



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

**Tropical Cyclone Forecast Programme
Report Dated 21st November, 2023**

Time of Issue: 1230 UTC

Synoptic features (based on 0300 UTC analysis):

- The trough in easterly at mean sea level now runs over Comorin area to Westcentral off Andhra Pradesh coast and extends upto 3.1 km above mean sea level.
- The upper air Cyclonic Circulation over Comorin area & neighborhood and another over Southwest Bay of Bengal off Tamil Nadu coast has merged with above mentioned trough.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	Around 28 over most parts of BoB, 29-30 over few parts of south BoB.	Around 28 over most parts of central and north AS, 29-30 over southeast, adjoining southwest and over eastcentral AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm²	100-110 over parts of southwest BoB, 70-80 over parts of eastcentral BoB.	100-110 over parts of southeast AS and parts of eastcentral AS, around 100 over southwest AS.
Cyclonic Relative vorticity (X10⁻⁶s⁻¹)	Around 30-40 over along and off Tamil Nadu and adjoining Andhra Pradesh coast, southern part of southeast BoB. 10-20 over southwest and adjoining westcentral BoB, over Comorin Area.	10-20 over parts of southwest and westcentral AS.
Low Level convergence (X10⁻⁵ s⁻¹)	5-10 over southwest and adjoining westcentral BoB, along and off Tamil Nadu and south Andhra Pradesh coast.	-5 over some parts of central and north AS, 5-10 over few parts of south AS.
Upper Level divergence (X10⁻⁵ s⁻¹)	5-10 over along and off north Tamil Nadu and south Andhra Pradesh coasts, 5 over South Andaman Sea, 10-20 over south BoB adjoining to EIO.	-5 to -10 over parts of eastcentral and westcentral AS, 10 over southeast AS and along and off north Kerala and south Karnataka coasts, 10-20 over southwest AS.
Vertical Wind Shear (VWS knots)	5-15 over south and adjoining central BoB, south Andaman Sea,	5-10 over the south and adjoining central AS, 20 over southern parts

Low: 05-10 knots Moderate: 10-20 knots High: >20 knots	20 over parts of central BoB, High (> 20 knots) over remaining parts of BoB.	of central AS, High (>20 knots) over the central AS and North AS.
Wind Shear Tendency (knots)	Decreasing over southwest BoB. Increasing over major parts of BoB and Andaman Sea.	Decreasing over north and adjoining central AS, increasing over south and adjoining central AS.
Upper Tropospheric Ridge	Along 14°N over BoB.	Along 14°N over AS.

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the Bay of Bengal & Andaman Sea:-

Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral & south Bay of Bengal south Andaman Sea. Scattered low and medium clouds with embedded weak to moderate convection lay over North Bay of Bengal.

(b) Over the Arabian Sea:-

Scattered low and medium clouds with embedded intense to very intense convection lay over southwest Arabian Sea and moderate to intense convection lay over comorin area.

(c) Convection outside India:-

Scattered low and medium clouds with embedded moderate to intense convection lay over Palk Strait, Gulf of Mannar, Maldives, Gulf of Thailand, South Thailand, South Vietnam, Sumatra adjoining west coast, Strait of Malacca, Malaysia, Borneo, South China Sea, Java Sea, Celebes Islands & Sea, Philippines, Sulu Sea, North Madagascar and over Indian ocean between equator to latitude 5.0N, longitude 50.0E to 100.0E and between latitude 03.0S to 35.0S longitude 45.0E to 85.0E.

M.J.O. Index:

MJO index is currently in Phase 1 with amplitude greater than 1. It will remain in same phase with amplitude greater than 1 till 22nd November. It will enter phase 2 with amplitude greater than 1 on 23rd November and it will remain in same phase till 26th with amplitude greater than 1. It will enter phase 3 on 27th November with amplitude less than 1.

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

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

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
IMD-GFS	Emergence of Depression into South Andaman Sea on 25 th Nov, moving northwestward and lay as CS on 26 th over southeast BoB, moving in the same direction and lay over eastcentral, adjoining westcentral BoB, adjoining south BoB as SCS on 27 th November, continue moving in same direction with intensification.	No significant system during next 7 days.
IMD-GEFS	Emergence of WML into South Andaman Sea on 25 th Nov, moving northwestward and lay over southeast BoB as WML on 26 th Nov, moving in the same direction and lay over eastcentral, adjoining westcentral BoB, adjoining south BoB as depression on 27 th November, moving in same direction with slight weakening further.	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	-	No significant system during next 7 days.

NCMRWF-NEPS	No significant system during next 7 days.	No significant system during next 7 days.
NCMRWF-UM (Regional)	No significant system during next 3 days.	No significant system during next 7 days.
ECMWF	No significant system during next 7 days.	No significant system during next 7 days.
ECMM	Indicating a depression over Andaman Sea around 28 th Nov.	
NCEP-GFS	Depression over South Andaman Sea on 27 th Nov, moves northwestward with significant intensification.	No significant system.
IMD-Genesis Potential Parameter	A potential zone over southwest BoB adjoining to EIO during 21 st – 25 th Nov. Another potential zone over southeast and adjoining Andaman Sea on 27 th Nov.	A potential zone over southwest AS close to Somalia coast on 22 nd Nov.

