



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

**Tropical Cyclone Forecast Programme
Report Dated 21st October, 2022**

Time of Issue: 1300 UTC

Synoptic features (based on 0600 UTC analysis):

- ❖ The Low Pressure Area over north Andaman Sea and adjoining areas of south Andaman Sea & Southeast Bay of Bengal with the associated cyclonic circulation extending upto 7.6 km above mean sea level persists. It is very likely to move west-northwestwards and concentrate into a Depression over southeast & adjoining eastcentral Bay of Bengal on 22nd October and then moving northwestwards, intensify further into a Deep Depression over eastcentral & adjoining southeast Bay of Bengal on 23rd October. Subsequently, it is very likely to recurve gradually northwards and intensify into a Cyclonic Storm over westcentral & adjoining eastcentral Bay of Bengal by 24th October. Thereafter, it is likely to move north-northeastwards and reach near West Bengal-Bangladesh coasts on 25th October, skirting Odisha coast.
- ❖ The trough now runs from cyclonic circulation associated with the low pressure area over north Andaman Sea and adjoining areas to Southeast Arabian Sea across South Bay of Bengal, Tamilnadu & Kerala and extends upto 5.8 km above mean sea level.
- ❖ The cyclonic circulation over Southeast Arabian Sea & adjoining Kerala coast has merged with the above trough.
- ❖ The Western Disturbance is seen as a cyclonic circulation over northern parts of Jammu & Kashmir at 5.8 km above mean sea level.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	About 29-31°C over entire bob	30-31°C over eastcentral AS and off Maharashtra-South Gujarat coasts. 27-29°C over eastcentral, westcentral and southwest BoB. Less than 26°C off Oman & Somalia coast.

Tropical Cyclone Heat Potential (TCHP) kJ/cm²	(a) >100 over entire andaman sea, central bob and south BoB. (b) 50-70 over western parts of BoB.	(a) 90-110 over northwest Equatorial Indian Ocean region. (b) 60-80 over south AS & adjoining eastcentral AS. (c) 30-40 over remaining AS off west coast of India.
Cyclonic Relative vorticity (X10⁻⁶s⁻¹)	Positive vorticity of 100 around the system centre and is extending upto 500 hpa level.	(a) Positive vorticity of 40-50 over southeast AS,. (b) 30-40 over southwest AS off Yemen coasts and another over North Somalia coast.
Low Level convergence (X10⁻⁵ s⁻¹)	10 to the southeast of system centre. Another zone of 05-10 over southwest BoB & adjoining equatorial Indian Ocean (EIO).	Small zones of value 05 over southeast AS off Kerala coast.
Upper Level divergence (X10⁻⁵ s⁻¹)	10 over South Andaman sea to the southeast of system centre. 05-10 over south BoB and adjoining EIO.	05-10 over southeast AS & adjoining equatorial Indian Ocean region, Lakshadweep Islands and Comorin Area. Another small zone of 5 over southwest AS.
Vertical Wind Shear (VWS knots)	Moderate (10-15 knots) over South Andaman Sea and central & adjoining south BoB. High to the north of 18°N.	5-15 over central & adjoining south AS. >30 over extreme north & adjoining central AS.
Wind Shear Tendency (knots)	No data available	No data available
Upper tropospheric Ridge	Along 19.0°N over the BoB.	Along 20.0°N over the AS.
Trough in westerlies	Near 75°E upto 20°N	

Satellite observations based on INSAT imagery (0600 UTC):

(a) Over the BoB & Andaman Sea:-

At 0900 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection over south Bay of Bengal and Andaman Sea. Scattered low and medium clouds with embedded isolated moderate to intense convection over westcentral & northwest Bay of Bengal.

(b) Over the Arabian Sea:-

At 0900 UTC, Scattered low and medium clouds with embedded moderate to intense convection over eastcentral & southeast Arabian Sea Lakshadweep Islands Area and

Comorin Area. Scattered low and medium clouds with embedded isolated weak to convection over westcentral & southwest Arabian Sea

M.J.O. Index:

MJO index is currently in Phase 6 with amplitude greater than 1. It will continue in same phase for next 7 days with amplitude remaining greater than 1.

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

Vortex (NESAT) over South China Sea and neighbourhood lay near 17.5N / 108.1E with intensity T.No./C.I. No. 1.5/1.5 at 0600 UTC.

