



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

**Tropical Cyclone Forecast Programme
Report Dated 20th October, 2023**

Time of Issue: 1500 UTC

Synoptic features (based on 0300 UTC analysis):

- Yesterday's Low Pressure Area over Southeast & adjoining southwest Arabian Sea moved nearly westward, became a well marked low pressure area over southwest Arabian Sea in the midnight (2330 hours IST). It concentrated into a depression at 0830 hours IST of today, the 20th October over southwest Arabian Sea. It moved west-northwestwards with a speed of 6 kmph during past 6 hours, intensified into deep depression and lay centered at 1730 hours IST of today, the 20th October over the same region, near latitude 9.4°N and longitude 61.3°E about 880 km east-southeast of Socotra (Yemen), 1150 km southeast of Salalah Airport (Oman) and 1240 km east-southeast of Al Ghaidah (Yemen).

It is likely to move west-northwestwards and intensify into a cyclonic storm over southwest Arabian Sea during next 12 hours. Continuing to move west-northwestwards, it is likely to intensify into a severe cyclonic storm in the evening of 22nd October. Thereafter, it would move north-northwestwards from 24th morning towards south Oman and adjoining Yemen coasts and cross Oman-Yemen coasts between Salalah (Oman) and Al Ghaidah (Yemen).

- Under the influence of yesterday's cyclonic circulation over southeast Bay of Bengal a low pressure area formed over southwest and adjoining southeast Bay of Bengal in the morning of 20th October. It persisted over the same region at 1730 hours IST of today, the 20th October, 2023. It is very likely to move northwestwards and intensify into a depression over westcentral Bay of Bengal around 22nd October. Thereafter, it is likely to move north-northeastwards towards Bangladesh and adjoining West Bengal coasts 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 south & west Arabian Sea.
Tropical Cyclone Heat Potential (TCHP) kJ/cm ²	80-100 over eastcentral BoB. 70-80 over most parts of BOB. Less than 30 along Andhra Pradesh and Tamil Nadu coasts, adjoining sea areas, over Gulf of Mannar	60-80 over southeast & adjoining southwest Arabian Sea. 20-30 over eastcentral and adjoining northeast AS, less than 10 over westcentral and adjoining southwest AS

Cyclonic Relative vorticity ($\times 10^{-6} \text{ s}^{-1}$)	60 over the central parts of BoB..	140 over the system centre and vertical extension upto 500 hpa level and vertical extension upto 700 hPa, 100 around the system and vertical extension upto 500 hpa level.
Low Level convergence ($\times 10^{-5} \text{ s}^{-1}$)	5 around the LPA.	10-15 to the southeast of the system.
Upper Level divergence ($\times 10^{-5} \text{ s}^{-1}$)	5-10 over the central parts of BoB.	10-20 around the system.
Vertical Wind Shear (VWS knots)	High (20-25) over the southwest BoB, low (10) over the central parts of BoB.	High (25-30) to the south of the system, north and adjoining central AS, 5-10 around the system, moderate (20) over the westcentral AS.
Wind Shear Tendency (knots)	Decreasing tendency over the central parts of BoB.	Decreasing tendency towards the southeast of the system.
Upper tropospheric Ridge	Along 13°N over BoB	Along 15°N over AS

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the BoB & Andaman Sea:-

At 0300 UTC, Scattered low and medium clouds with embedded moderate to intense to convection lay over central & south Bay of Bengal and Andaman sea.

(b) Over the Arabian Sea:-

At 0300 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Arabian Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over central parts of Arabian sea, Lakshadweep Islands area and Comorin area.

(c) Convection outside India:

Scattered low and medium clouds with embedded moderate to intense convection lay over gulf of Mannar, Maldives, Tibet, China, Gulf of Thailand, Gulf of Tonkin, Hainan, Sumatra, Strait of Malacca, Malaysia, Borneo, South China Sea, Celebes Islands & Sea Philippines, and over Indian ocean between latitude 5.0N & 10.0S and between longitude 47.0E & 100.0E .

M.J.O. Index:

MJO index is in Phase 1 with amplitude less than 1. It will move to phase 8 from 21^{st} onwards with amplitude less than 1.

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

Vortex (Sanba) over South China Sea (area F05) centered near 21.3N / 109.0N . Intensity T1.5/2.5. Corresponding maximum sustained winds of 17-27 knots. Associated scattered to broken low and medium clouds with embedded intense to very intense convection over area between latitude 18.5N & 24.0N and between longitude 108E & 116E and north Hainan.