Summary and conclusion:

1. For Bay of Bengal:

Models like IMD-GFS, IMD-GEFS, NCEP-GFS and ECMWF Ensemble (ECMM) are indicating a well marked low pressure area/depression over South Andaman Sea (IMD-GFS, IMD-GEFS on 25th, ECMM on 28th, NCEP-GFS on 27th) having northwestward movement with further intensification. IMD-GFS is indicating a depression over South Andaman Sea on 25th Nov, with intensification into cyclonic storm on 26th Nov over southeast BoB northwestwards movement. IMD-GEFS is indicating a well marked low over South Andaman Sea on 25th Nov, moving northwestwards and intensifying into depression on 27th Nov. NCEP-GFS is indicating a depression over South Andaman Sea on 27th Nov, with northwestward movement and significant intensification.

Considering all the above, there is likelihood of emergence of low pressure system into Andaman Sea around 26th. It is likely to move west-northwestwards and intensify into a depression over southeast & adjoining Andaman Sea around 27th. Hence, low to moderate probability is assigned to cyclogenesis (formation of depression) around 27th i.e., Day- 6 & 7.

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	LOW	MOD

Every 24 hour forecast is valid upto 0300 of next day.

2. For the Arabian Sea:

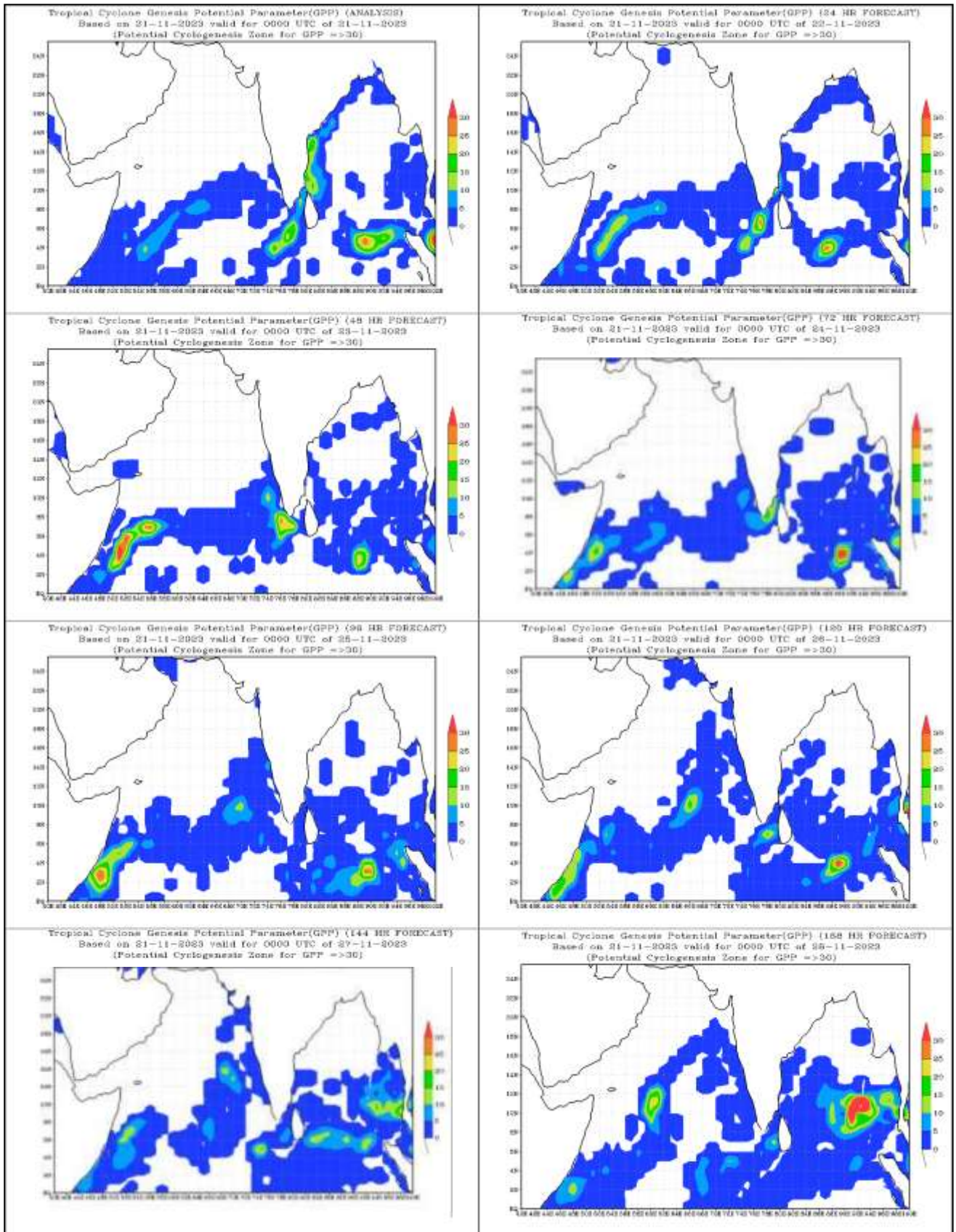
Most of the models are indicating that there will be no significant system for the next seven days.

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 26th and 27th.

