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

Tropical Cyclone Forecast Programme
Report Dated 19th October, 2023

Time of Issue: 1200 UTC

Synoptic features (based on 0300 UTC analysis):

- Yesterday's cyclonic circulation over southeast Bay of Bengal in lower tropospheric levels persisted over the same region at 0830 hours IST of today, 19th October, 2023. It is likely to move northwestwards and under its influence a low pressure area is likely to form over central parts of Bay of Bengal by 21st morning. Thereafter, it is likely to intensify further into a depression over westcentral Bay of Bengal around 23rd October.
- Yesterday's Low Pressure Area over Southeast & adjoining Eastcentral Arabian Sea moved nearly westwards and lay over Southeast & adjoining southwest Arabian Sea at 0830 hours IST of today, the 19th October, 2023.
  It is likely to move nearly west-northwestwards and become Well Marked Low Pressure Area over southwest Arabian Sea during next 24 hours and intensify into a Depression over southwest & adjoining westcentral Arabian Sea around 21st October.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	28-30°C over entire BoB.	28-30°C over entire AS. 30-31°C surrounding the LPA and some parts of southwest and westcentral AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	100-120 over eastcentral BoB. 60-80 over most parts of BOB. Less than 30 along Andhra Pradesh and Tamil Nadu coasts, adjoining sea areas, over Gulf of Mannar	50-80 over southeast and adjoining eastcentral AS, adjoining southwest AS.. Less than 30 along the west coast of India and most parts of AS.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	Positive vorticity of 50-60 over central parts of south BOB with vertical extension upto 700 hpa levels.	Positive vorticity of 60-70 around the system with vertical extension upto 500 hPa, and 50-60 over most parts of south and central AS.
Low Level convergence (X10^{-5} s^{-1})	5-10 over southwest BOB and adjoining Equatorial Indian Ocean (EIO).	10 around the system and over southeast & adjoining Lakshadweep area. 5 over the

		southwest and adjoining westcentral AS.
Upper Level divergence ($X10^{-5}$ s^{-1})	10-20 over southwest BOB, 05-10 over southeast and adjoining Andaman Sea.	20 around the system and central parts of AS. 10 over the westcentral and adjoining southwest AS, off Kerala coast.
Vertical Wind Shear (VWS knots)	High (30-40) over southwest, adjoining southeast BoB and North BoB. Moderate (10-15) over central BoB.	5 over the system and high (20-25) for the rest of AS.
Wind Shear Tendency (knots)	Decreasing tendency over central parts of BoB. Increasing tendency over most parts of BoB.	Decreasing tendency over southeast & adjoining southwest AS & parts of eastcentral AS. Increasing tendency over southwest and westcentral AS.
Upper tropospheric Ridge		Along 22.0°N/65°E over AS

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the BoB & Andaman Sea:-

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

(b) Over the Arabian Sea:-

At 0300 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection lay over central and adjoining south Arabian Sea, Lakshadweep islands area. Scattered low and medium clouds with embedded 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 Sri Lanka, gulf of Mannar, Maldives, Tibet, China, Yellow Sea, East China Sea, South Myanmar, Thailand, Gulf of Thailand, Cambodia, Laos, Vietnam, Gulf of Tonkin, Hainan, Sumatra, Strait of Malacca, Malaysia, Borneo, South China Sea, Java Sea, Celebes Islands & Sea Philippines, Sulu Sea, South Madagascar, South Mozambique Channel and over Indian ocean between latitude 5.0N & 10.0S longitude 47.0E & 100.0E.

M.J.O. Index:

MJO index is in Phase 1 with amplitude less than 1. It will continue in same phase during next 2 days with amplitude decreasing trend in amplitude. It will move to phase 8 from 22nd onwards.

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	LPA over southwest BOB adjoining southeast BOB (10N/86E) on 19th. extended low over westcentral and	LPA over southwest and AS (9.5N/61.8E) on 19th. WML/D over southwest AS adjoining westcentral AS

	adjoining eastcentral BOB (14N/85E) on 20th, extended low over wstcentral and adjoining southwest BoB on 21st till 23rd, WML over westcentral BoB (15N/85E). Intensifies into Depression over westcentral BOB (19N/85.5E) along the coast of south Odisha on 25th. WML over central parts of north BoB (20.5N/87E) along the coast of north Odisha on 27th. System weakens to LPA further.	(10.5N/59.5E) on 20th System intensifies to DD/CS over westcentral adjoining southwest AS (12N/57E) on 21st Intensification to Cyclonic Storm over westcentral AS (13.5N/54E) on 22nd . System weakens into DD over westcentral AS along the coast of Yemen (17.5N/53.5E) on 24th. Crosses Yemen as LPA (18.5N/53E) on 25th.
IMD-GEFS	LPA over central parts of BoB BoB (14N/89E) on 20th, LPA over same region (14N/88E) on 21st, becomes WML over westcentral BoB (14N/84E) on 22nd, intensifies into D over westcentral BoB off Andhra Pradesh coast (15N/84E) on 23rd, lay over westcentral & adjoining northwest BoB (19N/85E) on 24th. It weakens as LPA over north BoB (22N/88E) thereafter.	WML over SW AS (10N/62E) on 19th, D over same region (11N/60E) on 20th. Further intensify into CS over westcentral AS on 21st. SCS over westcentral AS (14N/54E) on 22nd. To reach Oman coast (16N/55E) on 24th with reduced intensity.
IMD-WRF	LPA over westcentral adjoining southeast BOB (13N/87.5E) on 19th, extended low over westcentral adjoining eastcentral BOB (14N/87.5E) on 20th, depression over the same region on 21st.	LPA over southwest AS (11N/63E) on 19th. WML over southwest AS (10N/57.5E) on 21st. Intensifies into depression southwest adjoining westcentral AS (11N/54E) on 22nd.
NCMRWF-NCUM	Cycir over southwest BoB adjoining southeast BoB (11N/86E) on 19th. LPA over westcentral adjoining south BoB (13.5N/86.5E) on 21st. WML/D over westcentral BoB (15N/87E) on 22nd. Intensifies into Depression over westcentral BoB (17.8N/87.5E) on 23rd. Further intensification to DD over northwest BoB (19N/90E) on 24th. Gradually weakens into depression over northwest BoB (19.5N/90.5E), LPA over northwest BoB off Bangladesh coast (21N/92E) on 28th	LPA over southwest AS adjoining southeast AS (10N/62.5E) on 19th. LPA over southwest AS (11N/62E) on 20th. WML over westcentral AS adjoining southwest AS (12.7N/59E) on 21st. Intensifies into DD over westcentral AS (13N/51E) on 23rd. System gradually weakens into LPA over westcentral AS (14N/49E) on 26th October.
NCMRWF-NEPS	LPA over southeast BoB (13N/88E) on 21st, becomes WML over westcentral BoB (14N/86E) on 22nd. Intensify into D over same region (15N/88E) on 23rd. Further intensification into DD in the evening of the same day (17N/88E). Further intensification into CS on 24th over westcentral adjoining northwest BoB.	LPA over southwest AS (10N/61E) on 19th, intensifies into D over southwest and adjoining westcentral AS (12N/58E) on 21st, over westcentral AS (14N/54E) on 22nd. Further intensifies into DD over same region (14N/52E) on 23rd. Further intensification into CS over same region (14N/52E) in the evening of 23rd. Starts weakening on 24th over same region (14N/52E).
NCMRWF-UM (Regional)	Cycir over southeast BOB adjoining southwest BOB (11N/87.5E) on 19th. WML over central parts of BoB on 21st.	Cycir over southwest AS (10N/62.5E) on 19th. WML over southwest AS (10N/63.5E) on 20th.
ECMWF	LPA over westcentral BoB (13.7N/85.5E) on 21st. Becomes WML over same region (14.5N/85.6E) on 22nd. Remains WML over same region on 23rd. To intensify into D over same region (16.6N/84.6E) on 23rd	LPA over southwest AS (10.2N/61.8E) on 19th, WML over southwest AS (9.7N/61.1E) over same region on 20th. Remains WML over westcentral AS on 21st. Intensifies into D over westcentral

