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

Tropical Cyclone Forecast Programme
Report Dated 22nd November, 2023

Time of Issue: 1230 UTC

Synoptic features (based on 0300 UTC analysis):

- A Cyclonic Circulation is likely to emerge over South Andaman Sea & neighborhood around 25th November. Under its influence, a Low Pressure Area is likely to form over South Andaman Sea & neighborhood around 26th November. It is likely to move west-northwestwards and intensify into a Depression over Southeast Bay of Bengal & adjoining Andaman Sea around 27th November.
- The Trough in easterly at mean sea level over Comorin area to Westcentral Bay of Bengal off Andhra Pradesh coast extending upto 3.1 km above mean sea level has become less marked.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	28-30^{0}C over major parts of BoB. 26-28^{0}C over parts of southwest BoB.	Around 28 over most parts of central adjoining north AS, 29-30 over southeast, adjoining southwest and eastcentral AS and north AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	80-100 over south Andaman Sea. 60-80 over western parts of north Andaman Sea. 80-90 over eastern parts of North Andaman Sea along Myanmar coast. 100-120 over parts of eastcentral adjoining southeast BoB. 20-40 over parts of southwest BoB & Gulf of Mannar, over westcentral BoB along the coast of Andhra Pradesh. 60-80 over remaining areas of BoB.	60-80 over southeast adjoining southwest and eastcentral AS. Less than 40 over remaining areas of AS and along the west coast.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	10-20 over parts of south BoB, parts of northeast BoB.	10-20 over parts of south and central AS.
Low Level convergence (X10^{-5} s^{-1})	10-15 over Comorin area, Gulf of Mannar, parts of southwest BoB.	5-10 over parts of south AS, -5 over parts of central AS.

Upper Level divergence ($X10^{-5}$ s^{-1})	10-20 over Comorin area, Gulf of Mannar and parts of southwest BoB, -5 to -10 over parts of south and central BoB.	10-20 over southeast and adjoining southwest AS, 5-10 over parts of southwest AS.
Vertical Wind Shear (VWS knots) **Low: 05-10 knots** **Moderate:10-20 knots** **High: >20 knots**	5-15 knots over south BoB and South Andaman Sea. 20 knots over central and north Andaman Sea. High (>20knots) over northern parts of central BoB & north BoB.	5-15 over the south and adjoining central AS, 20 over southern parts of central AS, High (>20 knots) over the central AS and North AS.
Wind Shear Tendency (knots)	Decreasing over South Andaman Sea and adjoining southeast BoB, Gulf of Mnnar, Comorin Area. Increastng over most parts of southwest, westcentral and north BoB.	Decreasing over southwest AS, increasing over remaining areas.
Upper Tropospheric Ridge	Along 12^{o}N over BoB.	Along 10^{o}N over AS.

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the Bay of Bengal & Andaman Sea:-
Scattered to broken low and medium clouds with embedded intense to very intense convection lay over southwest Bay of Bengal off north Tamil Nadu & east Sri Lanka coasts. Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral Bay of Bengal, south Andaman Sea and isolated weak to moderate convection lay over rest Bay of Bengal.

(b) Over the Arabian Sea:-
Scattered low and medium clouds with embedded intense to very intense convection lay over south Arabian Sea Comorin area and moderate to intense convection lay over Lakshadweep islands area. Scattered low and medium clouds with embedded isolated weak to moderate convection lay over northwest & westcentral Arabian Sea.

(c) Convection outside India:-
Scattered low and medium clouds with embedded moderate to intense convection lay over North Sri Lanka, Palk Strait, Gulf of Mannar, Maldives, Tibet, China, Yellow Sea, Gulf of Thailand, Cambodia, South Vietnam, Sumatra, Strait of Malacca, Malaysia, Borneo, South China Sea, Java Islands & Sea, Celebes islands & Sea, Philippines, Sulu Sea, North Madagascar, North Mozambique channel and over Indian Ocean between latitude 5.0N to 10.0S longitude 40.0E to 110.0E and between latitude 10.0S to 22.0S longitude 50.0E to 93.0E.

M.J.O. Index:
MJO index is currently in Phase 1 with amplitude greater than 1. It will enter phase 2 on 23rd Nov with amplitude greater than 1. It will remain in same phase till 26th with amplitude greater than 1. It will enter phase 3 on 27th with amplitude less than 1 and will remain in same phase till 29th Nov with amplitude less 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	Emergence of WML into South Andaman Sea on 24th Nov, moving northwestward and lay as CS near(11N/95E) on 25th over South Andaman Sea, moving in the same direction with further intensification as SCS over (13N/90E) Southeast BoB on 26th. Further moving Northwestward and intensification into VSCS over westcentral BoB (17.5N/88E) on 27th. System then move in northeastward and reach the Bangladesh coast on 28th Nov as depression.	No significant system during next 7 days.
IMD-GEFS	Emergence of WML into South Andaman Sea on 24th Nov, moving west-northwestward with intensification into depression/deep depression over South Andaman Sea and adjoining southeast BoB (11N/92E) on 25th Nov. System moves in northwestward and further intensifies into SCS over eastcentral adjoining Westcentral BoB (14N/88.5E) on 26th Nov. Moving in the same direction and intensifies into VSCS over westcentral BoB (17N/87E) on 27th. Further weakened into LPA over Northwest BoB (20.0N/88E) on 28th.	No significant system during next 7 days.
IMD-WRF	No significant system during next 3 days.	No significant system during next 3 days.
NCMRWF-NCUM	No significant system during next 7 days.	No significant system during next 7 days.
NCMRWF-NEPS	No significant system during next 7 days.	No significant system during next 7 days.
NCMRWF-UM (Regional)	No significant system during next 3 days.	No significant system during next 7 days.
ECMWF	Low over Southeast BoB (9N/89E) on 28th Nov. System intensified into depression over (10.5N/87E) southwest adjoining southeast BoB on 30th Nov. Further moving in northwestwards and intensification into CS over southwest BoB (10.5N/85E) on 1st Dec with.	No significant system during next 7 days.
ECMM	Indicating a depression over Andaman Sea around 27th Nov.	
NCEP-GFS	Emergence of LPA over South Andaman Sea near (9N/96E) on 26th Nov. Moving northwestwards and becomes WML over south Andaman Sea on 27th Nov, Moves in the same direction and intensification into CS over Southeast BoB and adjoining Andaman Sea (10N/92.5E) on 28th, SCS over southeast BoB (10.2N, 90.6E) on 28th Nov on the same day VSCS over southeast BoB (11.5N, 89.6E) on 29th, moving northwestward with further intensification.	No significant system.
IMD-Genesis Potential Parameter	Potential zone of over south Andaman Sea on 26th Nov. Having northwestward movement and lay over eastcentral and adjoining westcentral BoB on 28th Nov.	No potential zone over AS

Summary and conclusion:

1. For Bay of Bengal:

Models like IMD-GFS, IMD-GEFS, NCEP-GFS, ECMWF and ECMWF Ensemble (ECMM) are indicating a well marked low pressure area/depression over South Andaman Sea (IMD-GFS, IMD-GEFS on 24th, NCEP-GFS on 26th, ECMWF on 27th/28th, ECMM on 27th) having northwestward movement with further intensification. IMD-GFS is indicating its intensification

into cyclonic storm on 25th Nov over Andaman Sea. IMD-GEFS is indicating a depression over South Andaman Sea on 25th Nov, moving northwestwards with further intensification. NCEP-GFS is indicating a WML over south Andaman Sea on 27th Nov, moves northwestward with further intensification.

