



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



FDP (Cyclone) NOC Report Dated 15 October, 2019

Time of Issue: 1200 UTC

Synoptic features:

- The withdrawal line of Southwest Monsoon passes through Lat. 17.5°N/Long. 95.0°E, Lat. 17.5°N/Long. 90.0°E, Tuni, Hanamkonda, Bidar, Solapur, Ratnagiri, Lat. 17.0°N/Long. 70°E, Lat 17.0°N/Long. 65°E and Lat. 17.0°N/Long. 60°E.
- Conditions are becoming favourable for further withdrawal of southwest monsoon from some more parts of central Bay of Bengal, some more parts of south India, remaining parts of west India and some more parts of central Arabian Sea during next 24 hours.
- Thereafter conditions will become favourable for withdrawal of southwest monsoon from the remaining parts of the country and simultaneous commencement of northeast monsoon rains over southeast India during subsequent 48 hours.
- A trough at mean sea level runs from south Sri Lanka coast to eastcentral Arabian Sea off north Kerala coast and extends upto 1.5 km above mean sea level

Dynamical and thermodynamical features

Surface Temperature (SST):

SST is around 29-30°C over most parts of BOB with higher values over most parts of central BOB around 30-31°C.

SST is less than 28°C over most parts of westcentral Arabian Sea and western parts of southwest Arabian Sea. It is around 28-30°C to the east of 63°E.

Tropical Cyclone Heat Potential (TCHP):

TCHP is around 70-90 kJ/cm² over entire BoB, except some pockets in central and south BOB, and north Andaman Sea. It is less than 50 kJ/cm² over extreme northern parts of north Bay of Bengal and along the coastal belt.

TCHP is below 50kJ/cm² over northwest and most parts of westcentral and adjoining southwest Arabian Sea. It is 70-80 kJ/cm² over remaining parts of AS.

Relative Vorticity:

There are no significant zones of relative vorticity at 850 hPa is 50X10⁻⁶s⁻¹ over central BoB and Andaman sea. The vorticity is positive over south and westcentral BoB.

It is positive and around 25X10⁻⁵s⁻¹ over most parts of south AS and also off Saudi Peninsula. It is negative over most parts of north as well as central Arabian Sea.

Convergence:

Lower level convergence is about 10-15 x 10⁻⁵s⁻¹ over southwest BoB off Tamil Nadu coast. An elongated circular area of lower level convergence of 5-10 x 10⁻⁵s⁻¹ lies over central parts of south AS. Another small area with value 5x 10⁻⁵s⁻¹ lies over Maharashtra-Karnataka coasts.

Divergence:

Upper level divergence is circular and is around 10-20x10⁻⁵ s⁻¹ over parts of southwest BoB, off Tamil Nadu coast.

A zone of positive upper level divergence of 5-10x10⁻⁵ s⁻¹ is seen over southeast and adjoining eastcentral Arabian Sea and also over Lakshadweep area. Another circular area of positive

upper level divergence of $10-20 \times 10^{-5} \text{ s}^{-1}$ is seen over westcentral and adjoining southwest 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 eastcentral and south AS and is increasing towards southern and northern parts of AS.

Wind Shear Tendency:

There is decreasing wind shear tendency over Andaman Sea and most parts of BoB except north BOB, where it is positive.

The shear tendency is decreasing over east central AS. It is increasing or neutral over remaining parts of AS.

Upper tropospheric ridge:

The upper tropospheric ridge at 200 hPa runs along 18.0°N over Indian Region.

Satellite observations based on INSAT imagery:

Bay of Bengal & Andaman Sea:-

According to 0900 UTC satellite imagery, scattered low/medium clouds with embedded intense to very intense convection is seen over southwest and westcentral BOB. Scattered low/medium clouds with embedded moderate to intense convection is seen over rest of the BOB and south Andaman Sea.

Arabian Sea:-

According to satellite imagery, scattered low/medium clouds with embedded intense to very intense convection over eastcentral and adjoining south Arabian Sea off Karnataka coast and Comorin Area. Scattered low/medium clouds with embedded moderate to intense convection lies over rest of central and south Arabian Sea.

Large scale features

M.J.O. Index:

MJO index is in Phase 8 with amplitude more than 1. It will continue in same phase with amplitude greater than 1 for next 4-5 days.

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 15th October, 2019 shows formation of a low pressure area over eastcentral Arabian Sea on 18th which becomes a well marked low pressure area on 21st off Maharashtra coast. Thereafter it weakens into a low pressure area on 22nd over the same area and becomes less marked on 24th.

IMD-GEFS

The analysis of IMD-GEFS model charts based on 0000 UTC of 15th October, 2019 shows a low pressure area over Karnataka-Maharashtra coasts, which becomes less marked on 16th. Another low pressure area forms over eastcentral Arabian Sea on 18th, which without much intensification seen over northeast Arabian on 23rd.

IMD-WRF

The WRF model forecasts based on 15/00 analysis shows a low pressure area (LOPAR) over the southeast AS and adjoining Lakshadweep area which is seen as extended low pressure area over eastcentral AS till 18th.

NCMRWF-NCUM: The analysis of model forecast charts based on 0000 UTC of 15th October, 2019 shows a low pressure area on 17th over eastcentral and adjoining southeast Arabian Sea, which moving in a northward direction becomes a well marked low pressure area over eastcentral Arabian Sea on 19th, a depression on 20th, a cyclonic storm on 21st. On 22nd October it is seen close to north Maharashtra-south Gujarat coasts. It weakens into a depression on 23rd over the same area and further into a low pressure area by 25th

NCMRWF-UM-Regional Model: The 00UTC forecast based on 00/15 UTC analysis indicate formation of a low pressure area over SE and adjoining EC Arabian Sea on 18th.