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

MODEL GUIDANCE	BoB	AS
IMD-GFS	GFS is indicating a low pressure area (LPA) over north Andaman Sea on 21 st , Well marked low pressure area over eastcentral & adjoining southeast Bay of Bengal around 22 nd October and Cyclonic Storm over eastcentral & adjoining westcentral BoB on 23 rd October. Thereafter, it is very likely to recurve northwards and intensify into a Very Severe Cyclonic Storm over westcentral BoB by 24th October. Thereafter, it is likely to move gradually north-northeastwards and reach westcentral & adjoining northwest BoB on 25th October and cross Bangladesh coast near 22.5N/89.5E around 2100 UTC of 25 th .	A low pressure area (LPA) over central AS on 21 st . No significant system thereafter.
IMD-GEFS	GEFS is indicating a low pressure area (LPA) over north Andaman Sea on 21 st , Well marked low pressure area over eastcentral & adjoining southeast Bay of Bengal around 22 nd October and Deep Depression (DD) over eastcentral & adjoining westcentral BoB on 23 rd October. Thereafter, it is very likely to recurve northwards and intensify into a Very Severe Cyclonic Storm over westcentral BoB by 24th October. Thereafter, it is likely to move gradually north-northeastwards, weaken and lay over northwest & adjoining westcentral BoB on 25th October and cross Bangladesh coast near 22.5N/89.2E around 0000 UTC of 26 th .	A cycir over eastcentral & adjoining southwest AS during 21 st -22 nd . Extended low over southeast AS on 23 & 24, becoming more intensify on 25.
GEFS Probablistic guidance	About 70-80% ensemble members are indicating initial west-northwestwards movement followed by northwest movement towards westcentral BoB. Thereafter, it would gradually recurve north-northeastwards and cross Bangladesh coast near 22.5N/89.2E around 25 th /1800 UTC.	Not available
IMD WRF	indicating a low pressure area (LPA) over North Andaman Sea and on 21 st it is very likely to move westnorthwestwards and concentrate into a Well marked low pressure area over eastcentral & adjoining southeast Bay of Bengal on 22 nd October and into a Deep Depression on 23 rd October over westcentral BoB, Deep Depression/Cyclonic Storm over westcentral BoB of 24 th .	A low pressure area (LPA) over central AS on 21 st becoming less marked thereafter. LPA over southeast AS on 23 rd .

NCMRWF-NCUM	<p>The low pressure area (LPA) over Andaman Sea and adjoining southeast BOB on 20th Oct 2022 is very likely to move west-northwestwards and would become depression on 22nd October 2022 over east-central BoB. It would continue to move in the west-northwestward and would become deep depression on 23rd October 2022 over west-central BoB. It would then gradually recurve and will likely to move north-northeast ward and would intensify into cyclonic storm over west-central and adjoining northwest BoB on 24th October 2022. It would maintain the same direction i.e., north-northeast ward and would intensify further into severe cyclonic storm over northwest and adjoining northeast BoB on morning of 25th October 2022. It would move further in the same direction towards west Bengal - Bangladesh coast and would cross these coasts on midnight of 25th October 2022.</p> <p>Another LPA over southwest and adjoining southeast BoB would move southwest wards till 22nd Oct 2022.</p>	No significant system over AS
NCMRWF-NEPS	<p>The low pressure area (LPA) over Andaman Sea and adjoining southeast BOB is very likely to move west & northwestwards, till 22nd Oct 2022 and would become as depression over east-central and adjoining southeast BoB on 22nd Oct 2022. It would move north-northwest ward and gradually intensify into deep depression over west-central and adjoining northwest BoB on 23rd Oct 2022. It would then gradually recurve north-northeast ward and would become cyclonic storm over northwest and adjoining west-central BoB by morning of 24th Oct 2022. It would further move in the same direction and would become as severe cyclonic storm over northwest and adjoining northeast BoB by morning of 25th Oct 2022. It would further move in the same direction towards Bangladesh coast and would cross the coast by night of 25th Oct 2022.</p>	No significant system over AS
NCMRWF-UM (Regional)	<p>The low pressure area (LPA) over Andaman Sea and adjoining southeast BOB is very likely to move west - northwestwards and would lie as depression over east-central and adjoining southeast BoB by 22nd Oct 2022. It would further move north-northwest wards and would become deep depression over west central Bob by 23rd Oct 2022. It would move further in north-northwestward and would become cyclonic storm over west-central and adjoining north west BoB.</p> <p>Another LPA over southwest and adjoining southeast BoB would move southwest wards till 22nd Oct 2022.</p>	No significant system over AS
ECMWF	<p>LPA over Andaman Sea on 21st, depression over eastcentral & adjoining southeast BoB on 22nd with northwestwards movement till 25th and northeastwards recurvature thereafter towards north BoB. It is not indicating significant intensification of the system. It is indicating crossing near 22N/90E around 26th/0600 UTC.</p>	No significant system over AS.
ECMWF-EPS	<p>60-70% cyclogenesis probability over Andaman Sea and adjoining southeast BoB during next 2 days. Large variation in track with some members indicating nearly west-northwestwards movement towards westcentral & adjoining southwest BoB and some members indicating initial west-northwestwards movement, followed by nearly northwards movement towards north BoB and crossing West Bengal-</p>	Model is indicating 70-80% probability of cyclogenesis over southeast AS during next 3-5 days.

	Bangladesh coasts. Intensification is suggested upto deep depression stage only.	
NCEP-GFS	Model is indicating an LPA over north Andaman Sea & adjoining southeast BoB on 22 nd , CS over westcentral BoB on 23 rd , deep depression over westcentral & adjoining northwest BoB on 24 th , with crossing over Bangladesh coast as a depression on 25 th .	No significant system
IMD-Genesis Potential Parameter	A Potential zone over North Andaman Sea and another over southeast BoB on 23 rd & 24 th . The guidance product is indicating north-northeastwards movement of potential zone till 25 th off Bangladesh coast.	No significant zone

Summary and conclusion:

1. For the Bay of Bengal:

The guidance from various numerical models indicate that the depression would form over southeast & adjoining eastcentral BoB around 22nd. Models are indicating further intensification of the system into a cyclonic storm by 24th over westcentral BoB (NCEP GFS, IMD GFS & GEFS on 23rd, NCUM & NEPS on 24th). ECMWF is not indicating intensification upto CS stage. Models are unanimous regarding the landfall point over Bangladesh coast. Landfall time is varying between 25th evening/night. Various extended range models are also indicating likely formation of another cyclonic circulation over eastcentral BoB during week 2 with low probability of it's intensification into a depression.