Considering all the above, there is likelihood of emergence of a cyclonic circulation over south Andaman Sea and neighborhood around 25th November. Under it's influence, a low pressure area is likely to form over South Andaman Sea around 26th November. It is likely to move west-northwestwards and intensify into a depression over southeast & adjoining Andaman Sea around 27th 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	LOW	MOD	HIGH

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

2. For the Arabian Sea:

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

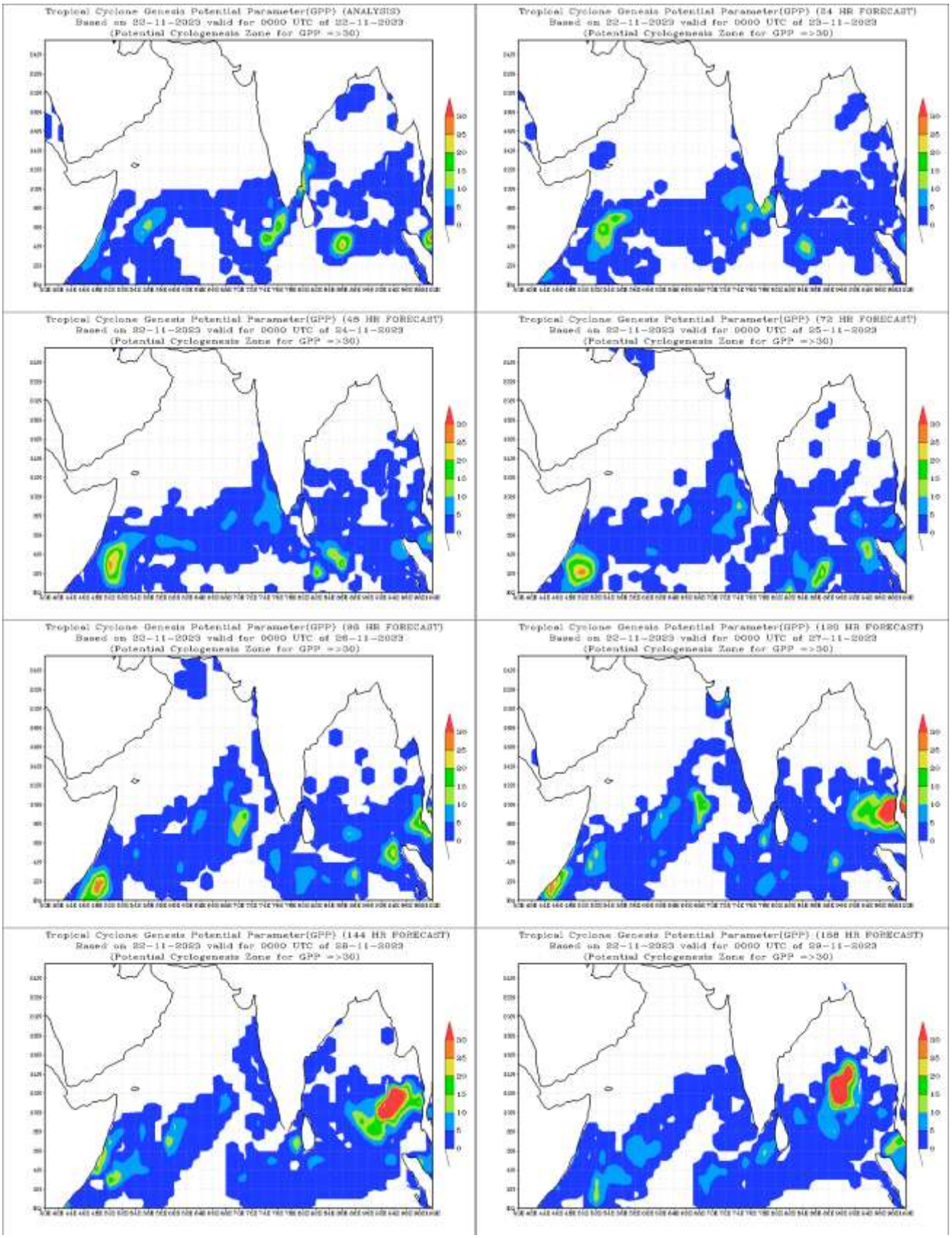
Probability of Cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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

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

IOP: IOP for Andaman & Nicobar Islands for 25th - 27th Nov.