	/1800 UTC. To intensify into DD over same region (18N/84.6E) on 24th/1800UTC.	AS (12.6N/56.2E) in evening of 21st/1800UTC. Further intensifies into DD over same region (13N/55E) on 22nd. Further intensification into CS over same region (13.2N/54.4E) on 22nd/0600UTC. Starts moving towards Yemen (14N/52.7E) on 22nd /1800UTC. To cross Yemen and weaken over the same region (15.6N/51.2E) on 23rd.
NCEP-GFS	LPA on 20th over central BoB (12.9N/88.5E), becomes WML over westcentral BoB (13.6N/87.0E) on 22nd. To intensify as D over westcentral BoB (16.5N/88.2E) on 23rd /1800 UTC. To move northwestwards remaining D over northwest BoB (19.1N/88.7E) on 25th/0000 UTC. To intensify into DD over northwest and adjoining northeast BoB (19.1N/89.5E). To weaken as LPA over northeast BoB of Myanmar coast (20.2N/92.0E) on 26th/0600 UTC.	LPA over southwest AS (10.7N/64.3E) on 19th. Becomes WML over same region (10N/63E) on 20th /0600 UTC. To intensify into D over same region (9.8N/62.7E) on 20th /1200UTC. To further intensify into DD over southwest and adjoining westcentral AS (10.4N/62.2E) on 20th/1800UTC. To further intensify into CS over same region (10.5N/62.3E) on 21st /0000UTCfurther intensification till 23rd /0000 UTC. To move towards northeastward skirting over Oman coast on 24th /0600UTC then recurves towards Pakistan on 25th /1800. To cross Pakistan on 26th /0600UTC and weaken further.
IMD-Genesis Potential Parameter	A Potential zone for cyclogenesis over central parts of BoB on 19th and westcentral BoB from 20th-23rd, over northwest and adjoining westcentral BoB on 24th.	A potential zone for cyclogenesis over southwest AS on 19th & 20th, westcentral and adjoining southwest AS on 21st and westcentral AS on 22nd, 23rd and 24th.

Summary and conclusion:

1. **For the Bay of Bengal**:

Over the Bay of Bengal, all the models including IMD GFS, GEFS, IMD WRF, NCUM(G), NEPS, ECMWF and NCEP GFS are indicating formation of a low pressure area over central parts of BoB by 21st October. Most of the models except GEFS are indicating further intensification of the system into a depression. Most of the models (except IMD GFS) are indicating likely northwestwards movement initially towards North Andhra Pradesh-Odisha coasts and then gradual northeastwards recurvature towards South Bangladesh-Myanmar coasts. Further intensification of this system is not indicating by various models.

Hence, it is inferred that there is high probability of formation of low pressure area over central parts of Bay of Bengal by 21st morning. Thereafter, it is likely to intensify further into a depression over westcentral Bay of Bengal around 23rd October.

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	NIL	NIL	Low	Moderate	HIGH	-

2. For the Arabian Sea:

Over the Arabian Sea, all the models (IMD GFS, IMD GEFS, NUM (G), NCUM (R), NEPS, ECMWF, NCEP GFS, IMD MME) are indicating formation of depression over southwest and adjoining westcentral Arabian Sea during 21st to 23rd October with NCUM group indicating depression slightly late and other models slightly earlier. All the models are indicating movement towards Oman-Yemen coasts. Models are also indicating slight weakening prior to landfall. NCUM group of models are indicating movement towards Gulf of Aden. IMD MME is indicating movement towards Oman-Yemen coasts, peak intensity of severe cyclonic storm (50-55 kts) and weakening before landfall. GPP is also indicating potential zone for cyclogenesis on 21st over southeast AS with gradual northwestwards movement towards Oman-Yemen coasts.

Hence, it is inferred that the low-pressure area over southeast & adjoining eastcentral Arabian Sea is likely to move west-northwestwards and become well marked low pressure area over eastcentral & adjoining southeast Arabian sea during next 24-hours and intensify into a depression over central Arabian sea around 21st 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
NIL	LOW	Moderate	High	-	-	-

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

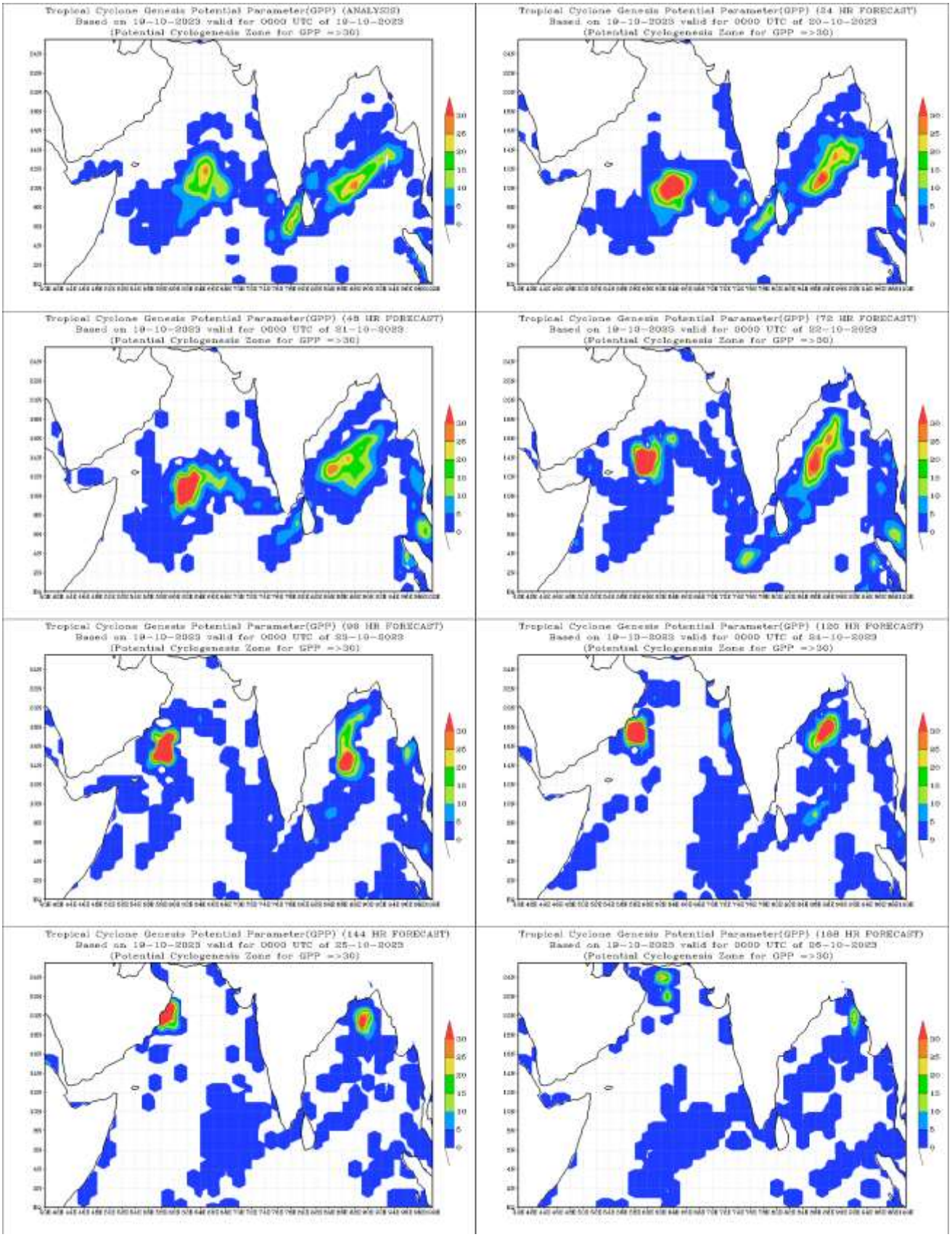
Advisory for fishermen:

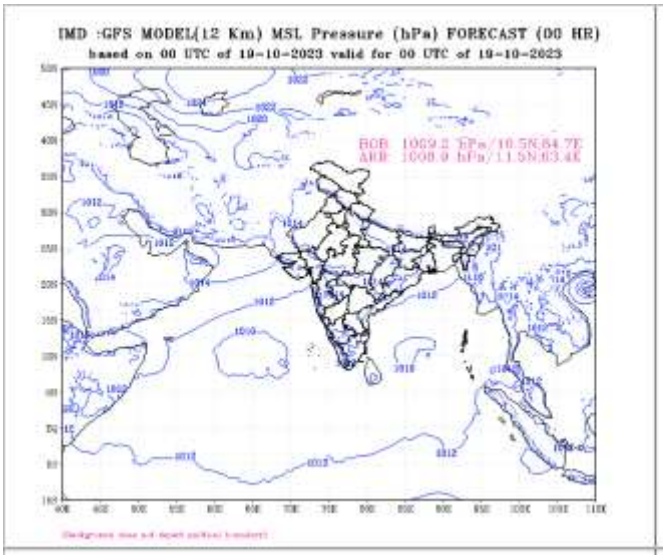
Both the cyclonic disturbances over the Arabian Sea and the Bay of Bengal are under continuous watch and being monitored regularly. Fishermen are advised not to venture into following areas (Warning Graphics are placed in Annexure):

- Eastcentral Arabian Sea & Lakshadweep Area on 19th October.
- Southeast Arabian Sea on 19th & 20th October.
- Southwest Arabian Sea from 19th to 23rd October.
- Westcentral Arabian Sea from 20th to 23rd October.
- Southwest and adjoining southeast Bay of Bengal from 20th to 23rd October.
- Westcentral Bay of Bengal from 21st October onwards.

