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

Tropical Cyclone Forecast Programme
Report Dated 01st December, 2023

Time of Issue: 1230 UTC

Synoptic features (based on 0600 UTC analysis):

The depression over Southeast and adjoining Southwest Bay of Bengal moved west-northwestwards with a speed of 13 kmph during the past 06 hours and lay centered at 0600 UTC of today, the 01st December 2023 over the same region near Latitude 9.5°N and Longitude 86.0°E, about 730 km east-southeast of Puducherry, 740 km east-southeast of Chennai, 860 km southeast of Nellore, 930 km southeast of Bapatla and 910 km southeast of Machilipatnam.

It is likely to move west-northwestwards, intensify into a Deep Depression by 2nd, and further into a Cyclonic Storm over the Southwest Bay of Bengal around 3rd December. Thereafter, it would move northwestwards and reach near south Andhra Pradesh and adjoining north Tamilnadu coasts by 4th December forenoon. Thereafter, it would move nearly northwards almost parallel to the south Andhra Pradesh coast and cross South Andhra Pradesh during the forenoon of 5th December between Nellore and Machilipatnam as a Cyclonic Storm with a wind speed of 80-90 Kmph gusting to 100 Kmph.

Dynamical and thermo-dynamical features (0600 UTC)

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	27-28 over major parts of BoB, Andaman Sea. Around 27^0C over north and adjoining westcentral BoB.	29-30 over southeast and adjoining southwest AS, along and off Karnataka, north Kerala coasts. 26-28 over major parts of central and southwest AS, Around 26^oC over north and adjoining westcentral AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	80-100 over parts of Andaman Sea, parts of eastcentral BoB, Gulf of Mannar, southwest BoB close to Sri Lanka coast.	100-110 over southeast and adjoining southwest AS. 80-100 over eastcentral AS. Less than 40 over westcentral AS along and off Yemen-Oman coast, north AS.
Cyclonic Relative vorticity ($X10^{-6}s^{-1}$)	50-60 over SWB, 30-40 to its surroundings.	30-40 over parts of eastcentral and southwest AS.
Low Level convergence ($X10^{-5}$ s^{-1})	10-15 over major part of south BoB, 10 over Gulf of Mannar.	-5 over parts of central AS.

Upper Level divergence ($X10^{-5}$ s^{-1})	20-30 over SWB and adjoining SEB. 10 over its surroundings and central Bay, Gulf of Mannar, Comorin area.	-5 to -10 over southwest AS, -5 over parts of south AS.
Vertical Wind Shear (VWS knots) **Low: 05-10 knots** **Moderate:10-20 knots** **High: >20 knots**	10-15 over southeast BoB and Andaman Sea. 20 over parts SWB. High (>20knots) over parts of SWB, central & north BoB.	10-20 over south AS,. High (>20knots) over rest of central & north AS.
Wind Shear Tendency (knots)	Decreasing over eastcentral BoB and south Andaman Sea. Increasing over rest of BoB.	Increasing over most parts of AS, decreasing over north AS.
Upper Tropospheric Ridge	Along 13^{o}N over BoB.	Along 11^{o}N over AS.

Satellite observations based on INSAT imagery (0600 UTC):

(a) Over the Bay of Bengal & Andaman Sea:-
Scattered to broken low/med clouds with embedded intense to v intense convection over south adjoining central bay & central bay. Scattered low/med clouds with embedded moderate to intense convection over northeast Bob, Andaman Sea.

(b) Over the Arabian Sea:-
Scattered low/med clouds with embedded mod to intense convection over south adjoining central Arabian Sea & Comorin area.

(c)Convection outside India:-
Scattered low/med clouds with embedded mod to intense convection over Sri Lanka, Palk Strait Gulf of Mannar, Maldives east Tibet, south Thailand, Gulf of Thailand, Vietnam, Sumatra, Strait of Malacca, Malaysia, Borneo, South China Sea south of lat 10.0N, Java Islands & Sea, Celebes Islands & Sea, Philippines, Madagascar, Mozambique channel and over Indian Ocean bet lat 5.0N to 3.0S and long 50.0E to 110.0E and bet lat 1.0S to 20.0S long 40.0E to 62.0E.

M.J.O. Index:
MJO index is currently in Phase 3 with amplitude greater than 1. It will be in phase 3 with amplitude greater than 1 till 3rd Dec. It will then move to phase 4 on 4th Dec with amplitude greater than 1, remains same and in same phase till 7th Dec. It will move to phase 5 on 8th Dec 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	Depression over southwest Bay (SWB) as on today i.e., 01st Dec. It moves northwestward and lay over SWB as Deep Depression (DD) on 2nd Dec. It moves in the same direction and lay over SWB and adjoining westcentral Bay (WCB) and lay as SCS on 3rd Dec. By moving in same direction, It lay over WCB as VSCS on 4th Dec.	No significant circulation for the next 7 days.

