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

Tropical Cyclone Forecast Programme
Report Dated 20th November, 2023

Time of Issue: 1200 UTC

Synoptic features (based on 0300 UTC analysis):

- The Cyclonic Circulation over Comorin area & neighborhood persists and now extends upto 3.1 km above mean sea level.
- A trough in easterly at mean sea level runs from Sri Lanka to Southwest & adjoining Westcentral Bay of Bengal.
- A Cyclonic Circulation lies over Southwest Bay of Bengal off Tamil Nadu coast and extends upto 3.1 km above mean sea level.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	Around 28 over most parts of BoB, 29-30 over few parts of south BoB.	Around 27 over north, west central and southwest AS, 29-30 over southeast, adjoining southwest and eastcentral AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	100-110 over parts of south and adjoining central BoB, 70-80 over north Andaman Sea.	100-110 over parts of south and adjoining eastcentral AS, around 100 over southwest AS.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	Around 40-50 over southwest and adjoining westcentral BoB and Comorin Area. 30-40 over southeast BoB.	10-20 over major parts of AS.
Low Level convergence (X10^{-5} s^{-1})	5-15 over southwest adjoining westcentral BoB. -5 over Comorin area. 5 over coast of Myanmar.	5-10 over southwest AS adjoining west EIO. -10 to -15 over along and off Yemen coast. -5 over parts of south and central AS.
Upper Level divergence (X10^{-5} s^{-1})	10-30 over southwest and westcentral BoB. 5-10 over southeast BoB.	5 over parts of southeast AS, 5-10 over parts of southwest AS, -10 over north AS.
Vertical Wind Shear (VWS knots) **Low: 05-10 knots** **Moderate: 10-20 knots**	5-15 over south and adjoining central BoB, 5 over Andaman Sea, 20 over parts of central BoB, High (> 20 knots) over remaining	5-10 over the south and adjoining central AS, 20 over southern parts of central AS, High (>20 knots) over the central AS and North AS.

High: >20 knots	parts of BoB.	
Wind Shear Tendency (knots)	Increasing over southwest BoB, decreasing over most parts of BoB.	Decreasing over most parts of AS, increasing over southwest AS.
Upper Tropospheric Ridge	Along 14^{o}N over BoB.	Along 12^{0}N over AS.

Satellite observations based on INSAT imagery (0300 UTC):

(a) Over the Bay of Bengal & Andaman Sea:-
Scattered to broken low and medium clouds with embedded intense to very intense convection lay over westcentral & south Bay of Bengal. Scattered low and medium clouds with embedded moderate to intense convection lay over North Bay of Bengal and south Andaman Sea. Scattered low and medium clouds with embedded isolated weak to moderate convection lay over eastcentral Bay of Bengal.

(b) Over the Arabian Sea:-
Scattered low and medium clouds with embedded moderate to intense convection lay over south Arabian Sea, Comorin area and weak to moderate convection lay over eastcentral Arabian Sea Lakshadweep islands 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, Maldives, Gulf of Thailand, Cambodia, South Vietnam, Sumatra adjoining west coast, Strait of Malacca, Malaysia, Borneo, South China Sea, Java islands & Sea, Celebes islands & Sea, Philippines, Sulu Sea, North Madagascar, Mozambique, channel and over Indian ocean between latitude 5.0N to 03.0S longitude 40.0E to 105.0E and between latitude 03.0S to 35.0S longitude 40.0E to 85.0E.

M.J.O. Index:
MJO index is currently in Phase 1 with amplitude greater than 1, it will remain in same phase till 21st November. It will enter phase 2 with amplitude greater than 1 on 22nd November. It will remain there in phase 2 with amplitude greater than 1 till 26th November, later it will be in same phase for few 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	A cyclonic storm (CS) over southeast and adjoining eastcentral, Andaman Sea during 26th Nov, having westnorthwestward direction with further intensification.	No significant system during next 7 days.
IMD-GEFS	A depression over (D) over southeast and adjoining eastcentral, Andaman Sea during 26th Nov, having westnorthwestward direction with further intensification.	No significant system during next 7 days.
IMD-WRF	No significant system during next 3 days.	No significant system during next 3 days.

NCMRWF-NCUM	No significant system during next 7 days.	No significant system during next 7 days.
NCMRWF-NEPS	No significant system during next 7 days.	No significant system during next 7 days.
NCMRWF-UM (Regional)	No significant system during next 3 days.	No significant system during next 7 days.
ECMWF	No significant system during next 7 days.	No significant system during next 7 days.
NCEP-GFS	No significant system during next 7 days.	No significant system.
IMD-Genesis Potential Parameter	Potential zone over southeast BoB around 5^{o}N during 20th to 24th November.	No potential zone over AS for next 7 days.

Summary and conclusion:

1. **For Bay of Bengal**:

Most of the models are indicating no significant system over the Bay of Bengal for the next seven days. However, IMD-GFS is indicating a cyclonic storm over southeast Andaman Sea and adjoining southeast Bay of Bengal on 26th November, it will have westnorthwestward movement with further intensification. IMD-GEFS model is indicating a depression over southeast Andaman Sea and adjoining southeast Bay of Bengal on 26th November having its westward movement with further intensification. The likely development of this system needs to be monitored.

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	NIL	NIL

2. **For the Arabian Sea**:

