



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

**Tropical Cyclone Forecast Programme  
Report Dated 02<sup>nd</sup> December, 2023**

**Time of Issue: 1300 UTC**

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

The deep depression over southwest Bay of Bengal moved west-northwestwards with a speed of 17 kmph during past 06 hours and lay centered at 0600 UTC of today, the 2<sup>nd</sup> December, 2023 over the same region near latitude 10.7°N and longitude 83.2°E, about 440 km east-southeast of Puducherry (43331), 420 km southeast of Chennai (43279), 540 km southeast of Nellore (43245), 650 km south-southeast of Bapatla (43220) and 650 km south-southeast of Machilipatnam (43185).

It is likely to move west-northwestwards and intensify into a cyclonic storm over southwest Bay of Bengal during next 24 hours. Thereafter, it would move northwestwards and reach westcentral Bay of Bengal off south Andhra Pradesh and adjoining north Tamil Nadu coasts by 0600 UTC of 4<sup>th</sup> December. Thereafter, it would move nearly northwards almost parallel and close to south Andhra Pradesh coasts and cross south Andhra Pradesh coasts between Nellore and Machilipatnam around 0600 UTC of 5<sup>th</sup> December as a **cyclonic storm** with a maximum sustained wind speed of 80-90 kmph gusting to 100 kmph.

**Dynamical and thermo-dynamical features (0600 UTC)**

<b>Parameter</b>	<b>Bay of Bengal (BoB)</b>	<b>Arabian Sea (AS)</b>
<b>Sea Surface Temperature (SST) °C</b>	29 over and surroundings of the system. 28 in its forecasted path. 27 over along and off Andhra Pradesh coast north of 14 <sup>0</sup> N, south Odisha coast.	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°C over north and adjoining westcentral AS.
<b>Tropical Cyclone Heat Potential (TCHP) kJ/cm<sup>2</sup></b>	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.
<b>Cyclonic Relative vorticity (X10<sup>-6</sup>s<sup>-1</sup>)</b>	50-100 over the system, 25 to its surroundings. 25-50 over southeast BoB close to EIO.	20-30 over parts of southwest AS, eastcentral AS.
<b>Low Level convergence (X10<sup>-5</sup> s<sup>-1</sup>)</b>	5-10 to the south and east of the system. 5 over it forecasted path.	10-20 over southwest AS adjoining to EIO. -5 over parts of central AS.

<b>Upper Level divergence (<math>\times 10^{-5} \text{ s}^{-1}</math>)</b>	20-30 to its northeast of the system, 20 over south and its forecasted path.	10-30 over southwest AS adjoining to EIO. 5-10 over central parts of south AS. -5 to -10 over central and north AS.
<b>Vertical Shear (VWS knots)</b> Low: 05-10 knots Moderate: 10-20 knots High: >20 knots	5-10 over the system. 20 over the north of the system and over south of central Bay. High (>20knots) over central & north BoB.	5-20 over southeast and adjoining southwest AS. 20 over parts of central and adjoining southwest AS. High (>20knots) over rest of central & north AS.
<b>Wind Shear Tendency (knots)</b>	Decreasing over north and adjoining central BoB, southwest BoB.	Decreasing over southeast and adjoining southwest AS, eastcentral AS.
<b>Upper Tropospheric Ridge</b>	Along 15°N over BoB.	Along 10°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 very intense convection over central & south Bay of Bengal. Scattered low/med clouds with embedded moderate to intense convection over north Bay of Bengal and Andaman Sea.

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

Scattered low/med clouds with embedded moderate to intense convection over south Arabian Sea, Lakshadweep islands area and Comorin area.

#### **(c) Convection outside India:-**

Scattered low/med clouds with embedded moderate to intense convection over Sri Lanka, Palk Strait, Gulf of Mannar, Maldives, Tibet, China, Myanmar, Thailand, 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 lat 5.0N to 10.0S long 40.0E to 100.0E and between lat 10.0S to 35.0S long 50.0E to 70.0E.

#### **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 3<sup>rd</sup> Dec. It will then move to phase 4 on 4<sup>th</sup> Dec with amplitude greater than 1, remains same and in same phase till 7<sup>th</sup> Dec. It will move to phase 5 on 8<sup>th</sup> Dec with amplitude greater than 1, remain there till 9<sup>th</sup> Dec.

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

### **Input for FDP Cyclone 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>	WML over southwest Bay (SWB) as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over SWB on 3 <sup>rd</sup> Dec as DD/CS. It moves in the same direction and lay over westcentral Bay (WCB) as SCS/VSCS on 4 <sup>th</sup> Dec. It moves in the same direction and made	No significant circulation for the next 7 days.

	landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as VSCS.	
<b>IMD-GEFS</b>	DD/CS over SWB and adjoining WCB on 3 <sup>rd</sup> Dec. Moving northwestward and lay over WCB as SCS/VSCS on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as CS.	No significant circulation for the next 7 days.
<b>IMD-WRF</b>	LPA/WML over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over SWB on 3 <sup>rd</sup> Dec as DD/CS. It will made landfall as CS along south Andhra Pradesh and north Tamil Nadu coast on 4 <sup>th</sup> Dec. It lay as WML over land on 5 <sup>th</sup> Dec and weakens thereafter.	No significant system during next 3 days.
<b>NCMRWF-NCUM</b>	WML over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over WCB as DD on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as CS. It lay over land as WML on 6 <sup>th</sup> Dec and weakens thereafter.	No significant system during next 3 days.
<b>NCMRWF-NEPS</b>	WML over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over WCB as DD on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as CS. It lay over land as WML on 6 <sup>th</sup> Dec and weakens thereafter.	No significant circulation for the next 7 days.
<b>NCMRWF-UM (Regional)</b>	LPA over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over WCB as DD/CS on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as CS.	No significant circulation for the next 3 days.
<b>ECMWF</b>	DD over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over SWB and adjoining WCB as DD/CS on 3 <sup>rd</sup> Dec. It lay over WCB as DD/CS on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as DD.	No significant system during next 3 days.
<b>NCEP-GFS</b>	DD over SWB as on today i.e., 2 <sup>nd</sup> Dec. Moving northwestward and lay over SWB and adjoining WCB as DD on 3 <sup>rd</sup> Dec. It lay over WCB as DD/CS on 4 <sup>th</sup> Dec. It moves in the same direction and made landfall along south Andhra Pradesh coast on 5 <sup>th</sup> Dec as DD/CS.	No significant system during next 7 days.
<b>IMD-Genesis Potential Parameter</b>	Potential zone over SWB as on today i.e., 2 <sup>nd</sup> Dec and 3 <sup>rd</sup> Dec. It lay over SWB and adjoining WCB, along and off north Tamil Nadu and adjoining south Andhra Pradesh coast on 4 <sup>th</sup> Dec. It lay over WCB, along and off south Andhra Pradesh coast on 5 <sup>th</sup> Dec. Another zone over eastcentral Bay (ECB) on 6 <sup>th</sup> Dec.	Potential zone over southeast Arabian Sea (SEA) adjoining to EIO on 7 <sup>th</sup> Dec, SEA along and south Kerala coast on 8 <sup>th</sup> and 9 <sup>th</sup> Dec.

## Summary and conclusion:

### 1. For the Bay of Bengal:

Most of the models are indicating initial west-northwestwards movement of the system followed by northwestwards movement towards Andhra Pradesh coast. The landfall point is varying between latitude 15.5-16.5 °N/80.0-82.0 °E. However, NCUM model is indicating landfall near 13.3N/80.1E. IMD MME is indicating landfall near 16.3N/81.2E. The landfall time is varying between 4<sup>th</sup>/1800 UTC to 5<sup>th</sup>/1500 UTC.

Considering all the above, the deep depression over southwest Bay of Bengal is likely to move west-northwestwards, intensify into a cyclonic storm over southwest Bay of Bengal during next 24 hours. Thereafter, it would move northwestwards and reach westcentral Bay of Bengal off south Andhra Pradesh and adjoining north Tamil Nadu coasts by 0600 UTC of 4th December. Thereafter, it would move nearly northwards almost parallel and close to south Andhra Pradesh coasts and cross south Andhra Pradesh coasts between Nellore and Machilipatnam around 0600 UTC of 5th December as a cyclonic storm with a maximum sustained wind speed of 80-90 kmph gusting to 100 kmph.

**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

\*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:**

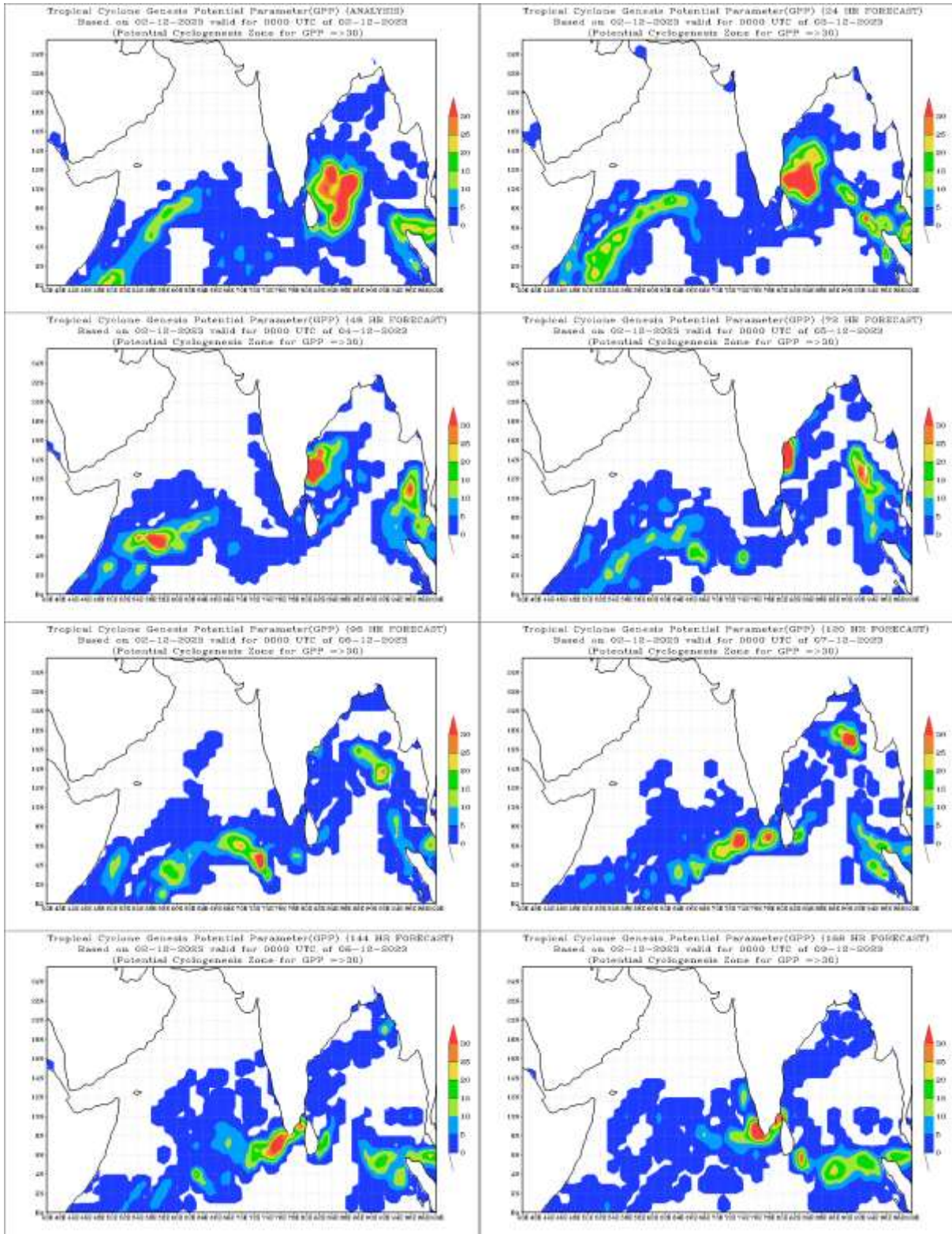
No significant system over the Arabian Sea for the next 7 days.

