



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

**Tropical Cyclone Forecast Programme  
Report Dated 07<sup>th</sup> December 2022**

**Time of Issue: 1200 UTC**

**Synoptic features (based on 0600 UTC analysis):**

Yesterday's Well Marked Low Pressure area concentrated into a Depression over Southeast Bay of Bengal in the evening (1730 hours IST) of 6th December. It moved west-northwestwards with a speed of 12 kmph, intensified into a Deep Depression over Southeast & adjoining Southwest Bay of Bengal, near latitude 8.6°N and longitude 86.4°E in the morning (0530 hours IST) of 7th December. It then moved west-northwestwards with a speed of 16 kmph during past 06 hours and lay centred at 1130 hours IST of today, the 07th December, 2022 over Southwest and adjoining Southeast Bay of Bengal, near latitude 8.7°N and longitude 85.5°E, about 470 km east of Trincomalee (Sri Lanka), about 610 km east-southeast of Jaffna (Sri Lanka), about 670 km east-southeast of Karaikal and about 750 km east-southeast of Chennai.

It is very likely to move west-northwestwards and intensify further gradually into a Cyclonic Storm around 07th December evening and reach Southwest Bay of Bengal off north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts by 08th December morning. It will continue to move west-northwestwards towards north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts during subsequent 48 hours.

**Dynamical and thermo-dynamical features**

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	Around 29°C over southeast and adjoining parts of central BoB, Andaman Sea. It decreases to 28°C over southwest BoB and along and of Tamil Nadu and western parts of the coast.	About 28-29°C over the southeast and adjoining southwest AS along and off Karnataka and Kerala, 26-28°C over eastcentral and adjoining north AS, 25-26°C over south Gujarat coasts, southwest AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm <sup>2</sup>	90-100 KJ/cm <sup>2</sup> over southeast BoB and adjoining south Andaman Sea and less than 50 KJ/cm <sup>2</sup> over westcentral and southwest BoB along east coast of India.	70-90 over southeast and adjoining eastcentral and adjoining southwest AS, and less than 40 over remaining AS and also off west coast of India, Comorin area.
Cyclonic Relative vorticity (X10 <sup>-6</sup> s <sup>-1</sup> )	200 around southwest BoB around system center.	25 over Maldives and Comorin area. 10-20 over northeast AS, southeast AS & adjoining EIO.
Low Level convergence (X10 <sup>-5</sup> s <sup>-1</sup> )	60 southwest BoB.	5-10 over southeast AS and Maldives.

<b>Upper Level divergence (<math>\times 10^{-5} \text{ s}^{-1}</math>)</b>	30 over southwest BoB.	20-30 over southwest AS and 10-20 over southeast AS, Comorin area.
<b>Vertical Wind Shear (VWS knots)</b>	Moderate 10-20 knots over and around system center and high 20-30 knots along the expected track over southwest BoB	5-15 over south AS, more than 25 over central and north AS.
<b>Wind Shear Tendency (knots)</b>	Decreasing over south Andaman Sea & adjoining southeast & westcentral BoB.	Decreasing over entire AS.
<b>Upper tropospheric Ridge</b>	Along 15.0°N over the BoB.	Along 11.0°N over the AS.
<b>Trough in westerlies</b>	No significant trough	

**Satellite observations based on INSAT imagery (0600 UTC):**

**a) Over the BoB & Andaman Sea: -**

As per INSAT 3D Imagery, Convection has further organized during last 06 hours and it shows curved band pattern. The associated broken low and medium clouds with embedded intense to very intense convection lies over south and central Bay of Bengal. The maximum sustained surface wind speed is 30 knots gusting to 40 knots. The estimated central pressure is about 1002 hPa. Sea condition is rough to very rough over southwest and adjoining southeast Bay of Bengal.

**b) Over the Arabian Sea: -**

The associated scattered low and medium clouds with embedded intense to very intense convection over southwest Arabian Sea. Scattered low and medium clouds with embedded moderate to intense convection over east central Arabian sea of Karnataka coast, southeast Arabian sea and Comorin area.

**M.J.O. Index:**

The Madden Julian Oscillation (MJO) Index is currently in Phase 3 with amplitude less than 1. It will continue in same phase for next 3 days. Thereafter, it will move to phase 4 and remain there another 2 days.

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

NIL

**Model guidance based on 0000 UTC for the next 7 days**

<b>MODEL GUIDANCE</b>	<b>Bay of Bengal (BoB)</b>	<b>Arabian Sea (AS)</b>
<b>IMD-GFS</b>	The cyclonic storm (CS) over southwest BoB as on today 7 <sup>th</sup> . It will intensify into severe cyclonic storm (SCS) over southwest BoB on 8 <sup>th</sup> morning, it then move west-northwestward and lay as CS over southwest BoB on 9 <sup>th</sup> , and close to north Tamil Nadu – south Andhra Pradesh coasts on 0000UTC of 10 <sup>th</sup> Dec as DD. It will make landfall along north Tamil Nadu – south Andhra Pradesh coasts around 00UTC of 10 <sup>th</sup> Dec as a DD (with MSD 26kts) near lat/lon of 12.8°N/80.0°E.	No significant system

<b>IMD-GEFS</b>	The cyclonic storm (CS) over southwest BoB as on today 7 <sup>th</sup> , It will move west-northwestwards and intensify into severe cyclonic storm (SCS) on 8 <sup>th</sup> . It will move in west-northwest ward and lay as CS over southwest BoB on 9 <sup>th</sup> , and close to north Tamil Nadu – south Andhra Pradesh coast on 10 <sup>th</sup> Dec morning as DD. It will make landfall along north Tamil Nadu – south Andhra Pradesh coasts around 00UTC of 10 <sup>th</sup> Dec as a DD near lat/lon of 13.5°N/80.2°E (with MSD 27kts)	No significant system
<b>GEFS Probabilistic guidance</b>	Based on the models guidance, 70-90 % probability is indicating that system to make landfall along north Tamil Nadu – south Andhra Pradesh coast as a DD between lat/lon 10.0°N/79.8°E to lat/lon 13.3°N/80.2°E with probability as 70-90% of MSD more than (with MSD 25 kts).	Not available
<b>IMD WRF</b>	A cyclonic storm (CS) over southwest Bay of Bengal as on today 7 <sup>th</sup> will intensify into severe cyclonic storm (SCS) over southwest BoB on 8 <sup>th</sup> , will move in west-northwest ward and will lay as VSCS over southwest BoB on 9 <sup>th</sup> Dec.	No significant system within forecast duration.
<b>NCMRWF-NCUM</b>	Deep Depression over southwest BoB on 7 <sup>th</sup> , CS on 8 <sup>th</sup> morning over southwest BoB, will move in west-northwestward direction as CS and close to north Tamil Nadu – south Andhra Pradesh coast on 9 <sup>th</sup> morning, it will make its landfall around 21UTC of 9 <sup>h</sup> Dec as a CS (with MSD 47kts) near lat/lon 13.5°N/80.2°E	No significant system
<b>NCMRWF-NEPS</b>	Deep depression over southwest BoB on 7 <sup>th</sup> , CS/SCS over southwest BoB close to northeast of Sri Lanka coast on 8 <sup>th</sup> , close to north Tamil Nadu – south Andhra Pradesh coast as SCS on 9 <sup>th</sup> , and it will make landfall around 21UTC of 9 <sup>th</sup> Dec as a CS (with MSD 45kts) near lat/lon 13.5°N/80.2°E	No significant system
<b>NCMRWF-UM (Regional)</b>	The CS over southwest BoB on 7 <sup>th</sup> , SCS over southwest BoB close to Tamil Nadu - Puducherry coast on 8 <sup>th</sup> . It will move west-northwestwards and lay centred on 9 <sup>th</sup> close to north Tamil Nadu – south Andhra Pradesh coast as CS. It will make landfall around 21UTC of 9 <sup>th</sup> Dec. as a CS (with MSD 41 kts) near lat/lon 12.8°N/80.2°E	No significant system
<b>ECMWF</b>	Deep Depression on 7 <sup>th</sup> over southwest BoB, intensify into CS over southwest BoB by 7 <sup>th</sup> evening. It will move west-northwestwards as CS on 8 <sup>th</sup> and it will have its maximum intensity on this day, it will make landfall close to north Tamil Nadu – south Andhra Pradesh coast on	No significant system

