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

Tropical Cyclone Forecast Programme
Report Dated 10TH November, 2023

Time of Issue: 1330 UTC

Synoptic features (based on 0300 UTC analysis):

- Yesterdays low pressure area over eastcentral Arabian Sea has become less marked at 0300 UTC of today, the 10th November 2023. However, the associated cyclonic circulation now lies over eastcentral & adjoining southeast Arabian Sea extending upto 3.1 km above mean sea level.
- The cyclonic circulation over Comorin area persists and now extends upto 0.9 km above mean sea level.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	29-31ºC over major parts of BoB, South Andaman Sea, Gulf of Mannar, 26-28ºC over parts of southwest BoB.	29-31ºC over southeast, adjoining southwest and adjoining eastcentral AS, north AS, along and off south Gujarat, Maharashtra coasts, 26-28ºC over central, adjoining north AS, southwest AS, along and off Kerala and Karnataka coasts. Less than 24 along and off Yemen-Oman & Somalia coasts and adjoining sea areas.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	100-120 over eastcentral BoB adjoining southeast BoB and adjoining southwest BoB. 100 over Gulf of Mannar and Comorin area, 80-90 over parts of westcentral BoB and Andaman Sea,	100-110 over southeast and adjoining eastcentral AS, adjoining westcentral AS, less than 50 over westcentral, southwest and north AS, north parts of eastcentral AS.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	20- 30 over northeast BoB along and off Myanmar coast. 10-20 over parts of south and central BoB, Gulf of Mannar.	30-40 over westcentral and adjoining eastcentral AS & 10-20 over adjoining areas, around 20 over parts of northeast AS, 10-20 over parts of southwest and westcentral AS & Comorin Area.
Low Level convergence (X10^{-5} s^{-1})	5 over parts of southwest BoB, -5 over along and off north Odisha and West Bengal coasts	-5 over parts of southeast AS, Comorin area, north AS.

Upper Level divergence ($X10^{-5}$ s^{-1})	5-10 over EIO adjoining to southwest BoB and Comorin area, 5 over Comorin area and south Andaman Sea. -5 to -10 over along and off north Andhra Pradesh coast.	-5 over parts of southeast and southwest AS, parts of westcentral AS, 10-20 over along and off Somalia coast.
Vertical Wind Shear (VWS knots) **Low: 05-10 knots** **Moderate: 10-20 knots** **High: >20 knots**	5-10 over south and adjoining central BoB, Andaman Sea, 20 over central BoB, High (>20 knots) over remaining parts of BoB.	5-15 over southeast and adjoining southwest, central BoB, 20 over south part of central AS and adjoining southwest AS, High (>20 knots) over remaining parts of AS.
Wind Shear Tendency (knots)	Increasing over south BoB & adjoining Andaman Sea. Decreasing over north BoB.	Decreasing over southeast, eastcentral AS, increasing over remaining parts of AS.
Upper Tropospheric Ridge	Along 15^{o}N over BoB.	Along 12^{o}N over AS.

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the BoB & Andaman Sea:-
Scattered low/med clouds with embedded isolated to moderate to intense convection over south BoB south of lat 12.0N, central and adjoining south Andaman islands.
(b) Over the Arabian Sea:-
Scattered low/med clouds with embedded isolated intense to very intense convection over east parts of eastcentral AS, adj Goa and north Karnataka coasts and southwest AS. Scattered low/med clouds with embedded moderate to intense convection over southeast AS and Comorin area.
(c) Convection outside India:-
Scattered Low And Medium Clouds With Embedded Moderate To Intense Convection lay Over Palk Strait, Gulf Of Mannar, Maldives, Yellow Sea and adjoining East China Sea, Extreme South Myanmar, Thailand, Gulf Of Thailand, Cambodia, Sumatra, Strait Of Malacca, Malaysia, Borneo, South China Sea, Java Islands & Sea, Celebes Islands & Sea, Philippines, Sulu Sea and Over Indian Ocean Between Latitude 5.0N To 7.0S East Of Longitude 74.0E And Between Latitude 2.5.0S To 10.0S Longitude 57.0E To 64.0E.

M.J.O. Index:
MJO index is currently in Phase 6 with amplitude less than 1 & it will remain there for next 1 days with amplitude less than 1. It will be in phase 7 with amplitude of 1 on 12th November & will remain there till 13th November. It will be in phase 8 on 14th November with amplitude greater than 1.

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

Input for FDP Cyclone based on 0000 UTC for the next 7 days

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
IMD-GFS	A cycir over westcentral and adjoining southwest BoB, off south Andhra Pradesh coast on day 6, slightly moves northwestward and lay over the westcentral BoB as a cycir/LPA on day 7.	No significant system.
IMD-GEFS	No significant system.	No significant system.
IMD-WRF	An extended cycir over southern part of southwest and adjoining southeast BoB on day 2, it moves northwestward and lay over southwest BoB off Sri Lanka coast as a cycir/LPA on day 3.	An extended cycir over northeast AS on day 3.
NCMRWF-NCUM	An extended cycir over westcentral and adjoining southwest BoB, off south Andhra Pradesh and adjoining Tamil Nadu coasts on day 6, slightly moves northeastward and lay over the westcentral BoB on day 7 without further intensification.	No significant system.
NCMRWF-NEPS	An extended cycir over westcentral and adjoining southwest BoB, off south Andhra Pradesh and adjoining Tamil Nadu coasts on day 6, slightly moves northeastward and lay over the westcentral BoB on day 7 without further intensification.	No significant system.
NCMRWF-UM (Regional)	-	No significant system.
ECMWF	A cycir over southeast BoB on day 4, having its northwestward movement and lay over eastcentral and adjoining westcentral BoB on day 5 as LPA, it moves northwestward and lay over westcentral BoB on day 6 as LPA, then it will start moving northeastward and lay over westcentral BoB as Deepression on day 7, weaken thereafter.	No significant system.
NCEP-GFS	A cycir over southeast BoB on day 4, having its northwestward movement and lay over eastcentral and adjoining westcentral BoB on day 5 as LPA, it moves northwestward and lay over westcentral BoB on day 6 as Depression, then it will start moving northeastward and lay	No significant system.

	over northwest and adjoining westcentral BoB as DD/CS on day 7.	
IMD-Genesis Potential Parameter	A potential zone over south Andaman Sea an adjoining southeast BoB on day 3; it lay over southeast BoB on day 4; over westcentral and adjoining eastcentral BoB on day 5; over northwest and adjoining westcentral BoB on day 6, over northeast BoB on day 7.	No potential zone over AS for next 7 days.