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

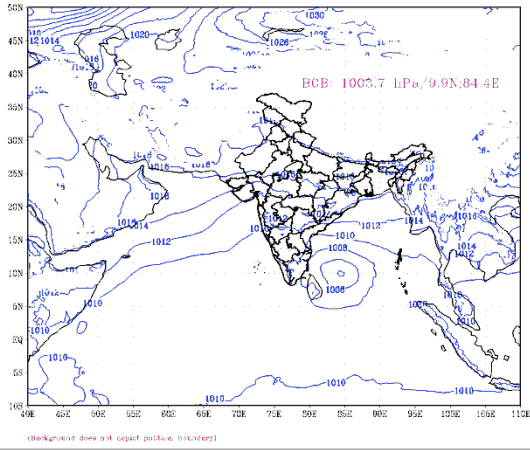
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

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

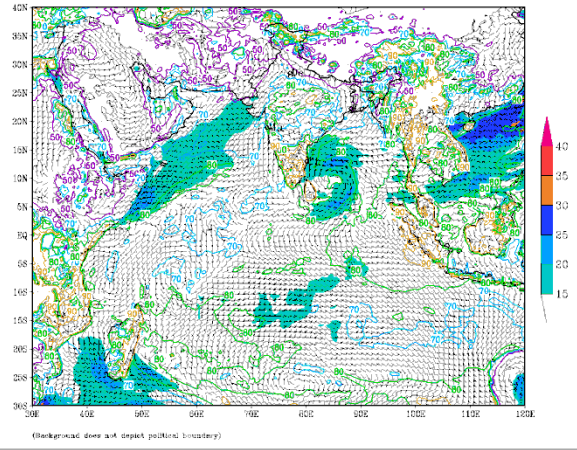
**IOP:** IOP for Tamil Nadu, Puducherry coasts 2<sup>nd</sup> to 4<sup>th</sup> Dec;  
IOP for Andhra Pradesh coast 2<sup>nd</sup> to 5<sup>th</sup> Dec.



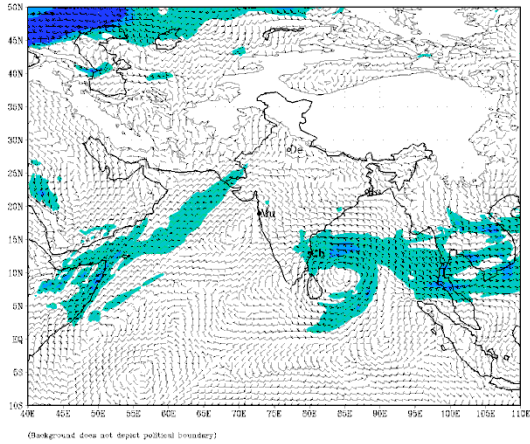
IMD:GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)  
 based on 00 UTC of 02-12-2023 valid for 00 UTC of 02-12-2023



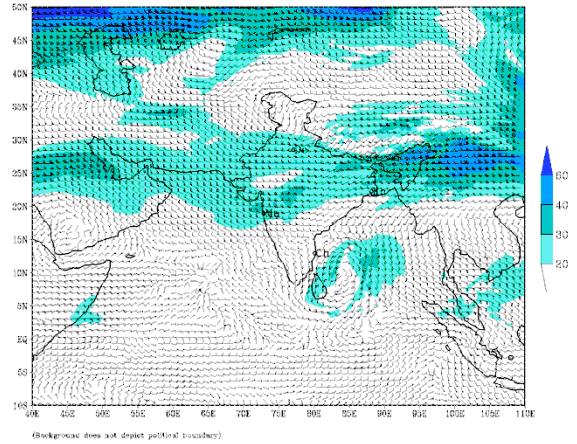
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)  
 based on 00 UTC of 02-12-2023 valid for 00 UTC of 02-12-2023