	10 <sup>th</sup> 0000 UTC as a CS/DD (with MSD 40kts) near lat/lon 13.4°N/80.16°E	
<b>ECMWF ensemble</b>	Deep Depression over Southeast BoB as on 7 <sup>th</sup> Dec, will track west-northwest wards with intensification up to Cyclonic Storm with 70-80% probability on 8 <sup>th</sup> Dec and will reach north Tamil Nadu – south Andhra Pradesh coast on 9 <sup>th</sup> Dec.	No significant system
<b>NCEP-GFS</b>	The CS over southwest BoB on 7 <sup>th</sup> southwest BoB will intensify into SCS on 8 <sup>th</sup> Dec. Continuing to move west-northwestwards and weakening into CS over southwest BoB close to north Tamil Nadu – south Andhra Pradesh coast on 10 <sup>th</sup> , it will make landfall close to north Tamil Nadu – south Andhra Pradesh coast on 10 <sup>th</sup> 1200 UTC as a DD (with MSD 30kts) near lat/lon 12.4°N/80.4°E	No significant system
<b>IMD MME</b>	The DD on 7 <sup>th</sup> Dec over southwest BoB, CS over southwest BoB on 8 <sup>th</sup> , it will then move northwest wards and will lay over southwest BoB as CS on 9 <sup>th</sup> , it will then move northwest wards and will weaken into DD over southwest Bay close to north Tamil Nadu – south Andhra Pradesh coast on 10 <sup>th</sup> . It will make landfall close to north Tamil Nadu – south Andhra Pradesh coast on 10 <sup>th</sup> 0000 UTC as a DD (with MSD 30kts) near lat/lon 12.32°N/80.04°E	No significant system
<b>IMD HWRF</b>	The DD on 7 <sup>th</sup> Dec. over southwest BoB. It is showing intensification upto severe cyclonic storm (SCS) during 1200UTC of 7 <sup>th</sup> Dec. to 0000 UTC of 8 <sup>th</sup> Dec. It moves west northwestwards gradually decrease into CS on 00UTC of 9 <sup>th</sup> Dec. It will make landfall close to north Tamil Nadu – south Andhra Pradesh coast around 10 <sup>th</sup> 0000 UTC as a DD (with MSD 31kts) near lat/lon 12.7°N/80.6°E	No significant system
<b>IMD-Genesis Potential Parameter</b>	A significant potential zone over south-southeast BoB as on 7 <sup>th</sup> Dec. having northwestward movement.	No potential zone over Arabian Sea during next 7 days

### Summary and conclusion:

- Most of the NWP models are indicating Deep Depression over southwest BoB on 7<sup>th</sup> Dec will have west-northwest ward movement. All the models are unanimously indicating its intensification into cyclonic storm by 1200 UTC of 7<sup>th</sup> Dec, except NCEP GFS and IMD GFS. Out of latter two models, IMD GFS makes CS at 0600 UTC of 7<sup>th</sup> while NCEP GFS makes it at 8 Dec 0000UTC. IMD-GFS and IMD-GEFS are also indicating intensification up to severe cyclonic storm stage.
- Table 1 shows summary of various models in terms of Landfall timing, location and intensity at the time of crossing coasts based upon MME-IMD, ECMWF, HWRF, NCUM, IMD-GFS, IMD-GEFS, NEPS, NEPS-R. Most of the models are indicating landfall by early hours of 10<sup>th</sup>

Dec with wind speed of 70-80 gusting 90 kmph along north Tamil Nadu, Puducherry-south Andhra Pradesh coasts between 12°N to 13.6°N between Puducherry and Sriharikota near 12.5°N/80.2°E whereas, IMD-GFS are indicating its landfall around 10<sup>th</sup> evening.

**In view of all the above, it is inferred that**

**1. For the Bay of Bengal:**

The Deep Depression over Southwest & adjoining Southeast Bay of Bengal moved west-northwestwards with a speed of 16 kmph during past 06 hours and lay centred at 1130 hours IST of today, the 07<sup>th</sup> December, 2022 over Southwest and adjoining Southeast Bay of Bengal, near latitude 8.7°N and longitude 85.5°E, about 470 km east of Trincomalee (Sri Lanka), about 610 km east-southeast of Jaffna (Sri Lanka), about 670 km east-southeast of Karaikal and about 750 km east-southeast of Chennai.

It is very likely to move west-northwestwards and intensify further gradually into a Cyclonic Storm around 07<sup>th</sup> December evening and reach Southwest Bay of Bengal off north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts by 08<sup>th</sup> December morning. It will continue to move west-northwestwards towards north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts during subsequent 48 hours.