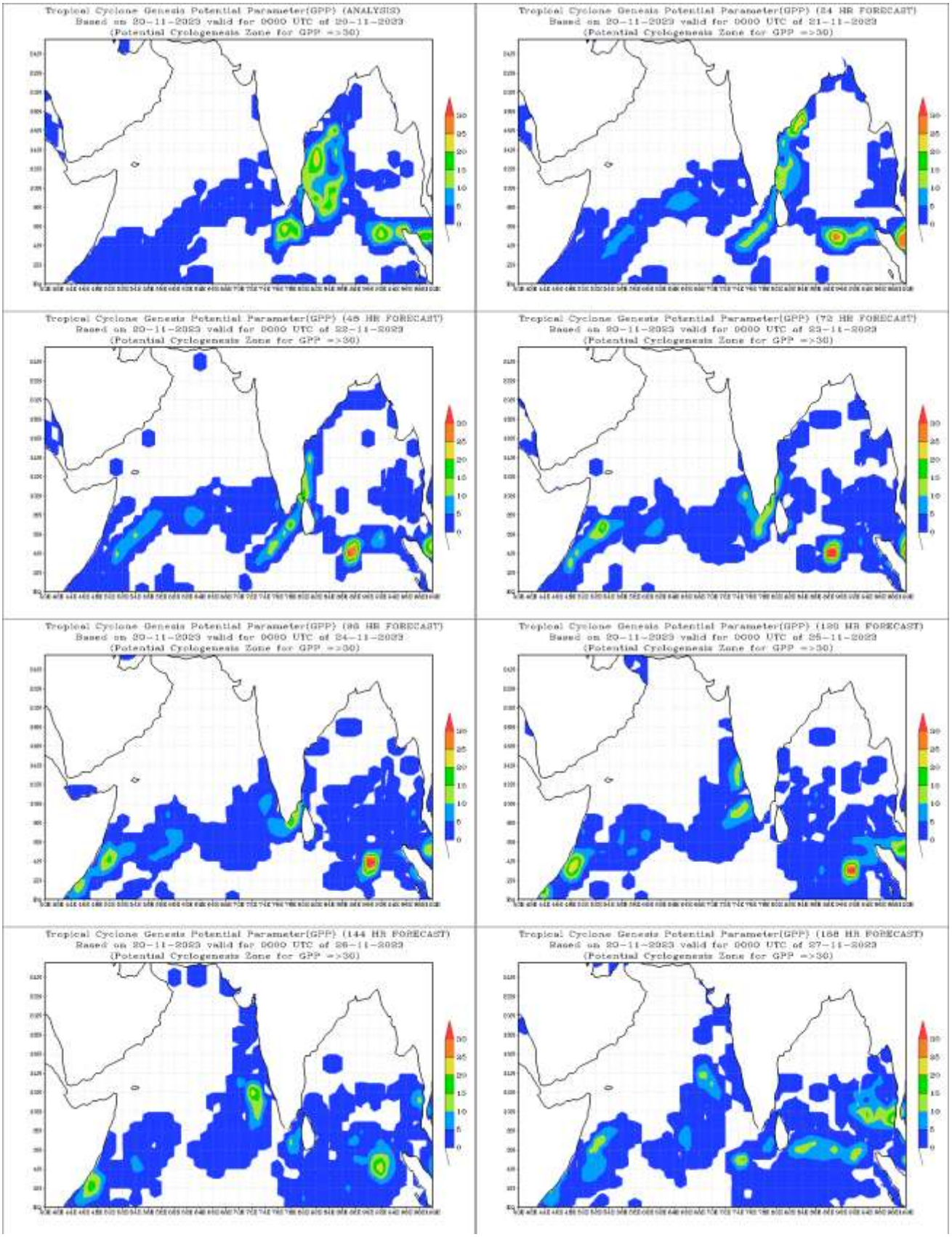
Most of the models are indicating that there will be no significant system for the next seven days.

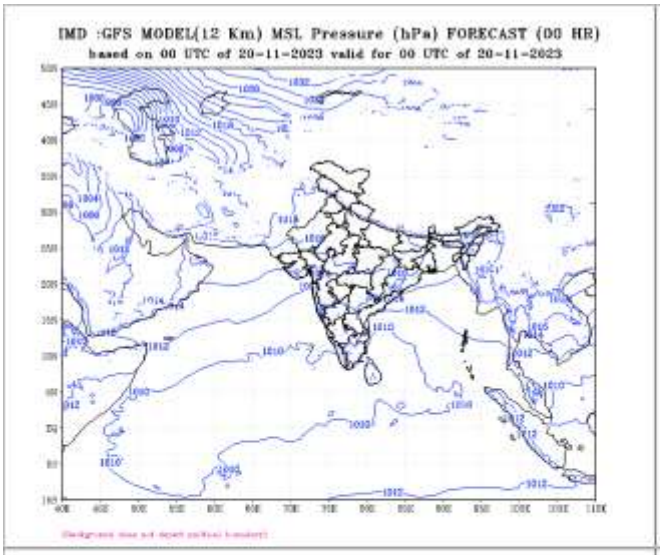
Probability of Cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

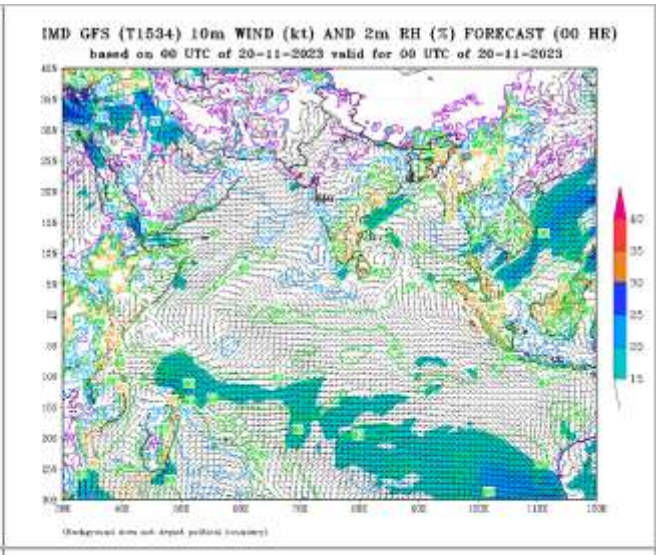
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

