



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

**Tropical Cyclone Forecast Programme  
Report Dated 04<sup>th</sup> December, 2023**

**Time of Issue: 1330 UTC**

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

The Severe Cyclonic Storm “MICHAUNG” (pronounced as MIGJAUM) over Westcentral & adjoining Southwest Bay of Bengal off south Andhra Pradesh and adjoining north Tamilnadu coasts moved northwestwards with a speed of 8 kmph during past 06 hours and lay centered at 1130 hours IST of 4th December, 2023 over the same region near Latitude 13.5°N and Longitude 80.8°E, about 90 km northeast of Chennai, 140 km southeast of Nellore, 200 km north-northeast of Puducherry, 270 km south of Bapatla and 300 km south of Machilipatnam.

It is likely to intensify gradually and move nearly northwards almost parallel and close to south Andhra Pradesh coast and cross South Andhra Pradesh coast between Nellore and Machilipatnam, close to Bapatla during forenoon of 5th December as a Severe Cyclonic Storm with a maximum sustained wind speed of 90-100 kmph gusting to 110 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>	28-29 over the system and its surroundings, also over its forecasted path. 27 over along and off Andhra Pradesh coast north of 14°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 parts of 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>	200-250 over the system. 100-150 around the system. 25 over Comorin area.	20-40 over parts of southwest AS. 10-20 over most parts of AS.
<b>Low Level convergence (X10<sup>-5</sup> s<sup>-1</sup>)</b>	10 over the system, 5-10 over its surroundings and over southwest and adjoining westcentral BoB, Gulf of Mannar, Comorin area.	10-30 over central parts of south AS adjoining to EIO.
<b>Upper Level divergence (X10<sup>-5</sup> s<sup>-1</sup>)</b>	20 to the northeast of the system and its forecasted path. 10 over its surrounding areas, southwest BoB,	10-20 over central parts of south AS.

	westcentral BoB, Gulf of Mannar.	
<b>Vertical Wind Shear (VWS knots)</b> Low: 05-10 knots Moderate:10-20 knots High: >20 knots	10 over the system. 5-10 over the south and adjoining central BoB, Andaman Sea. 20 over the parts of central BoB. High (>20knots) over rest of BoB.	10-20 over southeast and parts of southwest AS. High (>20knots) over rest of AS.
<b>Wind Shear Tendency (knots)</b>	Decreasing over central and adjoining southwest BoB, north Andaman Sea. Increasing over north BoB and south Andaman Sea, Gulf of Mannar.	Decreasing over southwest AS, along and off Somalia coast. Increasing over rest of the AS.
<b>Upper Tropospheric Ridge</b>	Along 15°N over BoB.	Along 12°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 wc & southwest bay, south Andaman Sea. Scattered low/med clouds with embedded moderate to intense convection over rest of the bay and North Andaman Sea.

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

Scattered to broken low/med clouds with embedded intense to very intense convection over central & south Arabian Sea & Comorin area. Scattered low/med clouds with embedded moderate to intense convection over Lakshadweep islands area and weak to moderate convection over northwest Arabian Sea.

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

Scattered low/med clouds with embedded moderate to intense convection over Sri Lanka, Gulf of Mannar, Maldives, Nepal, Tibet, China, east China Sea, Taiwan, south Thailand, Gulf of Thailand, Sumatra, Strait of Malacca, Malaysia, Borneo, South China Sea, Java islands & Sea, Celebes islands & Sea, Philippines, north Madagascar, north Mozambique channel and over Indian Ocean between lat 5.0N to 10.0S long 40.0E to 120.0E and between lat 20.0S to 35.0S long 60.0E to 110.0E.

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

MJO index is currently in Phase 4 with amplitude greater than 1, it will be in same phase till 7<sup>th</sup> Dec. It will then move to phase 5 on 5<sup>th</sup> Dec with amplitude greater than 1, it remains in same phase and with amplitude greater than 1 till 10<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>	SCS over southwest BoB (SWB) and adjoining westcentral BoB (WCB) as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (15.5N/80.5E) on 5 <sup>th</sup> Dec as SCS/CS. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	No significant circulation for the next 7 days.
<b>IMD-GEFS</b>	SCS over southwest BoB (SWB) and adjoining westcentral BoB (WCB) as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and	No significant circulation for the