Summary and conclusion:

1. **For Bay of Bengal**:

The various models, including IMD-GFS, IMD-WRF, NCUM (Global and Ensemble), ECMWF, and NCEP-GFS are showing variations in predictions for the development and movement of a cyclonic disturbance over the south Bay of Bengal (BoB). IMD-GFS is indicating a low pressure area (LPA) over southwest BoB on 15th November with westnorthwestward movement and lay over westcentral and adjoining southwest BoB off South Andhra Pradesh coast on 18th November 00 UTC as a low without any intensification. IMD-WRF is indicating an extended cyclonic circulation (cycir) over southern part of southwest and adjoining southeast BoB on 11th November. It would move northwestward and lie over southwest BoB off Sri Lanka coast as a cycir on 12th November. NCUM-Global and NEPS models are indicating an extended cycir over westcentral and adjoining southwest BoB, off south Andhra Pradesh and adjoining Tamil Nadu coasts on 15th November without showing an intensification during subsequent 48 hr. ECMWF & NCEP-GFS models are indicating a cycir over southeast BoB 13th November with northwestward movement, it would lie over eastcentral and adjoining westcentral BoB on 14th November as LPA and its intensification into depression on 16th November over westcentral BoB. Then onward ECMWF model is indicating further northwestward movement and weakening into LPA in the subsequent 24 hours. However, NCEP-GFS is showing northeastward movement after 16th November with further intensification into deep depression/cyclonic storm over westcentral BoB on 17th November.

It can be inferred that many models agree on the development of LPA over the south BoB except IMD-GEFS. Several models, including IMD-GFS, IMD-WRF, and ECMWF are indicating the initial northwestward movement of the system till 15th November and the formation of LPA on 15th November. There is a low probability for the intensification of the system subsequently into depression by 17th November, 2023.

Probability of Cyclogenesis (formation of depression and above intensity systems) over Bay 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**	**LOW**

2. For the Arabian Sea:

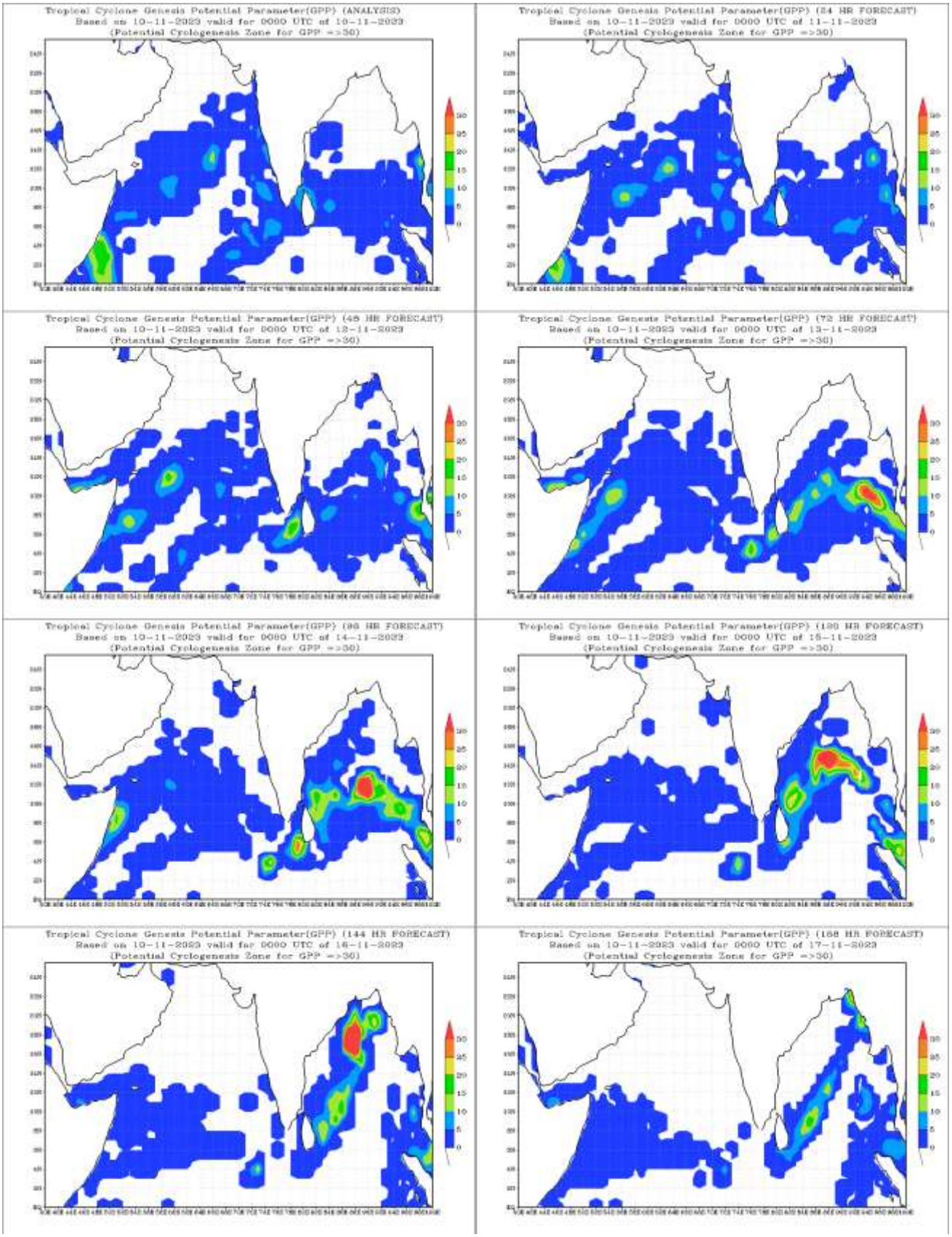
Most of the models are indicating that there will be no significant system for the next seven days.

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**

IOP: Nil

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 10-11-2023 valid for 0000 UTC of 10-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 10-11-2023 valid for 0000 UTC of 11-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 10-11-2023 valid for 0000 UTC of 12-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
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(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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(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
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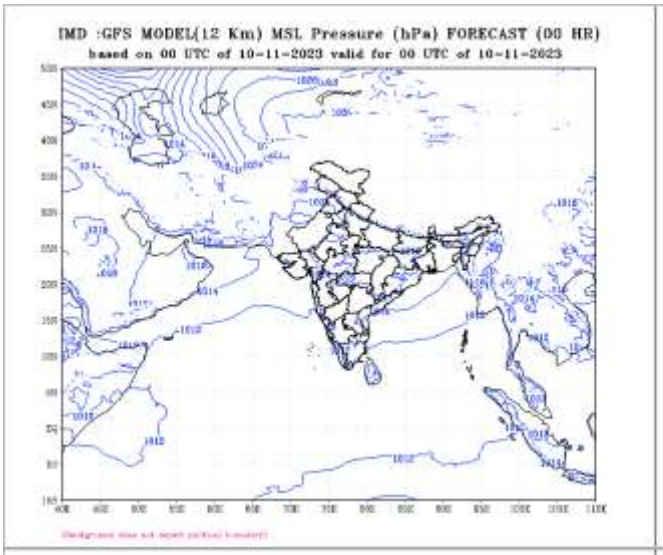
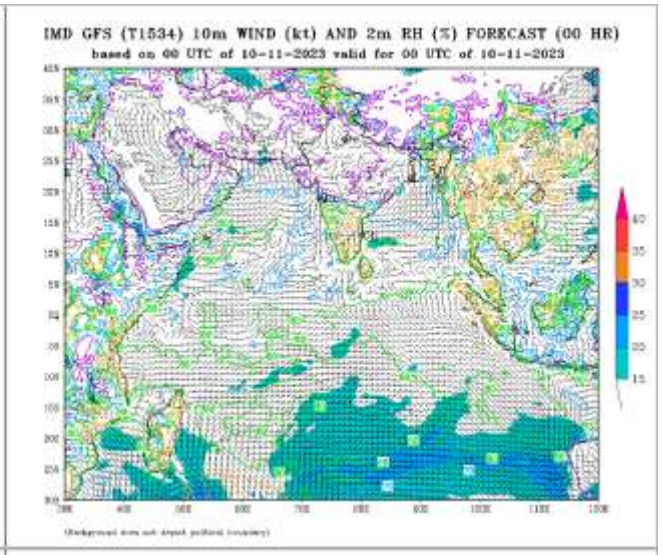
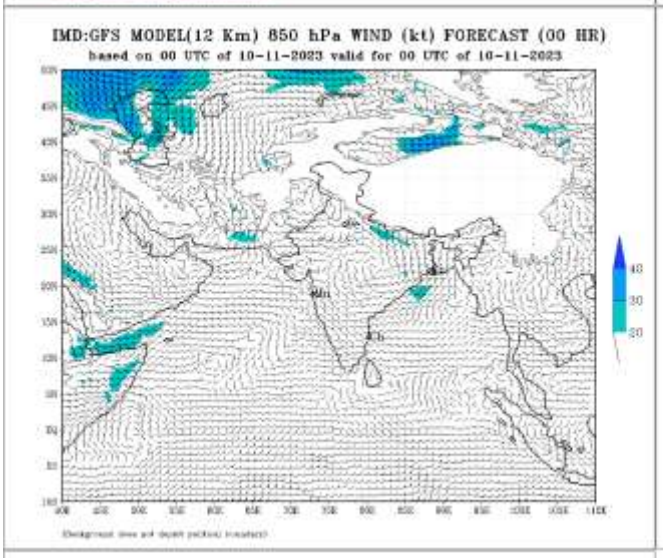

