



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

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

Time of Issue: 1400 UTC

Synoptic features (based on 0300 UTC analysis):

- The Severe Cyclonic Storm “Tej” (pronounced as Tej) over southwest Arabian Sea moved west-northwestwards with a speed of 18 kmph during past 6 hours and lay centered at 1730 hours IST of 21st October over the same region, near latitude 10.6°N and longitude 57.4°E about 440 km east-southeast of Socotra (Yemen), 800 km south-southeast of Salalah (Oman) and 830 km southeast of Al Ghaidah (Yemen).
It is very likely to move west-northwestwards and intensify further into a very severe cyclonic storm during next 12 hours. Thereafter, it is likely to move northwestwards till 24 th morning & then north-northwestwards. It is likely to cross Yemen-Oman coasts between Al Ghaidah (Yemen) & Salalah (Oman); Salalah (Oman) around early hours of 25th October.
- The well marked low pressure area over westcentral and adjoining south Bay of Bengal moved slowly northwestwards and lay over the same region at 1730 hours IST of 21st October, 2023. It is very likely to move further northwestwards and intensify into a depression over westcentral Bay of Bengal during next 12 hours. Thereafter, it is likely to move north-northeastwards towards Bangladesh and adjoining West Bengal coasts and intensify further during subsequent 3 days.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	28-30°C almost over entire BoB, 26-28 over southwest BoB adjoining to Sri Lanka coast, Gulf of Mannar, Comorin area.	29-30°C over southeast and adjoining southwest Arabian Sea, north AS. 26-28 over the system and less than 24 along and off Somalia, Yemen, Oman coasts.
Tropical Cyclone Heat Potential (TCHP) kJ/cm²	100-110 over eastcentral BoB. 50-60 over most parts of BOB. Less than 30 along Andhra Pradesh and Tamil Nadu coasts, adjoining sea areas, over Gulf of Mannar and Comorin area.	50-60 over southeast & adjoining southwest Arabian Sea. 20-30 over eastcentral and adjoining northeast AS, along and off west coast of India, less than 10 over westcentral and adjoining southwest AS.
Cyclonic Relative vorticity (X10⁻⁶s⁻¹)	30-50 over the LPA.	110 over the system centre and vertical extension upto 500 hpa level, 80 around the system and vertical extension upto 500 hpa

		level.
Low Level convergence ($X10^{-5} s^{-1}$)	5-10 over the LPA and Comorin area.	15 over the system centre, 10 surrounding the system.
Upper Level divergence ($X10^{-5} s^{-1}$)	10-20 over the LPA.	30-40 over the system centre, 10-20 to the surrounding area of the system.
Vertical Wind Shear (VWS knots)	10 around the LPA. 20-25 over southwest BoB.	10 over the system centre, 15 to the southeast of the system, 20-25 over the central AS, 30-40 over the north and adjoining central AS.
Wind Shear Tendency (knots)	Decreasing tendency over the south and adjoining central BoB, increasing tendency over the north and adjoining central BoB.	Decreasing tendency towards the southeast of the system, increasing tendency in its forecasted path.
Upper tropospheric Ridge	Along 15°N over BoB	Along 15°N over AS

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the BoB & Andaman Sea:-

Scattered to broken low/moderate clouds with embedded intense to very intense convection over central and adjoining South BoB. Scattered low/moderate clouds with embedded moderate to intense convection over rest of the BoB and Andaman sea south Arakan coast, Gulf of Martaban, Tenasserim coast and isolated weak to moderate convection over northwest BoB.

(b) Over the Arabian Sea:-

At 0300 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection lay over southwest and adjoining westcentral Arabian Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over eastcentral and southeast Arabian sea, Lakshadweep Islands area and Comorin area.

(c) Convection outside India:

Scattered low/medium clouds with embedded moderate to intense convection over south Sri Lanka, Gulf of Mannar, Maldives, Pakistan, Tibet, Taiwan, Myanmar, Thailand, Gulf of Thailand, Cambodia, Laos Vietnam, Hainan, Sumatra, Str of Malacca, Malaysia, Borneo, South china sea, Java, IIs & Sea Celebes IIs & Sea Philippines, Sulu Sea and over Indian Ocean between 5N to 12.5S, 42E to 80E and between 5N to 5S, 80E to 100E.

M.J.O. Index:

MJO index is in Phase 2 with amplitude less than 1. It remain in phase 8 for next seven days 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	Low pressure area (LPA) over westcentral and adjoining southeast BoB (13.5N/87E) as on today 21 st , moves northwestward and becomes well-marked low (WML)/ Depression (D) over westcentral BoB (15N/85.5E) on 22 nd , moves northeastwards thereafter and becomes cyclonic storm (CS)/severe cyclonic storm (SCS) over westcentral, adjoining eastcentral and adjoining north BoB (18N/87E) on 23 rd , moves northeastward and becomes CS over northwest and adjoining northeast BoB on 24 th , move further northeastward and lay over northeast BoB close to Bangladesh coast (22.5N/91.5E) as D on 25 th , and cross the coast on 26 th morning and less marked thereafter.	The current CS will intensify into SCS/very severe cyclonic storm (VSCS) over westcentral AS (13N/55.5E) by night of today 21 st , move northwestward and lay over westcentral AS (15N/53.5E) as VSCS on 22 nd , ststem moves northwestwards and cross the coast (north of) Yemen (16.5N/52.5E) around night of 23 rd or early hours of 24 th as SCS, weaken thereafter and lay over land (18N/52E) as depression on 24 th , less marked thereafter.
IMD-GEFS	LPA over westcentral and adjoining southeast BoB (13.5N/87E) as on today 21 st , moves northwestward and becomes D over westcentral BoB (15N/85.5E) on 22 nd , moves northeastwards thereafter and becomes CS over westcentral, adjoining eastcentral and adjoining north BoB (18N/87E) on 23 rd , moves northeastward and weakens into D, lay over northeast BoB (20N/90E) on 24 th , move further northeastward and cross the Bangladesh coast on 25 th , less marked thereafter.	The current CS will intensify into SCS/VSCS over westcentral AS (13N/54E) by night of today 21 st , move northwestward and lay over westcentral AS (15N/53.5E) as SCS/VSCS on 22 nd , ststem moves northwestwards and crosses the Yemen-Oman coast near (16.5N/52.5E) around night of 23 rd or early hours of 24 th as CS, weaken thereafter and lay over land (18N/52E) as LPA on 24 th , less marked thereafter.
IMD-WRF	LPA over southeast and adjoining westcentral BoB (12.5N/87.5E) as on today, moves northwestward and becomes WML/D over westcentral BoB (13N/86E) on 22 nd , moves northeastward and lay over westcentral BoB (16N/87E) with same intensity on 23 rd .	The current CS will intensify into SCS/VSCS over southwest and adjoining westcentral AS (12.5N/55.5E) by night of today 21 st or early hours of 22 nd , system moves northwestwards and lay over westcentral AS (13.5N/53.5E) as VSCS on 22 nd , moves further northwestward and lay over westcentral AS off Yemen coast (16N/53E) as VSCS on 23 rd .
NCMRWF-NCUM	LPA over westcentral and adjoining southwest and southeast BoB (13N/87E) as on today 21 st , moves northwestward and becomes WML/D over westcentral BoB (15.5N/86E) on 22 nd , moves then northeastward and becomes DD over westcentral and adjoining eastcentral and adjoining north BoB (17N/87E) on 23 rd , mover further northeastward and lay over northeast and adjoining northwest BoB (22N/90E) as D on 24 th , moves	The current CS will intensify into SCS over southwest and adjoining westcentral AS (12.5N/55.5E) by night of today 21 st or early hours of 22 nd , system moves northwestwards and lay over westcentral AS (13.5N/53.5E) as VSCS on 22 nd , moves further northwestward and lay over westcentral AS off Yemen coast (15.5N/53E) as VSCS on 23 rd , system moves further northwestward and

