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

Tropical Cyclone Forecast Programme
Report Dated 24th November, 2023

Time of Issue: 1230 UTC

Synoptic features (based on 0300 UTC analysis):

1. There is likelihood of emergence of a cyclonic circulation over South Andaman Sea and neighbourhood around 26th November. Under its influence, a low pressure area is likely to form over South Andaman Sea and adjoining southeast Bay of Bengal around 27th November. It is likely to move west-northwestwards and intensify into a depression over southeast Bay of Bengal around 29th November.
2. A Cyclonic Circulation lies over Southeast & adjoining Southwest Arabian Sea & extends upto 1.5km above mean sea level.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	28-30 over major parts of BoB. 26-28^{0}C over parts of westcentral and north BoB.	29-30 over southeast, adjoining southwest and eastcentral AS and north AS. 26-28 over most parts of central adjoining AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	70-90 over Andaman Sea and parts of eastcentral BoB. 90-100 over southwest BoB.	100-110 over parts of south and eastcentral AS.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	50 -60 over east equatorial region and adjoining southeast BoB.10-20 over parts of south BoB and south Andaman Sea. 40-50 over Bangladesh coast. 60-80 over Gulf of Thailand at 850Hpa with vertical extension upto 500 Hpa.	10-20 over South and Eastcentral AS. 30-40 over Southwest AS off Somalia. 30-40 over west EIO adjoining southwest BoB.
Low Level convergence (X10^{-5} s^{-1})	Extended zone of 5 over south Andaman Sea. 5 over southwest BoB.15-20 over gulf of Thailand	Zone of 10-15 over comorin area adjoining southeast AS. 5 over southeast and adjoining Eastcentral AS. Extended zone of 5-15 over southwest adjoining west EIO. 5 along north Maharashtra Coast.
Upper Level divergence (X10^{-5} s^{-1})	Extended zone of 10 over Andaman Sea adjoining southeast BoB.10-20 over Gulf of	10-20 over southwest adjoining west EIO. 5-10 over southeast adjoining eastcentral AS along

	Thailand and adjoining Andaman Sea.	Karnataka coast.
Vertical Wind Shear (VWS knots) **Low: 05-10 knots** **Moderate:10-20 knots** **High: >20 knots**	5-15 knots over south Andaman Sea. 5-10 over south BoB. 20 knots over parts of central BoB and north Andaman Sea. High (>20knots) over central & north BoB. Low 5-10 over Gulf of Thailand and adjoining Andaman Sea.	5-15 over the south AS, High (>20 knots) over the central and North AS.
Wind Shear Tendency (knots)	Decreasing over southwest BoB adjoining east EIO. Increasing over southeast and northwest BoB. Negative over gulf of Thailand.	Decreasing over Comorin area, northwest adjoining northeast AS, along the coast of Yemen, over southwest adjoining southeast AS.
Upper Tropospheric Ridge	Along 12^{o}N over BoB.	Along 10^{0}N over AS.

Satellite observations based on INSAT imagery (0600 UTC):

(a) Over the Bay of Bengal & Andaman Sea:-
Scattered Low and Medium Clouds with Embedded Moderate to Intense Convection lay over Westcentral Bay of Bengal adjoining South Coastal Andhra Pradesh, Southeast Bay of Bengal adjoining South Andaman Sea.

(b) Over the Arabian Sea:-
Scattered low and medium clouds with embedded intense to very intense convection lay over eastcentral Arabian Sea adjoining south Karnataka coast. Scattered low and medium clouds with embedded moderate to intense convection lay over southeast Arabian Sea, Lakshadweep islands area and comorin area.

(c) Convection outside India:-
Scattered low and medium clouds with embedded moderate to intense convection lay over Gulf of Mannar Maldives north Tibet adjoining china 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 20.0S longitude 50.0E to 80.0E.

M.J.O. Index:
MJO index is currently in Phase 2 with amplitude greater than 1. It will remain in same phase till 28th Nov with amplitude greater than 1. It will enter phase 3 on 29th Nov with amplitude greater than 1, it will remain in phase 3 but amplitude will reduce to less than 1 on 3rd December. It will remain in phase 3 with amplitude less than 1 till 7th Dec.

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

A low pressure area is centered near latitude 4.1N and longitude 107.8E at 0600 UTC of 14th November. Associated maximum sustained wind speed is 10-15 knots.

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

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
IMD-GFS	Well marked low pressure area (WML) over South Andaman Sea on 26th Nov, Moving northwestwards and becomes deep depression (DD) over southeast BoB and adjoining Andaman sea on 27th Nov, It would cross Andaman and Nicobar island as DD/CS around 27th/1200 UTC. Cyclonic storm (CS) over (10N/91E) southeast BoB on the 28th Nov. It would move west-northwestwards with further intensification till 30th Nov, thereafter it would move northwestwards with gradual weakening towards Westcentral Bay till 4th Dec.	No significant system during next 7 days.
IMD-GEFS	Low pressure area (LPA) over South Andaman Sea and adjoining Southeast BoB on 26th Nov. It would move in west-northwestward and intensify into a depression over southeast BoB and adjoining Andaman Sea on 27th Nov, deep depression (DD) over Southeast adjoining Eastcentral BoB on 28th Nov. It would then move northward and intensify into CS over (15N/88E) Westcentral BoB on 29th Nov. It would weakens over Eastcentral adjoining Northeast BoB as WML on 30th Nov.	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	LPA over Southeast BoB on 1st Dec. Depression over Southwest BoB on 3rd Dec. Northwestwards movement towards Tamil Nadu coast is indicated as a depression. Fresh cycir over South Andaman sea on 1st Dec. Low pressure area over Southeast BoB on 4th Dec.	Cycir over Southwest AS on 25th Nov. To move slowly westwards and intensify into LPA over Southwest AS on 1st Dec, Depression over southwest AS on 3rd Dec. DD over Southwest and adjoining westcentral AS on 4th Dec.
NCMRWF-NEPS	Similar to NCUM Global	Similar to NCUM Global
NCMRWF-UM (Regional)	No significant system during next 3 days.	No significant system during next 7 days.
ECMWF	LPA over southeast BoB on 29th Nov. WML over southeat & adjoining southwest BoB on 30th Dec and Depression over the southwest on 1st Dec. To move West-northwestward thereafter. Depression over southwest & adjoining westcentral BoB on 3rd Dec.	No significant system during next 7 days.
ECMM	ECMM is indicating formation of depression around 28th Nov over South Bay of Bengal. Some of the ensemble members are indicating movement towards Tamil Nadu-Andhra Pradesh coasts and some members are indicating northeastwards recurvature towards Bangladesh coast.	No significant system during next 7 days.
NCEP-GFS	LPA over South Andaman Sea on 27th Nov, Depression over Southeast BoB adjoining Andaman Sea on 28th Nov. To move west-northwestwards and intensify into a CS on 30th Nov over southeast	No significant system.

	BoB. Severe Cyclonic Storm (SCS) over Eastcentral BoB on 1st Dec. Weakening is indicated after 2nd December. WML near Bangladesh Coast on 3rd Dec.	
IMD-Genesis Potential Parameter	Potential zone over South Andaman Sea on 27th and 28th Nov, over southeast BoB and adjoining Andaman Sea on 29th Nov, over southeast and adjoining eastcentral BoB on 30th Nov over Eastcentral BoB on 1st Dec.	Potential zone over Southwest AS on 30th Nov, over Southwest adjoining westcentral AS on 1st Dec.

