



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

**Tropical Cyclone Forecast Programme
Report Dated 16th November, 2023**

Time of Issue: 1230 UTC

Synoptic features (based on 0300 UTC analysis):

Yesterday's depression over westcentral Bay of Bengal moved nearly northwards till the midnight (2330 hours IST) of 15th November and thereafter gradually recurved north-northeastwards and intensified into a deep depression in the morning (0530 hours IST) of 16th November. Continuing to move further north-northeastwards, it lay centered at 1130 hours IST of today, the 16th November over Westcentral Bay of Bengal near latitude 17.9°N and longitude 87.3°E, about 420 km east of Visakhapatnam (Andhra Pradesh), 270 km south-southeast of Paradip (Odisha), 410 km south of Digha (West Bengal) and 540 km south-southwest of Khepupara (Bangladesh).

It is likely to continue to move north-northeastwards, intensify further into a cyclonic storm during next 24 hours and cross Bangladesh coast between Mongla and Khepupara with wind speed of 60-70 kmph gusting to 80 kmph by the early hours of 18th November, 2023.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	Around 30 over the north Andaman Sea and some parts of southeast BoB, around 29 over the system, 28 over the most parts of eastcentral and south BoB, along and off Andhra Pradesh and Odisha coasts, around 27 over northern part of north BoB, along and off north Odisha, West Bengal and Bangladesh coasts.	Around 30-31 over southeast adjoining eastcentral AS, along and off the coast of south Maharashtra, Karnataka, Kerala coasts, 29-30 over Southwest adjoining eastcentral AS and along the coast of Northern Maharashtra, 26-28 over westcentral and entire North AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm²	100-110 over eastcentral and adjoining southeast BoB and along the North Andaman Sea, 80-90 over south Andaman Sea, 50-60 over most parts of BoB.	70-80 over few parts of southeast adjoining Southwest AS, 60-70 over eastcentral AS, less than 10 over westcentral, southwest AS, 30-40 around the Extreme North of AS and 20-30 over rest part of North adjoining Westcentral AS.
Cyclonic Relative vorticity (X10⁻⁶s⁻¹)	Around 160 to the south of the system, 50 over westcentral and	10-20 over parts of north and south AS.

	adjoining southwest BoB, 25 over southwest BoB.	
Low Level convergence ($\times 10^{-5} \text{ s}^{-1}$)	30 to the northeast of the system, 10-20 over central and adjoining north BoB, 5-10 over southwest BoB, 5 over Andaman Sea.	-5 over most parts of AS.
Upper Level divergence ($\times 10^{-5} \text{ s}^{-1}$)	40 to the northeast of the syetem, 10-30 over westcentral and adjoining areas, 5-10 over the southwest BoB.	-5 over most parts of AS.
Vertical Wind Shear (VWS knots) Low: 05-10 knots Moderate: 10-20 knots High: >20 knots	10-15 over the system, most parts of southBoB, 20 over central and adjoining southwest BoB, High (> 20 knots) over remaining parts of BoB.	10-15 over southwest and adjoining southeast AS, 10 over southeast AS, 20 over south part of central AS, High (>20 knots) over remaining parts of AS.
Wind Shear Tendency (knots)	Increasing over northwest BoB along and off Odisha and West Bengal coasts, decreasing over south and adjoining central BoB.	Decreasing over most parts of AS.
Upper Tropospheric Ridge	Along 15°N over BoB.	Along 12°N over AS.

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the BoB & Andaman Sea:-

Scattered to broken low and medium clouds with embedded intense to very intense convection lay over Bay of Bengal and moderate to intense convection lay over Andaman Sea.

(b) Over the Arabian Sea:-

Scattered low and medium clouds with embedded moderate to intense convection lay over northwest & south Arabian Sea and weak to moderate convection lay over westcentral Arabian Sea and Comorin area.

(c) Convection outside India:-

Scattered low and medium clouds with embedded moderate to intense convection lay over Sri Lanka, Palk strait, Gulf of Mannar, Tibet, China, Yellow Sea, adjoining East China Sea, Myanmar, Thailand, Gulf of Thailand, Cambodia, Laos, 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 latitude 5.0N to 10.0S longitude 40.0e to 115.0E and between latitude 10.0S to 35.0S longitude 50.0E to 70.0E.

M.J.O. Index:

MJO index is currently in Phase 8 with amplitude greater than 1. It will be in phase 8 with amplitude greater than 1 on 17th November. It will enter phase 1 with amplitude greater than 1 on 18th November. It will remain in the same phase with amplitude greater than 1 till 21st November. It will enter phase 2 with amplitude greater than 1 on 22nd November and it will remain there till 25th November with amplitude greater 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	Severe cyclonic storm (SCS) over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, cross the Bangladesh coast during 17 th Nov with reduced intensity.	No significant system during next 7 days.
IMD-GEFS	Cyclonic storm (CS) over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, moves northeastward and cross the Bangladesh coast during 17 th Nov as a low pressure area (LPA).	No significant system during next 7 days.
IMD-WRF	Severe cyclonic storm (SCS) over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, weaken rapidly thereafter and cross the coast.	No significant system during next 3 days.
NCMRWF-NCUM	Depression (D) over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, moves northward and lay over northwest BoB on 17 th Nov DD, cross the south Odisha coast as a WML during 18 th Nov. Another cyclonic circulation (cycir) is indicated over southwest BoB on 22 nd Nov.	No significant system during next 7 days.
NCMRWF-NEPS	WML over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, moves northward and lay over northwest BoB on 17 th Nov as WML, cross the Odisha coast as a WML during 18 th Nov.	No significant system during next 7 days.
NCMRWF-UM (Regional)	D over northeast and adjoining westcentral BoB as on today i.e., 16 th Nov, moves northeastward and cross the Bangladesh coast during 17 th Nov as an LPA.	No significant system during next 7 days.
ECMWF	DD over northwest and adjoining westcentral BoB as on today i.e., 16 th Nov, moves northeeastward and lay over northwest BoB as a CS on morning of 17 th Nov, moves northeastward and lay over northwest BoB as an SCS on afternoon of 17 th Nov, intensify further in next few hours and weakening thereafter and cross the West Bengal-Bangladesh coast on mid night of 17 th Nov/early hours of 18 th Nov as an SCS.	No significant system during next 7 days.
NCEP-GFS	Very severe cyclonic storm (VSCS) over northwest BoB as on today i.e., 16 th Nov, moves northewestward and lay over northwest and adjoining northeast BoB as VSCS on morning of 17 th Nov, continue to move northeastward and and cross the coast with reduced intensity during afternoon of 17 th Nov. Another LPA is likely over eastcentral Bay on 19 th , depression on 20 th over eastcentral and adjoining westcentral Bay, Very severe cyclonic storm on 21 st over westcentral and adjoining eastcentral Bay, gradually recurving northeastwards with slight weakening from 22 nd onwards. It is indicated to reach southeast Bangladesh coast on 25 th as an Depression.	No significant system.
IMD-Genesis Potential Parameter	GPP is indicating a potential zone over southwest and adjoining westcentral BoB and northwest BoB as on today i.e., 16 th Nov, over westcentral and southeast BoB on 17 th Nov. Potential zone over eastcentral and adjoining southeast BoB on 18 th , over westcentral and adjoining eastcentral BoB on 19 th Nov, over westcentral BoB on 20 th Nov, over westcentral and	No potential zone over AS for next 7 days.