**2. For the Arabian Sea:**

**No significant system during next 7 days**

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

24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
HIGH	HIGH	HIGH	LOW	--	--	--

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

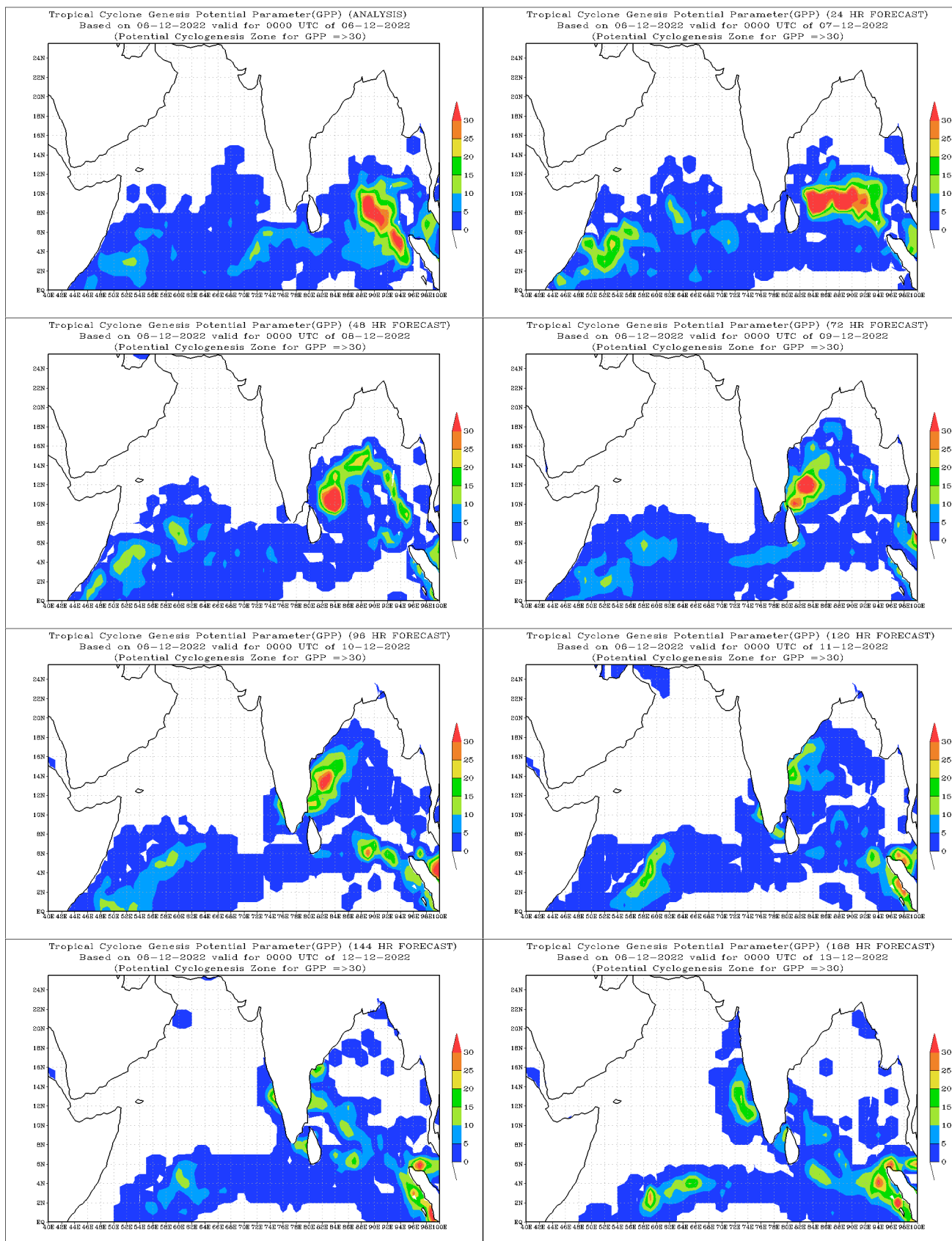
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

**Advisory:**

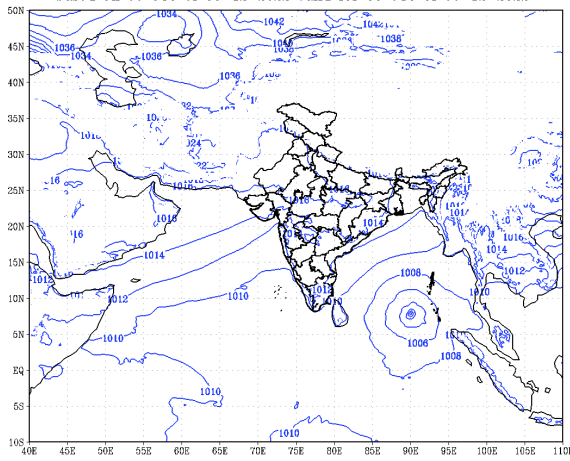
System is under continuous surveillance

**IOP: NIL**

# Annexure

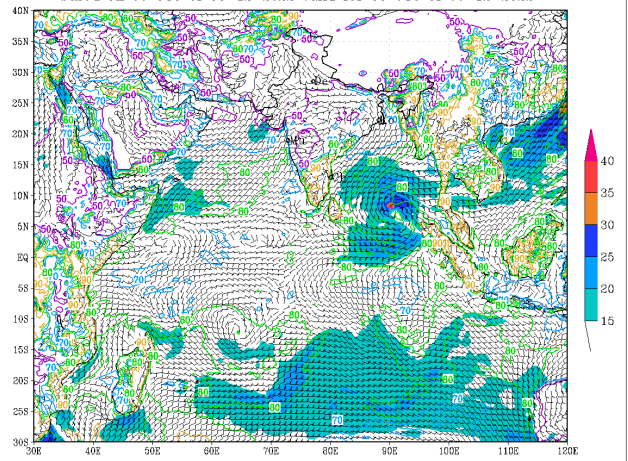


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 06-12-2022



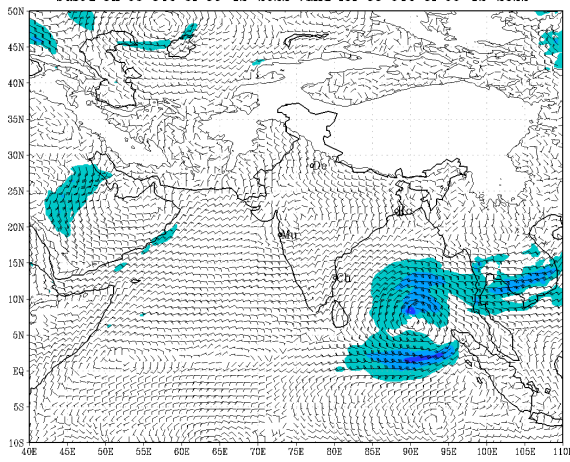
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 06-12-2022