ANNEXURE


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 22-11-2023 valid for 0000 UTC of 22-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 22-11-2023 valid for 0000 UTC of 23-11-2023
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Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 22-11-2023 valid for 0000 UTC of 24-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
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Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 22-11-2023 valid for 0000 UTC of 26-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
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Based on 22-11-2023 valid for 0000 UTC of 27-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
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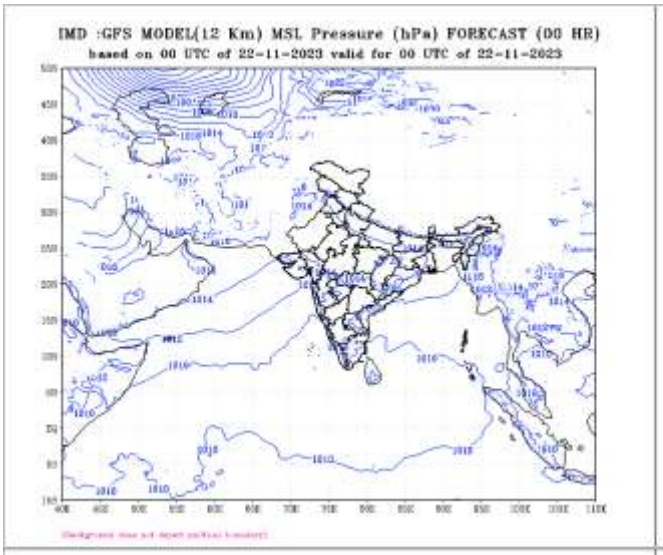
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
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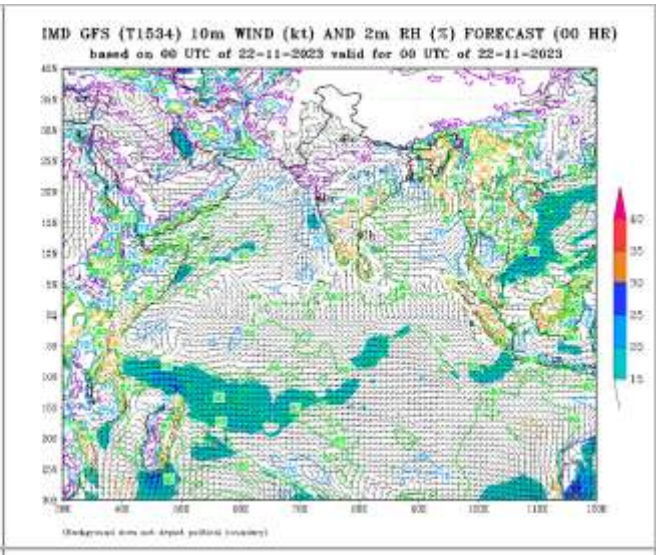
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