adjoining eastcentral BoB on 21 st Nov, over eastcentral BoB on 22 nd Nov.
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Summary and conclusion:

1. For Bay of Bengal:

- a) The guidance from various numerical models (IMD GFS, NCEP GFS, ECMWF AND IMD MME) is indicating north-northeastwards movement towards Bangladesh coasts. Models are also indicating marginal intensification of this system into a cyclonic storm during next 12 hours. Models are also indicating slight weakening prior to landfall.

Considering all these, the deep depression over westcentral Bay of Bengal is likely to move north-northeastwards, intensify further into a cyclonic storm and cross Bangladesh coast between Mongla and Khepupara with wind speed 60-70 kmph gusting to 80 kmph around 2100 UTC of 17th November.

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

“-“ INDICATE THAT CYCLOGENESIS HAS ALREADY OCCURRED. THE ABOVE TABLE INDICATES PROBABILITY OF CYCLOGENESIS ONLY (FORMATION OF DEPRESSION).

- b) NCEP-GFS is also indicating a fresh LPA is likely over eastcentral Bay on 19th, depression on 20th over eastcentral and adjoining westcentral Bay, Very severe cyclonic storm on 21st over westcentral and adjoining eastcentral Bay, gradually recurving northeastwards with slight weakening from 22nd onwards. It is indicated to reach southeast Bangladesh coast on 25th as Depression. The likely development of this system needs to be watched.

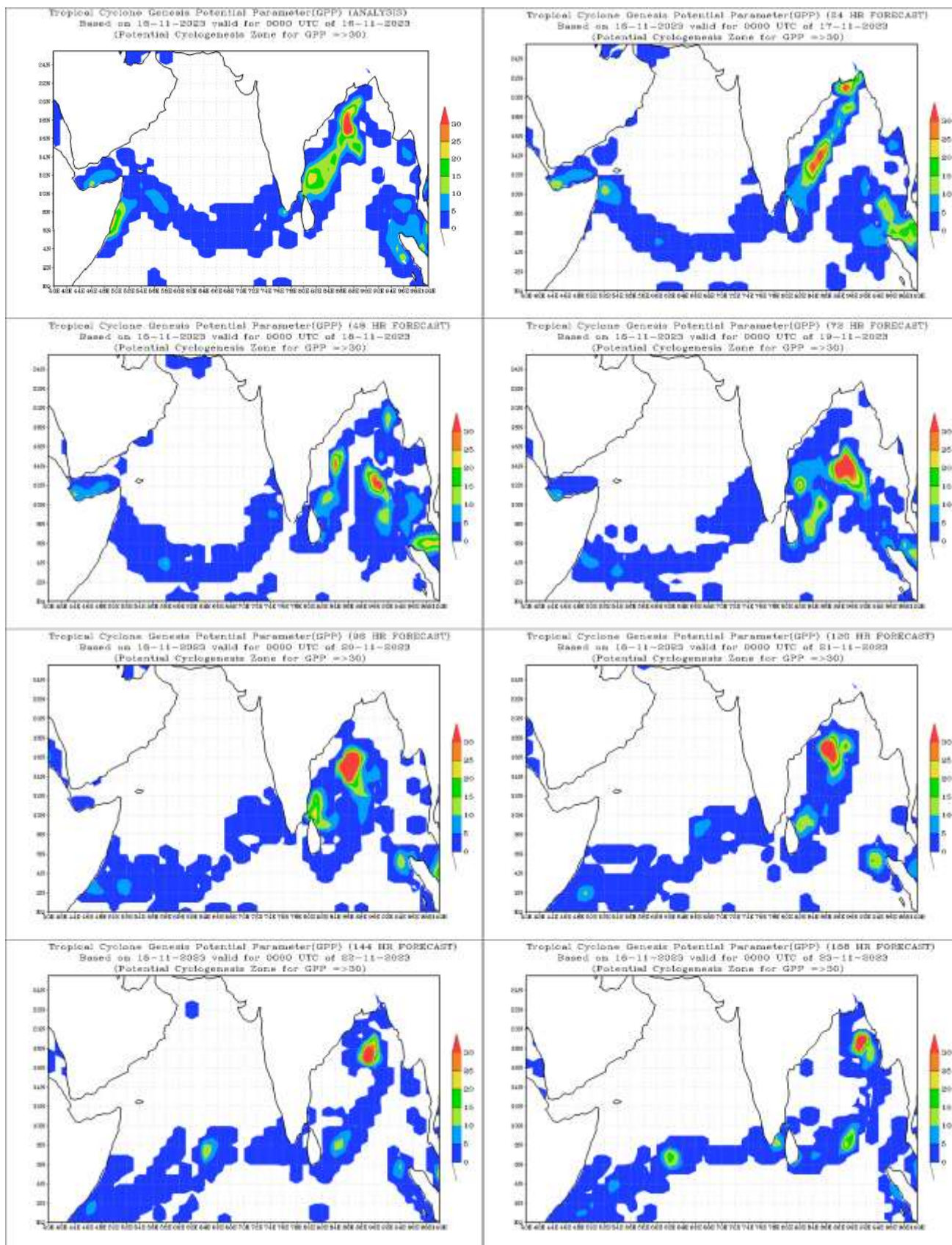
2. For the Arabian Sea:

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

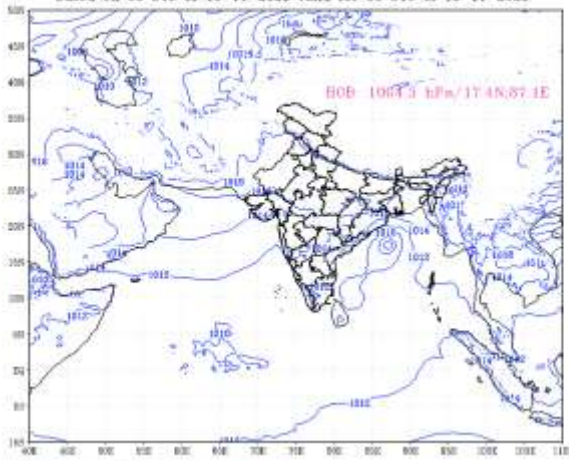
Probability of Cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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

IOP: North Andhra Pradesh coast during 16th Nov, Odisha coast during 16th-18th Nov, West Bengal coast during 16th-18th Nov, Bangladesh coasts during 17th-18th.

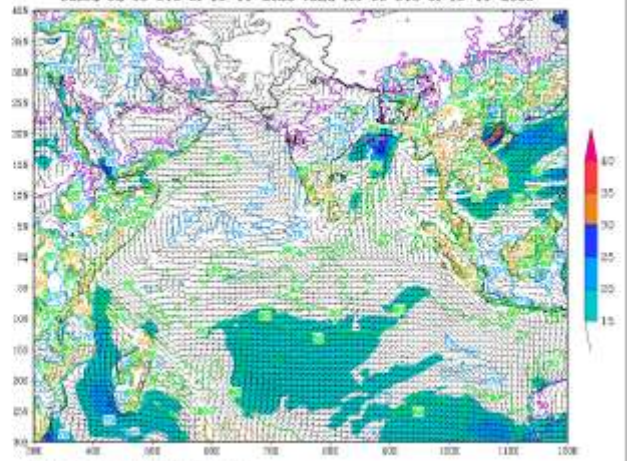


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
 based on 00 UTC of 16-11-2023 valid for 00 UTC of 16-11-2023



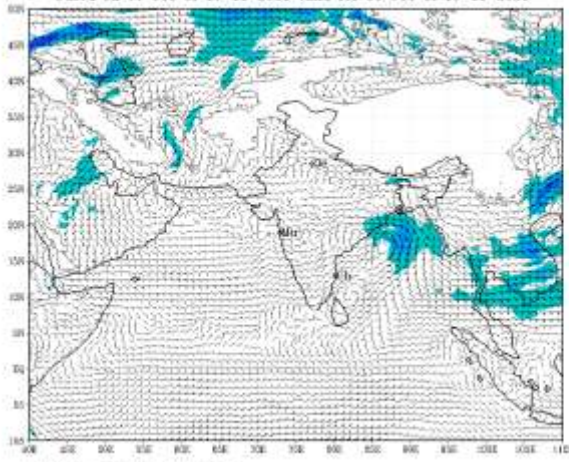
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
 based on 00 UTC of 16-11-2023 valid for 00 UTC of 16-11-2023



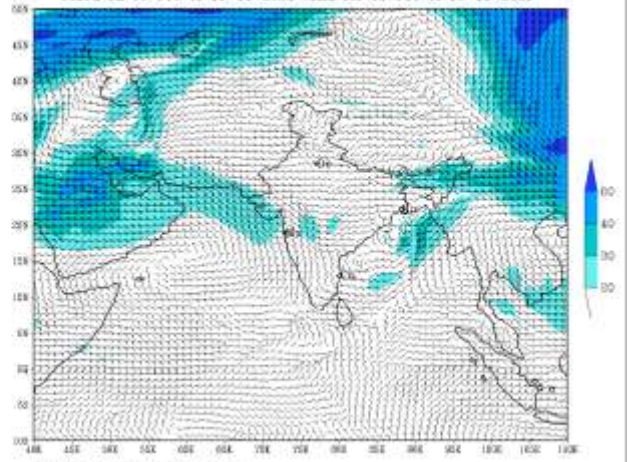
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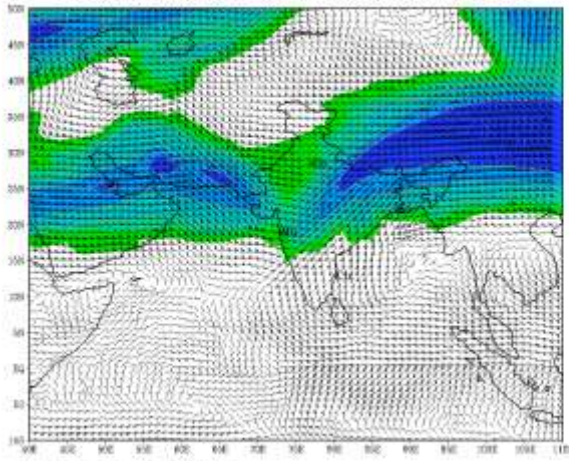
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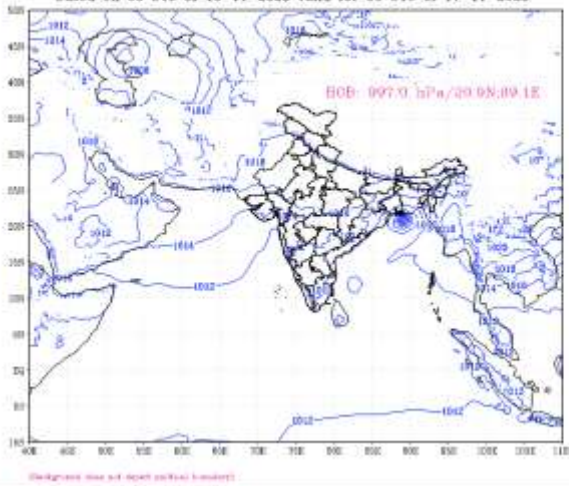
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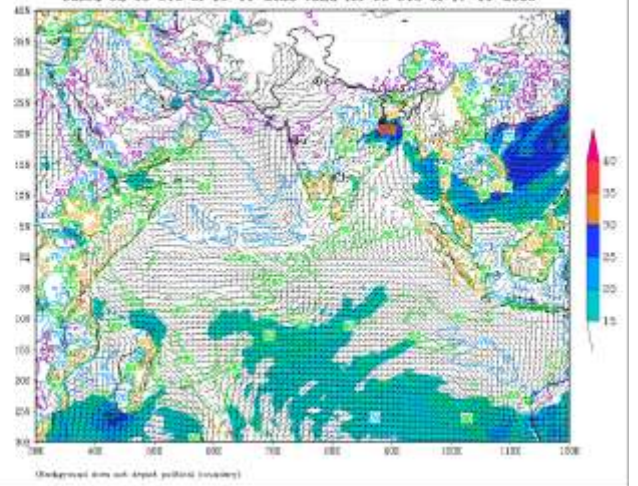