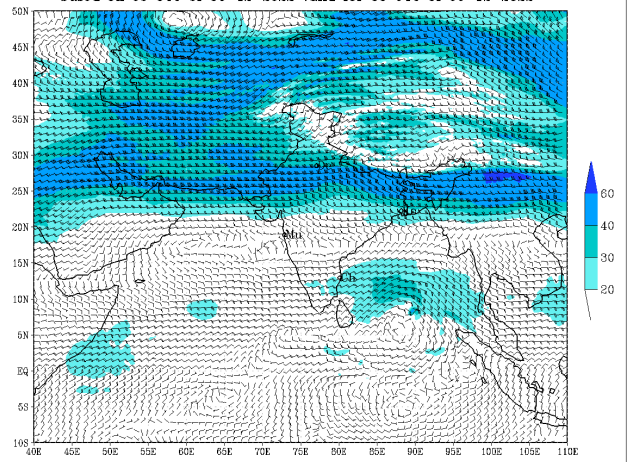
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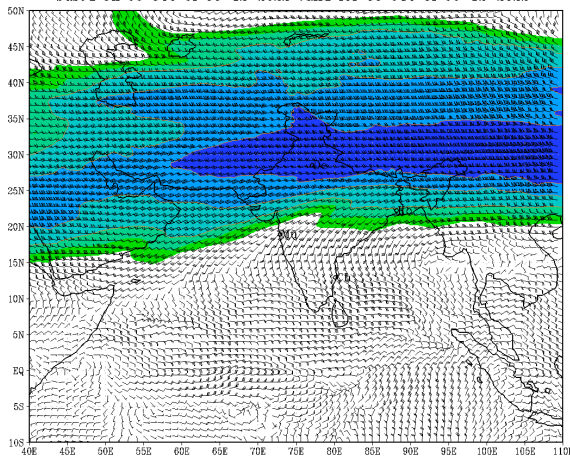
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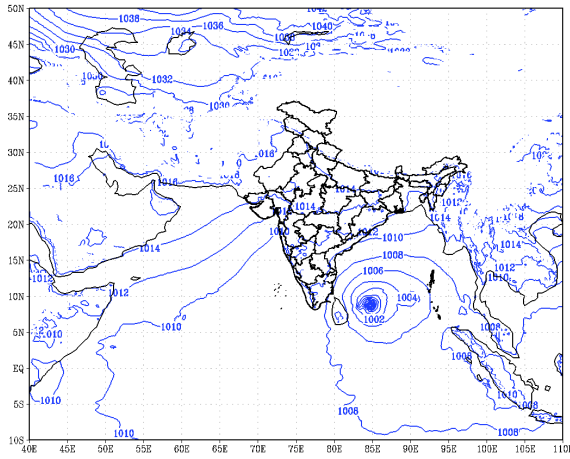
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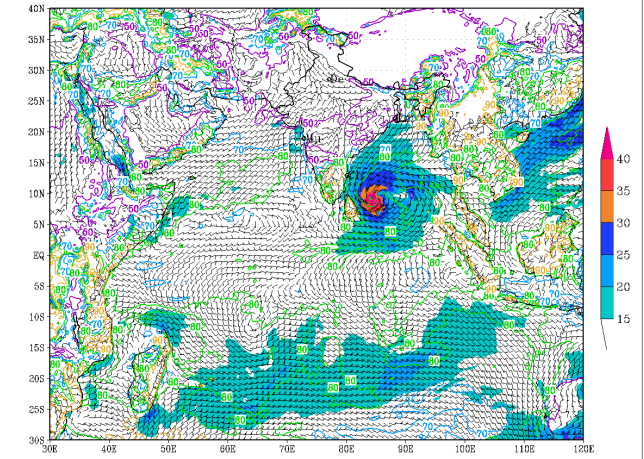
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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)  
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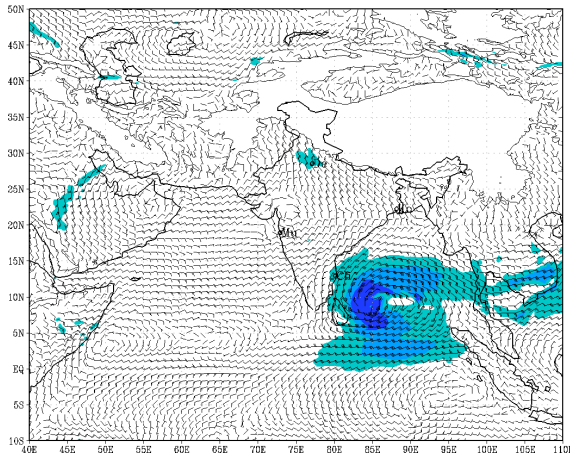
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)  
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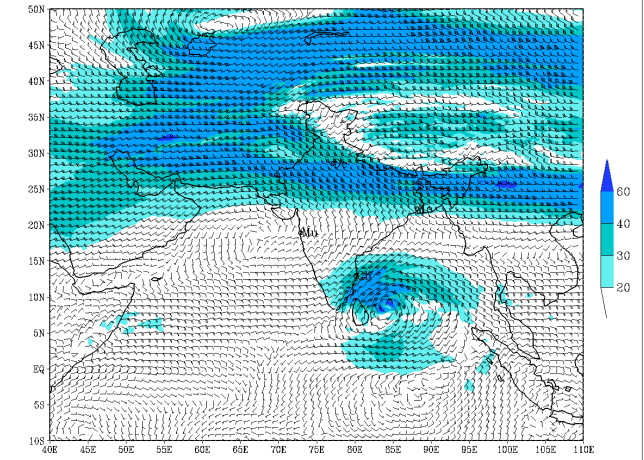
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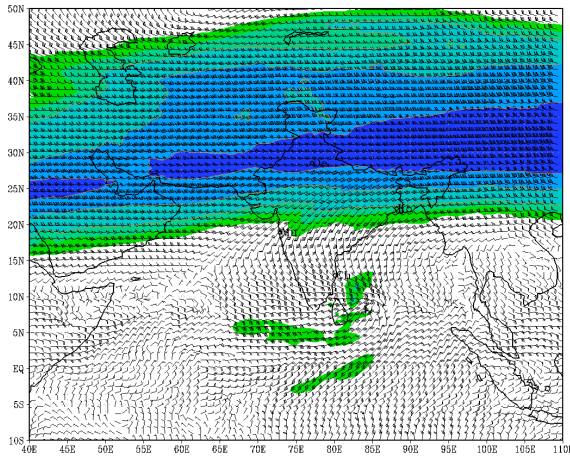
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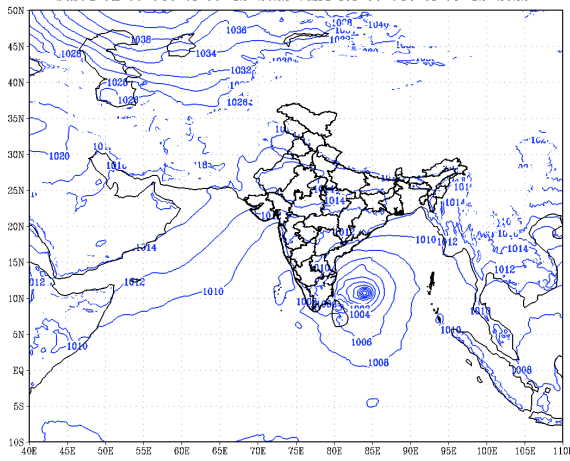
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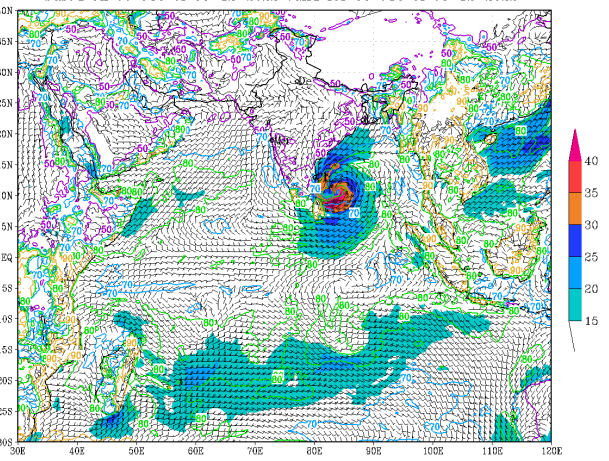