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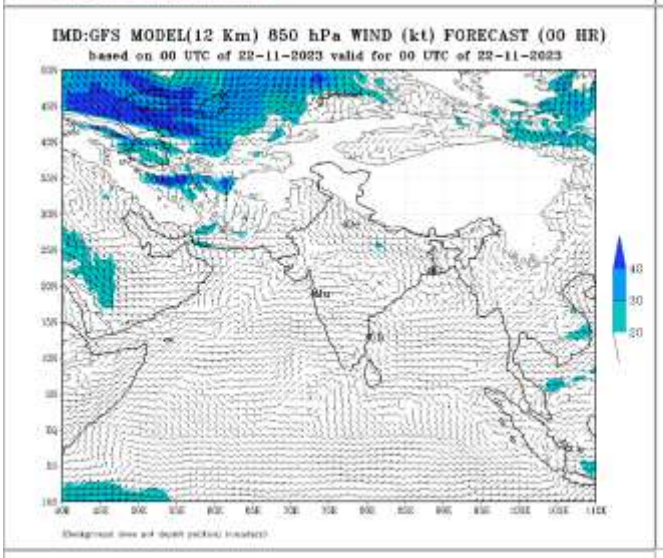
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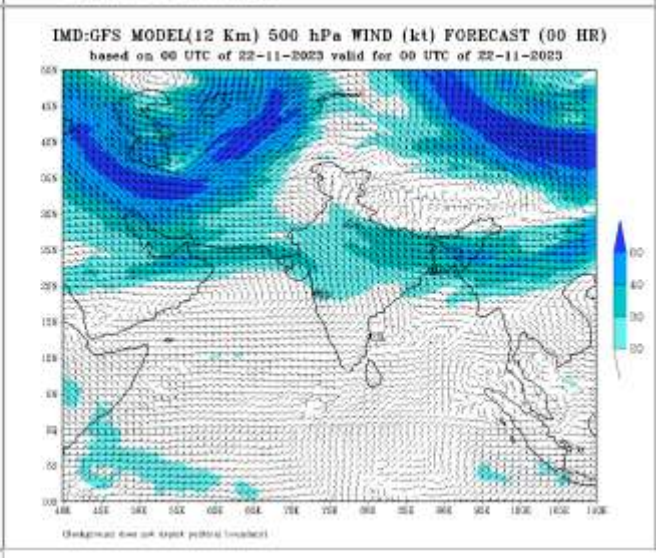
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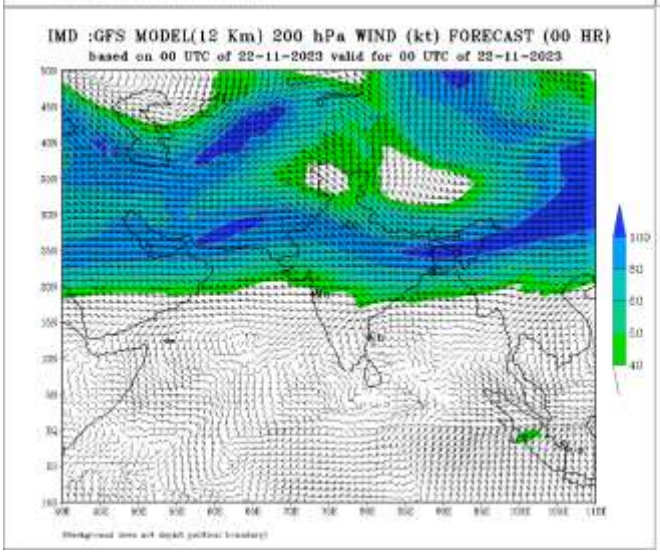
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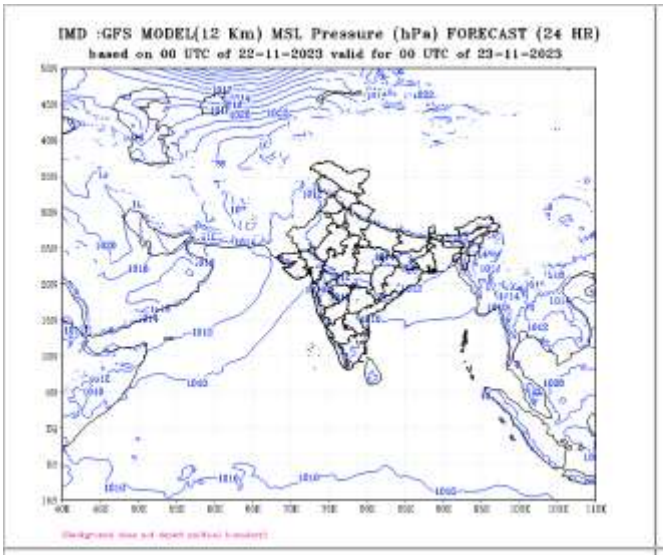
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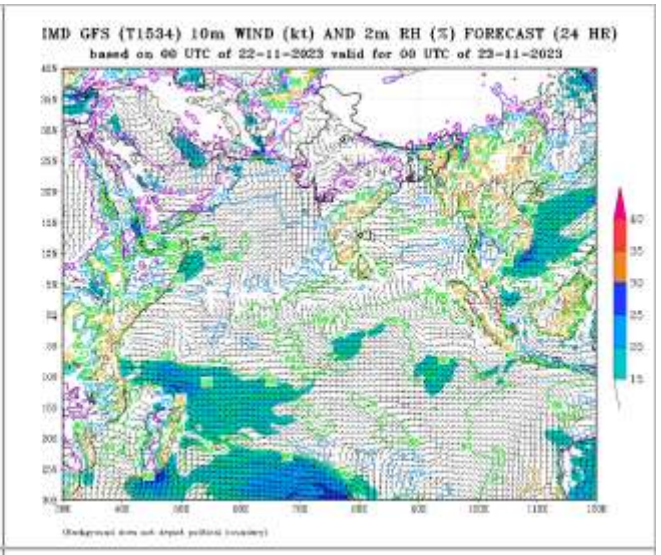
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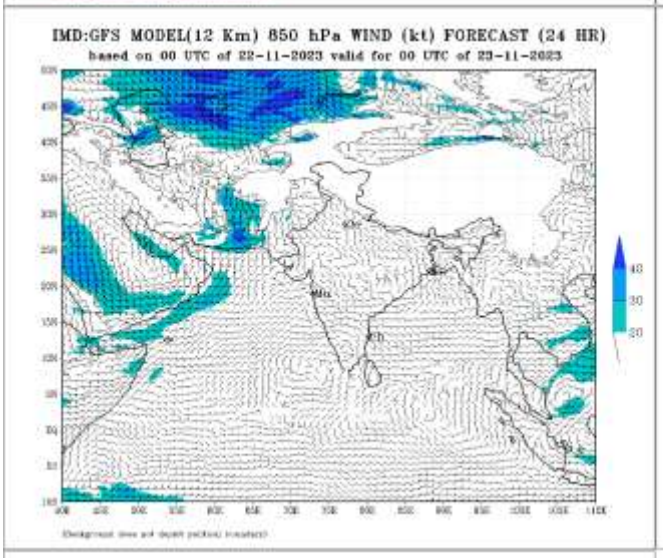
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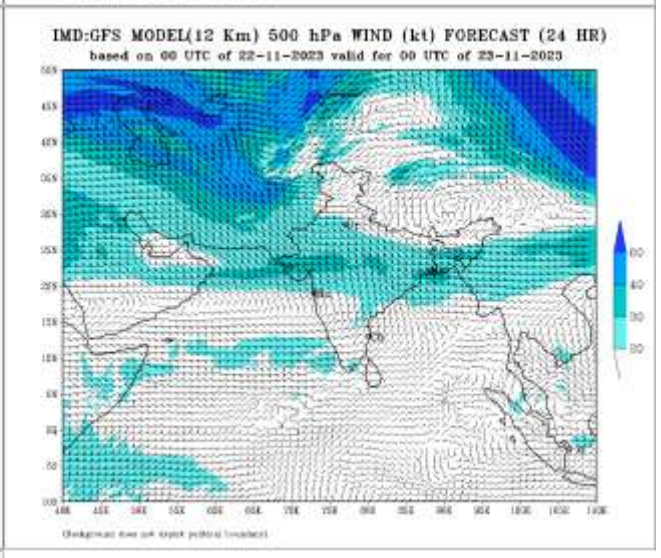
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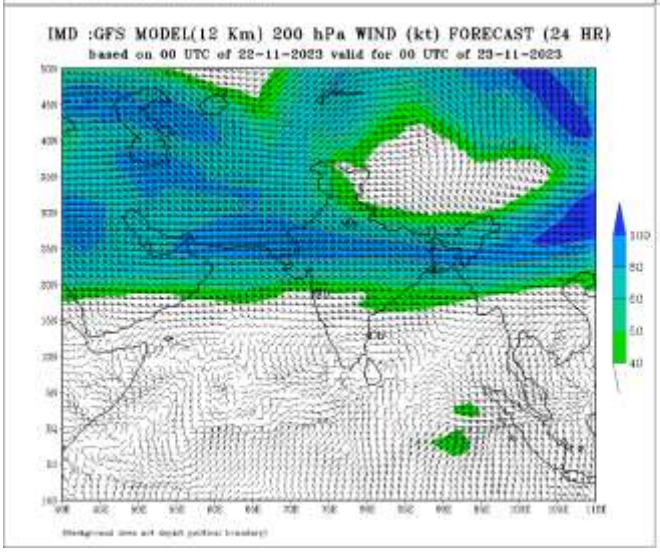
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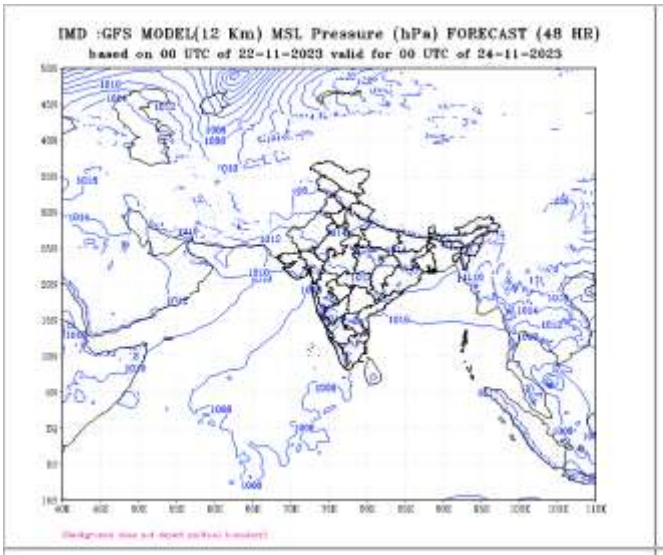
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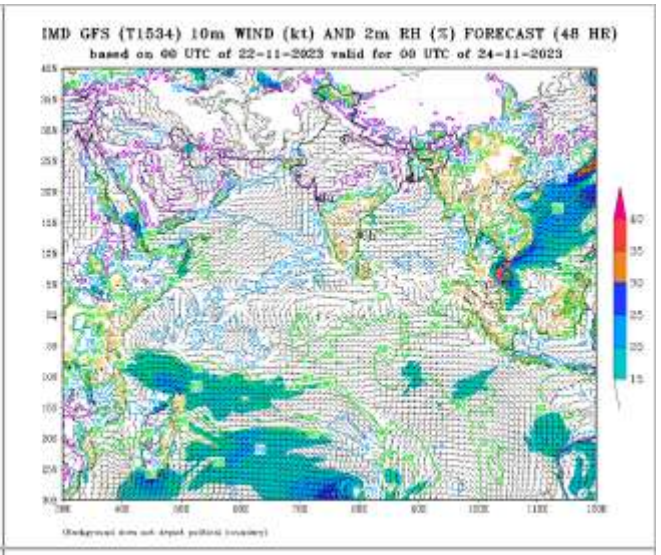
based on 00 UTC of 22-11-2023 valid for 00 UTC of 24-11-2023


