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

Tropical Cyclone Forecast Programme
Report Dated 28th November, 2022

Time of Issue: 0900 UTC

Synoptic features (based on 0600 UTC analysis):

- Yesterday's cyclonic circulation over southeast Arabian sea and neighbourhood became less marked at 0830 hours IST (0300 UTC) of today, the 28th November, 2022.
- Yesterday's cyclonic circulation over Eastcentral Bay of Bengal & adjoining North Andaman Sea lay over central parts of Bay of Bengal region at 0830 hours IST (0300 UTC) of today, the 28th November, 2022.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	About 28-29°C over the system and major parts of BoB, 29-30°C over southeast BoB and along south Sri Lanka coast, 25-26°C over northwest BoB along West Bengal, Bangladesh and Odisha coast.	About 29-30°C over the southeast AS and adjoining southwest, eastcentral AS, off Karntaka and Kerala coasts, 26-28°C over eastcentral and adjoining north AS, adjoining southwest AS off south Gujarat and Maharashtra coasts, less than 24°C over southwest AS off Oman and Yemen coasts and adjoining sea areas.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	>110 over south Andaman sea & eastcentral BoB, 70-80 over north Andaman Sea, north parts of southwest BoB and adjoining westcentral BoB, off Sri Lanka, north BoB, and less than 40 over westcentral BoB, along and off east coast of India, west coast of SriLanka, Gulf of Mannar, some parts of southwest BoB.	70-90 over southeast and adjoining eastcentral and adjoining southwest AS, Maldives & adjoining EIO, Comorin area and less than 40 over remaining AS and also off west coast of India, Comorin area.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	40-50 over southeast & adjoining eastcentral BoB. 30-40 over westcentral & adjoining southwest BoB.	40-50 over southwest AS & adjoining EIO. 30-40 over southwest parts of AS.
Low Level convergence (X10^{-5} s^{-1})	Small zone of 05 over Gulf of Thailand and another of 05 value over southwest BoB.	Small zone of 05 over central parts of south AS.
Upper Level divergence (X10^{-5} s^{-1})	Small zone of 05 over North Andaman Sea.	Small zone of 05-10 over eastcentral AS & adjoining southwest AS.

Vertical Wind Shear (VWS knots)	05-15 over Andaman Sea and central & adjoining south BoB.	10-20 over Lakshadweep, Comorin area and adjoining areas of southeast AS.
Wind Shear Tendency (knots)	Decreasing over south BoB & adjoining EIO.	Decreasing over most parts of AS.
Upper tropospheric Ridge	Along 15.0°N over the BoB.	Along 12.0°N over the AS.
Trough in westerlies	No significant trough	

Satellite observations based on INSAT imagery (0300 UTC):

a) Over the BoB & Andaman Sea:-

Scattered low and medium clouds with embedded moderate to intense convection lay over northeast & eastcentral Bay of Bengal, Gulf of Martaban and adjoining north Andaman Sea.

b) Over the Arabian Sea:-

Scattered low and medium clouds with embedded moderate to intense convection lay over southeast and adjoining eastcentral Arabian Sea.

M.J.O. Index:

The Madden Julian Oscillation (MJO) Index is currently in Phase 7 with amplitude more than 1. It will continue in same phase for next 2 days with gradually decreasing amplitude. Thereafter, it would move across phases 2, 3, 4 & 5 with gradually increasing amplitude but remaining less than 1.

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

NIL

Model guidance based on 0000 UTC for the next 7 days

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
IMD-GFS	The cyclonic circulation (cycir) over central parts of BoB on 28th, to persist over the same region during next 2 days & less marked thereafter. A Cycir over Gulf of Thailand on 2nd December, to emerge into south Andaman Sea as a low pressure area LPA (8.5N/98E) on 3rd, to move westwards and lie as a depression over South Andaman Sea ((8N/97E) on 4th, to move west-northwestwards and lie as a cyclonic storm (CS) over southeast & adjoining south Andaman Sea (7.5N/93E) on 5th, severe cyclonic storm over southeast BoB (9.8N/84E) on 6th, very severe cyclonic storm over southwest & adjoining westcentral BoB (12.5N/82.0E) on 7th, becoming insignificant over sea on 8th.	No significant system

IMD-GEFS	The cycir over central parts of BoB on 27th, to move slightly northwards, persist over central parts of BoB during next 2 days & less marked thereafter. An extended circulation over Gulf of Thailand on 2nd & 3rd December, to emerge into south Andaman Sea on 4th over south Andaman Sea (8N/99E), intensify into depression over southeast BoB (8N/92E) on 5th, intensify into a CS over southwest BoB (10N/87E) on 6th Dec.	No significant system
GEFS Probablistic guidance	Not available	Not available
IMD WRF	A cycir over central parts of BoB on 28th and 29th and less marked thereafter.	No significant system
NCMRWF-NCUM	Cycir over central parts of BoB on 28th, to persist over same region during next 2 days and less marked thereafter A cycir over Gulf of Thailand (4N/108E) on 2nd Dec, cycir over Gulf of Thailand (4N/104E) on 3rd Dec, to emerge into South Andaman Sea on 4th Dec near 5N/95E, cycir into southeast BoB (6N/91E) on 5th Dec, to move nearly westwards and intensify into a LPA over southwest BoB (7N/85E) on 6th Dec., depression over southwest BoB (8N/83E) on 7th Dec. and depression over southwest BoB near Tamil Nadu (10N/81E).	No significant system
NCMRWF-NEPS	Cycir over central parts of BoB on 28th, to persist over same region during next 2 days and less marked thereafter. A fresh cycir/low pressure area to emerge into South Andaman Sea on 5th Dec., move nearly west-northwestwards and intensify into an LPA over southwest BoB on 6th Dec., continuing to move west-northwestwards as an LPA towards North Tamil Nadu.	No significant system
NCMRWF-UM (Regional)	Cycir over central parts of BoB on 28th, to persist over same region during next 2 days and less marked thereafter A cycir over Gulf of Thailand (4N/108E) on 2nd Dec, cycir over Gulf of Thailand (4N/104E) on 3rd Dec,	No significant system
ECMWF	Cycir over central parts of BoB on 28th to persist over same region during next 2 days and become less marked thereafter. A low pressure area over Gulf of Thailand (8.5N/99.7E) on 4th Dec., to move westwards and emerge into South Andaman Sea as a depression near 9N/95.6E on 5th Dec., cyclonic storm over southeast BoB (10.5N/91.3E) on 6th Dec, severe cyclonic storm over southeast BoB (12.9/87.9) on 7th Dec, over westcentral BoB (13.7N/84.9E) as	No significant system

	severe cyclonic storm on 8th Dec.	
ECMWF ensemble	Likely cyclogenesis over South BoB during 4th-10th Dec. with intensification upto Cyclonic Storm (50-60% probability). 20-30% Enesmle members indicate likely northwestwards movement towards Andhra Pradesh-Tamil Nadu coasts.	No significant system
NCEP-GFS	Cycir over central parts of BoB on 28th to become less marked less marked during next 2 days. LPA over Gulf of Thailand (8.5N/99.7E) on 3rd Dec. & 4th Dec, to emerge into South Andaman Sea as a depression/deep depression (9N/98E) on 5th , cyclonic storm over southeast BoB (11N/93E) on 6th, severe cyclonic storm over southeast BoB near 12N/89E on 7th Dec.	No significant system
IMD MME	Available during cyclonic disturbance period only	Available during cyclonic disturbance period only
IMD HWRF	Available during cyclonic disturbance period only	Available during cyclonic disturbance period only
IMD-Genesis Potential Parameter	No potential zone over Bay of Bengal till 4th December. A significant potential zone over south Andaman Sea on 5th Dec.	No potential zone over Arabian Sea during next 7 days

Summary and conclusion:

- Most of the models are indicating that the cyclonic circulation over southeast Arabian Sea would move west-southwestwards with no significant intensification during subsequent 2-3 days.