In view of all the above, it is inferred that the Low Pressure Area over north Andaman Sea and adjoining areas is very likely to move west-northwestwards and concentrate into a Depression over southeast & adjoining eastcentral Bay of Bengal on 22nd October and then moving northwestwards, intensify further into a Deep Depression over eastcentral & adjoining southeast Bay of Bengal on 23rd October. Subsequently, it is very likely to recurve gradually northwards and intensify into a Cyclonic Storm over westcentral & adjoining eastcentral Bay of Bengal by 24th October. Thereafter, it is likely to move north-northeastwards and reach near West Bengal-Bangladesh coasts on 25th October, skirting Odisha coast.

The environmental conditions like SST and ocean thermal energy are favourable over south & central BoB for formation of low/depression. The La Nina conditions supported with negative IOD conditions will support the movement of remnant circulations from South China Sea to Andaman Sea with possible further intensification. However, MJO being in phase 6 with amplitude more than 1, will not be supportive for amplification of convection and hence the system.

2. For the Arabian Sea:

No significant system is likely to develop over Arabian Sea 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
LOW	MODERATE	HIGH	HIGH	HIGH	NIL	NIL

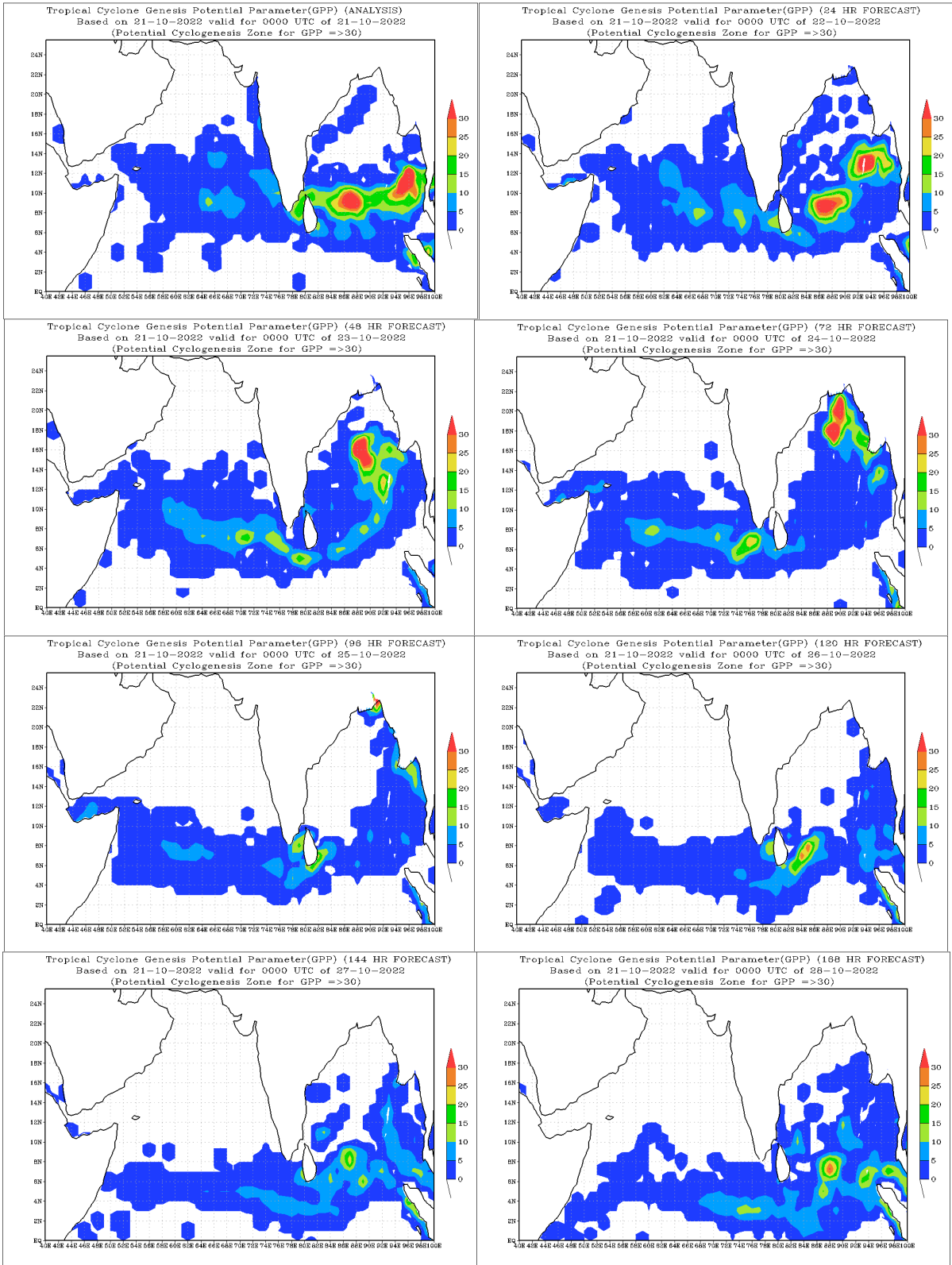
Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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

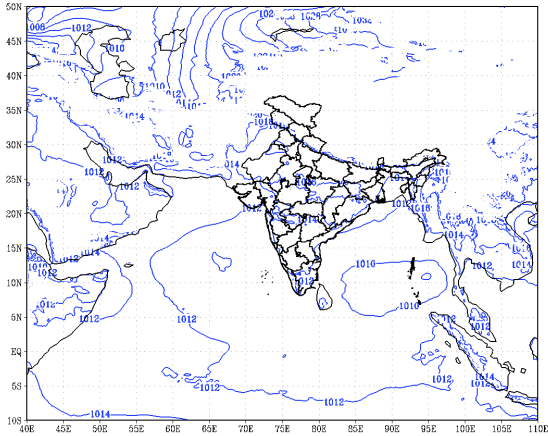
Advisory:

The intensification & movement of depression likely to form over central Bay of Bengal by 22nd October morning need to be monitored closely.