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 10-11-2023


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 10-11-2023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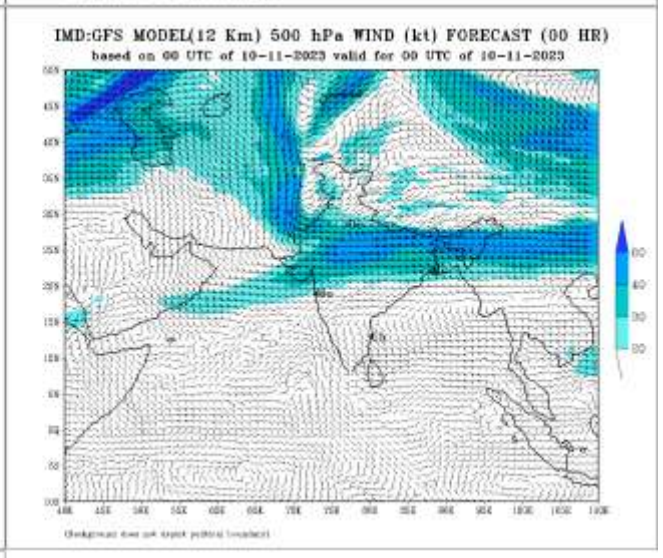
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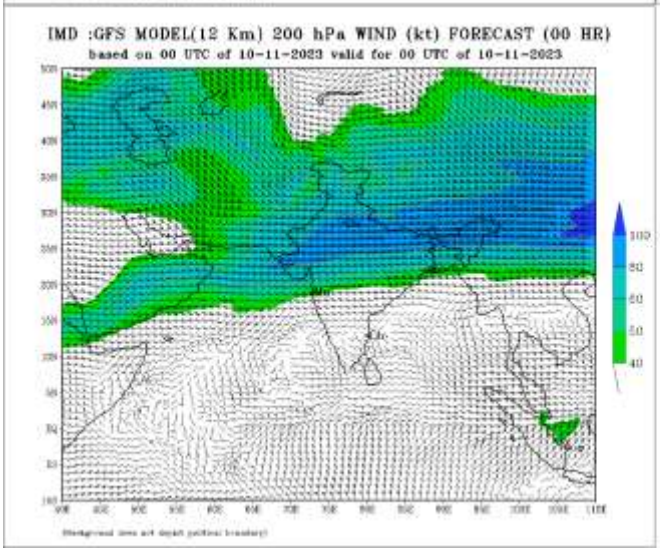
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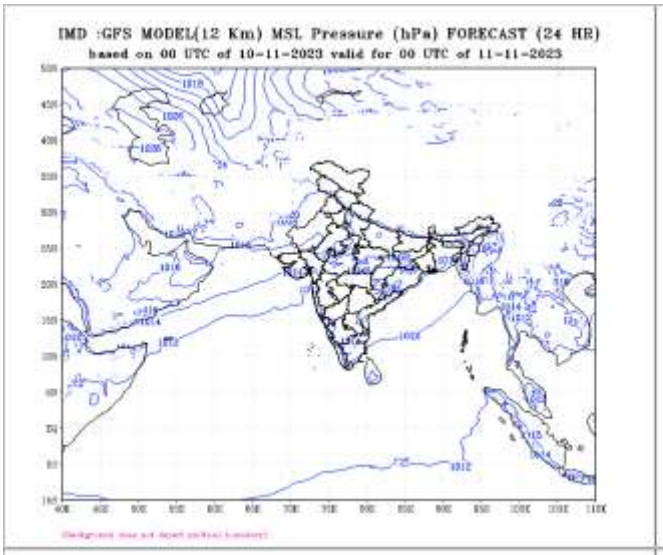
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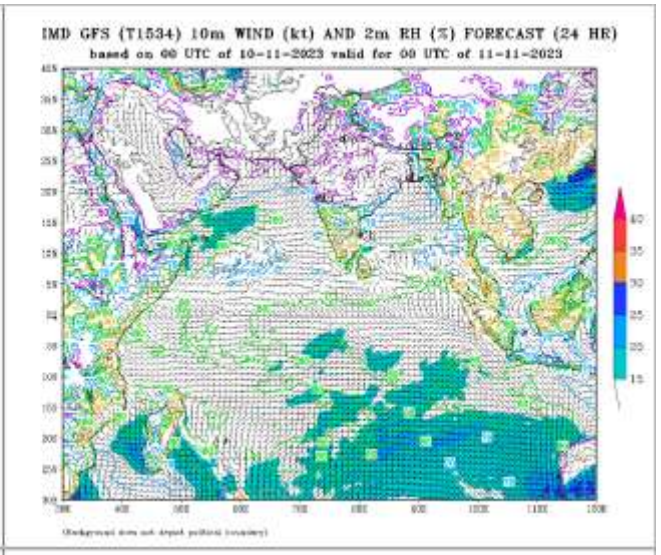
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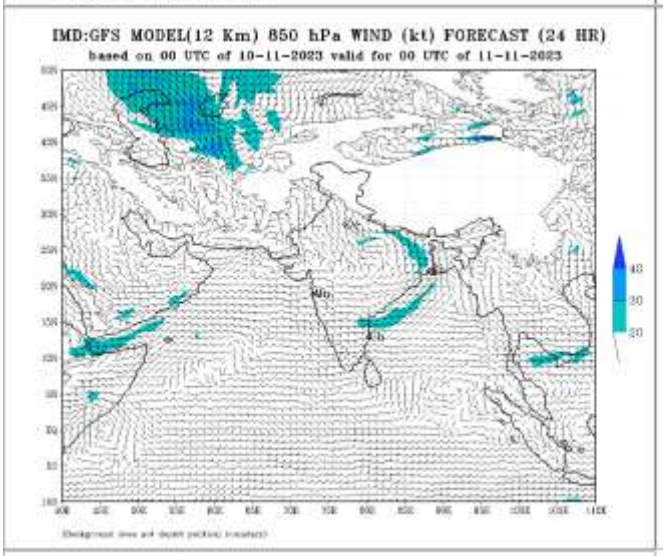
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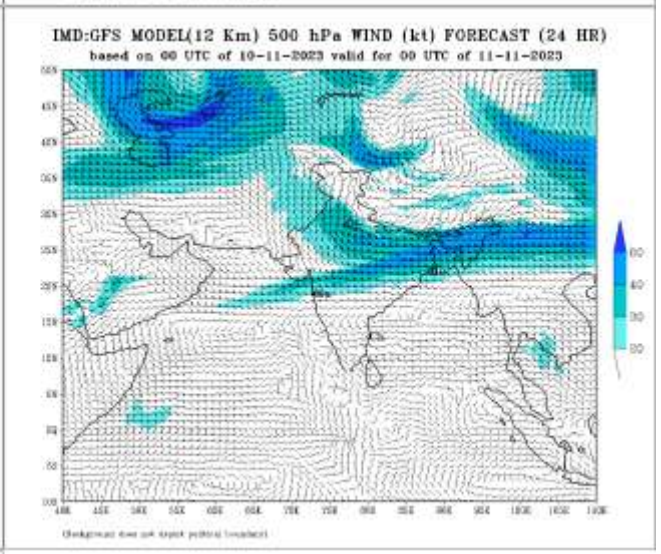