- Most of the models are indicating that the existing cyclonic circulation over eastcentral Bay of Bengal would persist over central parts of Bay of Bengal during next 2 days with no significant intensification.

- Most of the models are also indicating likely emergence of another low pressure area/depression (remnant from South China Sea) into Andaman Sea around 5th December with nearly west-northwestwards movement and significant intensification. However, NCUM group of models are indicating likely emergence of cyclonic circulation into Andaman Sea with intensification upto low pressure area/depression only. All models are unanimously indicating intial westwards movement followed by west-northwestwards movement towards southwest & adjoining westcentral BoB.

In view of all the above, it is inferred that
1. For the Bay of Bengal:

The cyclonic circulation over central parts of Bay of Bengal is likely to persist over the same region during next 2 days with no significant intensification.

Another low pressure area/depression (remnant from South China Sea) is likely to emerge into Andaman Sea around 5th December. The movement and intensification of this system need to be monitored critically during 5th-10th December.

Thus, Nil probability is assigned to formation of depression over Bay of Bengal during next 7 days.

2. For the Arabian Sea:

No significant system during next 7 days

Probability of cyclogenesis (formation of depression and above intensity systems) over the BAY OF BENGAL of Bengal and Andaman Sea during next 168 hours

24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

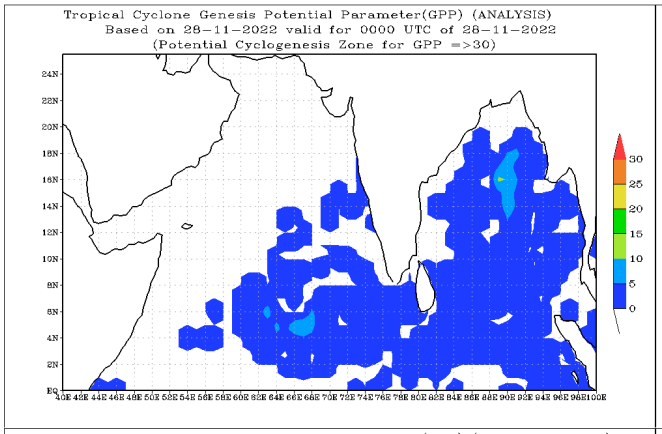
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

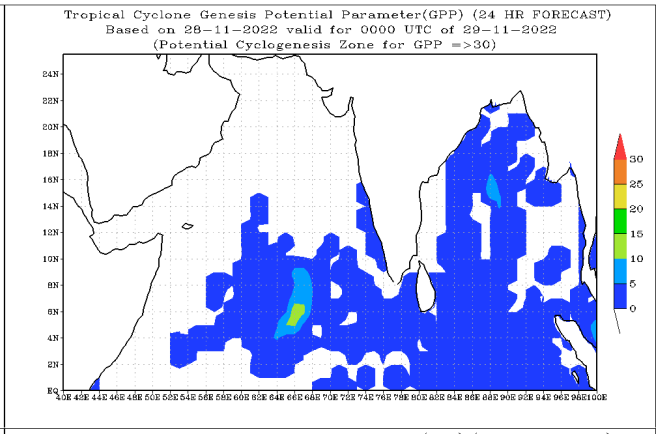
Advisory:

The movement and intensification of low pressure area/depression (remnant from South China Sea) likely to emerge into Andaman Sea around 5th December need to be monitored very critically.

IOP: NIL

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 28-11-2022 valid for 0000 UTC of 28-11-2022
(Potential Cyclogenesis Zone for GPP =>30)


Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
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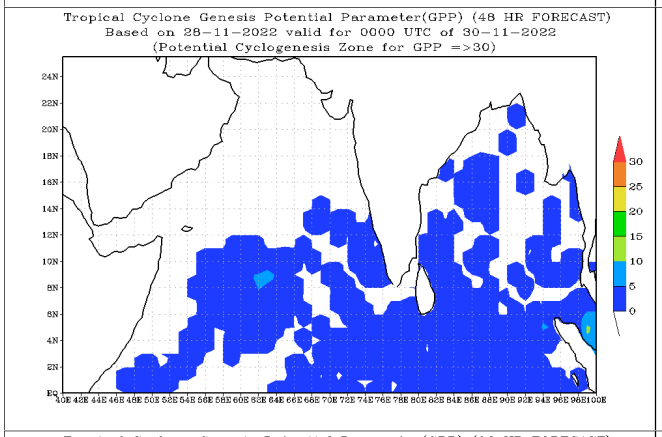
(Potential Cyclogenesis Zone for GPP =>30)


Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
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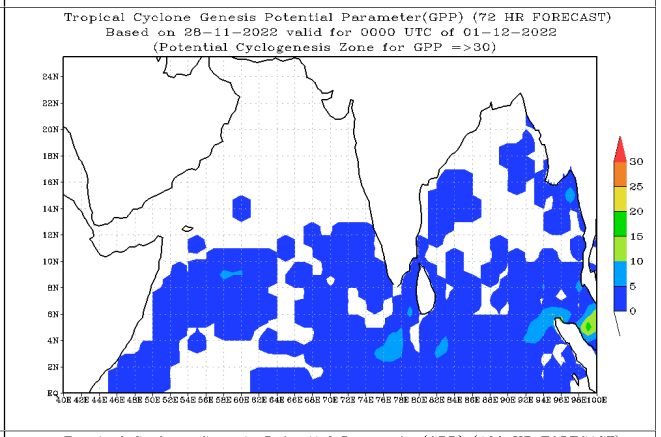
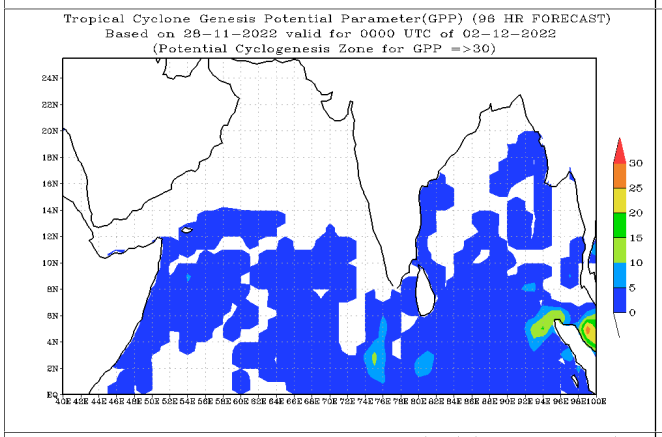

Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 28-11-2022 valid for 0000 UTC of 01-12-2022
(Potential Cyclogenesis Zone for GPP =>30)


Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
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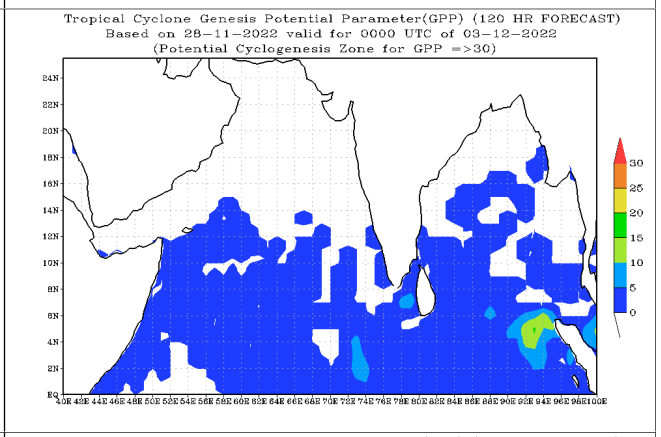
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
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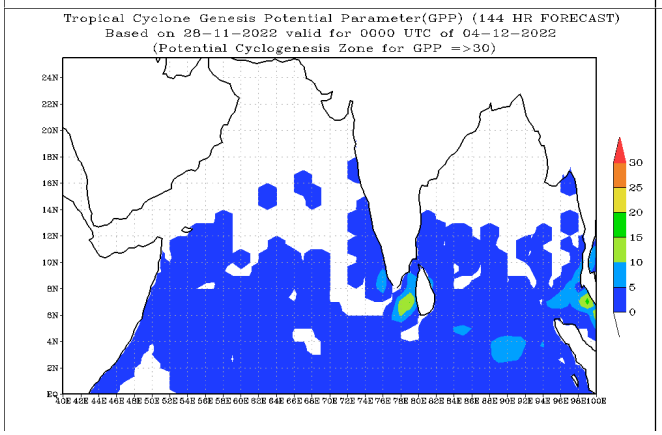
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
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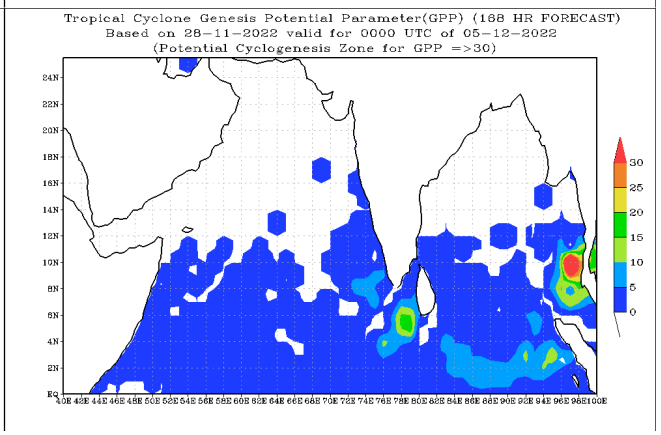
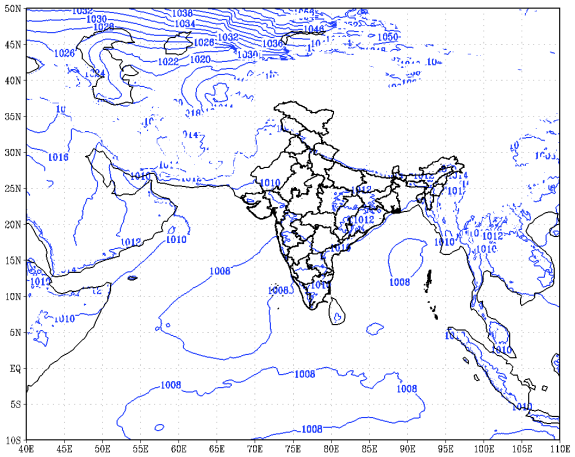

Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 28-11-2022 valid for 0000 UTC of 05-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)

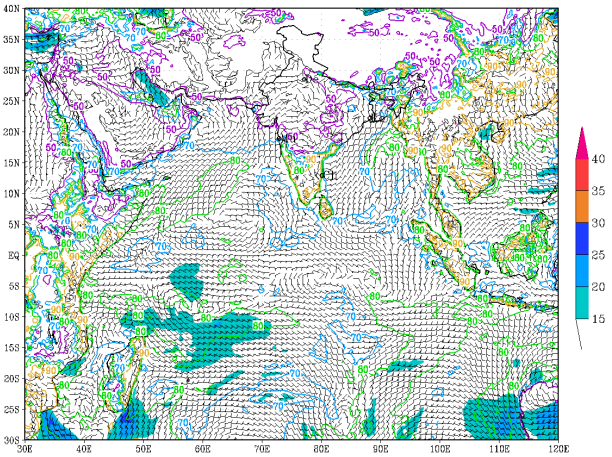
based on 00 UTC of 28-11-2022 valid for 00 UTC of 28-11-2022



(Background does not depict political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)

based on 00 UTC of 28-11-2022 valid for 00 UTC of 28-11-2022



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IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (00 HR)

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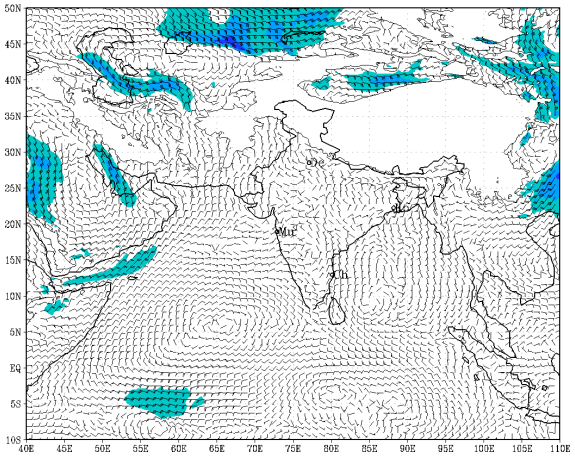

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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (00 HR)

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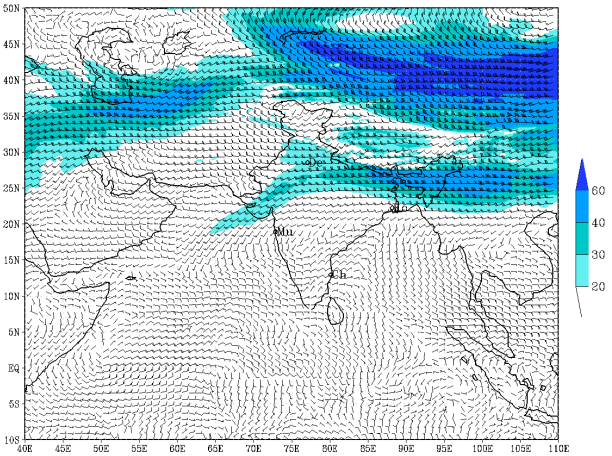

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IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (00 HR)