NEPS Model: The analysis of model forecast charts based on 0000 UTC of 15th October, 2019 shows a low pressure area on 15th over eastcentral and adjoining southeast Arabian Sea, which becomes a well marked low pressure area over eastcentral Arabian Sea on 19th, a depression on 20th, a cyclonic storm on 21st. On 22nd October it is seen close to north Maharashtra-south Gujarat coasts. It weakens into a depression on 23rd over the same area and further into a low pressure area by 25th.

ECMWF. : ECMWF forecast do not suggest formation of low pressure systems for the next 10 days.

NCEP-GFS : Model suggests formation of a low pressure area over central Arabian Sea on 21st October, which is seen to meander over the region without much intensification.

ARP-Meteo France ARP: Model indicates a low pressure area over southeast and adjoining eastcentral Arabian Sea on 17th and 18th.

Dynamical statistical models

IMD Genesis Potential Parameter (GPP):

The Genesis Potential Parameter (GPP) analysis and forecasts based on 0000 UTC of 15th October 2019 shows a significant GPP zone developing over southeast Arabian Sea off Karnataka coast, which becomes significant while moving in a nearly northward direction to reach northern parts of eastcentral Arabian Sea on 21st. It becomes less marked on 22nd.

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:

Majority of the numerical models except ECMWF, and NCEP GFS suggest formation of low pressure area (LPA) over southeast and adjoining eastcentral AS on 18th October. NCUM and its ensemble models suggest that the system would concentrate into a depression and move nearly northwards towards south Gujarat- North Maharashtra coast. Further, they indicate the system to intensify into a cyclonic storm on 21st. The genesis potential parameter index developed by IMD also indicate a potential zone for cyclogenesis over southeast & eastcentral AS during 18th -21st October 2019.

Considering the above, the development of a low pressure area over Arabian Sea on 18th and any possible intensification needs to be monitored.

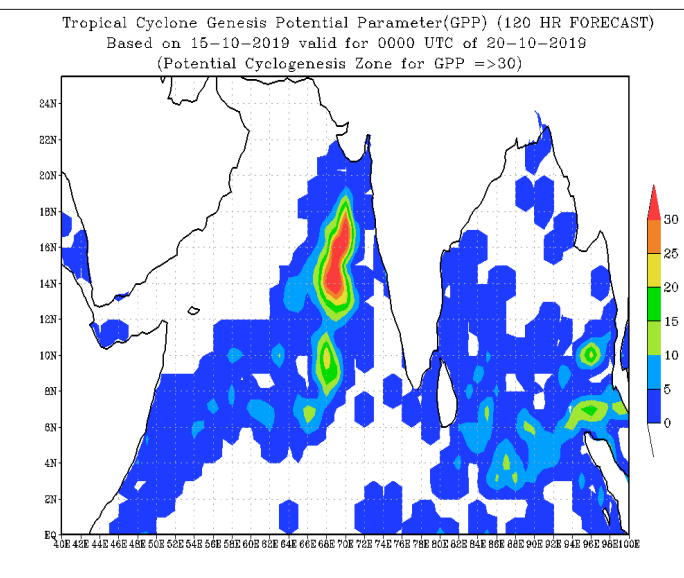
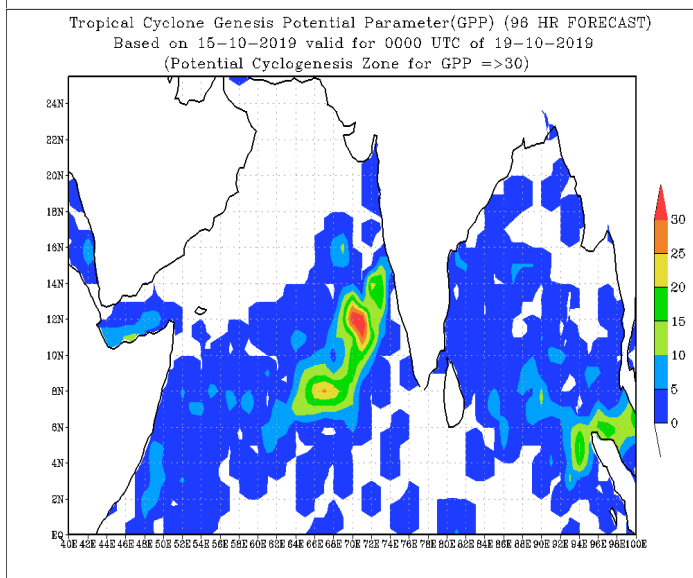
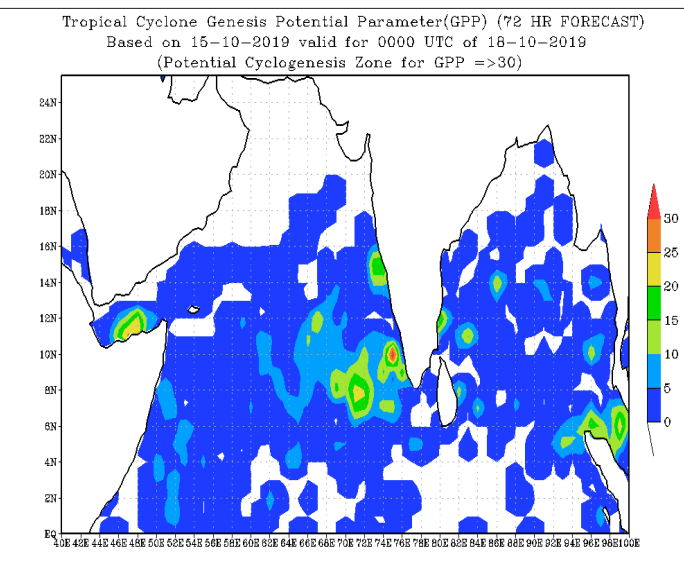
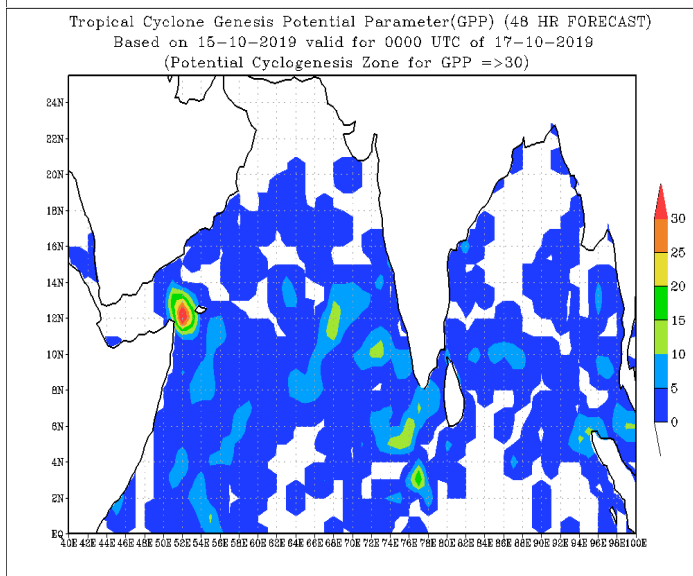
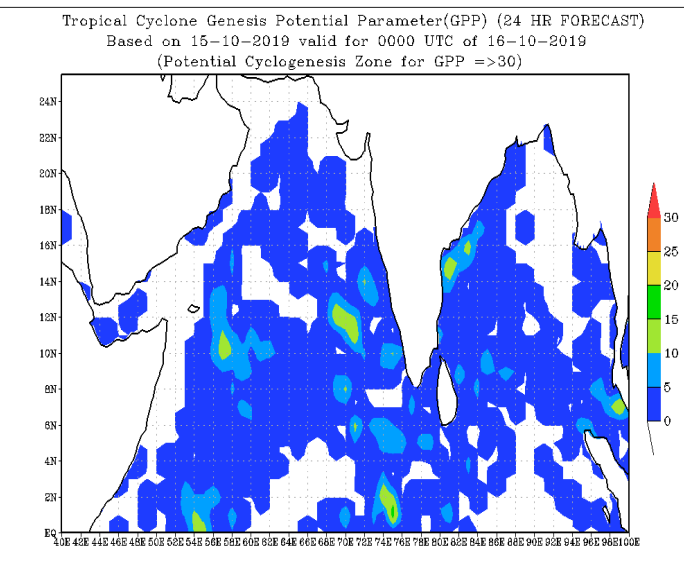
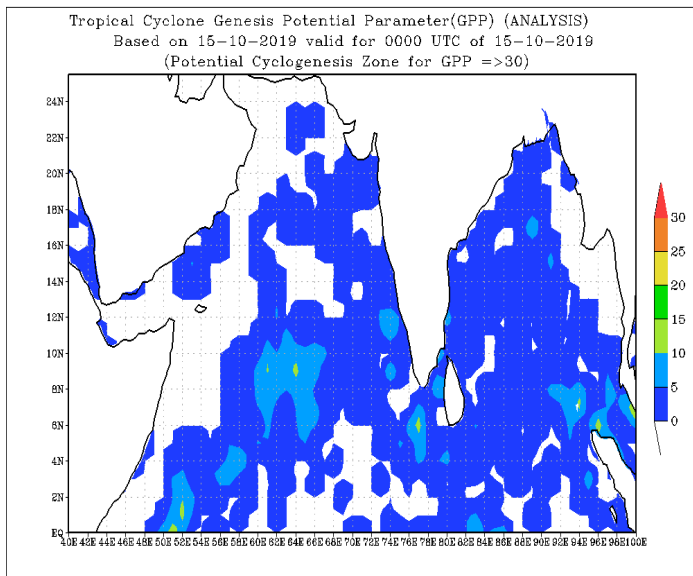
Probability of cyclogenesis over Bay of Bengal and Andaman Sea during next 120 hours:

