation of low pressure area on 21st, and further intensification into depression around 23rd and into cyclonic storm around 25th.
The genesis potential parameter index indicates a significant potential zone for cyclogenesis over southeast & eastcentral AS on 19th, which becomes less significant next day.

Considering the above, possible intensification of the low pressure area over southeast Arabian Sea & adjoining areas of Lakshadweep and eastcentral Arabian Sea needs to be closely monitored.

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

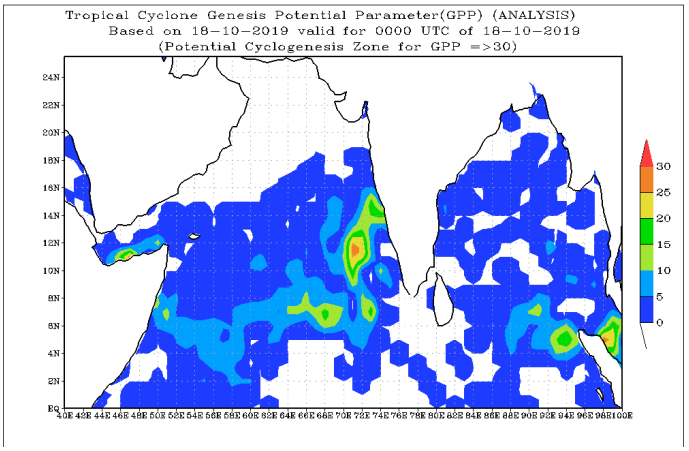