	It crosses the coast (16.5N/81.5E) as VSCS on 5th Dec.	
IMD-GEFS	Depression over southwest Bay (SWB) as on today i.e., 01st Dec. It moves northwestward and lay over SWB as DD on 2nd Dec. It moves in the same direction and lay over SWB and lay as SCS on 3rd Dec. By moving in same direction, It lay over WCB as VSCS on 4th Dec. It crosses the coast (16.5N/81.5E) as VSCS/SCS on 5th Dec.	No significant circulation for the next 7 days.
IMD-WRF	Depression over southwest Bay (SWB) as on today i.e., 01st Dec. It lay over SWB as a depression on 2nd Dec. It moves northwestward and lay over SWB as CS on 3rd Dec. It crosses the coast (14N/80E) along south Andhra Pradesh and adjoining Tamil Nadu coast on 4th Dec as DD.	No significant system during next 3 days.
NCMRWF-NCUM	LPA over SWB as on today i.e., 1st Dec. It moves northwestward and lay over SWB as WML/D on 3rd Dec. It moves in same direction and lay over WCB close to south Andhra Pradesh coast as depression. It intensifies and lay over the same region as CS and cross the coast near (15N/80E) on 5th Dec. Weaken thereafter over land gradually till 7th Dec.	No significant system during next 3 days.
NCMRWF-NEPS	LPA over SWB as on today i.e., 1st Dec. It moves northwestward and lay over SWB as D on 3rd Dec. It moves in same direction and lay over WCB close to south Andhra Pradesh coast as CS on 4th Dec. It cross the coast near (15N/80E) on 5th Dec as CS. Weaken thereafter.	No significant circulation for the next 7 days.
NCMRWF-UM (Regional)	LPA over SWB as on today i.e., 1st Dec. It moves northwestward and lay over SWB as D/DD on 2nd Dec. It moves in same direction and lay over SWB and adjoining WCB as CS/SCS on 3rd Dec. It crosses the south Andhra Pradesh coast (15N/80E) as VSCS on 4th Dec.	No significant circulation for the next 3 days.
ECMWF	depression over SWB as on today i.e., 1st Dec. It moves northwestward and lay over SWB as DD/CS around 6 UTC of 2nd Dec. It lay over SWB and adjoining WCB as DD/CS on 3rd Dec, and lay as CS over WCB and adjoining SWB on 12 UTC of 4th Dec. It cross the coast near 15.5N/81.3E on 5th Dec, weaken gradually over land.	No significant system during next 3 days.
NCEP-GFS	Depression over SWB as on today i.e., 1st Dec. It moves northwestward and lay over SWB as DD on 2nd Dec. It lay over SWB as CS on 3rd Dec, and intensifies into SCS over SWB and adjoining WCB on 18 UTC of 3rd Dec. It intensifies into VSCS on 4th 12 UTC over WCB. It crosses the coast as SCS along south Andhra Pradesh coast (15.2N/80.3E) around 06 UTC of 5th Dec. Weakening thereafter over land.	No significant system during next 7 days.
IMD-Genesis Potential Parameter	Potential zone over SWB on 1st Dec, over SWB and adjoining WCB on 2nd Dec, 3rd Dec. It lay over WCB on 3rd Dec & over WCB on 4th and 5th Dec. It lay over eastcentral Bay (ECB) on 6th Dec and over northeast BoB (NEB) on 7th Dec.	No potential zone of cyclogenesis over AS.

Summary and conclusion:

1. For the Bay of Bengal:

Guidance from various numerical models is indicating initial northwestwards movement towards Andhra Pradesh and adjoining north Tamil Nadu coasts, with crossing over south Andhra Pradesh coast and northeastwards movement along the coast. There is good consensus among the models

with respect to movement. With respect to intensification, most of the models are indicating the system to intensify into a cyclonic storm. Peak intensification of 45 knots is suggested. However, ECMWF is indicating intensification upto deep depression stage. IMD GFS is indicating Intensification upto very severe cyclonic storm. IMD MME is indicating intensification upto 45 knots (cyclonic storm category).

Considering all the above, the depression over southeast and adjoining southwest Bay of Bengal is likely to move west-northwestwards and intensify into a deep depression by 2nd December and further into a cyclonic storm over southwest Bay of Bengal around 3rd December. Thereafter, it would move northwestwards and cross south Andhra Pradesh coasts between Nellore and Machilipatnam around 0600 UTC of 5th December as a cyclonic storm.

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
-	-	-	-	-	-	-

*Note: Every 24 hour forecast is valid upto 0300 UTC of the next day.

"-" Indicate that cyclogenesis has already occurred. The above table indicates probability of cyclogenesis only (formation of depression).

2. For the Arabian Sea:

No significant system over the Arabian Sea for the next 7 days.

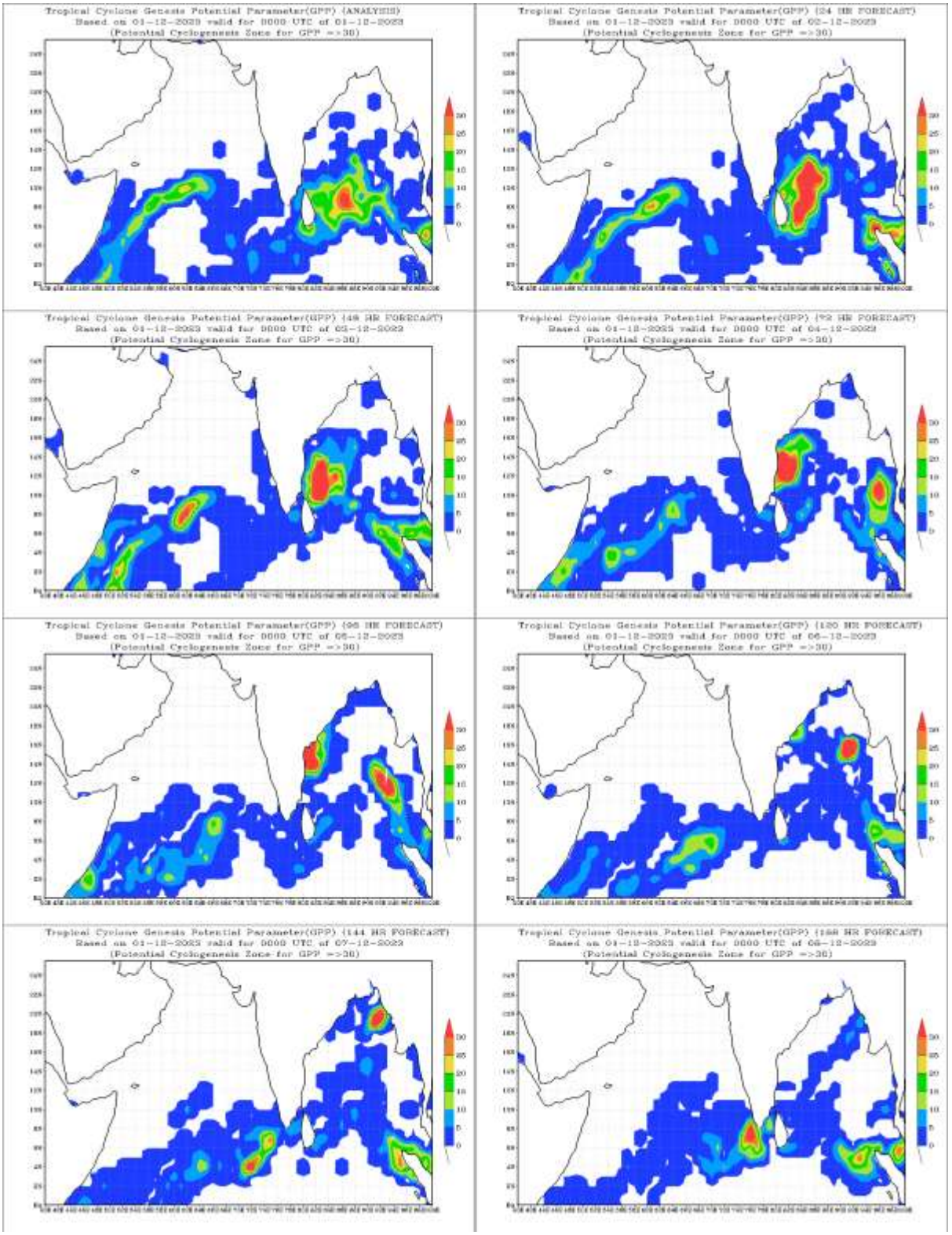
Probability of Cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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