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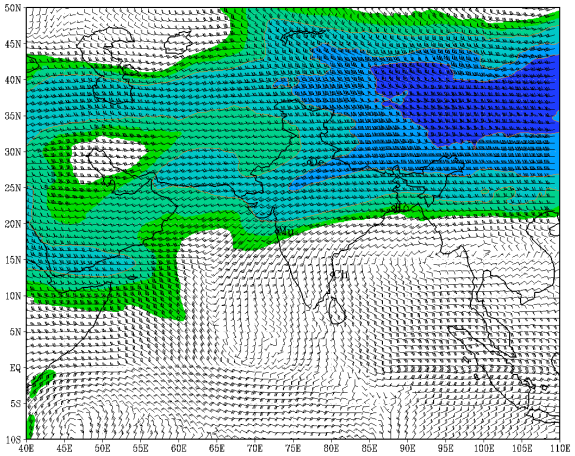

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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)

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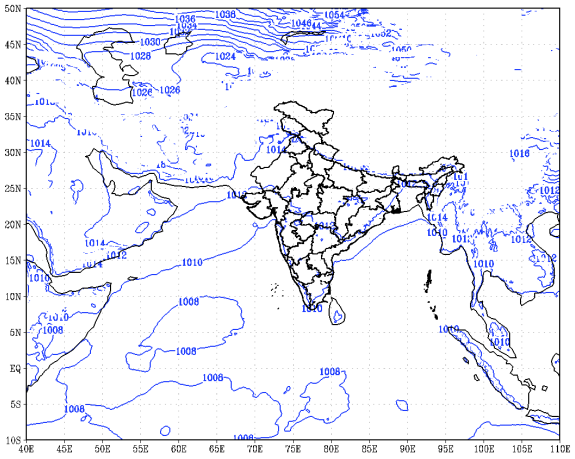

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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)

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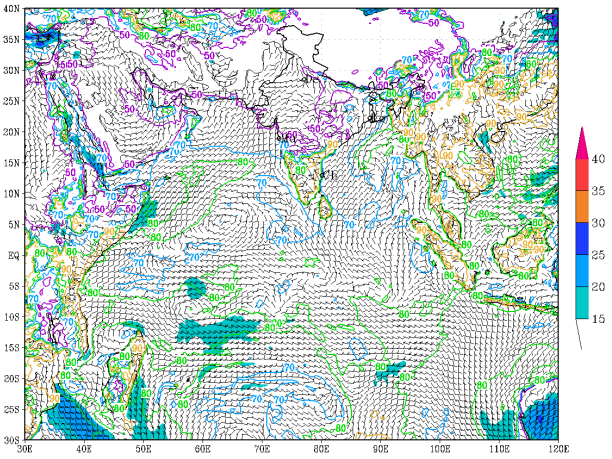

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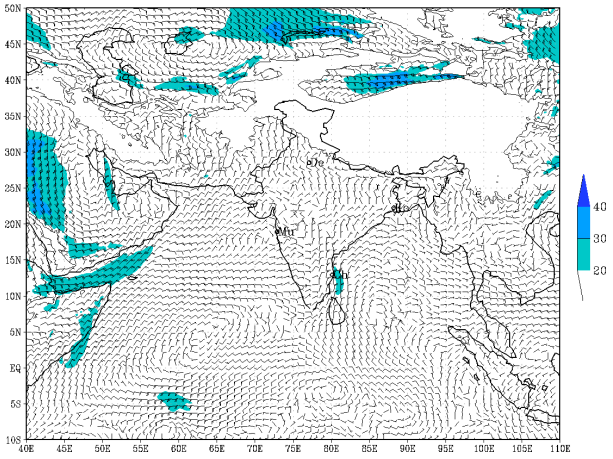

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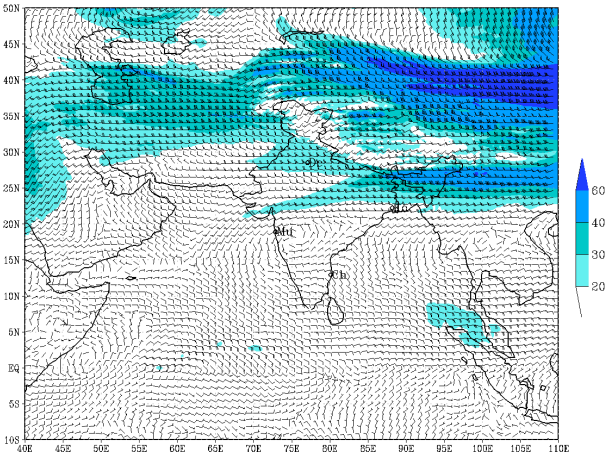

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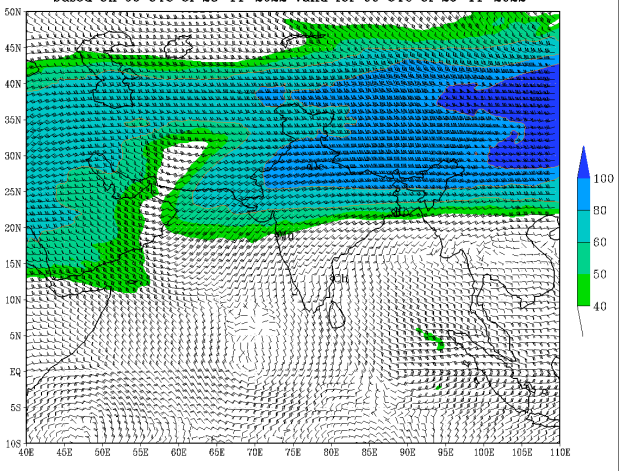

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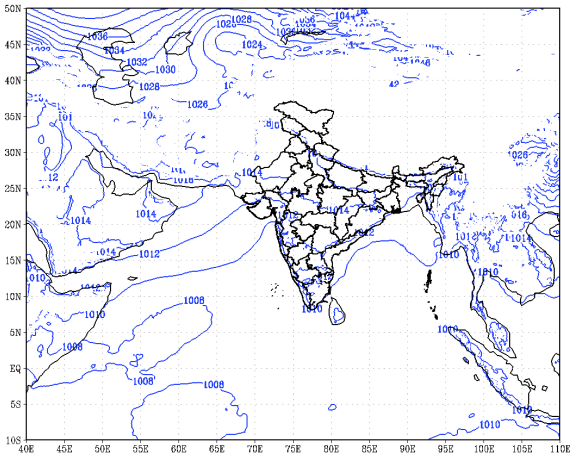
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (48 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 30-11-2022



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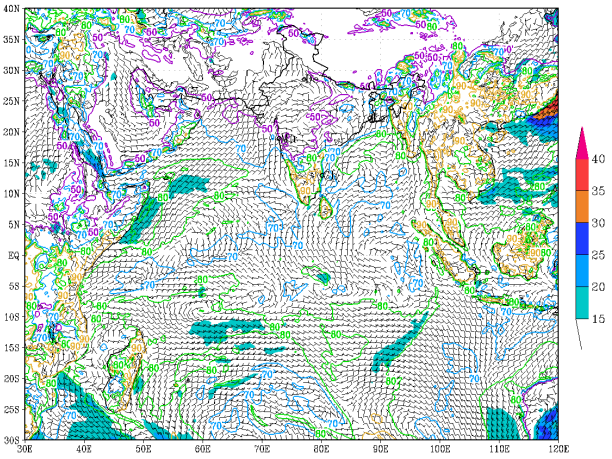
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 30-11-2022