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS
Nil	Nil	Nil	Nil	Nil

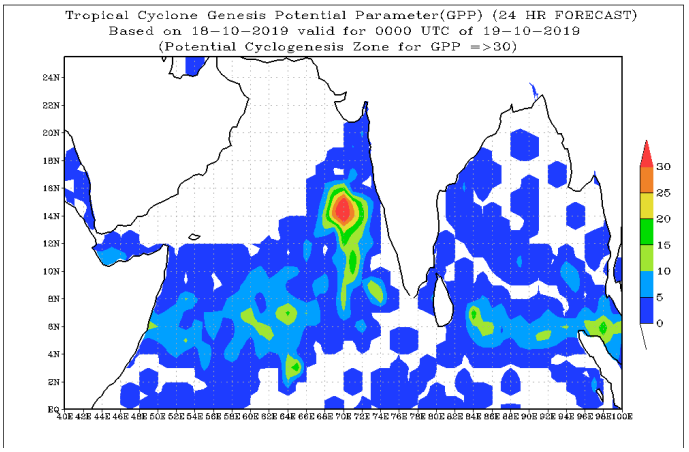
Probability of cyclogenesis over Arabian Sea during next 120 hours:

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

Advisory: No IOP area for the next 5 days.

Annexure-I


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 18-10-2019 valid for 0000 UTC of 18-10-2019
(Potential Cyclogenesis Zone for GPP =>30)


Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
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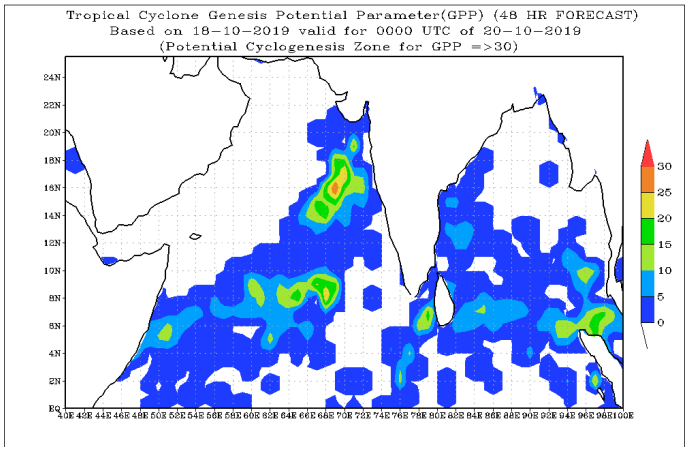