	cross the south Andhra Pradesh (AP) coast (15.5N/80E) on 5 <sup>th</sup> Dec as SCS/CS. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	next 7 days.
<b>IMD-WRF</b>	VSCS over WCB and adjoining SWB as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (14.8N/80E) on 5 <sup>th</sup> Dec as VSCS/SCS. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	No significant system during next 3 days.
<b>NCMRWF-NCUM</b>	SCS over SWB and adjoining WCB as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (15.5N/80E) on 5 <sup>th</sup> Dec as CS/SCS. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	An LPA over southeast AS on 9 <sup>th</sup> Dec having northeastward movement without significant intensification.
<b>NCMRWF-NEPS</b>	SCS over SWB and adjoining WCB as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (15.5N/80E) on 5 <sup>th</sup> Dec as SCS or higher intensity. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	An LPA over southeast AS on 9 <sup>th</sup> Dec having northeastward movement without significant intensification.
<b>NCMRWF-UM (Regional)</b>	WML over SWB as on today i.e., 3 <sup>rd</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 (15 <sup>0</sup> N/80 <sup>0</sup> E) on 5 <sup>th</sup> Dec as CS. It lay over land as WML on 6 <sup>th</sup> Dec.	No significant circulation for the next 4 days.
<b>ECMWF</b>	SCS over WCB and adjoining SWB as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (15.1N/80E) on 06 UTC of 5 <sup>th</sup> Dec as CS/SCS. It will lay over land as WML on 6 <sup>th</sup> Dec and weaken thereafter.	An LPA over southeast (8.5N/65.7E) AS on 7 <sup>th</sup> Dec having northeastward movement. It lay over southeast AS (10.0N/70.7E) on 8 <sup>th</sup> /9 <sup>th</sup> Dec as depression. Moving in same direction with further intensification.
<b>NCEP-GFS</b>	CS/SCS over WCB and adjoining SWB as on today i.e., 4 <sup>th</sup> Dec. It moves northwestward and cross the south Andhra Pradesh (AP) coast (14.8N/80E) on 00 UTC of 5 <sup>th</sup> Dec as CS/SCS. It will lay over land as WML on 00 UTC of 6 <sup>th</sup> Dec and weaken thereafter.	An LPA over southeast (8.3N/72.8E) AS on 18 UTC of 7 <sup>th</sup> Dec having northeastward movement. It lay over southeast AS (10.4N/73.5) as a depression on 9 <sup>th</sup> Dec and will have further intensification.

<b>IMD-Genesis Potential Parameter</b>	Potential zone over WCB and adjoining SWB along and off north Tamil Nadu and adjoining south Andhra Pradesh coast as on today i.e., 4 <sup>th</sup> Dec. It lay over WCB along and off south Andhra Pradesh coast on 5 <sup>th</sup> Dec. It lay over WCB, along and off south Andhra Pradesh coast on 5 <sup>th</sup> Dec.	Potential zone over southeast Arabian Sea on 7 <sup>th</sup> Dec having its northeastward movement. It lay over eastcentral and adjoining southeast Arabian Sea on 11 <sup>th</sup> Dec.
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**Summary and conclusion:**

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

Most of the models are indicating initial northwestwards movement of the severe cyclonic storm towards Andhra Pradesh coast. The landfall point is varying between latitude 15.1-15.70N/80.0-80.30E. The landfall time is varying between 5<sup>th</sup>/0000 UTC to 5<sup>th</sup>/0900 UTC.

Considering all the above, the severe cyclonic storm is likely to intensify gradually and move nearly northwards almost parallel and close to south Andhra Pradesh coast and cross south Andhra Pradesh coast between Nellore and Machilipatnam, close to Bapatla by 0600 UTC of 5<sup>th</sup> December as a severe cyclonic storm with a maximum sustained wind speed of 90-100 kmph gusting to 110 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	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:**

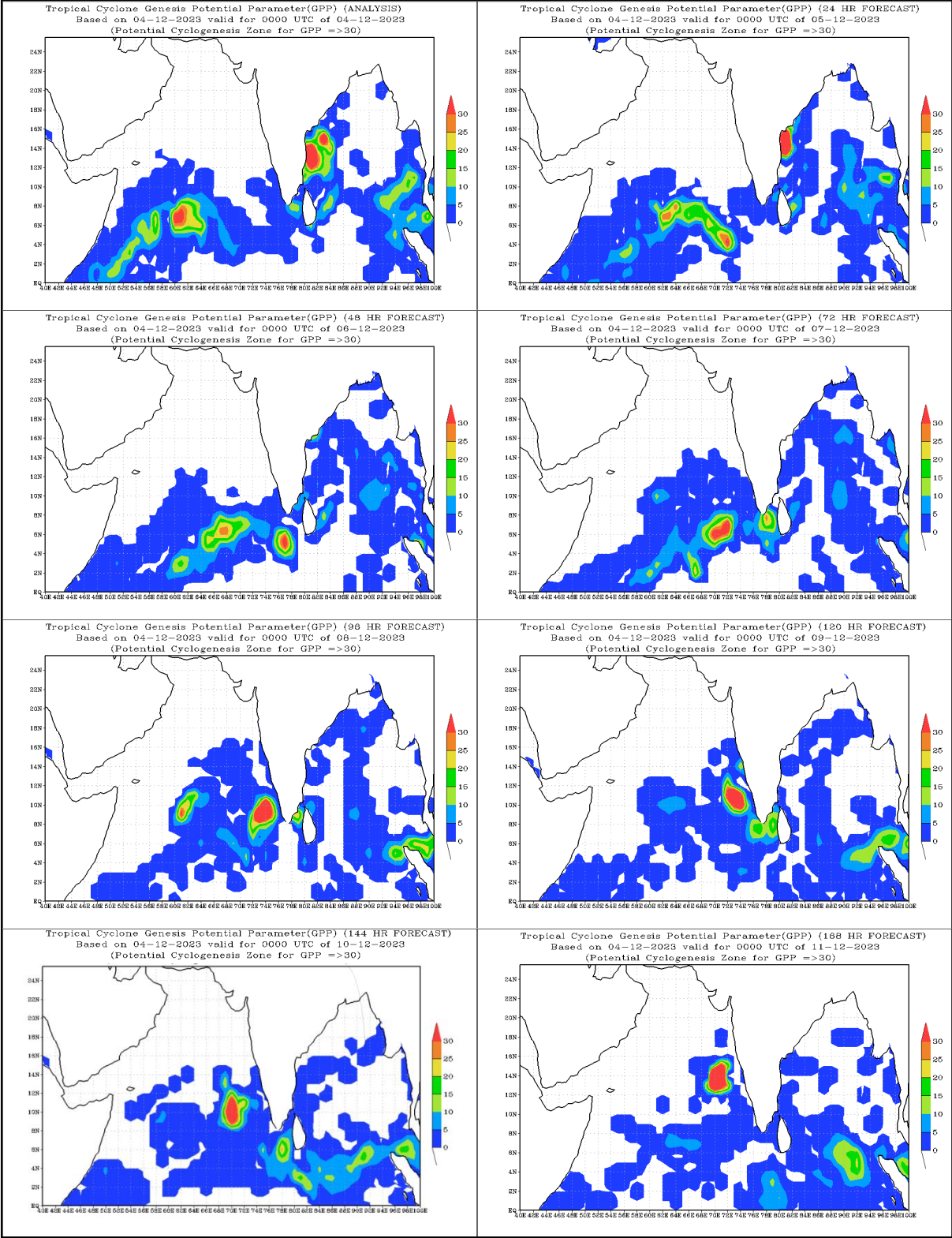
The IMD-GFS and IMD-GEFS models are not indicating any significant system for the next seven days. However, the NUCM models are indicating a low pressure area (LPA) over southeast Arabian Sea on 9<sup>th</sup> Dec having northeastward movement without further intensification. NCEP-GFS and ECMWF models are indicating an LPA over southeast Arabian Sea on 7<sup>th</sup> Dec. Both the models are indicating its northeastward movement with further intensification into depression on 9<sup>th</sup> Dec. These models are also suggesting its further intensification on the subsequent days. Hence, there is a low probability for the cyclogenesis over the Arabian Sea from the day 5 to day 7.