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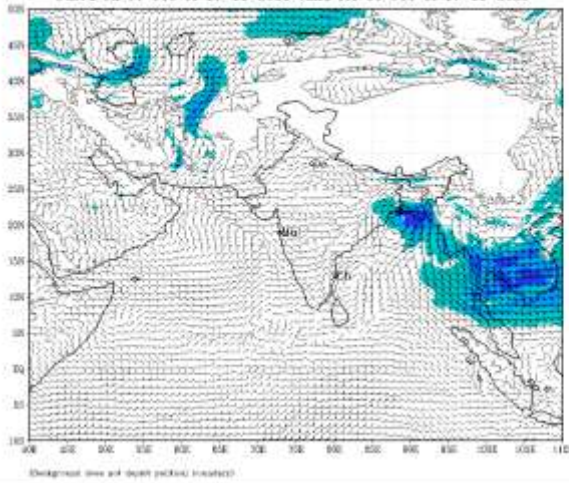
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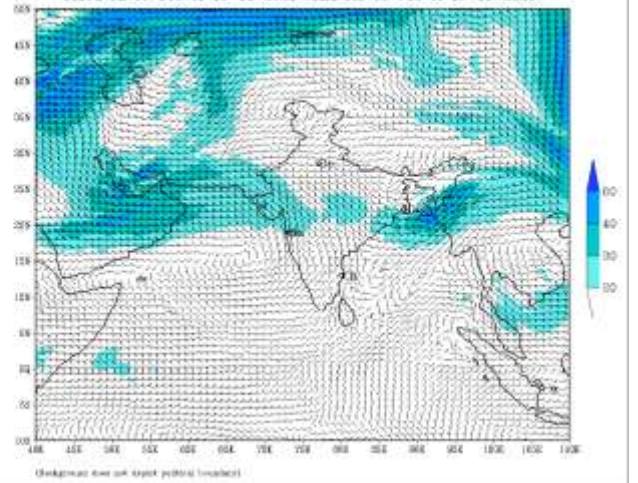
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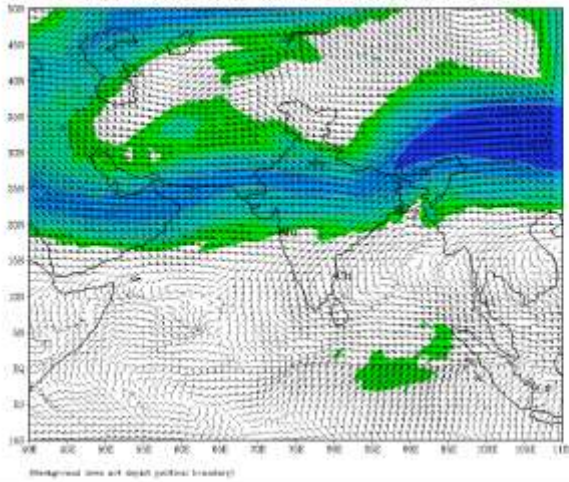
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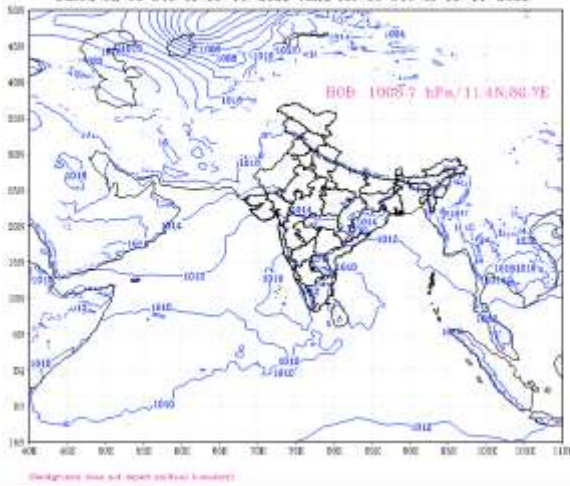
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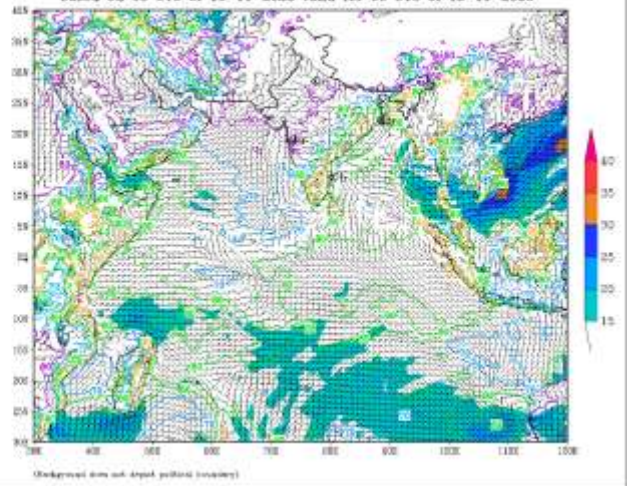