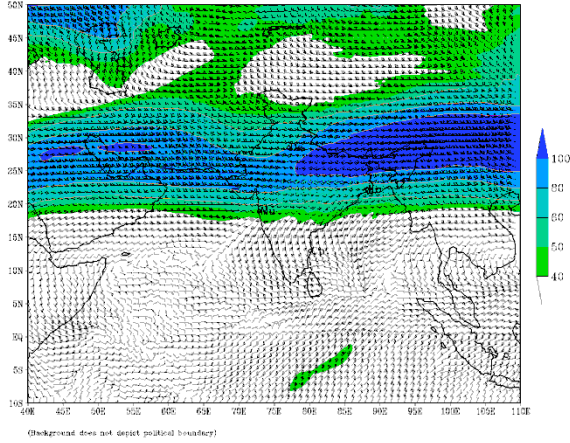
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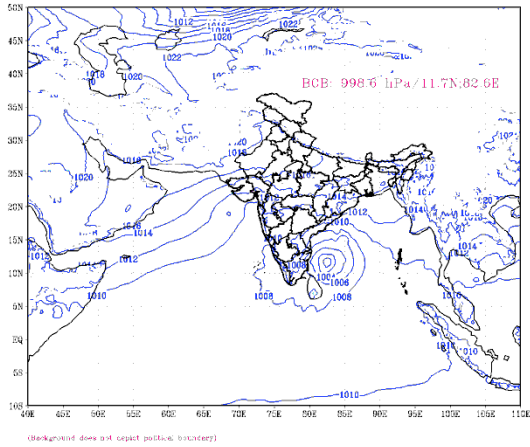
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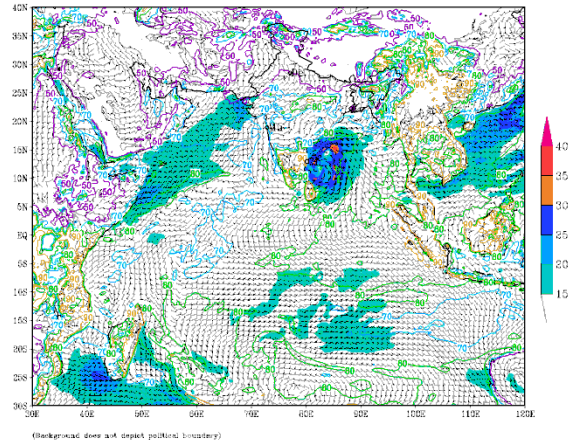
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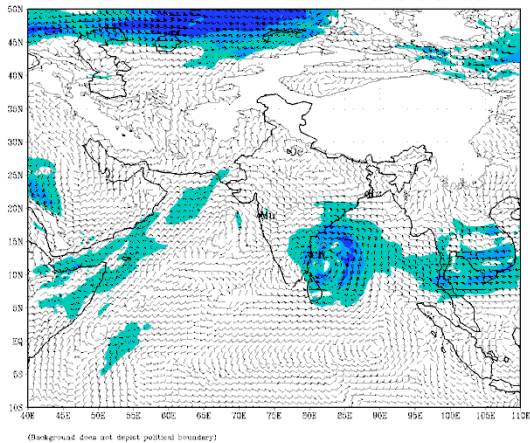
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)  
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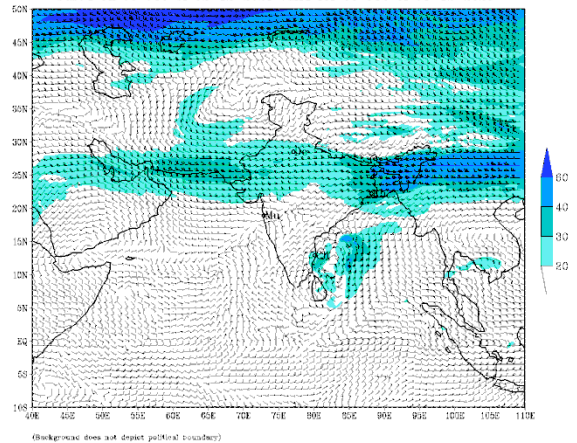
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)  
 based on 00 UTC of 02-12-2023 valid for 00 UTC of 03-12-2023