	northeastwards and touches the Bangladesh coast (23N/91.5E) as D on 25 th night or early hours of 26 th , cross the coast on 26 th morning and weakens thereafter.	moves close to the Yemen-Oman coast and lay over there (16N/52.5E) on 24 th , system crosses the coast (16.2N/52E) on 25 th and lay over land as D, will becomes less marked thereafter.
NCMRWF-NEPS	LPA over westcentral and adjoining southwest and southeast BoB (13N/87E) as on today 21 st , moves northwestward and becomes WML/D over westcentral BoB (15N/86E) on 22 nd , moves then northeastward and becomes DD over westcentral and adjoining eastcentral and adjoining north BoB (17N/87E) on 23 rd , mover further northeastward and lay over northeast and adjoining northwest BoB (20N/89.7E) as DD on 24 th , moves northeastwards and touches the Bangladesh coast (22.5N/91.5E) as D on 25 th night or early hours of 26 th , cross the coast on 26 th morning and weakens thereafter.	The current CS will intensify into SCS/VSCS over southwest and adjoining westcentral AS (12.5N/56.5E) by night of today 21 st or early hours of 22 nd , system moves northwestwards and lay over westcentral AS (14N/53.5E) as VSCS on 22 nd , moves further northwestward and lay over westcentral AS off Yemen coast (15.5N/53E) as VSCS on 23 rd , system moves further northwestward and moves close to the Yemen-Oman coast and lay over there (16N/52.5E) on 24 th , system crosses the coast (16.2N/52E) on 25 th and lay over land as D, will becomes less marked thereafter.
NCMRWF-UM (Regional)	LPA over westcentral and adjoining southwest and southeast BoB (13N/87E) as on today 21 st , moves northwestward and becomes SCS over westcentral BoB (16.5N/85.5E) on 22 nd , moves then northeastward and becomes VSCS over westcentral BoB (17N/86.5E) on 23 rd ,	
ECMWF	LPA over westcentral and adjoining southwest and southeast BoB (13.8N/87E) as on today 21 st , moves northwestward and lay as L or WML over westcentral BoB (15.5N/85.9E) on 22 nd , moves then northeastward and becomes D over westcentral BoB (16.8N/86.3E) on 23 rd , will moves further northeastward and lay over northwest and adjoining northeast BoB (18.9N/88.0E) as DD/CS on 24 th , lay over northeast and adjoining northwest BoB (20.3N/90E) as DD on 25 th , moves further northeastward and touches west of Bangladesh coast as D on 26 th and moves along the coast as D till 12 UTC of 26 th and weakens thereafter off east Bangladesh coast.	SCS/VSCS over southwest and adjoining westcentral AS (12N/56E) by night of today 21 st or early hours of 22 nd , it will moves northwestwards and lay over westcentral AS (13.3N/54.7E) VSCS on 22 nd , moves northwestwards and lay close to Yemen coast (15.5N/52.6E) as VSCS on 23 rd , System moves northwestward and cross the coast close to Yemen (16.0N/52.1E) as CS on morning of 24 th , and weaken rapidly thereafter over land.

NCEP-GFS	LPA over westcentral and adjoining southwest and southeast BoB (13N/87E) as on today 21 st , moves northwestward and lay as LPA over westcentral BoB (15N/86E) on 22 nd , moves then northeastward and lay over westcentral and adjoining eastcentral (17N/87E) as LPA on 23 rd , mover further northeastward and lay over northeast and adjoining northwest BoB (20N/91E) as WML on 24 th , moves northeastwards and lay close to the Bangladesh coast (21.5N/91.5E) becomes LPA on 25 th , remains there as LPA till 27 th .	The current CS will intensify into SCS/VSCS over southwest and adjoining westcentral AS (12.5N/56.5E) by night of today 21 st or early hours of 22 nd , system moves northwestwards and lay over westcentral AS (14N/53.5E) as VSCS on 22 nd , moves further northwestward and lay over westcentral AS close to Yemen coast (16N/53E) as VSCS on 23 rd , crosses the coast on 24 th as CS near Yemen coast (16.2N/52.5E) on 24 th .
IMD-Genesis Potential Parameter	Potential zone of Cyclogenesis over westcentral BOB on 21st, westcentral and adjoining eastcentral on 22 nd , eastcentral and adjoining north east BoB on 23 rd .	Potential zone of Cyclogenesis over westcentral and adjoining southwest AS on 21 st , westcentral on 22 nd , westcentral AS on 22 nd , close to the Yemen-Oman coast on 23 rd , near Oman coast on 24 th .

Summary and conclusion:

1. For the Bay of Bengal:

The global models are in agreement that the low pressure area over southeast Bay of Bengal is likely to intensify further into a depression over westcentral Bay of Bengal around 22nd. Hence moderate to high probability of formation of depression is assigned to formation of depression over Bay of Bengal during 22nd – 23rd October. There is consensus among various models wrt movement towards Bangladesh coast. Most of the models are indicating intensification upto depression/deep depression stage; However NCUM (R), NCEP-GFS are indicating higher intensity.

Considering all these, the well marked low pressure area over westcentral and adjoining south Bay of Bengal is very likely to move further northwestwards and intensify into a depression over westcentral Bay of Bengal during next 12 hours. Thereafter, it is likely to move north-northeastwards towards Bangladesh and adjoining west Bengal coasts and intensify further during subsequent 3 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
HIGH	-	-	-	-	-	-

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

2. For the Arabian Sea:

The multi model guidance is indicating the system to move west-northwestwards till 0000 UTC of 22nd, northwestwards thereafter till 0000 UTC of 24th & then north-northwestwards. Most of the models are indicating the system to cross Oman – Yemen coasts (ECMWF, NCEP, CMC, IMD-GFS towards Yemen and IMD-MME, NCUM, IMD-HWRF slightly towards

Oman). But there is consensus that crossing would be over Yemen & adjoining Oman coasts. Models are also suggesting slight weakening prior to landfall. This is supported by decreasing ocean thermal energy and increasing wind shear over westcentral Arabian Sea along & off Oman-Yemen coasts.