*Note: Every 24 hour forecast is valid upto 0300 UTC of the next day.

IOP: IOP for Tamil Nadu, Puducherry coasts 2nd to 4th Dec;
IOP for Andhra Pradesh coast 2nd to 5th Dec.

ANNEXURE


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 01-12-2023 valid for 0000 UTC of 01-12-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 01-12-2023 valid for 0000 UTC of 02-12-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 01-12-2023 valid for 0000 UTC of 03-12-2023
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(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 01-12-2023 valid for 0000 UTC of 06-12-2023
(Potential Cyclogenesis Zone for GPP =>30)
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Based on 01-12-2023 valid for 0000 UTC of 07-12-2023
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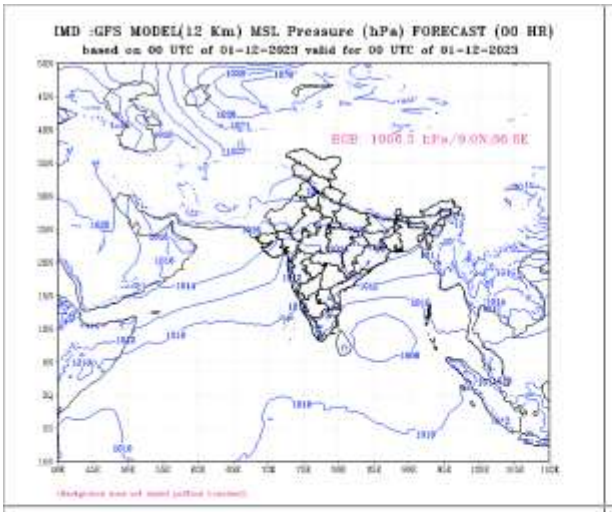
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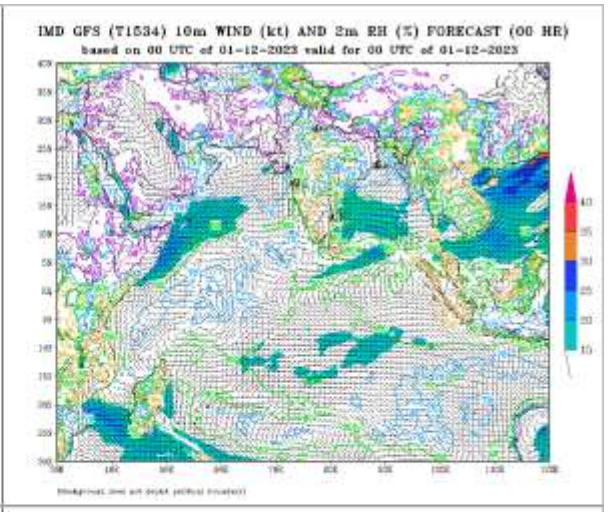
based on 00 UTC of 01-12-2023 valid for 00 UTC of 01-12-2023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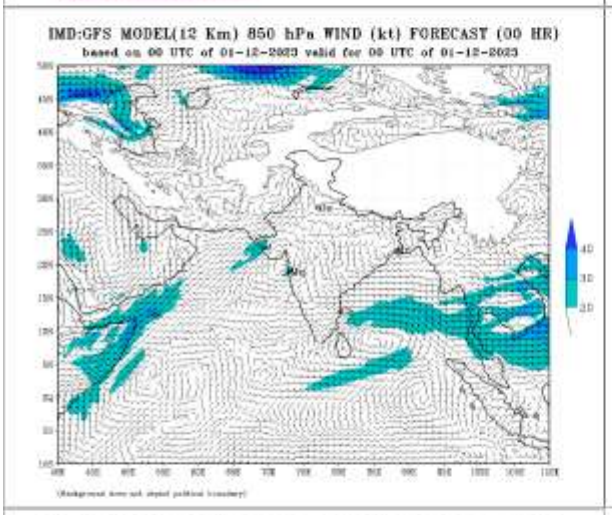
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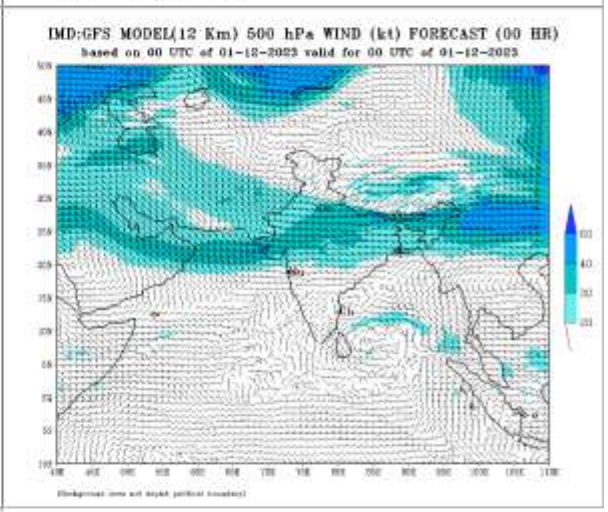
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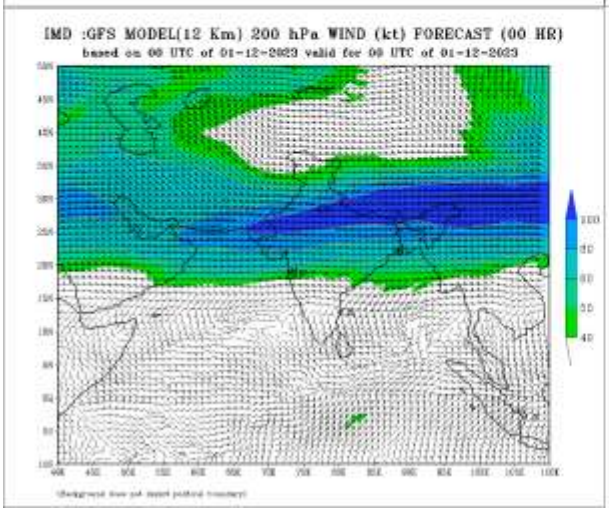
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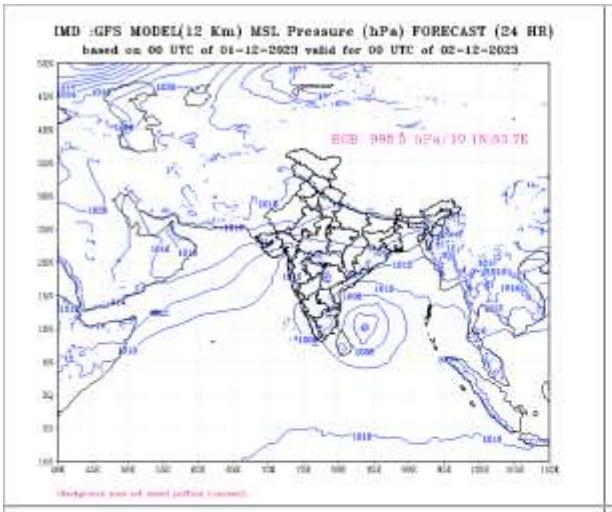
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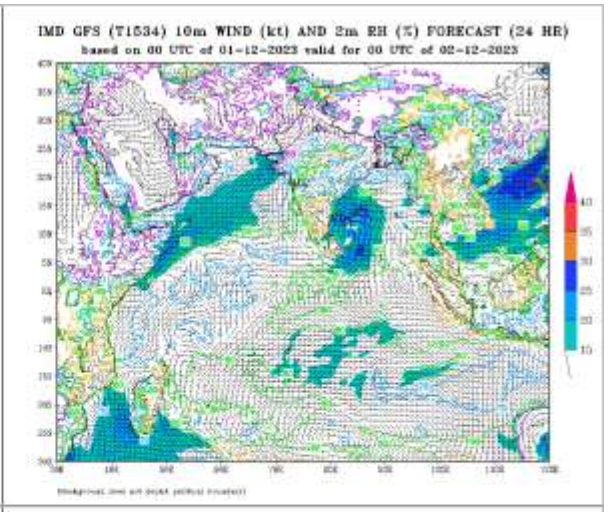