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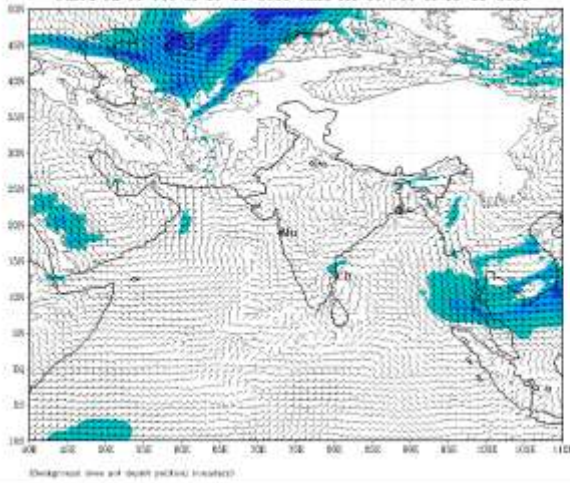
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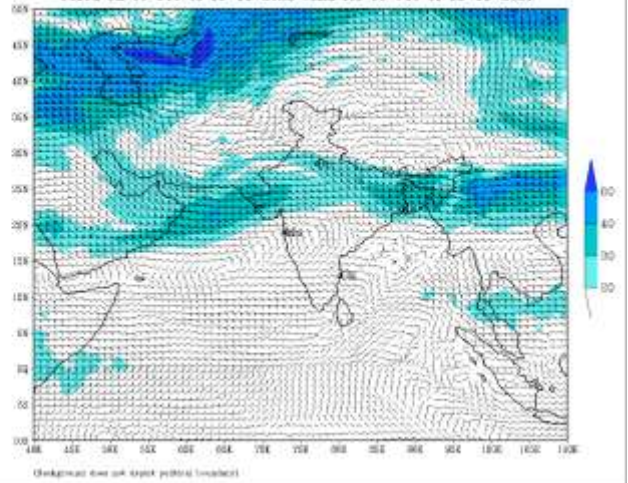
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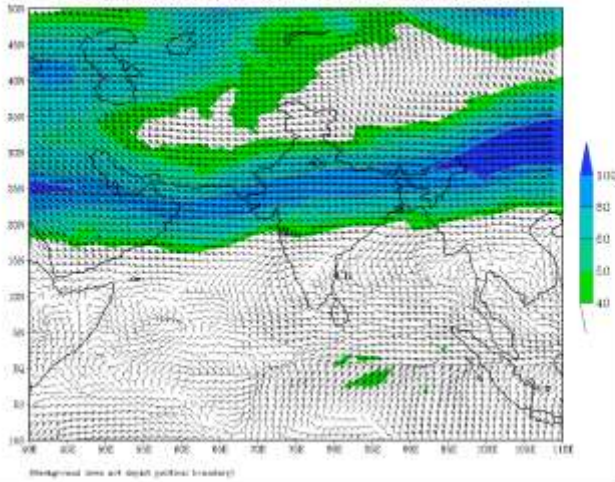
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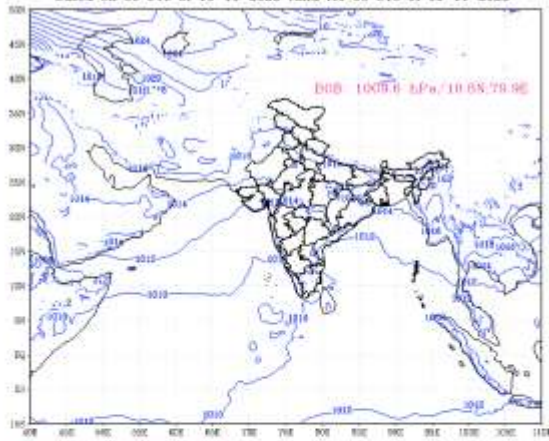
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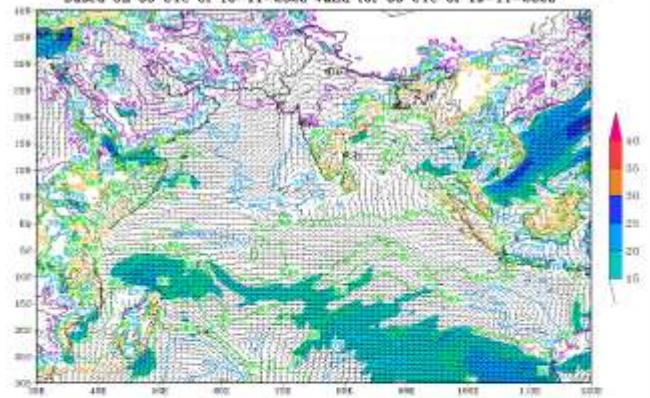