Intense Observation Period (IOP) is suggested for Oman and Yemen coasts on 24th and 25th October.

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 19-10-2023 valid for 0000 UTC of 19-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 20-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 21-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 22-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 23-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 24-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 25-10-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 19-10-2023 valid for 0000 UTC of 26-10-2023
(Potential Cyclogenesis Zone for GPP =>30)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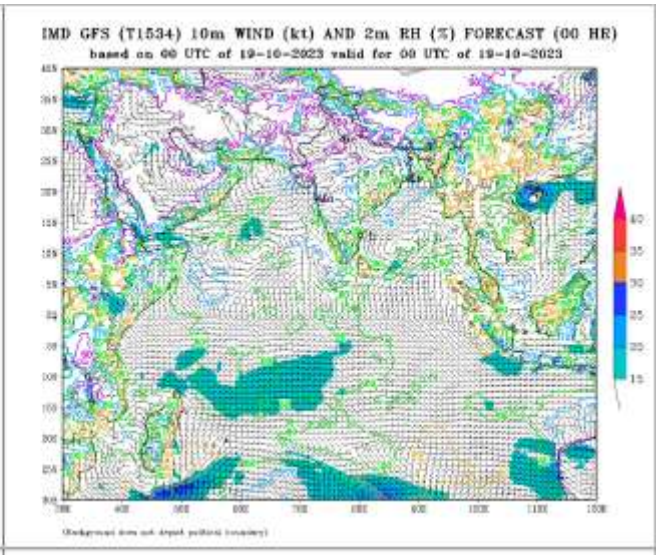
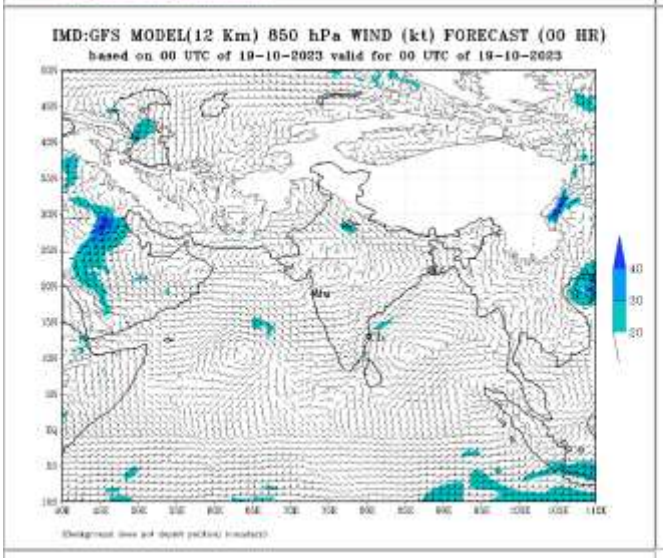
based on 00 UTC of 19-10-2023 valid for 00 UTC of 19-10-2023


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 19-10-2023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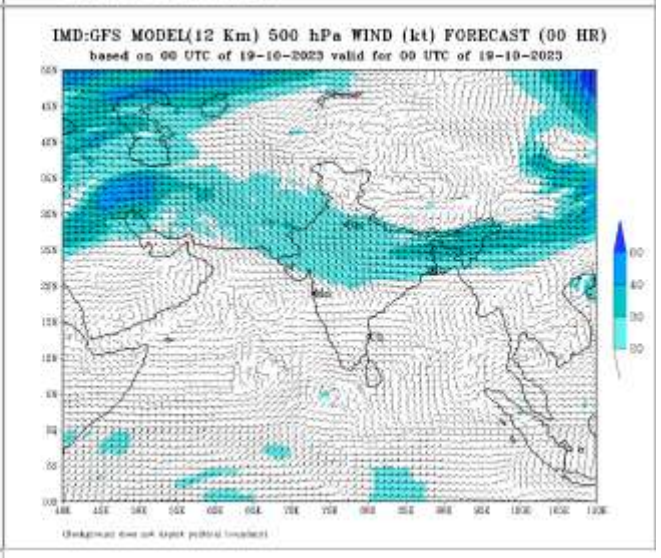
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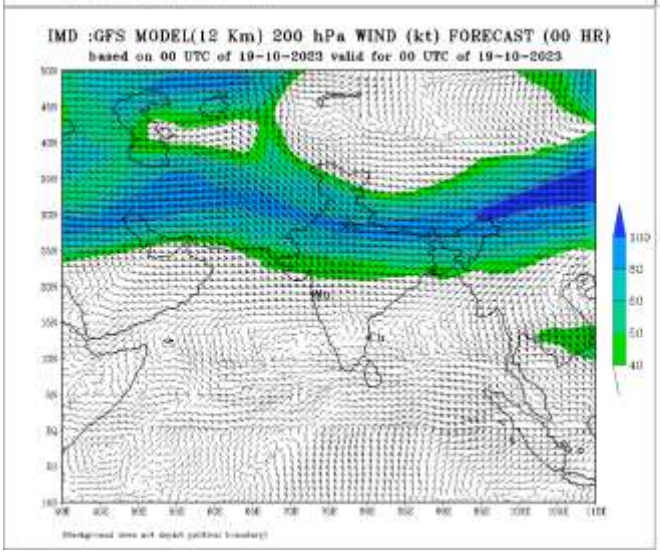
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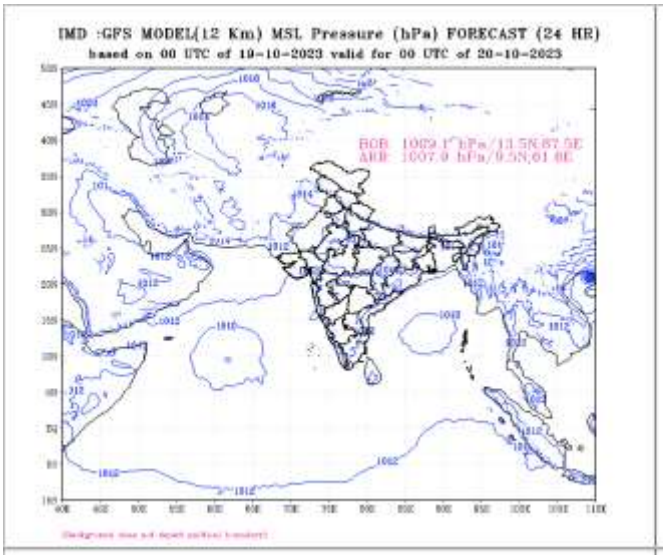
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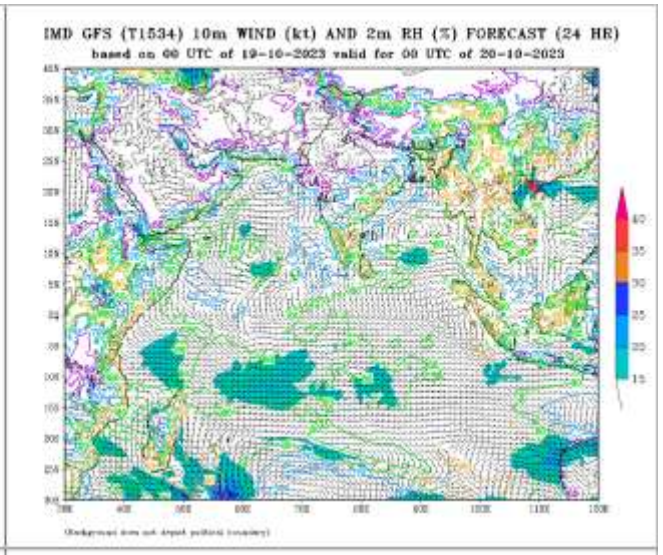
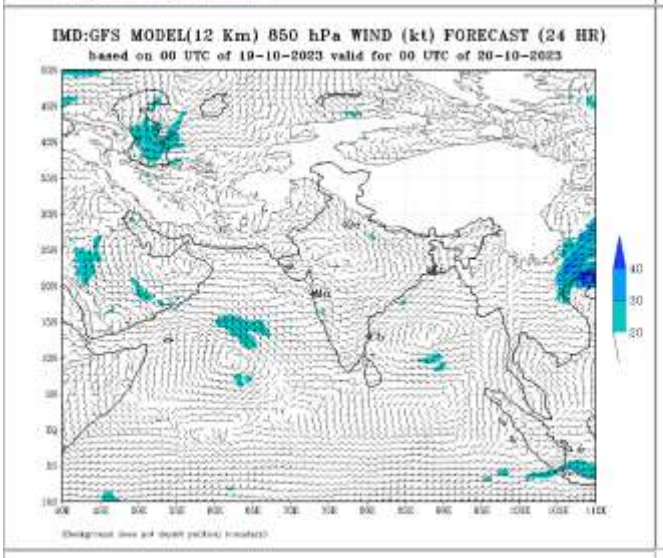