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IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (48 HR)
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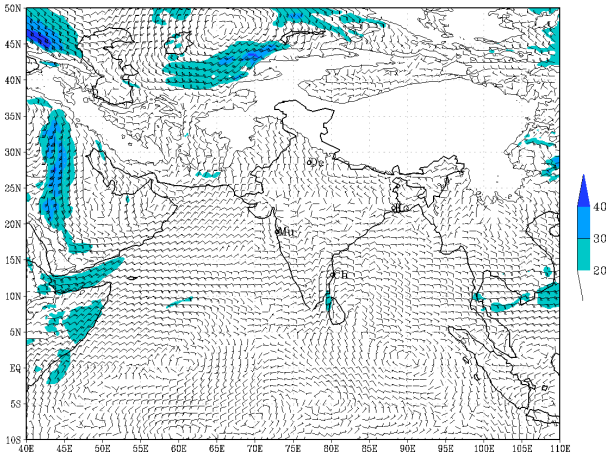

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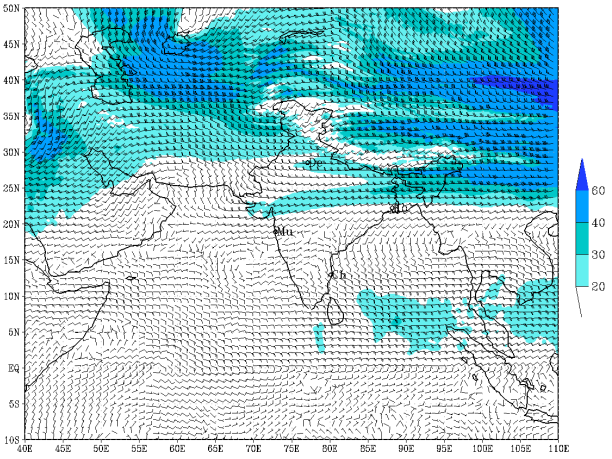

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IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (48 HR)
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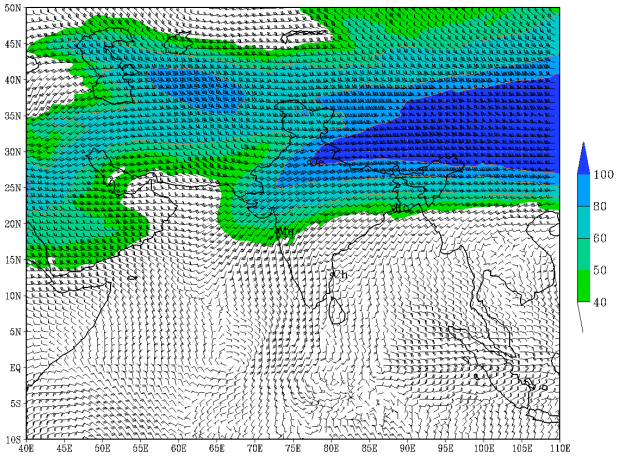

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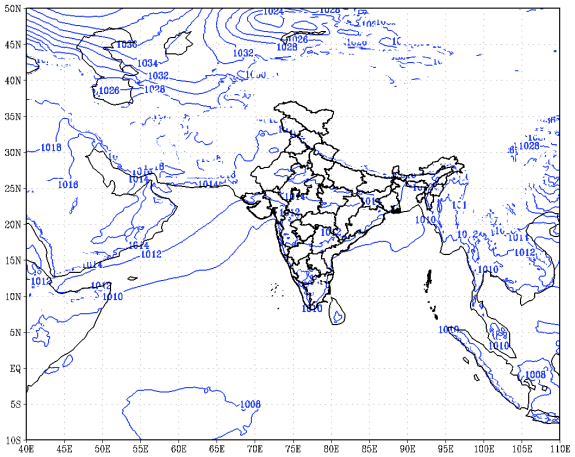
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 01-12-2022



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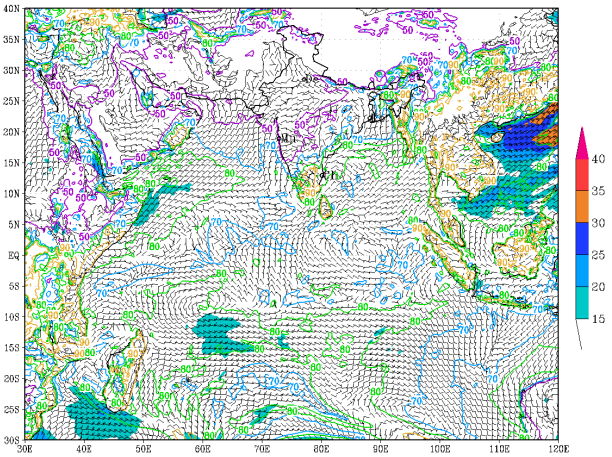
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 01-12-2022



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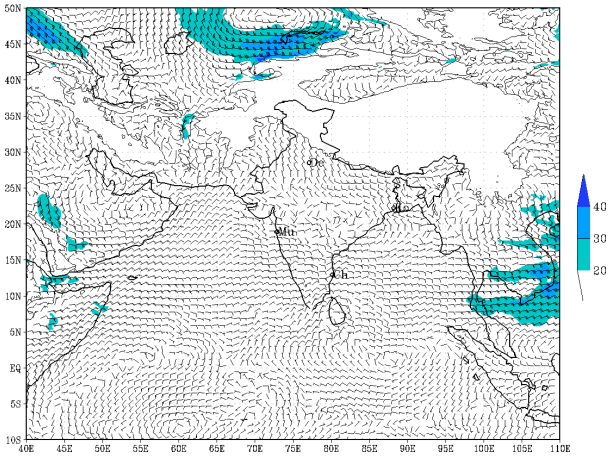
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 01-12-2022



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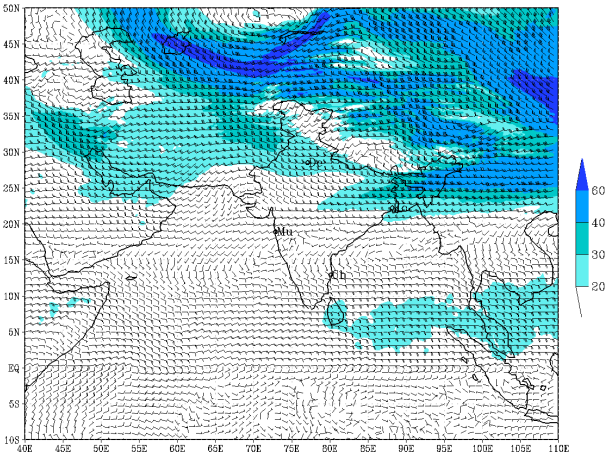

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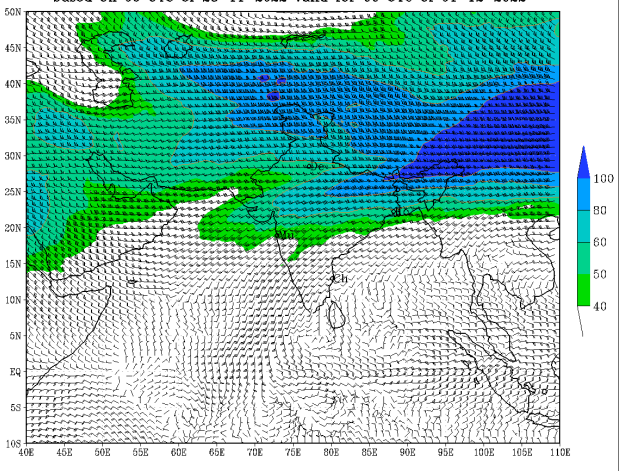

