



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

FDP (Cyclone) NOC Report Dated 02nd December, 2021

Time of Issue: 1200 UTC

Synoptic features (based on 0900 UTC analysis):

- ❖ Yesterday's low pressure area over central parts of Andaman Sea moved west-northwestwards and became a Well marked Low Pressure Area over southeast Bay of Bengal & adjoining Andaman Sea in the early morning (0530 hrs IST) of today, the 2nd December 2021. It lay over southeast Bay of Bengal at 0830 hrs IST of today. It concentrated into a depression over southeast Bay of Bengal at 1730 hours IST of today, the 2nd December. Then it is likely to move northwestwards and intensify into a Cyclonic Storm over central parts of the Bay of Bengal during the subsequent 24 hours. It is likely to reach west-central Bay of Bengal off north Andhra Pradesh – south Odisha coasts around 4th December morning. Thereafter it is likely to move north-northeastwards.
- ❖ Yesterday's cyclonic circulation over southeast and adjoining eastcentral AS lay over northeast Arabian Sea off south Gujarat and north Konkan coasts and extended upto 3.1 km above mean sea level.
- ❖ The trough at mean sea level from Southeast Arabian Sea to the above cyclonic circulation over Northeast Arabian Sea off south Gujarat-north Konkan coasts extending upto 1.5 km above mean sea level persists.

Dynamical and thermodynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) °C	29-30°C over major parts of west BoB and higher off south Andhra Pradesh-north Tamil Nadu coasts. Slightly less 27-28°C over north BoB and Andaman Sea.	28-29°C over major parts of AS. 29-30°C over eastcentral AS off Kerala coast.
Tropical Cyclone Heat Potential (TCHP) kJ/cm²	110-120 over parts of south Andaman Sea and adjoining southeast BoB. Gradually decreasing becoming 80-90 over central and north BoB.	70-80 over southeast & parts of eastcentral AS. 50-60 over central AS. Less than 50 over major parts of west AS.
Cyclonic Relative vorticity (X10⁻⁶s⁻¹)	Vorticity is 100 to the northwest of system centre with vertical extension upto 500 hPa.	40 to 50 over northeast AS off south Gujarat coast with vertical extension upto 500 hPa.
Low Level convergence (X10⁻⁵ s⁻¹)	Low level convergence 20 to the northwest and 10 to the east of system centre.	05-10 over eastcentral AS off Maharashtra coast.

Upper divergence (X10⁻⁵ s⁻¹)	Level	30 to the northwest of system centre.	Decreased significantly and is about 05 over south Maharashtra coast.
Vertical Shear (Knots)	Wind (VWS)	Moderate (15-20) over system centre and also over adjoining eastcentral BoB. High towards westcentral and northwest BoB.	High over central and north AS.
Wind Tendency (knots)	Shear	Decreasing over the system area. Increasing over a small area over central BoB. Decreasing along the western parts of BoB.	Decreasing over northeast AS.
Upper tropospheric Ridge		Along 15.0°N over the central BoB.	Along 15.0°N.
Trough in Westerlies			A trough in mid & upper tropospheric westerlies runs along longitude 58°E to the north of latitude 12°N.

Satellite observations based on INSAT imagery (0900 UTC):

(a) Depression over southeast BoB:

The intensity of the system is characterized as T 1.5. The cloud mass is organized in shear pattern. The convective cloud clusters are sheared in northwest sector. Associated scattered to broken low & medium clouds with embedded intense to very intense convection lay over southeast & adjoining southwest BoB and central BoB between latitude 9.5N & 17.5N and longitude 81.5E & 92.5E, Andaman Islands and adjoining Andaman Sea.

(b) Arabian Sea

At 0900 UTC, scattered to broken low & medium clouds with embedded moderate to intense to very intense convection lay over south Konkan and Goa coasts and also over southeast Arabian Sea off Kerala coast.

M.J.O. Index:

MJO index is currently in Phase 6 with amplitude more than 1. It will continue in same phase for next 7 days..

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

No system over the area.

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

Model	BoB	AS
IMD-GFS	Indicates a Depression over southeast BoB at 00 UTC of 2 nd December, as a Cyclonic Storm (CS) over central BoB at 00 UTC of 3 rd December, moving nearly northwards and reaching west-central & adjoining northwest BoB off north Andhra Pradesh – south Odisha coasts at 18 UTC of 4 th , north-northeastward re-curvature along & off Odisha – west Bengal coasts with gradual weakening on 5 th & 6 th .	No significant development is indicated.
IMD-GEFS	Same as above. However, there is large uncertainty with respect to the intensity. Also	Same as above

	the ensemble track shows probable crossing point as northern most location of coastal Andhra Pradesh & adjoining Odisha.	
IMD-WRF	Well Marked Low (WML) over southeast BoB and adjoining Andaman Sea on 2 nd & rapid intensification into a CS over southeast BoB on 3 rd , as a VSCS over west-central BoB off central Andhra Pradesh coast on 4 th , crossing north Andhra Pradesh coast and as a Depression over north coastal Andhra Pradesh on 5 th .	No significant development is indicated.
NCMRWF-NCUM(Global)	Indicates a WML over southeast BoB on 2 nd , a Depression over central BoB on 3 rd , as a CS over west-central BoB off Andhra Pradesh coast on 4 th , as a Severe Cyclonic Storm (SCS) over west-central BoB near north Andhra Pradesh coast on 5 th , persistence over northwest BoB off Odisha coast with slight movement along the coast during 6 th – 8 th and weakening on 9 th .	No significant development is indicated.
NCMRWF-NEPS	Similar to NCUM-G	Similar to NCUM-G
NCMRWF-UM (Regional)	Same as NCUM (G) upto 4 th . But deviates from it as it shows the system crossing north coastal Andhra Pradesh in the early hours of 5 th .	Same as above
ECMWF	A WML over southeast BoB & adjoining Andaman Sea on 2 nd , as a Depression over central BoB at 0300 UTC of 3 rd , as a CS over west-central BoB at 1800 UTC of 3 rd , as a CS over west-central BoB close to north Andhra Pradesh coast at 00 UTC of 4 th , re-curving north-northeastwards along & off Andhra Pradesh coast upto 0900 UTC, weakening into a Depression at 09 UTC of 4 th , moving over to south coastal Odisha as a Depression at 03 UTC of 5 th , continues movement across West Bengal coast over to Bangladesh on 6 th & further weakening on 7 th .	Indicates an LPA over east-central AS off north Maharashtra coast on 2 nd December and weakening on 3 rd .
ECMWF-EPS	90-100 % probability of cyclogenesis / strike from Andaman Sea to west-central BoB and north Andhra Pradesh coast on 4 th , over west-central BoB and north Andhra Pradesh – south Odisha coasts on 5 th & 6 th and 80-90% over south Odisha coast on 7 th .	50-60% genesis & strike probability over east-central & adjoining northeast AS off north Maharashtra – south Gujarat coasts on 4 th December.
NCEP-GFS	Indicates a Depression over central BoB on 3 rd , a CS over west-central & adjoining northwest BoB off north Andhra Pradesh – south Odisha coasts on 4 th , as a CS over northwest BoB off Odisha - West Bengal coast on 5 th , as a Depression over West Bengal & adjoining Bangladesh coast on 6 th and as an LPA over Bangladesh on 7 th and further weakening on 8 th .	No Low pressure system predicted.
IMD-GPP	Potential zone over southeast BoB on 2 nd ,	No potential zone

	over central BoB on 3 rd , over northwest & adjoining west-central BoB on 4 th and over northwest BoB off Odisha coast on 5 th , NIL during 6 th - 8 th .	predicted.
--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------

GPP- Genesis Potential Parameter based on Dynamical Statistical model developed by IMD.