In view of above, the severe cyclonic storm “Tej” (pronounced as Tej) is very likely to move west-northwestwards and intensify further into a very severe cyclonic storm during next 12 hours. Thereafter, it is likely to move northwestwards till 0000 UTC of 24th morning & then north-northwestwards. It is likely to cross Yemen-Oman coasts between al Ghaidah (yemen) & Salalah (Oman, 41398) around 2100 UTC of 24th October.

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
-	-	-	-	-	-	-

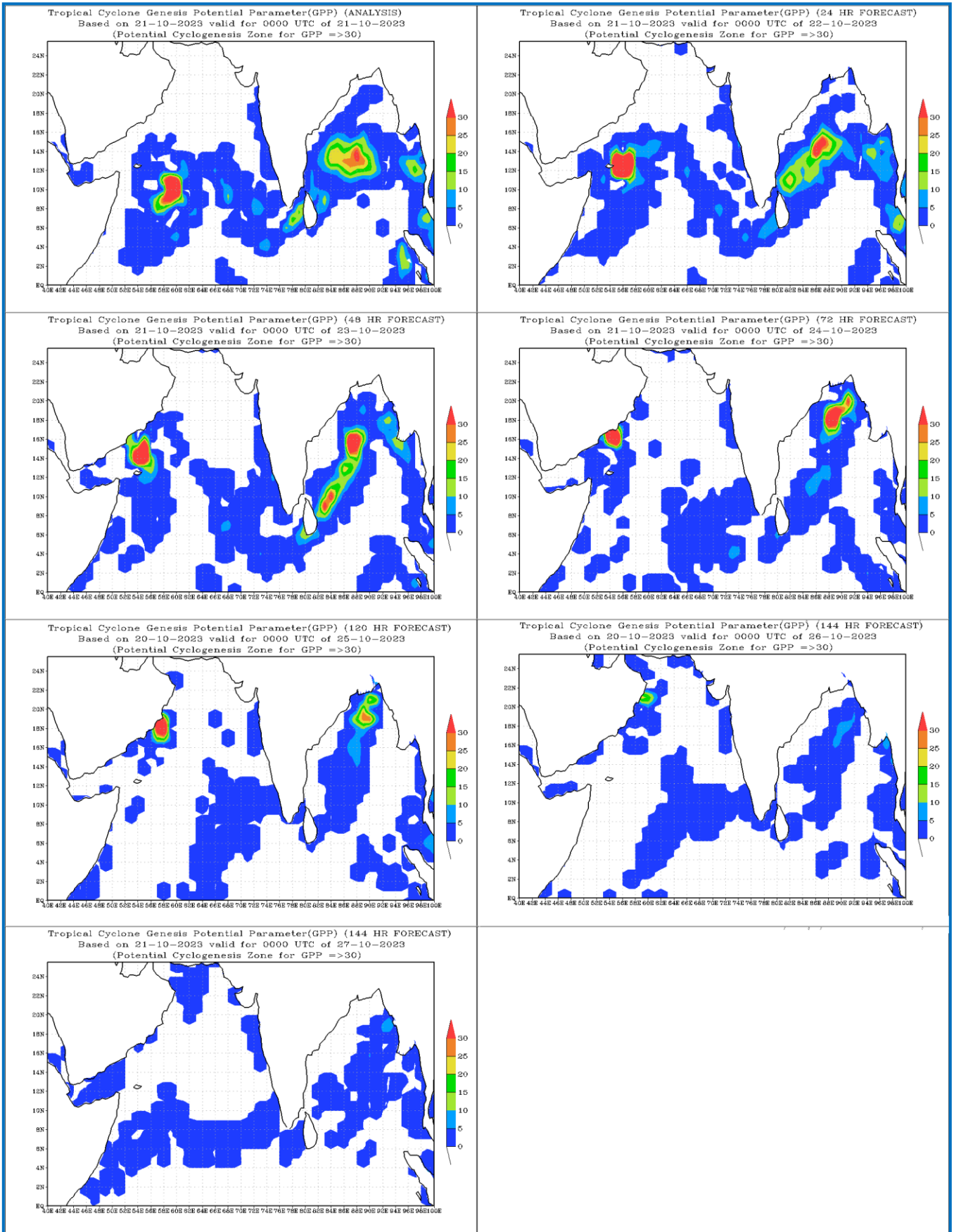
“-“indicate that Cyclogenesis has already occurred. The above table indicates probability of cyclogenesis (formation of depression).

Advisory for fishermen:

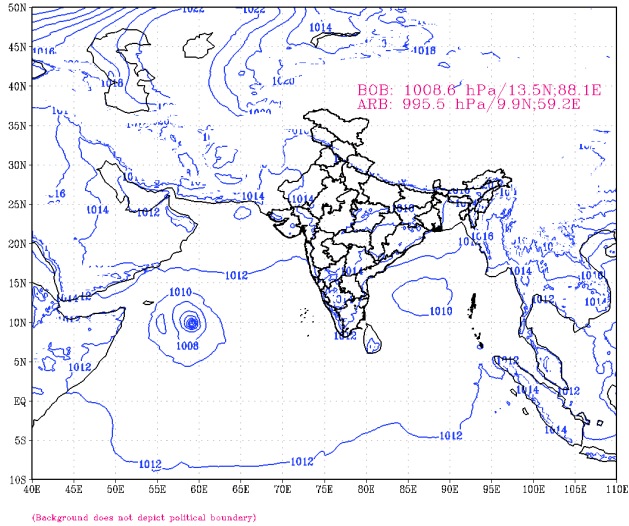
Fishermen are advised not to venture into following areas:

- ❖ **Southwest Arabian Sea** from 21st to 22nd October.
- ❖ **Westcentral Arabian Sea** from 23rd October onwards till 25th evening.
- ❖ Those out at sea are advised to return to coast.
- ❖ **Southwest and adjoining southeast Bay of Bengal** from 21st to 22nd October.
- ❖ **Westcentral Bay of Bengal** from 21st October onwards.
- ❖ **North Bay of Bengal and along & off Odisha, West Bengal and Bangladesh coasts** from 24th to 26th October.