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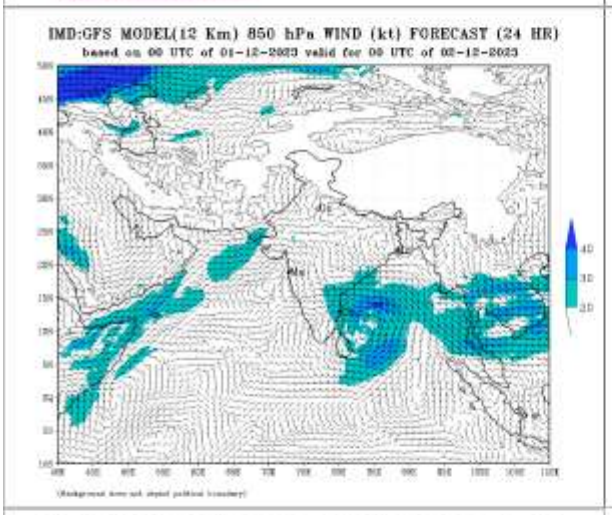
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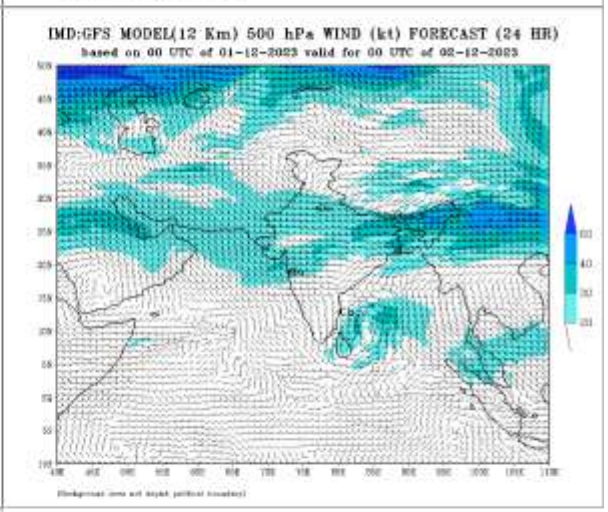
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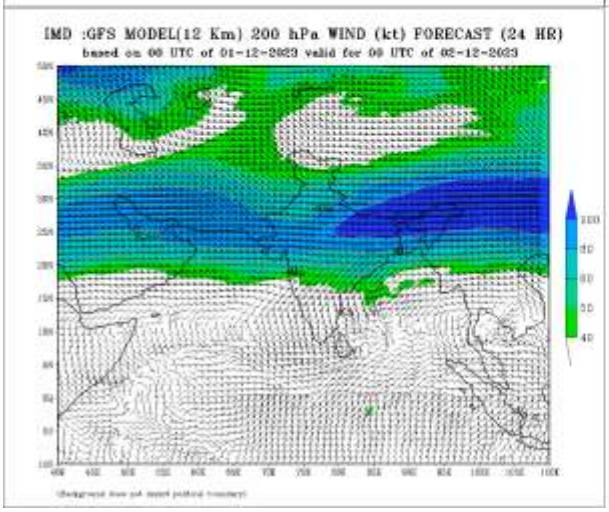
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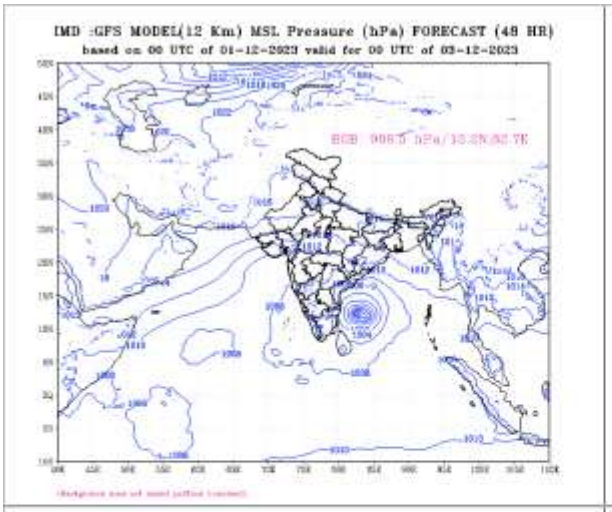
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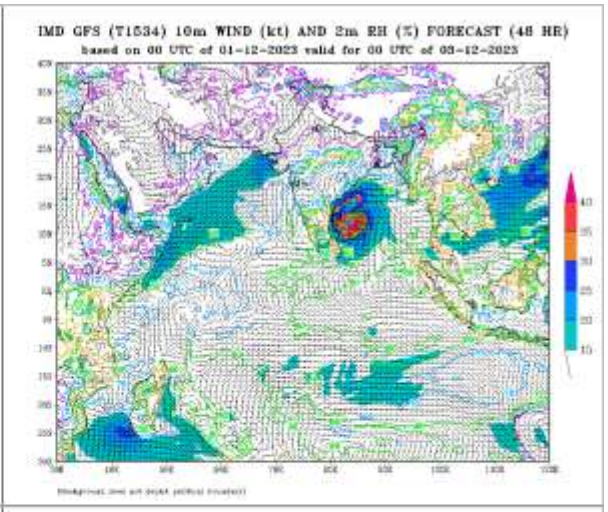
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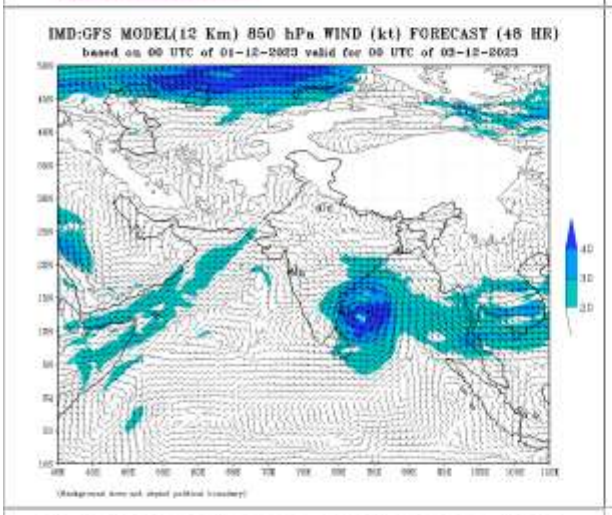
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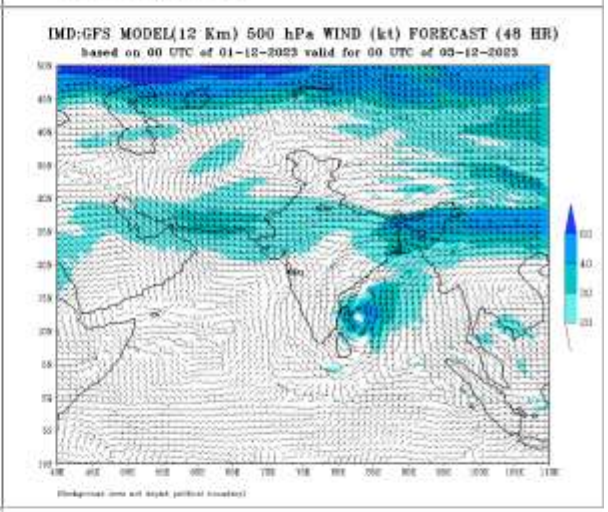
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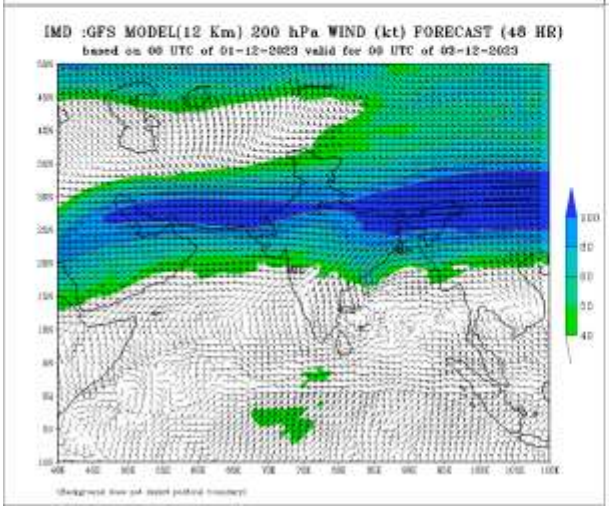