Summary and conclusion:

1. For Bay of Bengal:

Most of the models are indicating formation of depression over Bay of Bengal during 29th - 30th November. However, there is large variation among various models wrt area of formation, time of formation and peak intensification. IMD GFS and NCEP GFS are indicating likely emergence of a cyclonic circulation into south Andaman Sea around 26th with formation of low pressure area around 27th over south Andaman Sea. GFS group of models are indicating formation of depression around 28th, with further intensification into cyclonic storm and above intensity storm. These models are indicating initial west-northwestwards movement till 1st December, followed by north-northeastwards movement thereafter. However, gradual weakening is indicated from 3rd December over westcentral BoB. NCUM is showing very delayed formation of cyclonic circulation over southeast BoB on 29th, low pressure area on 1st December and depression over southwest BoB on 3rd December. ECMWF is indicating a low pressure area over southeast BoB on 28th and intensification into depression on 30th November.

In view of all the above, it is inferred that there is likelihood of emergence of a cyclonic circulation over South Andaman Sea and neighbourhood around 26th November. Under its influence, a low pressure area is likely to form over South Andaman Sea and adjoining southeast Bay of Bengal around 27th November. It is likely to move west-northwestwards and intensify into a depression over southeast Bay of Bengal around 29th November.

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 of 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.

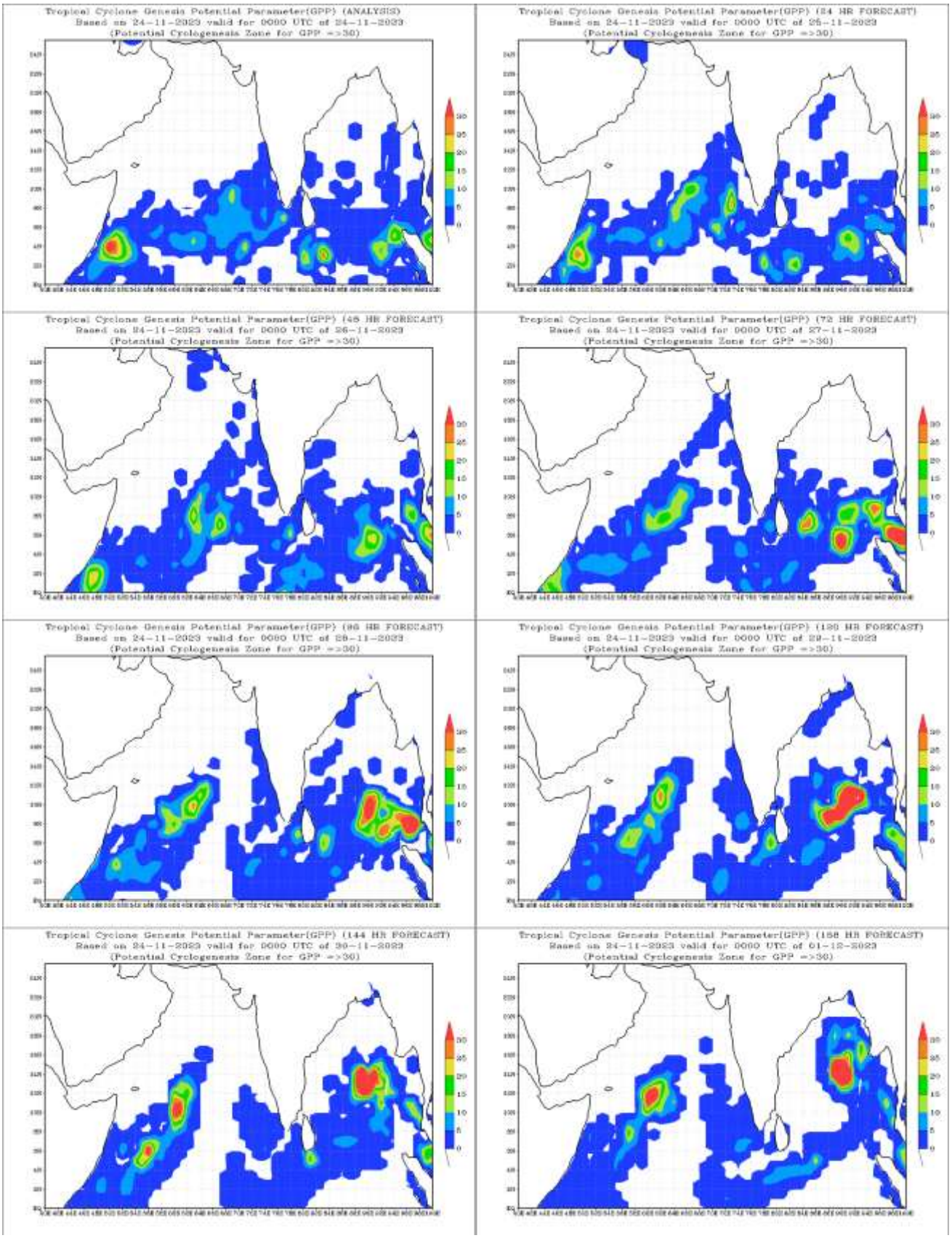
Probability of Cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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 of next day.

IOP: IOP for Andaman & Nicobar Islands for 27th and 28th.