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
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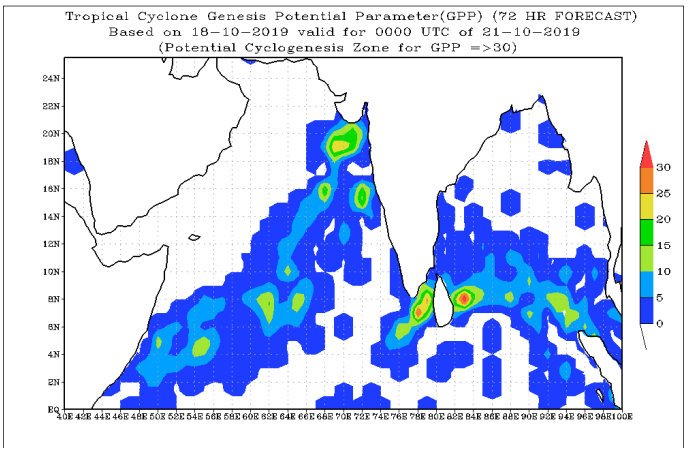
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
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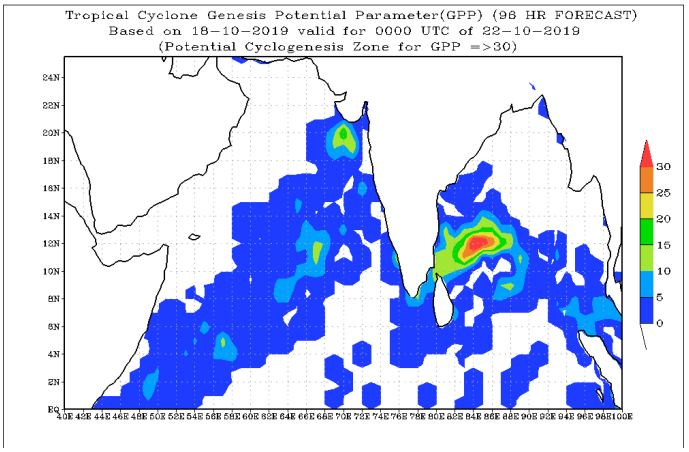
Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
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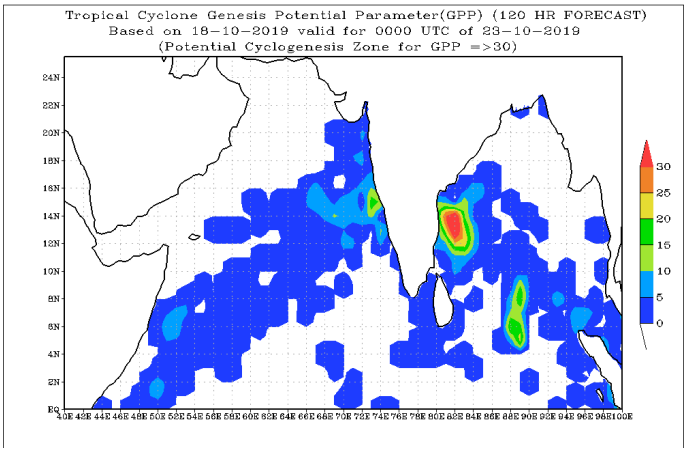
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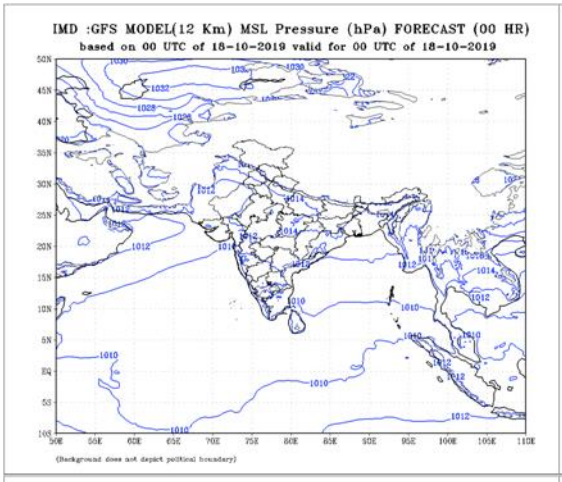