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

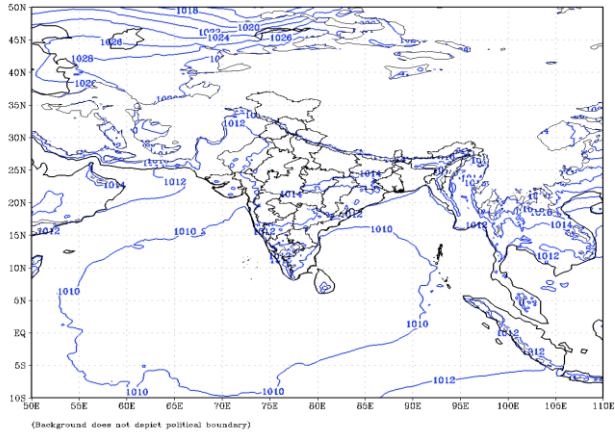
Probability of cyclogenesis over Arabian Sea during next 120 hours:

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

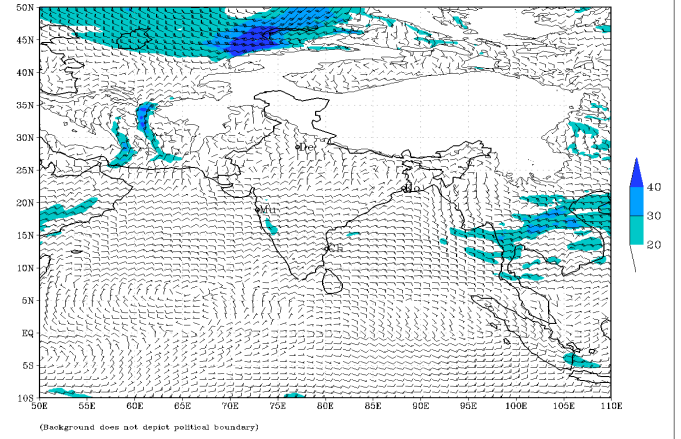
Advisory: No IOP area for the next 5 days.