ANNEXURE


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 24-11-2023 valid for 0000 UTC of 24-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 24-11-2023 valid for 0000 UTC of 25-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 24-11-2023 valid for 0000 UTC of 26-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 24-11-2023 valid for 0000 UTC of 27-11-2023
(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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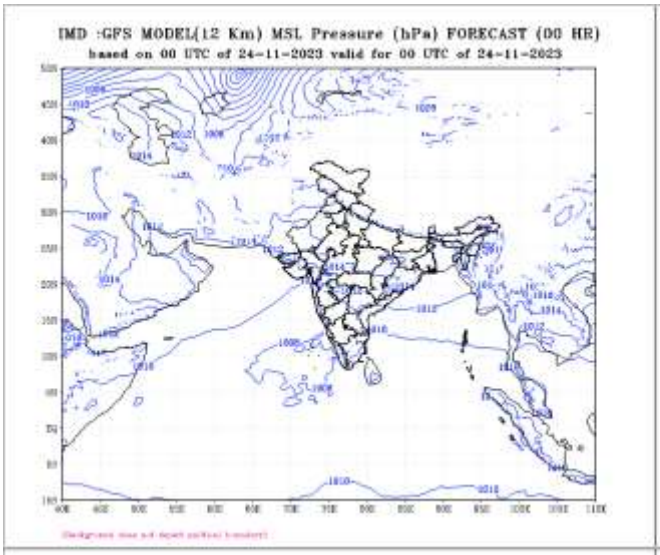
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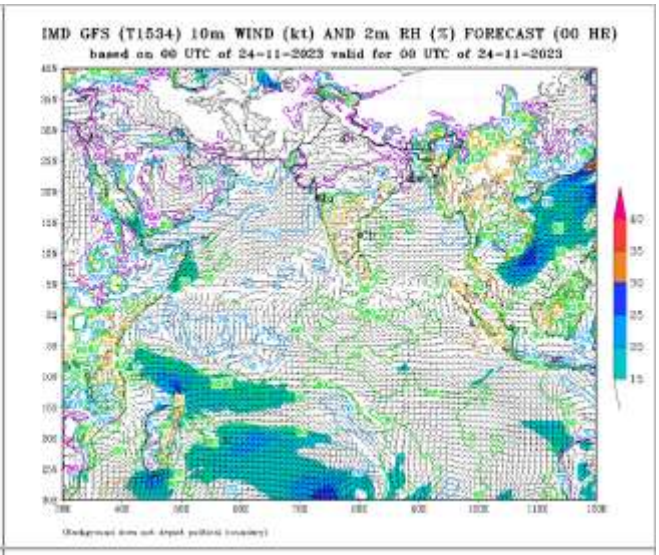