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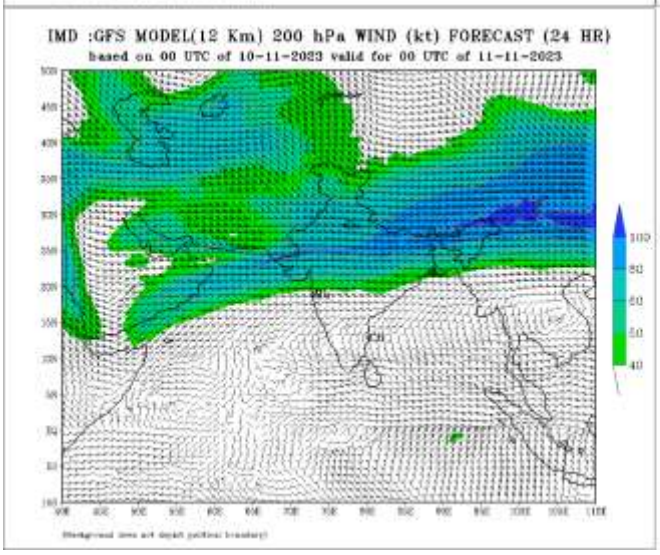
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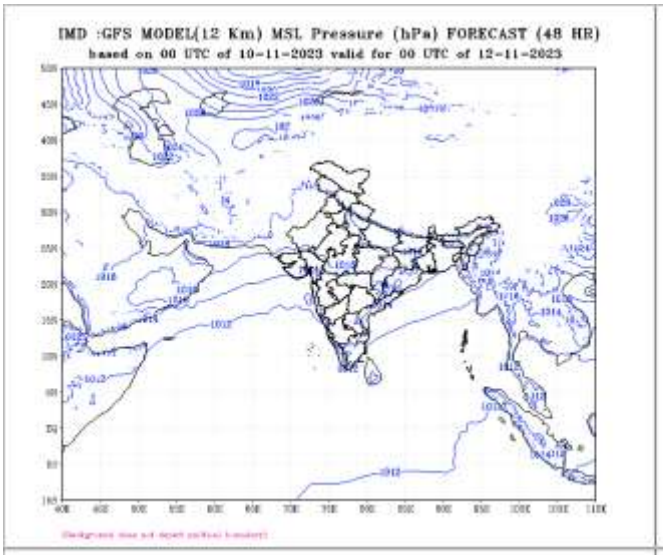
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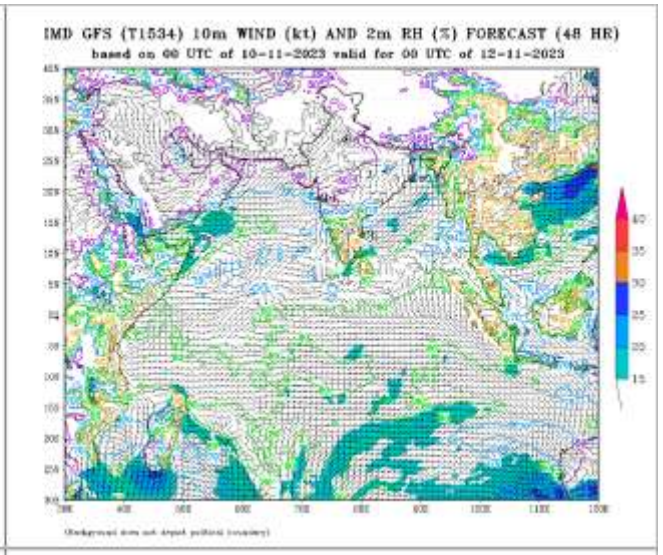
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
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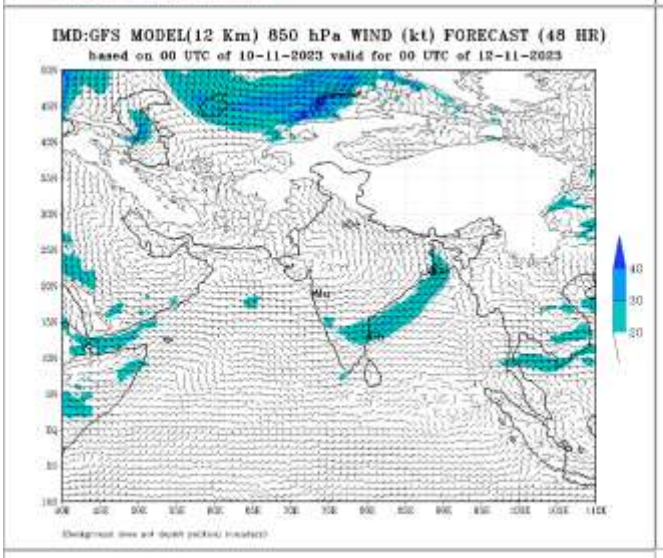
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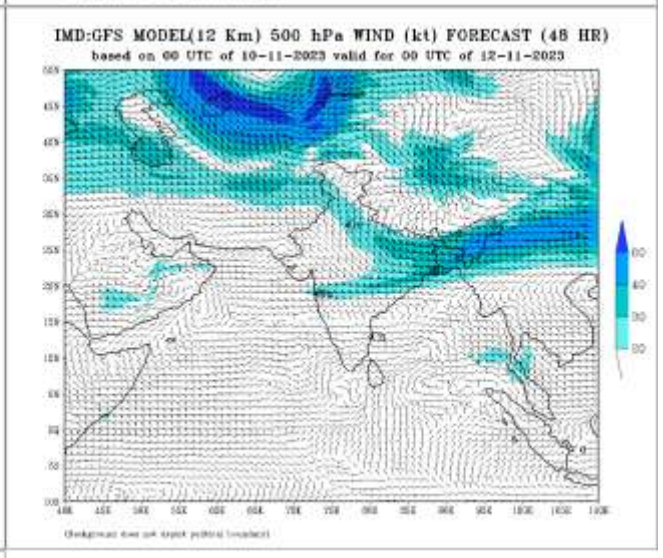
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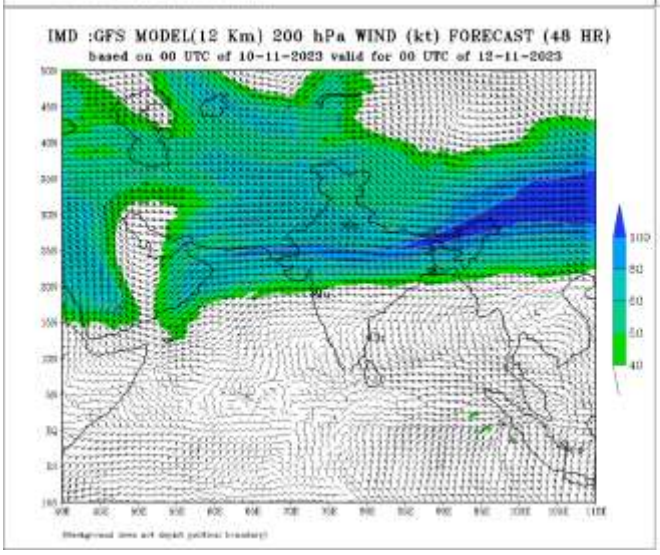
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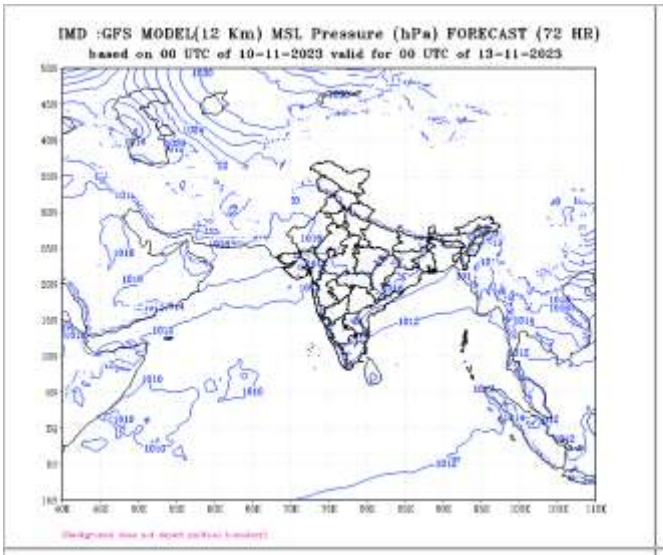