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
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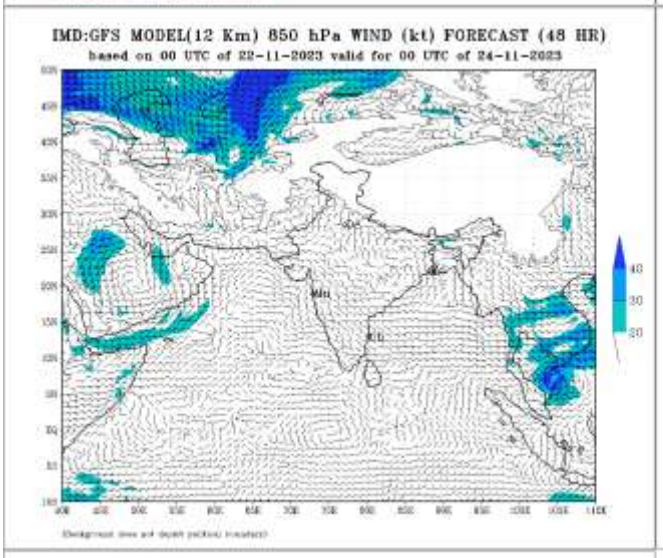
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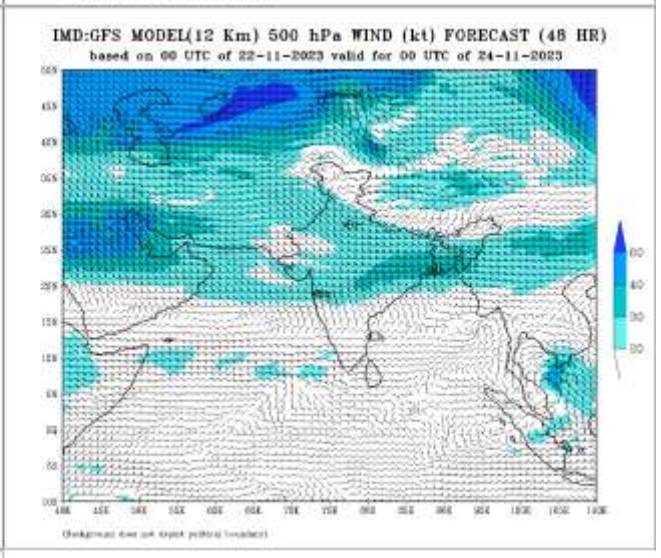
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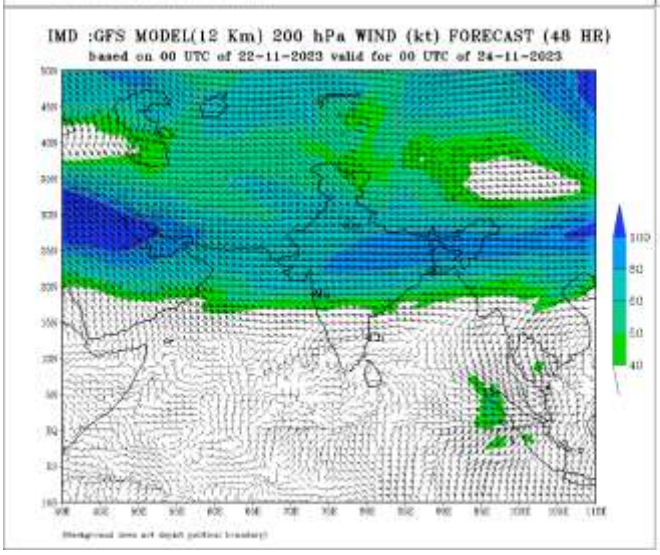
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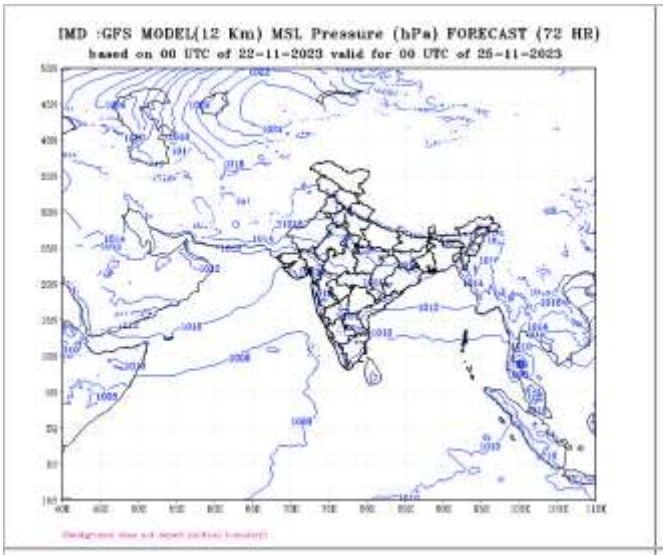
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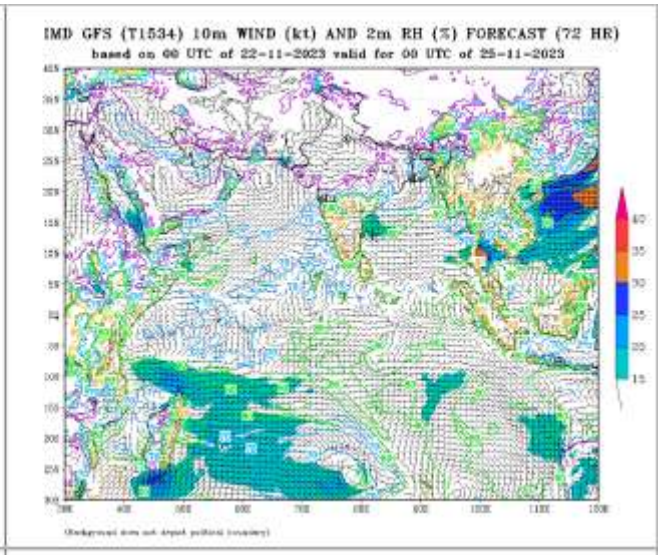