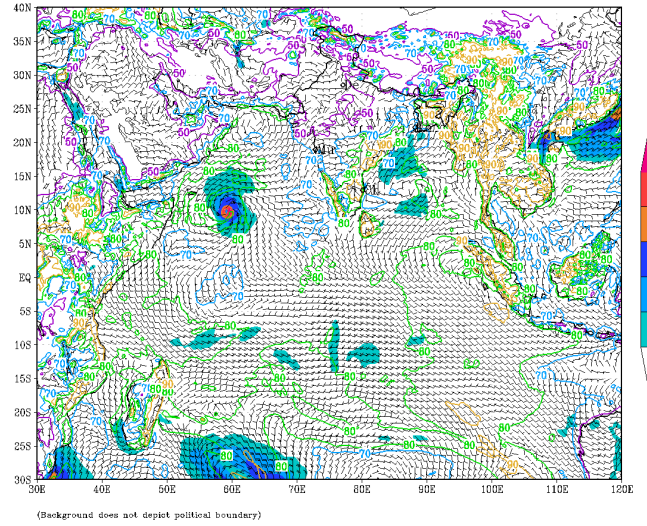
Intense Observation Period (IOP) is suggested for Oman and Yemen coasts on 24th and 25th October, Odisha coast on 24th & 25th and West Bengal and Bangladesh coasts on 25th and 26th October.



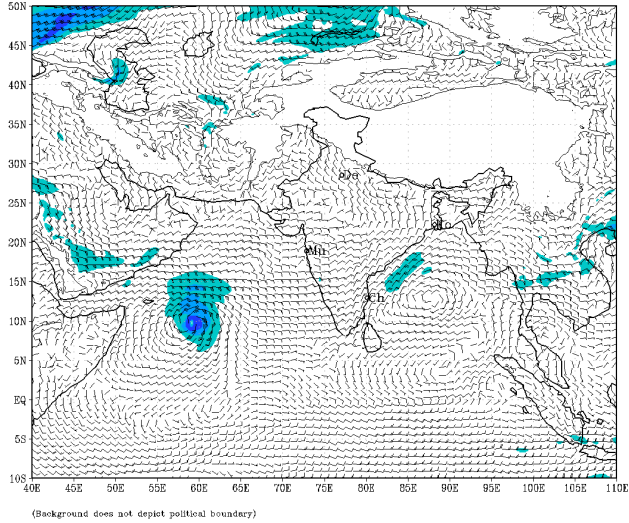
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 21-10-2023



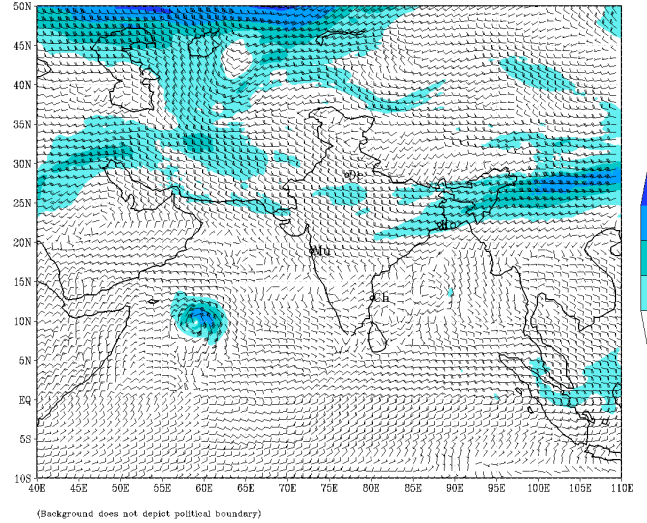
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 21-10-2023



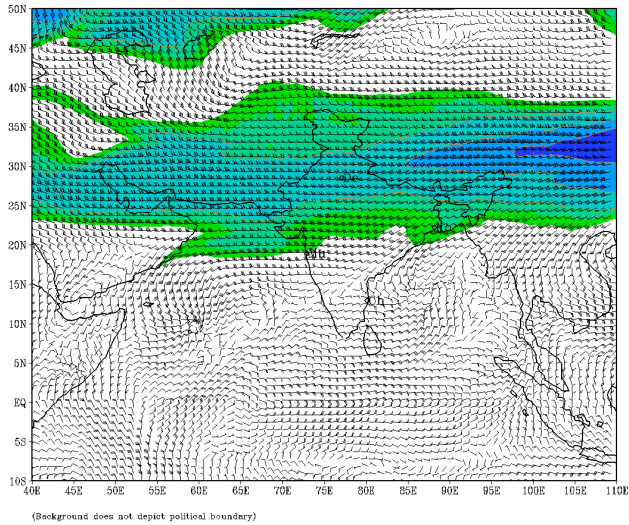
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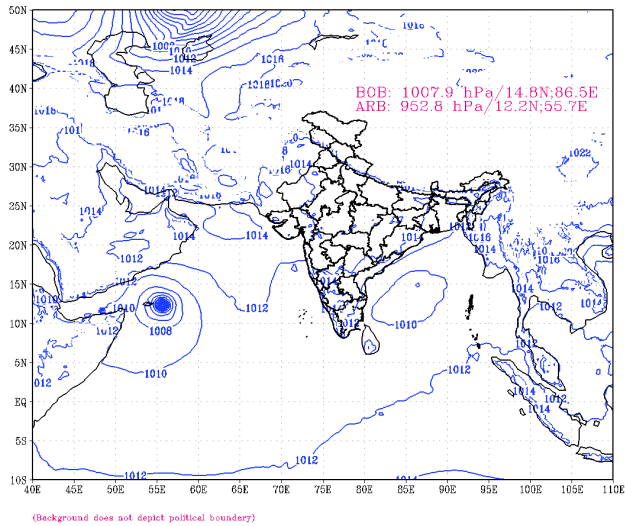
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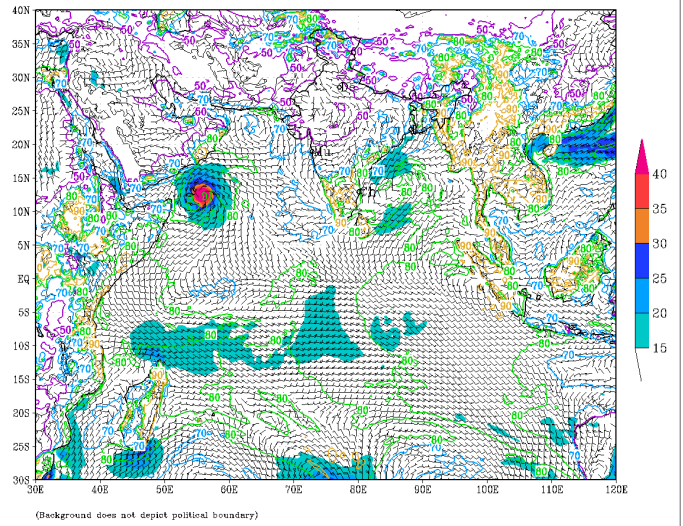
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 based on 00 UTC of 21-10-2023 valid for 00 UTC of 21-10-2023