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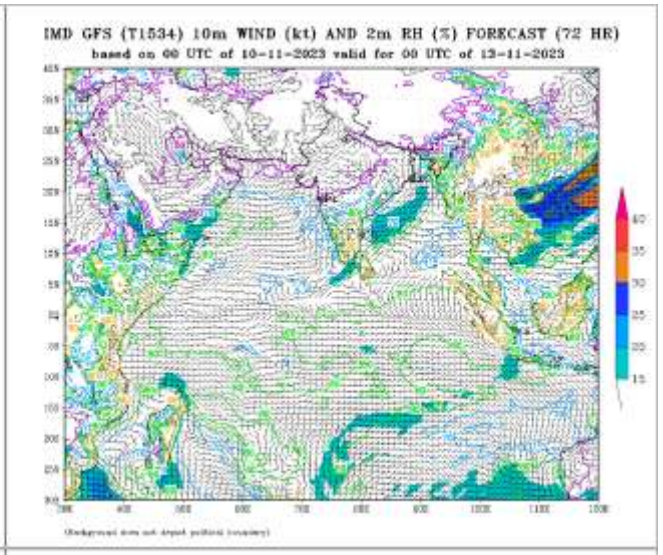
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
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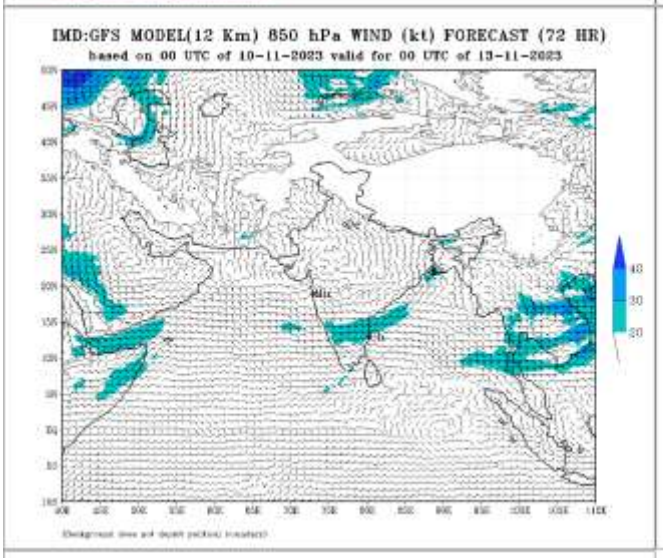
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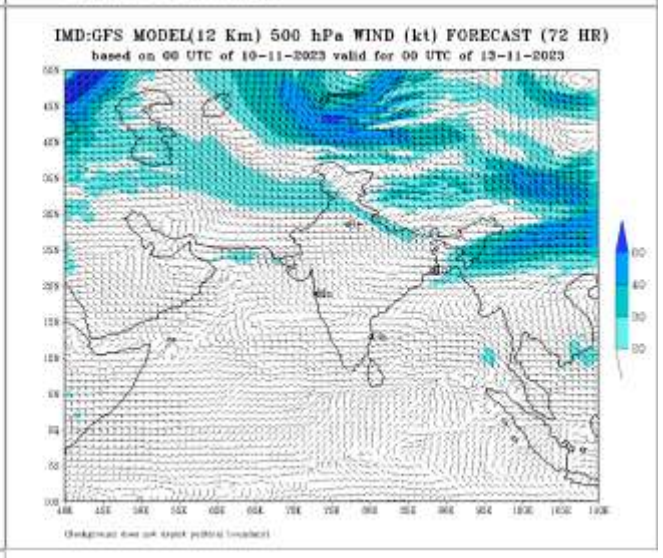
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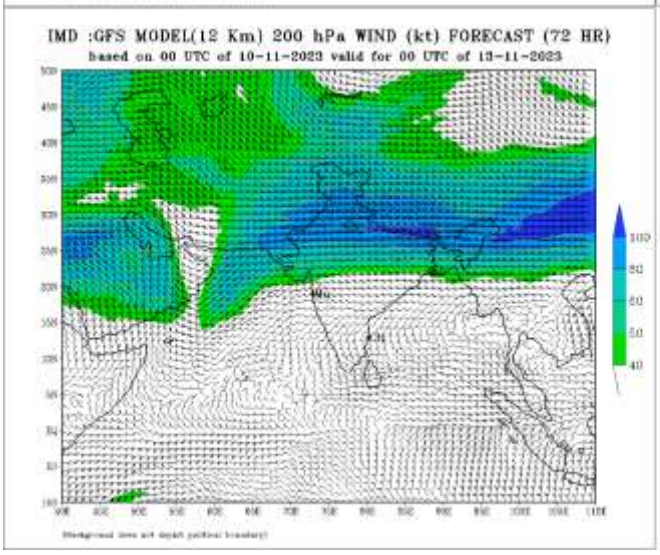
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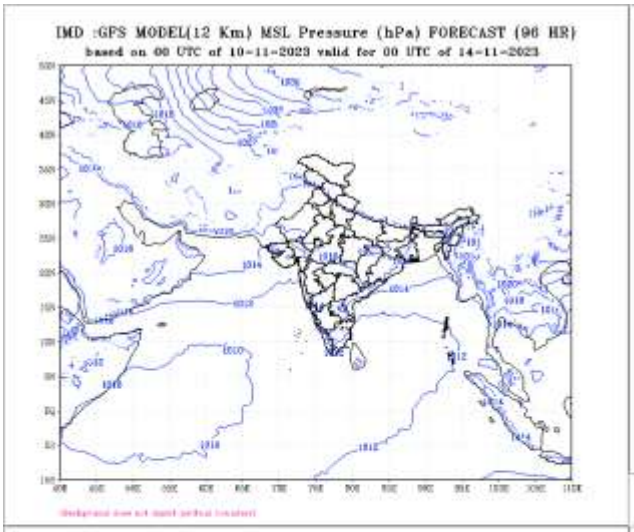
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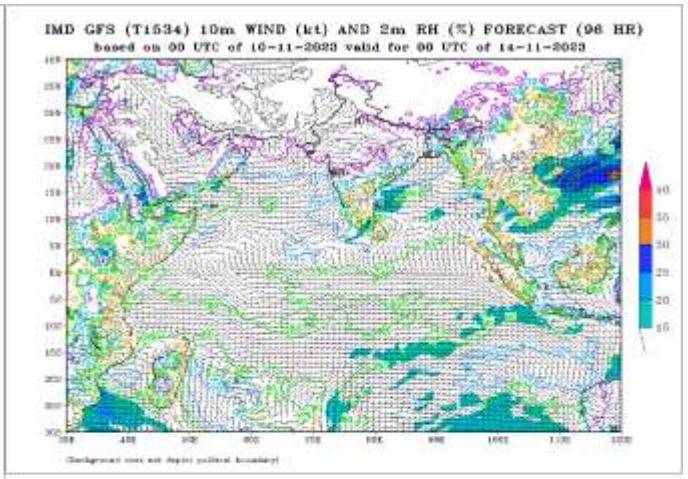
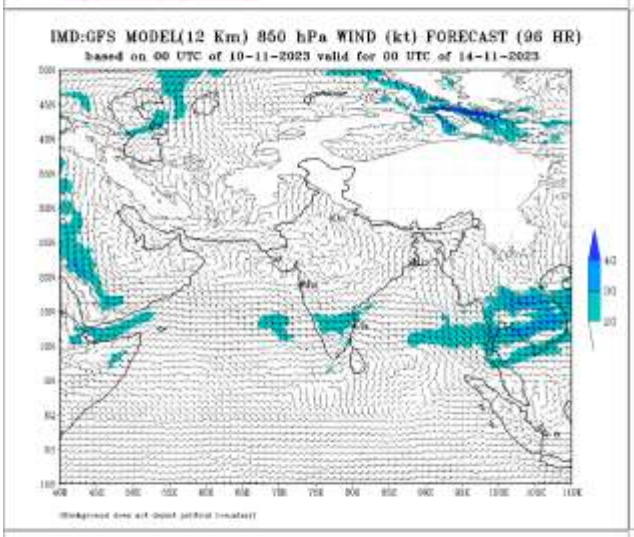