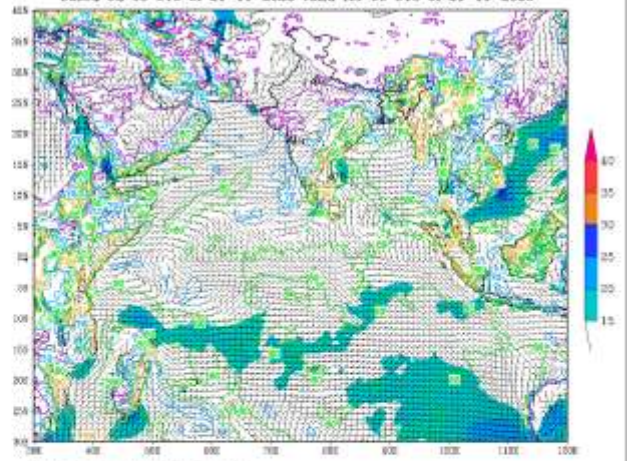


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 21-11-2023



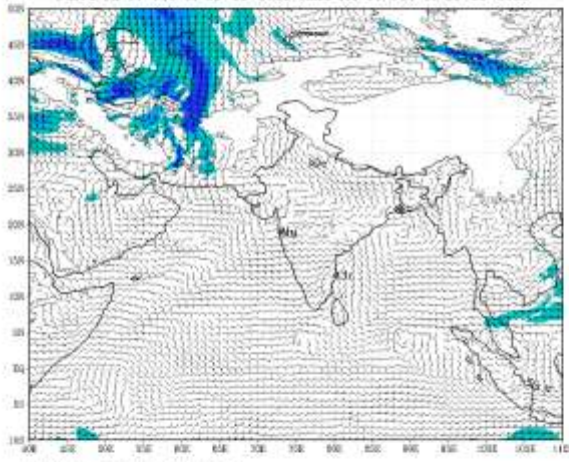
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 21-11-2023



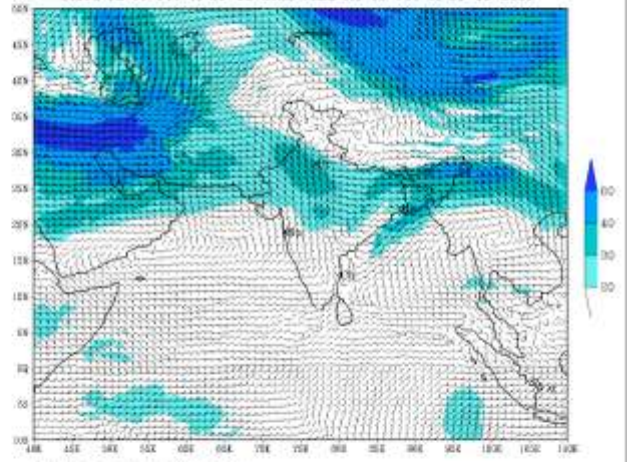
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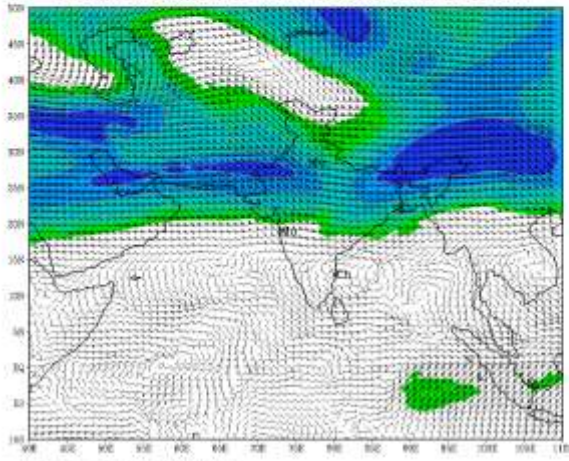
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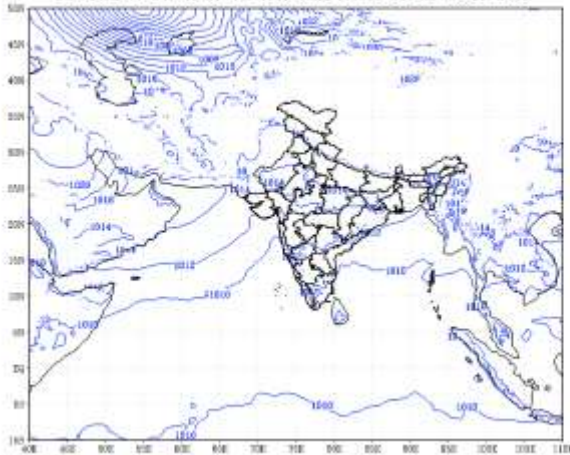
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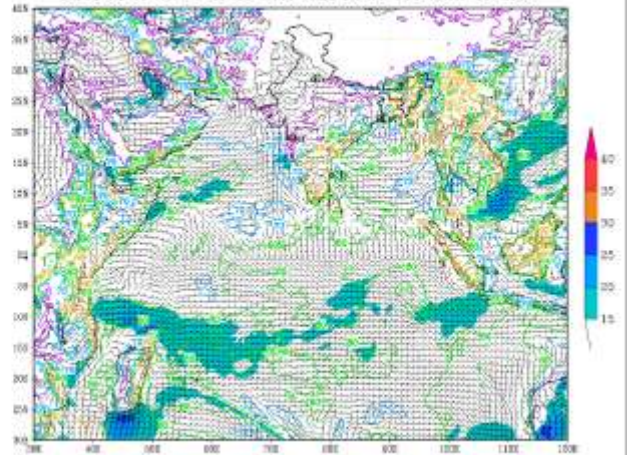
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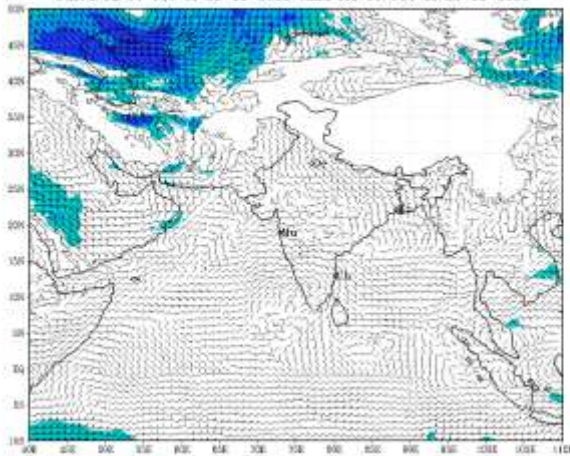
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 22-11-2023