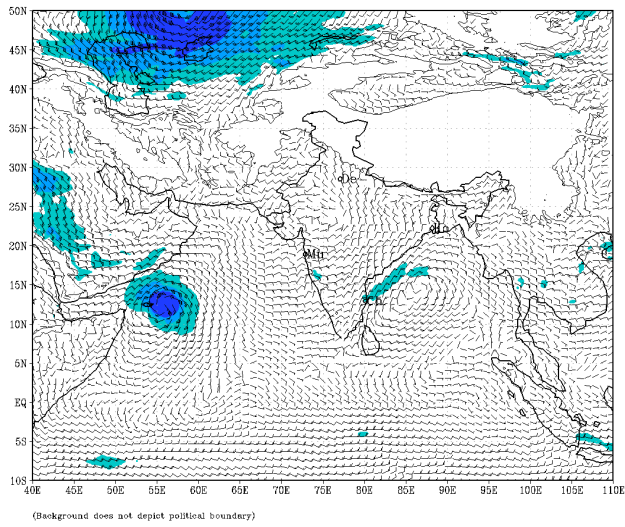
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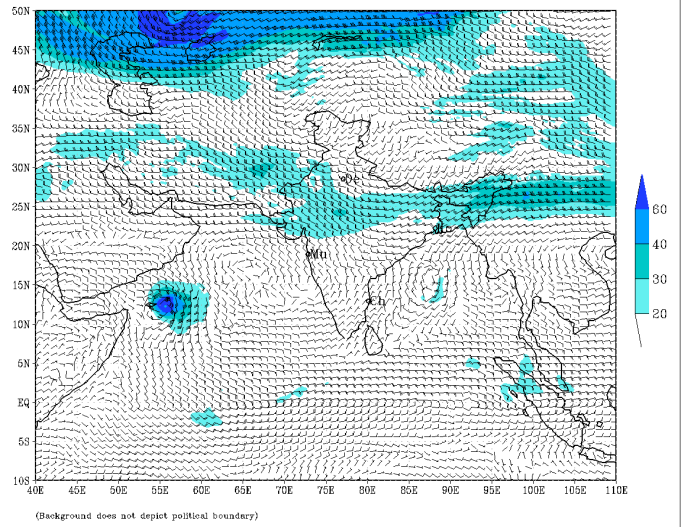
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 22-10-2023



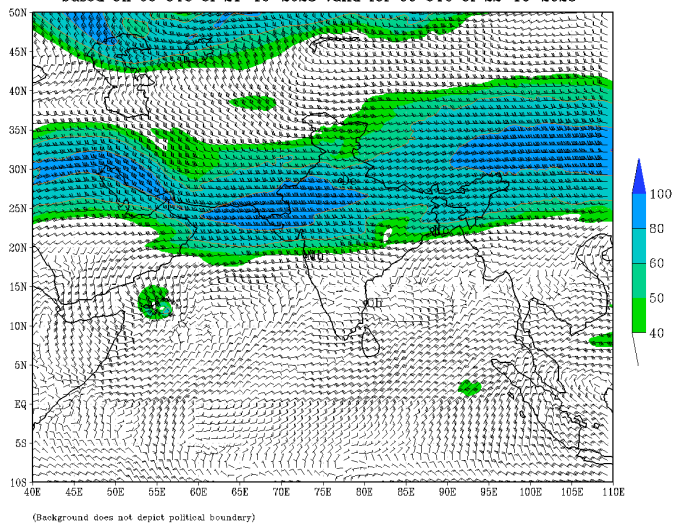
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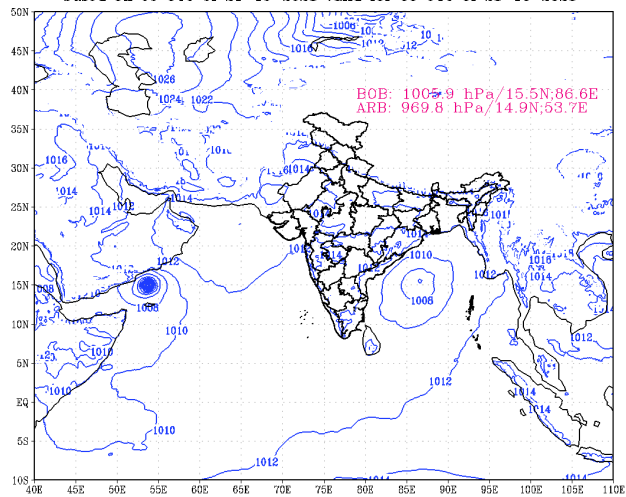
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based on 00 UTC of 21-10-2023 valid for 00 UTC of 22-10-2023



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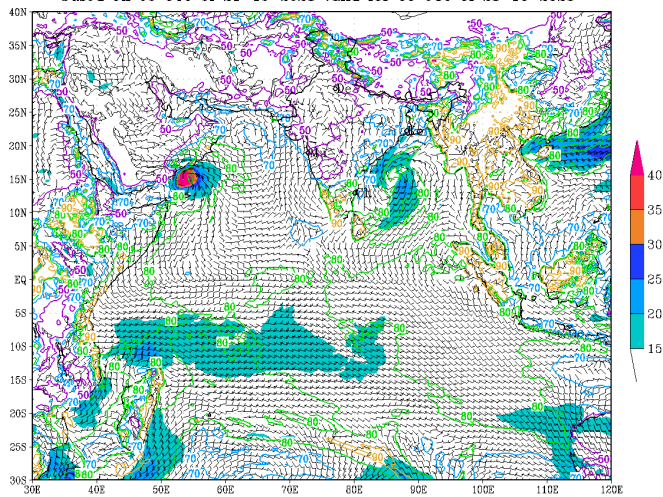


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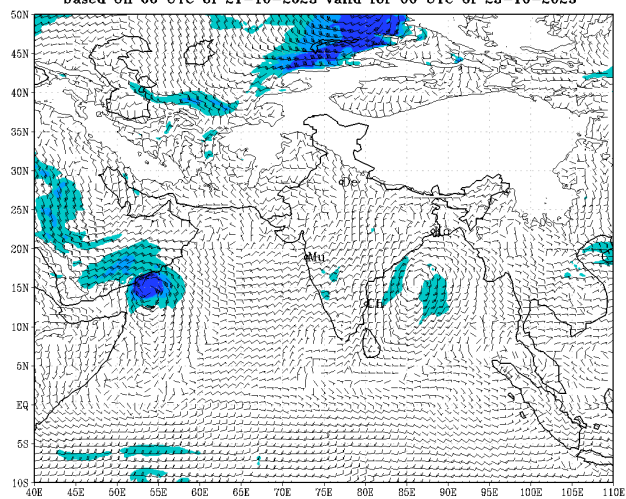
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 23-10-2023