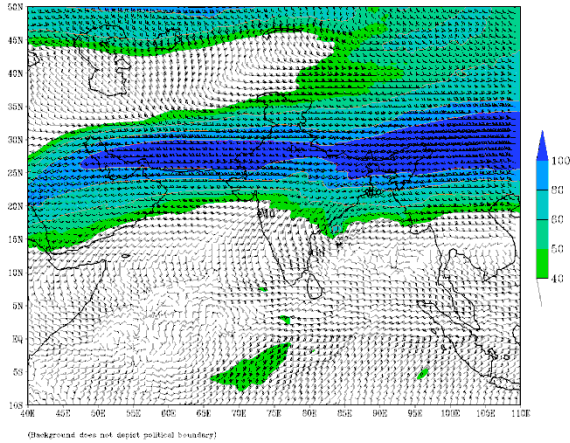
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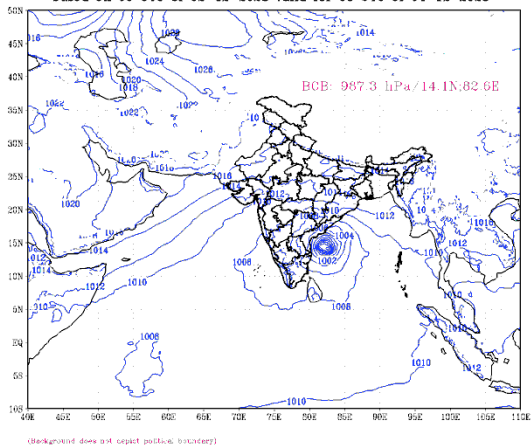
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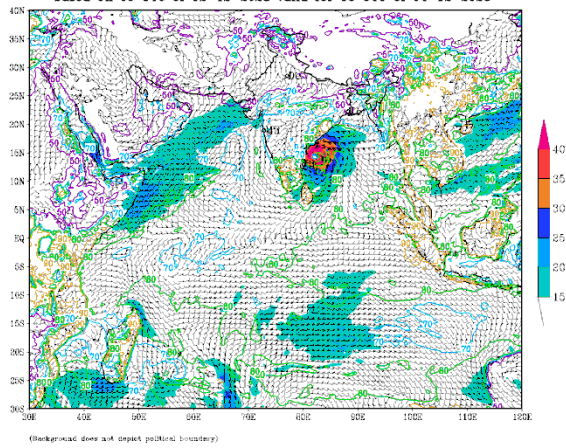
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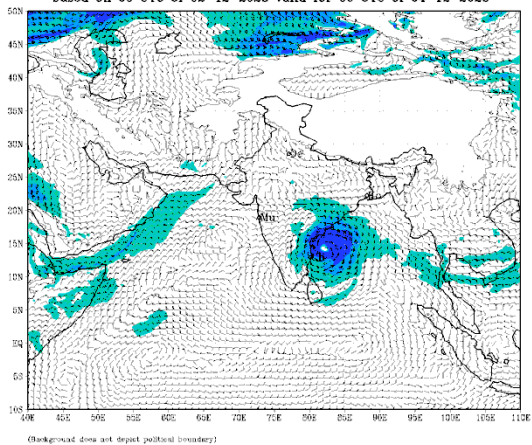
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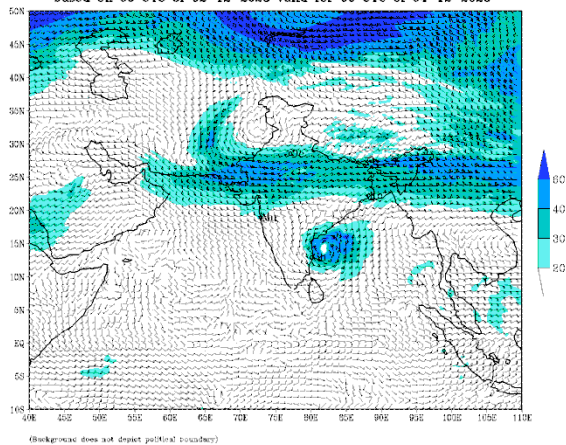
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)  
 based on 00 UTC of 02-12-2023 valid for 00 UTC of 04-12-2023



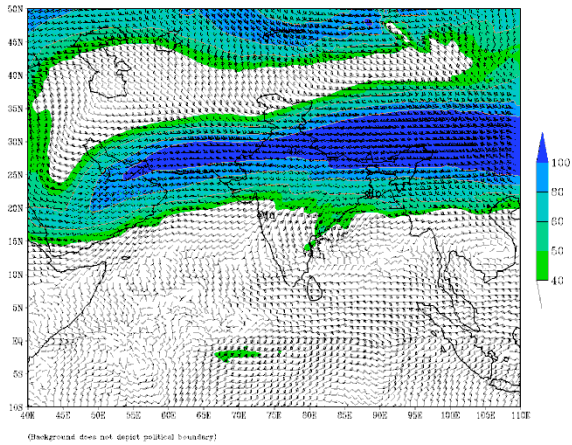
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 based on 00 UTC of 02-12-2023 valid for 00 UTC of 04-12-2023



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (48 HR)  
 based on 00 UTC of 02-12-2023 valid for 00 UTC of 04-12-2023

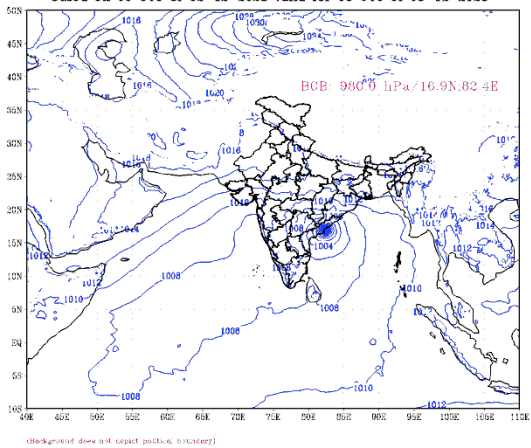


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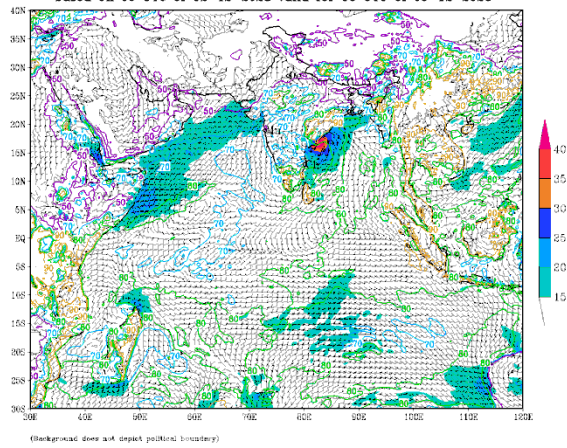