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

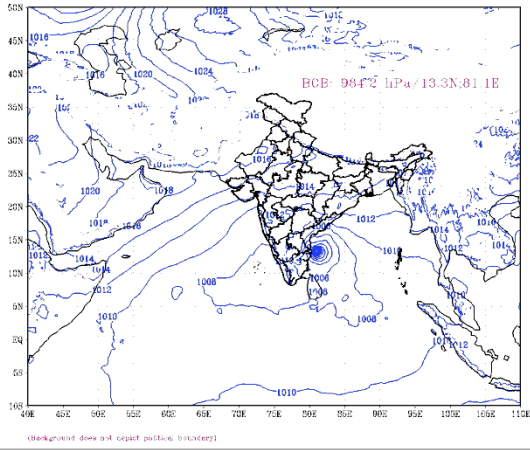
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	LOW	LOW	LOW

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

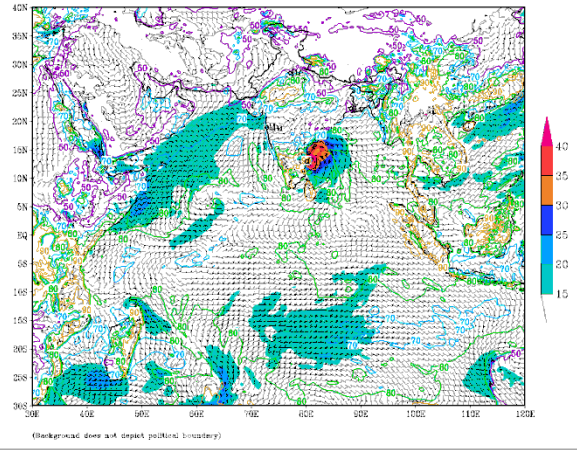
**IOP:** IOP for Tamil Nadu, Puducherry coasts 4<sup>th</sup> Dec;  
IOP for Andhra Pradesh coast 4<sup>th</sup> to 5<sup>th</sup> Dec.