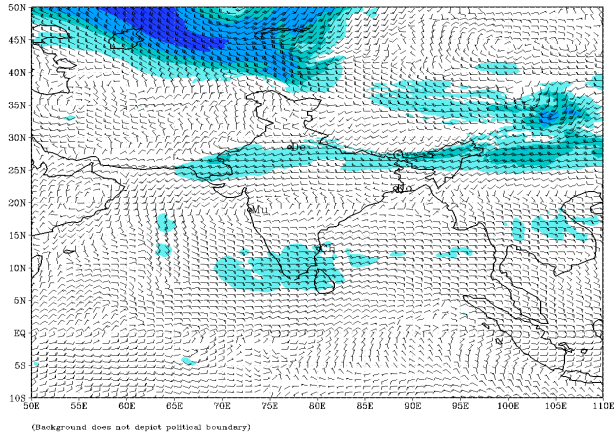
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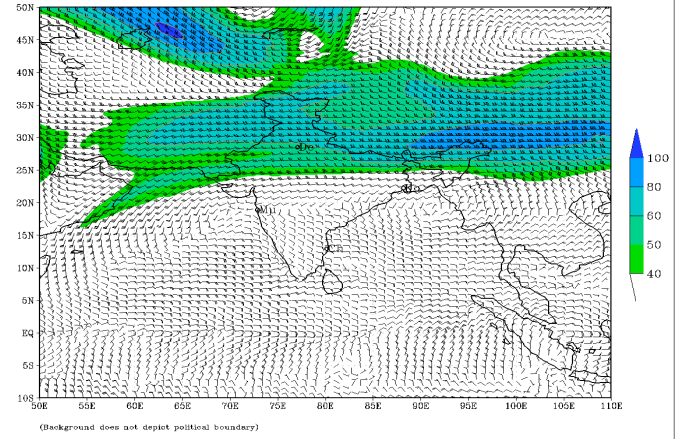
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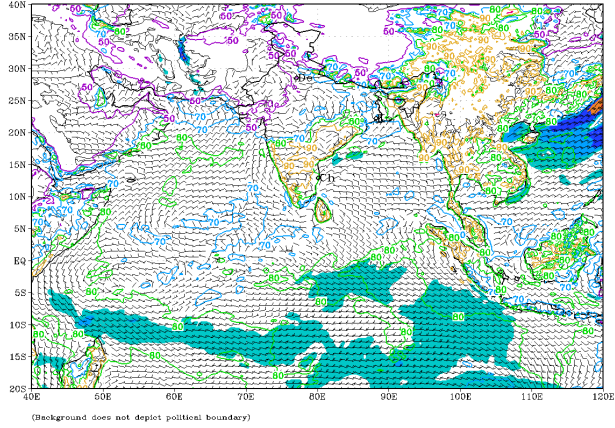
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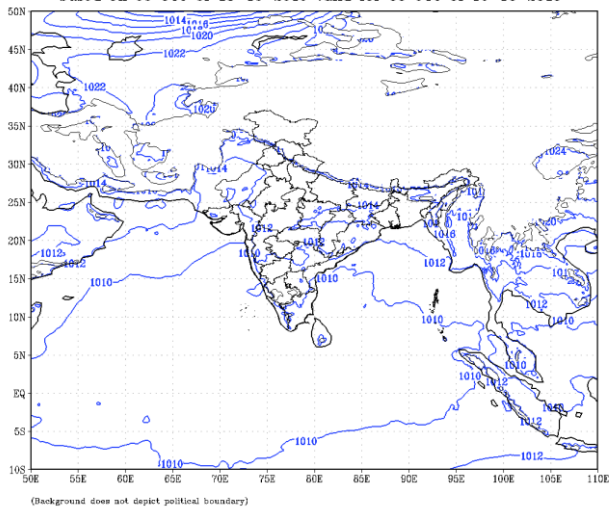
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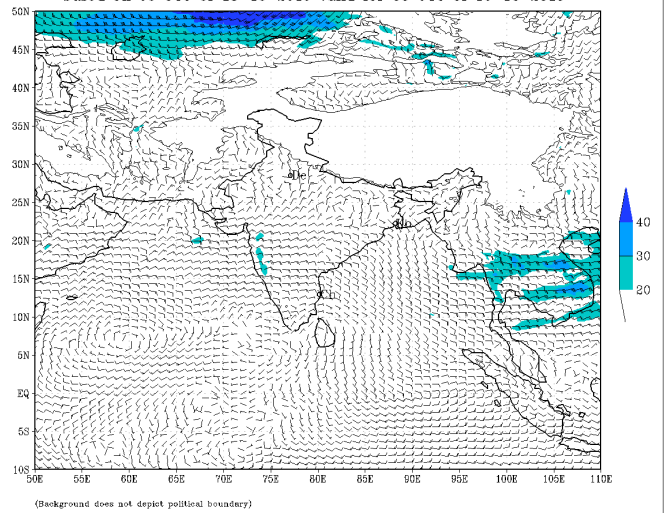
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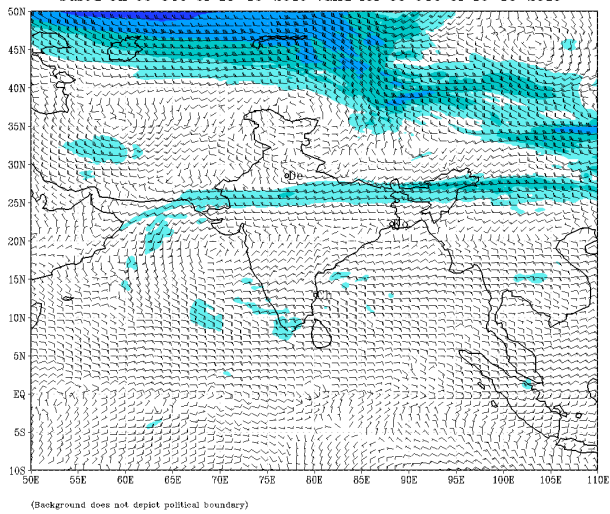