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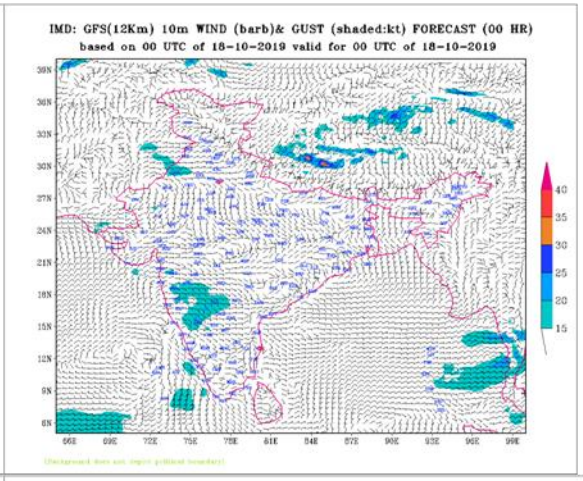
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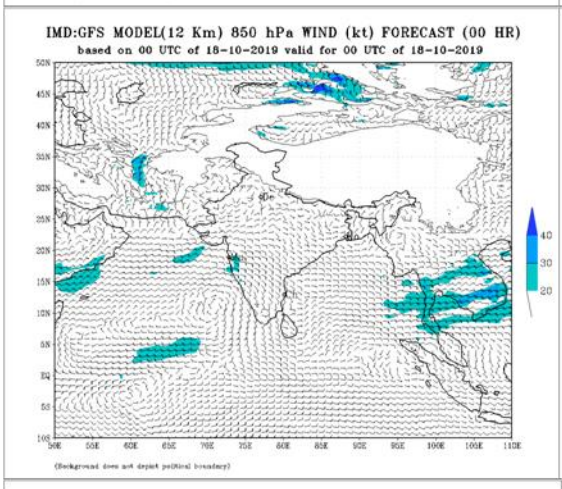
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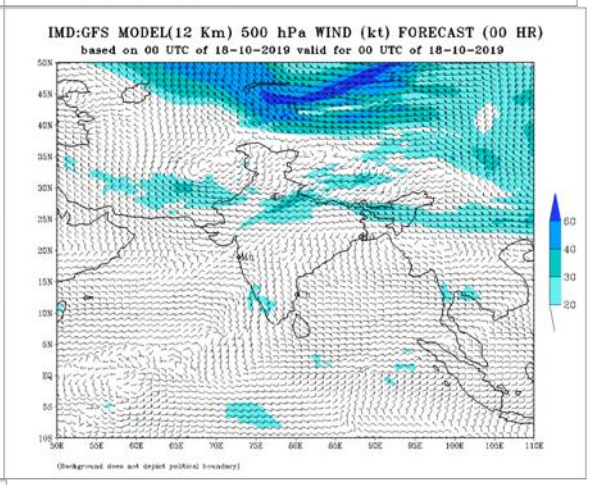
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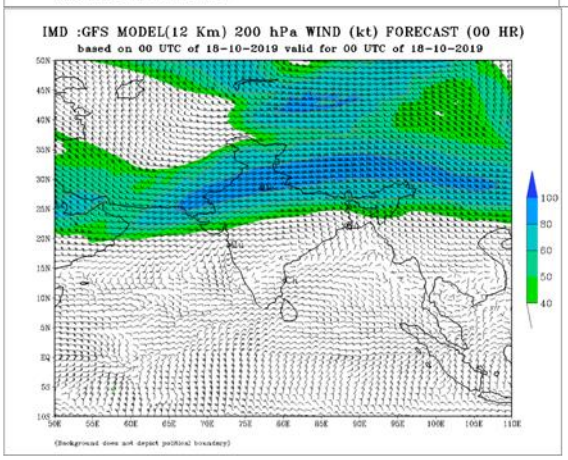
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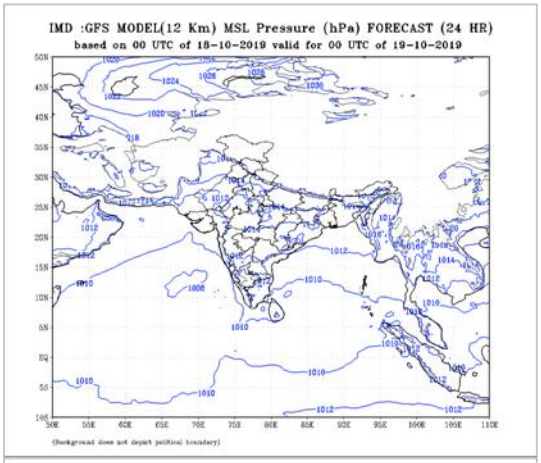
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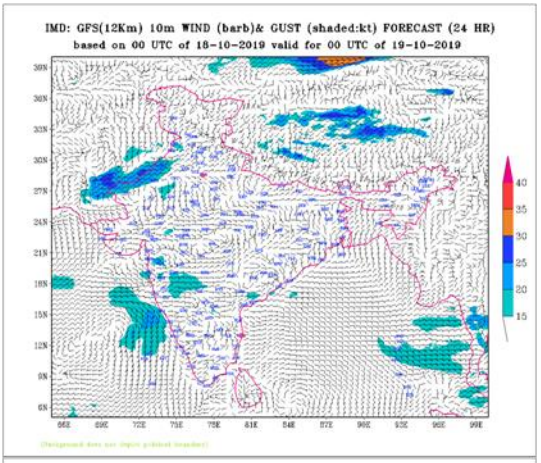