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 14-11-2023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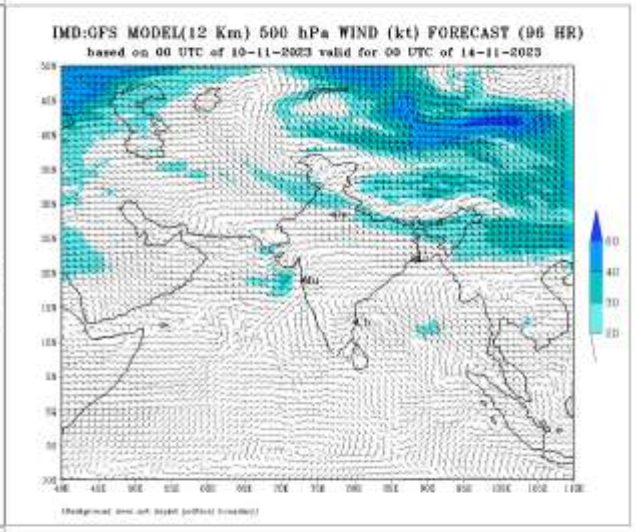
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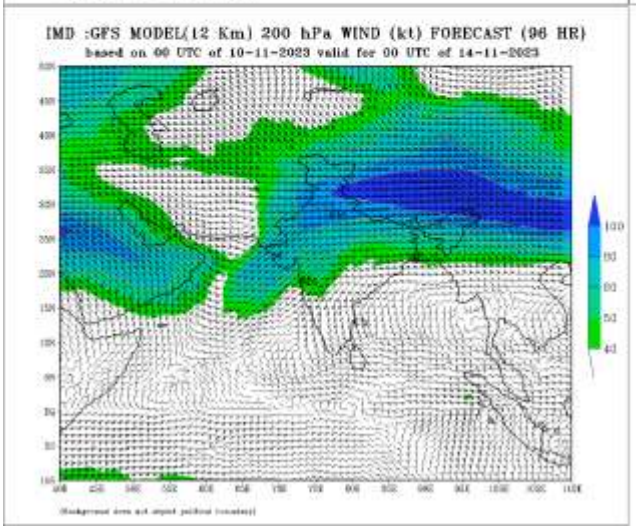
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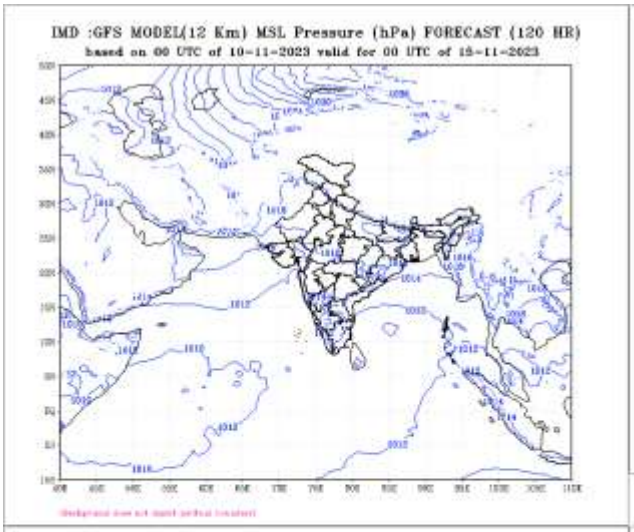
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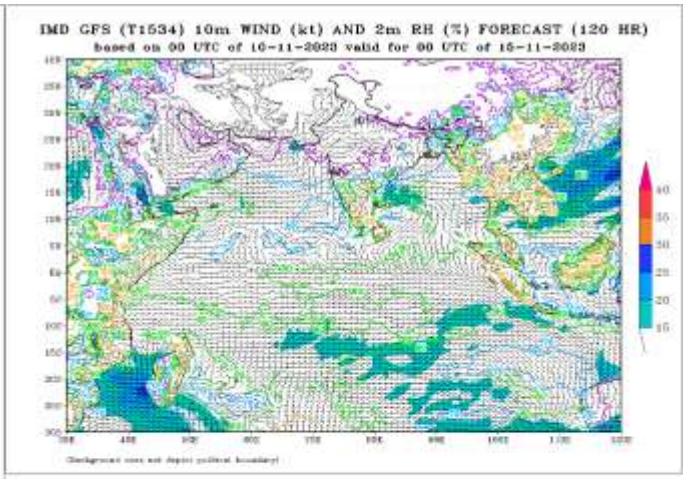
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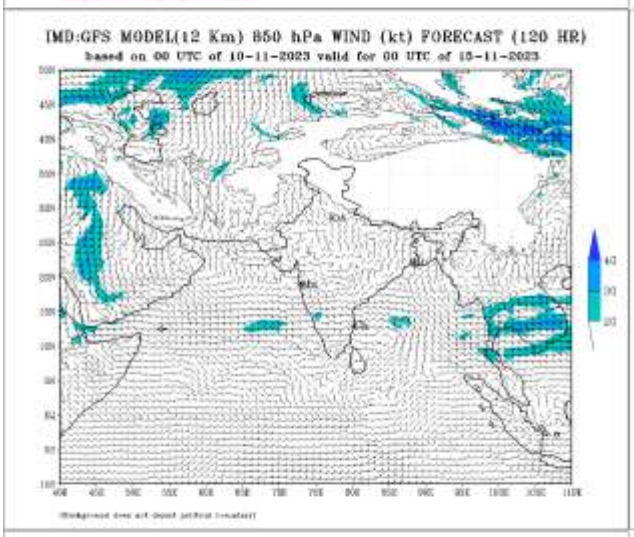
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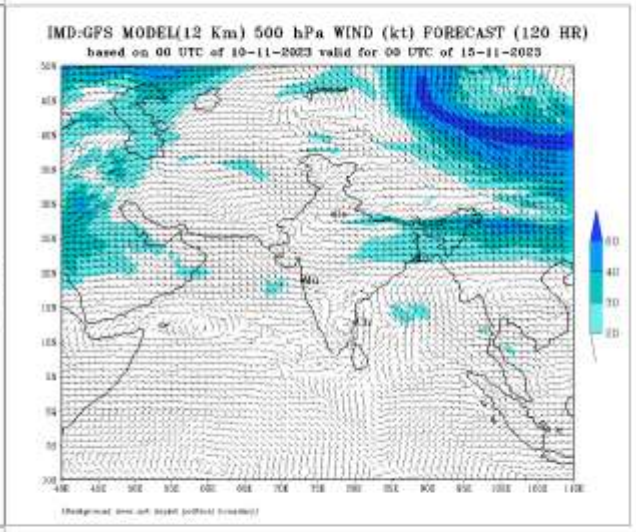