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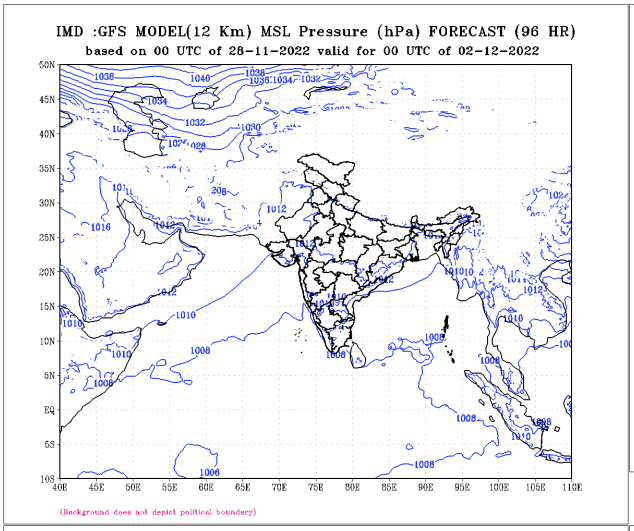
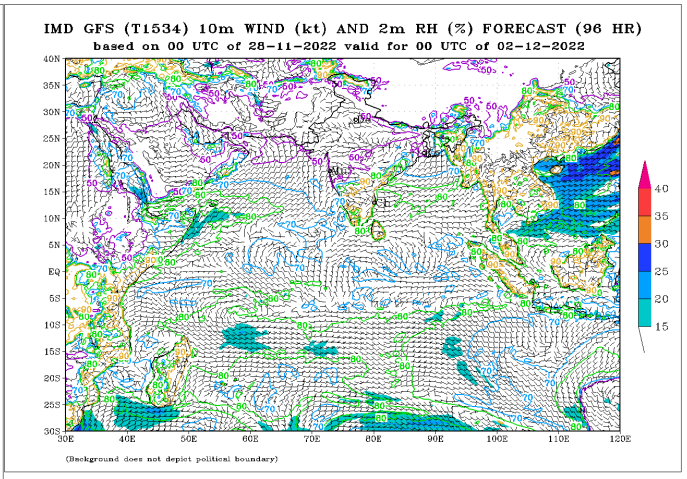
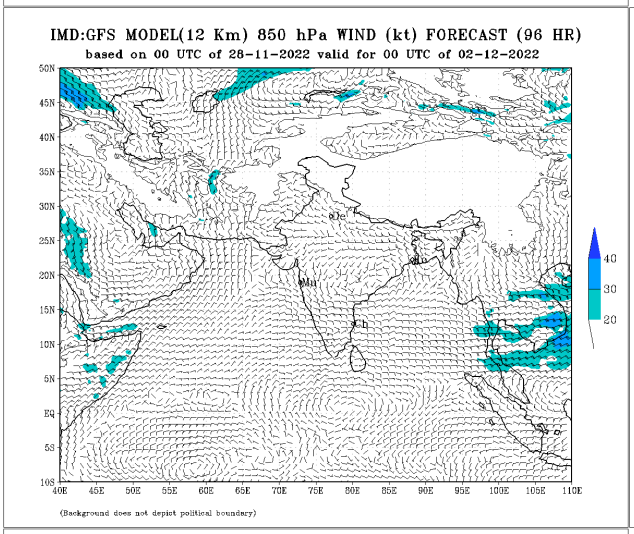
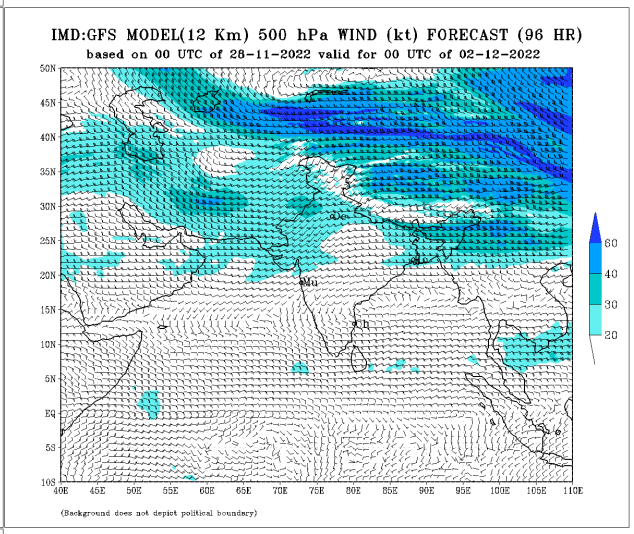
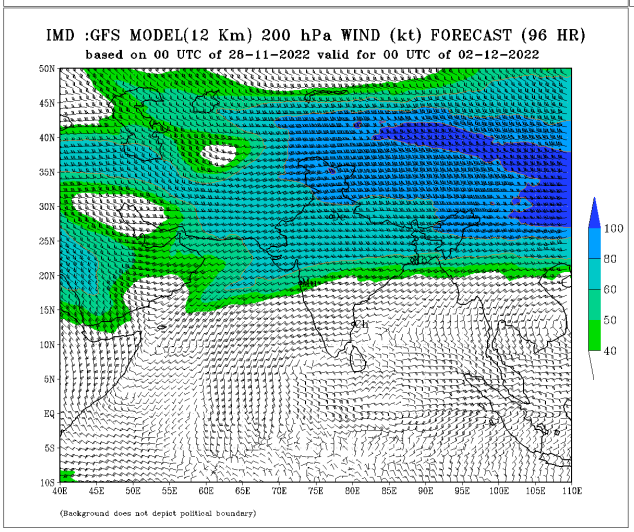
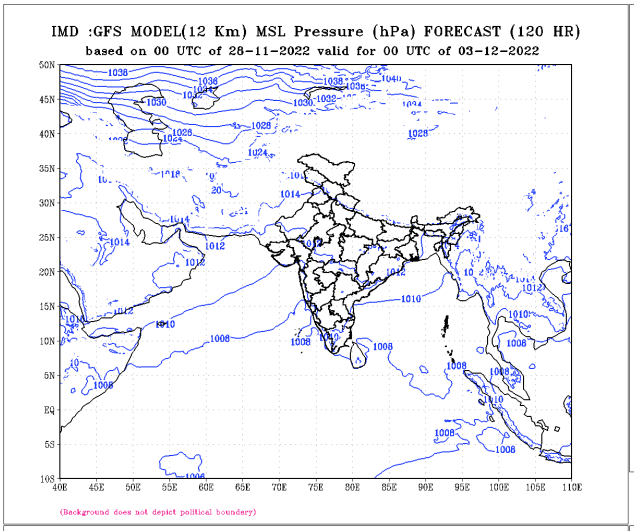

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 02-12-2022
(Background does not depict political boundary)