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

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
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IMD-GFS	LPA over southeast adjoining southwest BOB (13.6N/87.4E) on 20 th . WML over southwest BOB adjoining westcentral (13N/84.6E) on 22 nd . Depression over westcentral BOB (17N/86) on 23 rd . DD over the northwest and adjoining westcentral BoB (22N/86.5E) on 24 th , lay over northeast BoB close to the Bangladesh coast (23N/91E) by early hours of 26 th as depression.	Depression (D) over Southwest AS (9.3N/61.7E) as on 0830 IST of today 20 th , CS over the southwest and adjoining westcentral AS (11N/59E) by evening of today, moving northwestwards and intensifies into SCS over westcentral AS (13N/656E) on 21 st , SCS over Westcentral AS (15N/57E) on 22 nd , moves north-northwestward and lay over westcentral AS off Oman coast (17N/55E) on 23 rd as SCS. Crosses between Yemen and Oman coasts as CS on early hours of 25 th (18.2N/55.E), weakens to LPA on 26 th .
IMD-GEFS	LPA over southwest BoB adjoining southeast and westcentral BoB as on today. WML over westcentral BOB on 21 st , depression over westcentral BoB (15N/86E) on 22 nd , weaken into WML over westcentral and adjoining northwest BoB by 23 rd , LPA over northeast and adjoining northwest BoB (22N/88.5E) on 25 th .	CS over southwest and adjoining westcentral AS (10N/58E) by evening of today 20 th . Intensification into SCS over westcentral AS on 21st. Moves northwestward and lay over westcentral AS (14.8N/55E) on 22nd. Lay over off Yemen coast (17N/55E) as SCS on 23 rd , Crosses the coast between Yemen and Oman on 24 th as DD (17N/53E), weakens thereafter.
IMD-WRF	Extended low over westcentral adjoining south BOB (13N/87E) on today 20 th . LPA over over the westcentral BoB by 21 st , depression over the westcentral BoB (14.9N/87E) on 22 nd .	DD/CS over the southwest and adjoining westcentral AS (11N/59E) by today 20 th evening, SCS over westcentral AS (12.5N/57E) on 21 st , move northwestward and lay over westcentral AS (13.5N/54E) as SCS on 22 nd .
NCMRWF-NCUM	Extended low over westcentral and adjoining southwest BOB (14N/86E) as on 20 th . WML over westcentral and adjoining southwest BOB (14N/85E) on 21 st . Moves northwestward and becomes depression over westcentral BOB (17N/84E) on 22nd. Moves northeastwards and lay over westcentral BOB (19N/86E) as DD on 23 rd . Mover further northeastward and lay over northeast and adjoining northwest BoB as WML on 24 th , moves close to Bangladesh coast and lay over WML on 25 th .	LPA over southwest AS (10N/61E) on 20 th . DD/CS over southwest and adjoining westcentral AS (10.5N/59E) by evening of today. Moving northwestwards intensify to CS over westcentral AS (13N/55E) on 21 st . SCS over westcentral AS (14N/52E) on 22 nd . Moves northwestward and lay over westcentral AS (14N/51E) on 23 rd . Lay over westcentral AS off Yemen-Oman coast (16N/51E) as SCS on 24 th , crosses the coast between Yemen and Oman on 25 th at (16N/50E) as SCS on 25 th , DD over land (19N/51E) on 26 th .
NCMRWF-NEPS	LPA over westcentral and adjoining southwest BOB (13N/86E) as on today. WML over westcentral (14N/85E) on 21st. Depression over westcentral BOB (15.5N/83E) on 22 nd , DD on 23 rd over westcentral and adjoining northwest BoB (18N/84E), weakens into D and lay over northwest and adjoining northeast BoB (21N/87E) on 24 th , moves close to the Bangladesh coast and lay over northeast	DD/CS over southwest and adjoining westcentral AS (10.1N/58E) on evening/night of today 20 th . SCS over westcentral and adjoining southwest AS (12.5N/55E) on 21 st . Moves northwestward and lay over westcentral AS (14N/52E) on 22 nd as SCS. SCS over westcentral BOB (15N/51.5E) on 23 rd . Close to the Oman-Yemen coast as SCS by

	BoB as D on 25 th , and crosses coast of Bangladesh as D on 25 th , crosses the coast of Bangladesh near 22N/91E as LPA on 26 th .	evening/night of 24 th , crosses the coast near 17N/51E with almost same intensity on early hours of 25 th , weakens there after over land.
NCMRWF-UM (Regional)	LPA over central parts of BOB (13N/86E) as on today 20 th , DD/CS over westcentral BoB (15N/86E) on 21 st . SCS over westcentral BoB (16N/85.5E) on 22 nd .	
ECMWF	LPA as on today 20 th over westcentral and adjoining southwest BoB, WML over westcentral BoB on 22 nd , D over westcentral BoB (15.4N/85.5E) on 23 rd , moves northwestward and becomes DD over westcentral BoB (17.2N/85.1E) on 24 th , moves northeastward and becomes DD/CS over westcentral BoB (18.5N/87.09) on 25 th , DD over northwest and adjoining northeast BoB (20.2N/88.6N) on 26 th .	DD over southwest and adjoining westcentral AS by evening of today 20 th , CS over west central and adjoining southwest AS (11.4/57.1) on 21 st , SCS over westcentral AS (13.8N/54.6E) on 22 nd , moves northwestward and lay as SCS close to Yemen coast (15.5N/52.5E) on 23 rd , crosses near Yemen (16.1N/52.6E) on morning of 24 th as SCS, DD over land on the same day and weakens further on the same day.
NCEP-GFS	LPA over central BOB (16N/87E) on 20 th , moves northwestward and lay as WML on 23 rd over westcentral BoB, moves northeastward and lay as WML over westcentral and adjoining north BoB on 24 th , moves northeastward and lay close to Bangladesh coast as LPA on 25 th , weakens thereafter.	DD over westcentral AS as on evening of today 20 th , CS/SCS over westcentral AS on 21 st , moves northwestward and lay over westcentral AS on 22 nd as SCS, moves northwestward and lay off Yemen-Oman coast as SCS on 23 rd , moves northeastward and touches the coast as SCS on 24 th , moves further close to the coast and lay as CS on 25 th , recurve by moving northeastward and lay over westcentral AS (21N/61E) as DD on 26 th .
IMD-Genesis Potential Parameter	Potential zone of Cyclogenesis over southwest BOB on 21 st , southwest & westcentral on 22 nd , westcentral on 23 rd , westcentral and adjoining north BoB on 24 th ,	Potential zone of Cyclogenesis over southwest AS on 20 th , westcentral and adjoining southwest AS on 21 st , 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 BoB during 22nd – 23rd October. Some of the models are showing movement towards Bangladesh-Myanmar coasts. While ECMWF and GEFS are indicating movement towards Bangladesh & adjoining West Bengal coasts. Most of the models are indicating intensification upto depression/deep depression stage, however ECMWF is indicating higher intensity.

Considering all these, the low pressure area over southwest and adjoining southeast Bay of Bengal is likely to move northwestwards and intensify into a depression over westcentral Bay of Bengal around 22nd October. Thereafter, it is likely to move north-northeastwards towards Bangladesh and adjoining West Bengal coasts 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
NIL	MOD	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 towards Oman-Yemen coasts and gradual north-northeastwards recurvature thereafter. Most of the models are indicating the system to cross Oman coast (except ECMWF which is indicating crossing over Yemen). 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.