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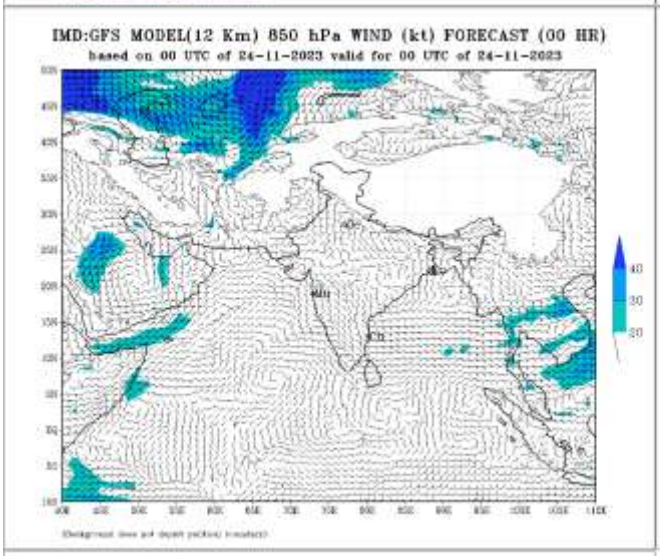
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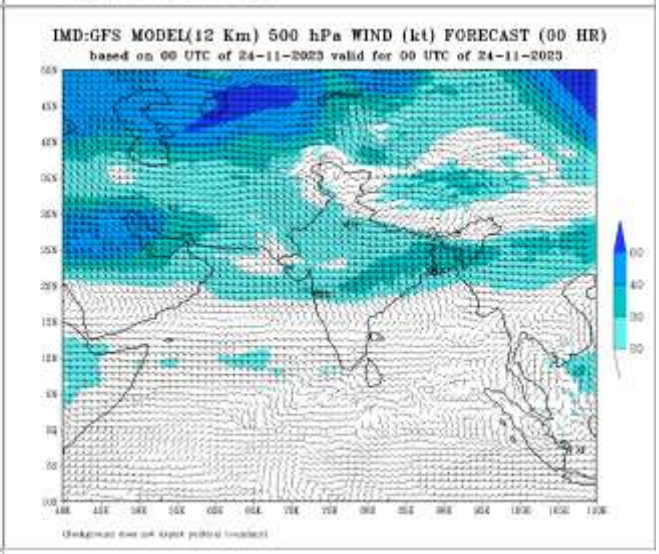
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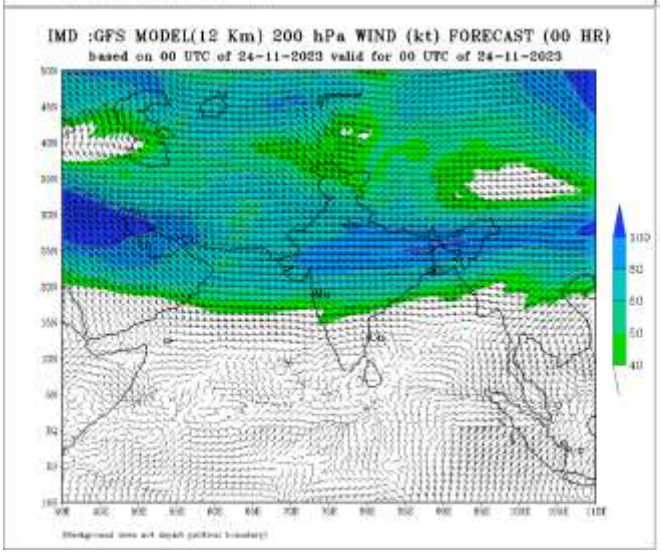
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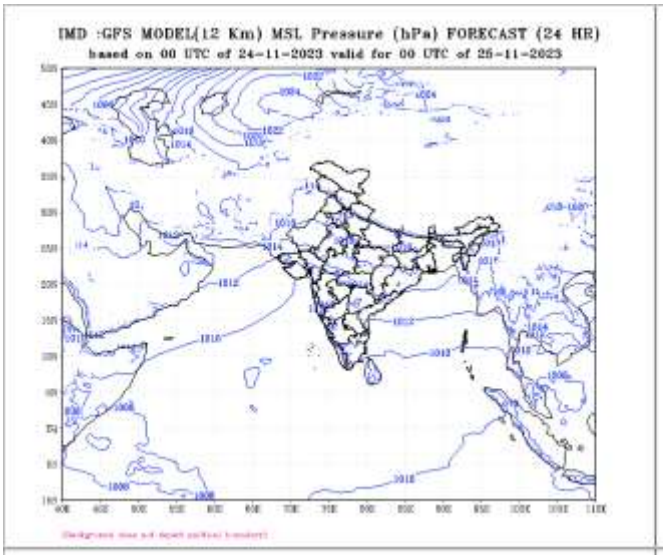
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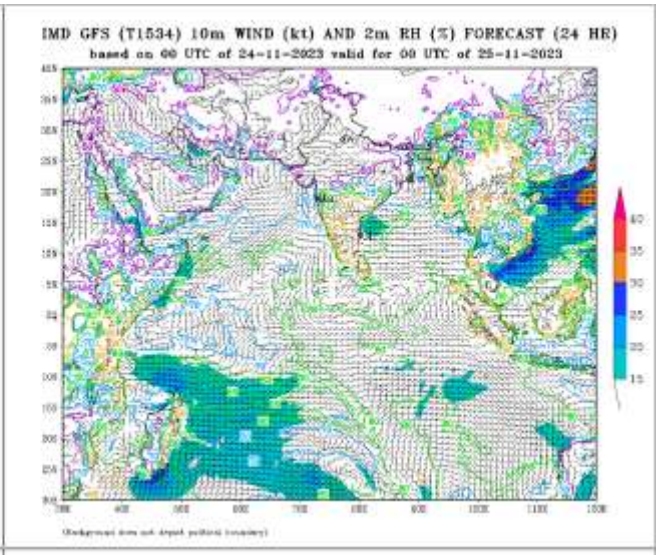
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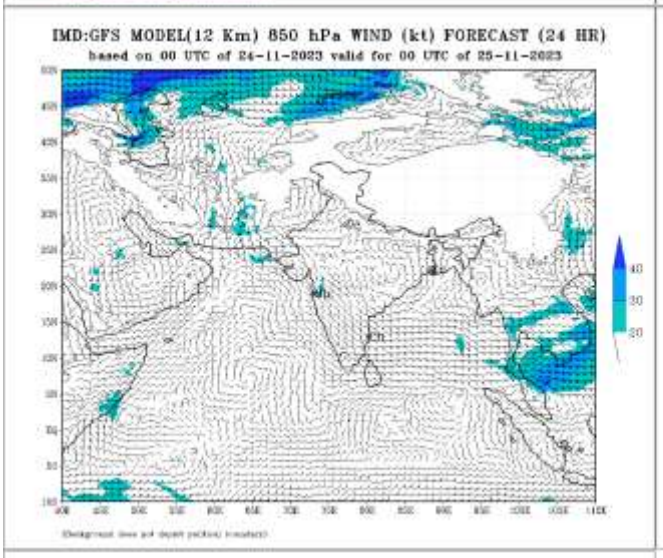
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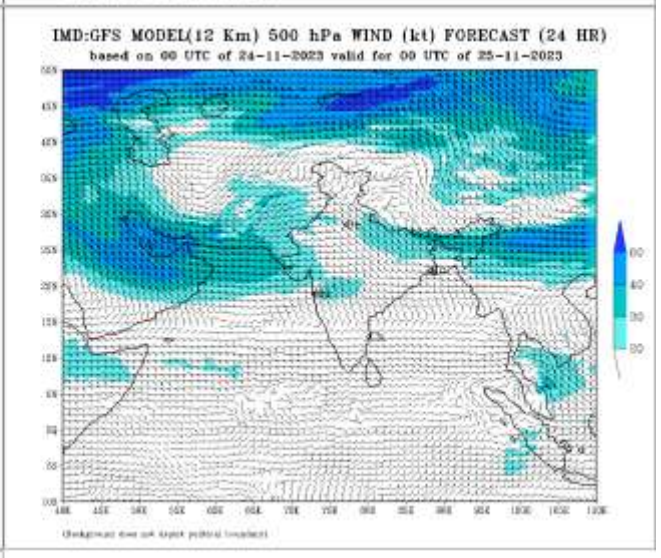
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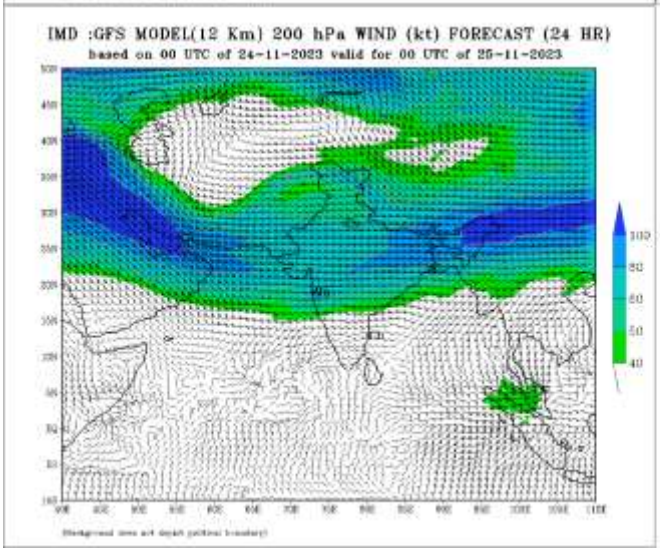