IOP is suggested for Andaman & Nicobar Islands on 21st & 22nd.

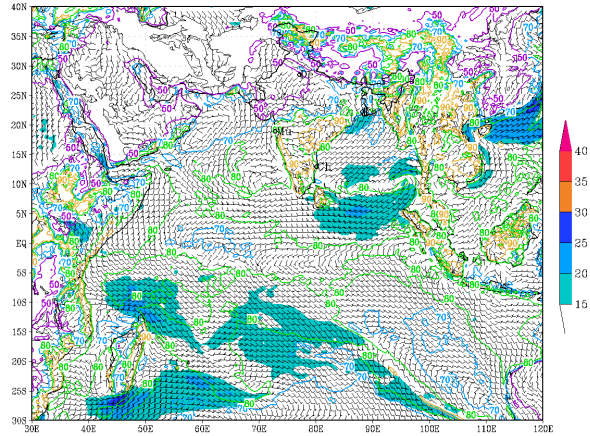


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
 based on 00 UTC of 21-10-2022 valid for 00 UTC of 21-10-2022



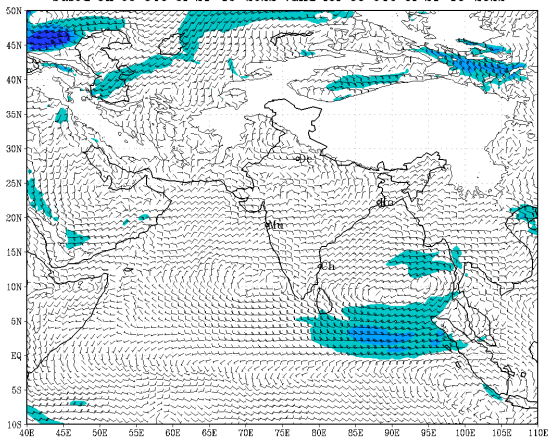
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
 based on 00 UTC of 21-10-2022 valid for 00 UTC of 21-10-2022