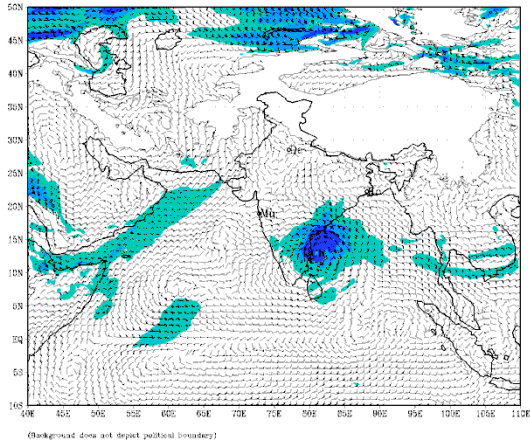
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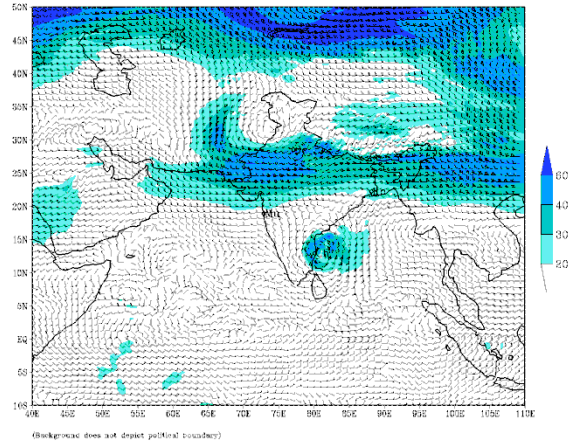
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)  
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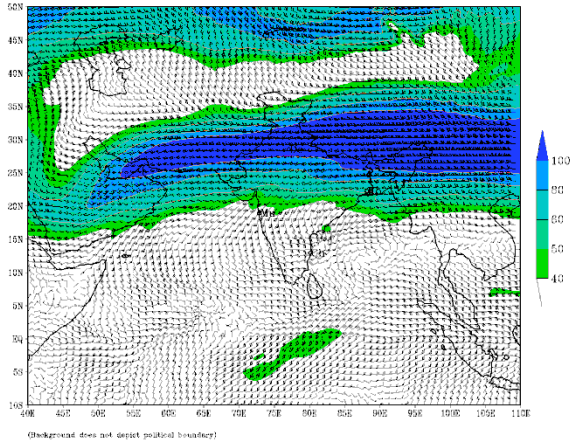
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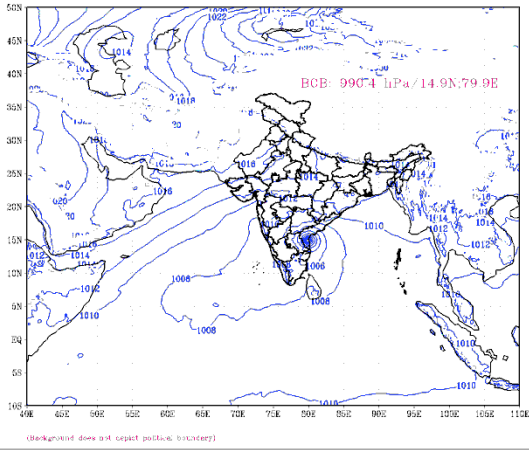
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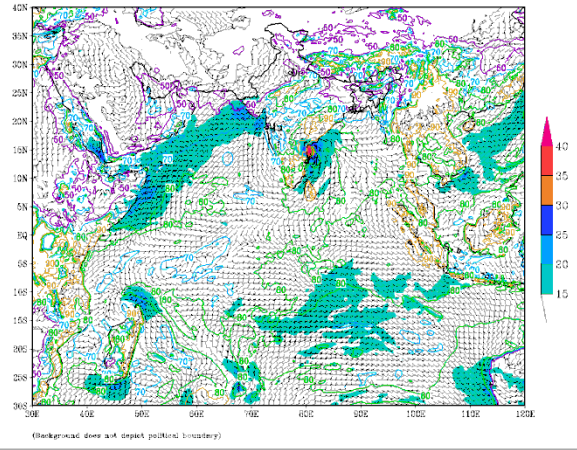
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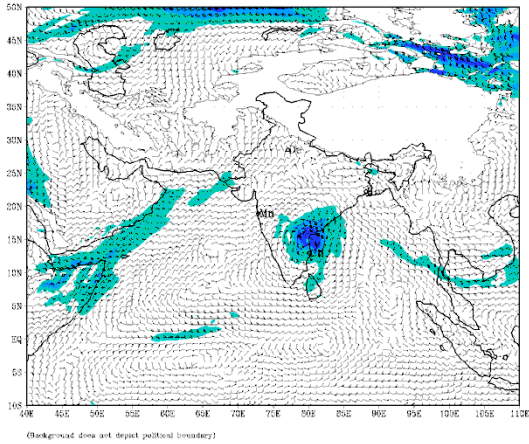
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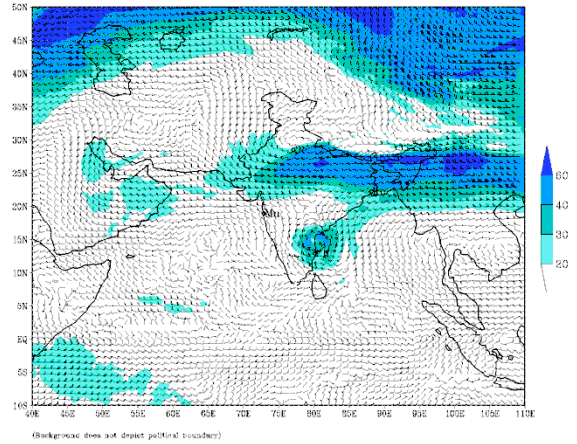
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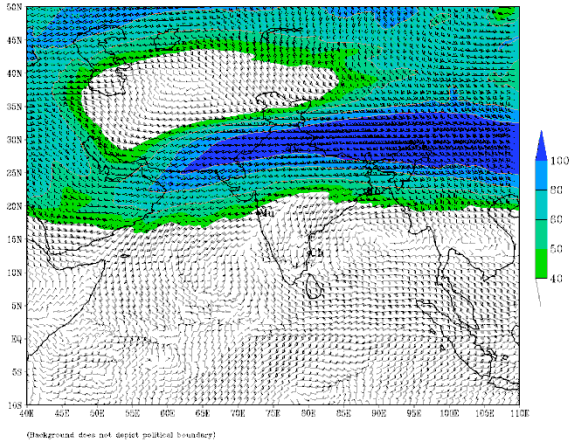
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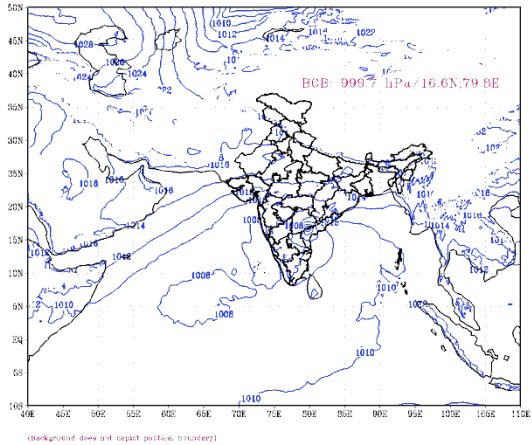