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
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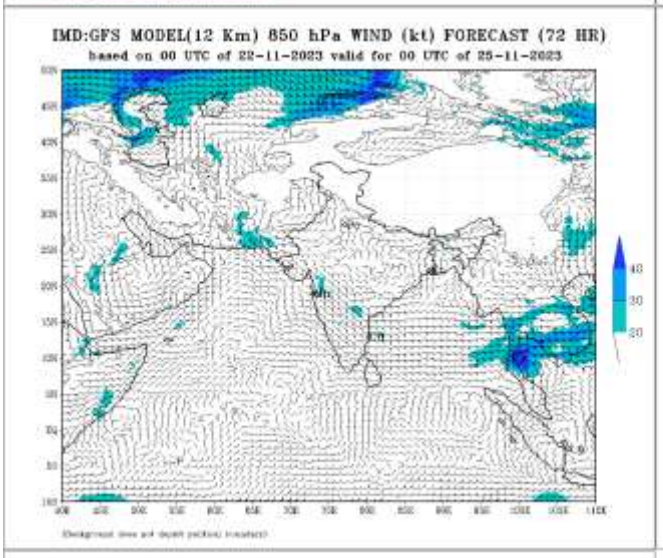
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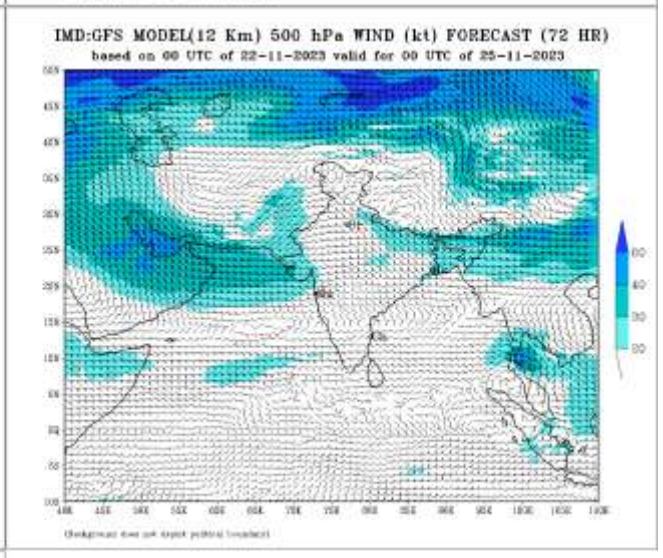
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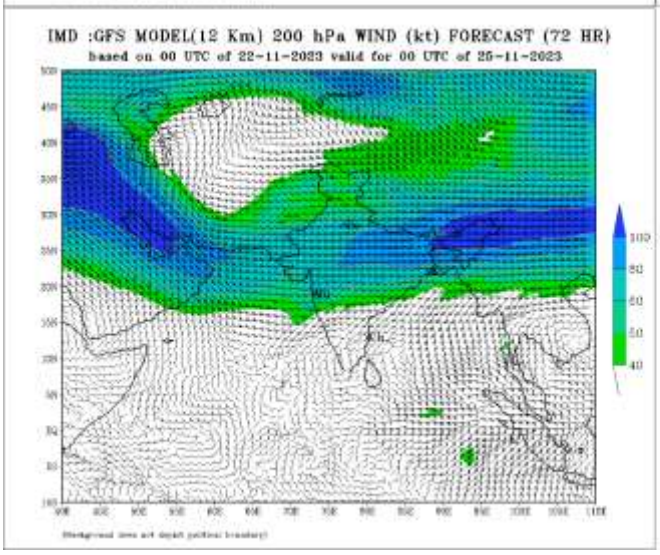
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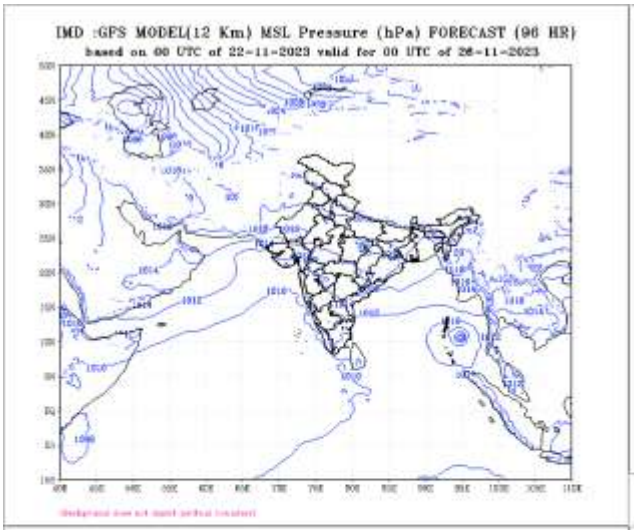
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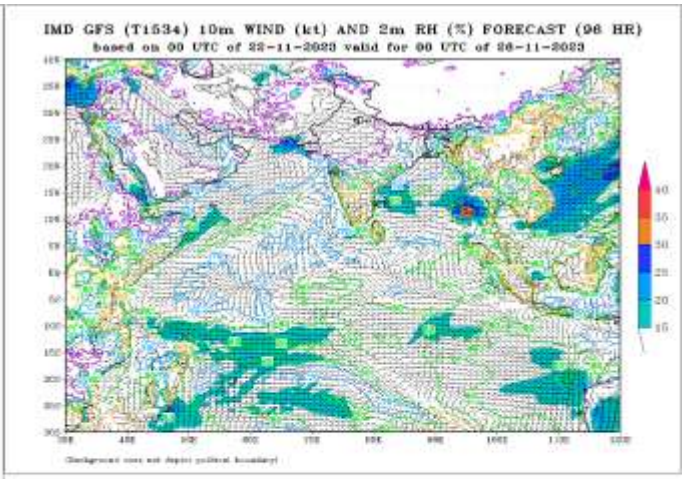
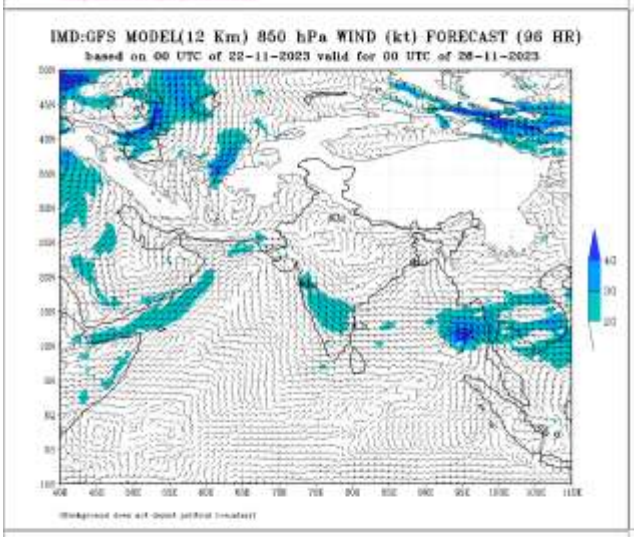