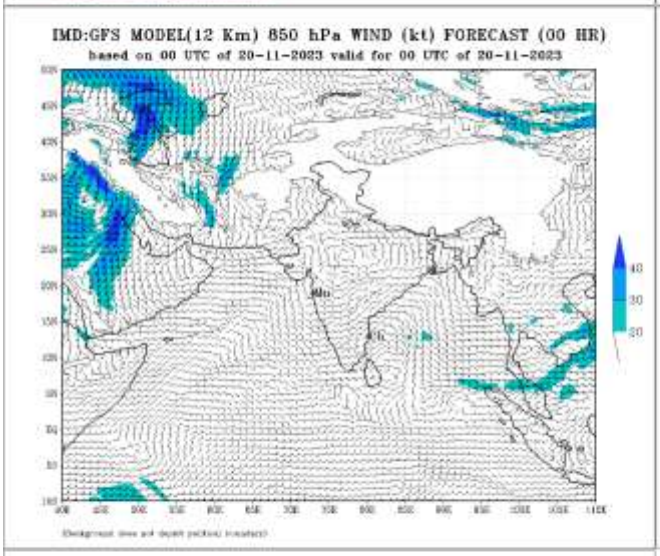
IOP: NIL

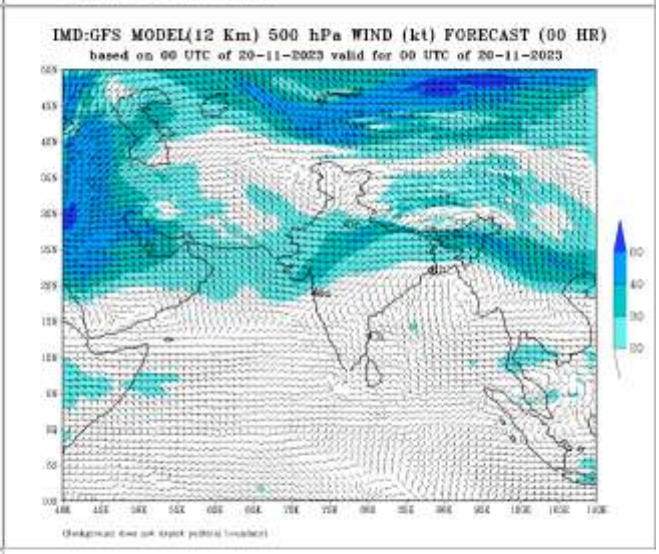
ANNEXURE

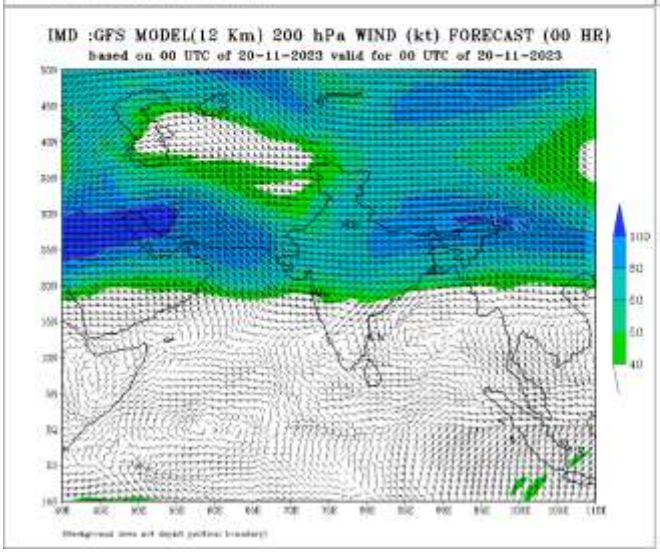

Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 20-11-2023 valid for 0000 UTC of 20-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 21-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 22-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 23-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 24-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 25-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 26-11-2023
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 20-11-2023 valid for 0000 UTC of 27-11-2023
(Potential Cyclogenesis Zone for GPP =>30)

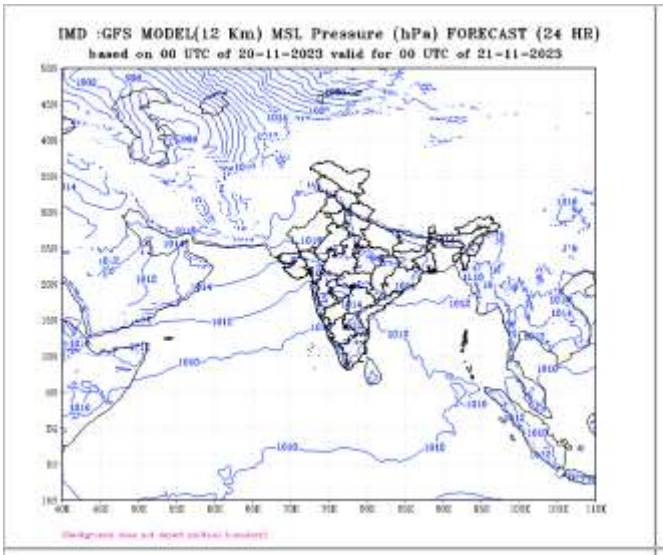

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 20-11-2023

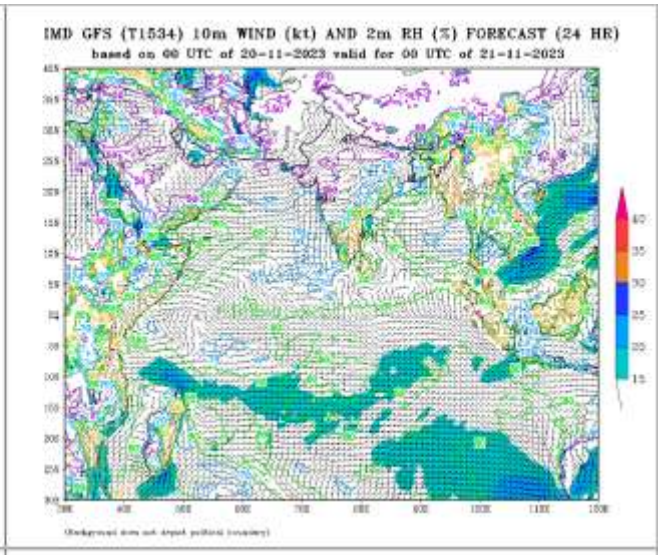

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 20-11-2023

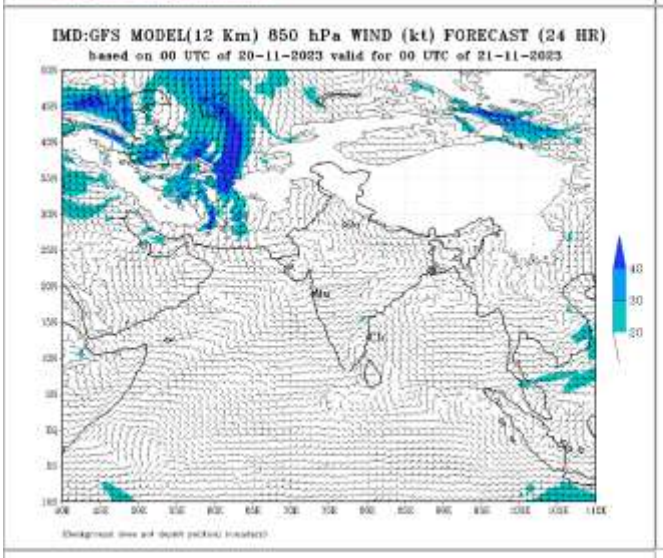

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (00 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 20-11-2023

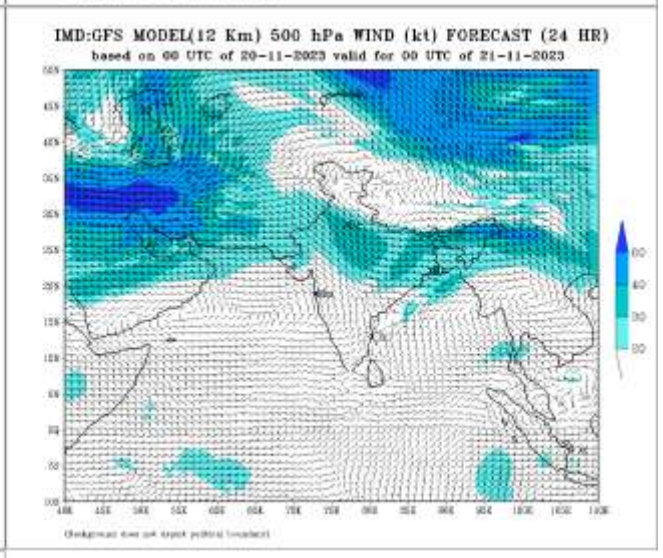

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (00 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 20-11-2023