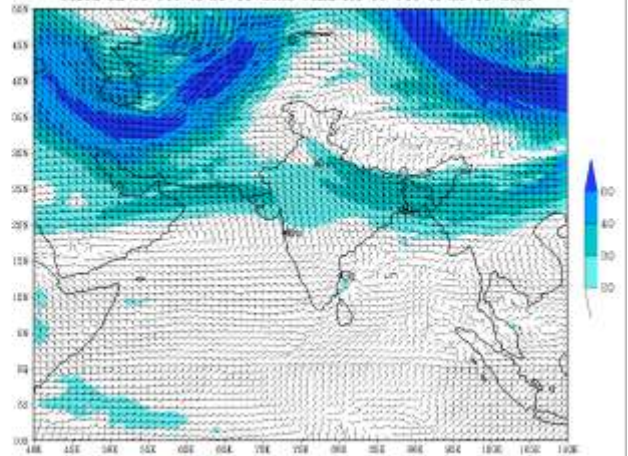
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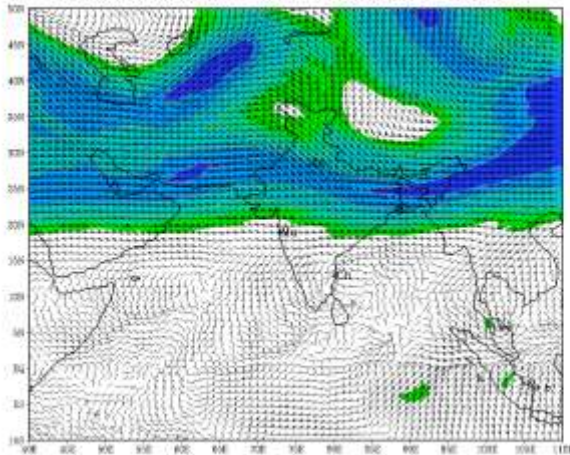
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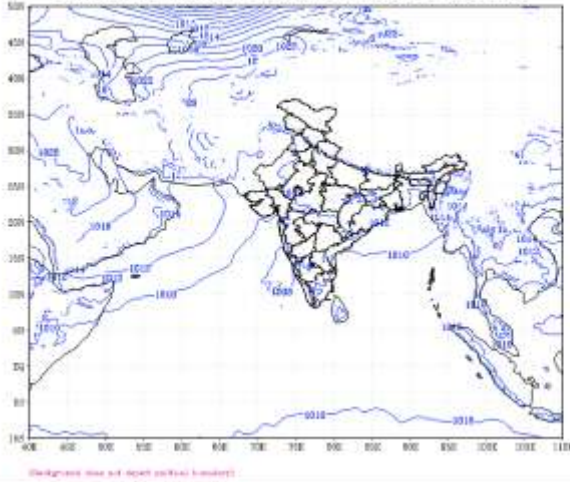
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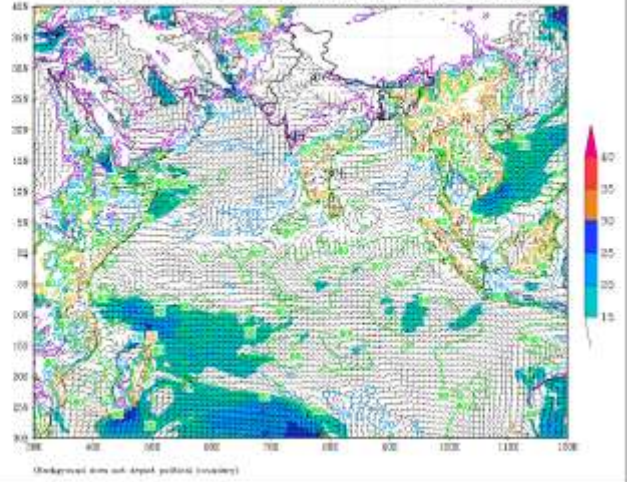