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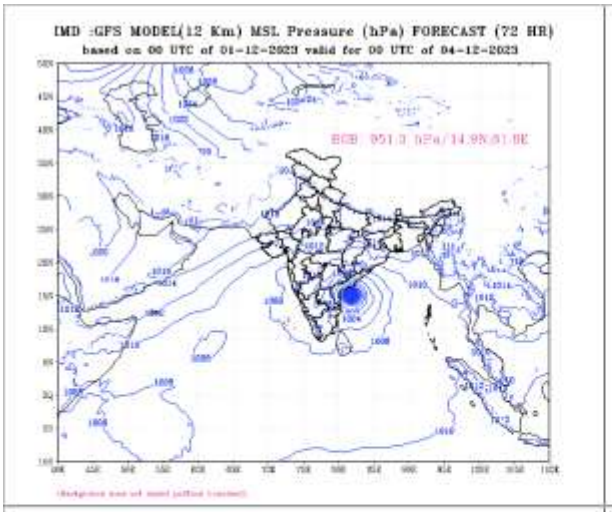
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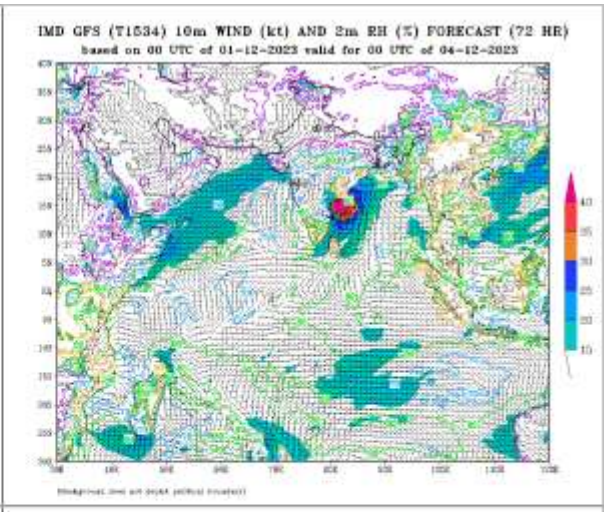
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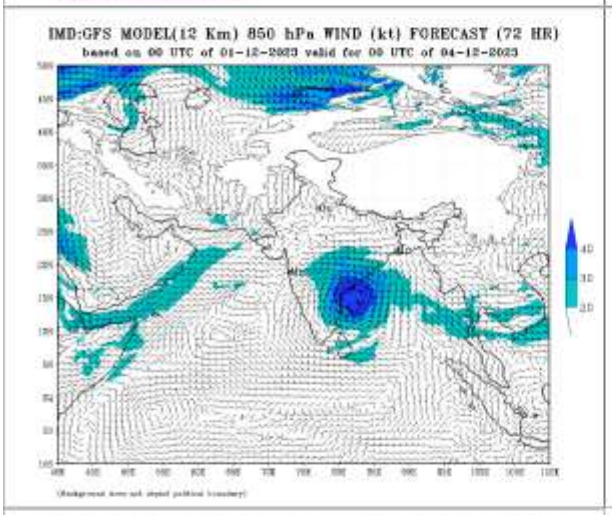
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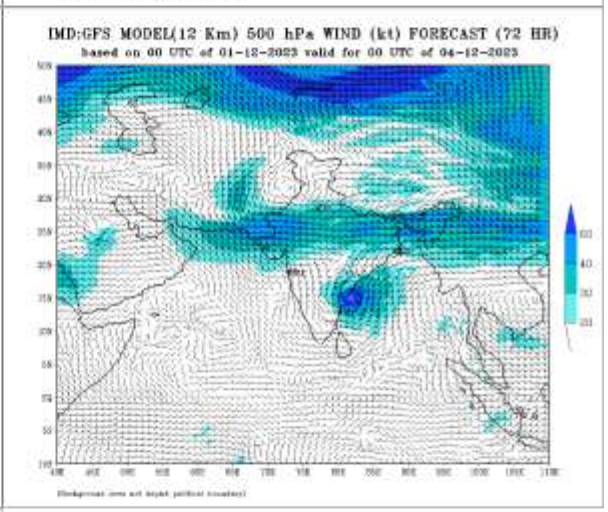
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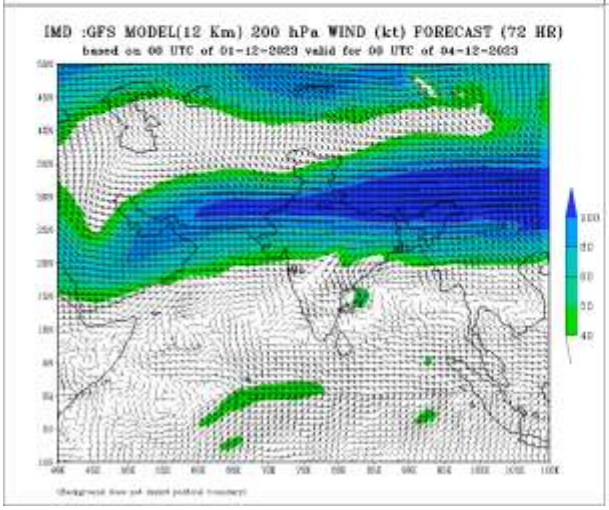
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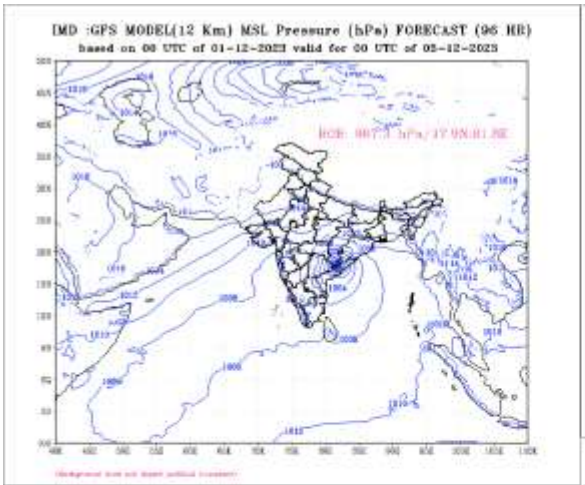
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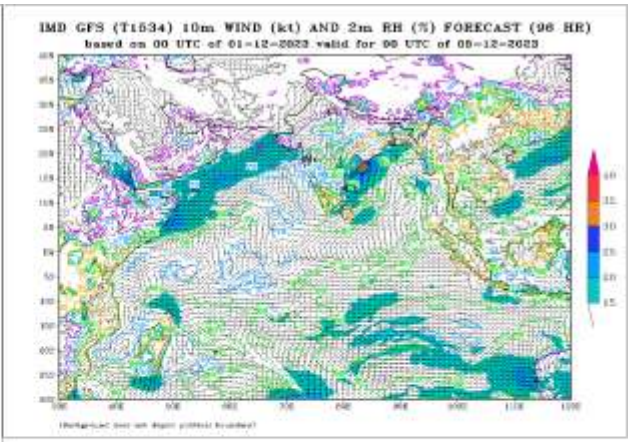
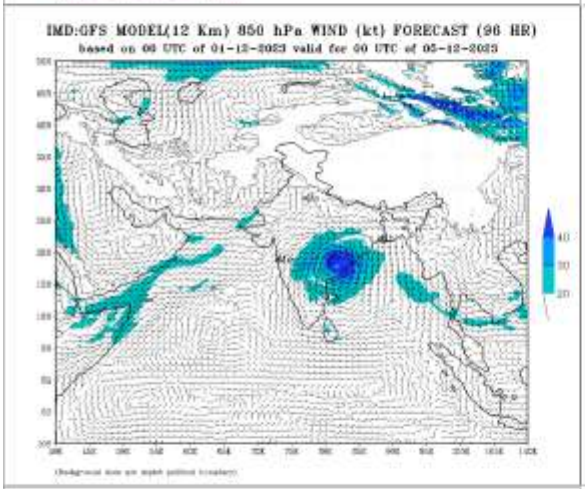