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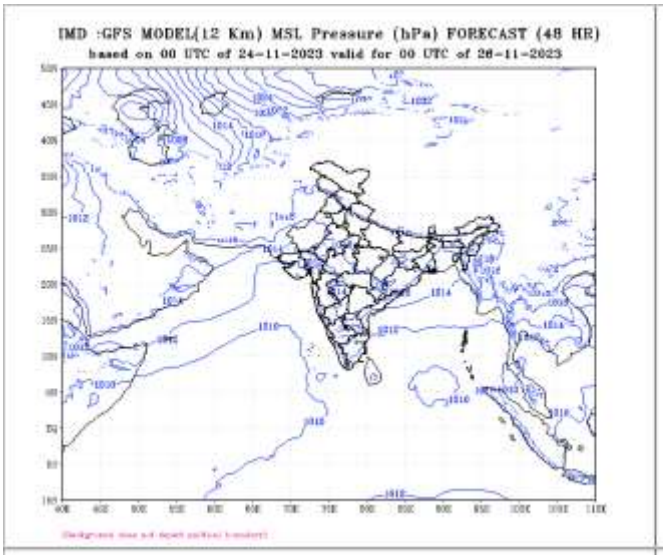
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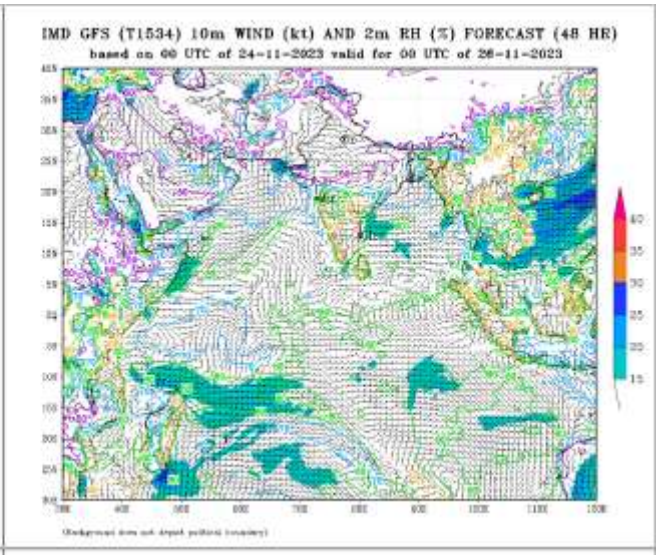
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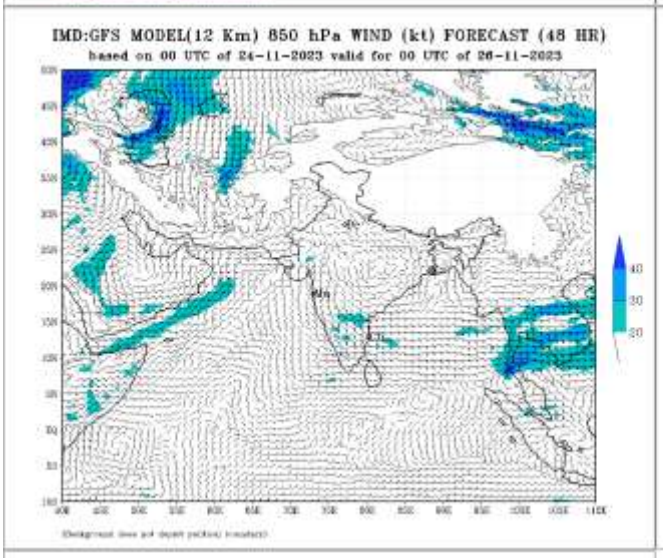
based on 00 UTC of 24-11-2023 valid for 00 UTC of 26-11-2023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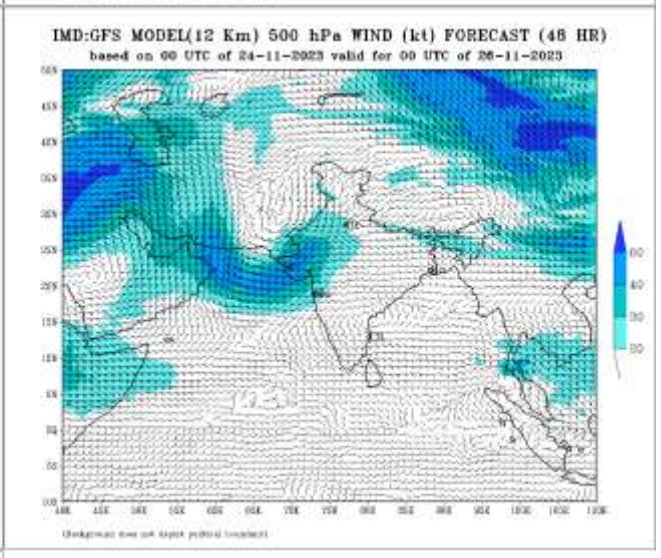
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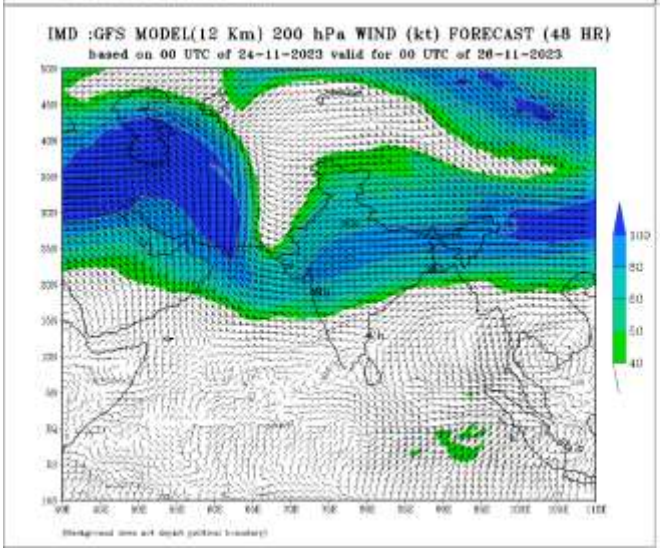
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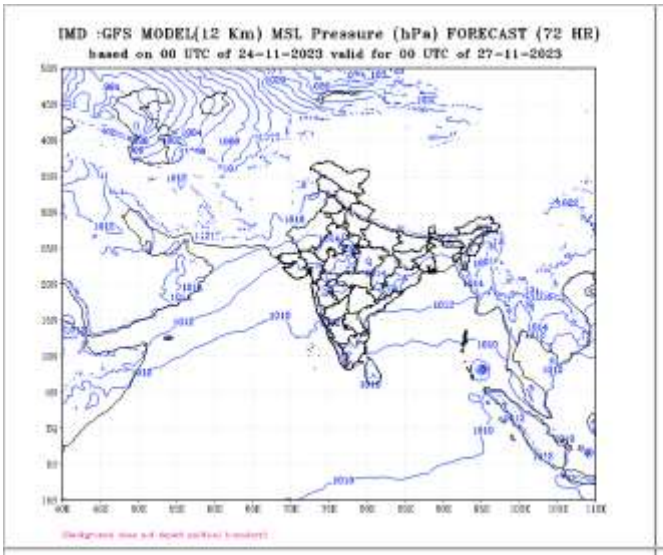