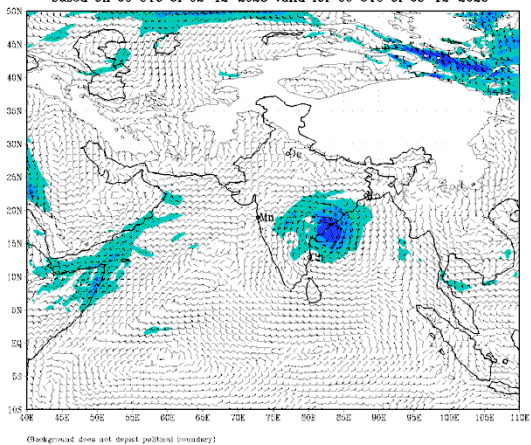
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based on 00 UTC of 02-12-2023 valid for 00 UTC of 05-12-2023



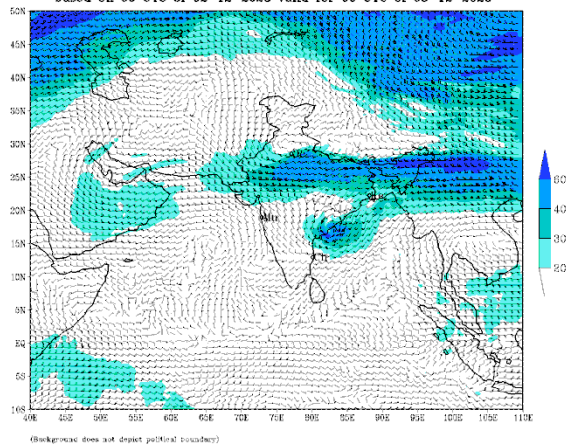
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 05-12-2023



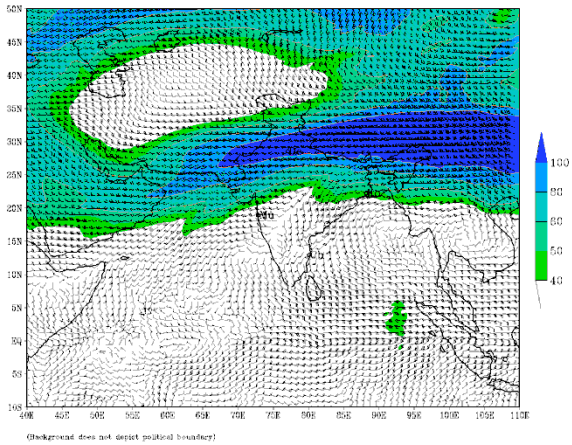
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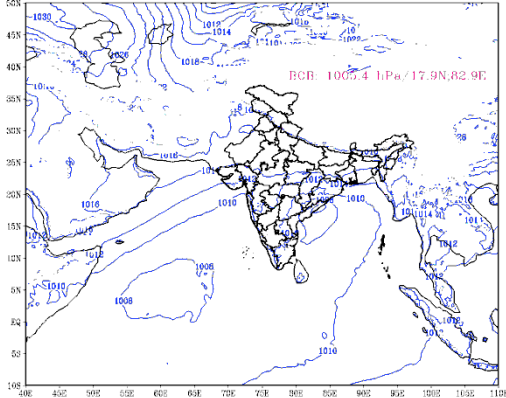
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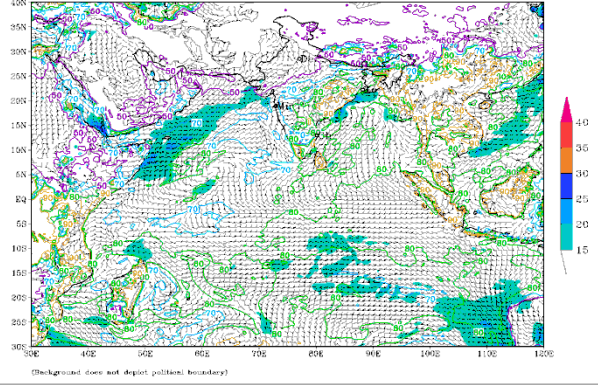
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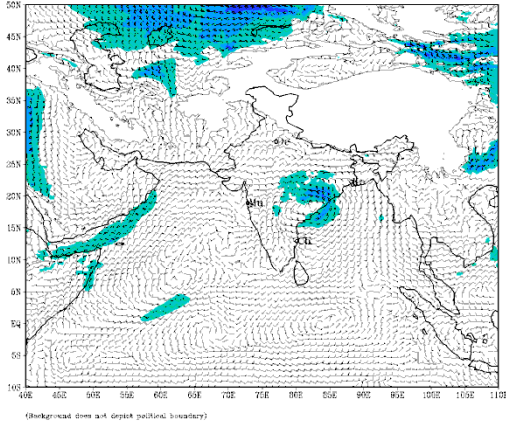
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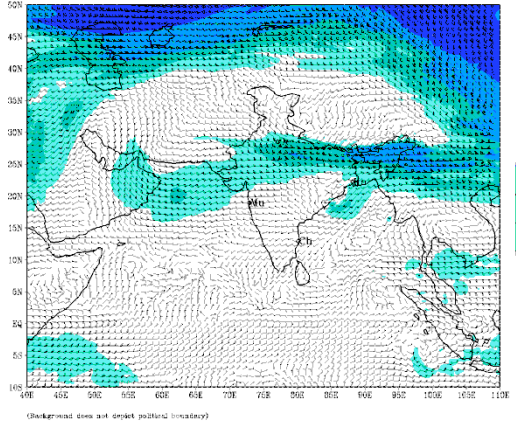
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 06-12-2023