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 20-10-2023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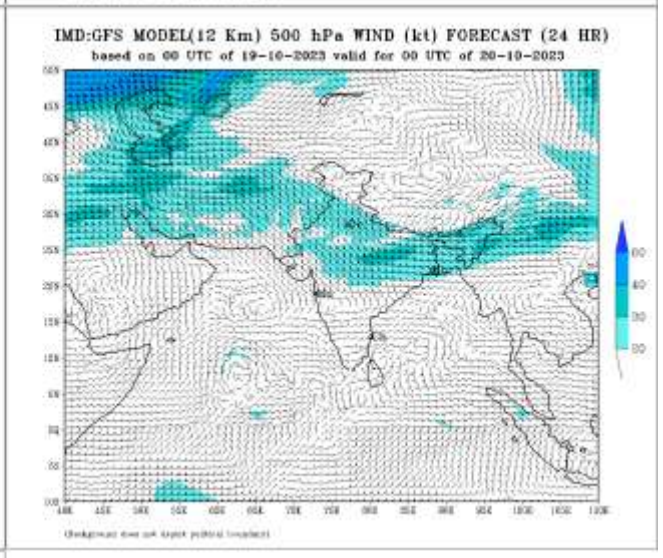
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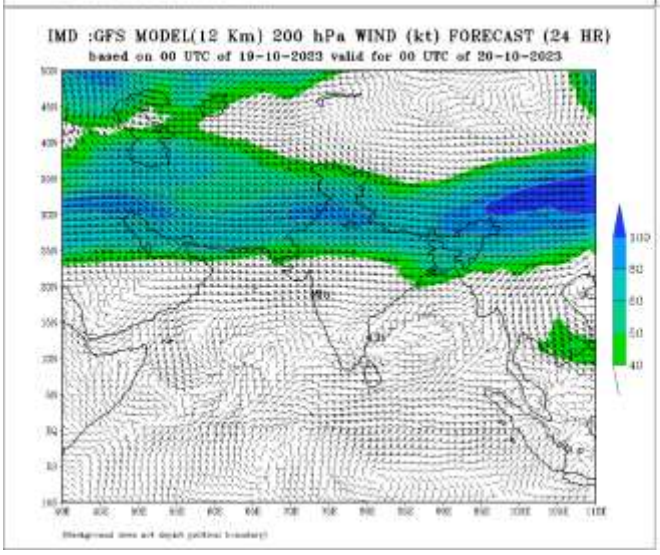
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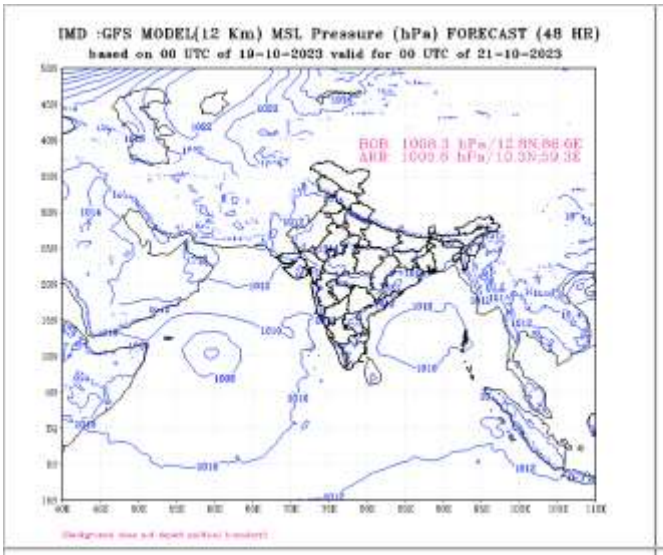
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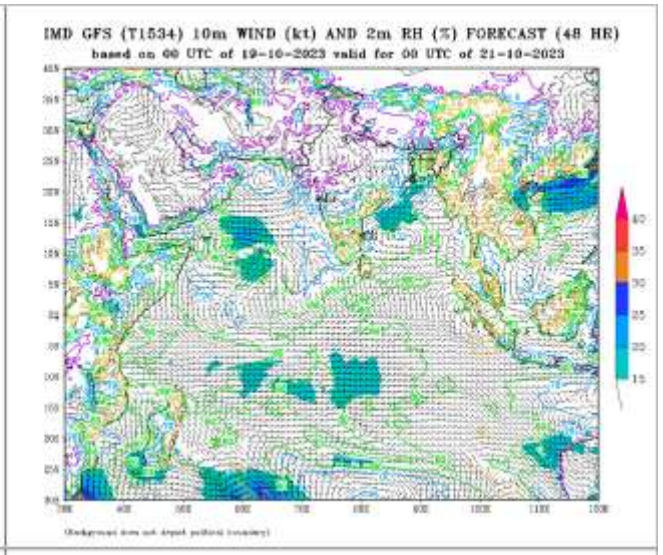
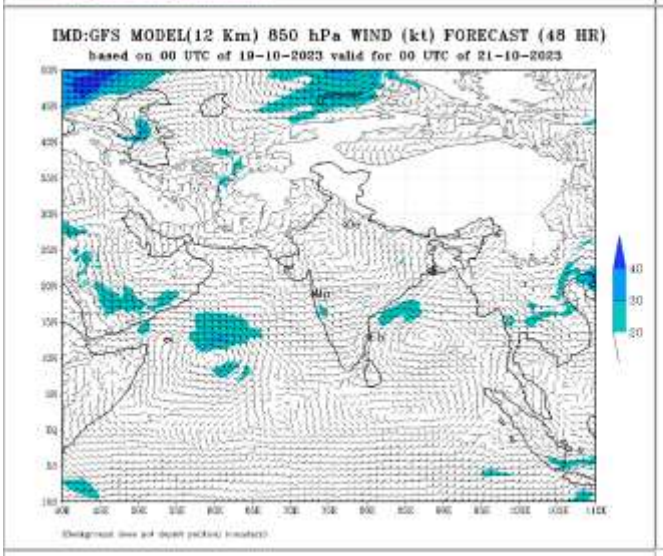