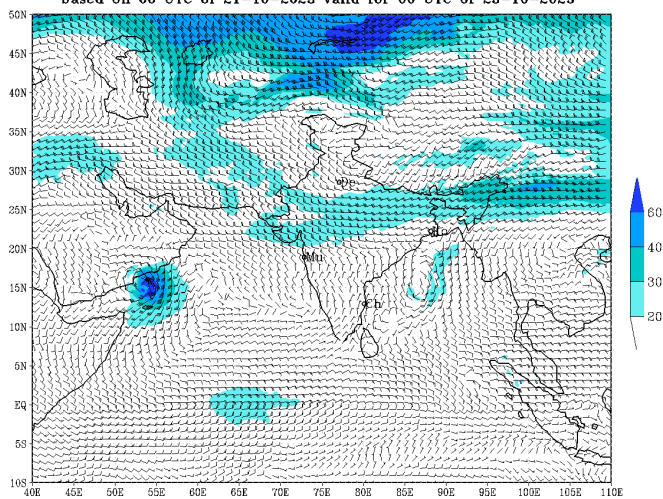
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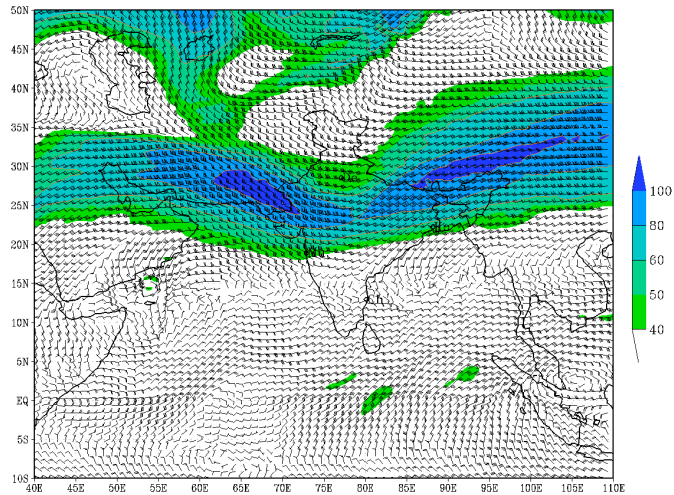
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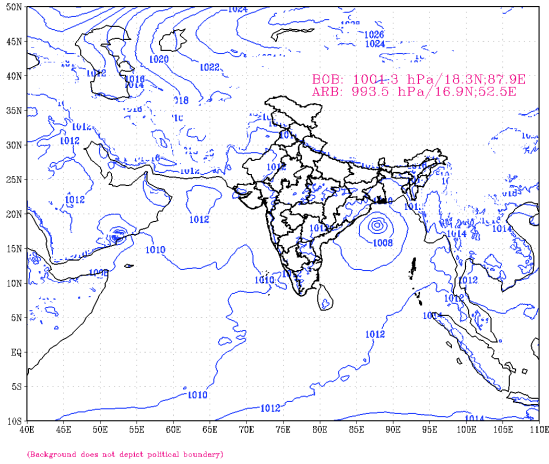
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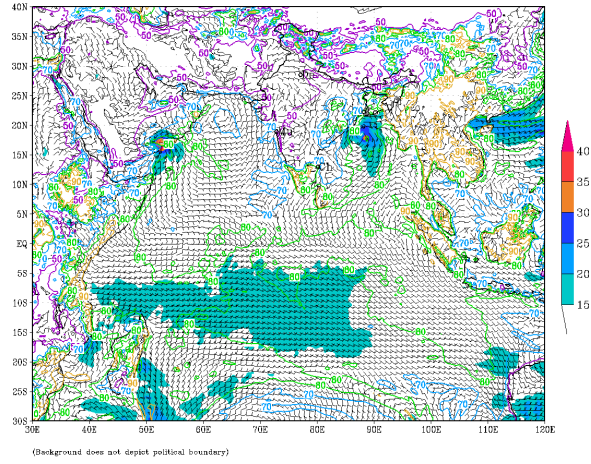


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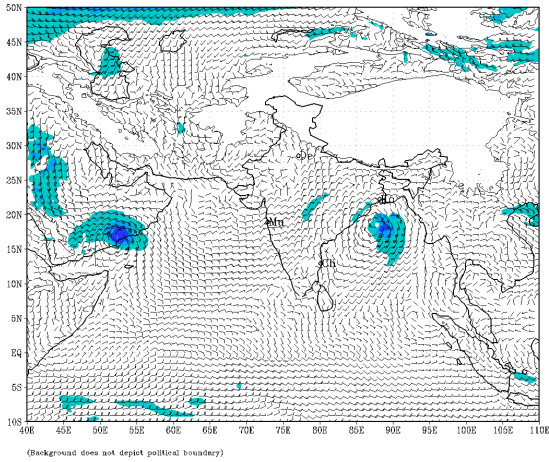
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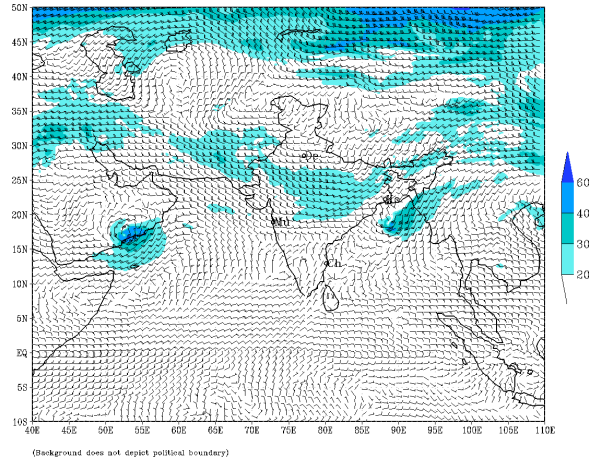
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 24-10-2023