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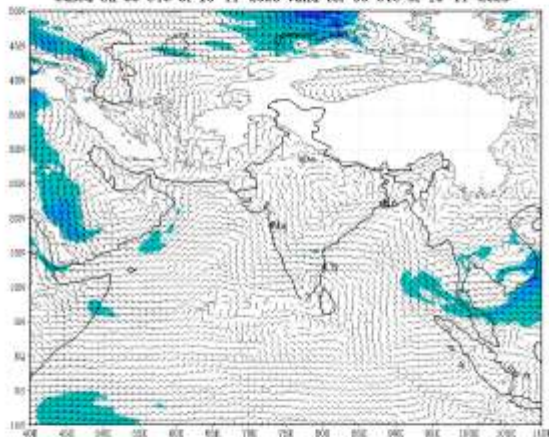
(Background over sea based on political boundary)

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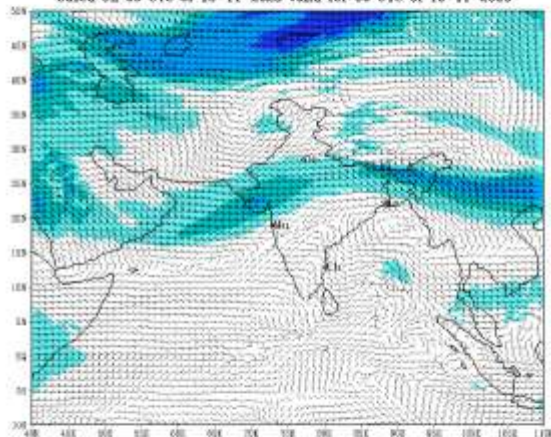
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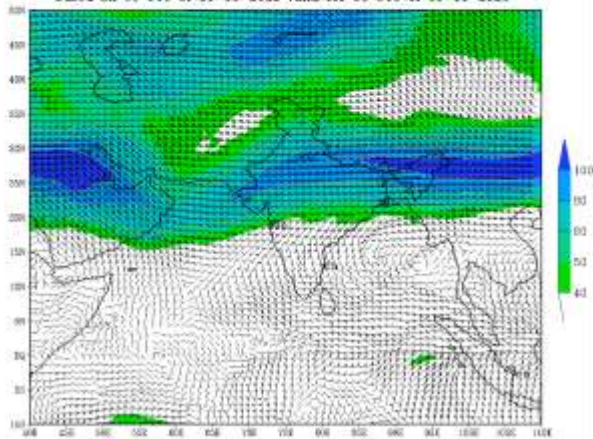
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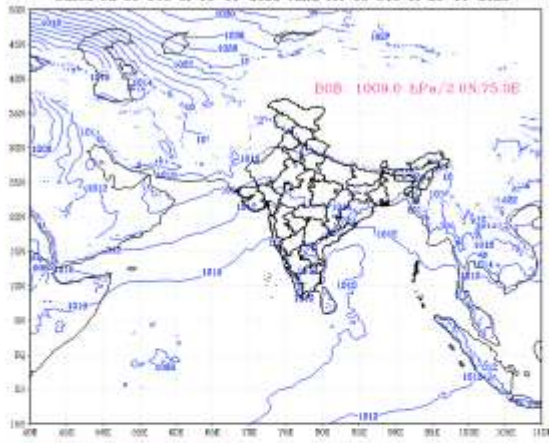
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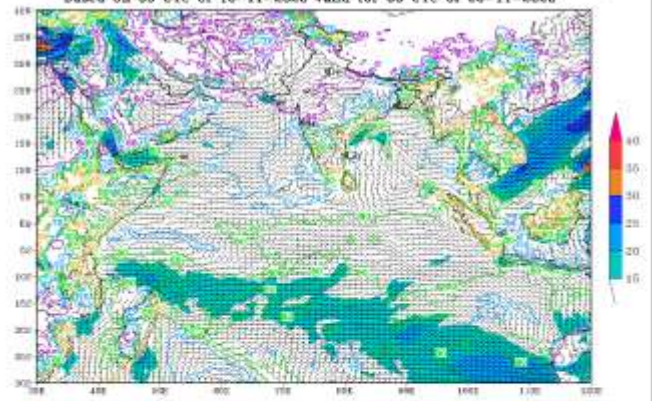
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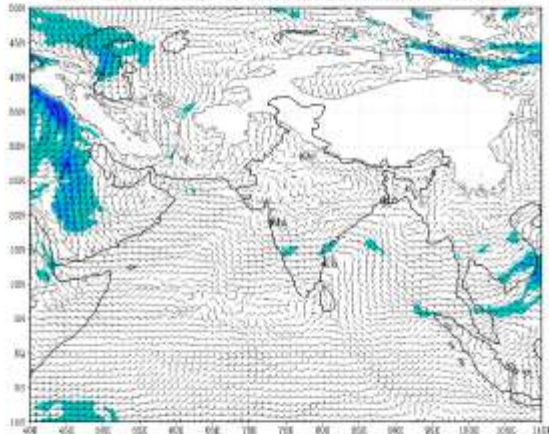
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
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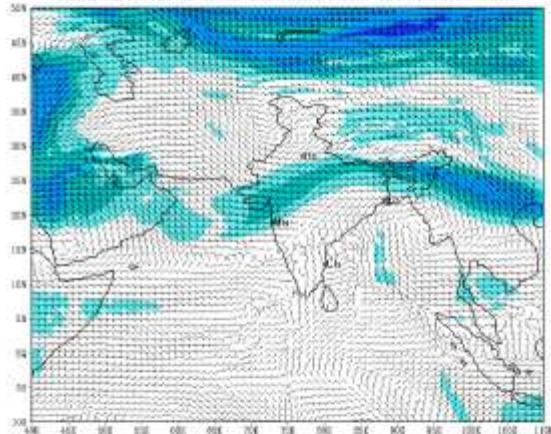
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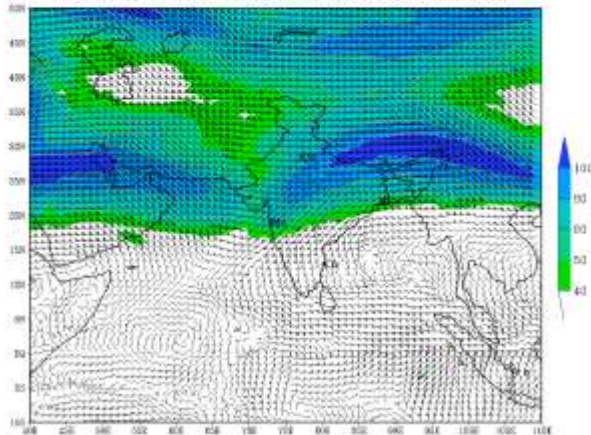
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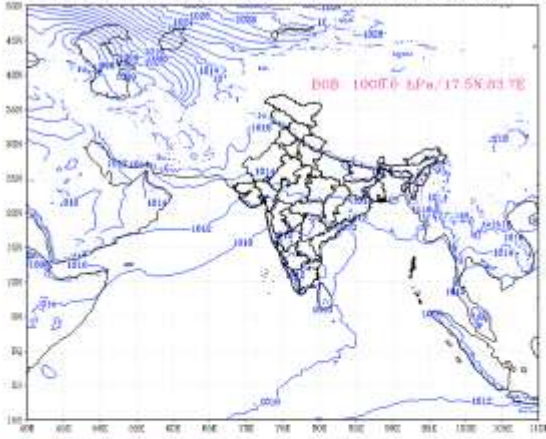
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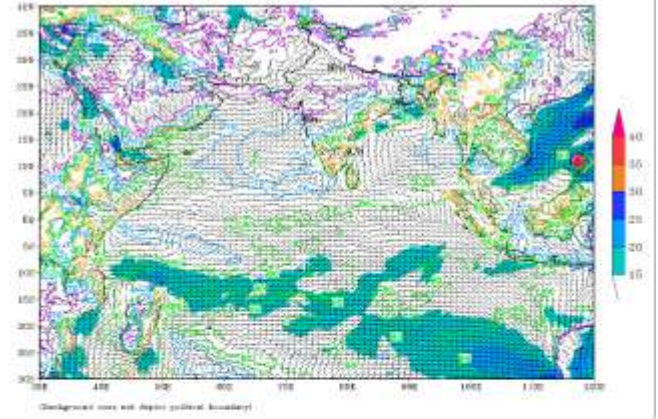