Summary and Conclusion:

Most of the models are indicating that the current Depression over southeast BoB would intensify into a cyclonic storm on 3rd December. However, there is some divergence among various models w.r.t. track of this system. Models including IMD GFS, IMD MME, NCEP GFS, NCUM and NEPS are indicating the system to move west-northwestwards initially, with gradual change in movement to northwest/north-northwest till 4th evening (1200 UTC). Thereafter, the system will re-curve north-northeastwards. However, ECMWF deterministic & ensemble and GEFS are indicating that the system would cross north Andhra Pradesh-south Odisha coasts in the late night of 4th December. The Genesis Potential Parameter (GPP) of IMD is also indicating potential zone of cyclogenesis during 2nd to 5th over westcentral and northwest BoB. Though all these models are in agreement with the potential genesis and intensification over the BoB, still, there is large un-certainty with respect to the likely movement and crossing location of this system.

It may thus be concluded that,

1. The current depression over southeast Bay of Bengal is likely to move west-northwestwards and intensify into a cyclonic storm on 3rd December. The system is likely to reach west-central Bay of Bengal off north Andhra Pradesh – south Odisha coasts around 4th December morning. Thereafter it is likely to re-curve north-northeastwards gradually.
2. No significant development is likely over the Arabian Sea during next 7 days.

Probability of cyclogenesis (formation of depression and above intensity systems) over the Bay of Bengal and Andaman Sea during next 168 hours:

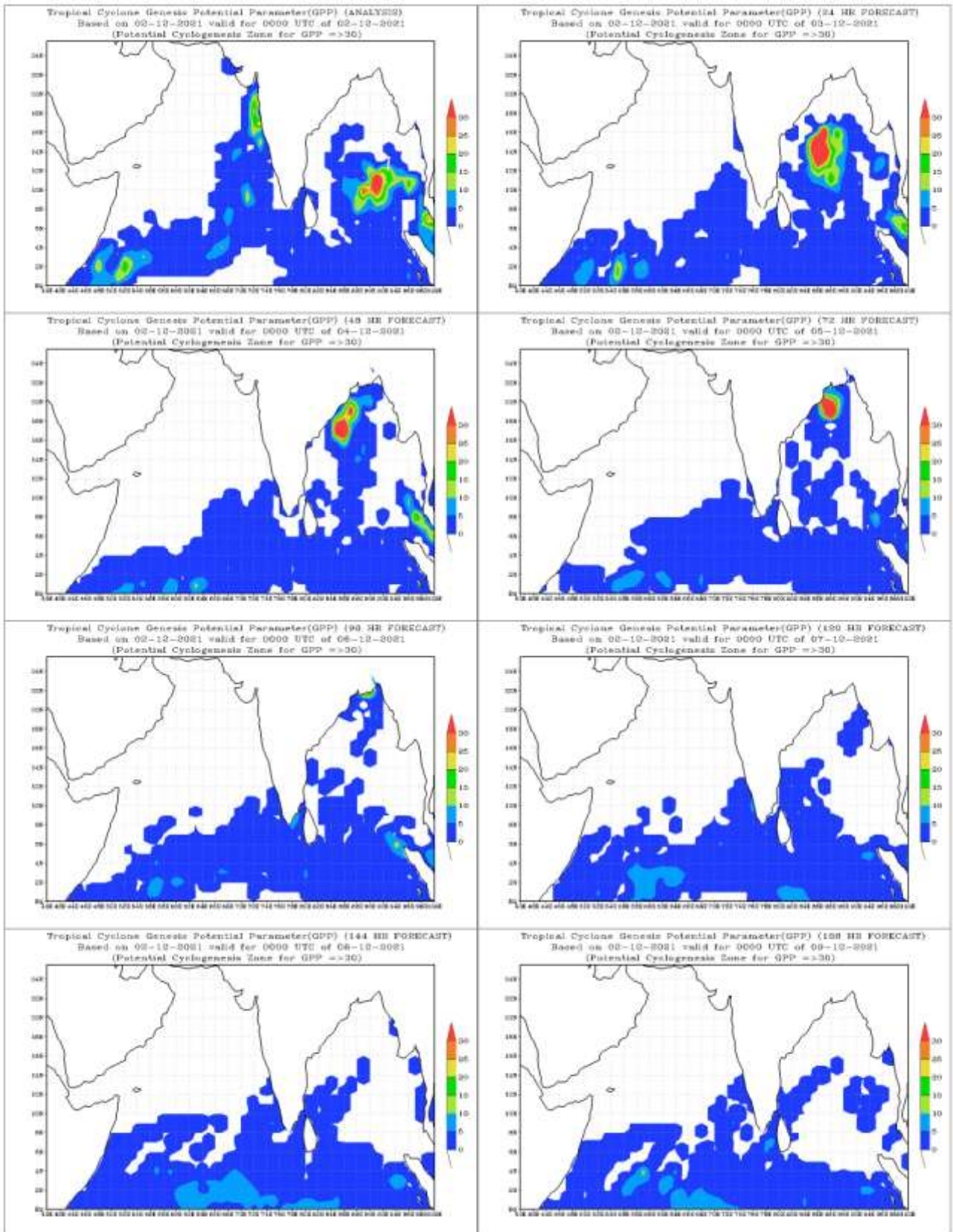
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
HIGH	HIGH	HIGH	HIGH	LOW	NIL	NIL