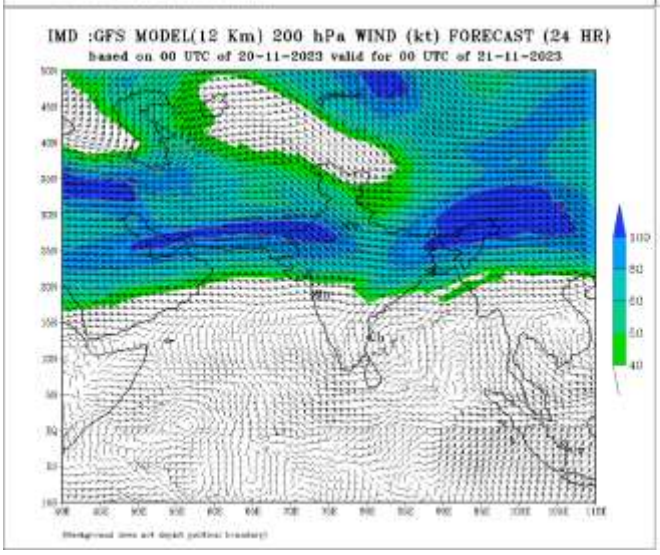

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (00 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 20-11-2023

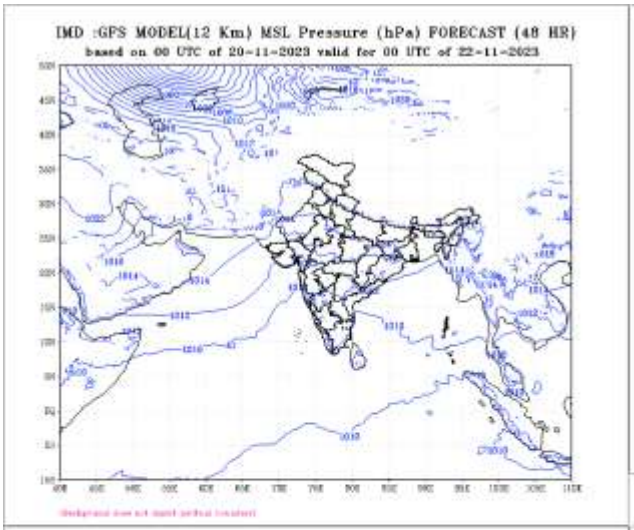

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 21-11-2023

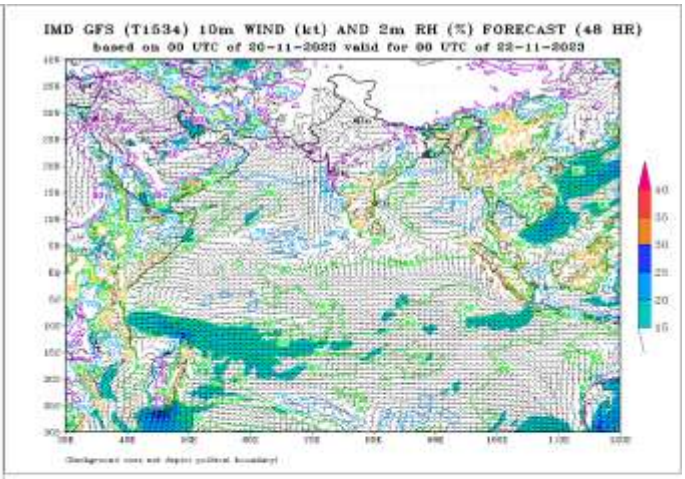

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 21-11-2023

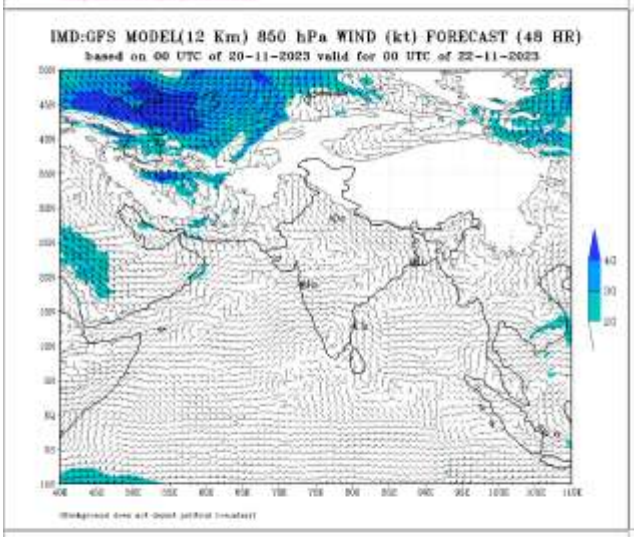

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (24 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 21-11-2023

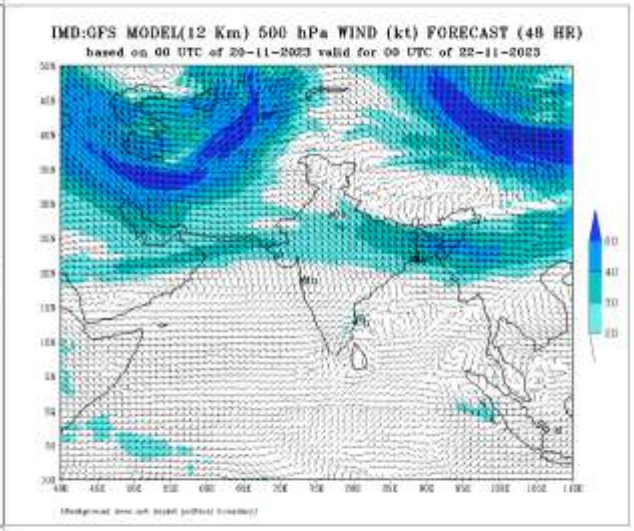

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (24 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 21-11-2023

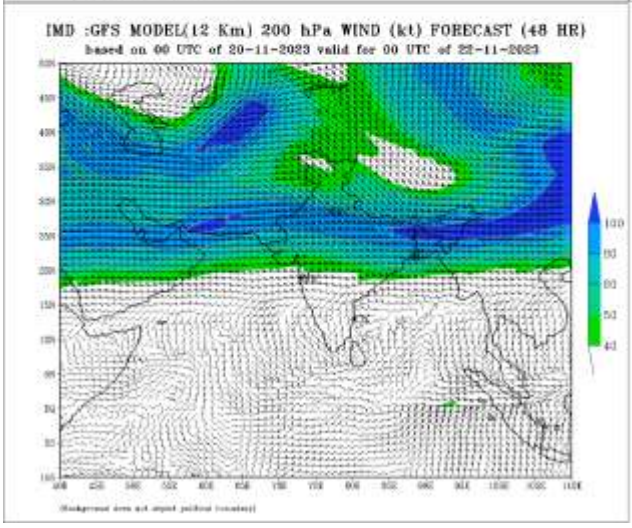

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (24 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 21-11-2023