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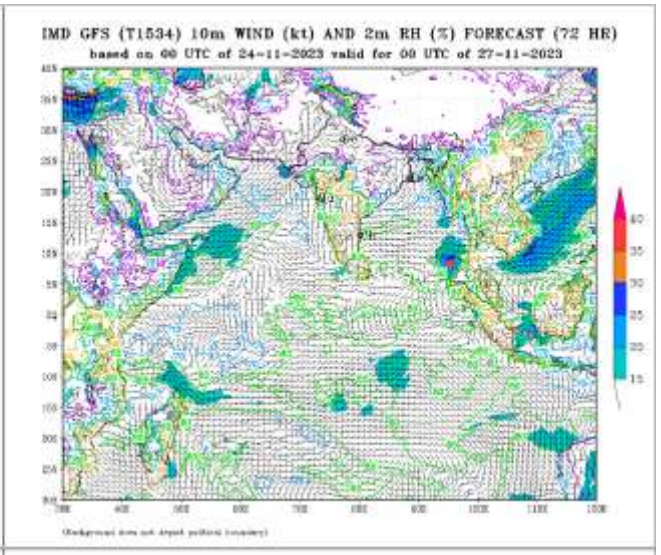
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
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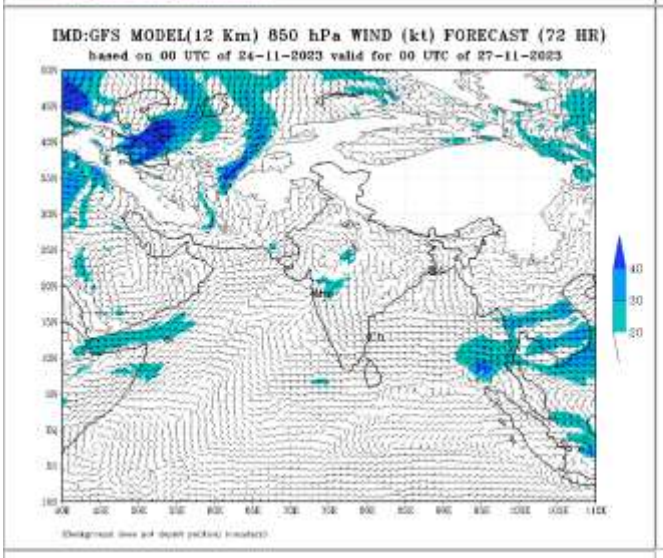
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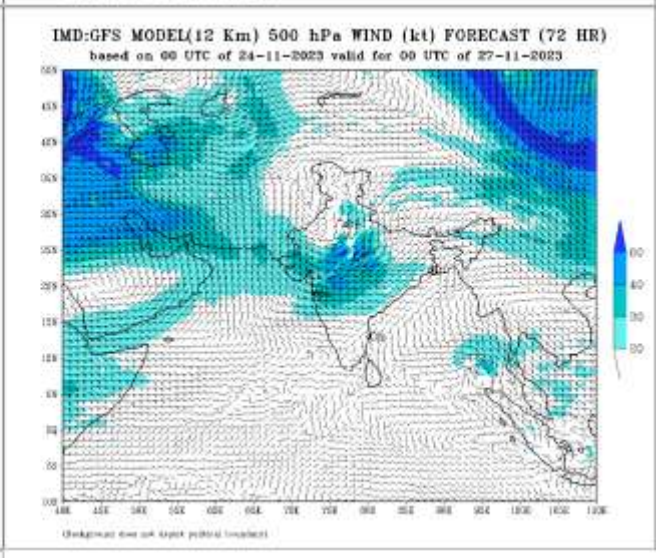
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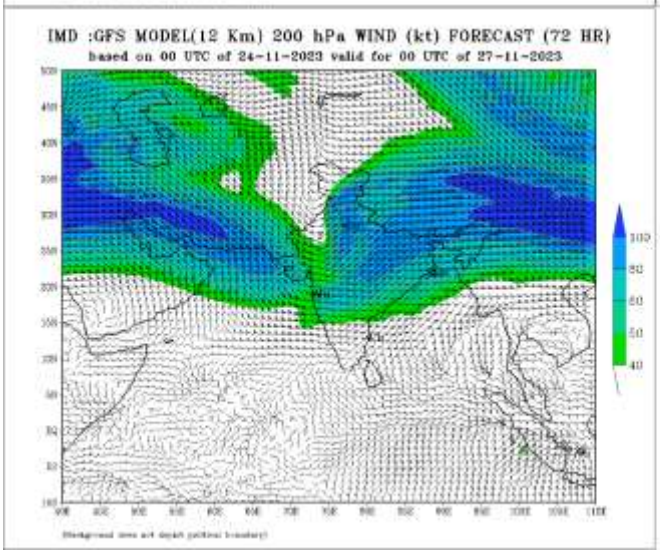
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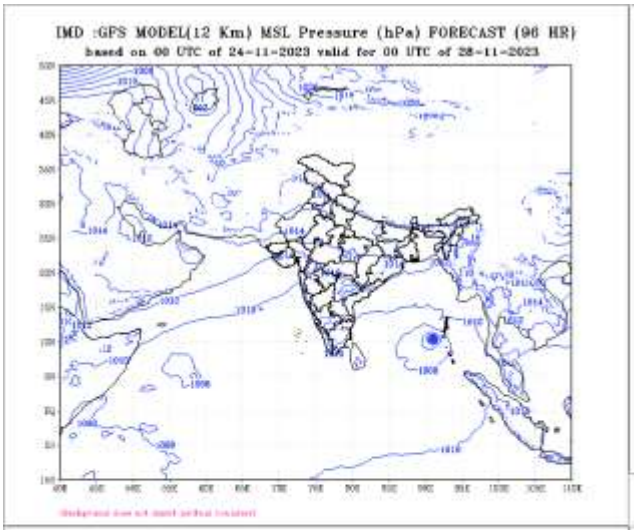
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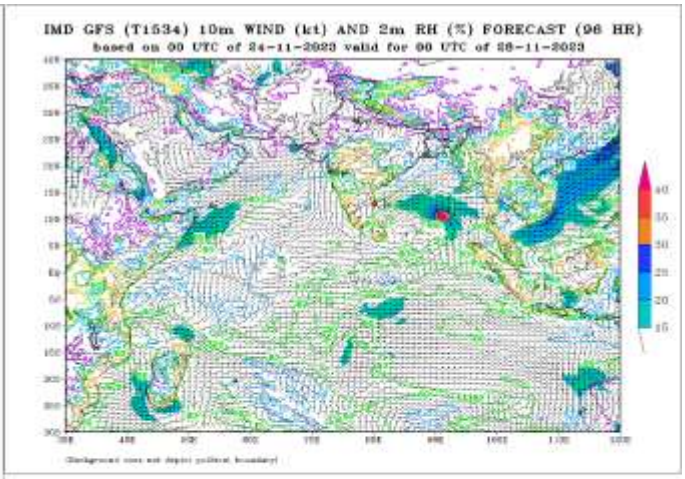
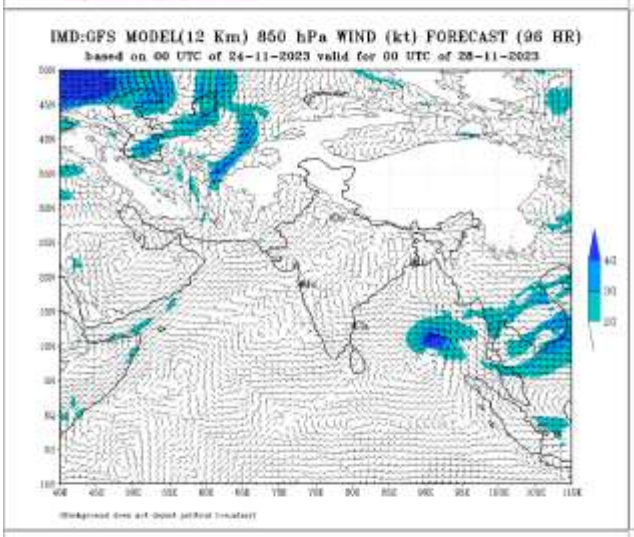