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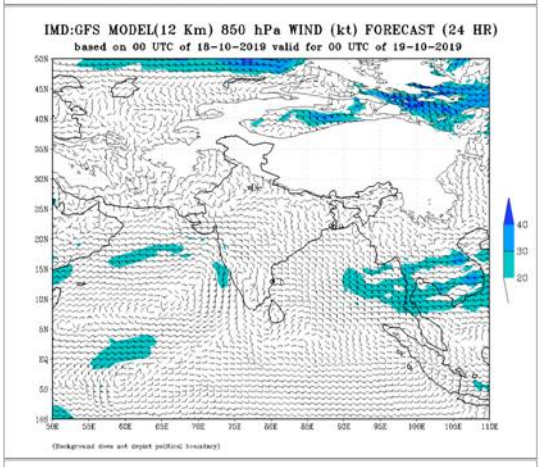
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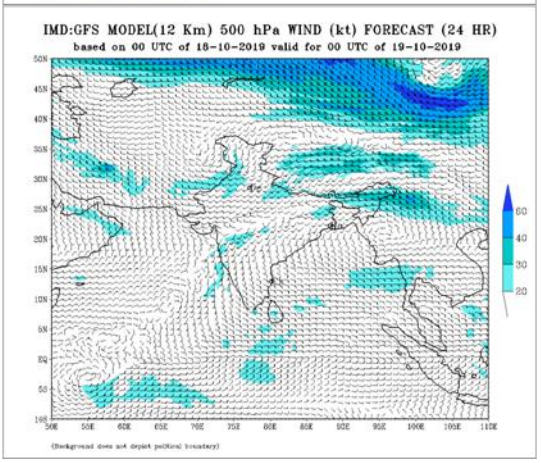
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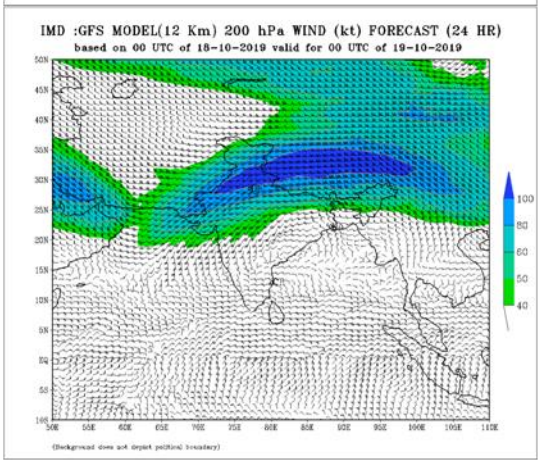
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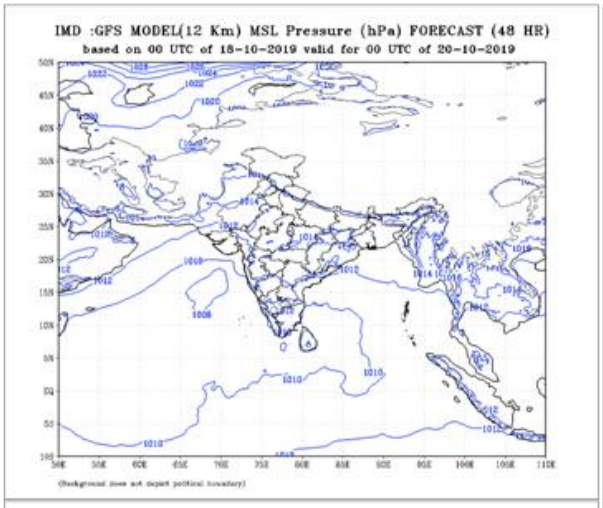
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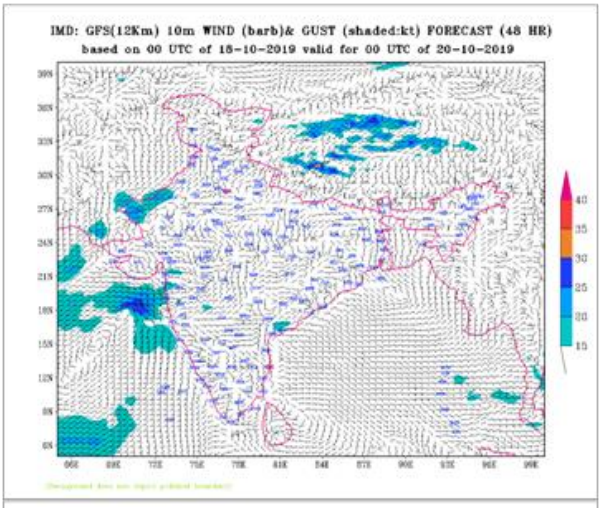
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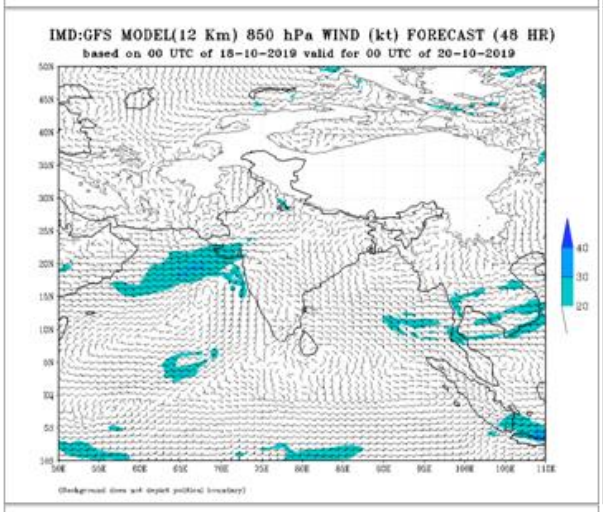
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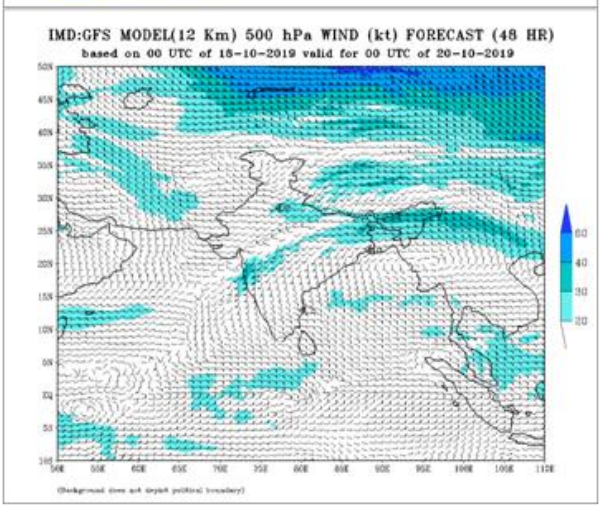