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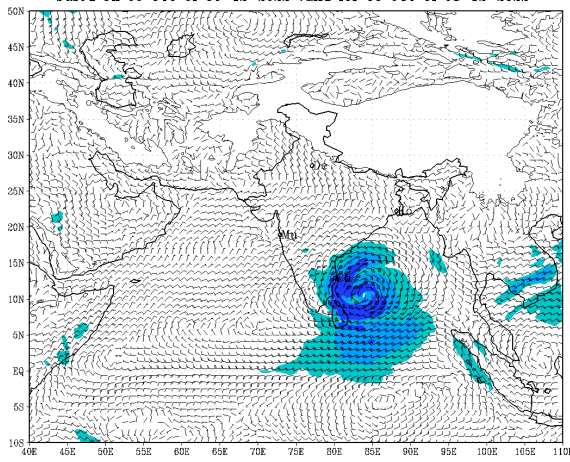
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)  
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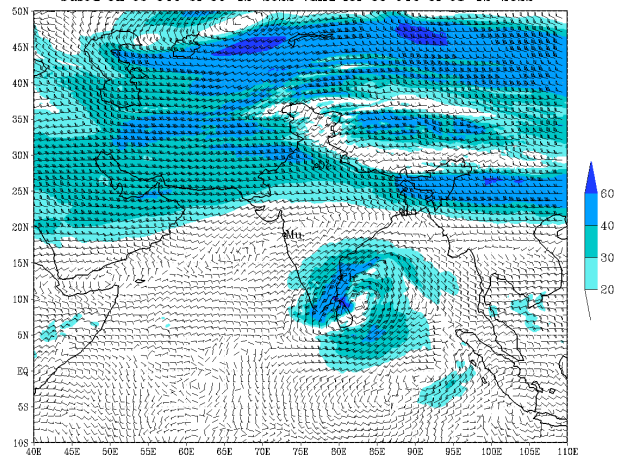
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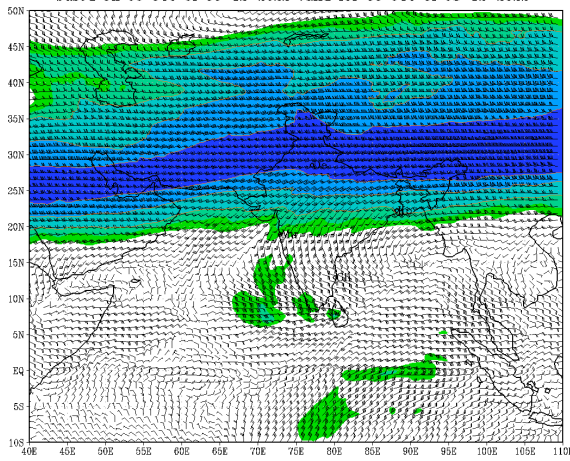
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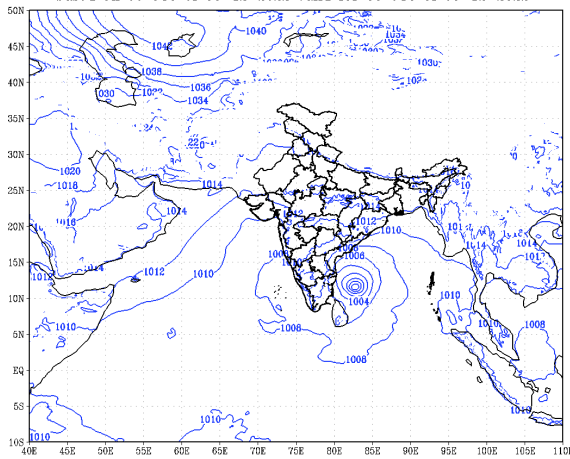
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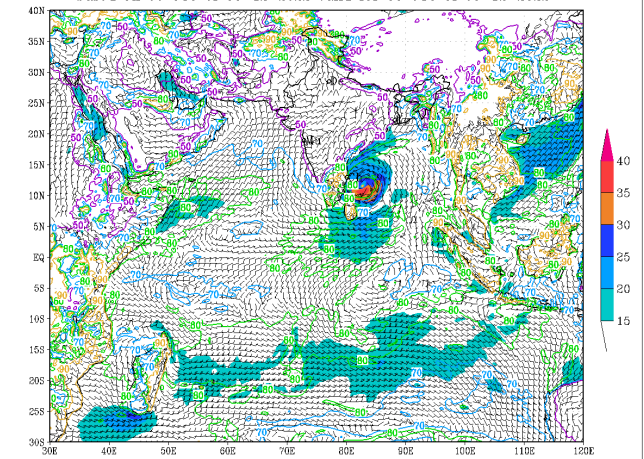
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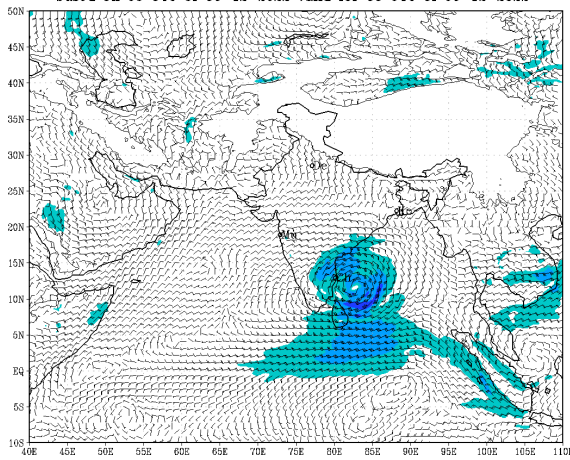
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)  
 based on 00 UTC of 08-12-2022 valid for 00 UTC of 09-12-2022