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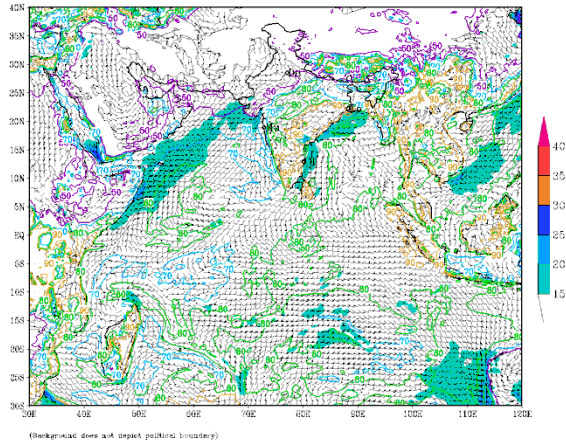




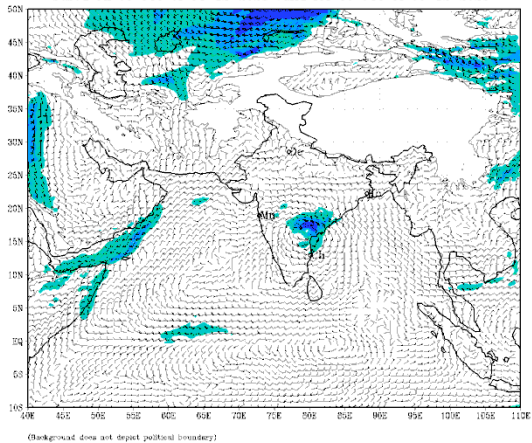
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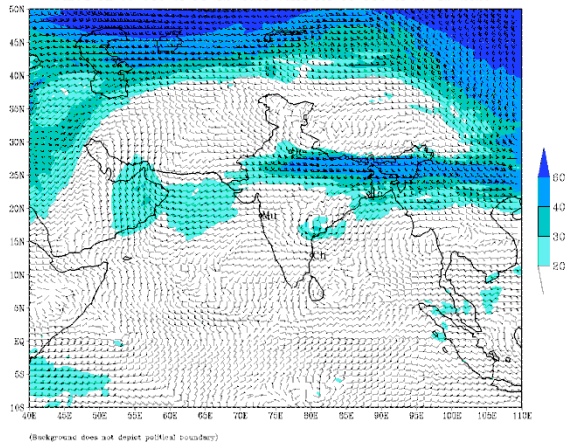
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)  
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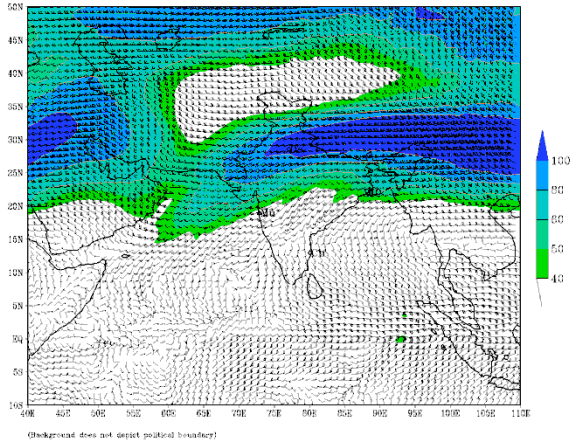
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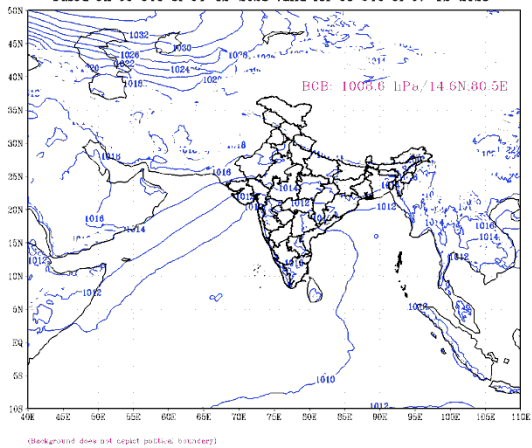
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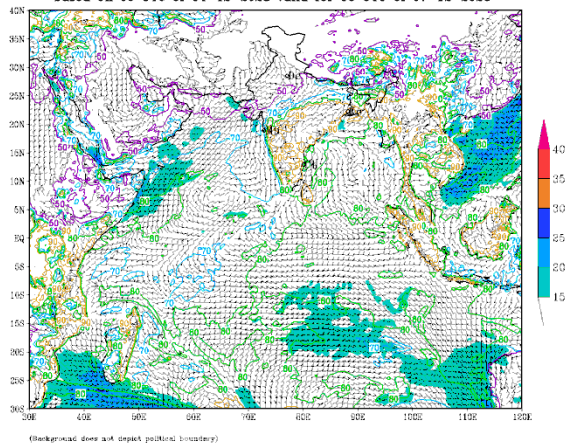
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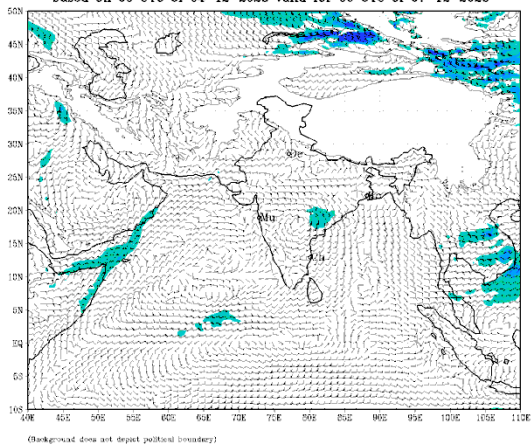
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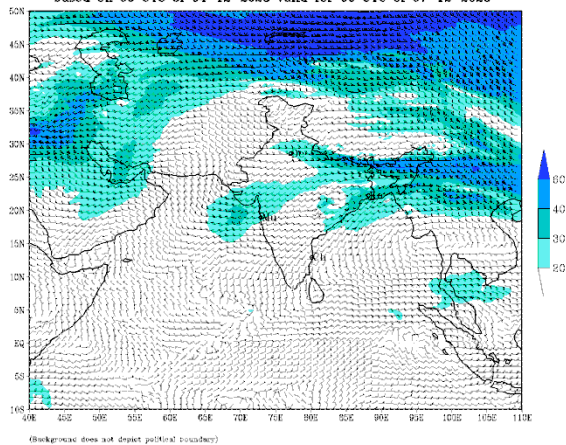
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)  
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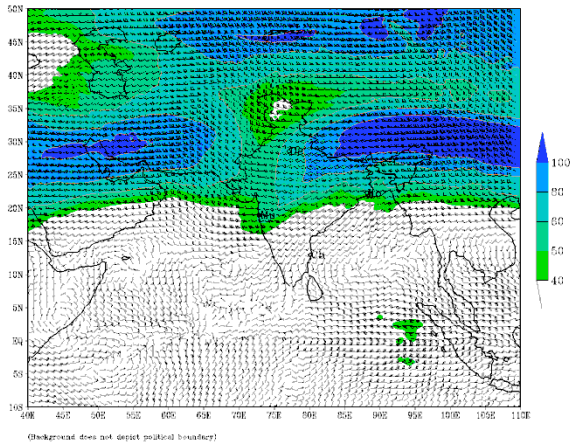
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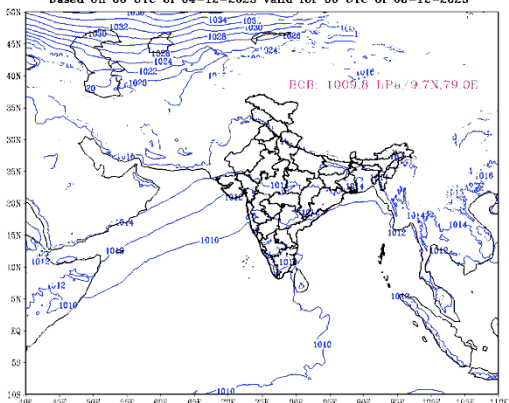
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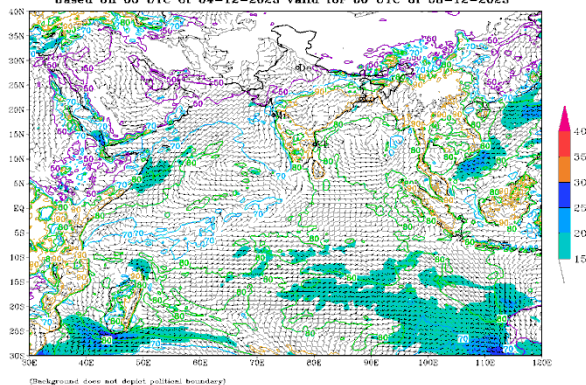