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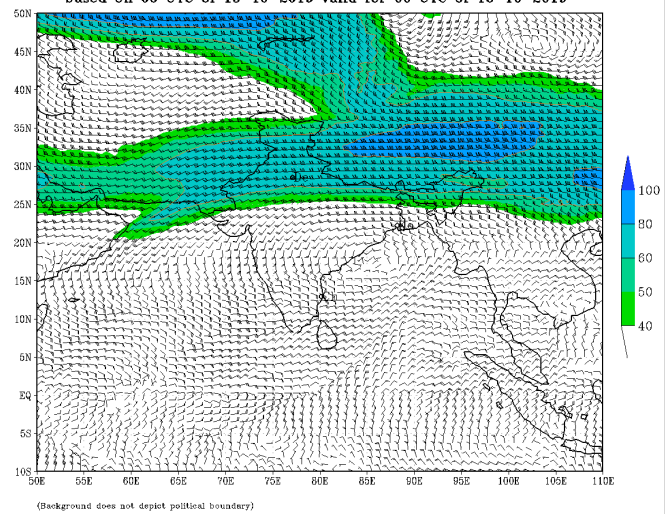
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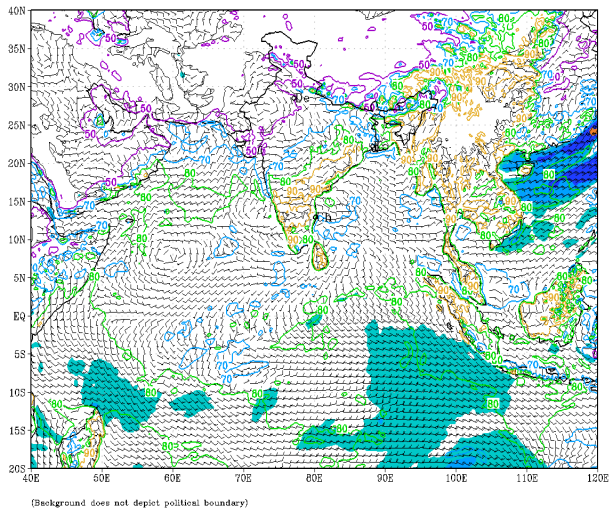
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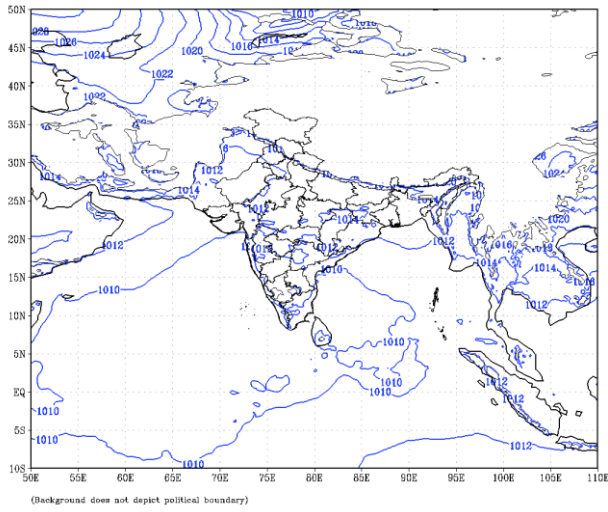
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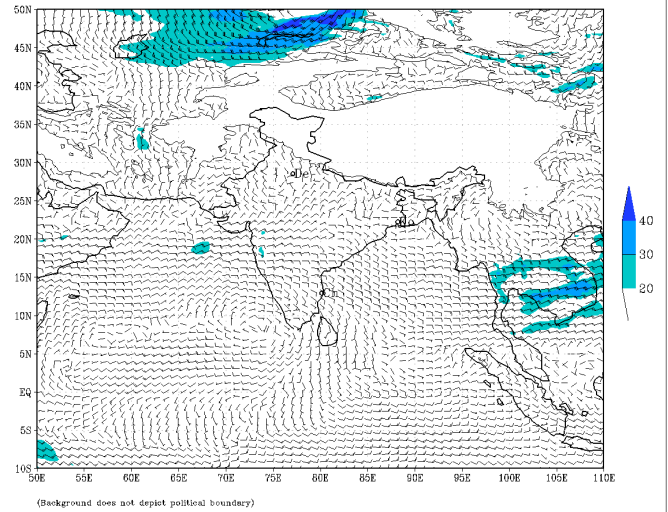
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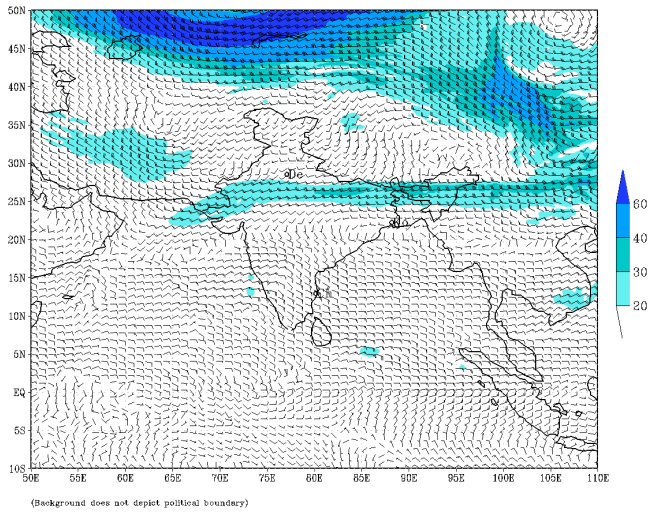
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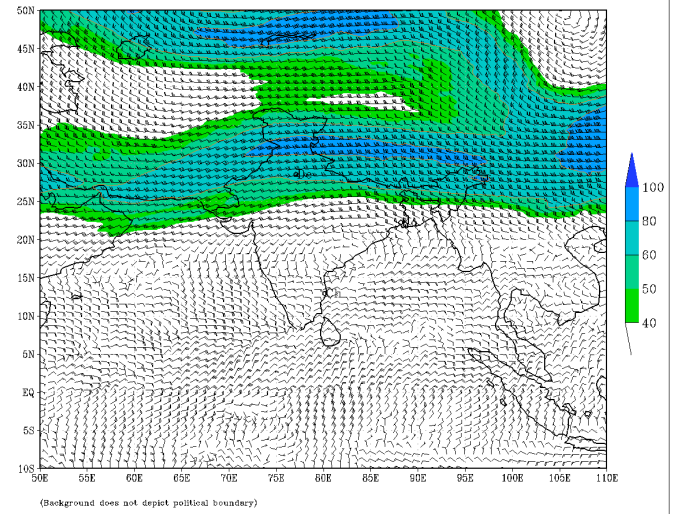