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 26-11-2023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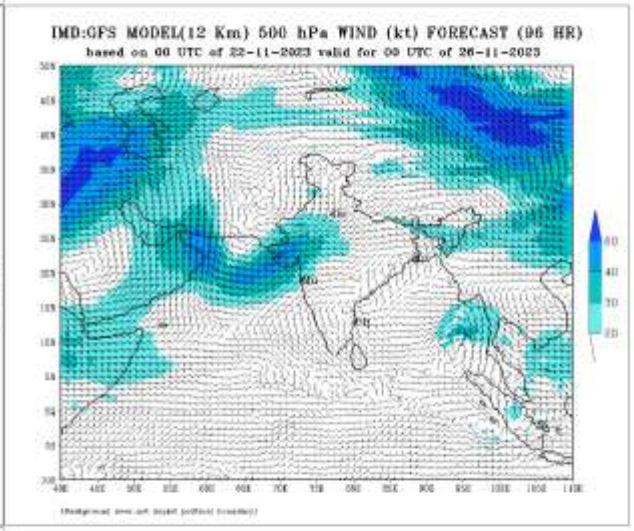
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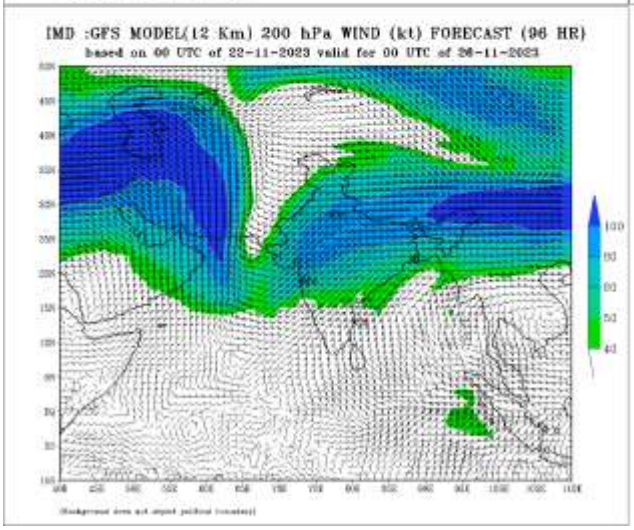
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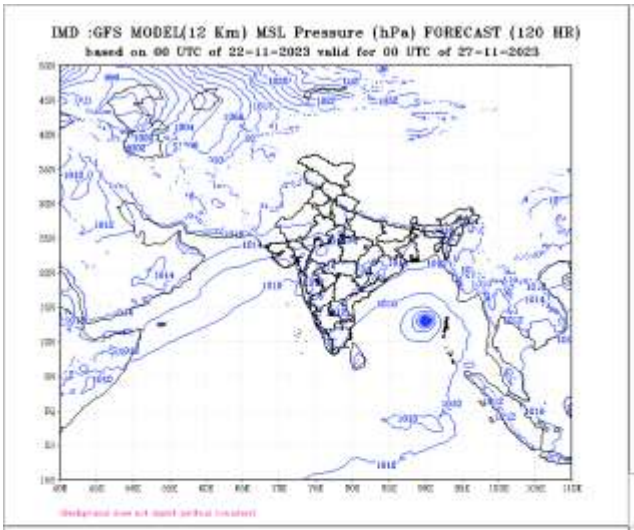
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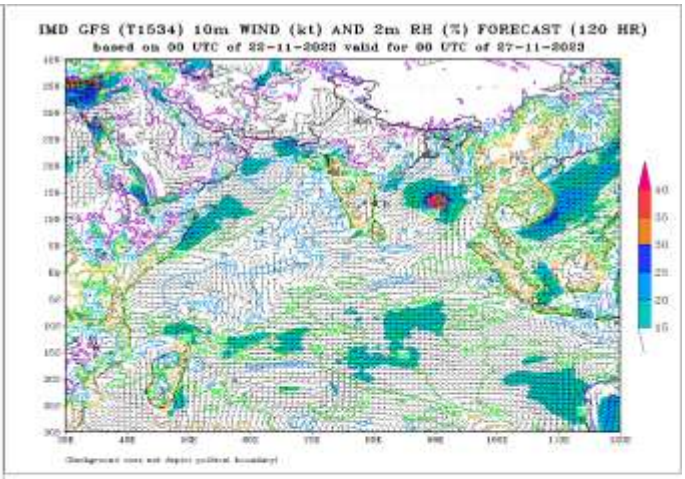
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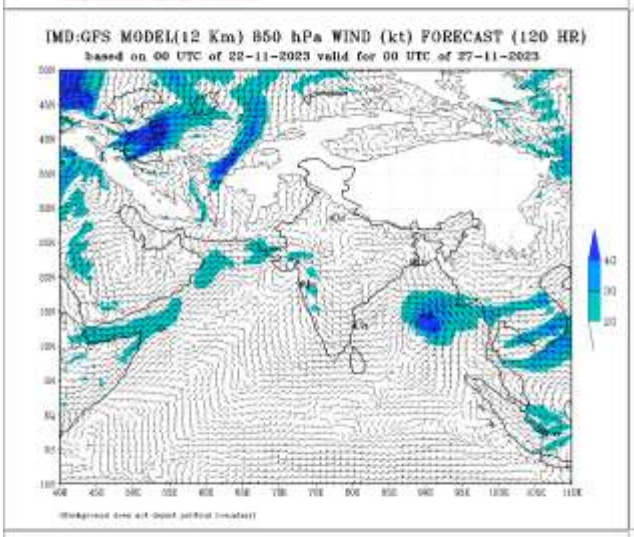
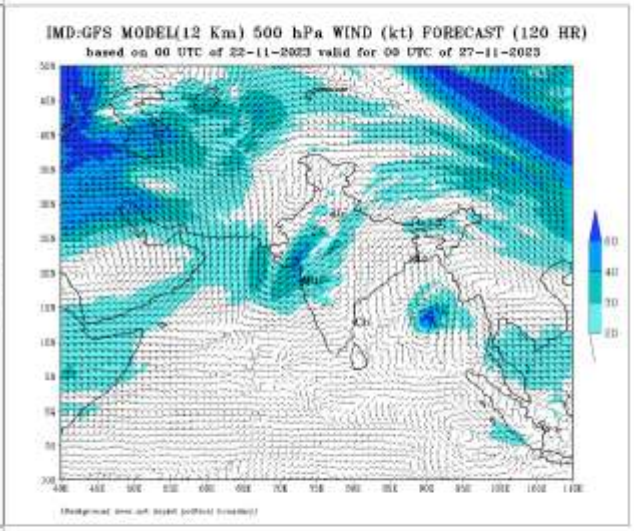
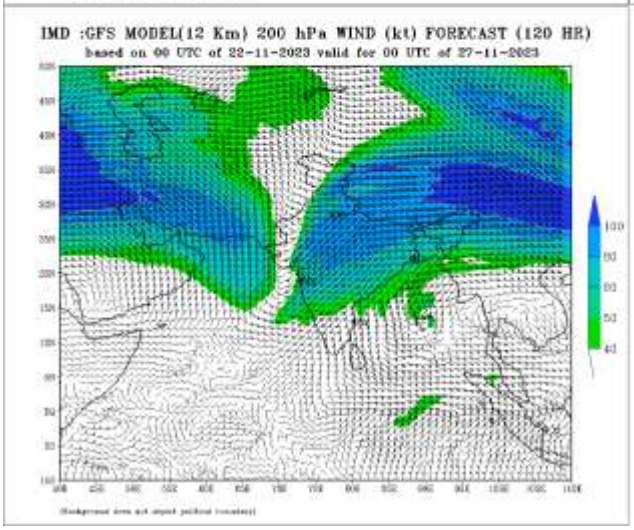
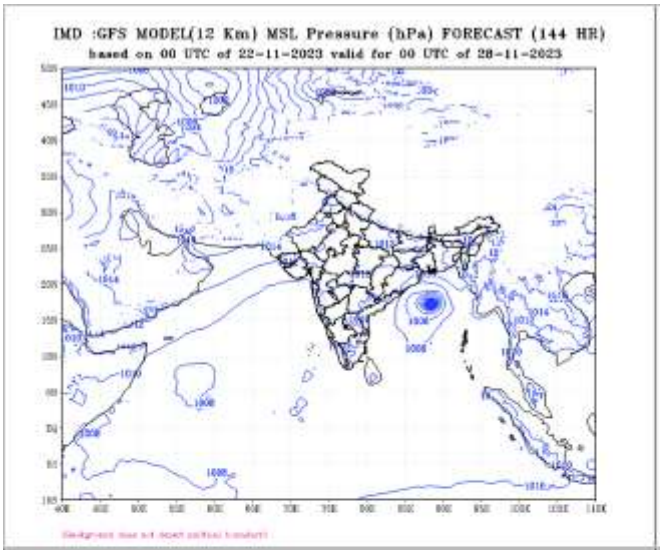
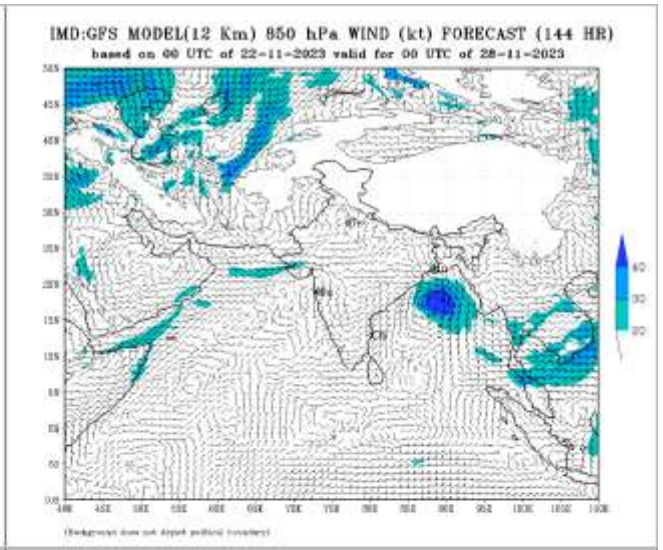
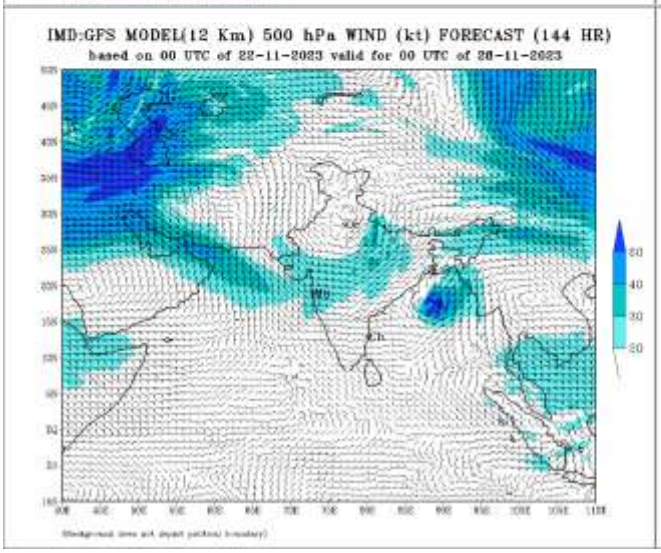