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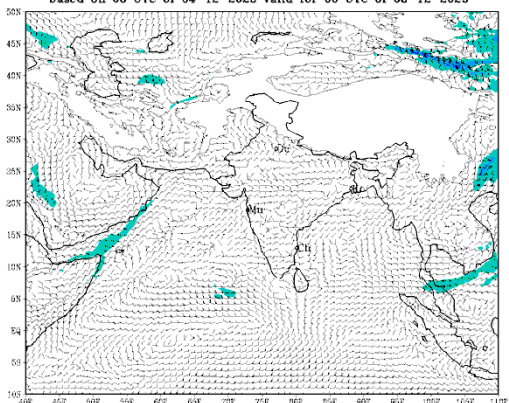
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)  
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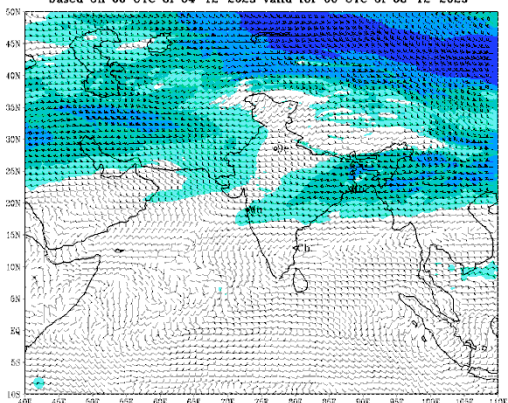
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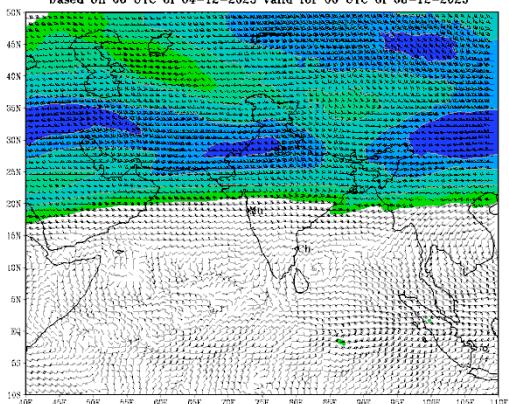
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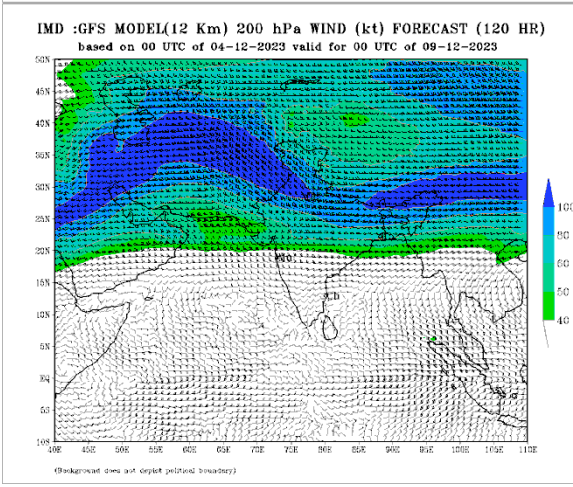
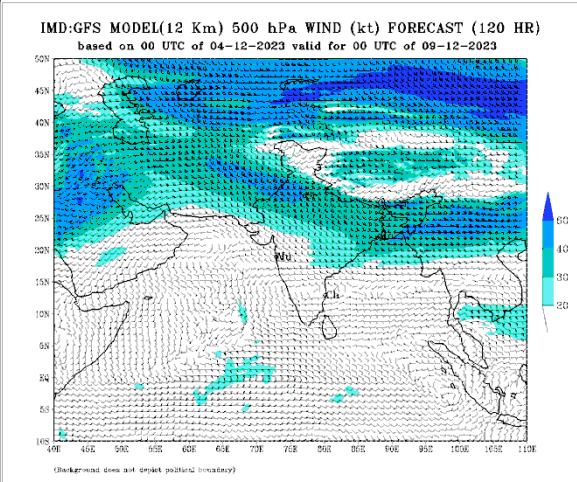
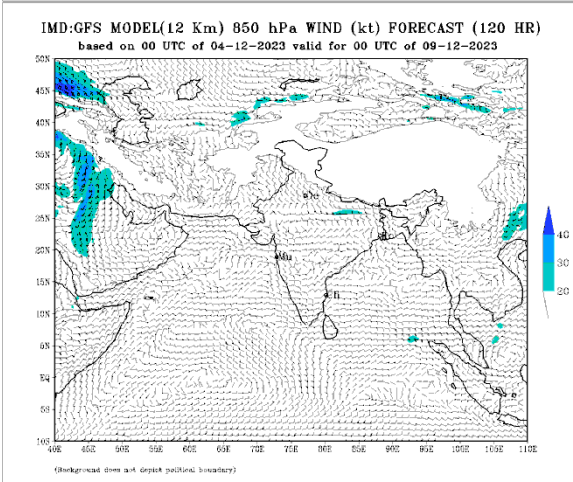
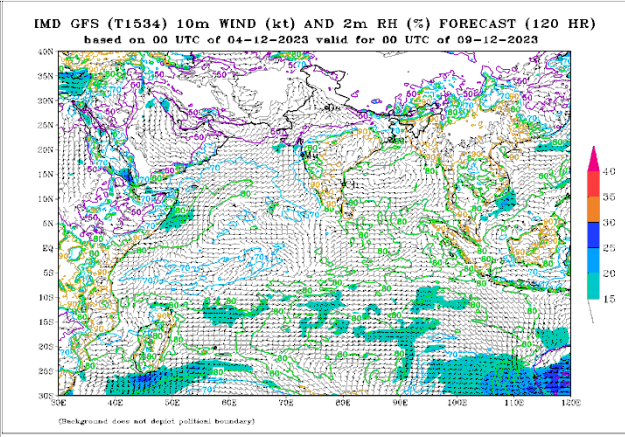
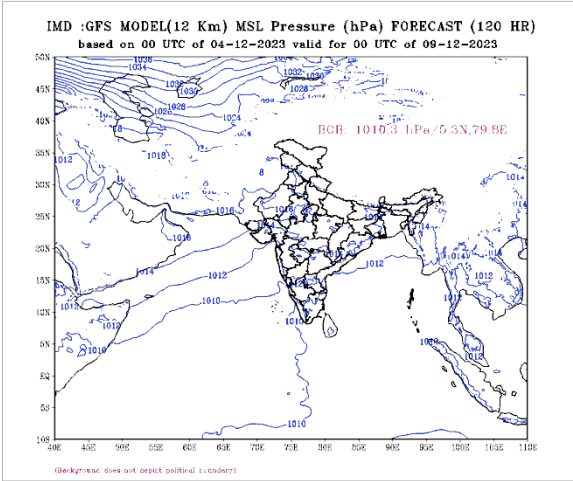