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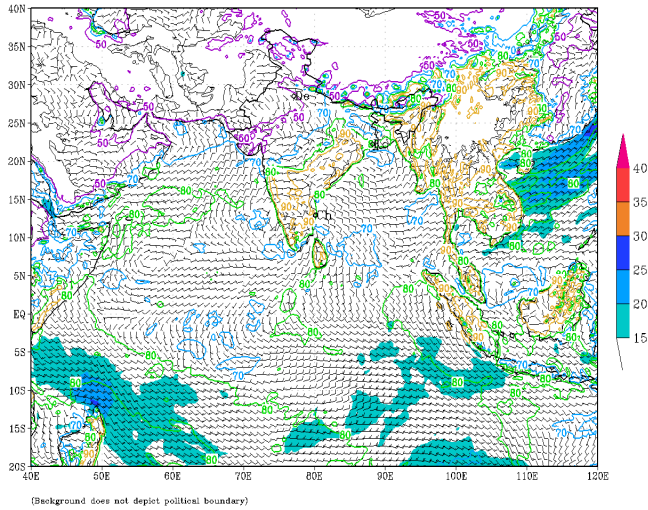
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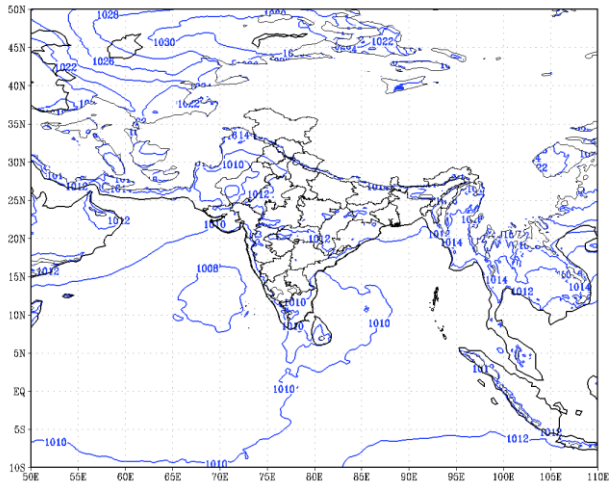
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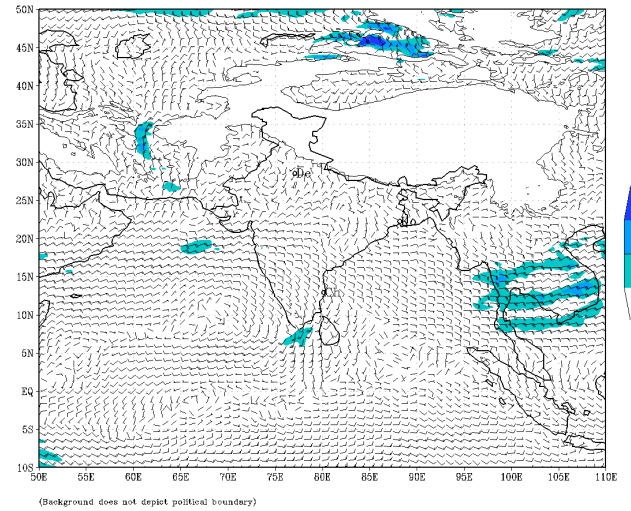
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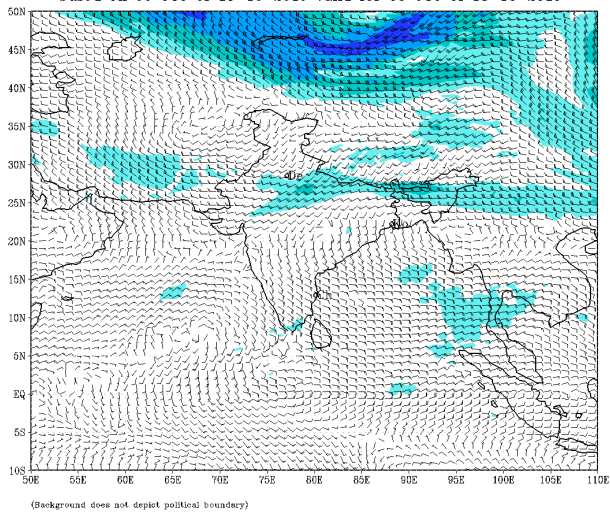
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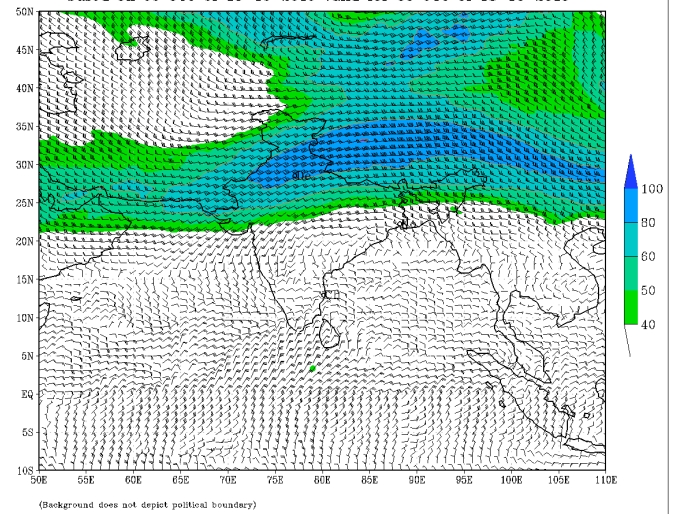