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 21-10-2023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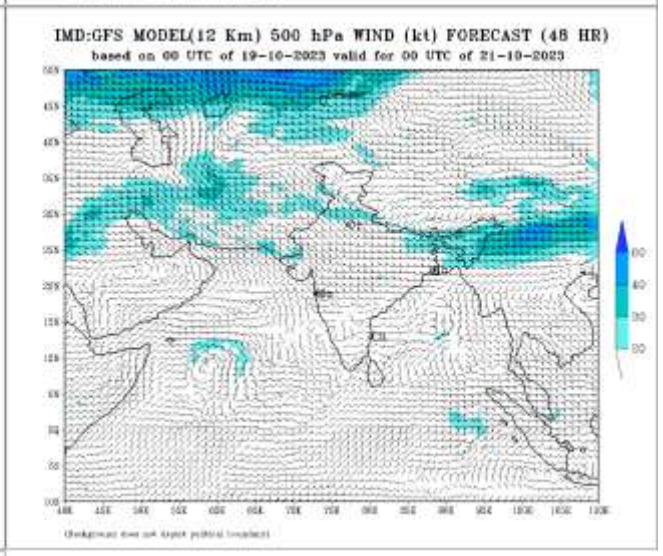
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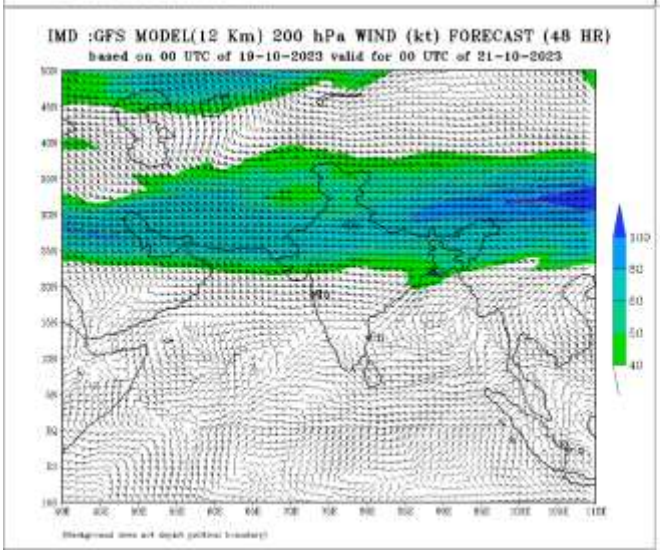
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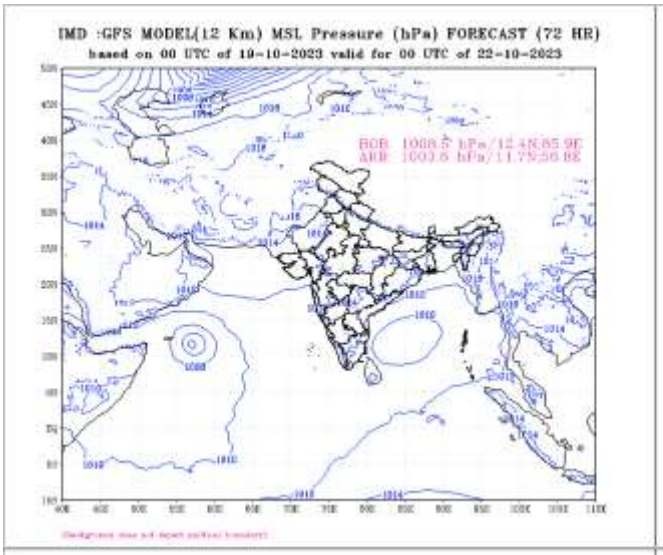
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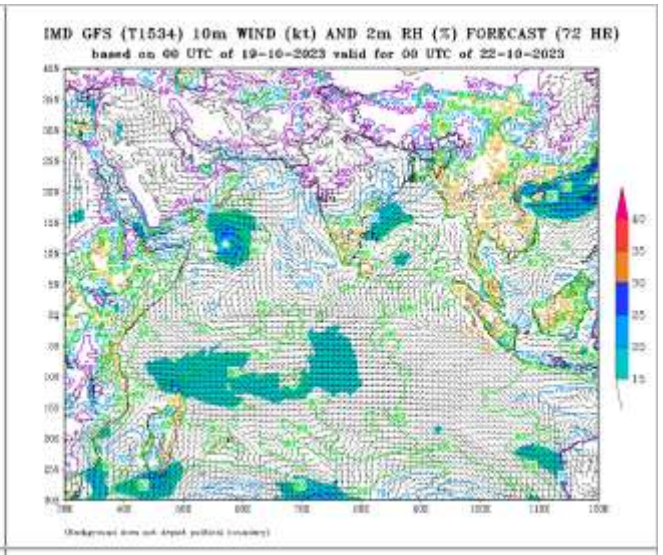