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 05-12-2023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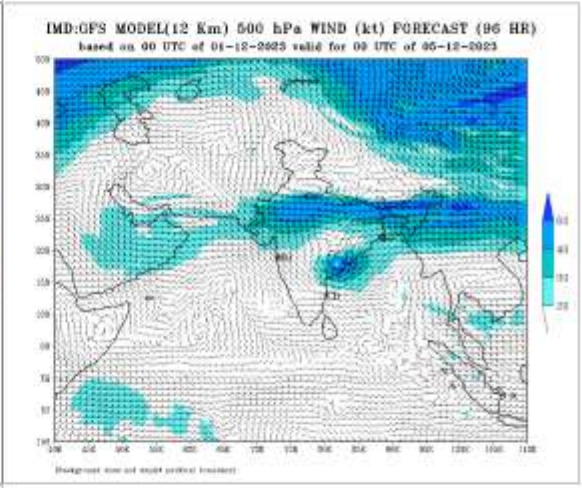
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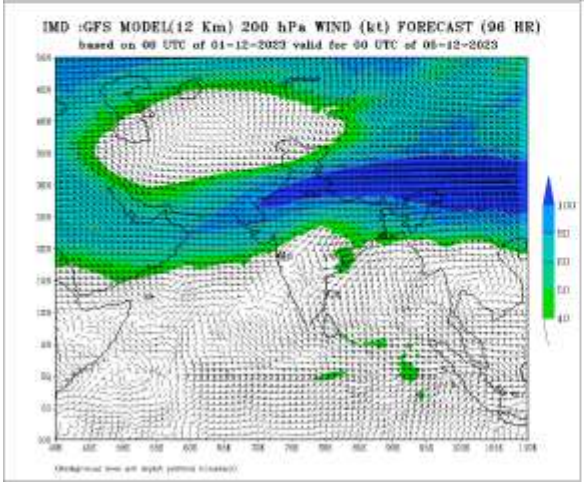
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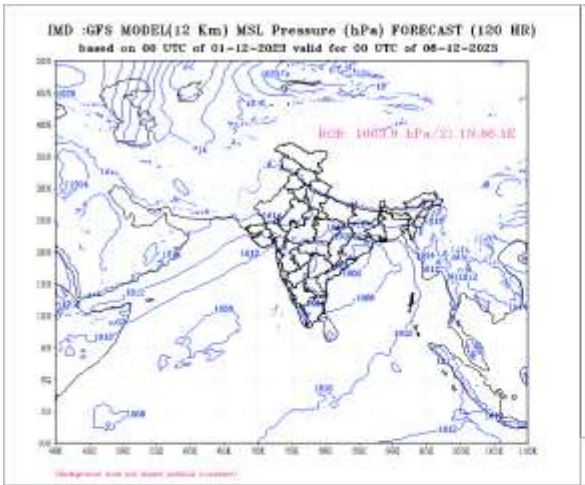
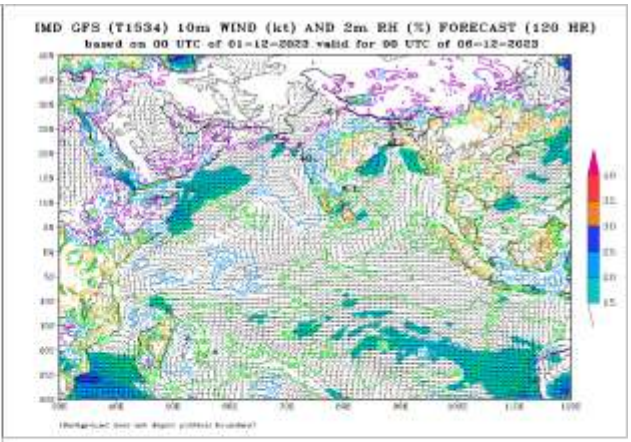
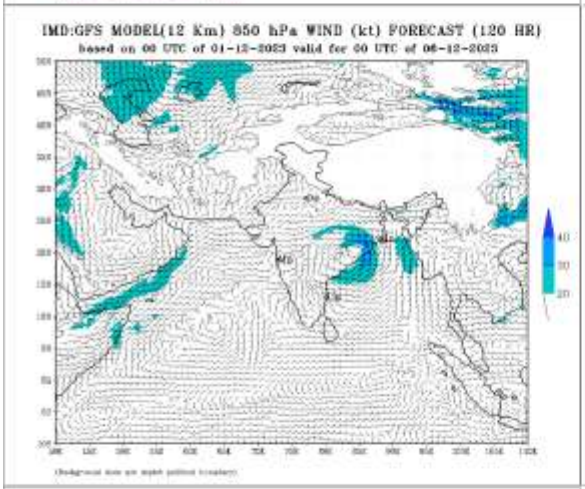
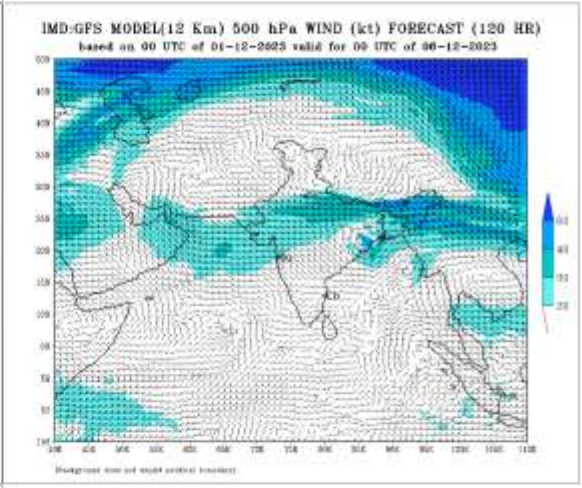
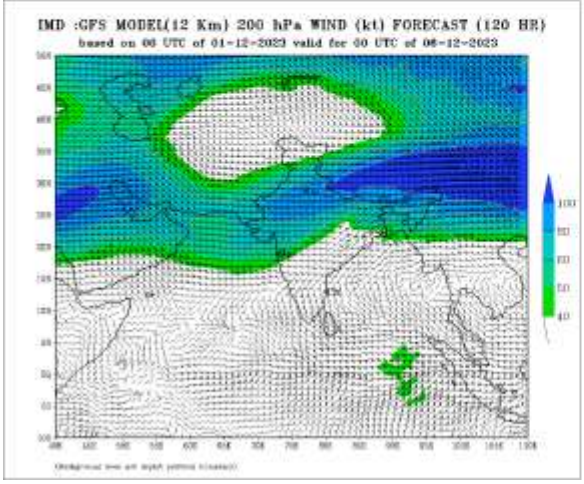
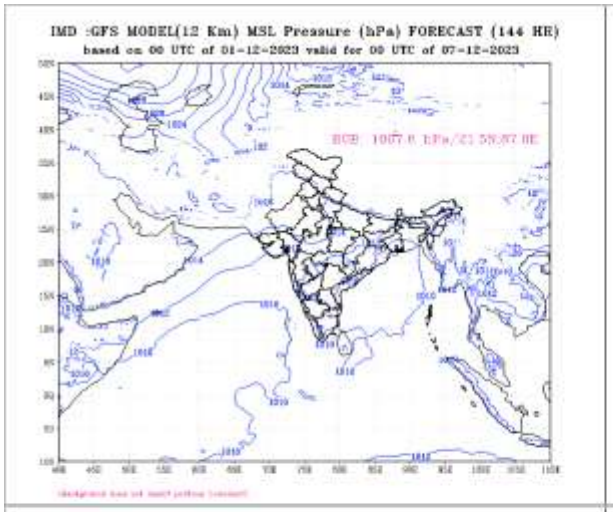