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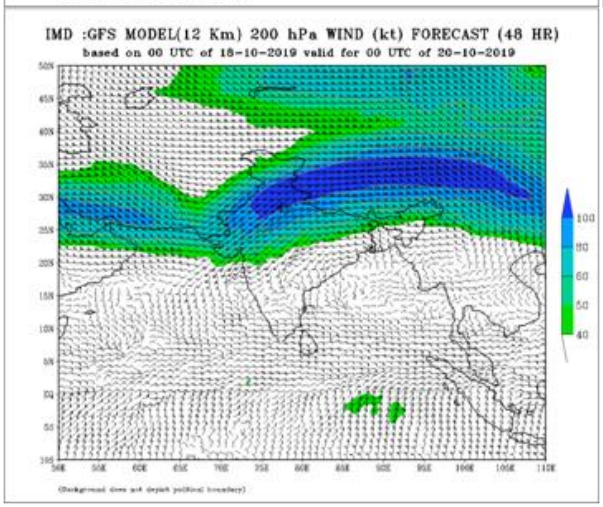
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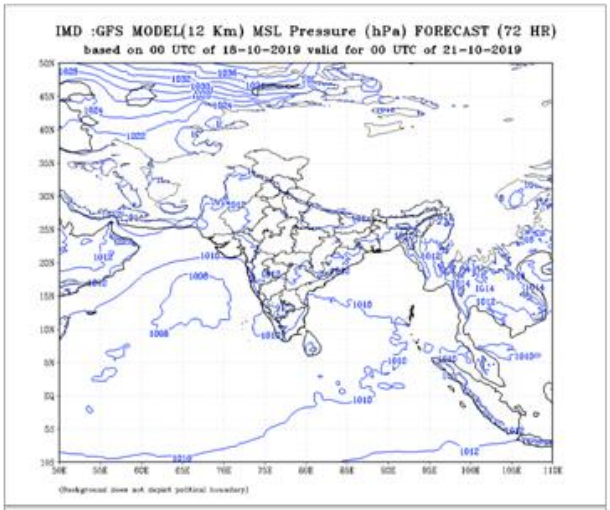
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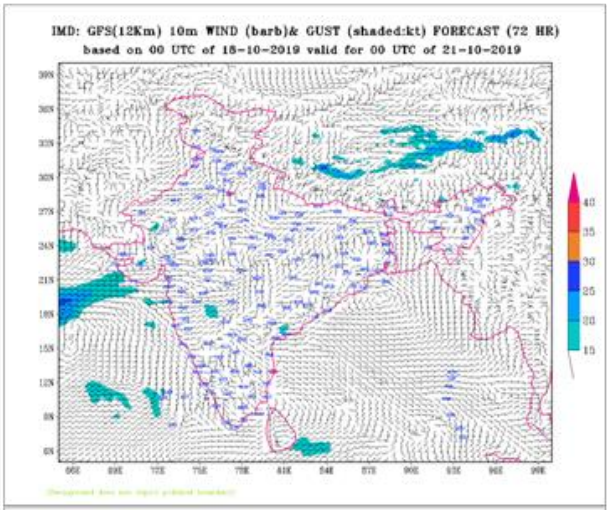
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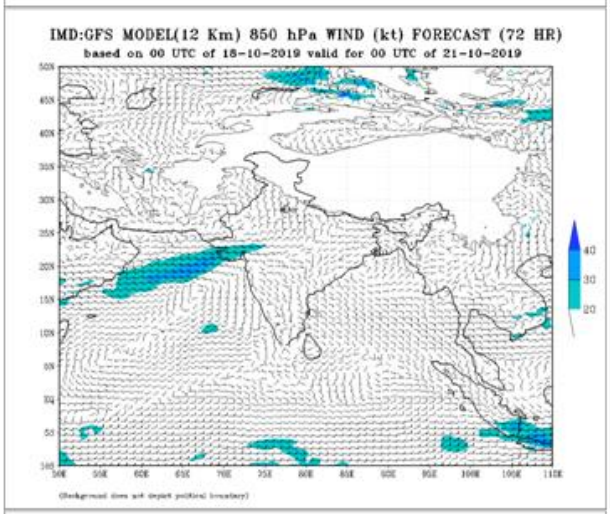
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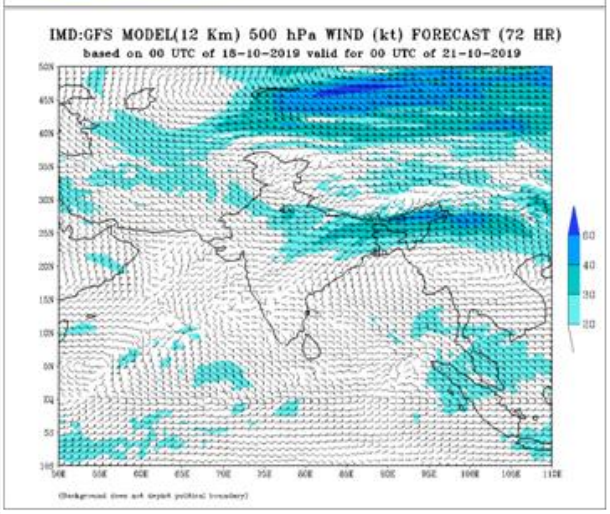
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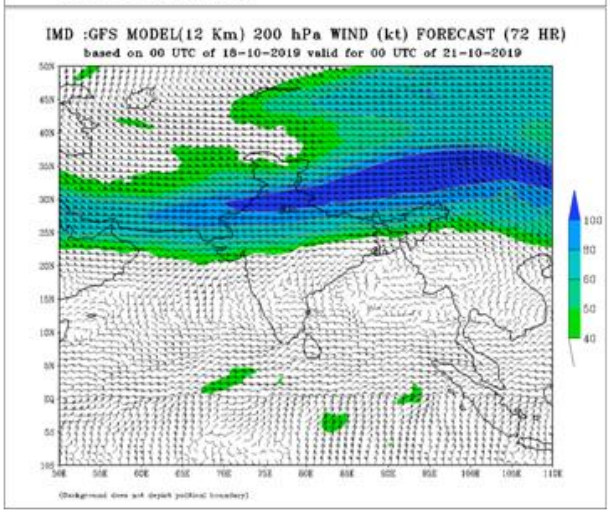