The deep depression over southwest Arabian Sea is likely to move west-northwestwards and intensify into a cyclonic storm over southwest Arabian Sea during next 12 hours. Continuing to move west-northwestwards, it is likely to intensify into a severe cyclonic storm around 1200 utc of 22nd October. Thereafter, it would move north-northwestwards from 0000 utc of 24th morning towards south Oman and adjoining yemen coasts and cross Oman-Yemen coasts between Salalah (Oman) and al Ghaidah (Yemen).

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
-	-	-	-	-	-	-

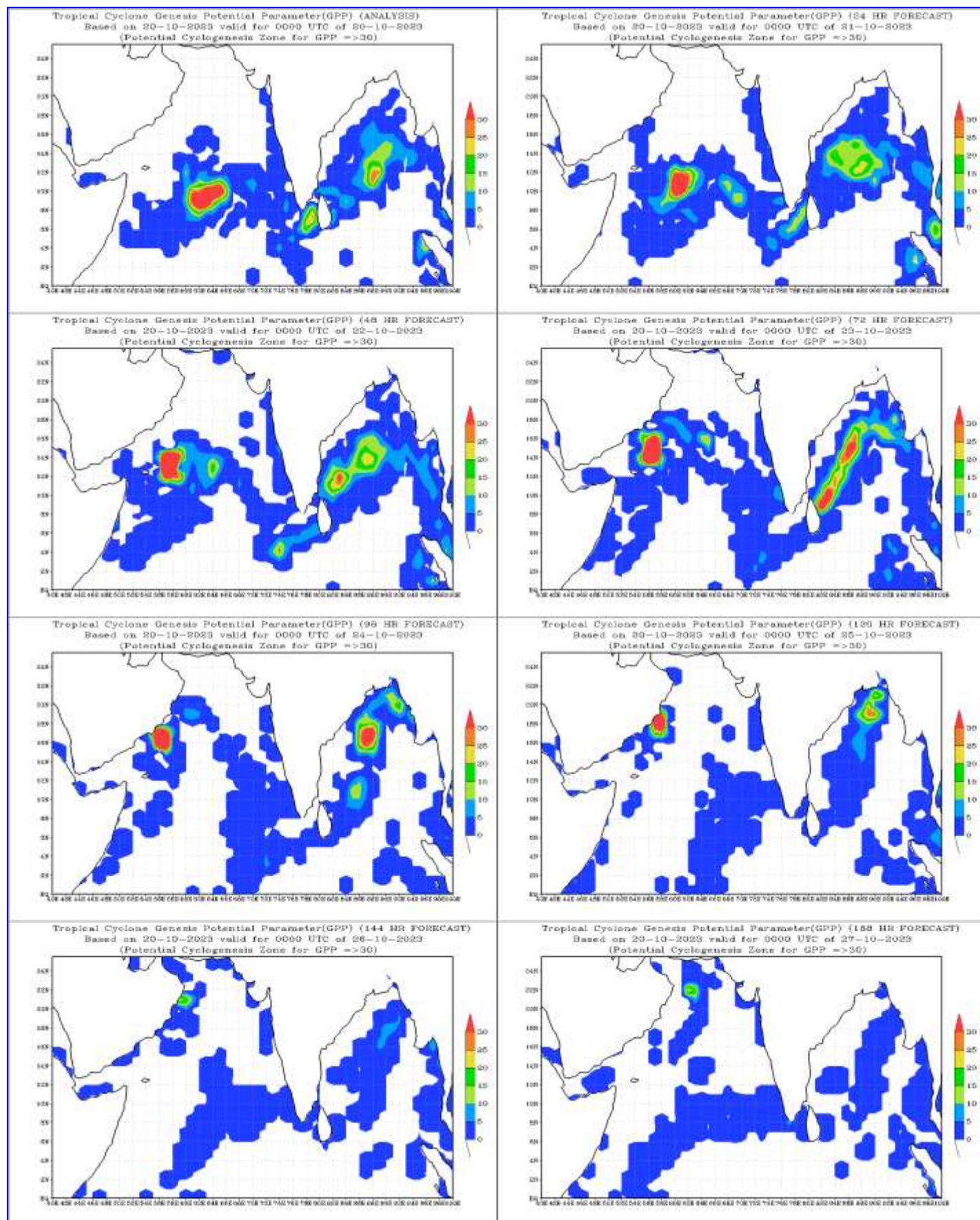
““indicate that Cyclogenesis has already occurred. The above table indicates probability of cyclogenesis (formation of depression).

Advisory for fishermen:

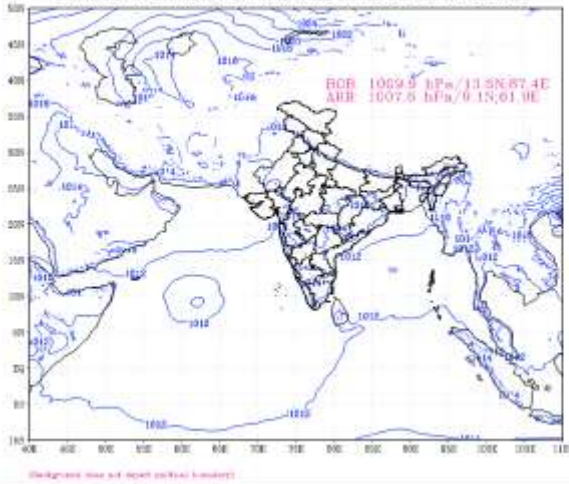
Fishermen are advised not to venture into following areas:

- ❖ **Southwest Arabian Sea** from 20th to 23rd October.
- ❖ **Westcentral Arabian Sea** from 20th October onwards till 25th evening.
- ❖ Those out at sea are advised to return to coast.
- ❖ **Southwest and adjoining southeast Bay of Bengal** from 20th to 23rd 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.