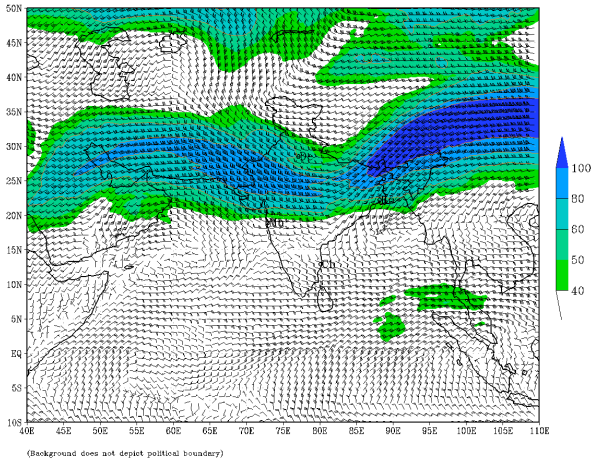
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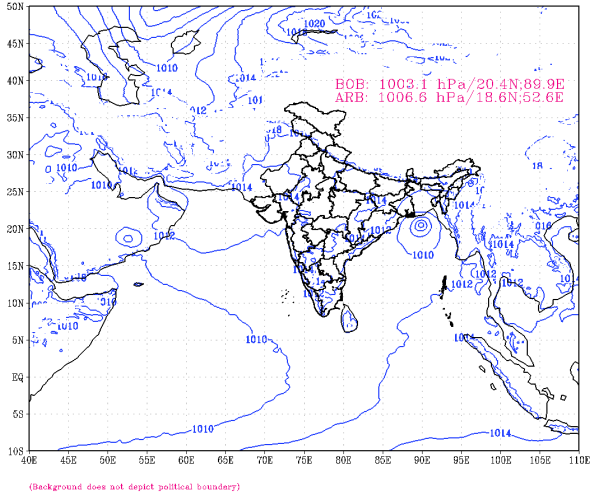
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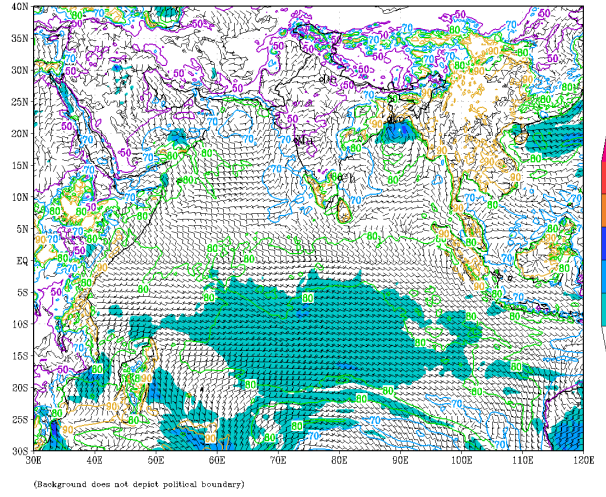
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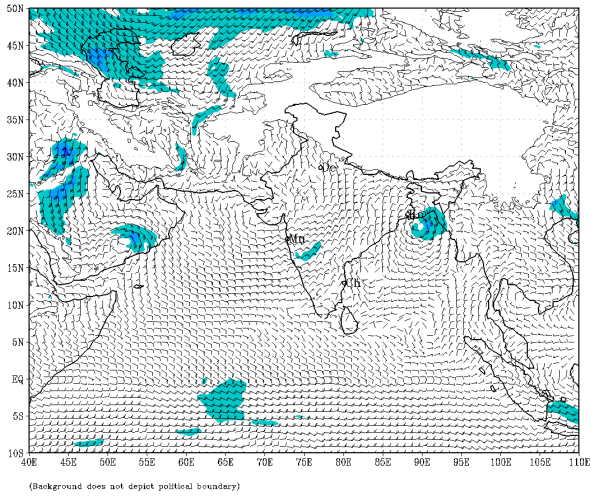
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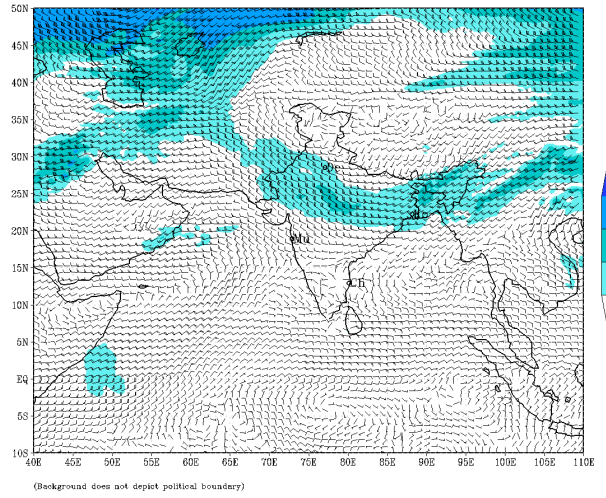
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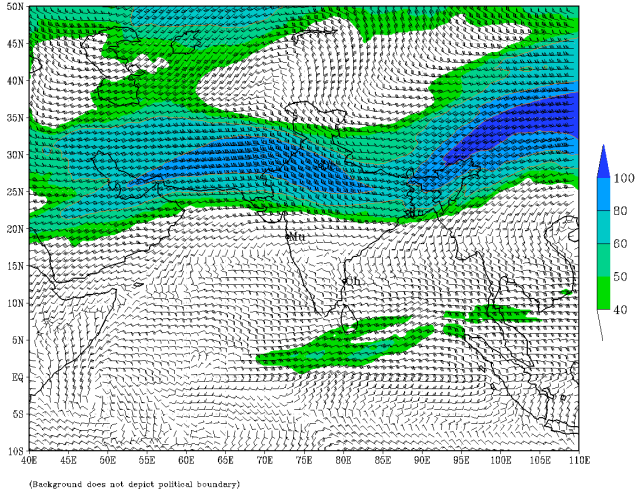
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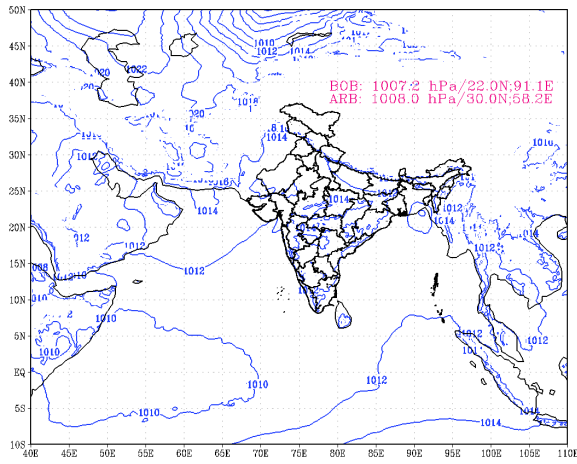
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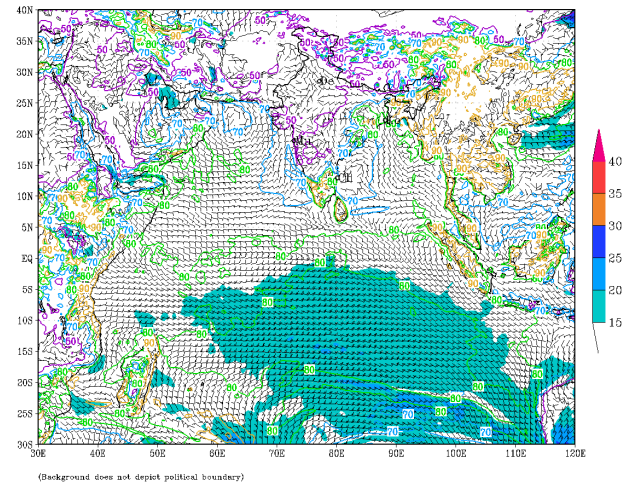
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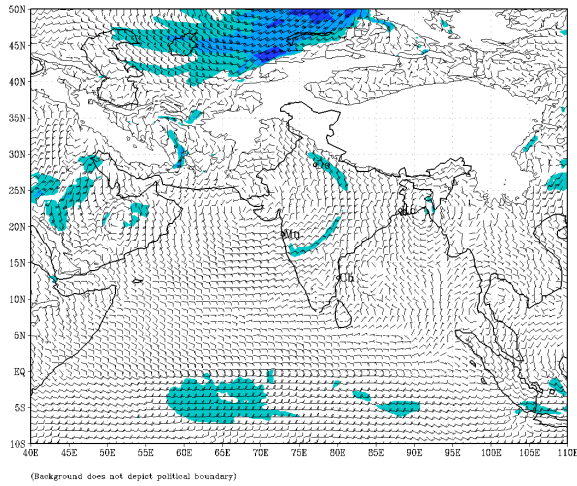
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based on 00 UTC of 21-10-2023 valid for 00 UTC of 26-10-2023