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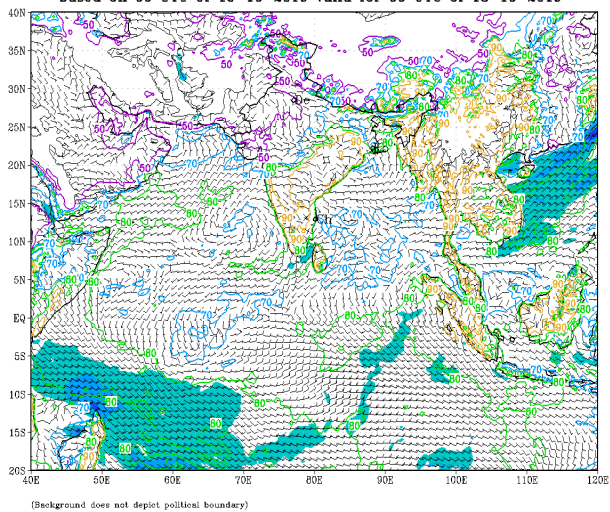
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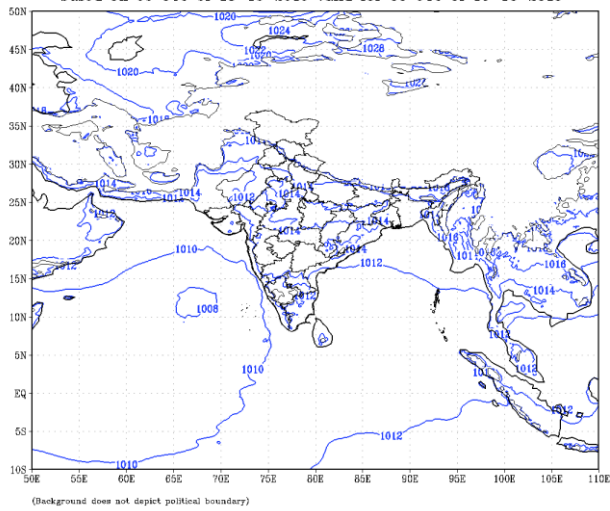
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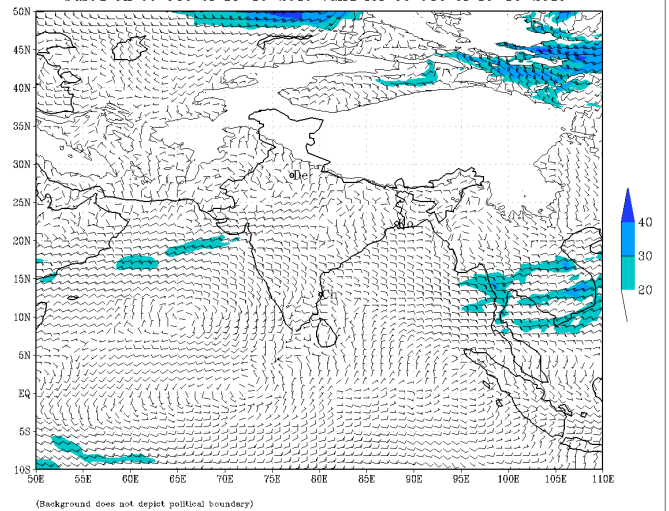
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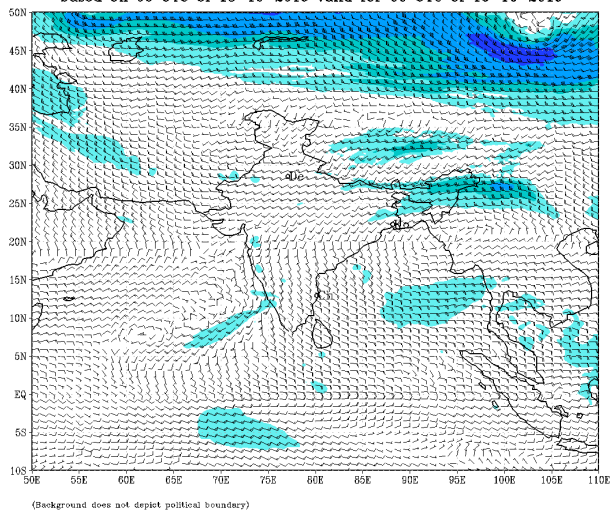
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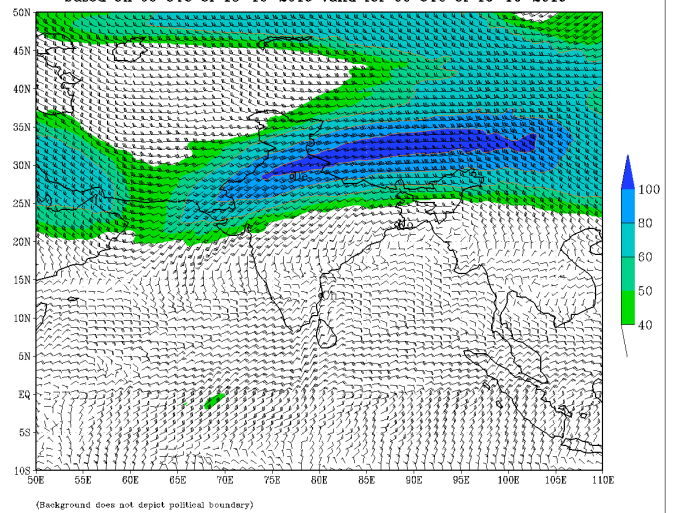
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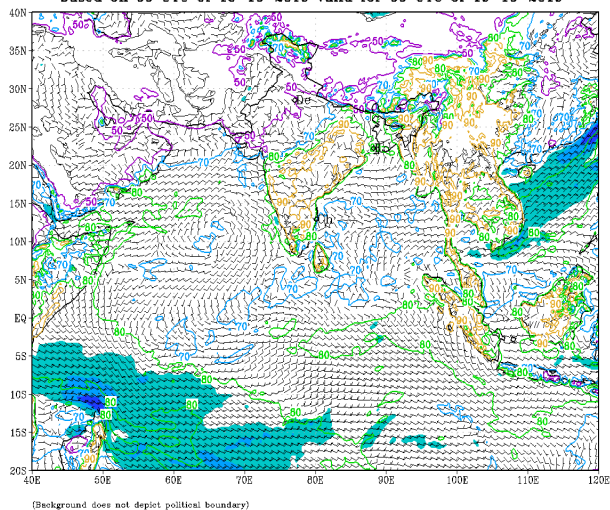