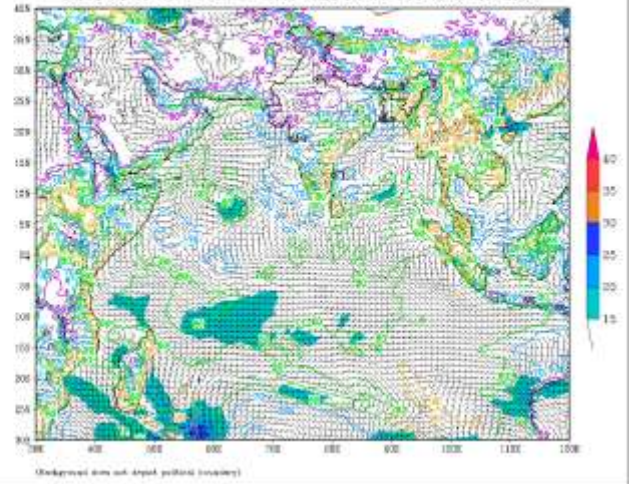
Intense Observation Period (IOP) is suggested for Oman and Yemen coasts on 24th and 25th October, Odisha coast on 24th & 25th and West Bengal and Bangladesh coasts on 25th and 26th October.



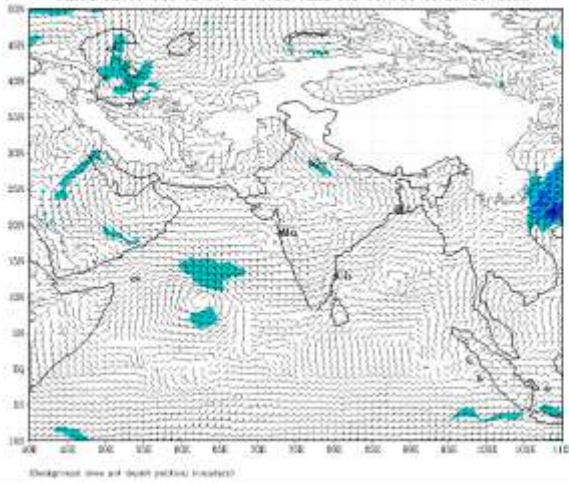
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 20-10-2023



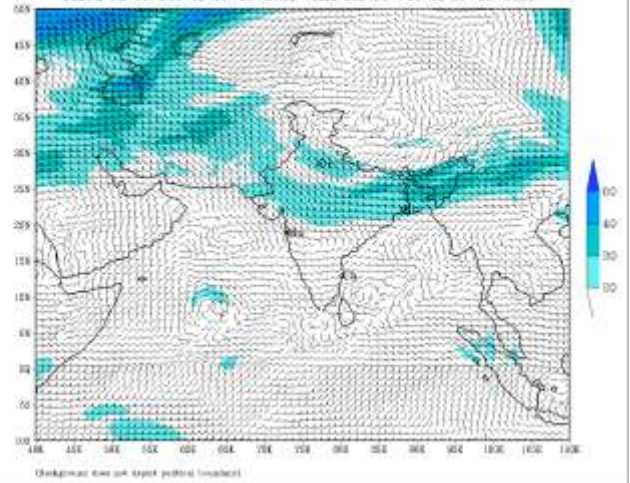
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 20-10-2023



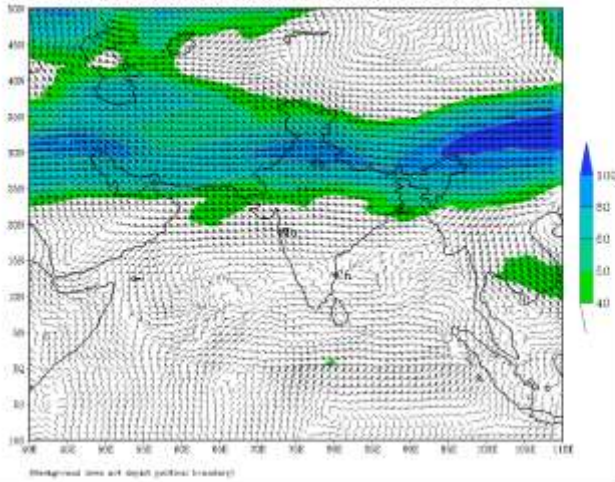
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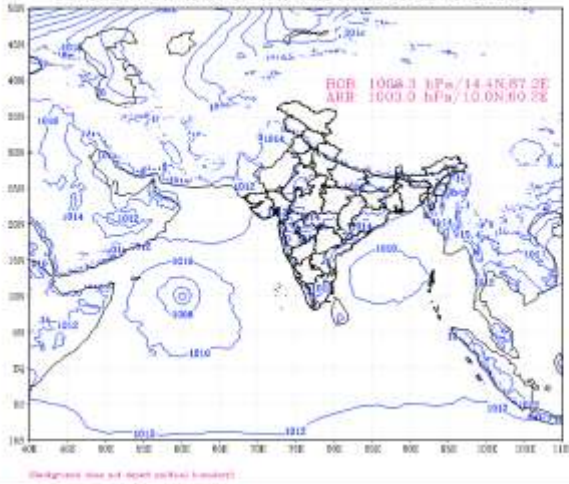
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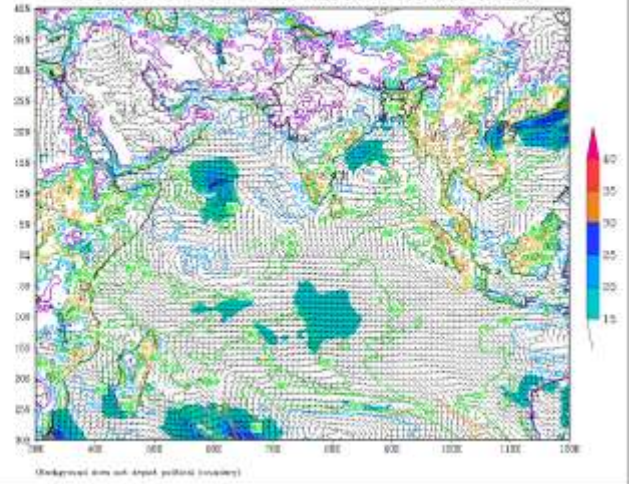
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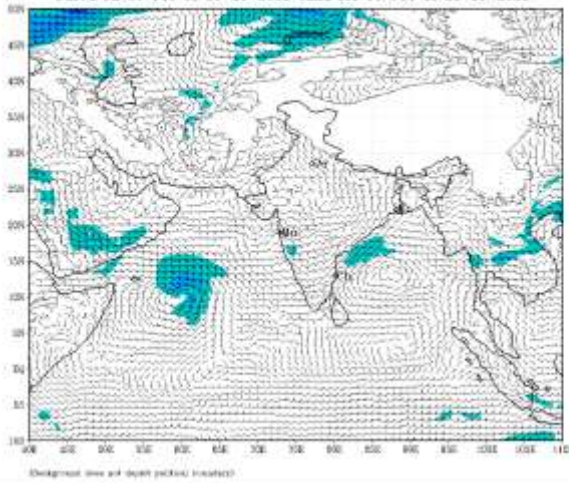
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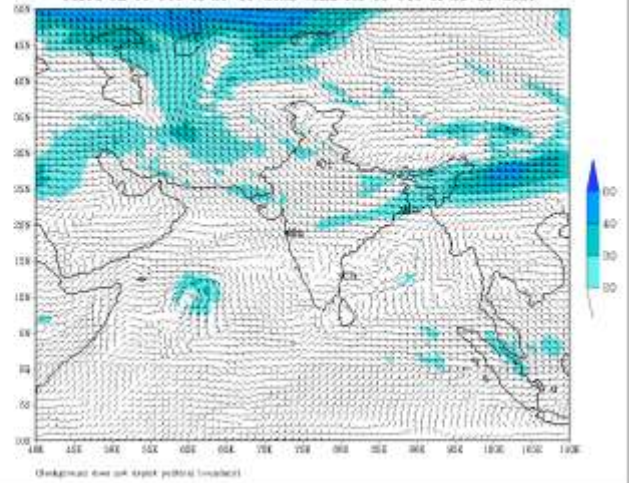
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 20-10-2023 valid for 00 UTC of 21-10-2023