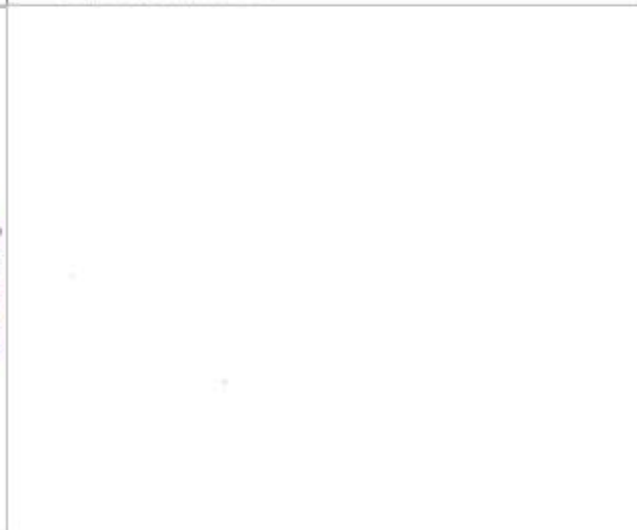
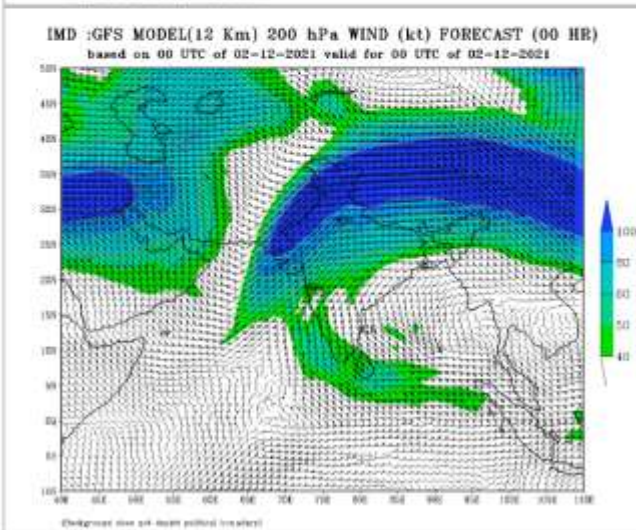
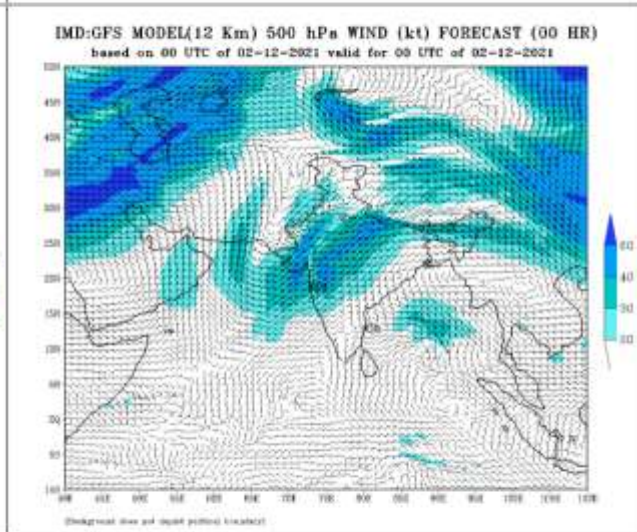
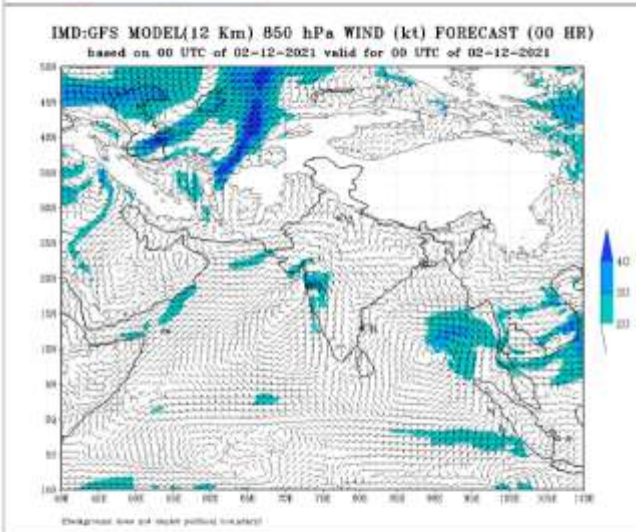
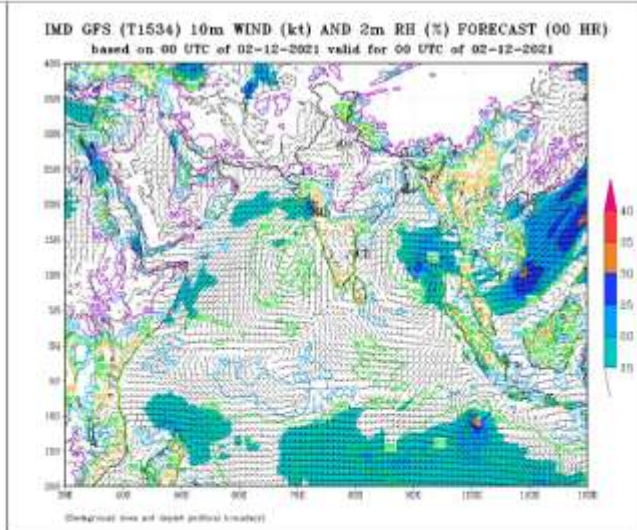
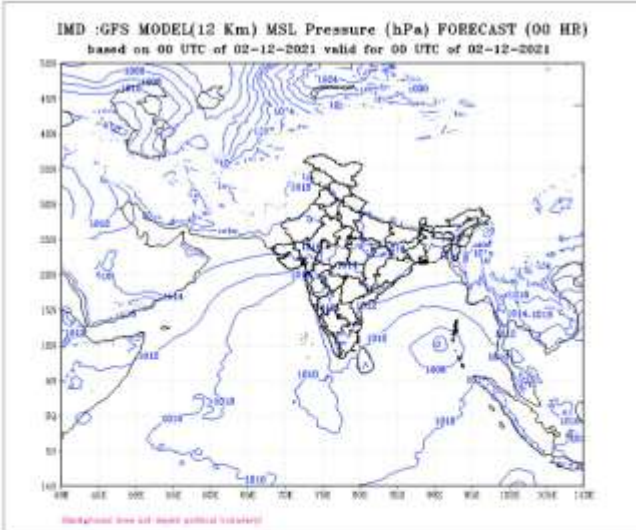
Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