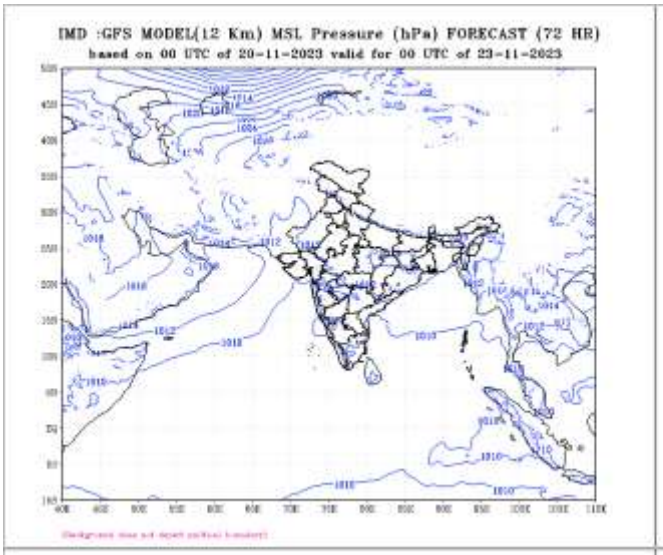

IMD :GPS MODEL(12 Km) MSL Pressure (hPa) FORECAST (48 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 22-11-2023

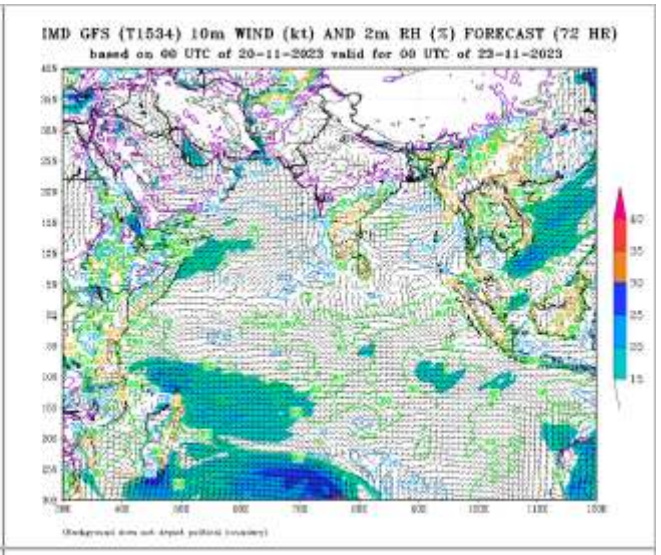

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 22-11-2023

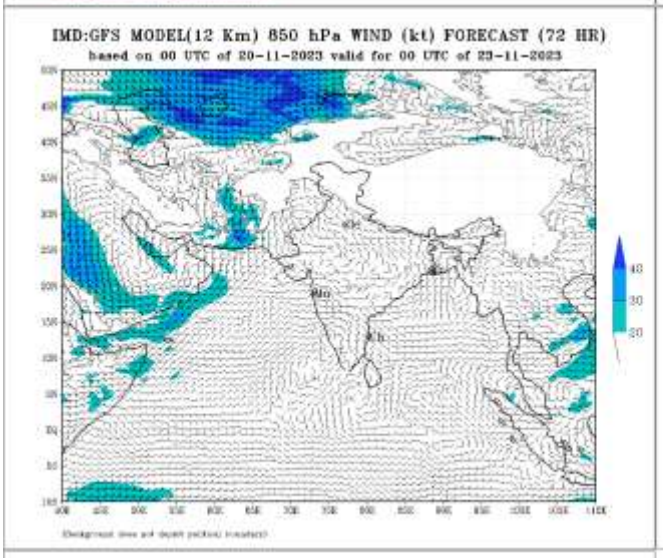

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (48 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 22-11-2023

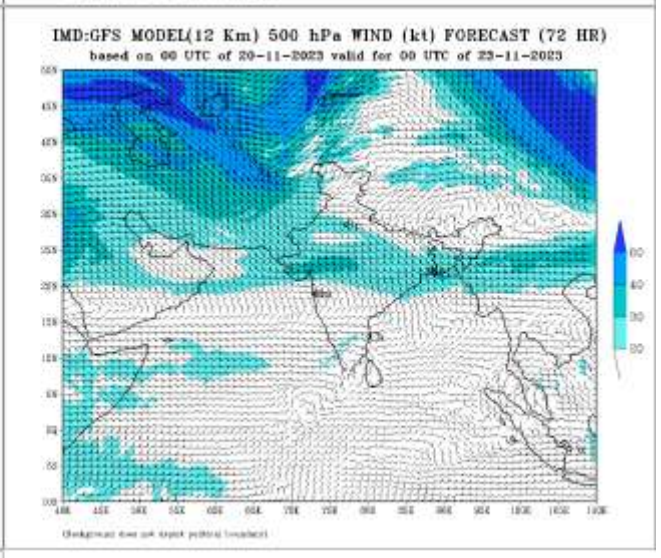

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (48 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 22-11-2023

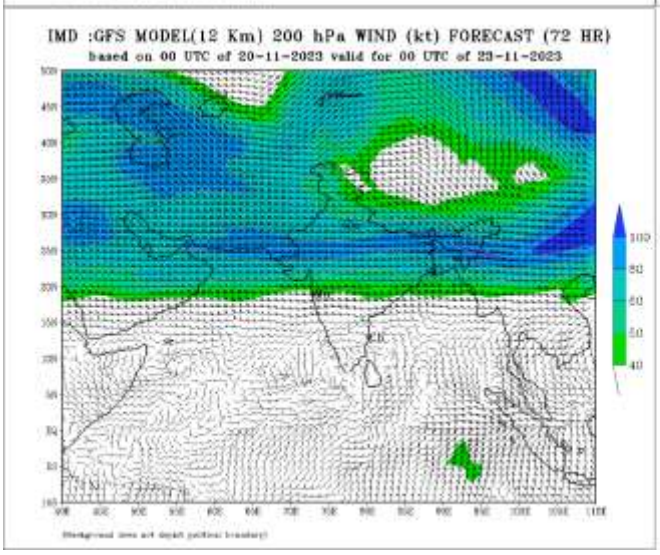

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (48 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 22-11-2023