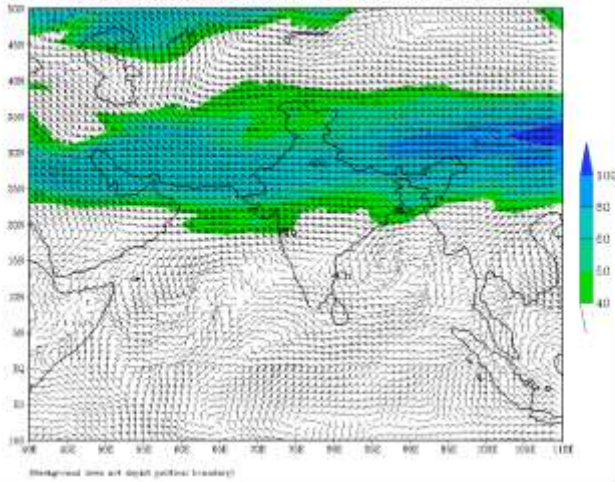
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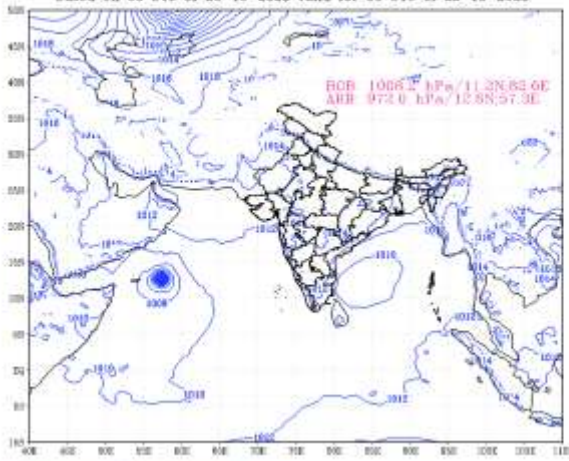
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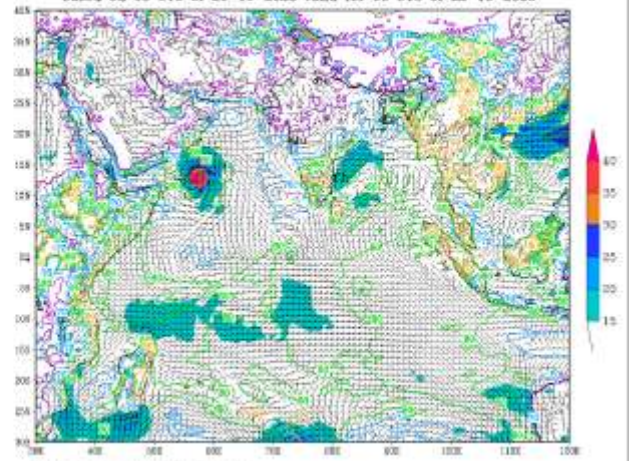