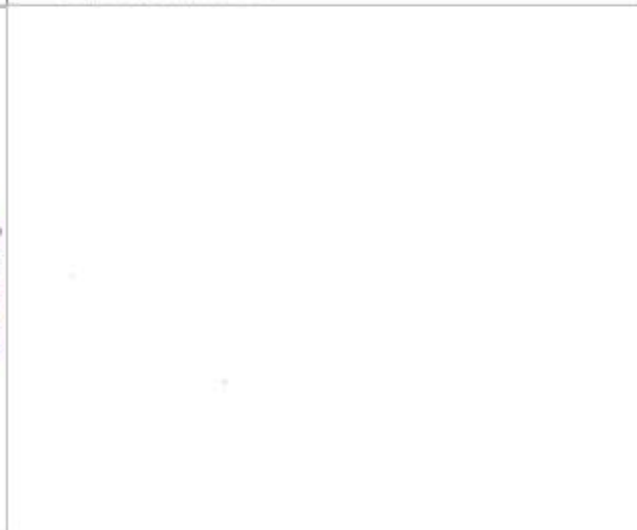
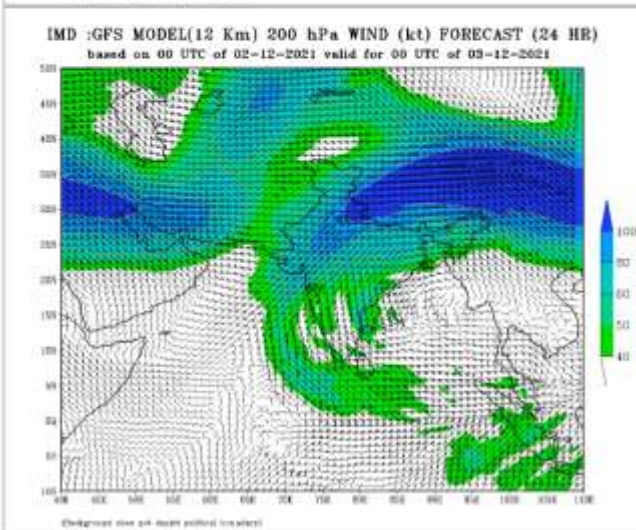
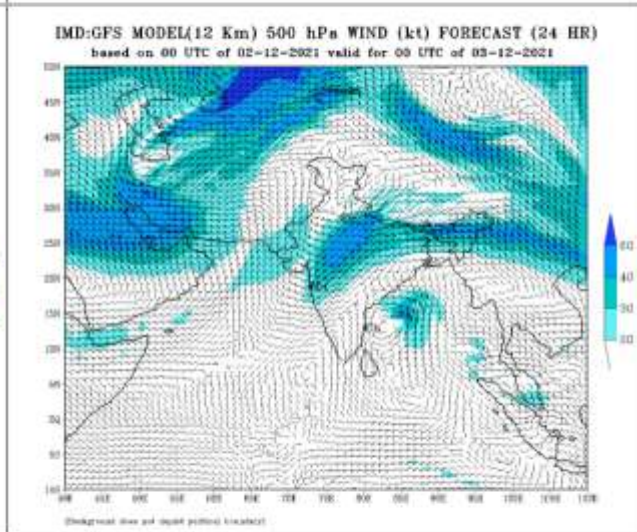
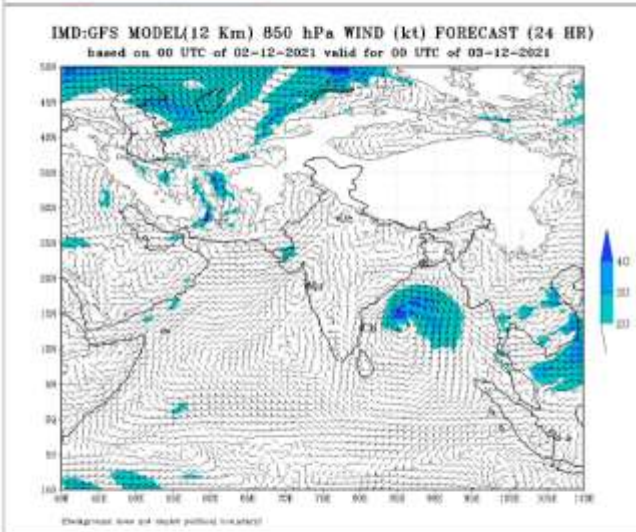
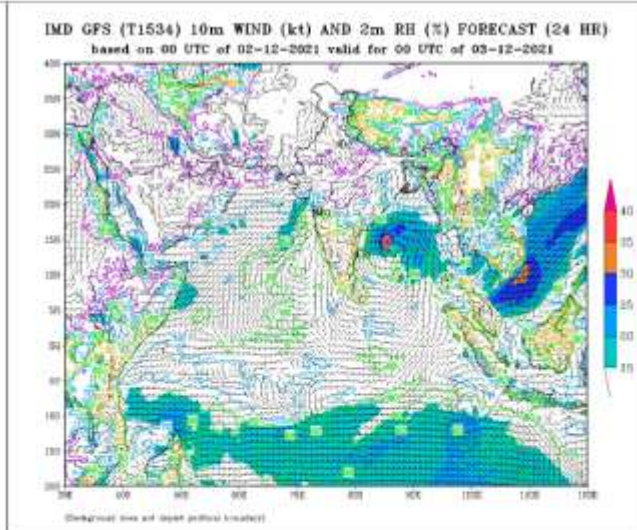
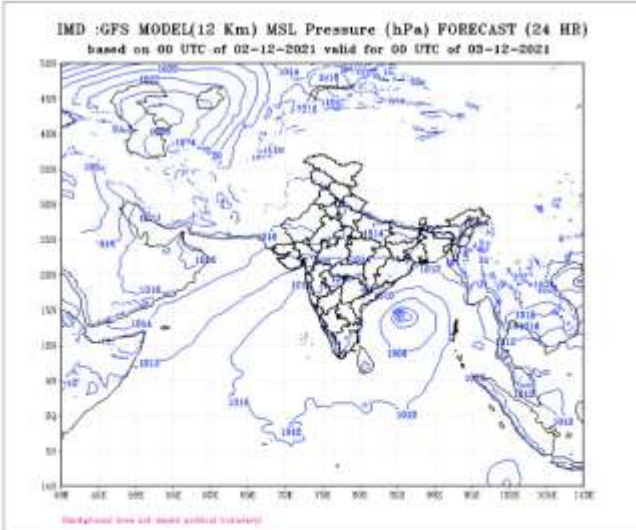
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	NIL	NIL	NIL