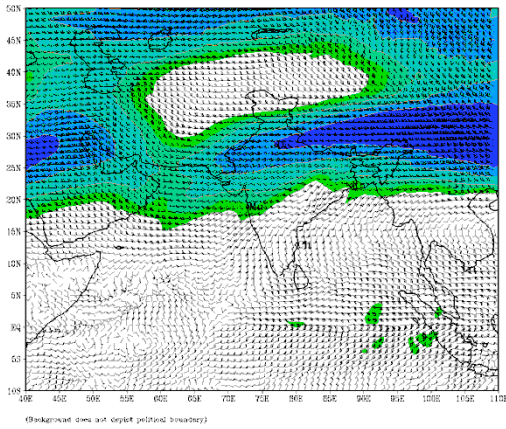
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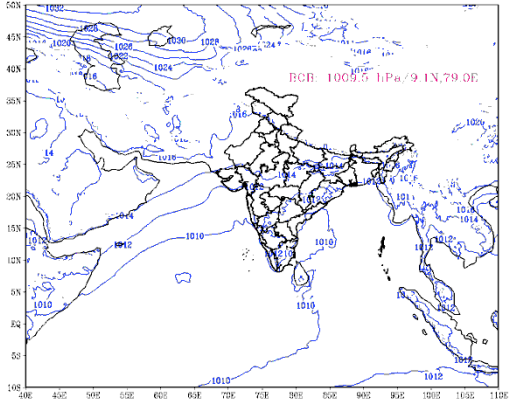
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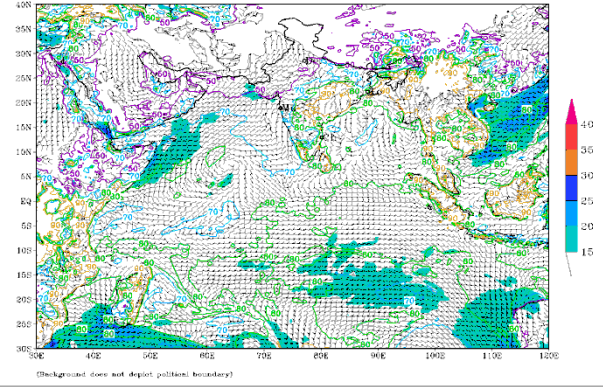
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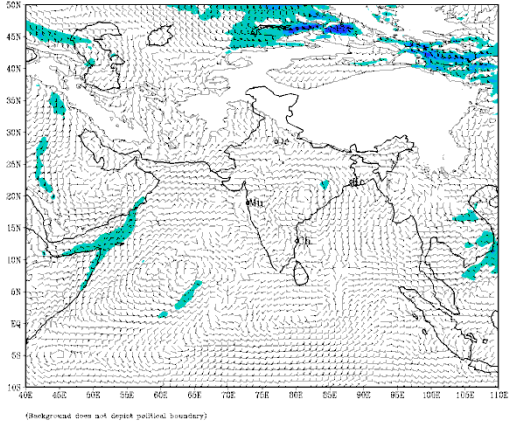
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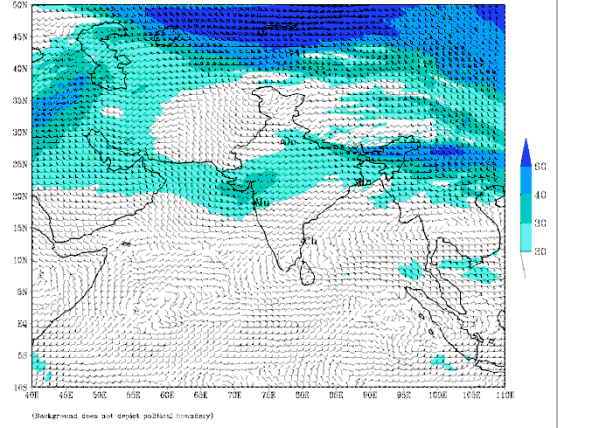
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)  
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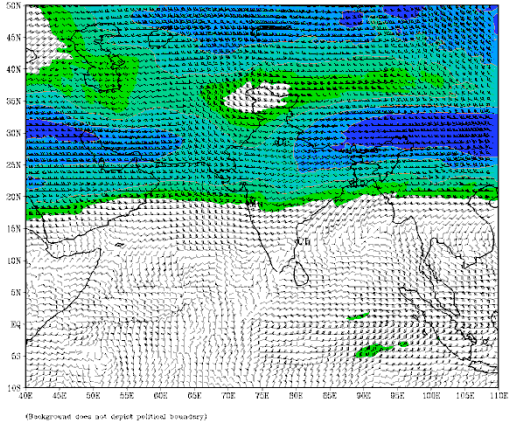
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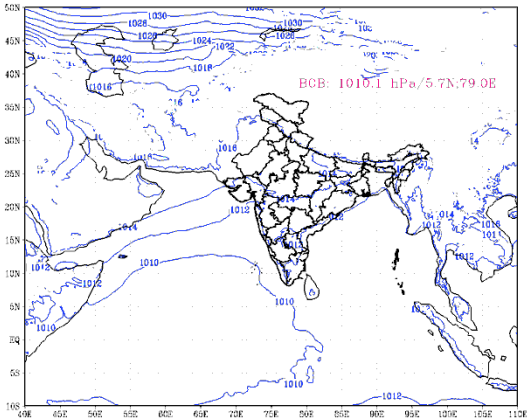
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 07-12-2023



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based on 00 UTC of 02-12-2023 valid for 00 UTC of 07-12-2023