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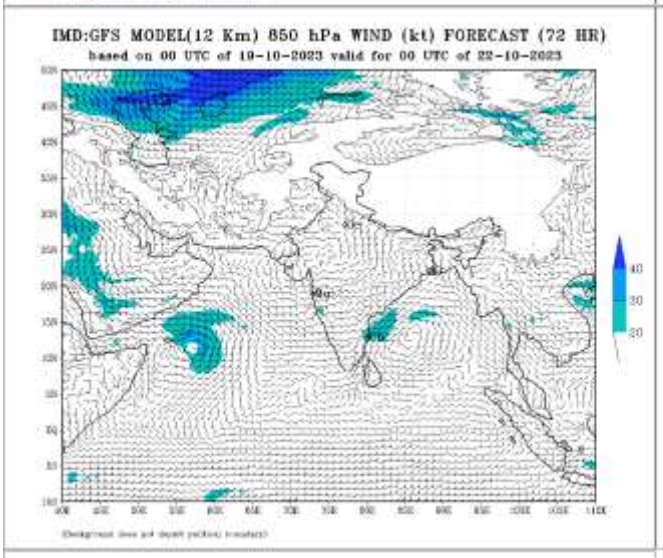
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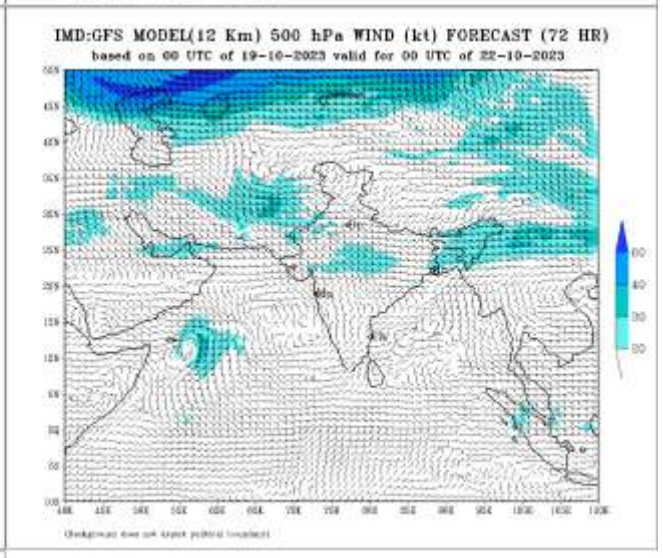
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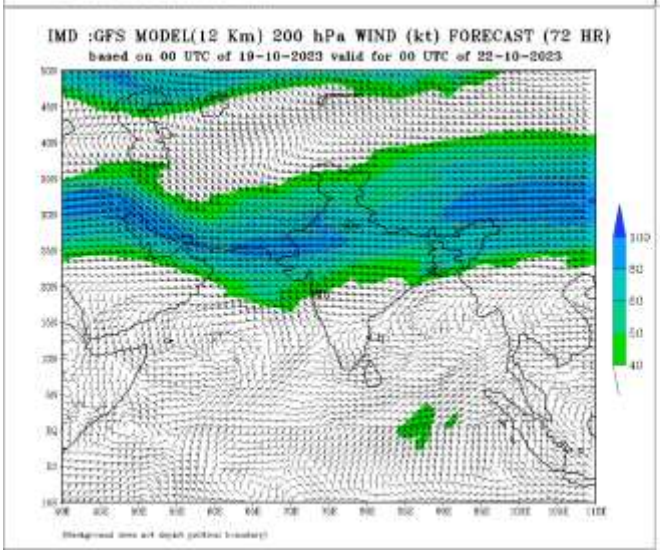
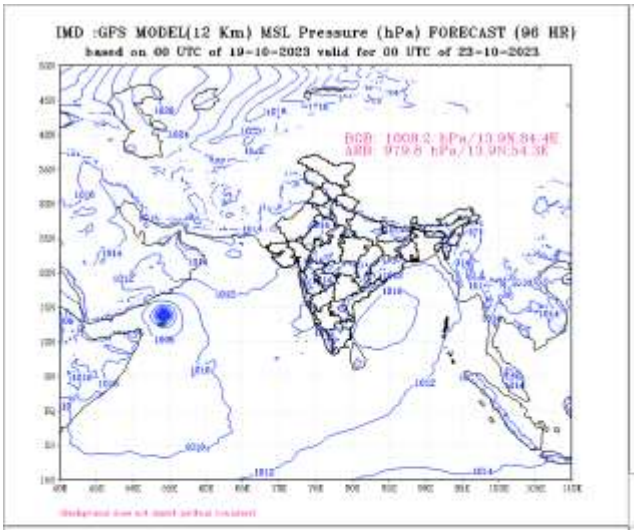
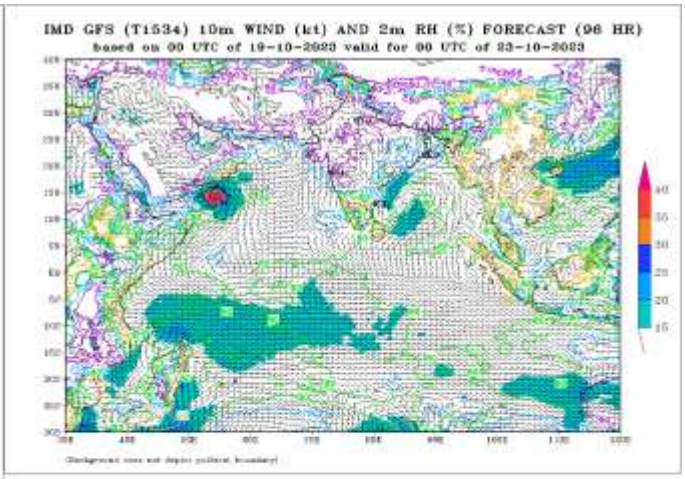
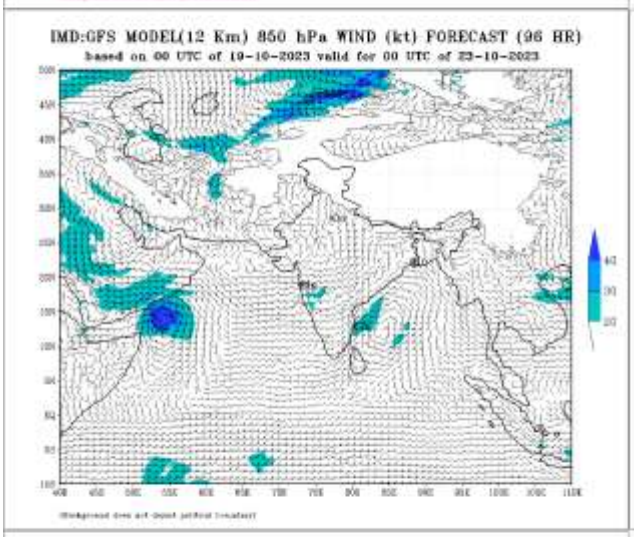
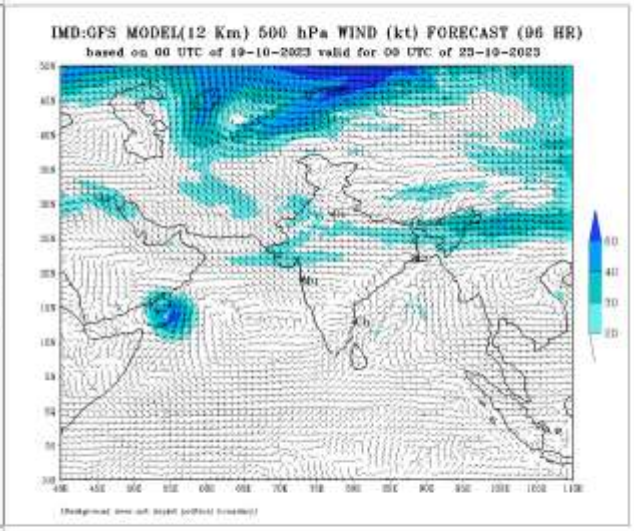
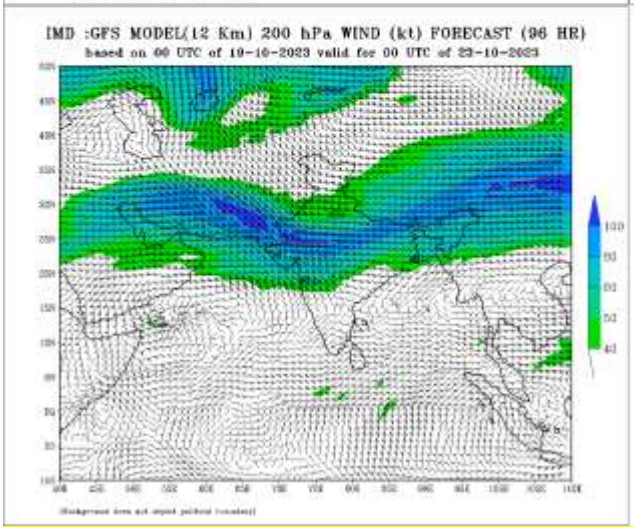