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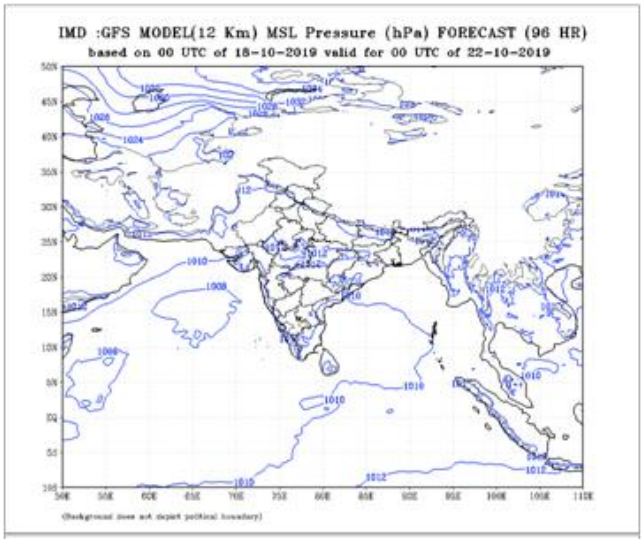
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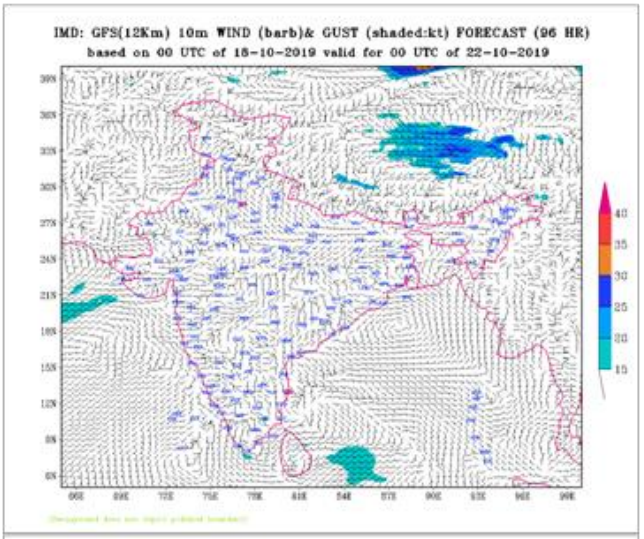
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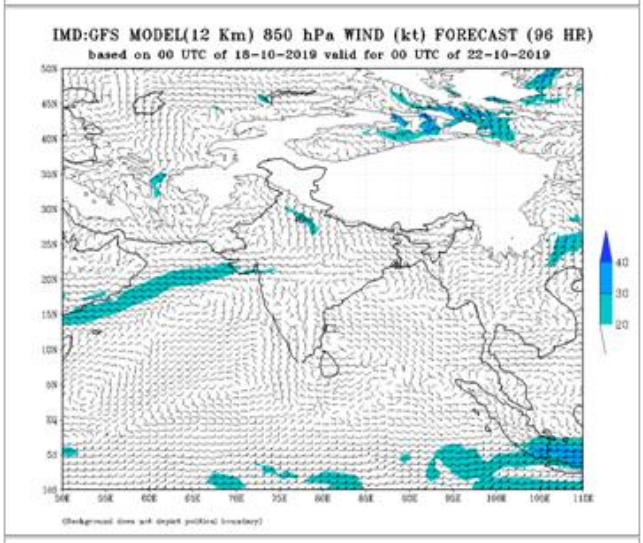
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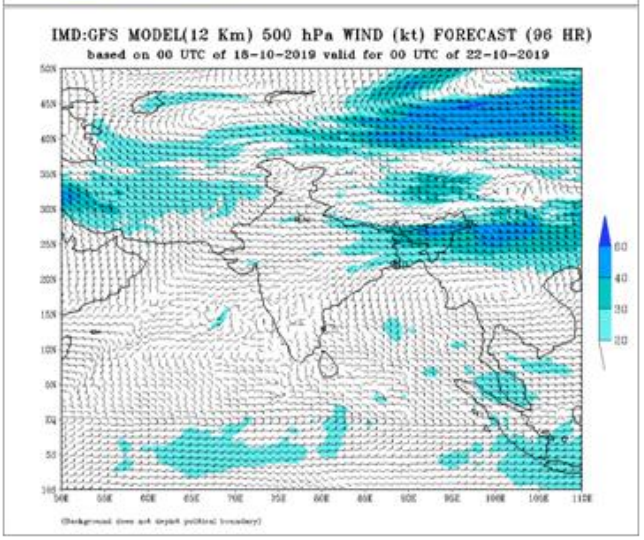
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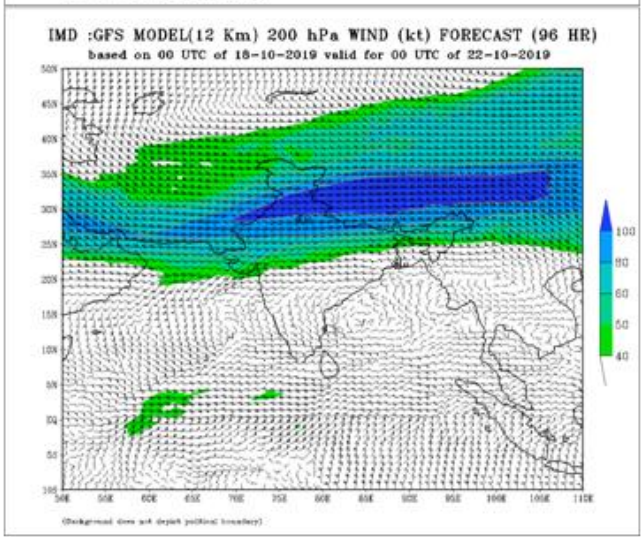
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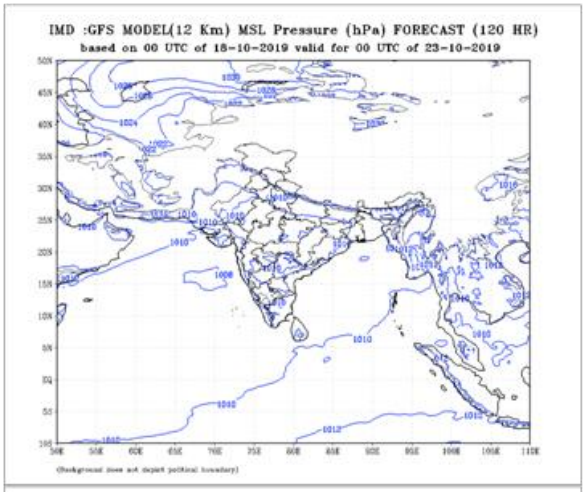