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 27-11-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 27-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 27-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 28-11-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 28-11-2023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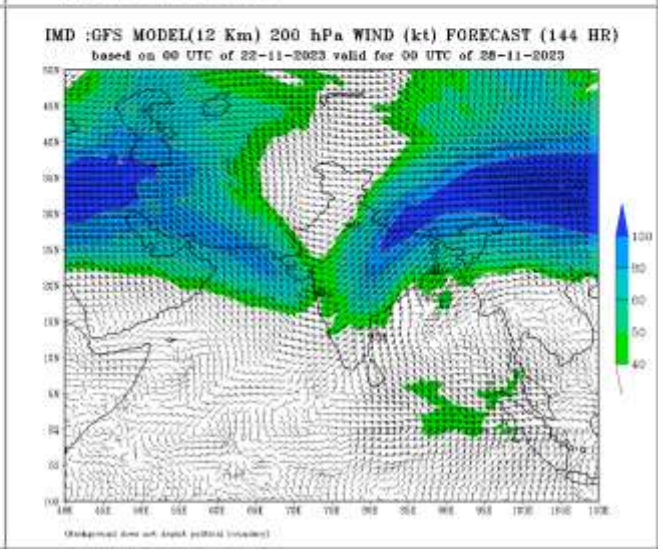
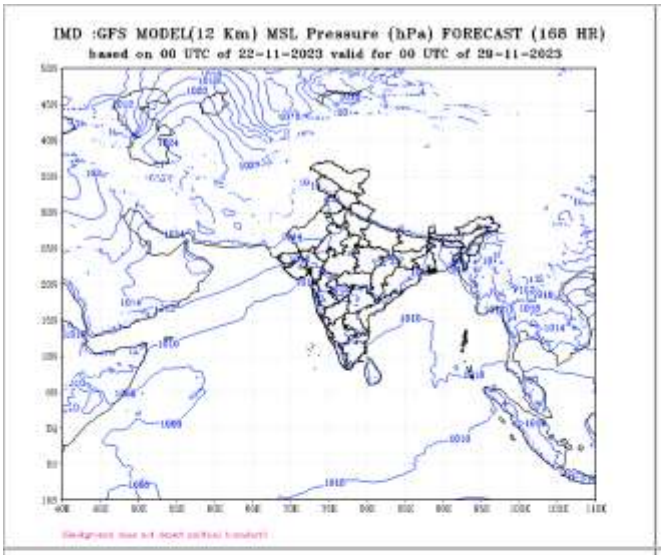
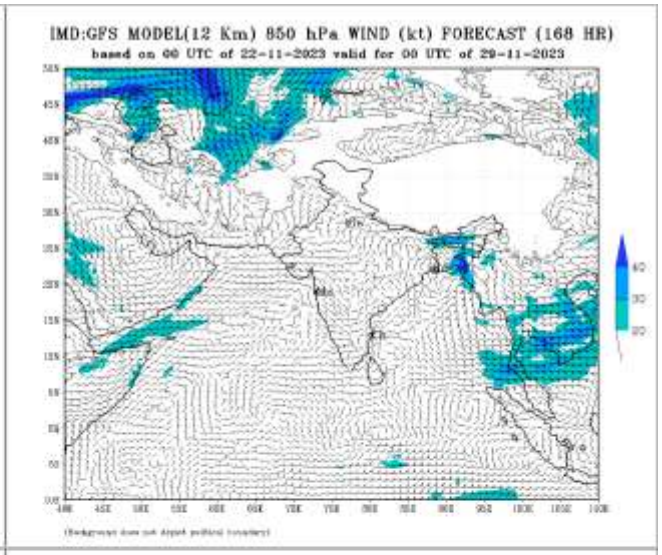
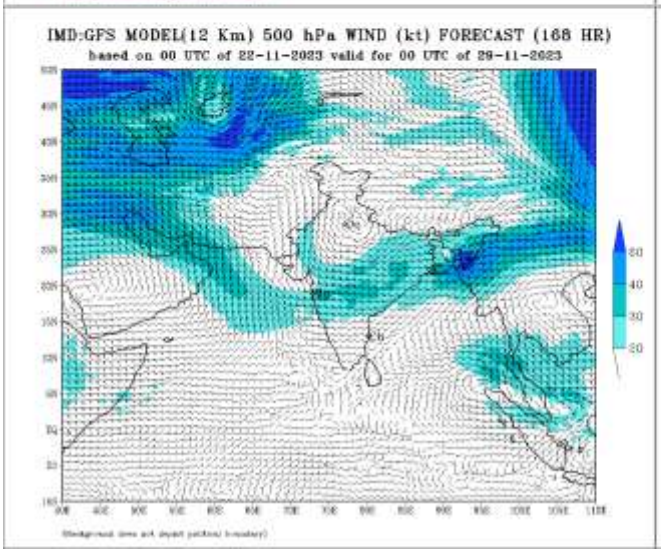
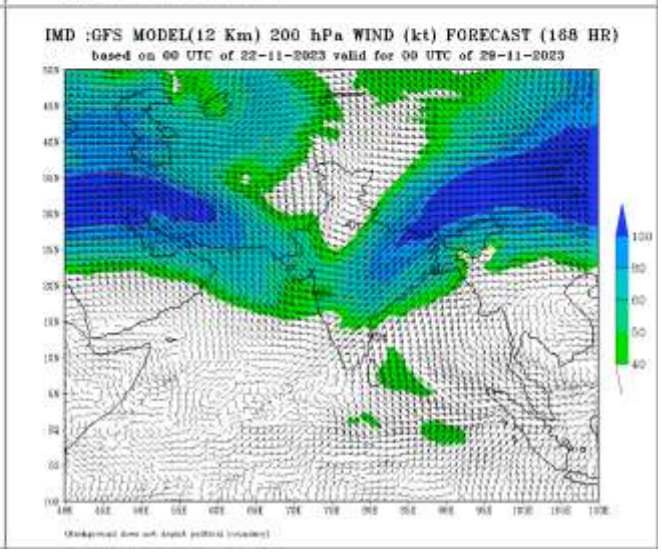
based on 00 UTC of 22-11-2023 valid for 00 UTC of 28-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 28-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 29-11-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 29-11-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 29-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 22-11-2023 valid for 00 UTC of 29-11-2023