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 22-10-2023

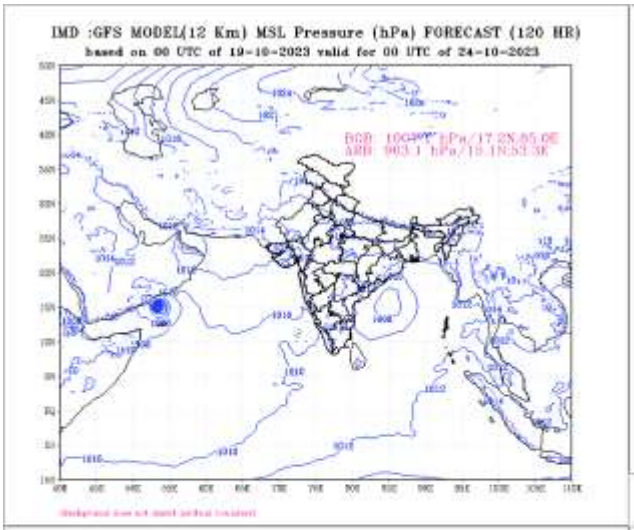

IMD :GPS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 23-10-2023

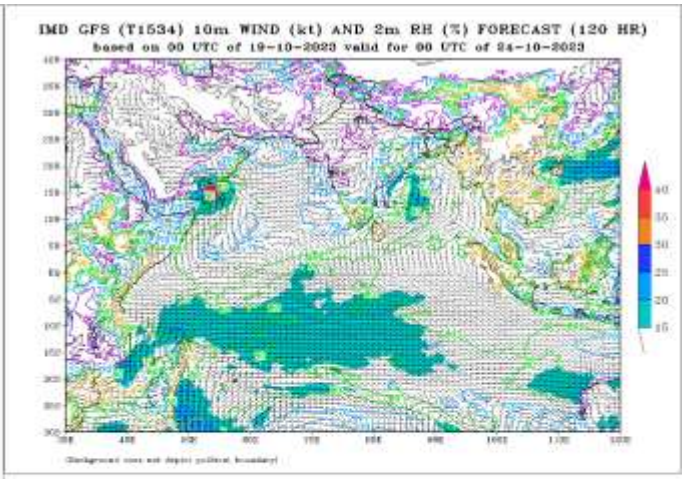

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 23-10-2023

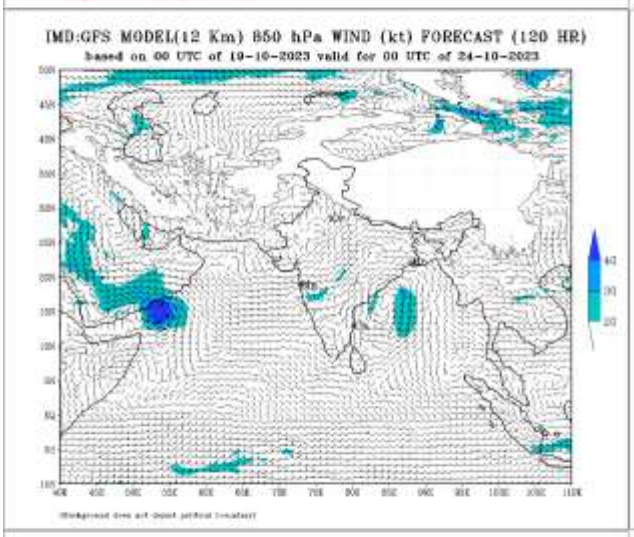

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 23-10-2023

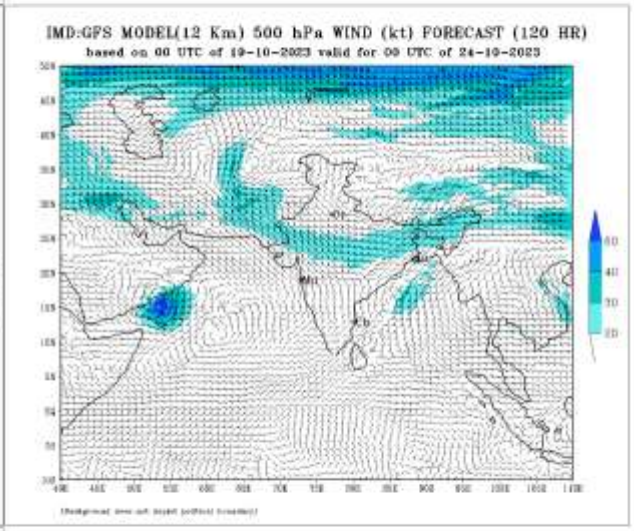

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 23-10-2023

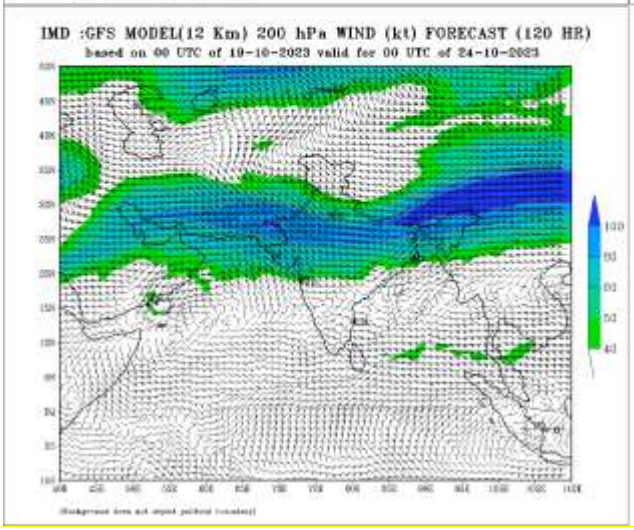

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 23-10-2023

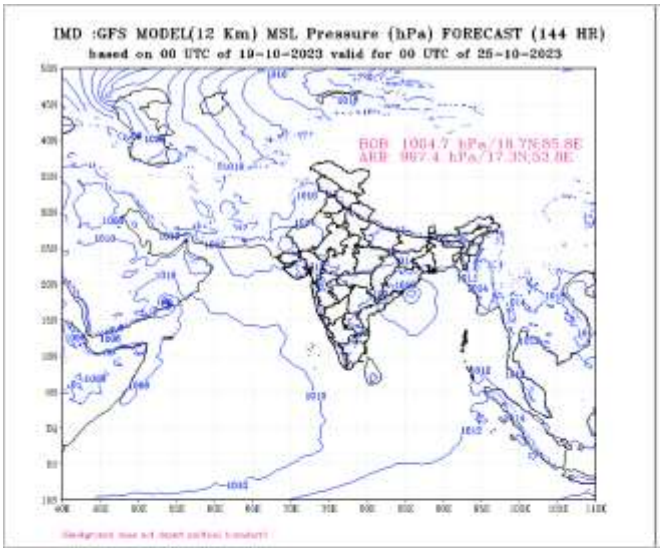

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 24-10-2023

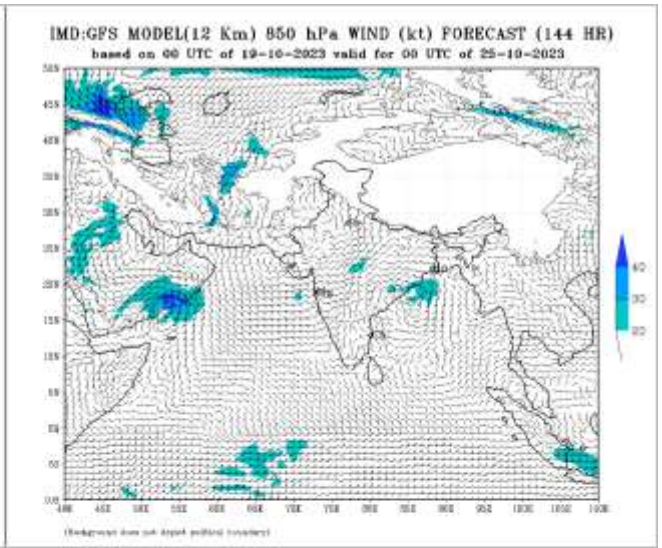

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 24-10-2023

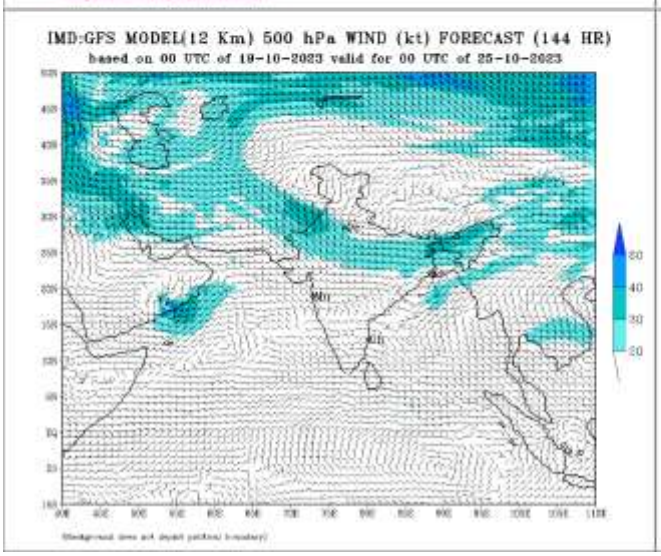

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 24-10-2023

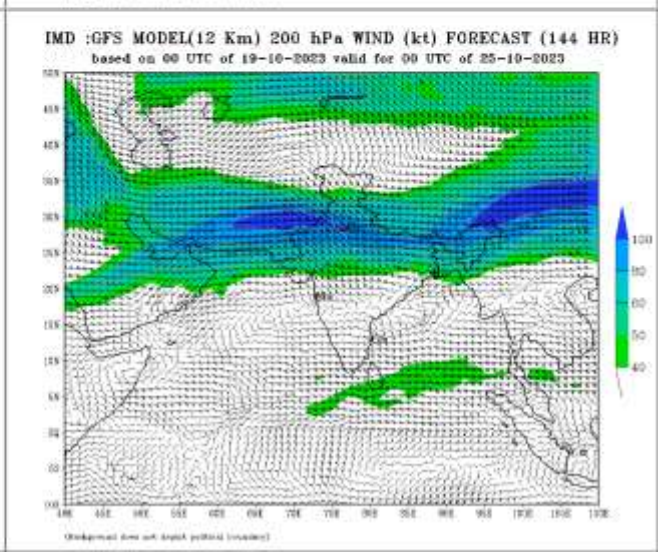