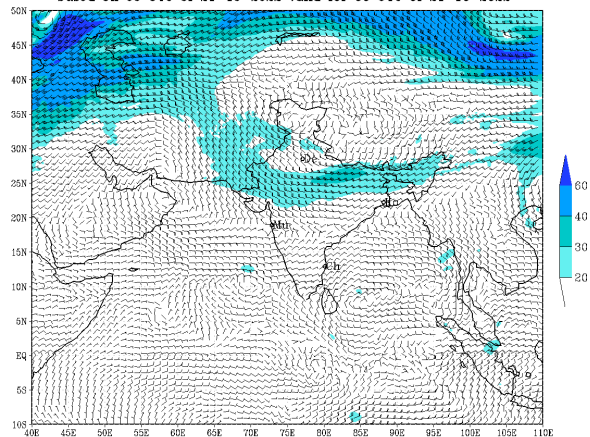
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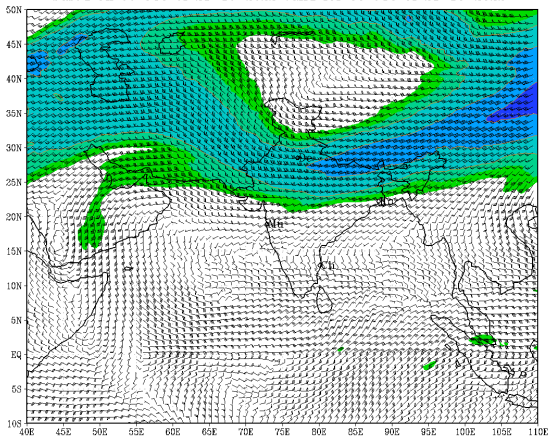
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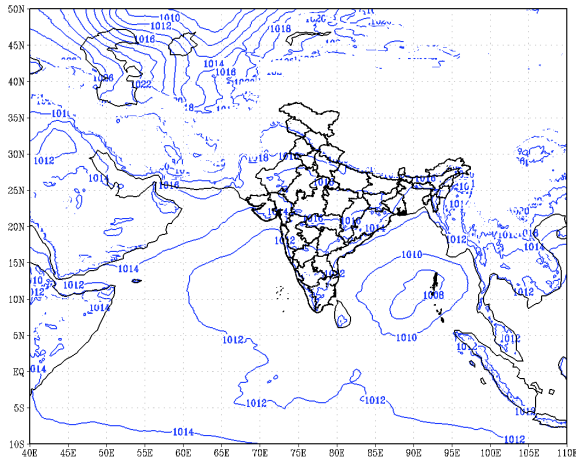
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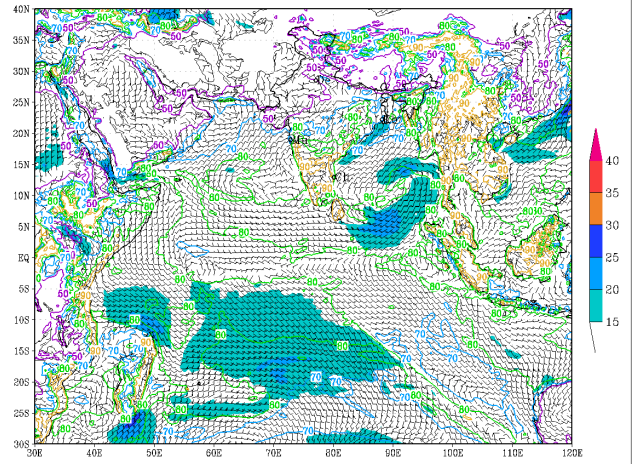
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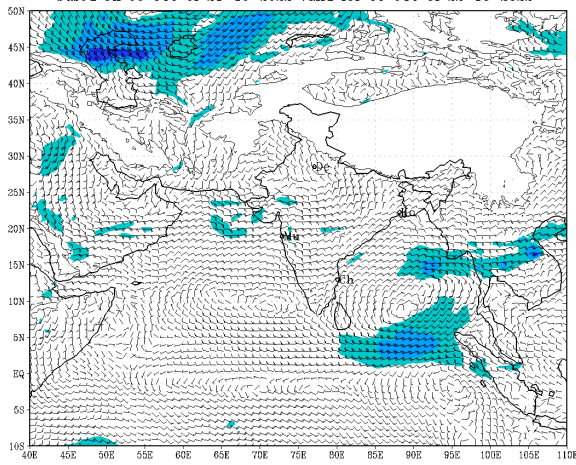
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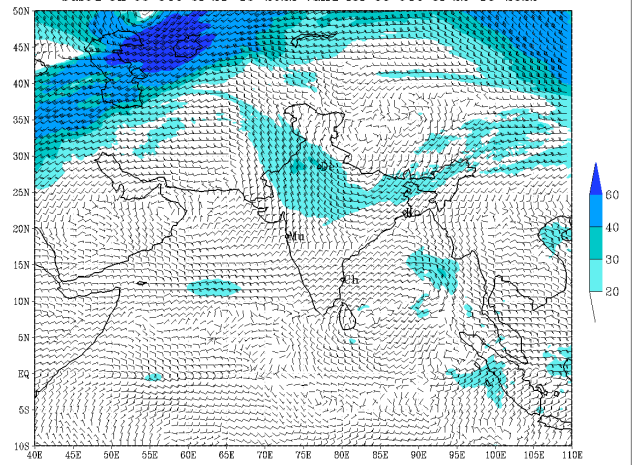
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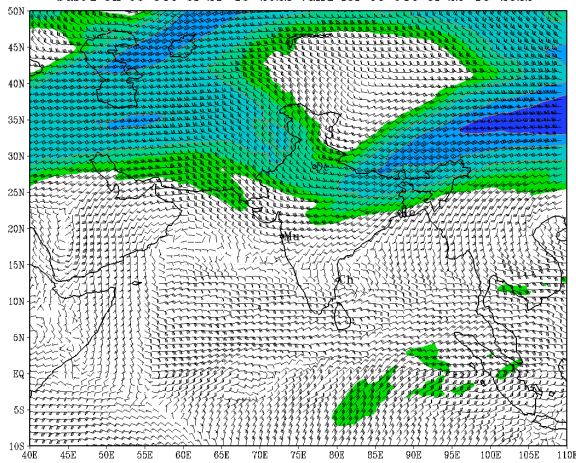
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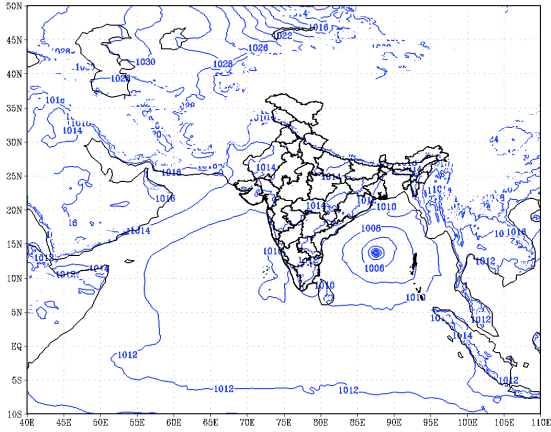
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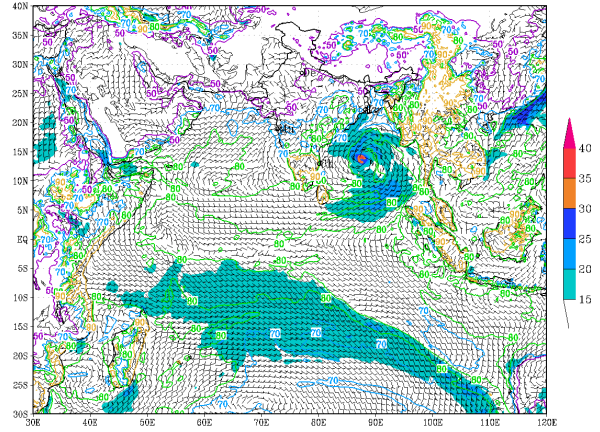
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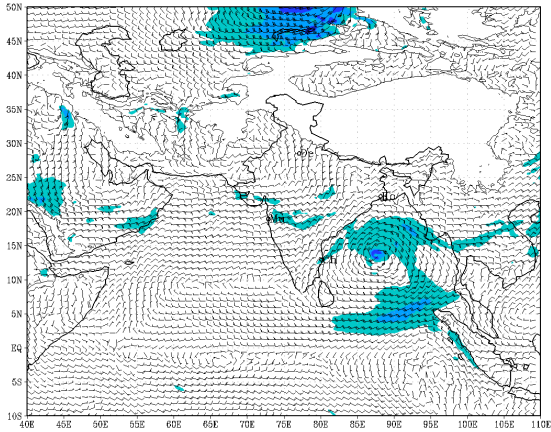
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
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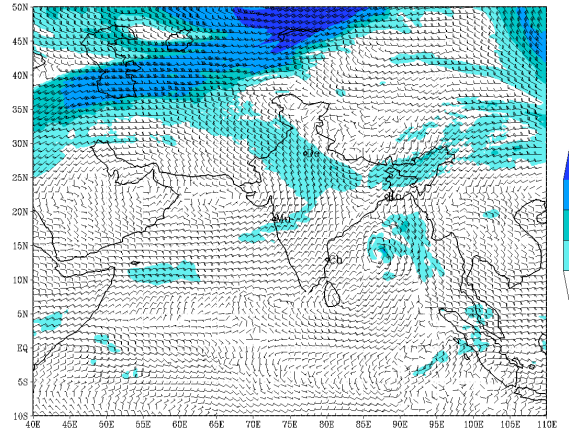
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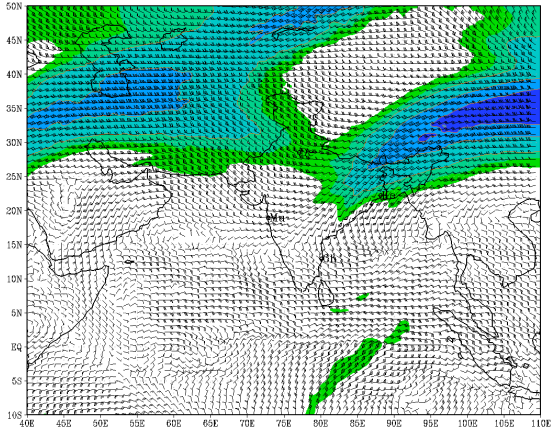
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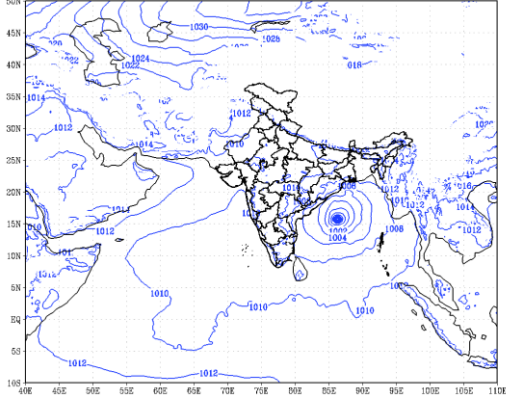
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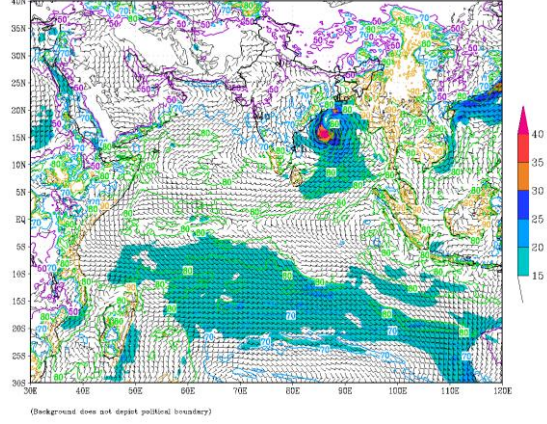