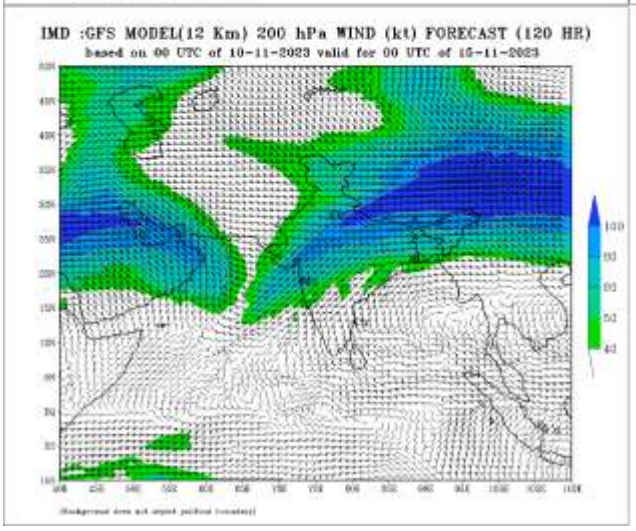
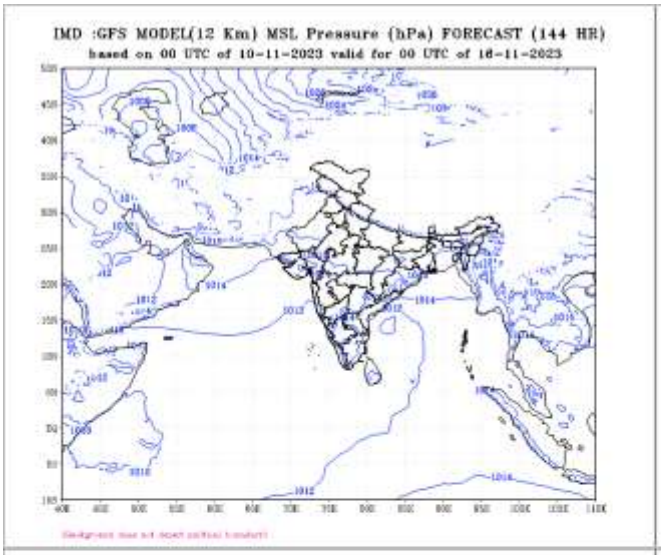
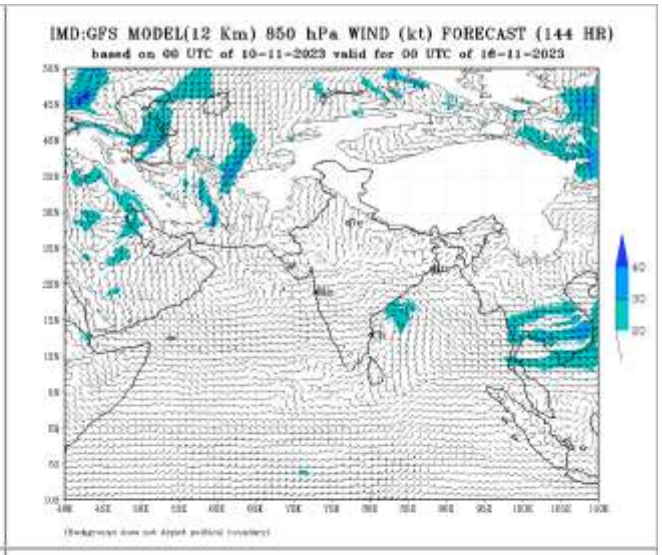
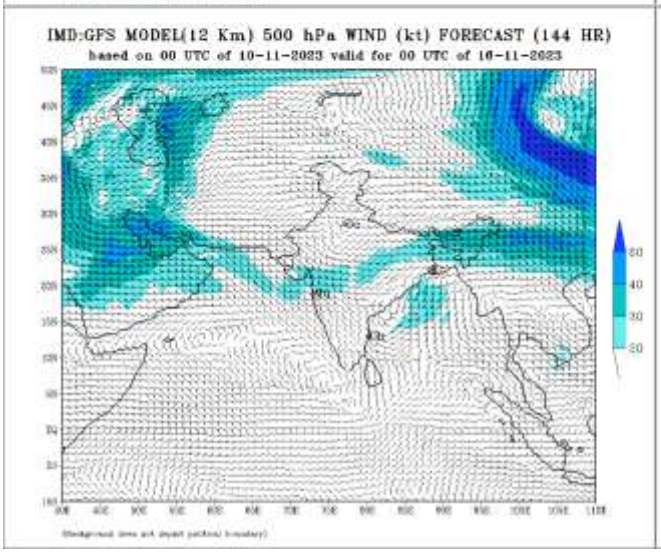
based on 00 UTC of 10-11-2023 valid for 00 UTC of 15-11-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 15-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 15-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 16-11-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 16-11-2023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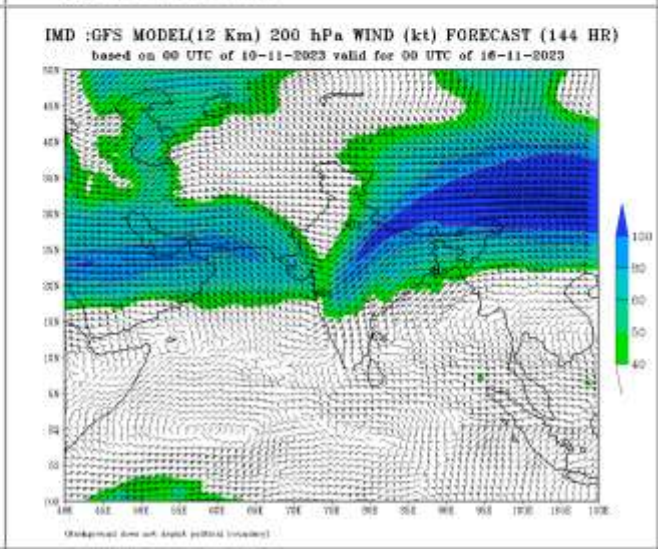
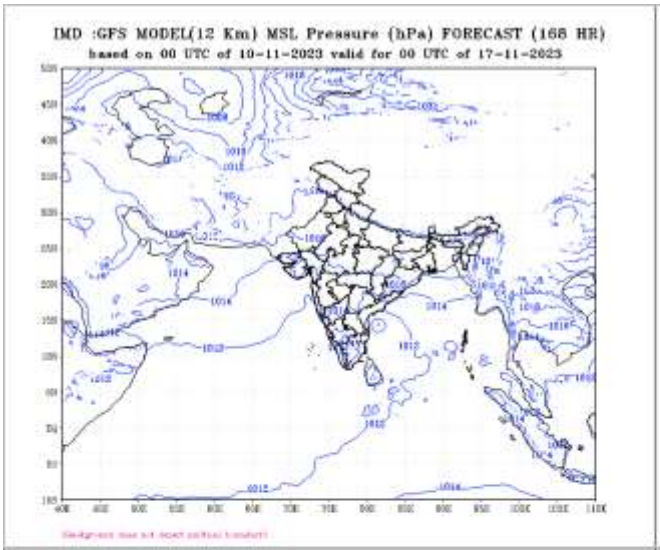