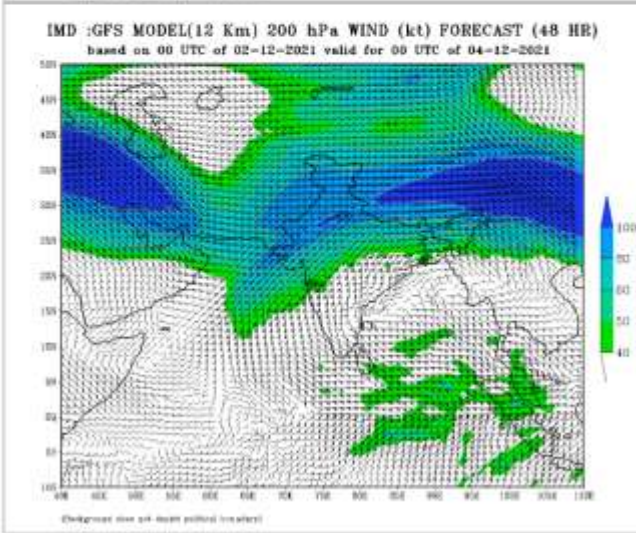
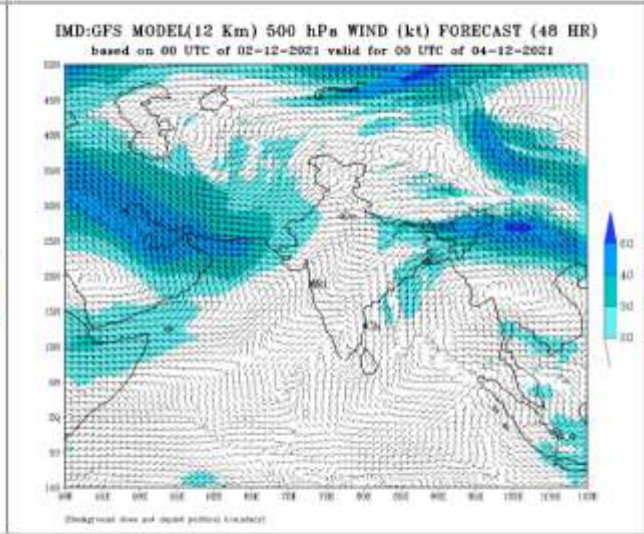
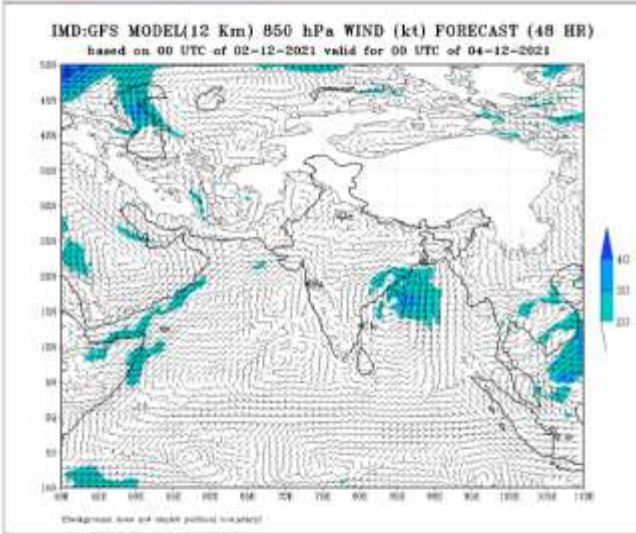
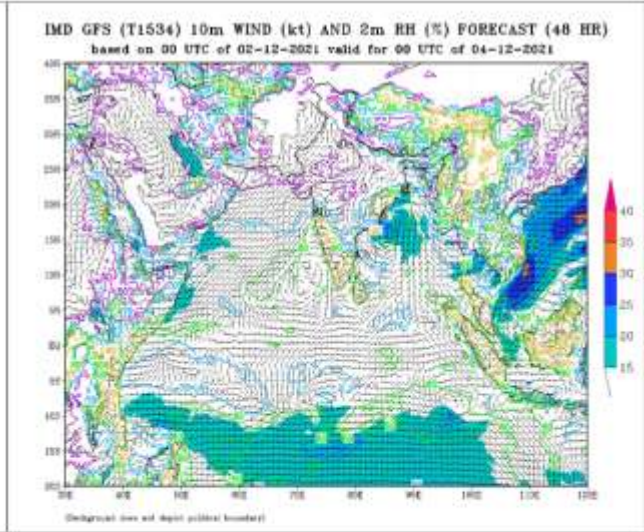
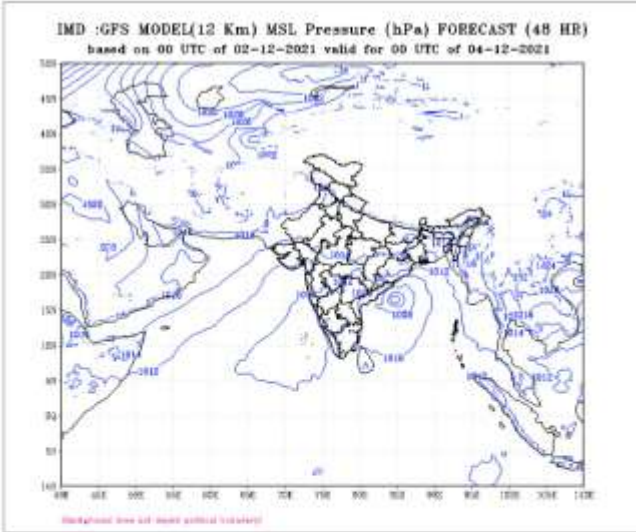
Advisory: The intensification and movement of the Depression over southeast Bay of Bengal is to be monitored regularly.