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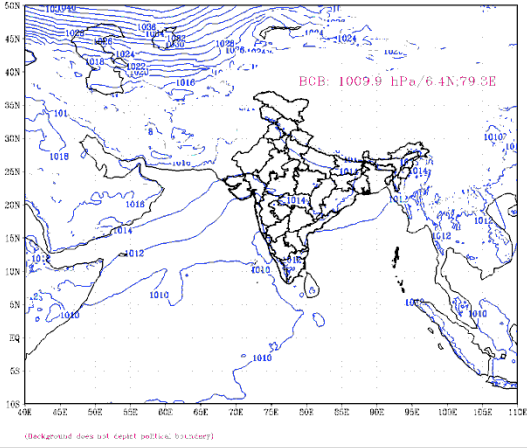
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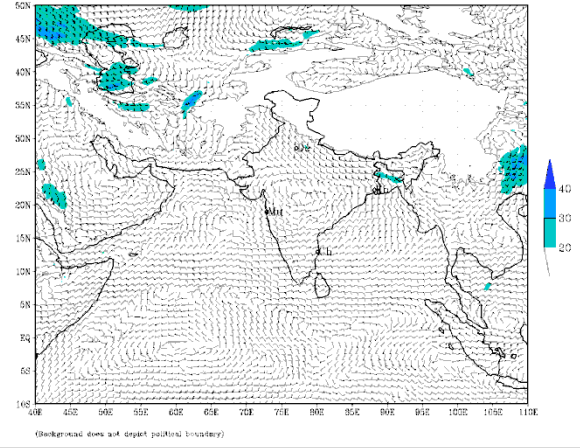
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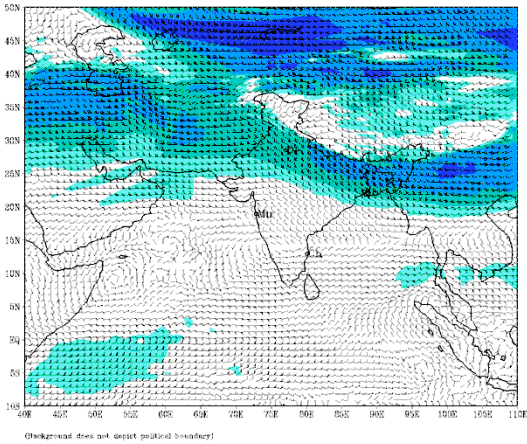
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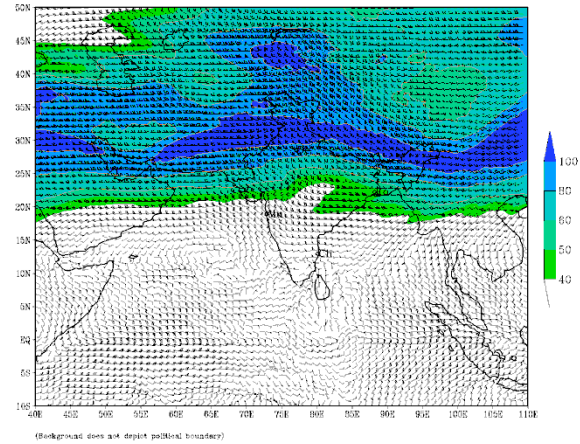
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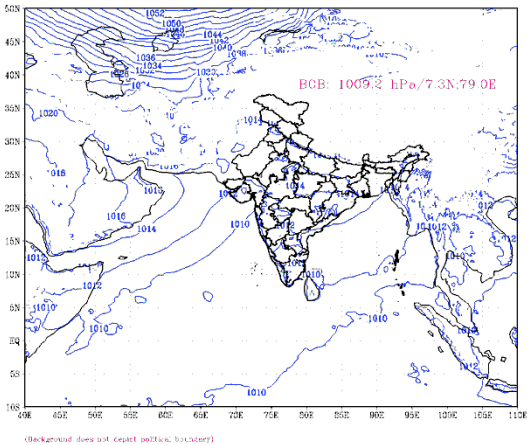
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based on 00 UTC of 04-12-2023 valid for 00 UTC of 10-12-2023