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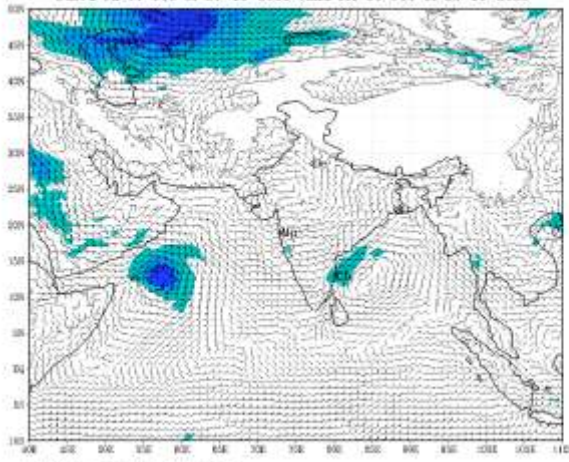
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
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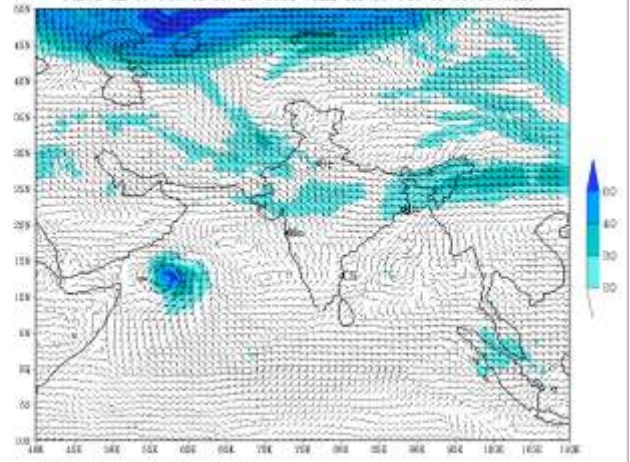
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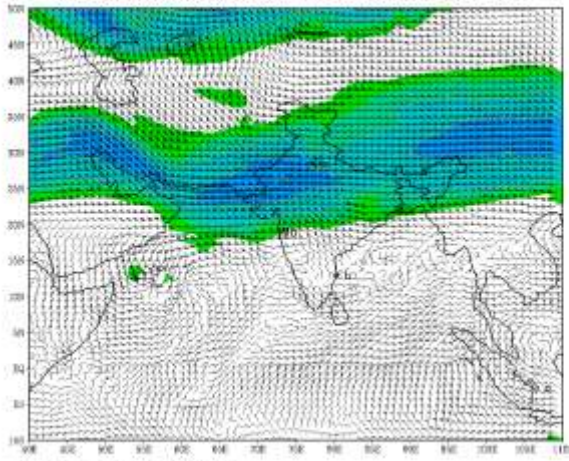
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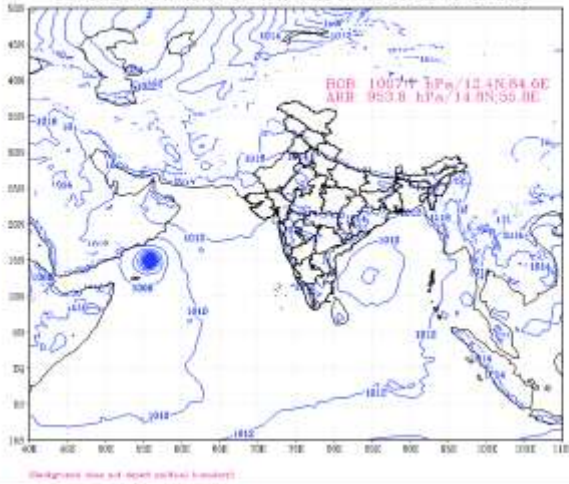
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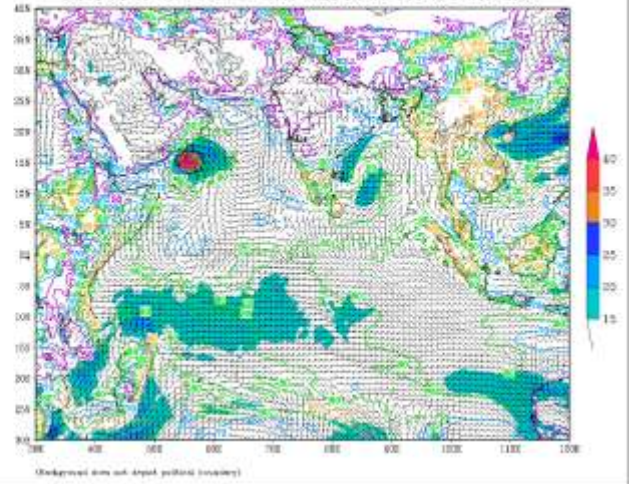