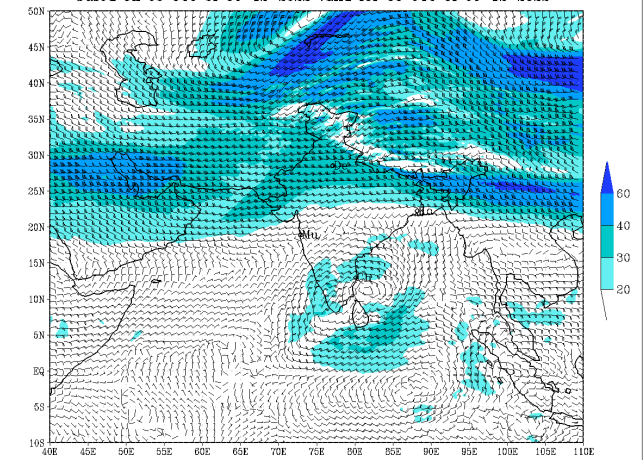
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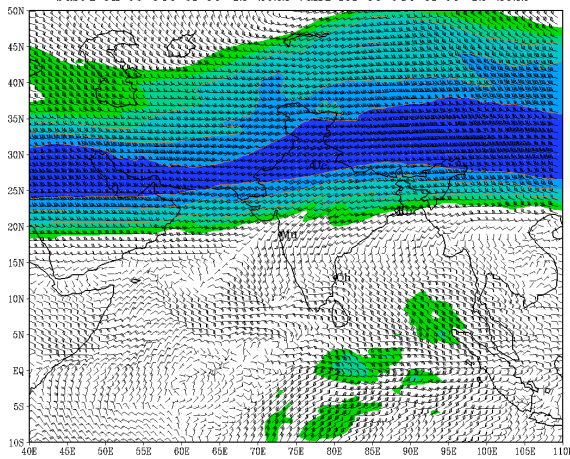
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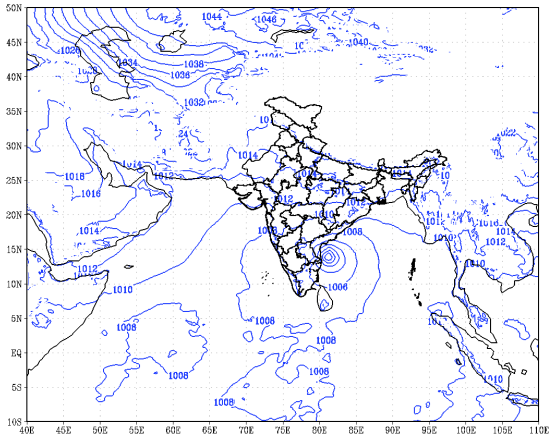
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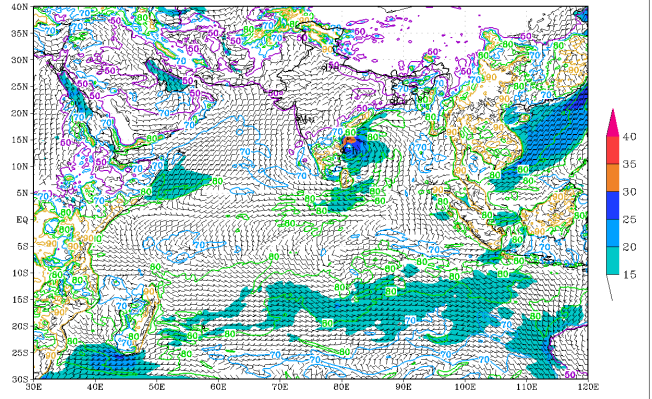
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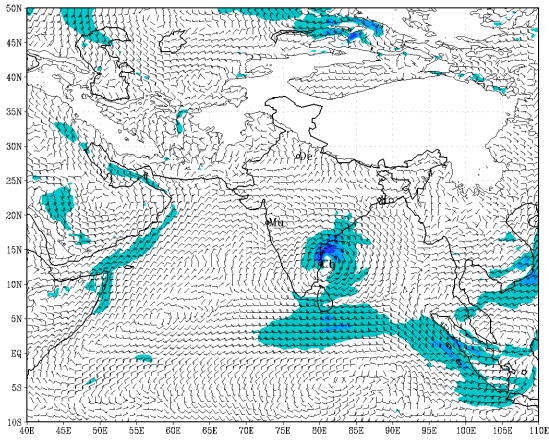
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 10-12-2022



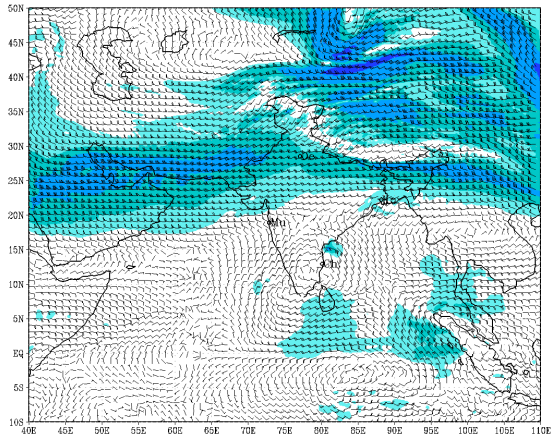
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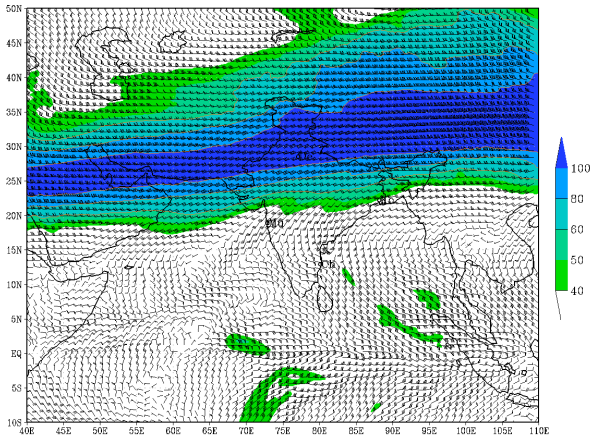
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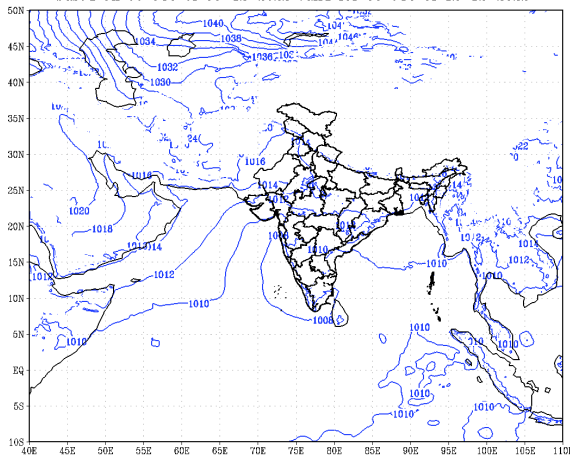
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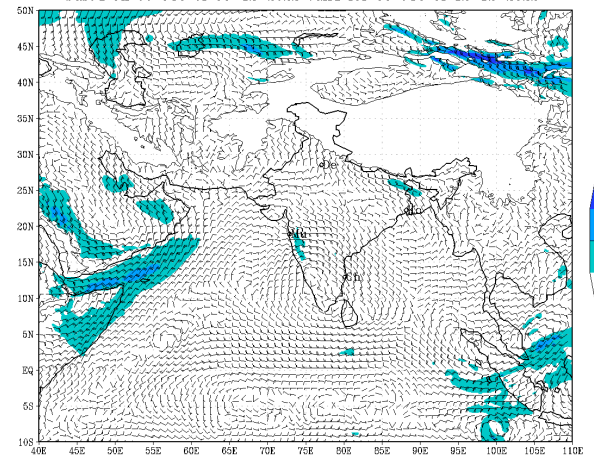