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 24-10-2023

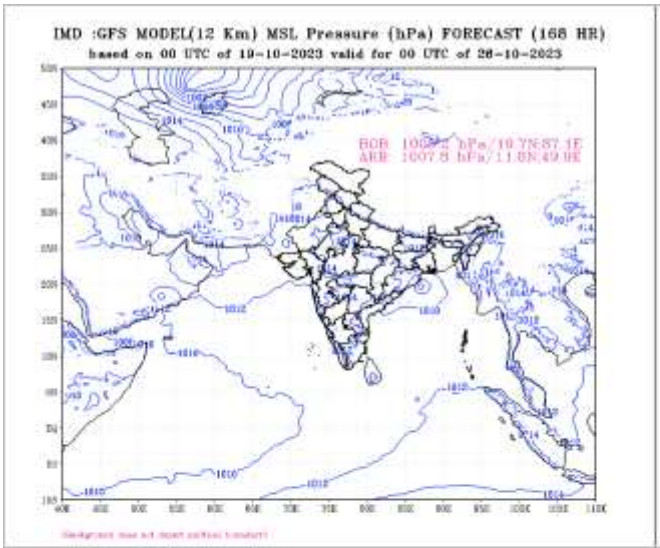

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 24-10-2023

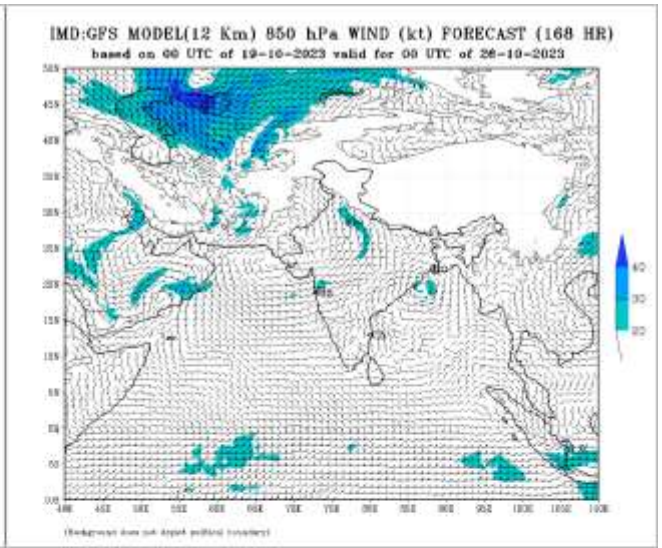

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 25-10-2023
BOB 1004.7 hPa/18.7N85.8E
ARB 987.4 hPa/17.3N53.8E

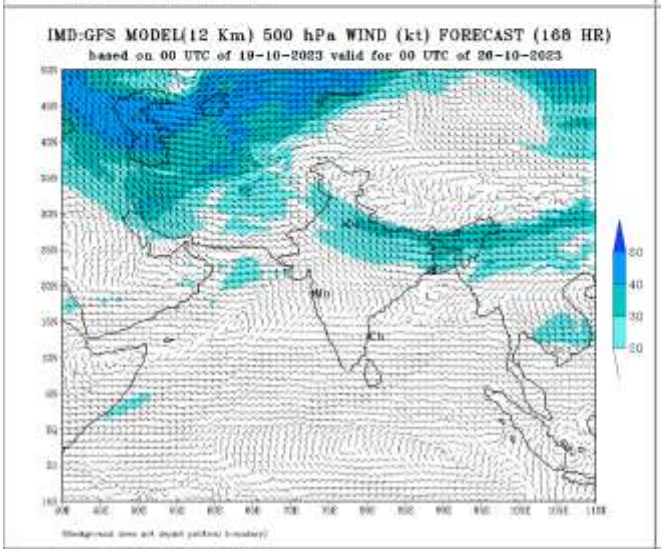

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 25-10-2023

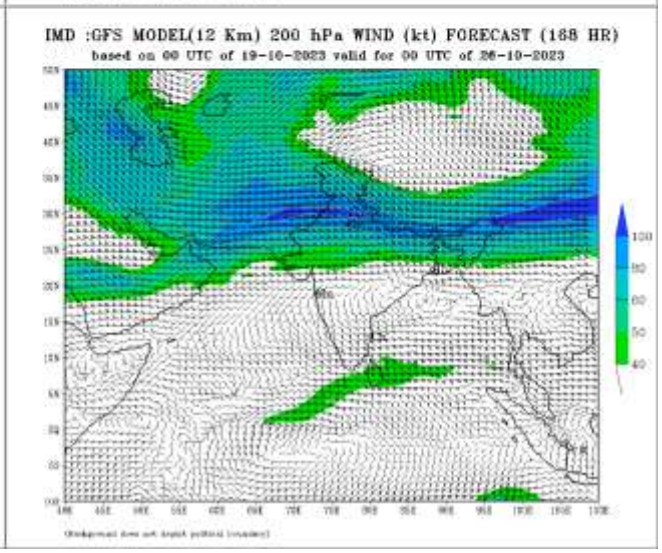

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 25-10-2023

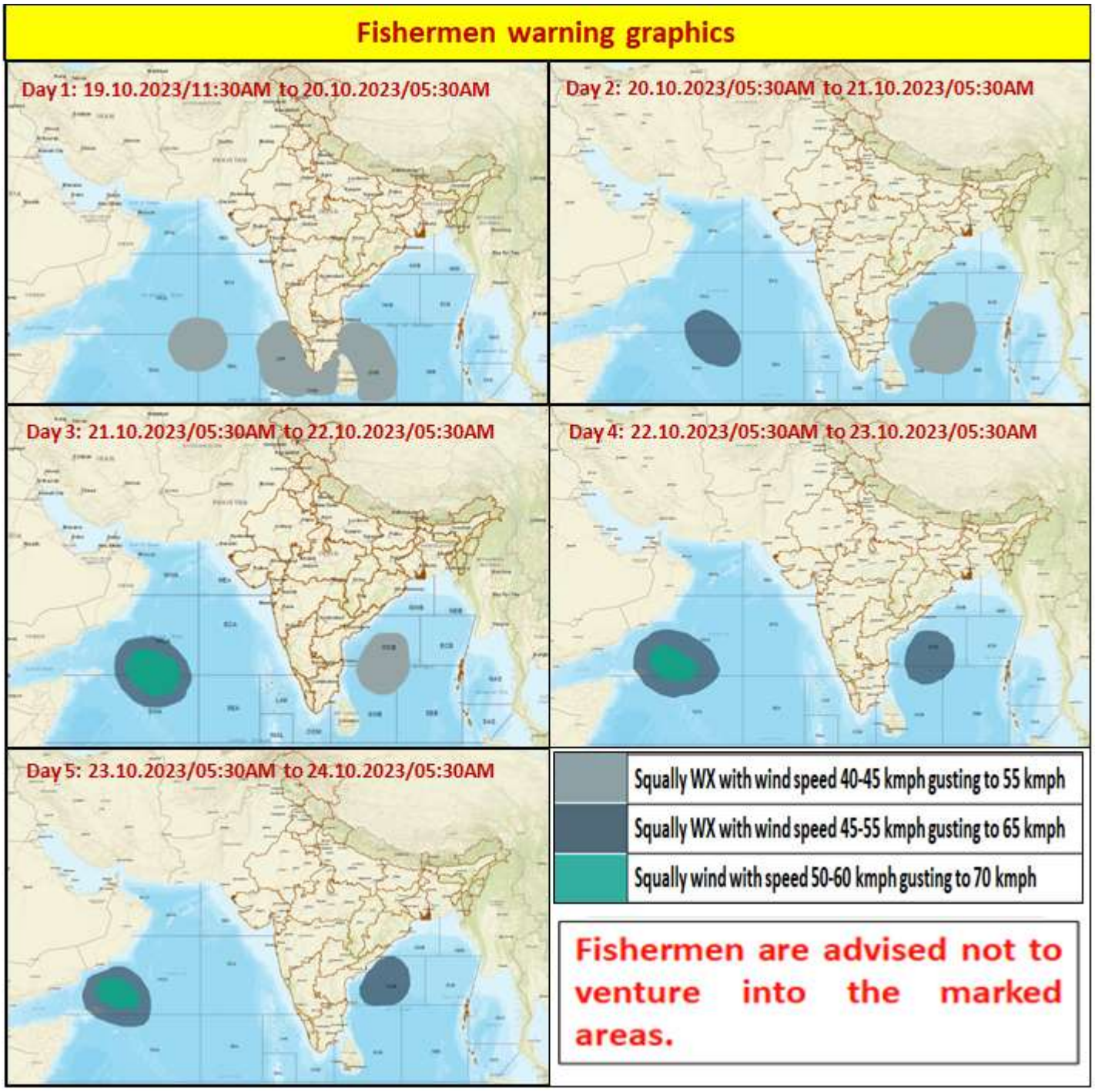

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 25-10-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 26-10-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 26-10-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 26-10-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-10-2023 valid for 00 UTC of 26-10-2023



Fishermen Warning Graphics