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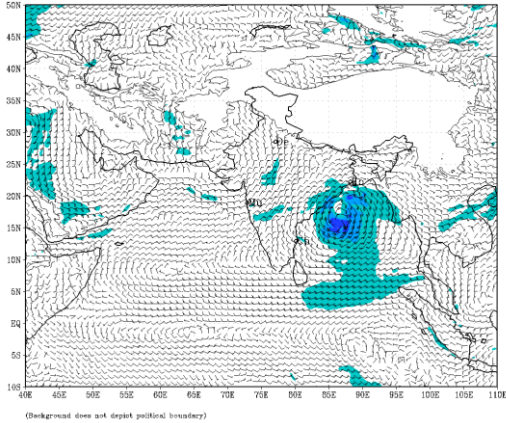
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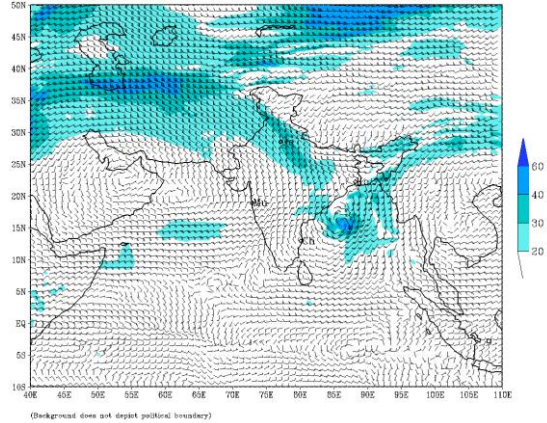
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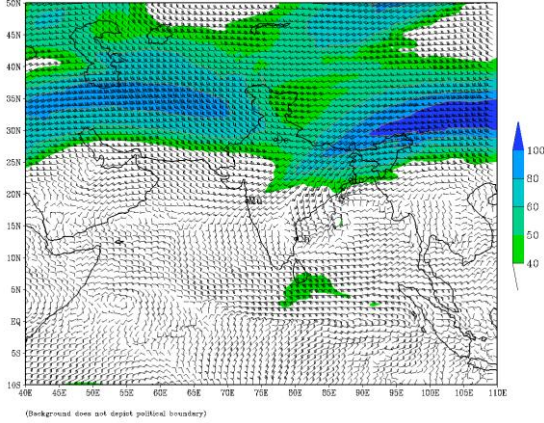
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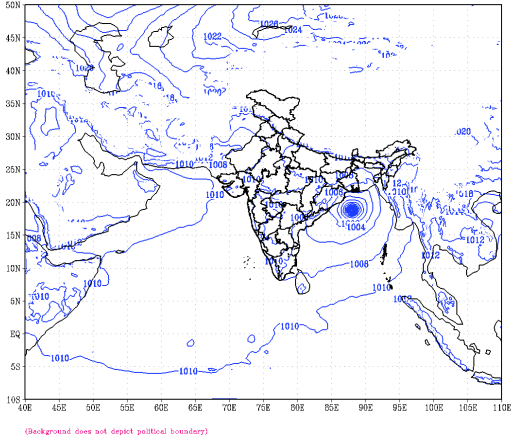
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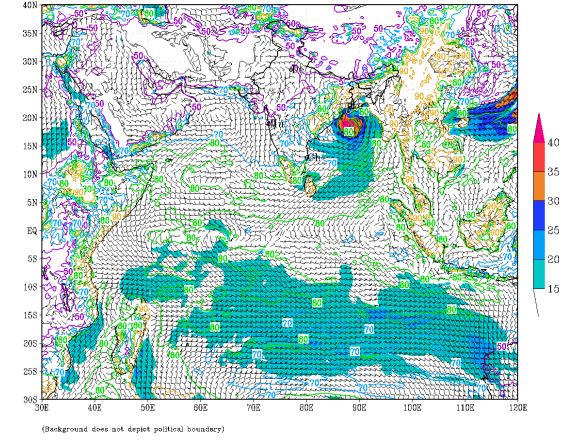
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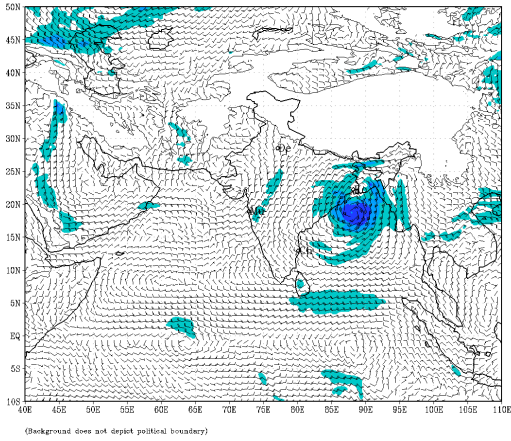
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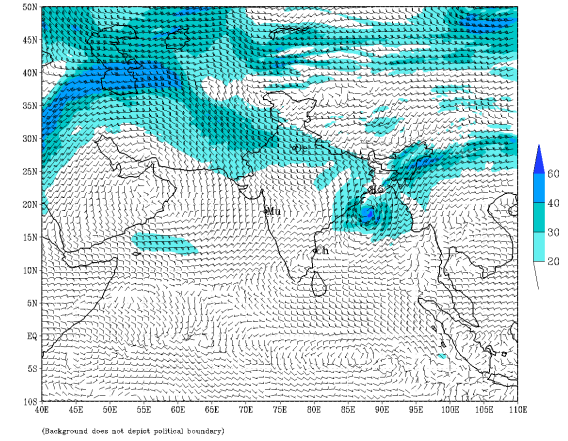
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based on 00 UTC of 21-10-2022 valid for 00 UTC of 25-10-2022