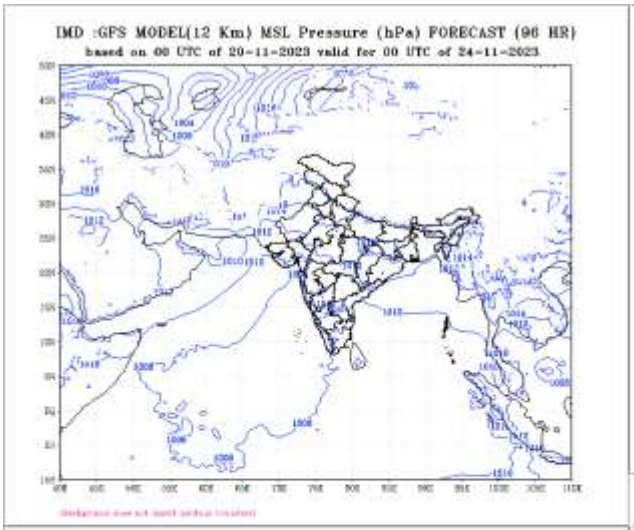

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 23-11-2023

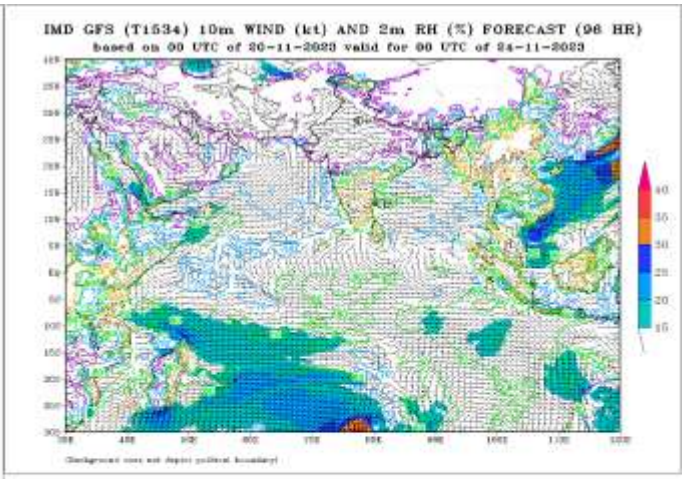

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 23-11-2023

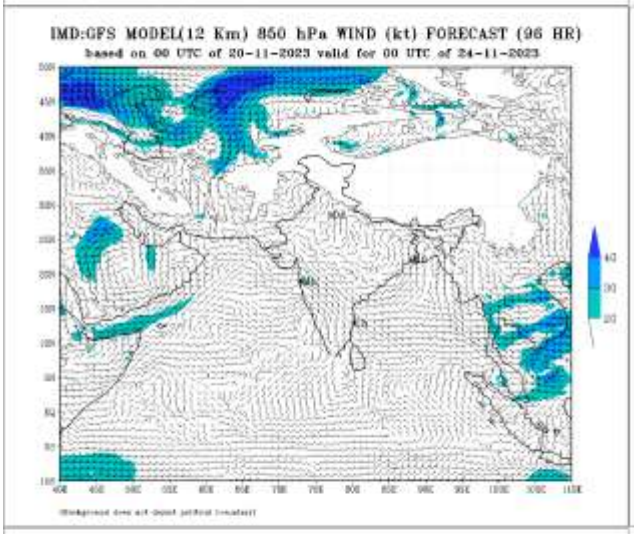

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 23-11-2023

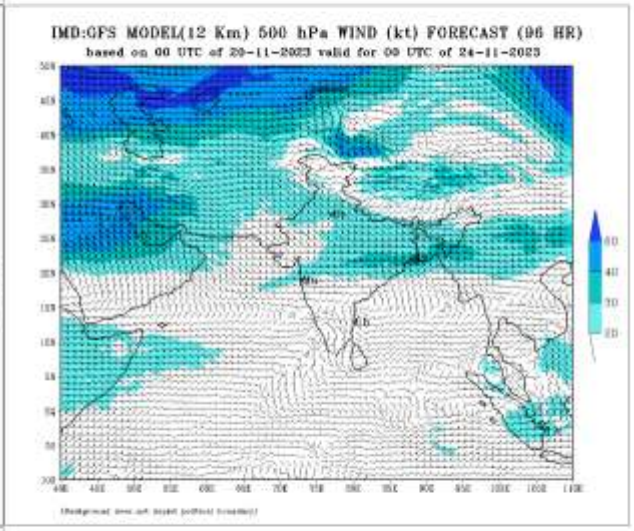

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 23-11-2023

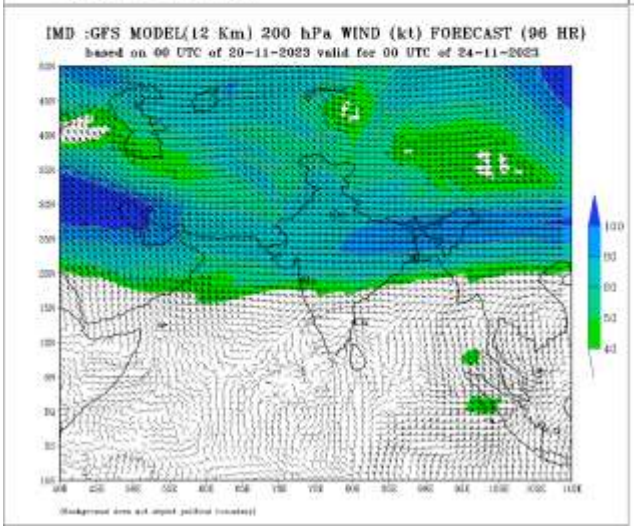

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 23-11-2023

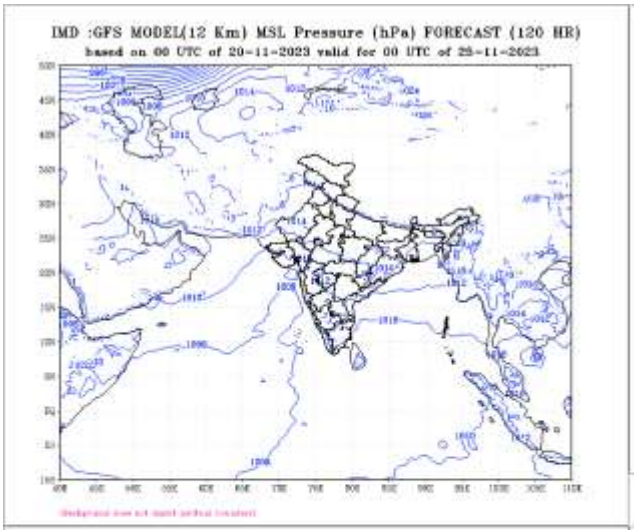

IMD :GPS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 24-11-2023

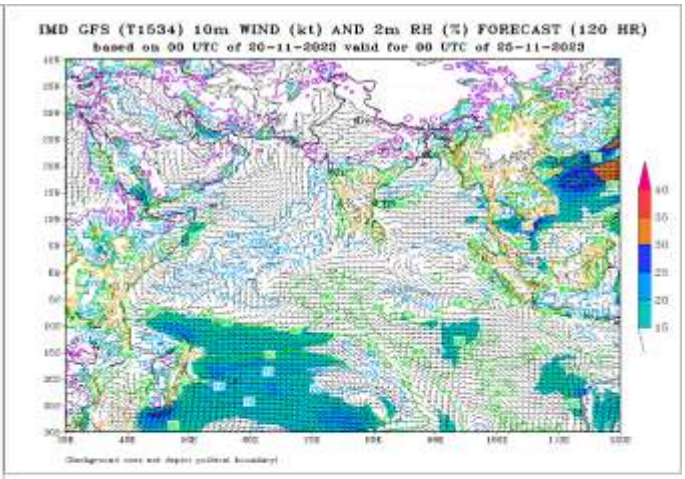

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 24-11-2023