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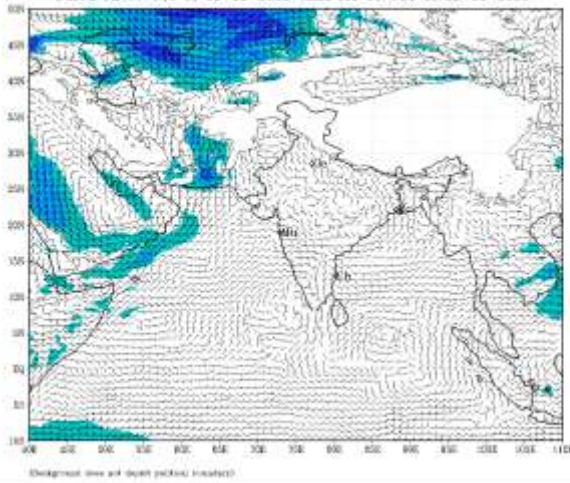
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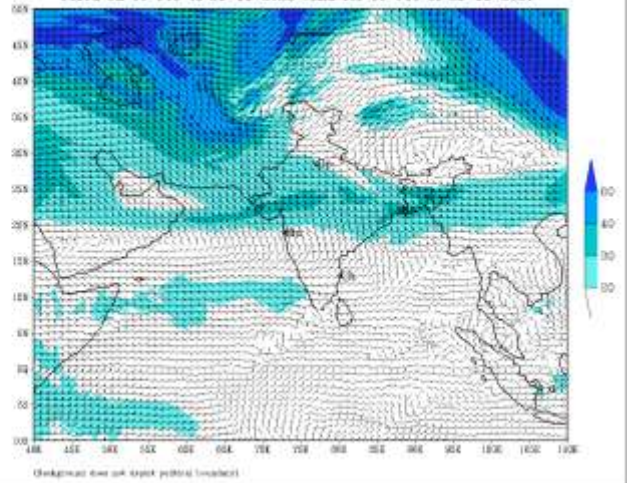
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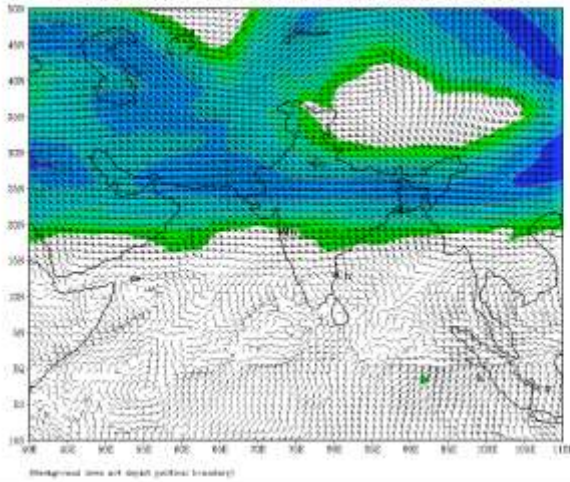
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 23-11-2023



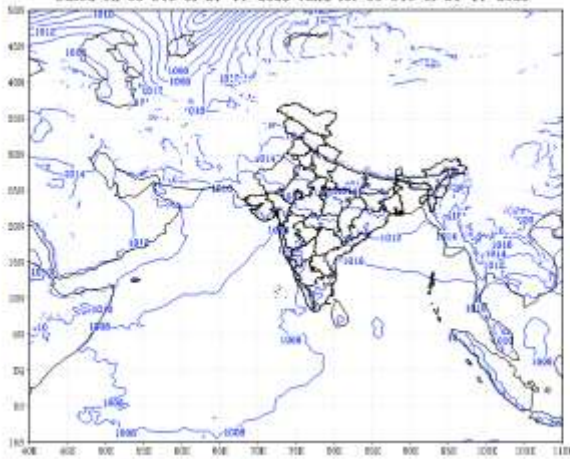
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 23-11-2023



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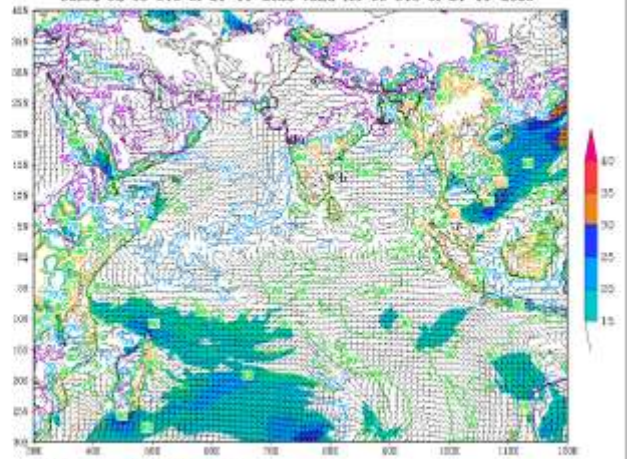


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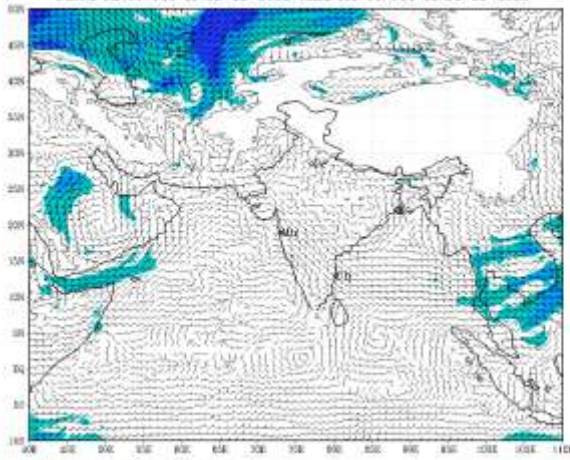
(Background does not depict political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 24-11-2023