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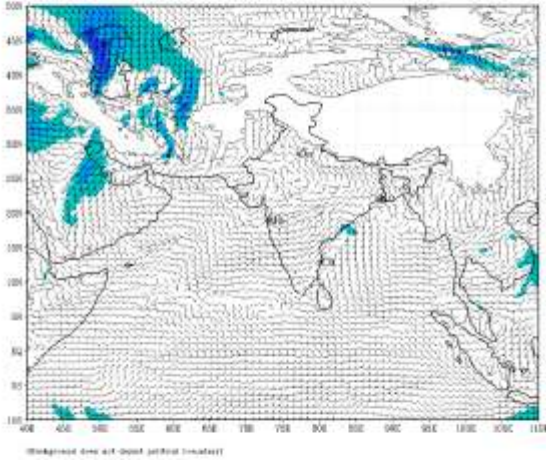
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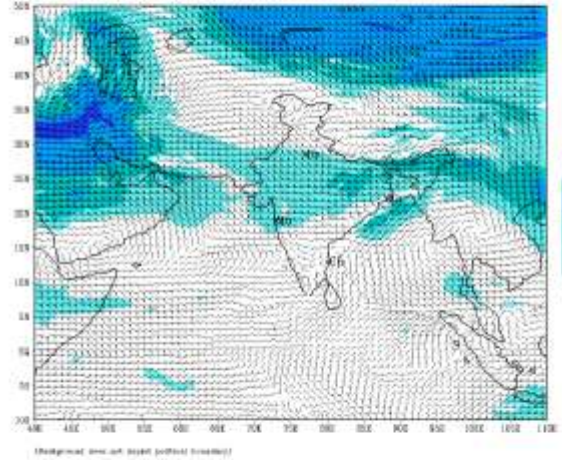
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 16-11-2023 valid for 00 UTC of 21-11-2023