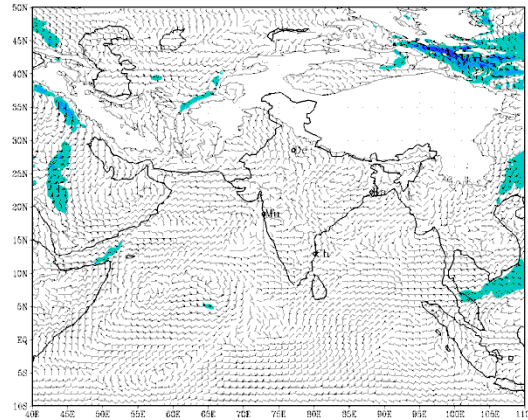


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 08-12-2023



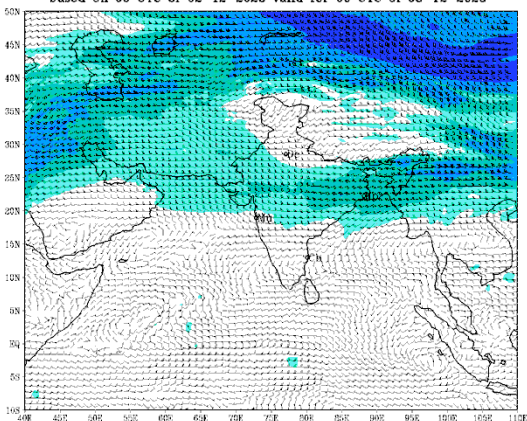
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IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 08-12-2023



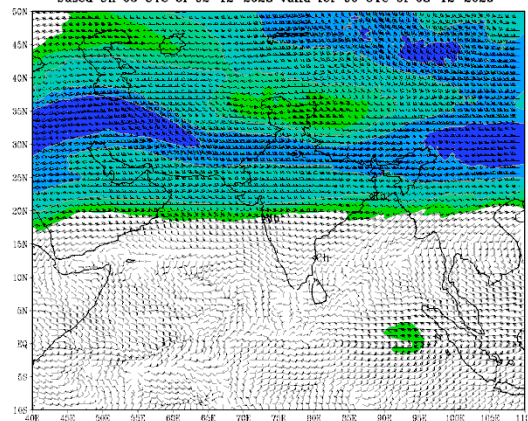
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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 08-12-2023



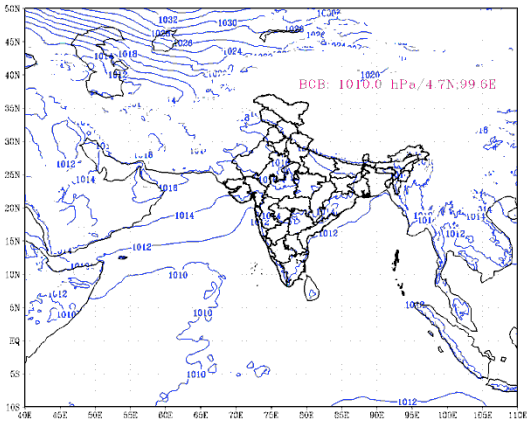
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IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 08-12-2023



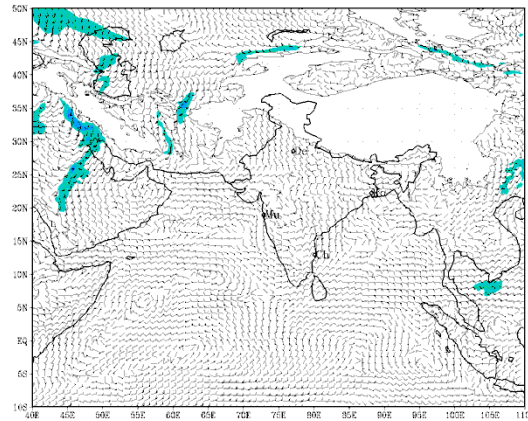
(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 09-12-2023



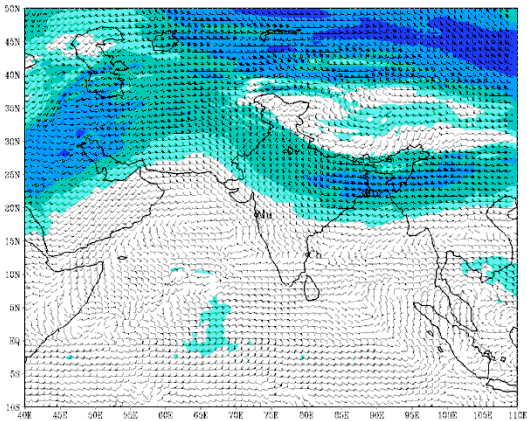
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 09-12-2023



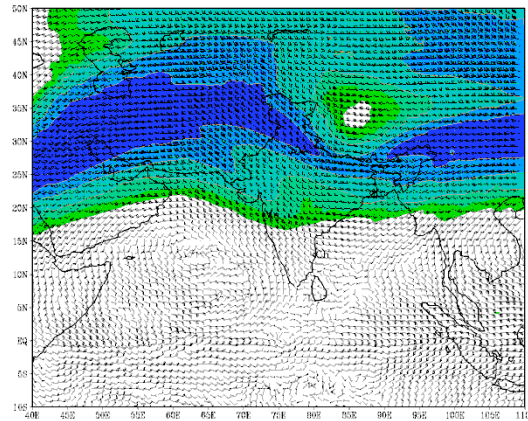
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 09-12-2023



(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 02-12-2023 valid for 00 UTC of 09-12-2023



(Background does not depict political boundary)