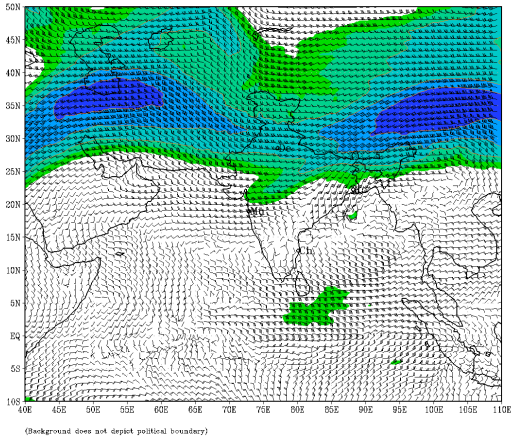
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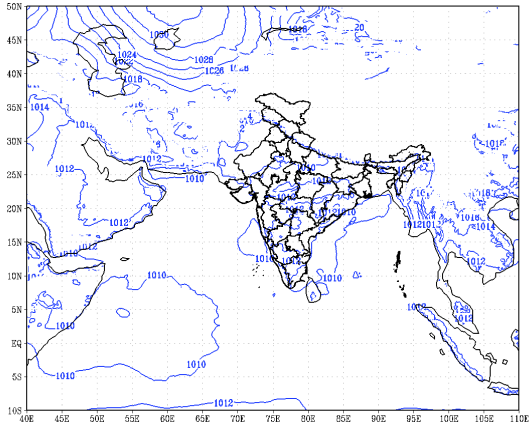
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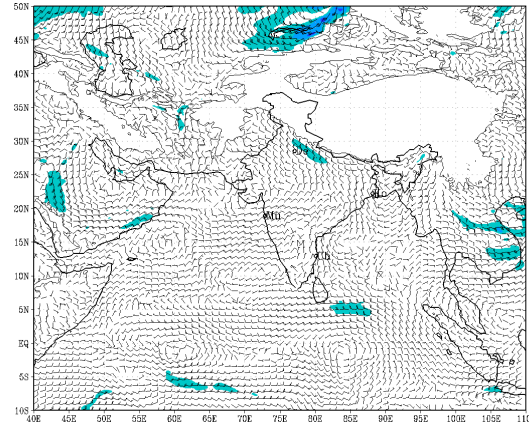