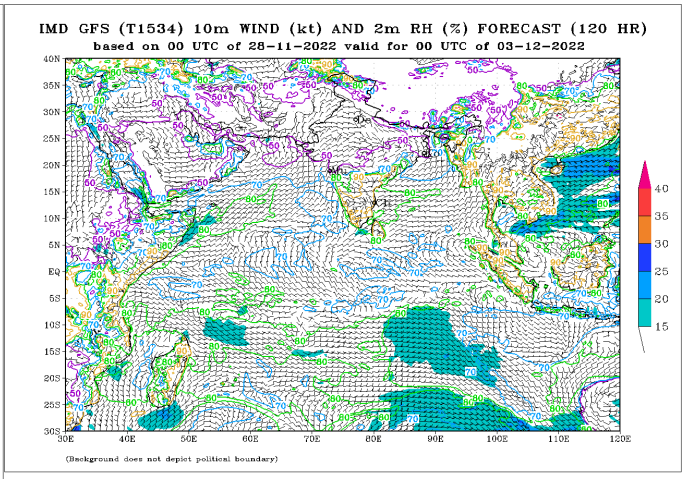

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 02-12-2022
(Background does not depict political boundary)

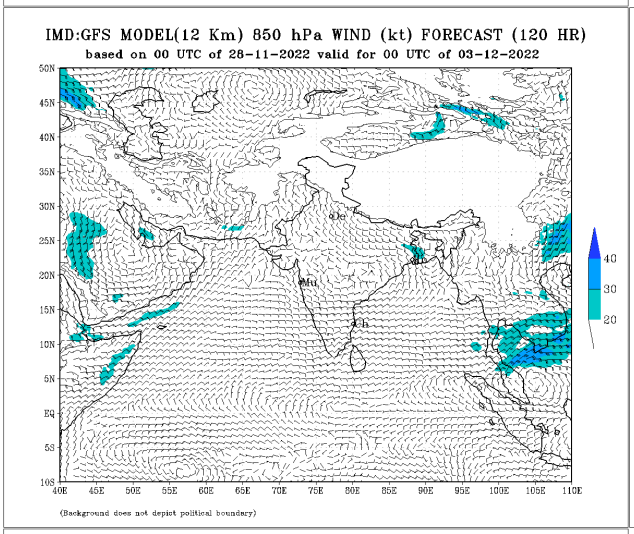

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 02-12-2022
(Background does not depict political boundary)

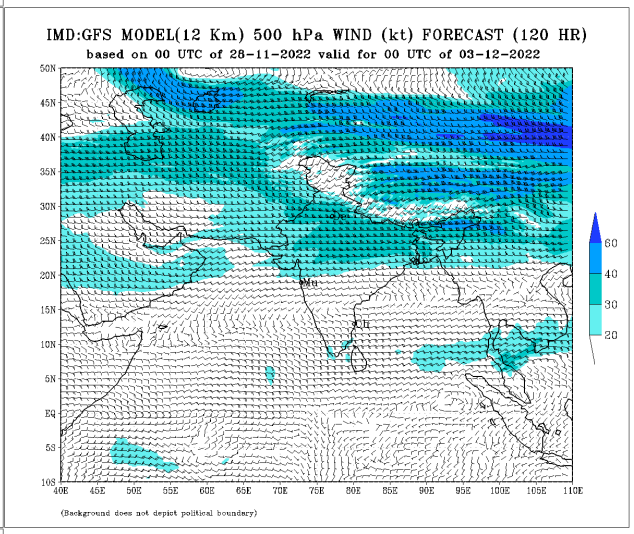

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 02-12-2022
(Background does not depict political boundary)

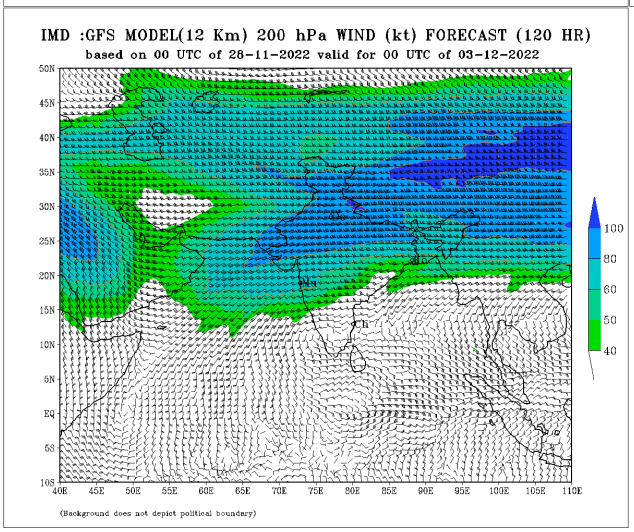

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 02-12-2022
(Background does not depict political boundary)

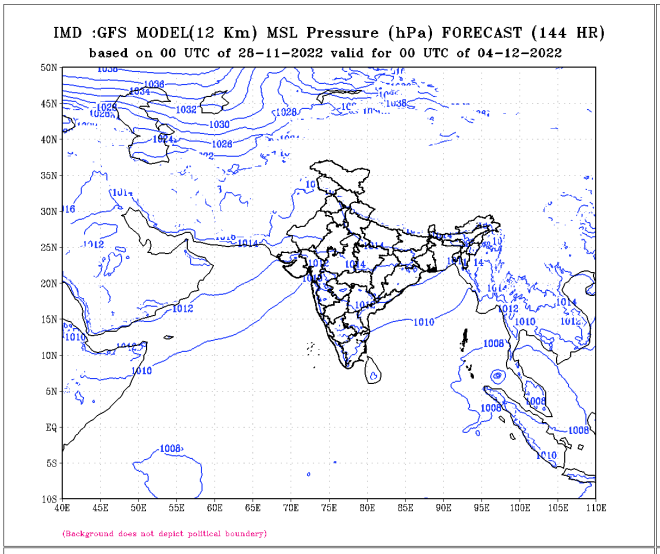

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 03-12-2022
(Background does not depict political boundary)