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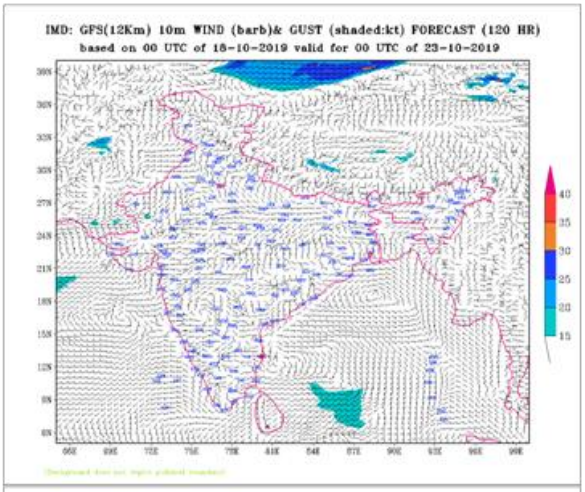
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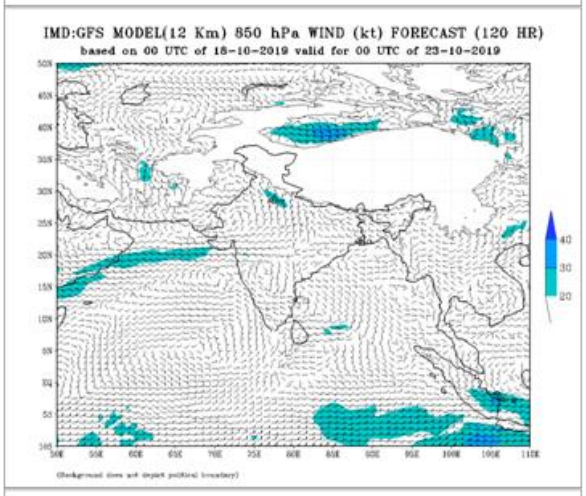
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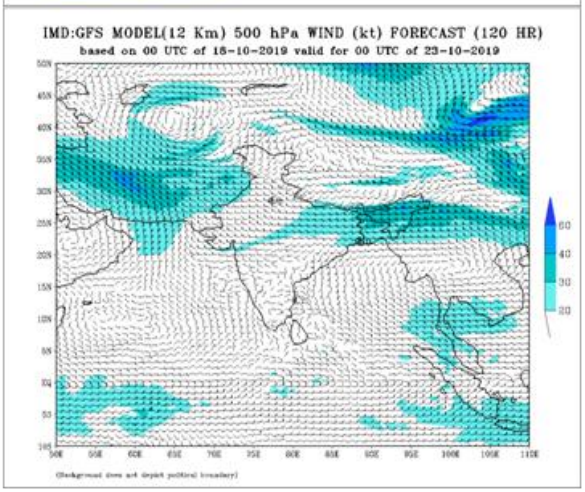
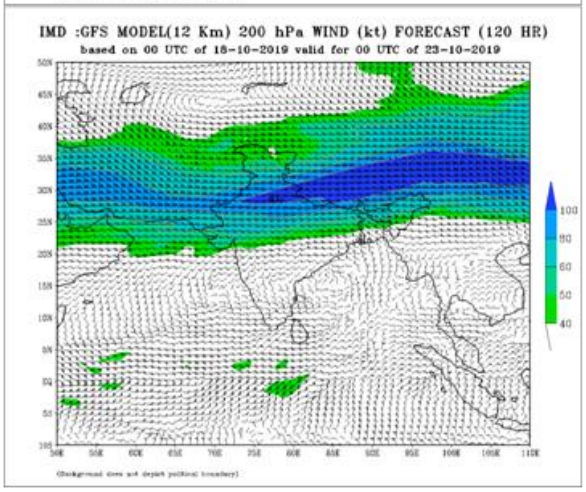
based on 00 UTC of 18-10-2019 valid for 00 UTC of 23-10-2019


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 18-10-2019 valid for 00 UTC of 23-10-2019


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 18-10-2019 valid for 00 UTC of 23-10-2019