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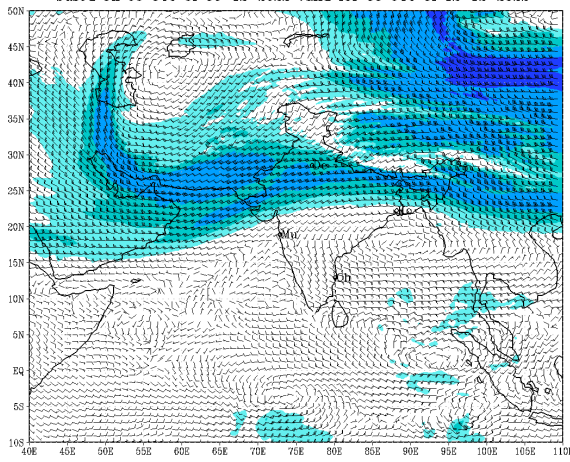
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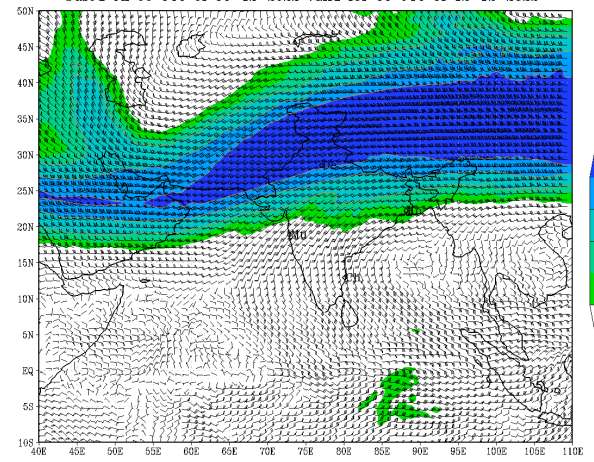
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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 12-12-2022



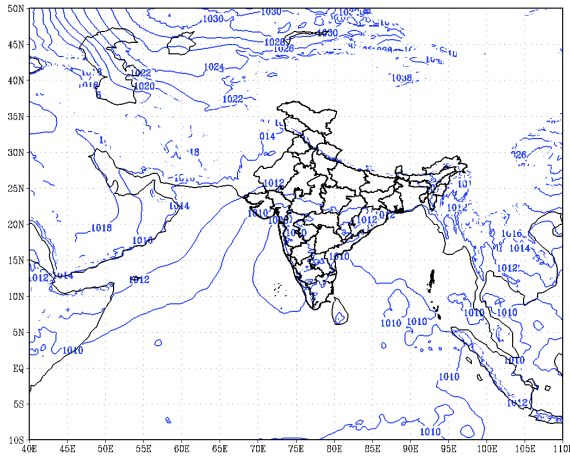
(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 12-12-2022



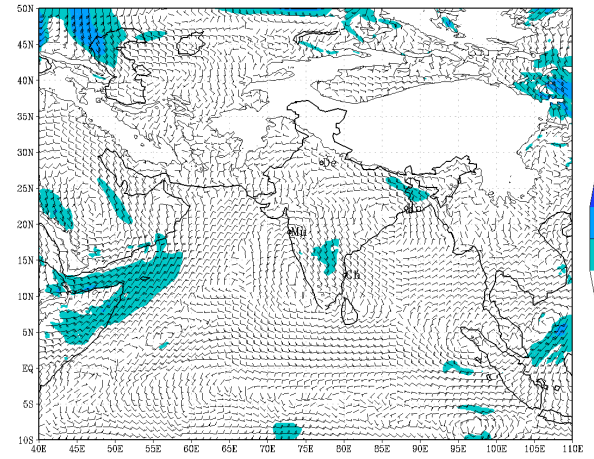
(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 13-12-2022



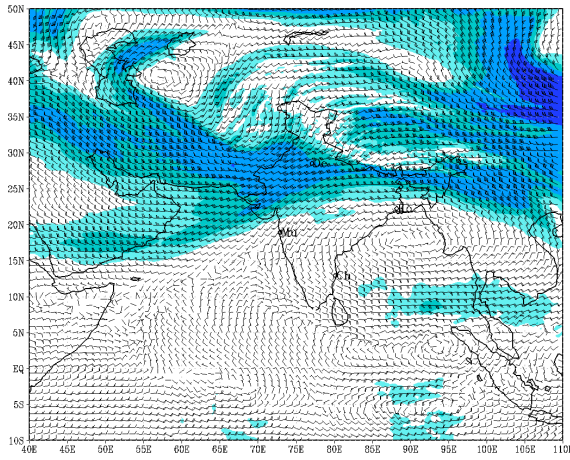
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 13-12-2022



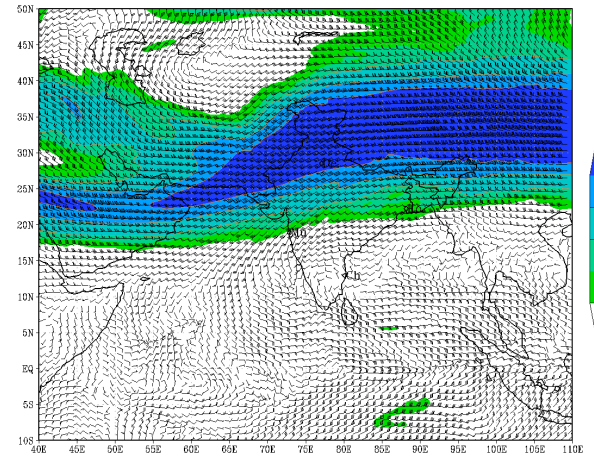
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 13-12-2022