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 06-12-2023

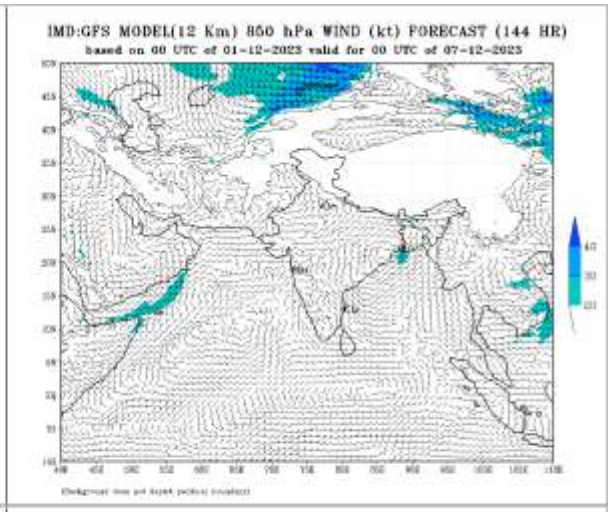

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 06-12-2023

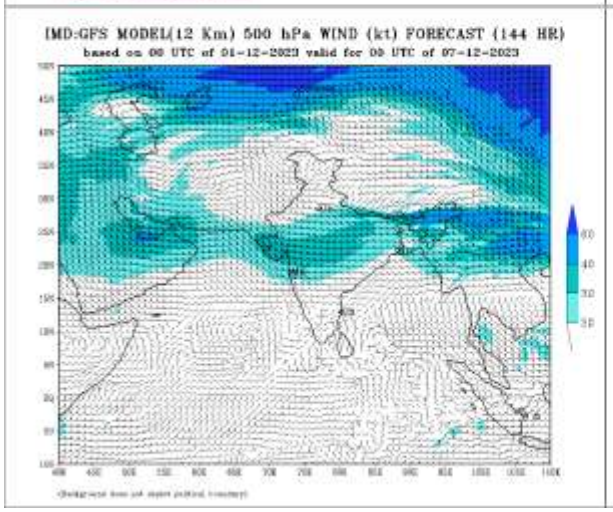

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 06-12-2023

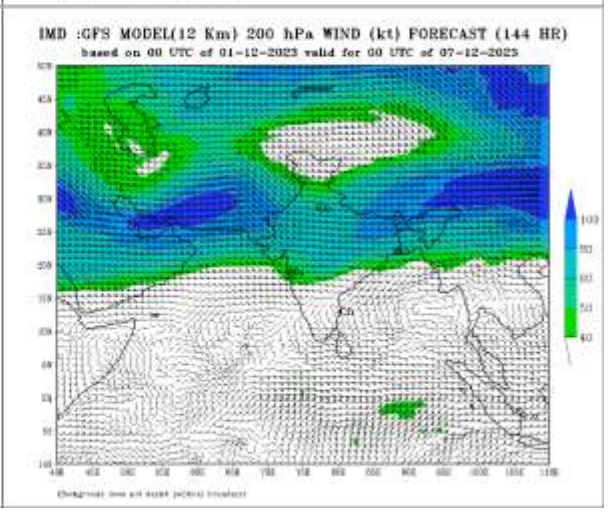

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 06-12-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 06-12-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 07-12-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 07-12-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 07-12-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 01-12-2023 valid for 00 UTC of 07-12-2023