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 28-11-2023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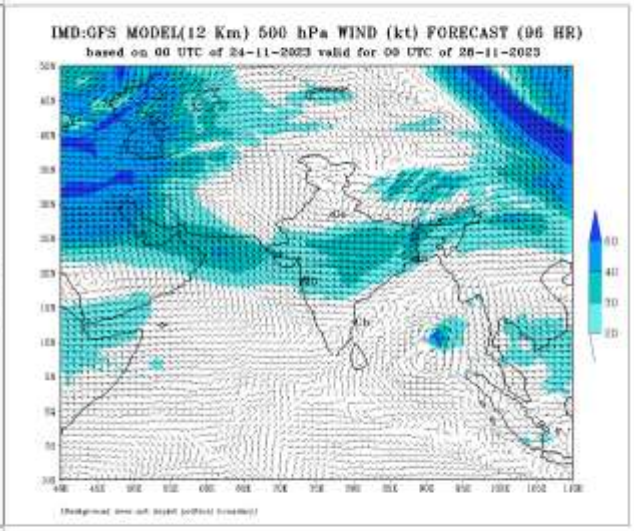
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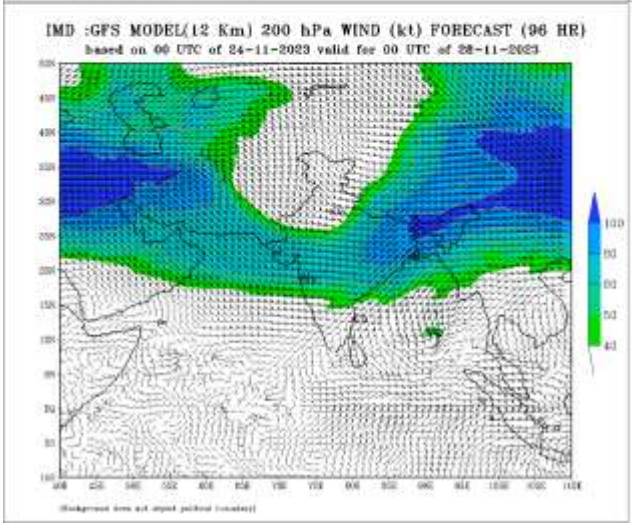
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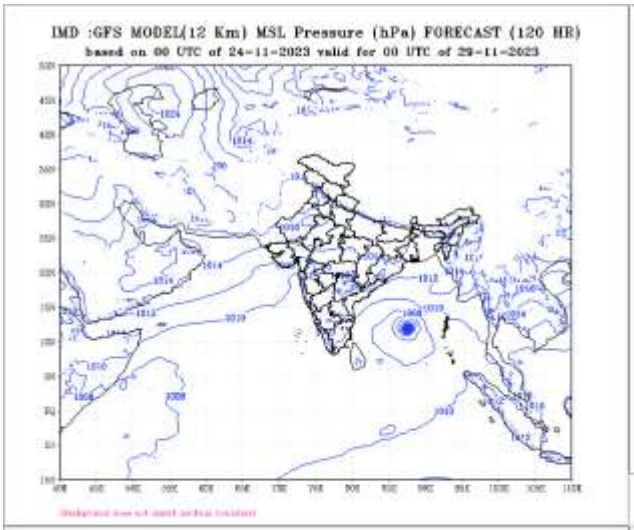
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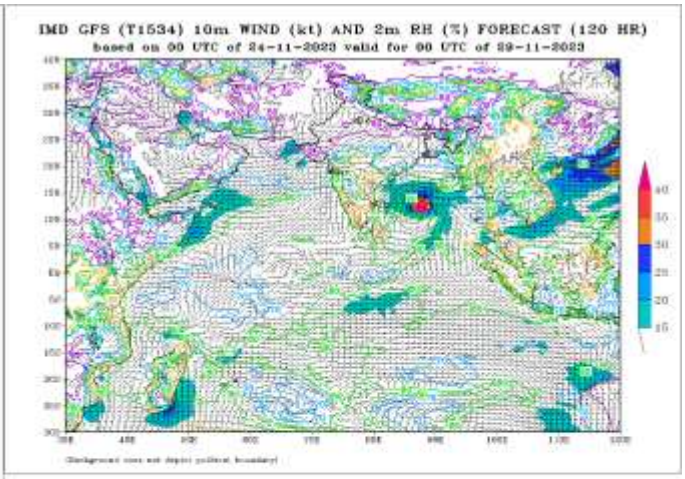
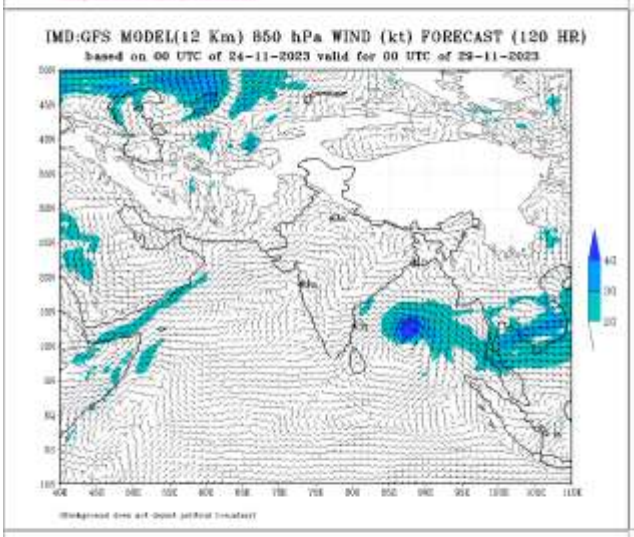
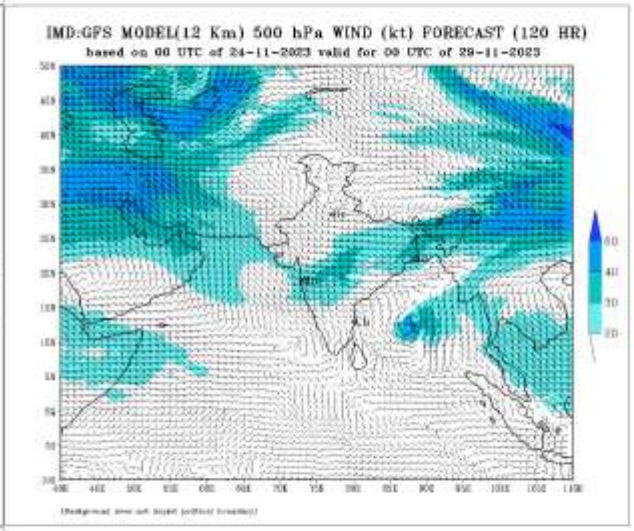
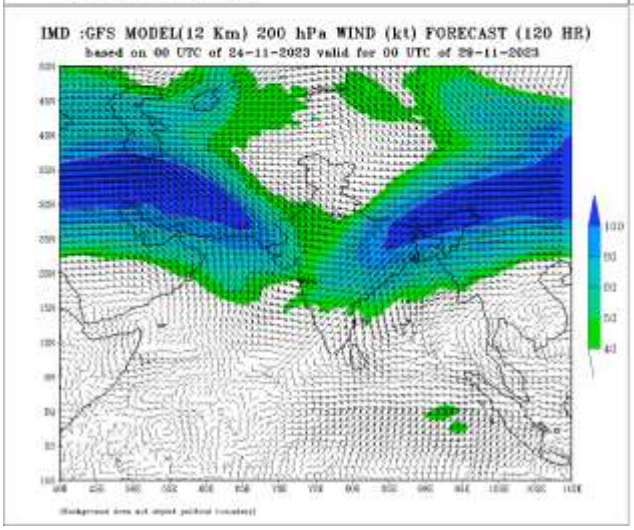
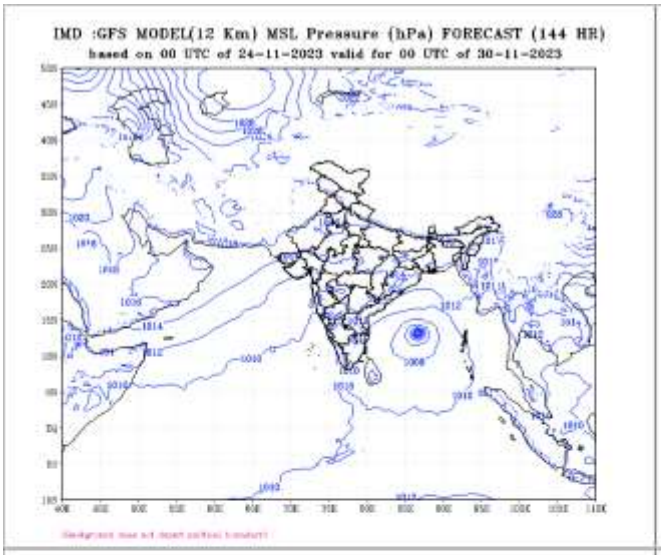
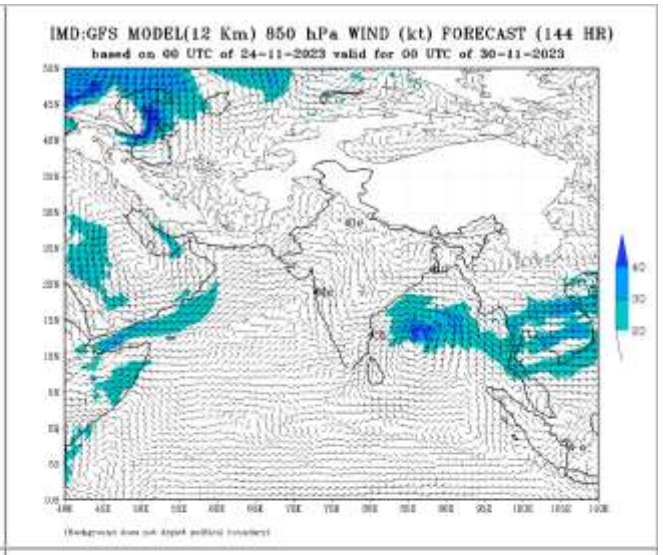