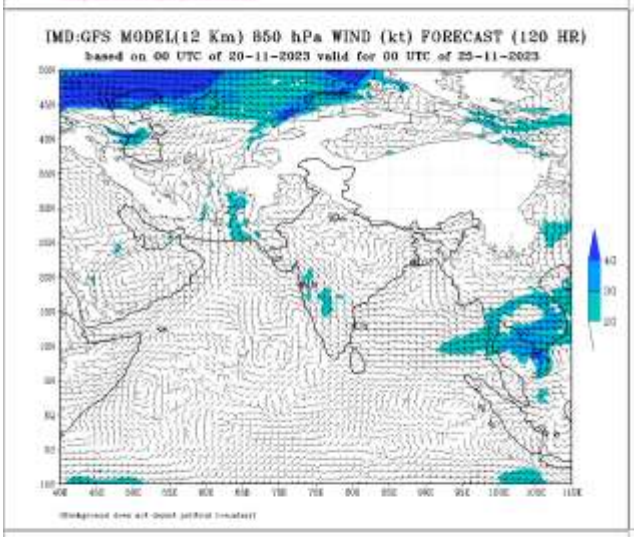

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 24-11-2023

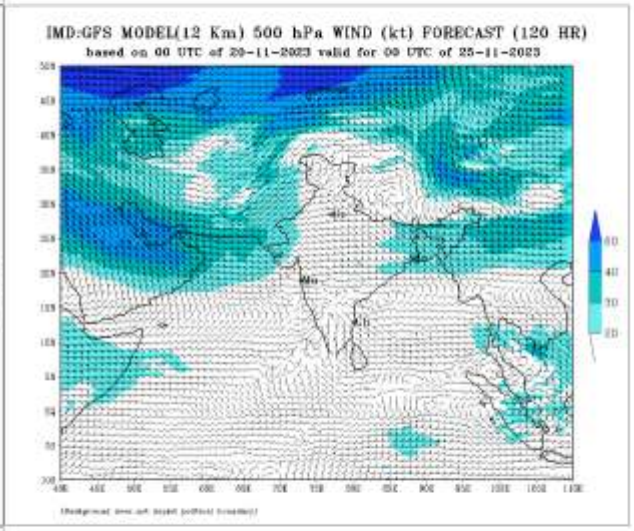

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 24-11-2023

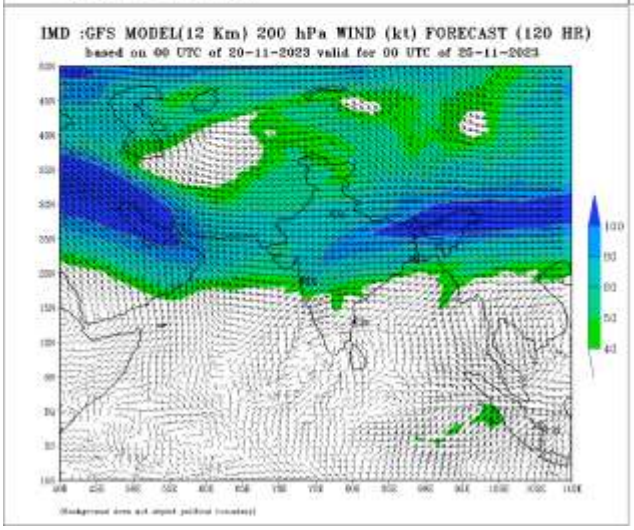

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 24-11-2023

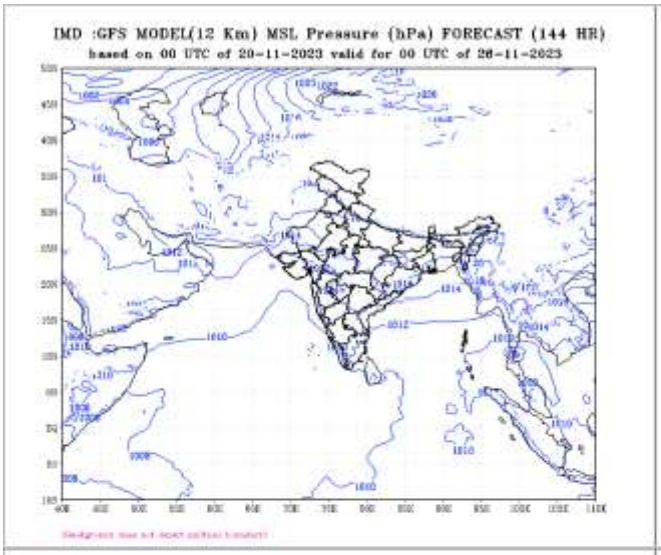

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 25-11-2023

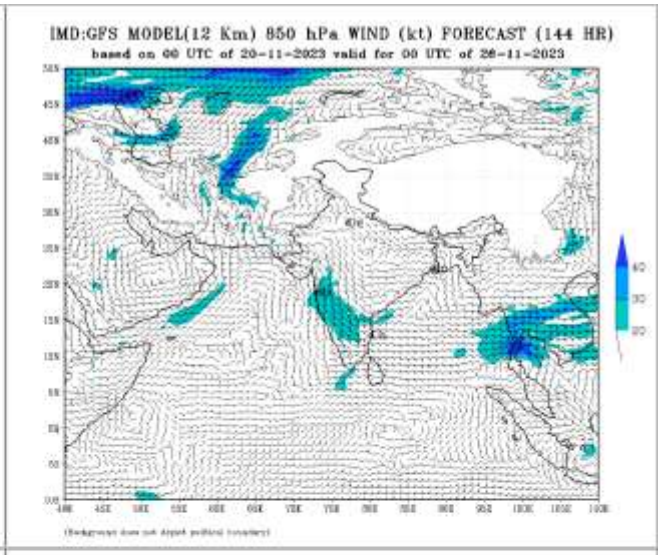

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 25-11-2023

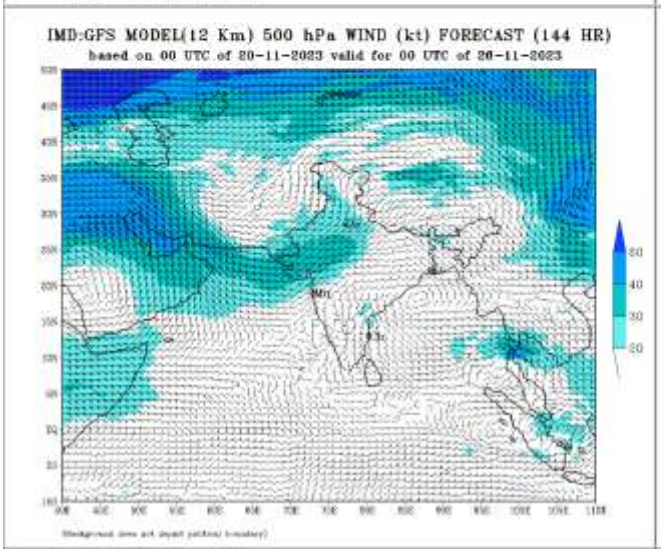

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 25-11-2023

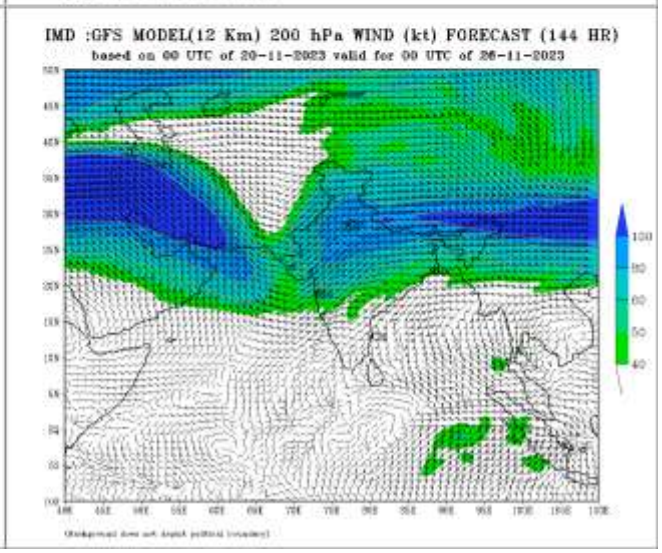

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 25-11-2023