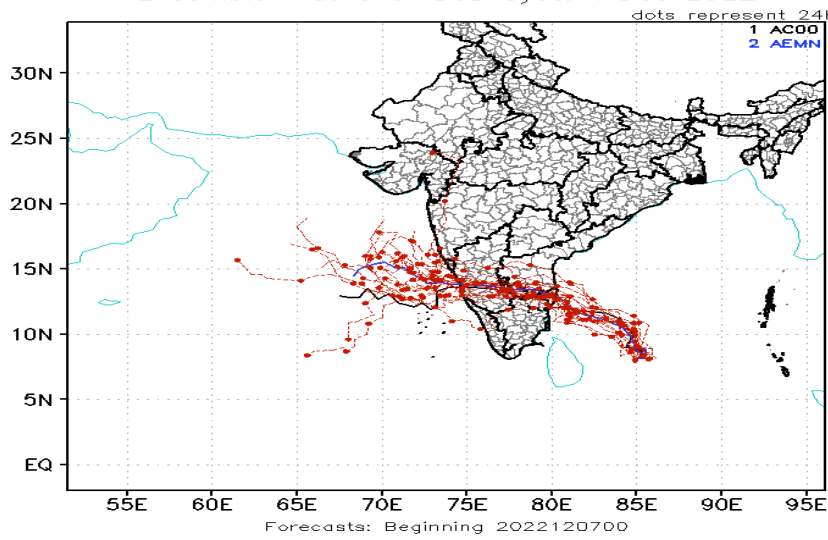
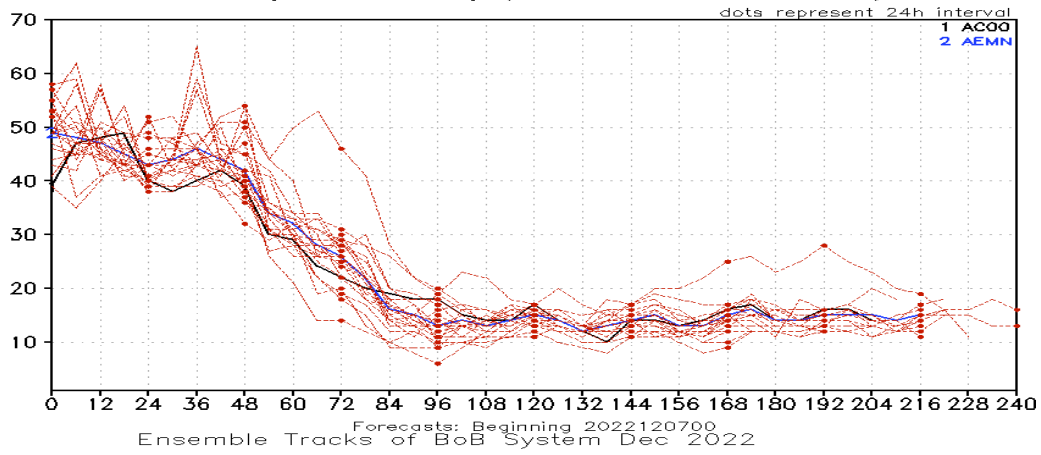
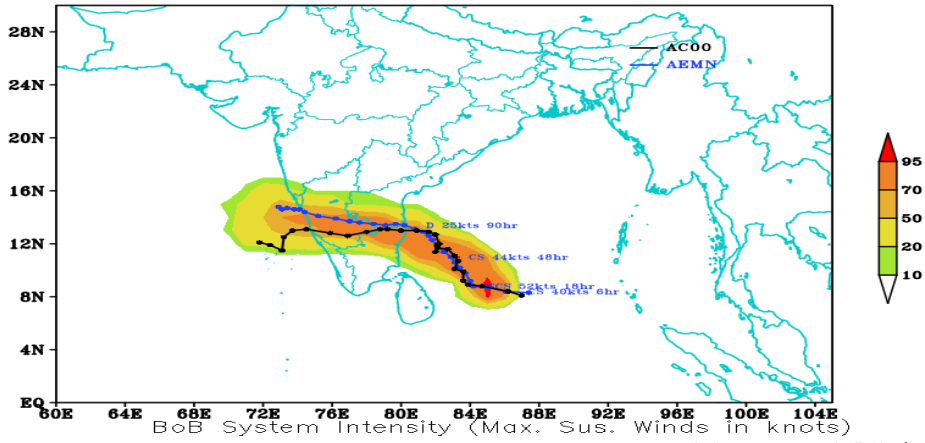
(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 06-12-2022 valid for 00 UTC of 13-12-2022

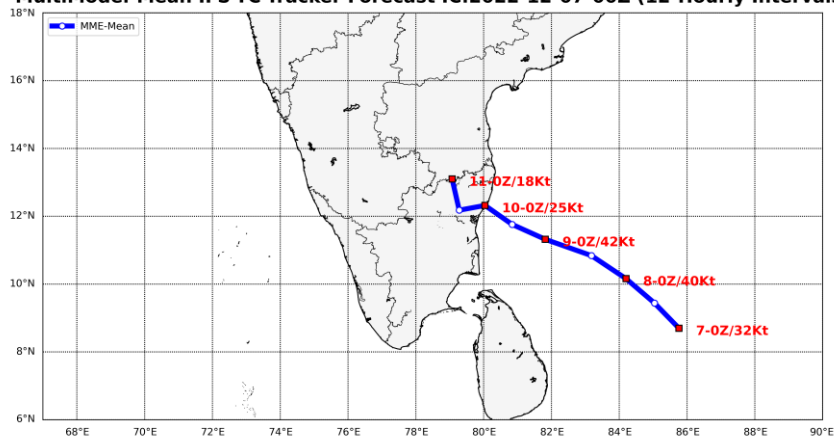


(Background does not depict political boundary)

Probability (%) of BoB System passing within 65nm during next 168hr



**MultiModel-Mean IFS-TC-Tracker Forecast IC:2022-12-07-00Z (12-Hourly Intervals)**



**Table 1: Model summary in terms of Landfall timing, location and intensity at the time of crossing coasts based upon 1200 UTC for, MME NEW IMD, MME OLD IMD, ECMWF of 6<sup>th</sup> Dec, HWRF PF 06/18 UTC and 0000 UTC of 7<sup>th</sup> Dec**

Model names	Landfall timing	Landfall point in LAT/LONG degree values	Likely MSD(Winds) in kts	Intensity of the system during landfall
IMD GFS	9Dec/21UTC	12.8/80.0	30	DD
HWRF	10Dec/00UTC	12.5/80	40	CS
ECMWF	10Dec/00UTC	13.4/80.16	40	CS
NCEP GFS	After 10/06UTC	12.4/80.4	30	DD
NCUM	10 Dec/0000UTC	11.6/80.6	47	CS
MME IMD NEW	10 Dec/0000UTC	12.4/79.97	30	DD
MME IMD OLD	09 Dec/1200-1500 UTC	12.0/80.2	42	CS
<b>Average</b>	<b>09 Dec around 2100 UTC</b>	<b>12.5/80.2</b>	<b>40</b>	<b>DD/CS</b>