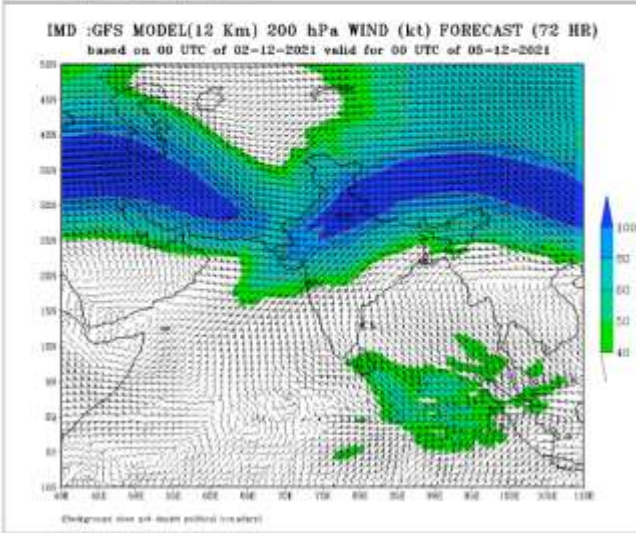
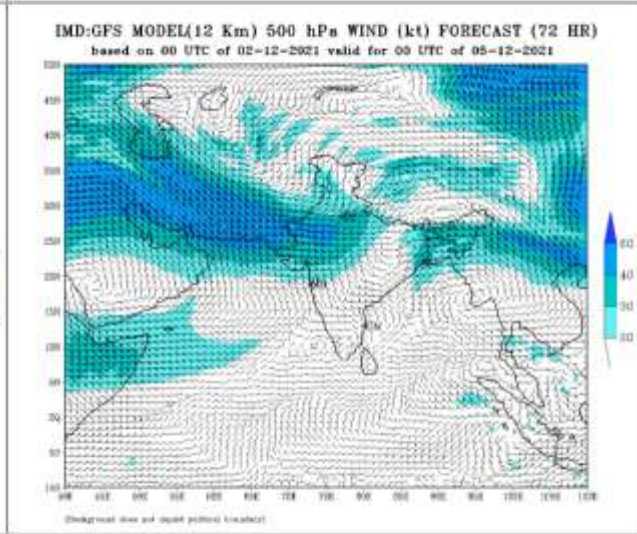
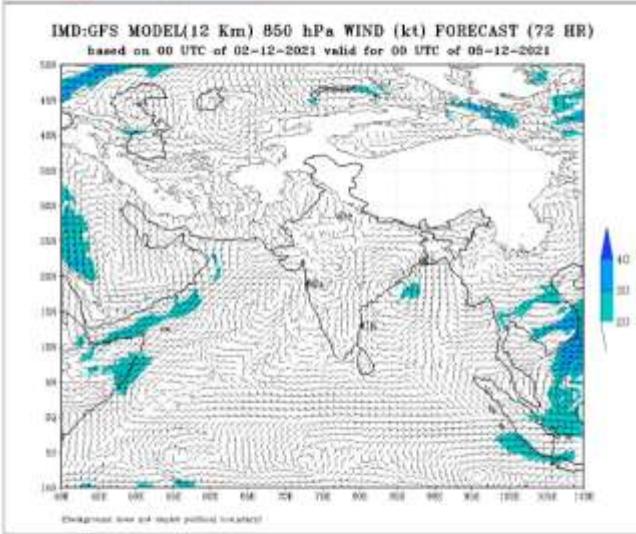
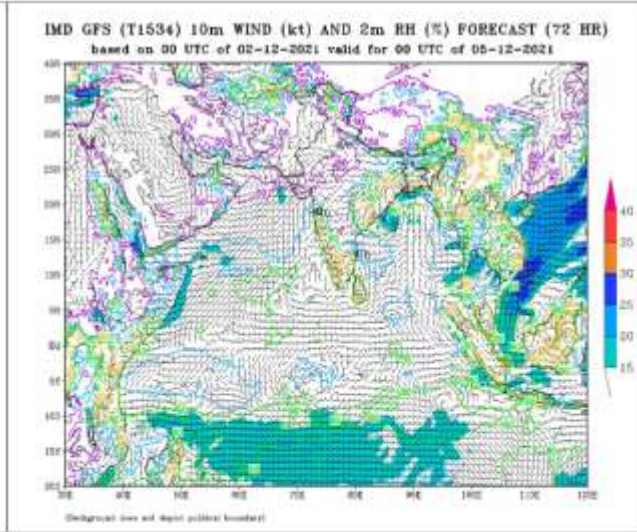
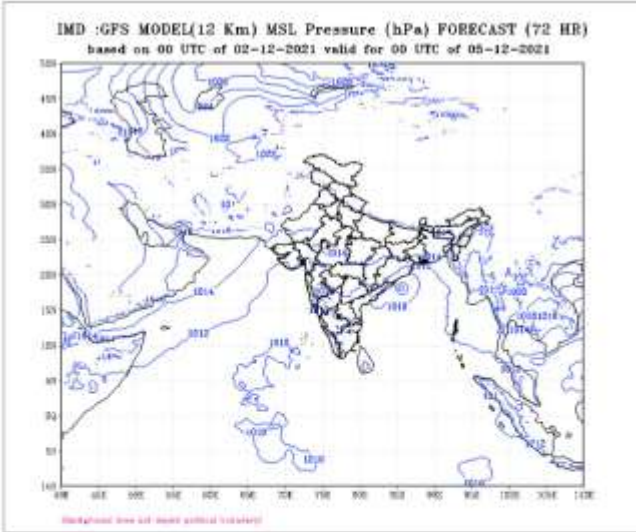
IOP is suggested for Andhra Pradesh from 3rd evening - 4th December, Odisha coast on 4th - 5th December and for West Bengal coast on 5th December.



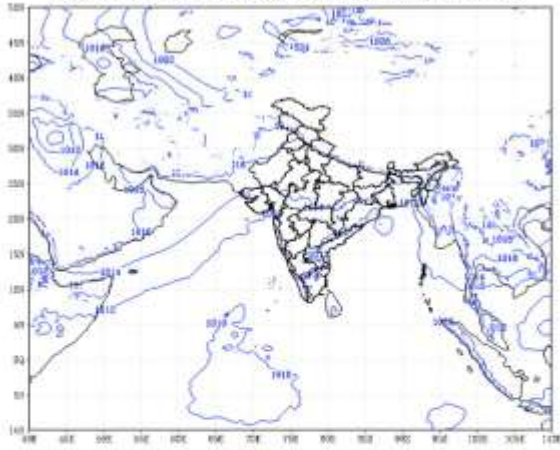






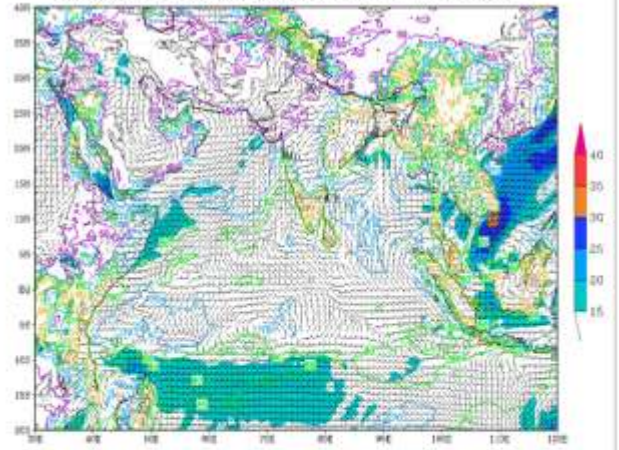


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 06-12-2021



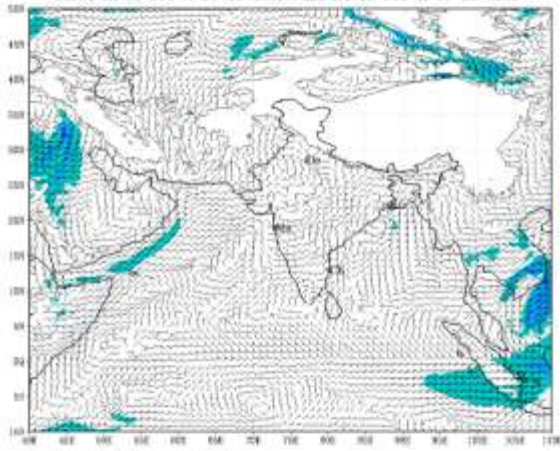
(Background line of coast political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 06-12-2021