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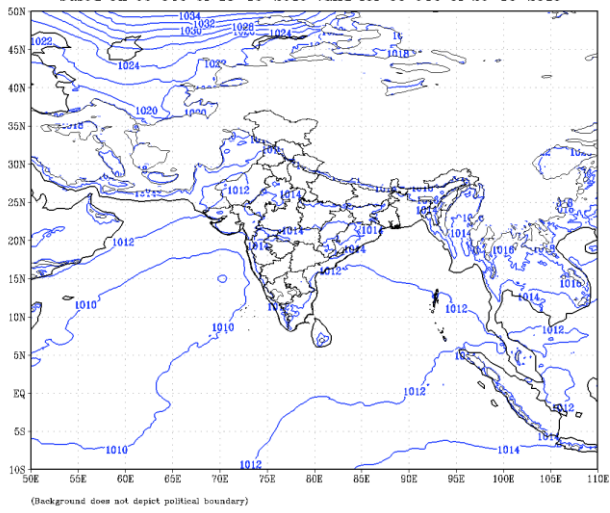
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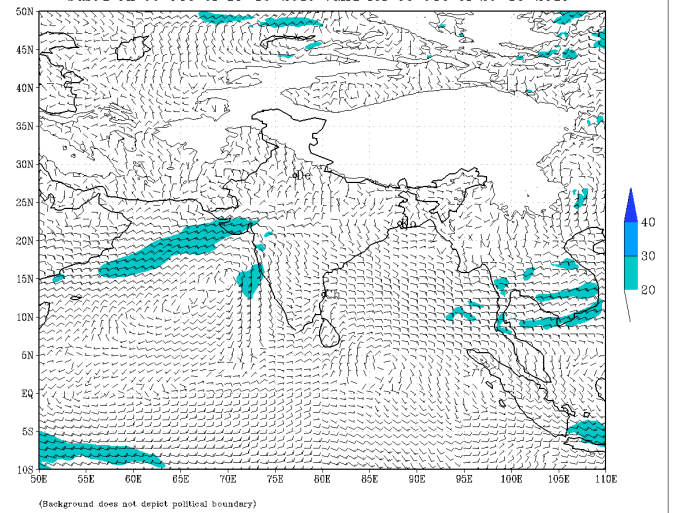
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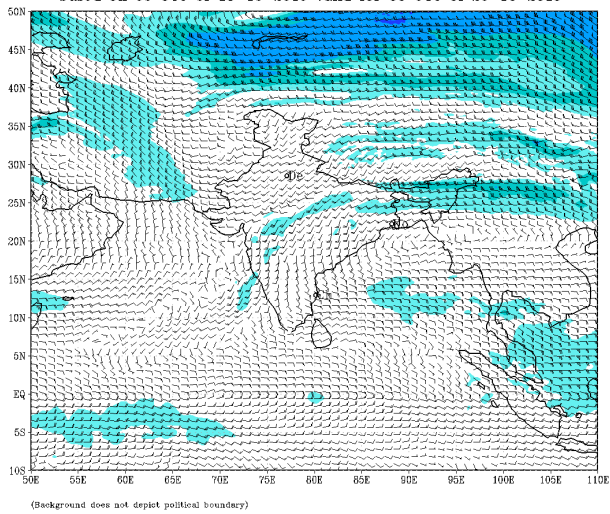
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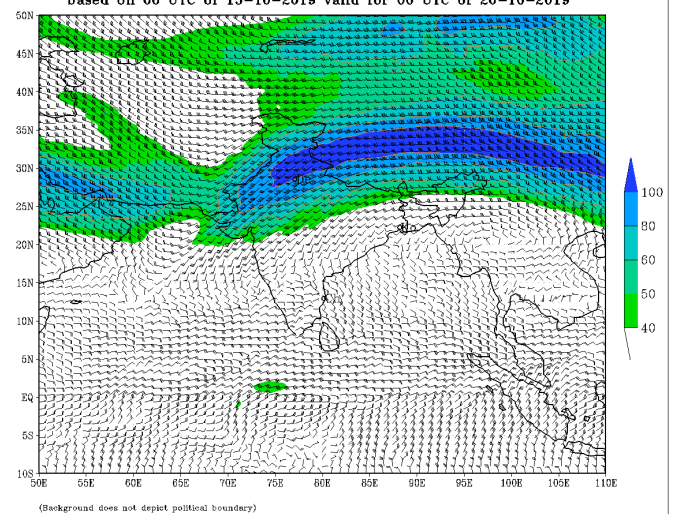
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
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