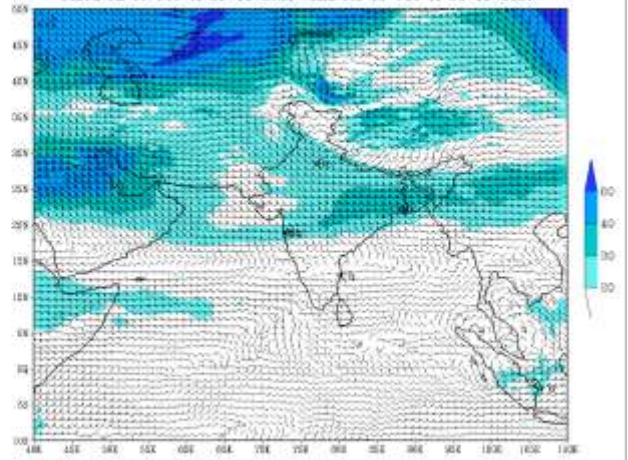
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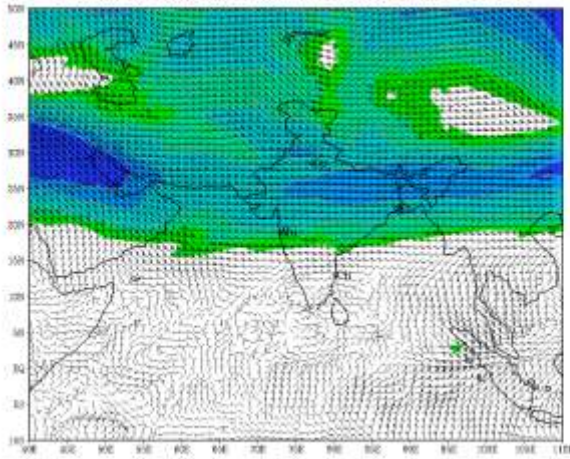
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 24-11-2023



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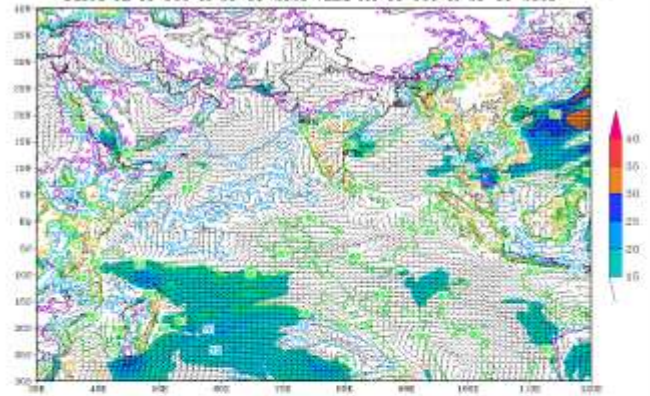
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 25-11-2023



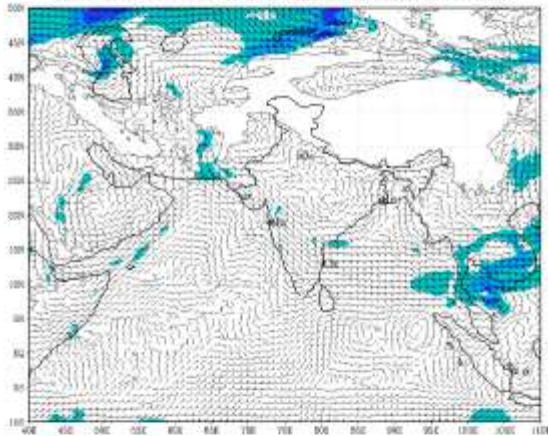
(Background over sea depicts political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 25-11-2023



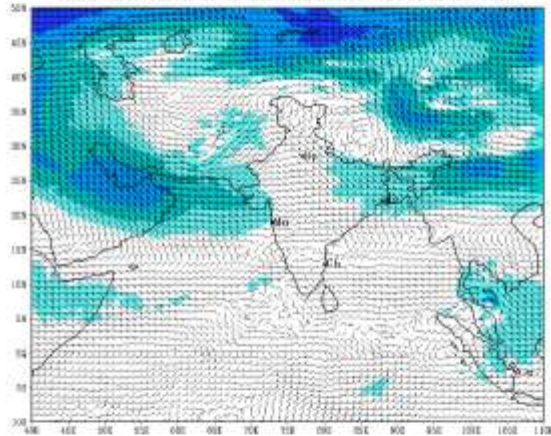
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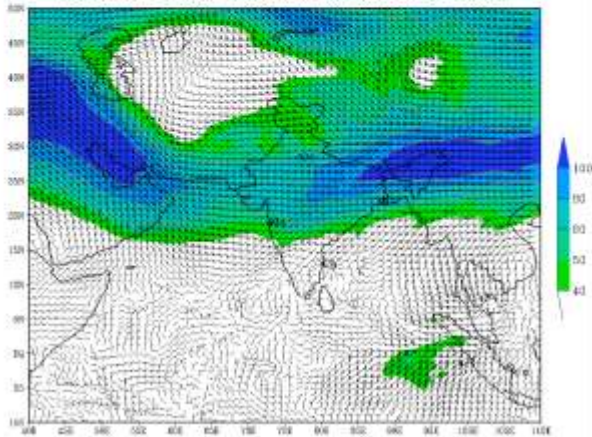
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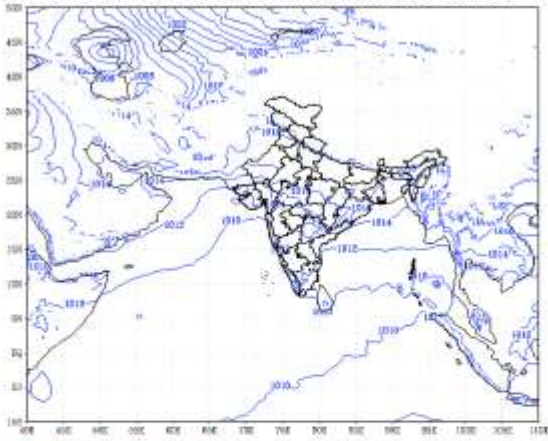
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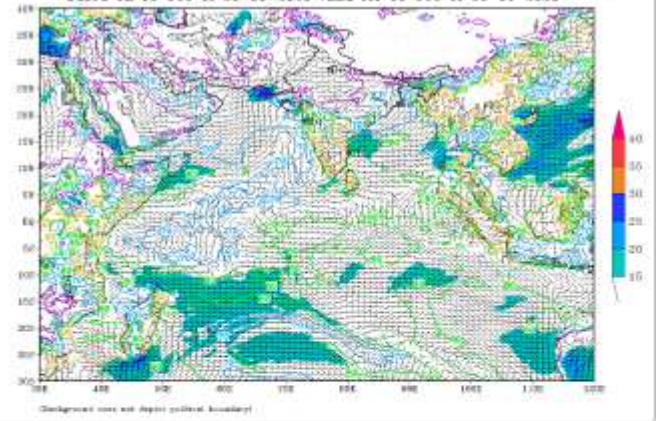