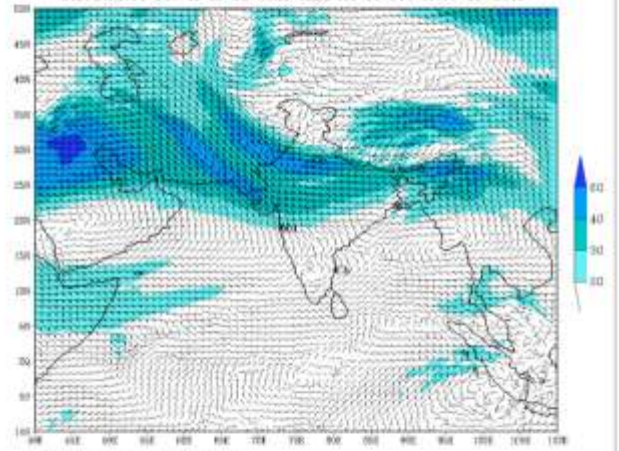
(Background line of coast political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 06-12-2021



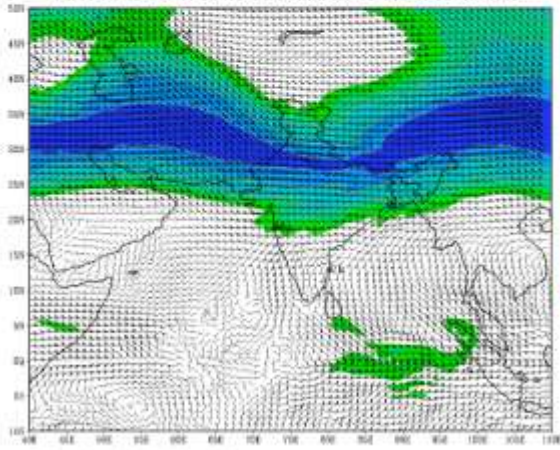
(Background line of coast political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 06-12-2021



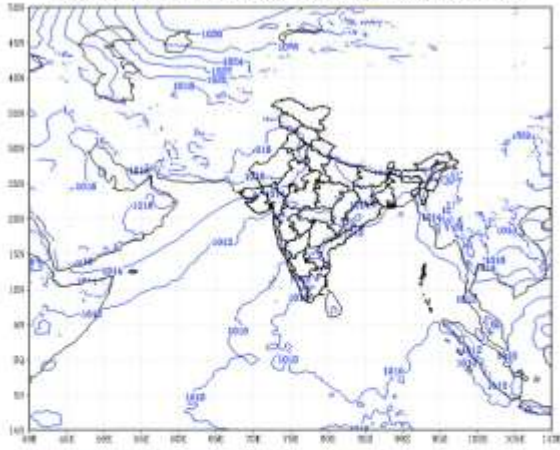
(Background line of coast political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 06-12-2021



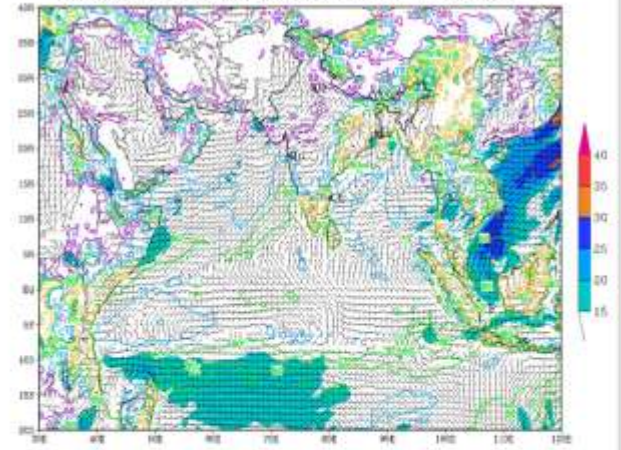
(Background line of coast political boundary)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
 based on 00 UTC of 02-12-2021 valid for 00 UTC of 07-12-2021



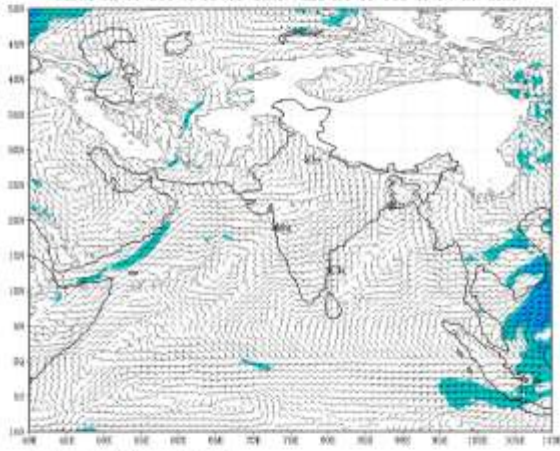
(Background line of mean political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
 based on 00 UTC of 02-12-2021 valid for 00 UTC of 07-12-2021



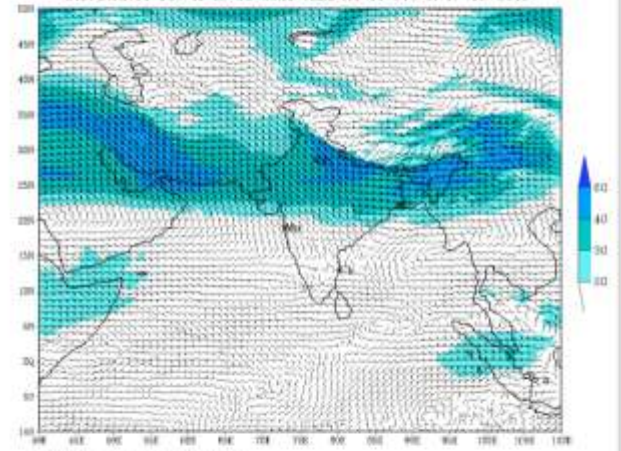
(Background line of mean political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 02-12-2021 valid for 00 UTC of 07-12-2021



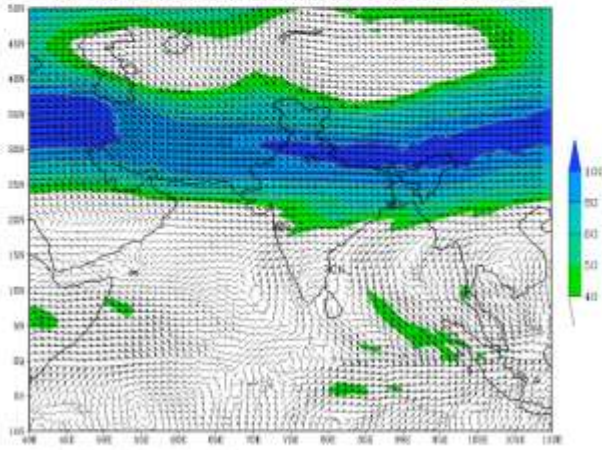
(Background line of mean political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 02-12-2021 valid for 00 UTC of 07-12-2021