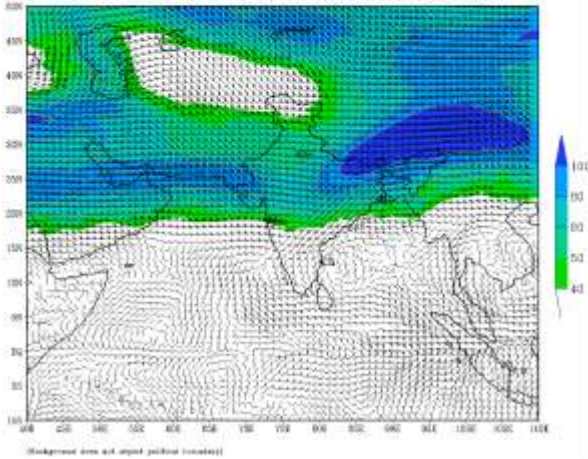
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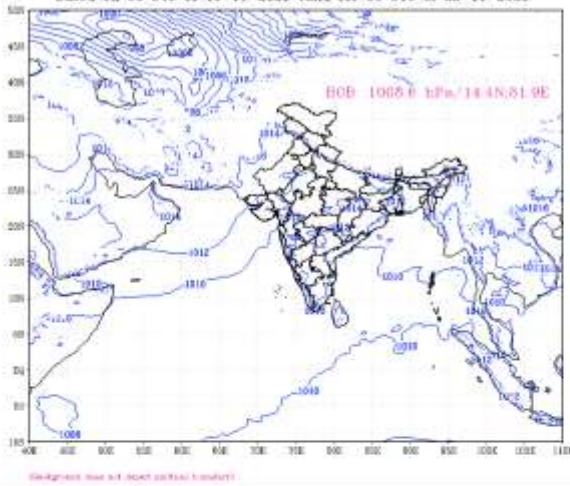
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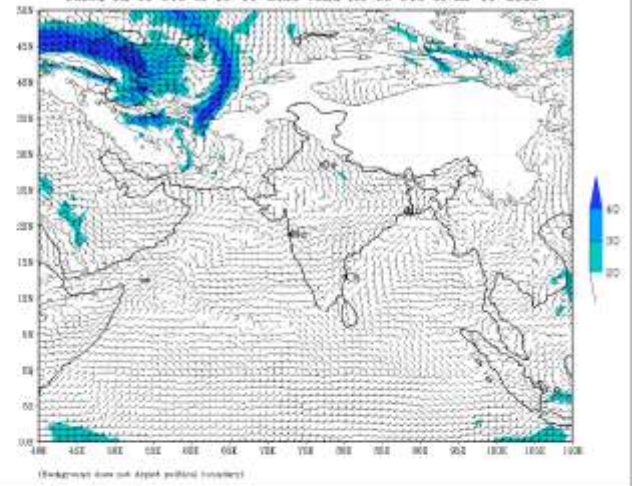
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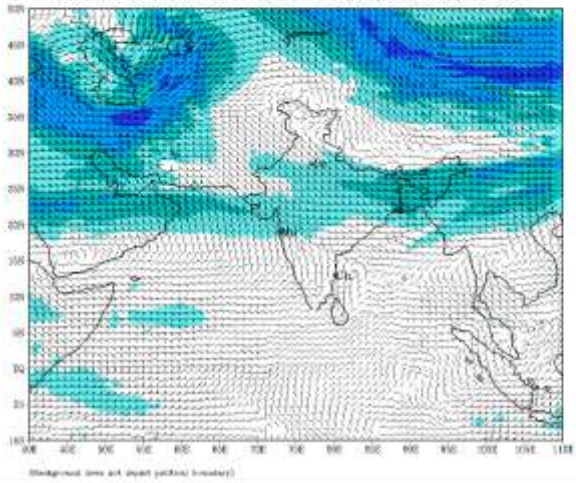
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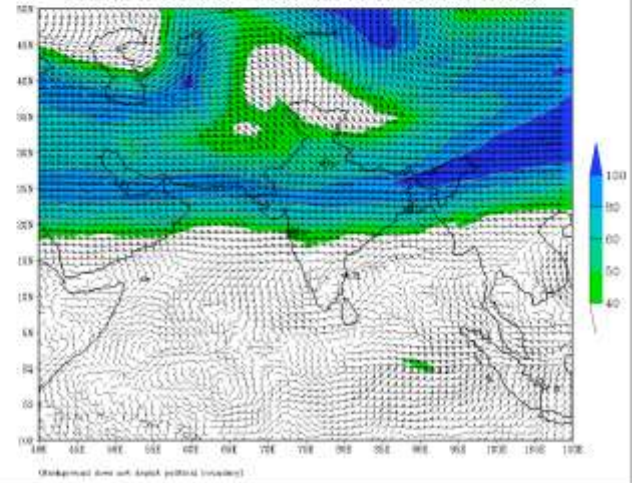
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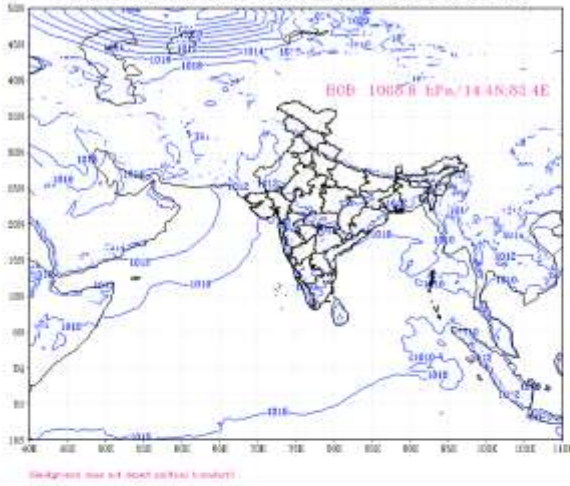
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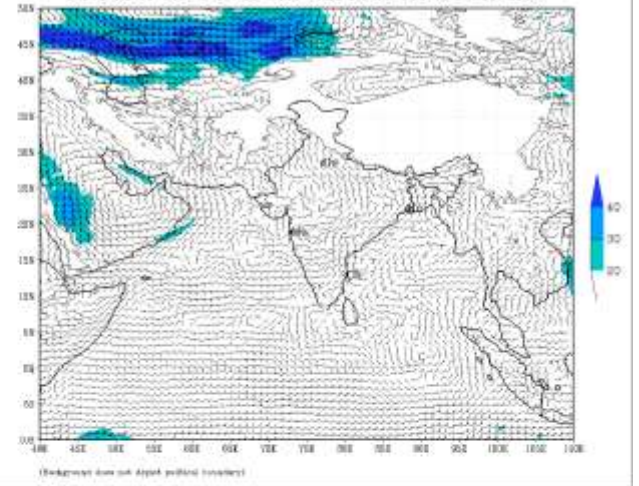
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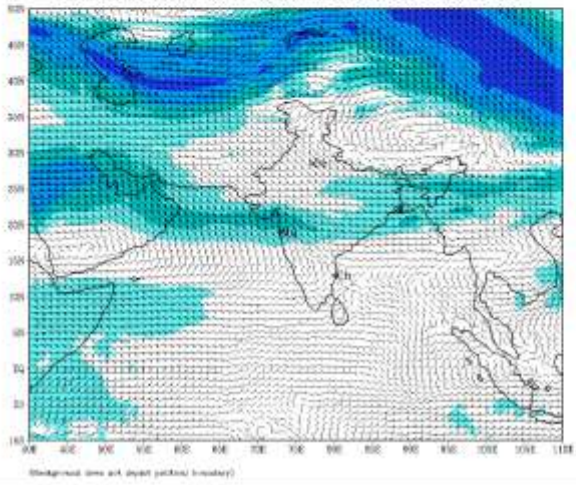
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 16-11-2023 valid for 00 UTC of 23-11-2023



IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 16-11-2023 valid for 00 UTC of 23-11-2023



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 16-11-2023 valid for 00 UTC of 23-11-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 16-11-2023 valid for 00 UTC of 23-11-2023