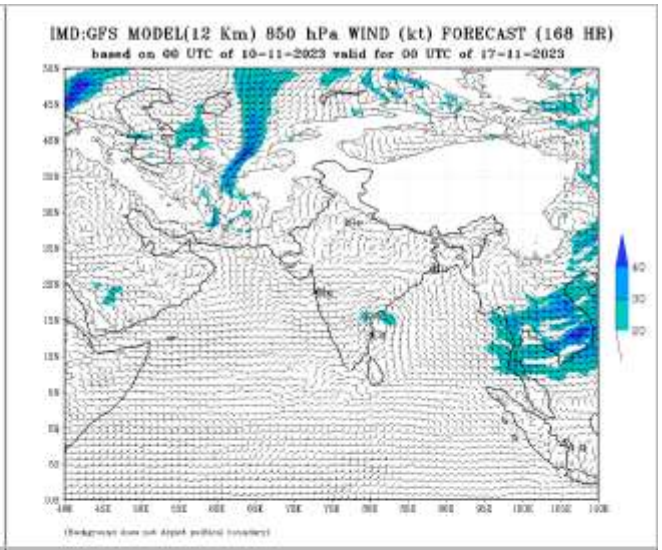
based on 00 UTC of 10-11-2023 valid for 00 UTC of 16-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 16-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 17-11-2023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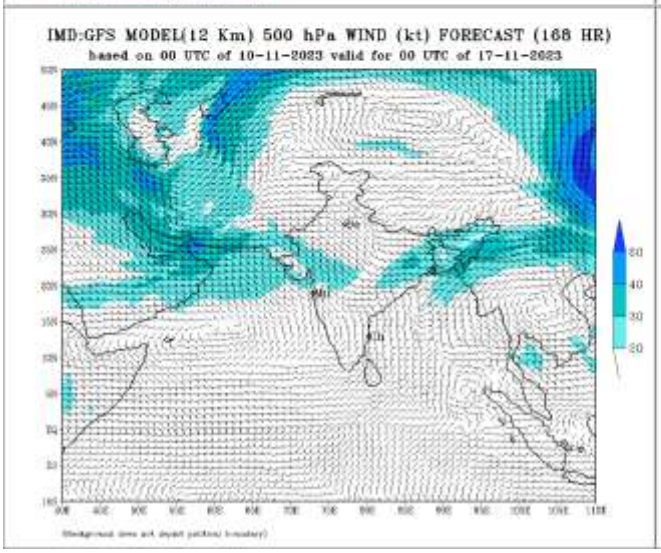
based on 00 UTC of 10-11-2023 valid for 00 UTC of 17-11-2023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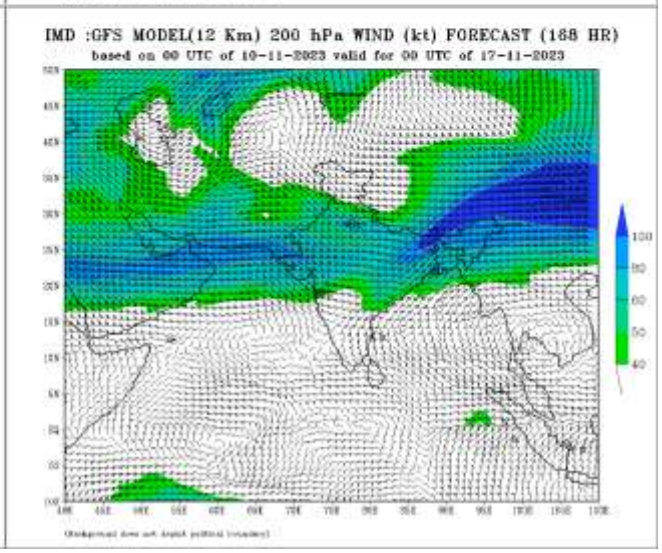
based on 00 UTC of 10-11-2023 valid for 00 UTC of 17-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 10-11-2023 valid for 00 UTC of 17-11-2023