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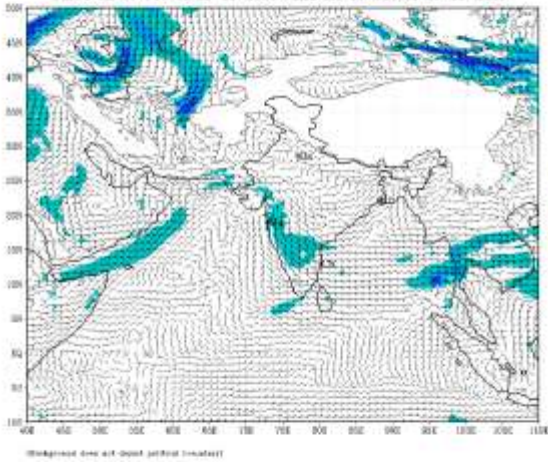
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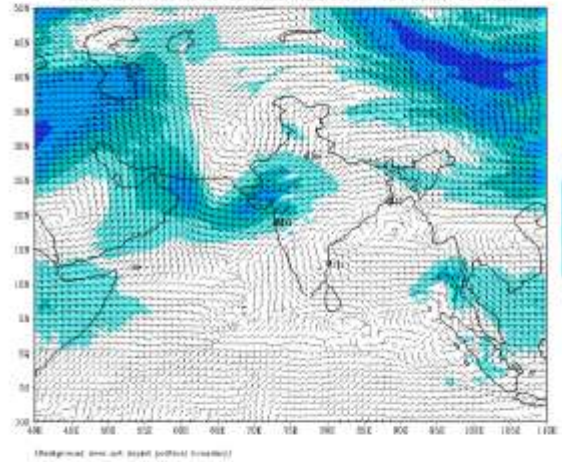
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
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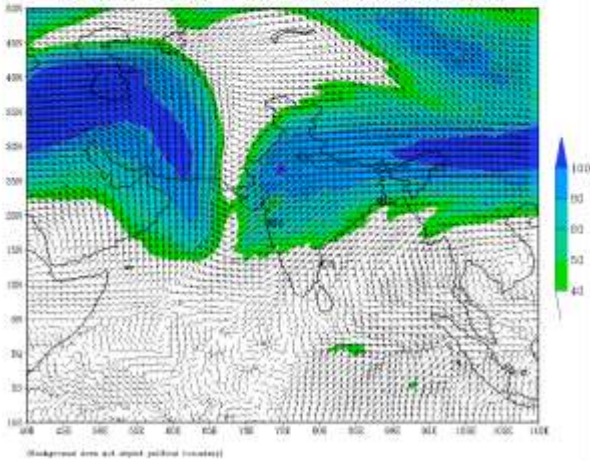
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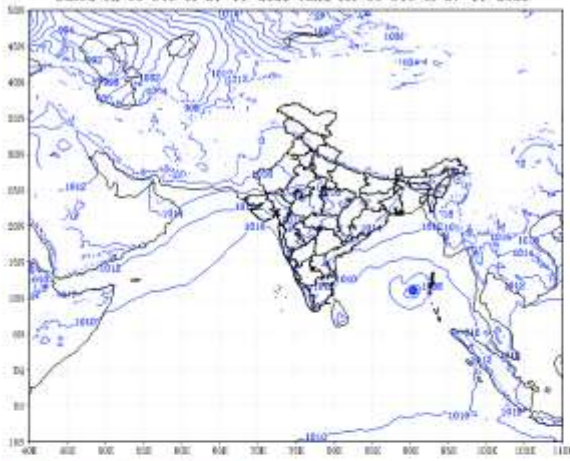
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 26-11-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
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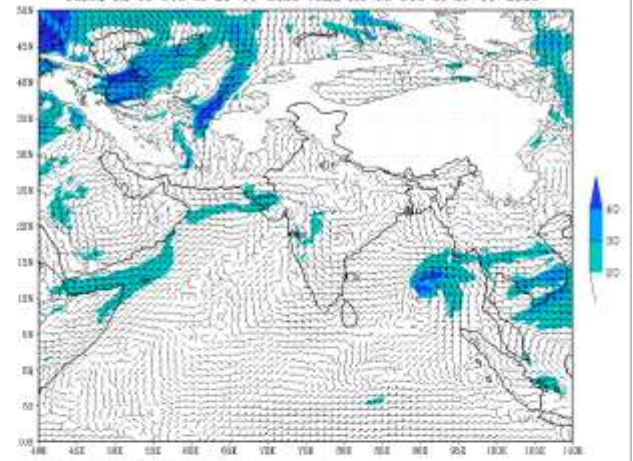