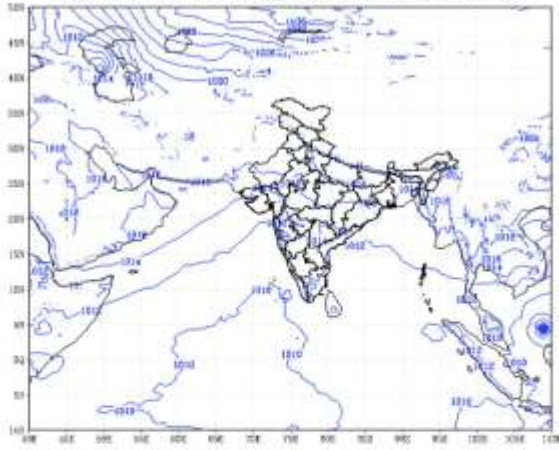
(Background line of mean political boundary)

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
 based on 00 UTC of 02-12-2021 valid for 00 UTC of 07-12-2021

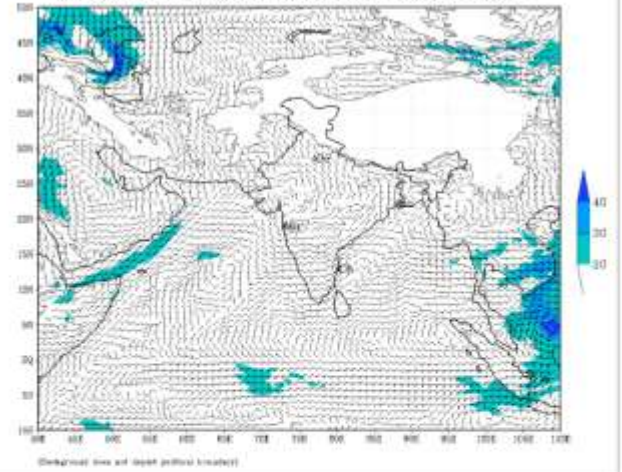


(Background line of mean political boundary)

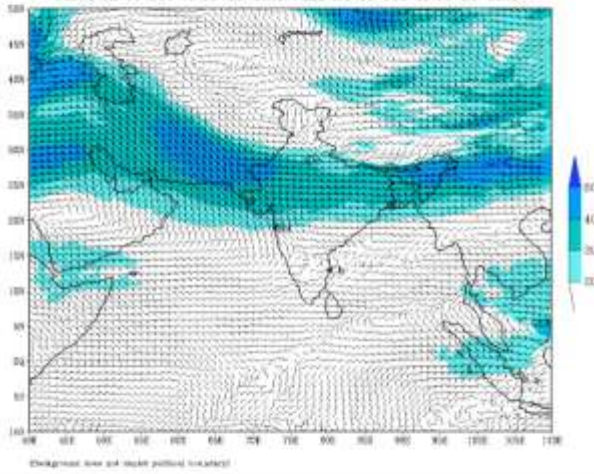
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 08-12-2021



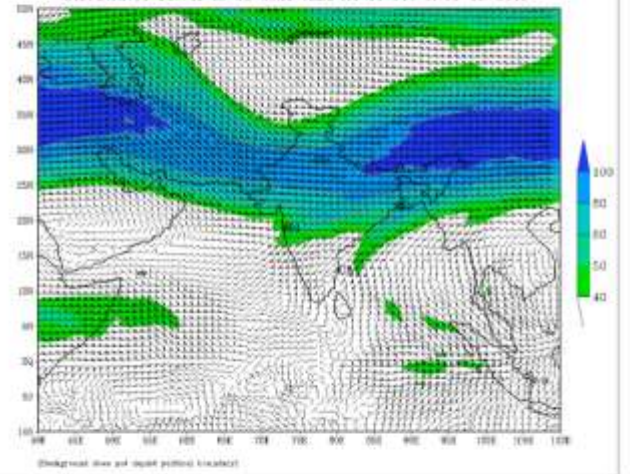
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 08-12-2021



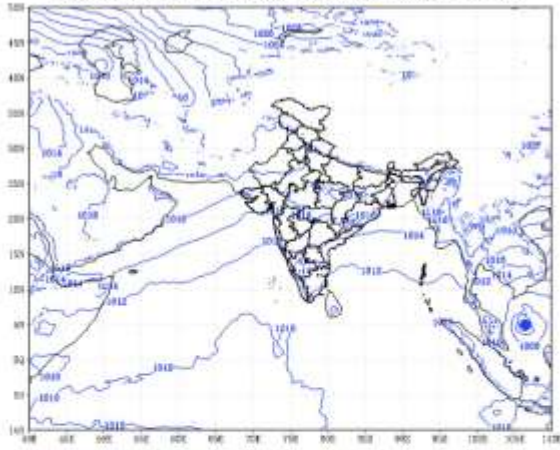
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 08-12-2021



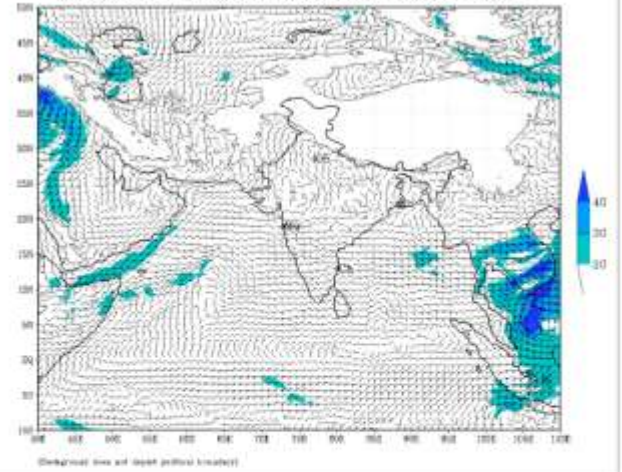
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 08-12-2021



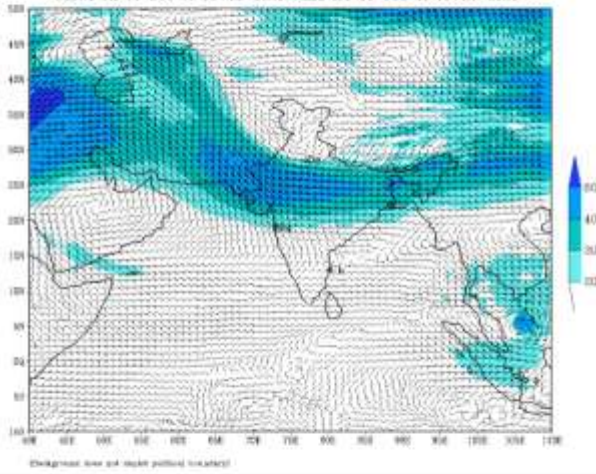
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 09-12-2021



IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 09-12-2021



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 09-12-2021



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 02-12-2021 valid for 00 UTC of 09-12-2021