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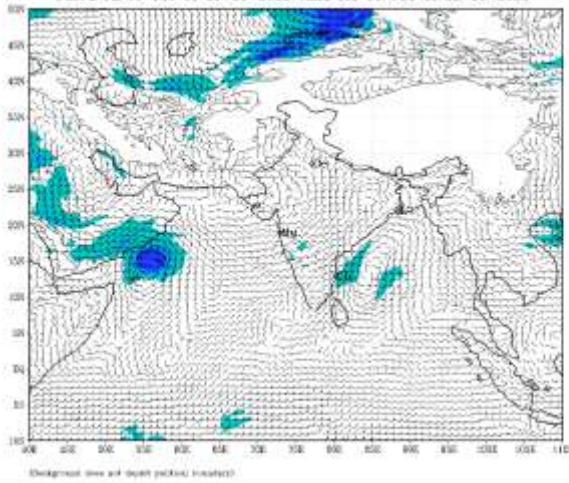
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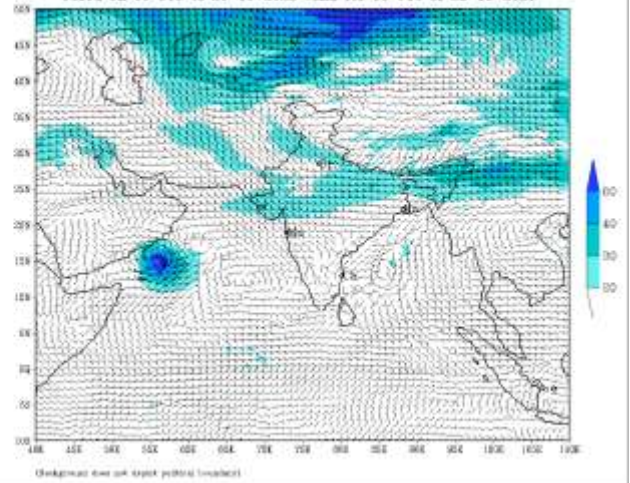
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
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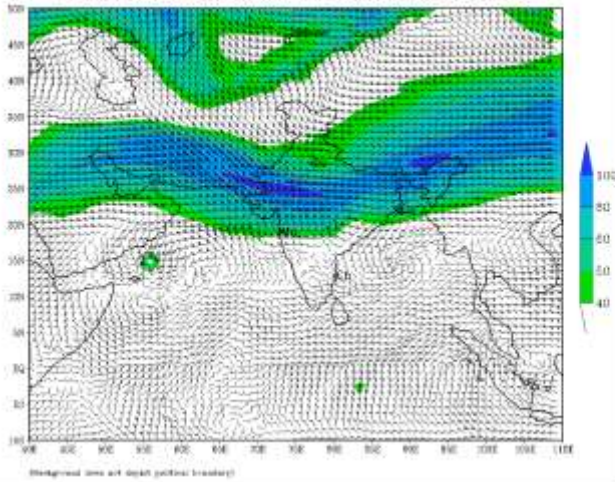
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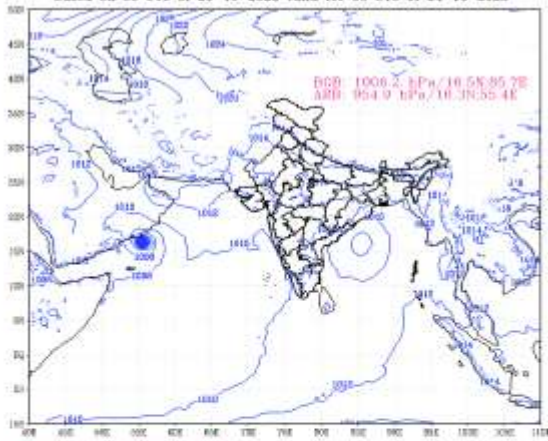
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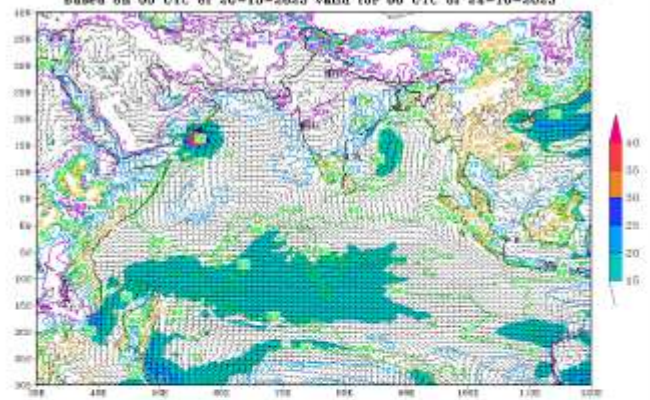


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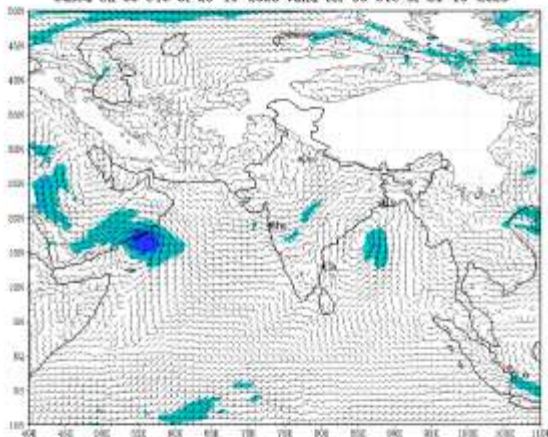
(Background over sea depicts political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 24-10-2023



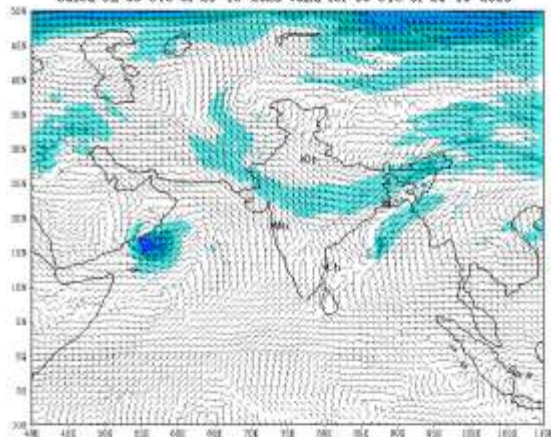
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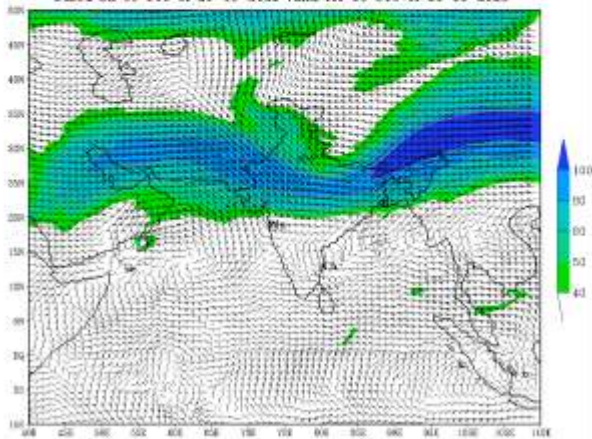
(Background over sea depicts political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 24-10-2023



(Background over sea depicts political boundary)