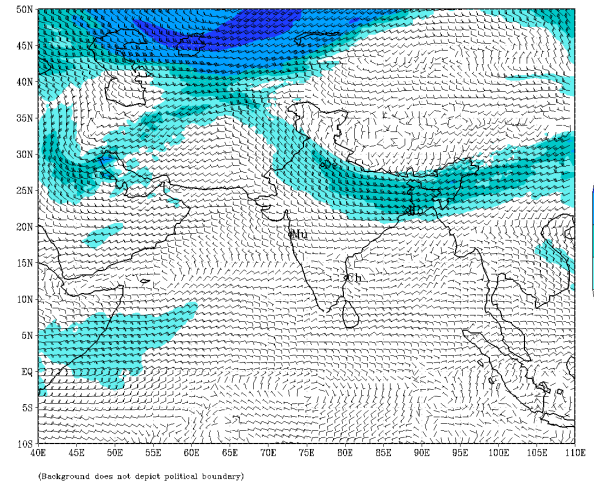
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 26-10-2023



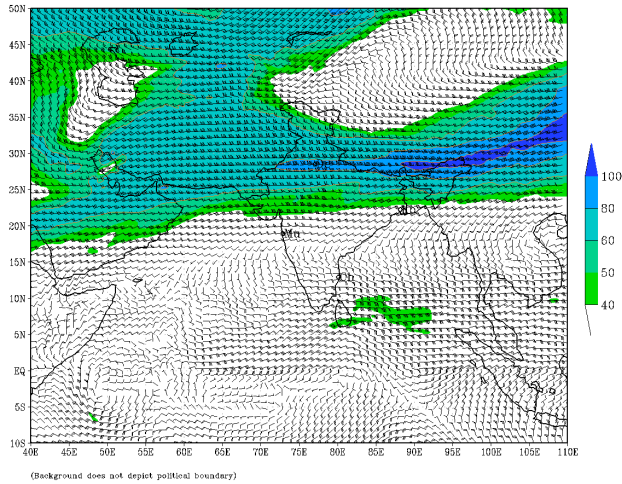
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 26-10-2023



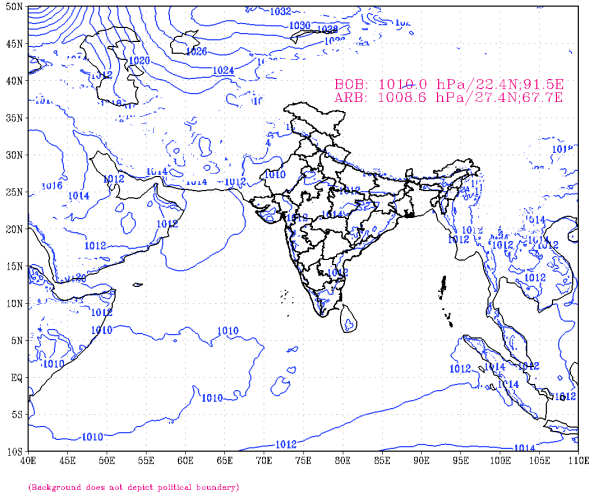
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 26-10-2023



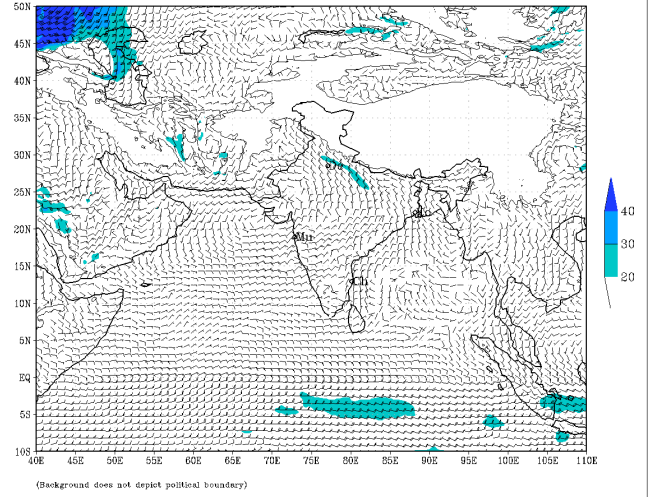
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 21-10-2023 valid for 00 UTC of 26-10-2023



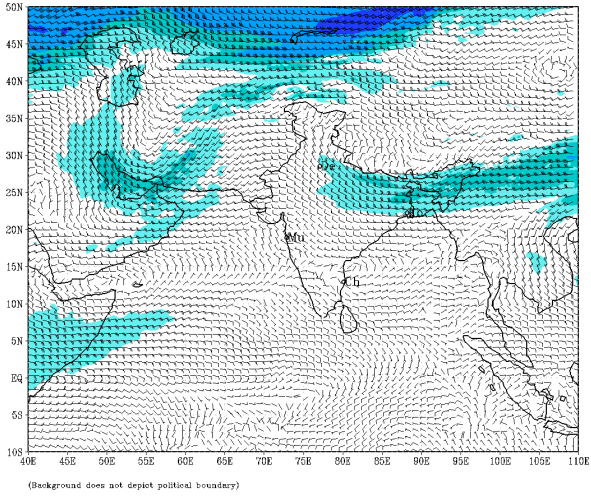
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 27-10-2023



IMD :GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 27-10-2023



IMD :GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 27-10-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 21-10-2023 valid for 00 UTC of 27-10-2023