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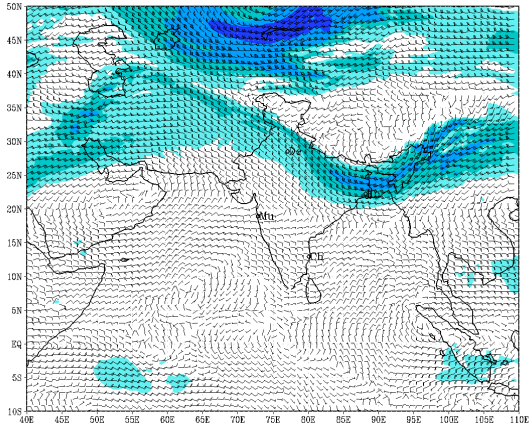
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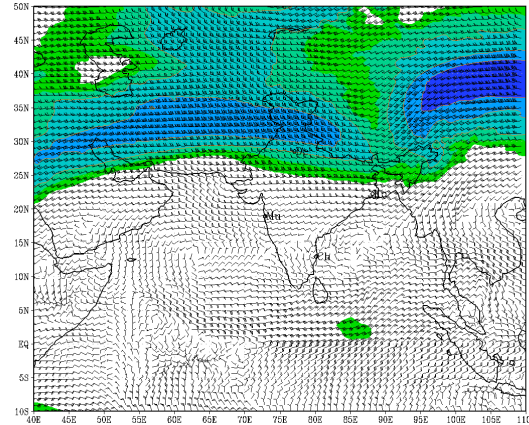
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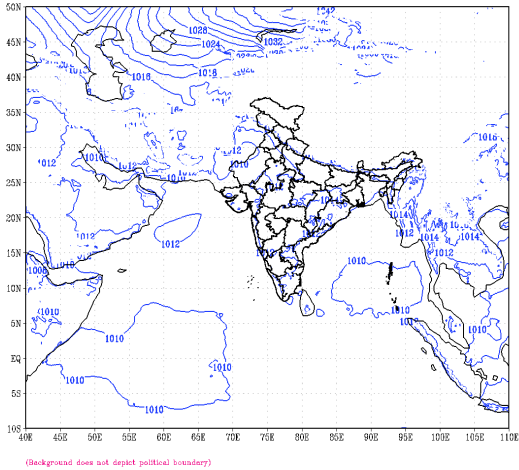
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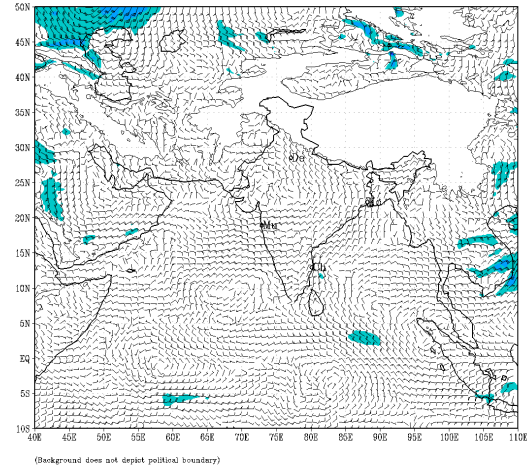
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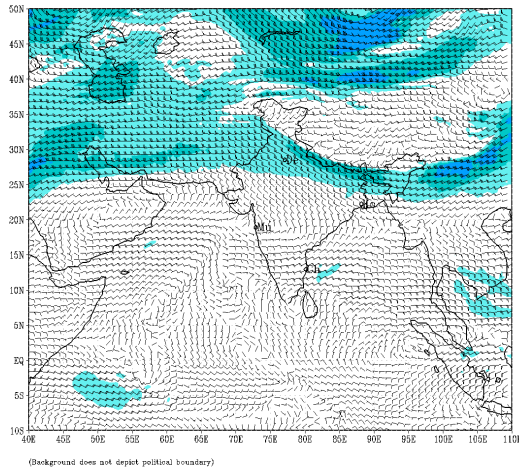
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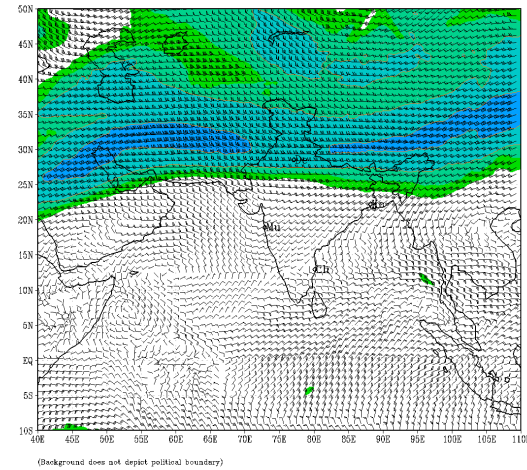
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IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
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