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 29-11-2023

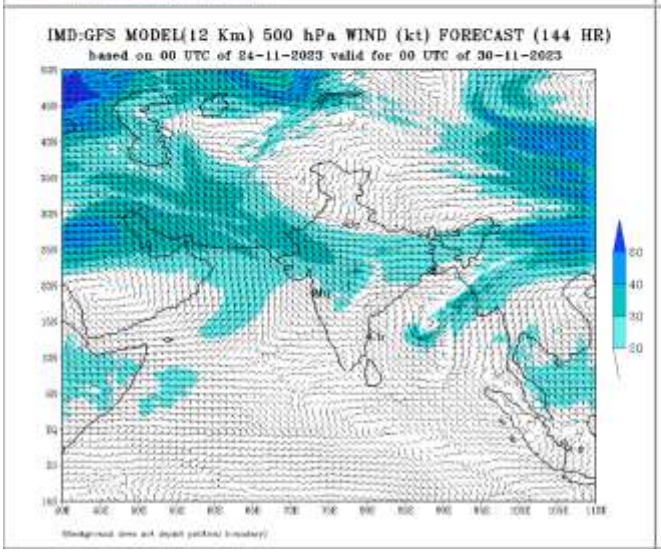

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 29-11-2023

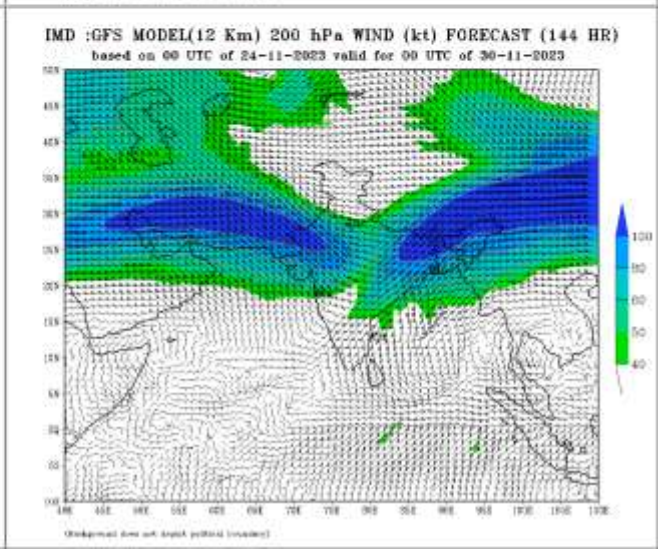

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 29-11-2023

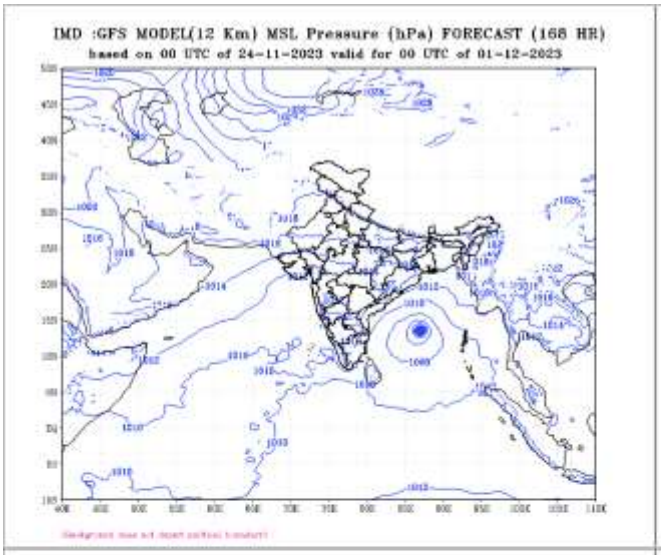

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 29-11-2023

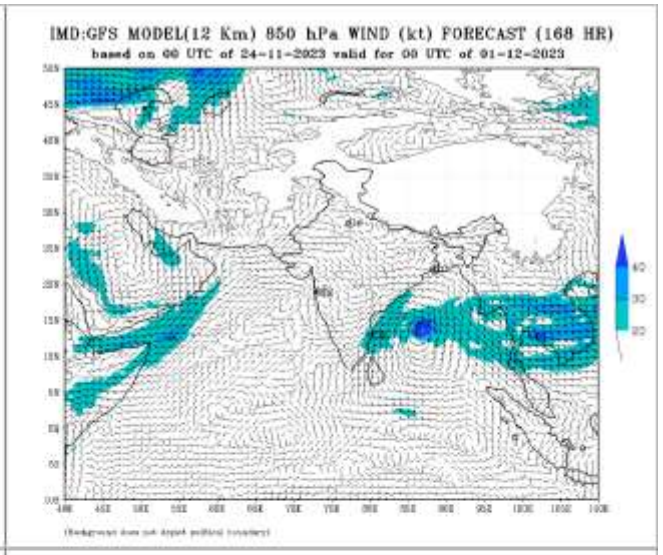

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 30-11-2023

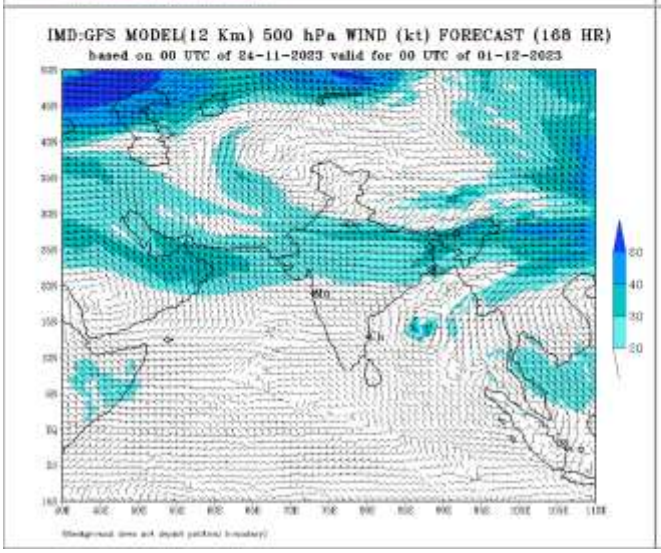

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 30-11-2023

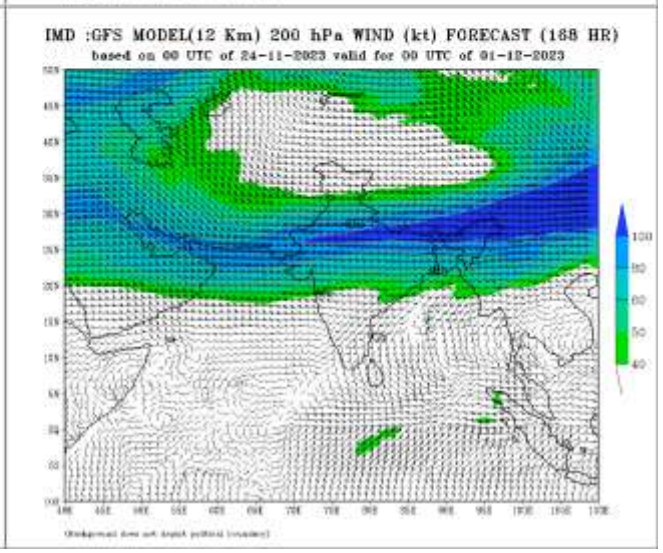

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 30-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 30-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 01-12-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 01-12-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 01-12-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 24-11-2023 valid for 00 UTC of 01-12-2023