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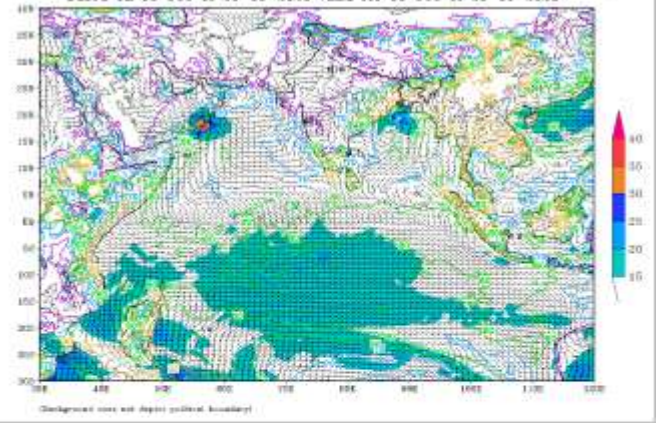
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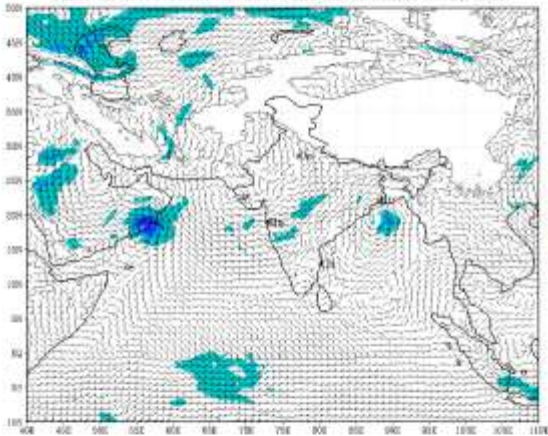
(Background over sea based on sea level)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
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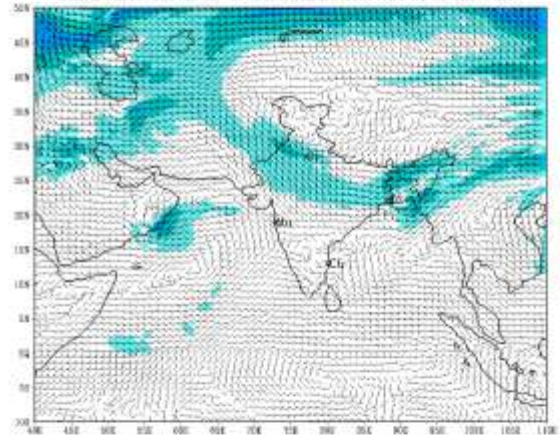
(Background over sea based on political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 25-10-2023



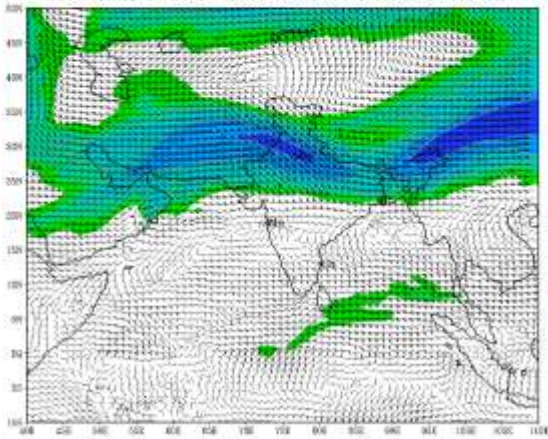
(Background over sea based on political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 25-10-2023



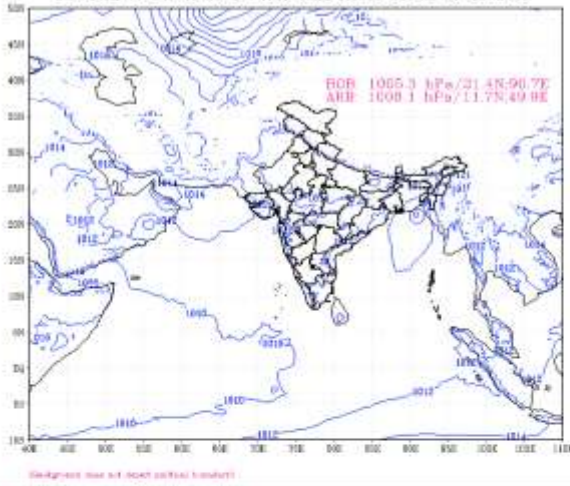
(Background over sea based on political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 25-10-2023

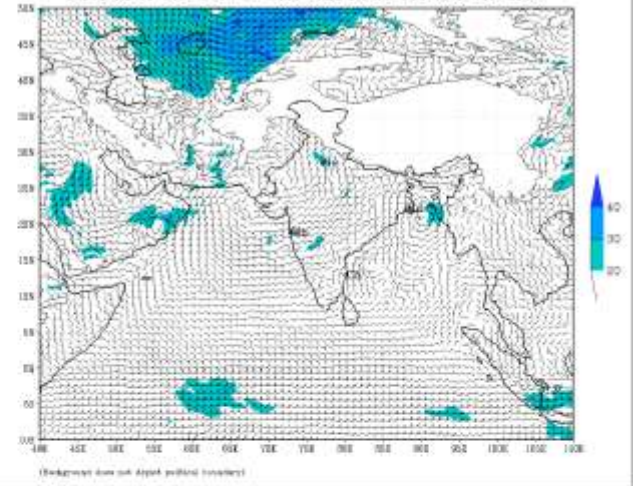


(Background over sea based on political boundary)

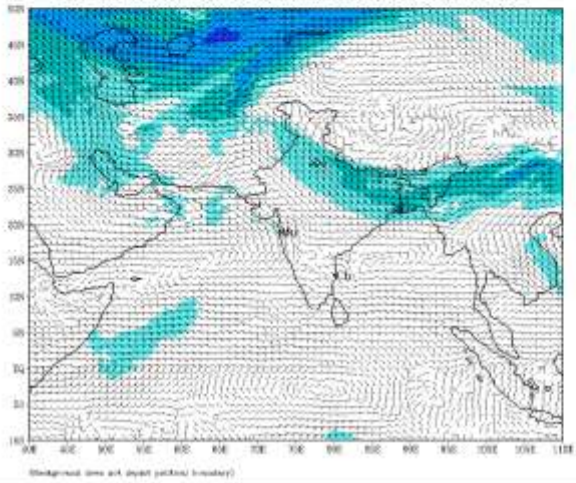
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 26-10-2023



IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 26-10-2023



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 26-10-2023



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
 based on 00 UTC of 20-10-2023 valid for 00 UTC of 26-10-2023