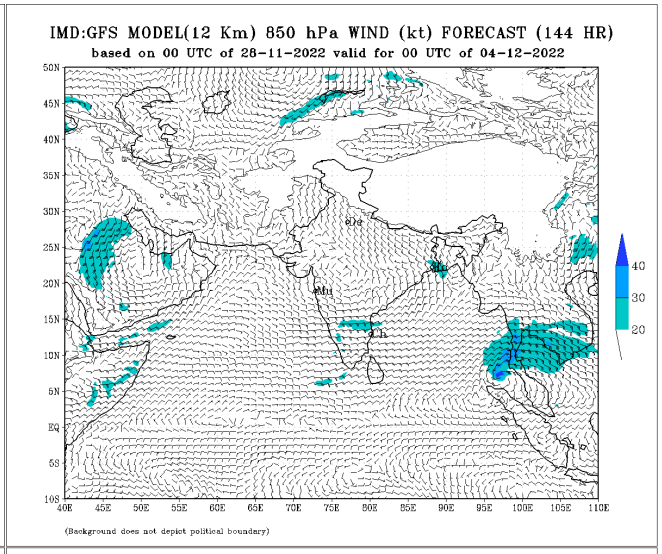

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 03-12-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 03-12-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 03-12-2022
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 03-12-2022
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 04-12-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 04-12-2022
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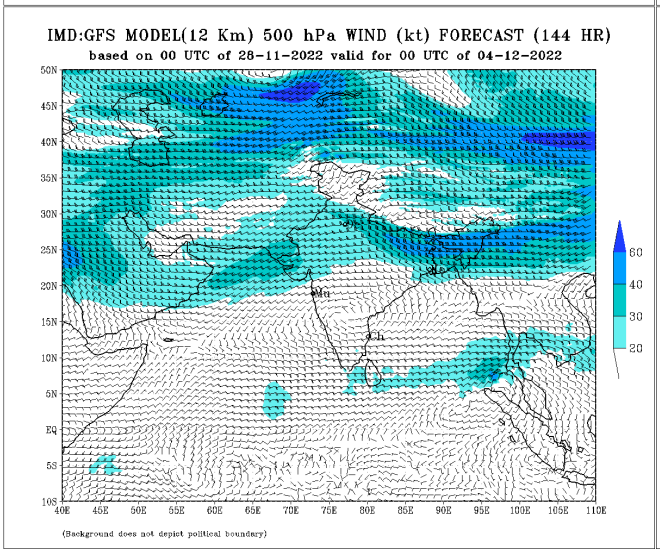
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 04-12-2022
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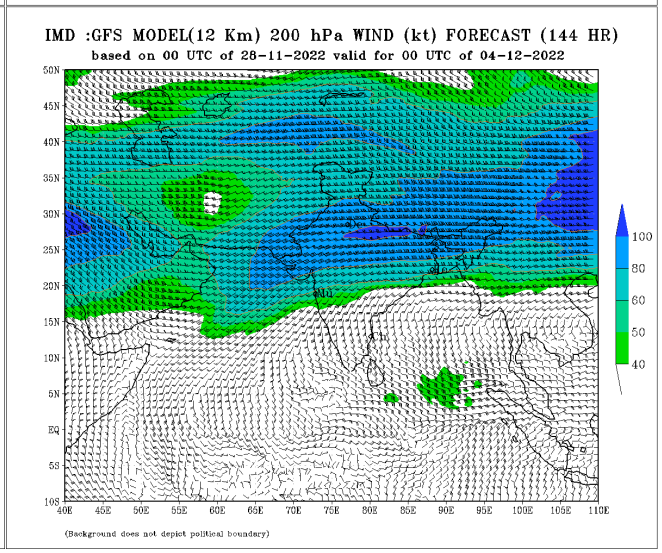
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 04-12-2022
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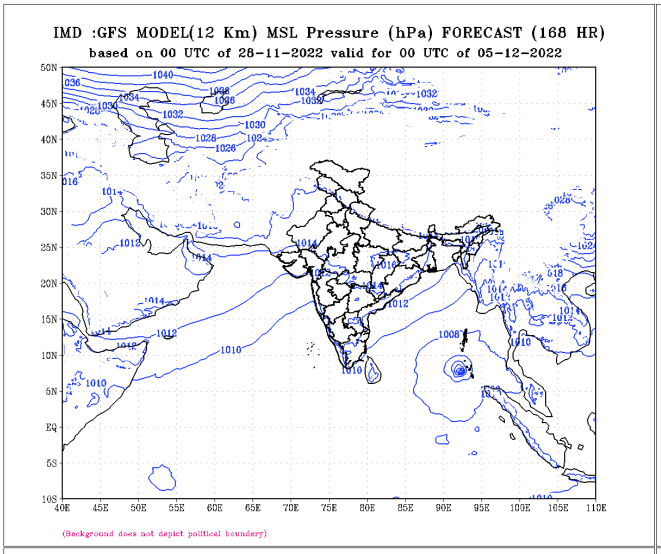
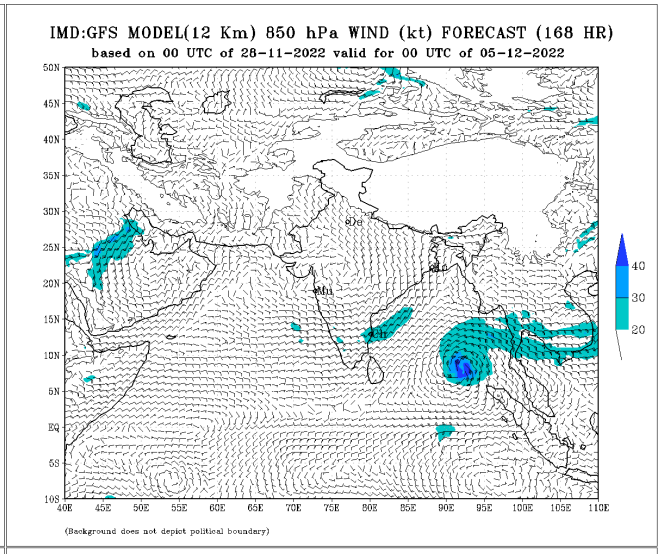
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 05-12-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 05-12-2022
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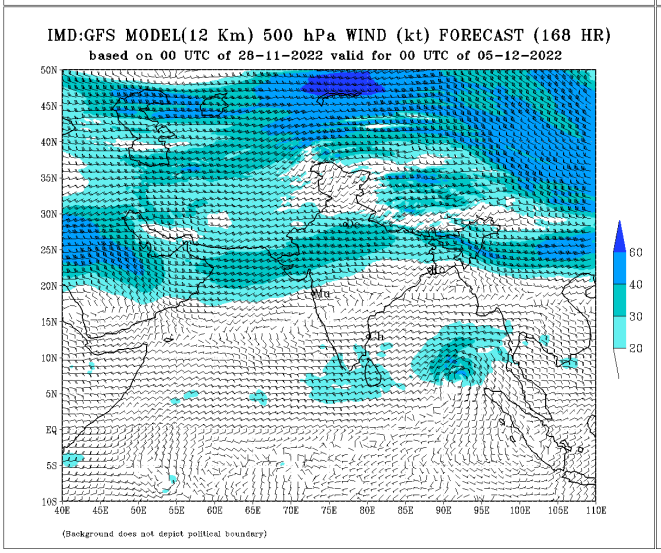
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 05-12-2022
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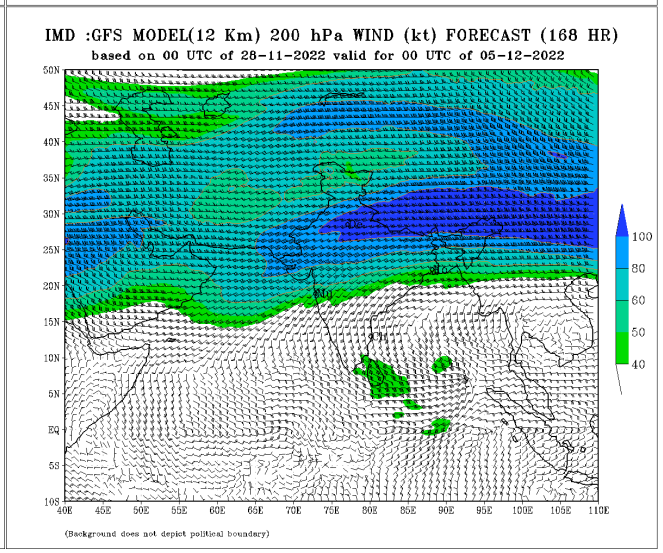
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 28-11-2022 valid for 00 UTC of 05-12-2022
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(Background does not depict political boundary)