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 27-11-2023



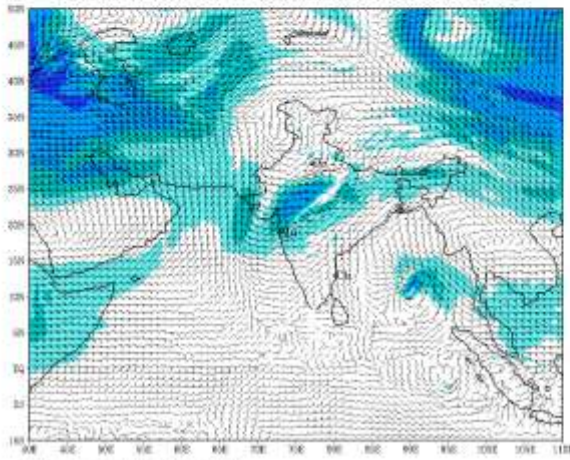
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 27-11-2023



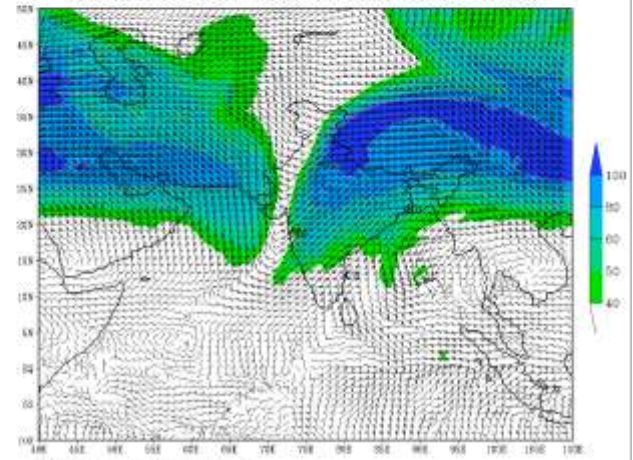
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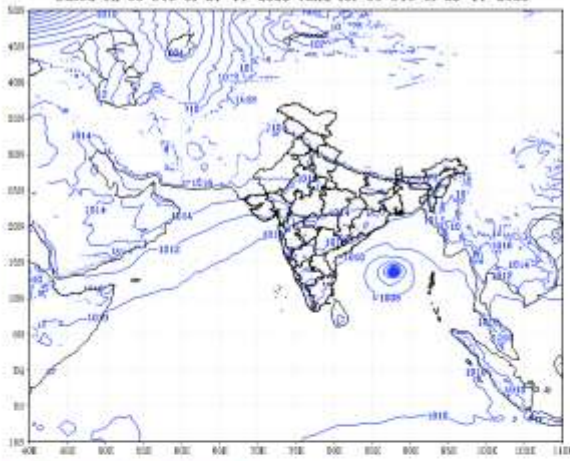
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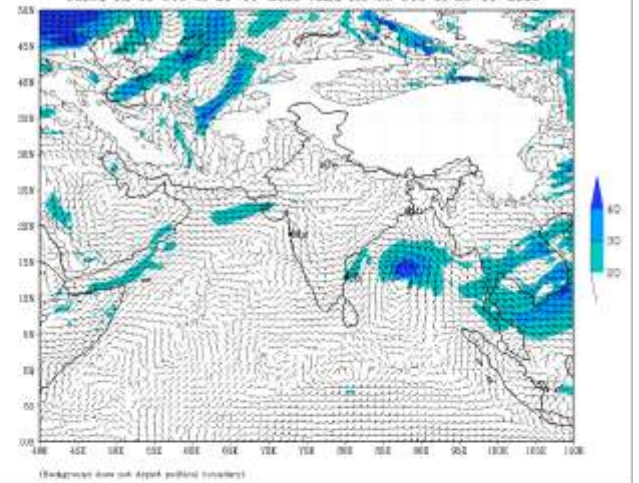


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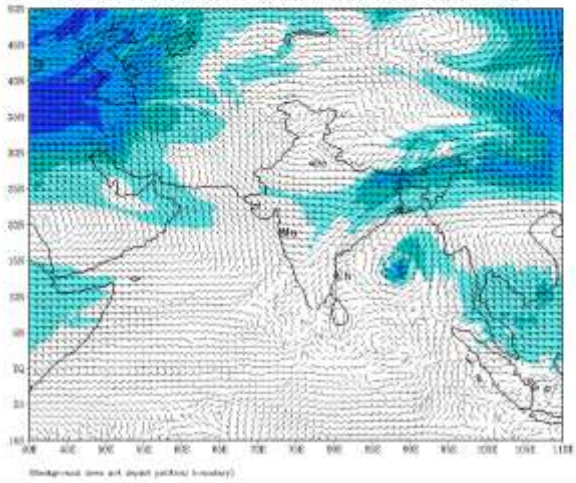
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based on 00 UTC of 21-11-2023 valid for 00 UTC of 28-11-2023



IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 28-11-2023



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 28-11-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 21-11-2023 valid for 00 UTC of 28-11-2023