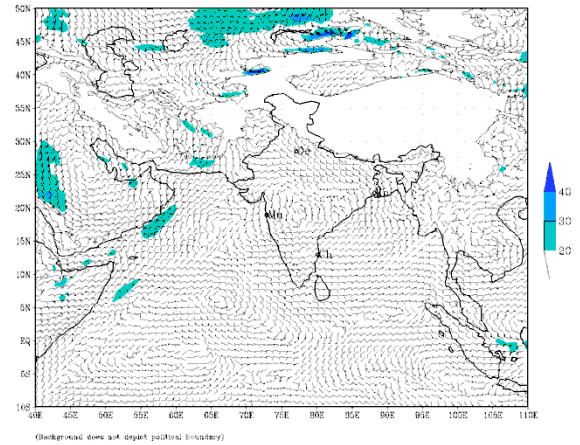
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 04-12-2023 valid for 00 UTC of 10-12-2023



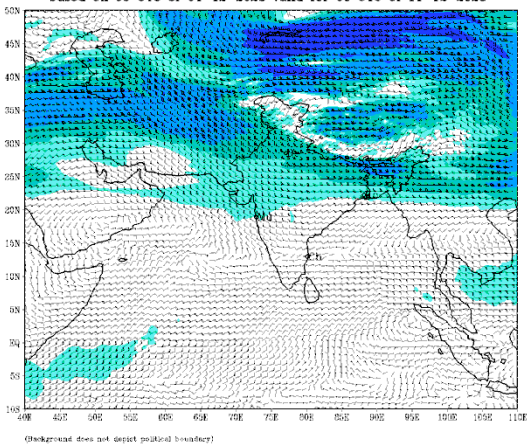
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)  
based on 00 UTC of 04-12-2023 valid for 00 UTC of 11-12-2023



IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 04-12-2023 valid for 00 UTC of 11-12-2023



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 04-12-2023 valid for 00 UTC of 11-12-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)  
based on 00 UTC of 04-12-2023 valid for 00 UTC of 11-12-2023