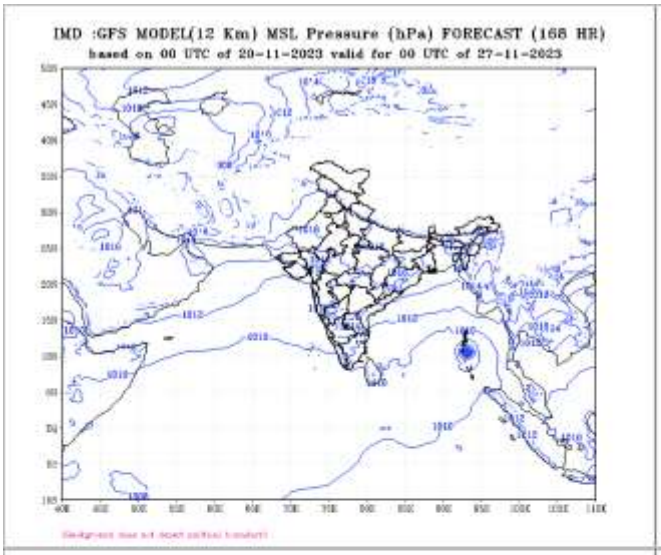

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 25-11-2023

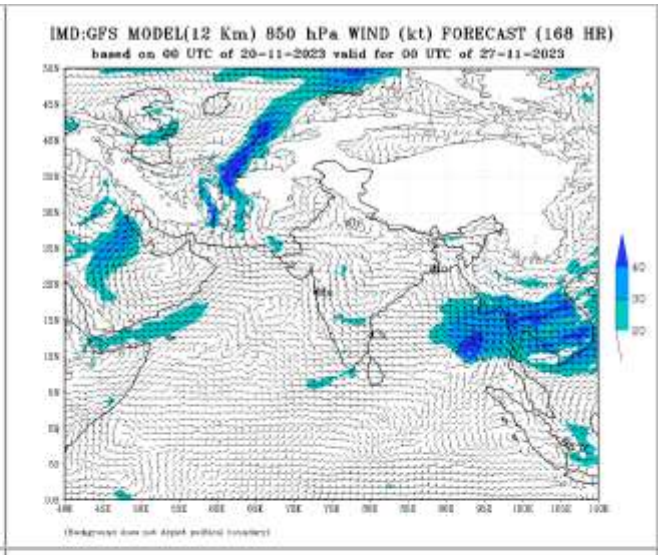

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 26-11-2023

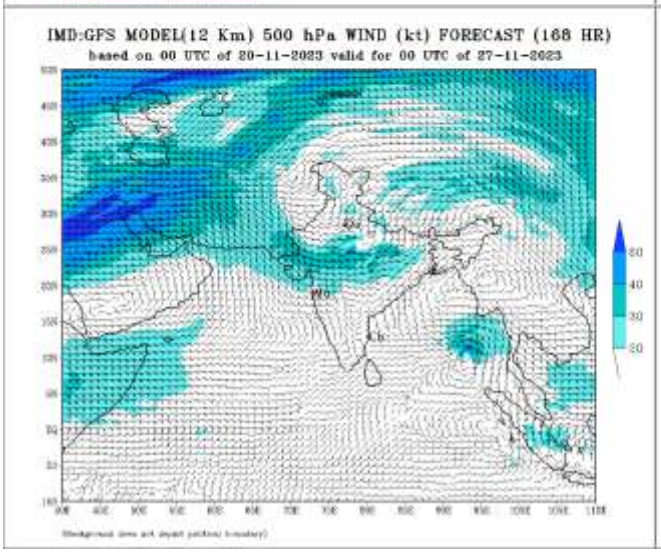

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 26-11-2023

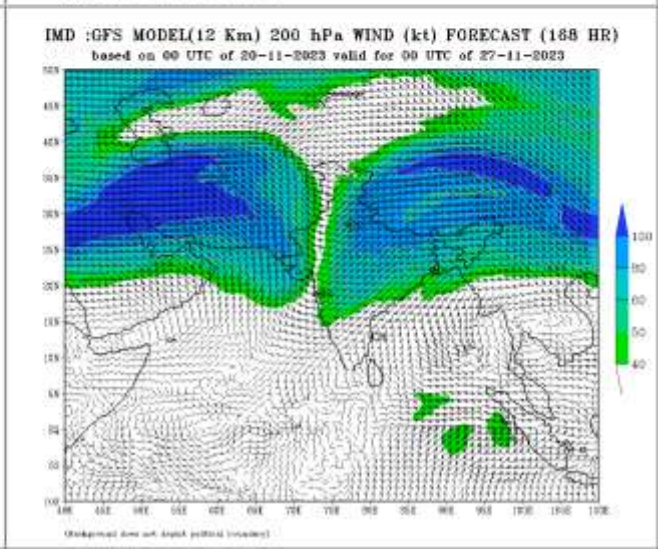

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 26-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 26-11-2023


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 27-11-2023


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 27-11-2023


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 27-11-2023


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 20-11-2023 valid for 00 UTC of 27-11-2023