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

Tropical Cyclone Forecast Programme
Report Dated 14th November, 2022

Time of Issue: 1200 UTC

Synoptic features (based on 0600 UTC analysis):

- Yesterday's Low Pressure Area (LPA) over southeast Arabian Sea off Kerala coast became less marked and lay as cyclonic circulation over southeast Arabian Sea and adjoining areas of Lakshadweep Islands at 0000 UTC and lay over southeast Arabian Sea at 0300 UTC of today, the 14th November, 2022. It persisted over the same region at 0900 UTC.
- A Low pressure area is likely to form over Southeast Bay of Bengal & neighbourhood around 16th November, 2022.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	About 29-31°C over major parts of BoB and 26-28°C over a small pocket southwest BoB and Comorin area.	29-31°C over extreme north AS, along and off south Gujarat & Maharashtra coasts and southeast AS, adjoining southwest AS & adjoining EIO. 26-28°C over remaining parts of AS with less than 24°C off Oman & Somalia coast, Socotra Islands and adjoining parts of southwest and westcentral AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	>110 KJ/cm^2 over eastcentral BoB & south Andaman Sea and adjoining southeast BoB, 90-100 KJ/cm^2 over south BoB BoB, off north Andhra Pradesh coast, coastal Odisha, coastal West Bengal, northeast BoB, & less than 40 over westcentral and southwest BoB off south AP and Tamil Nadu coasts & Comorin Area.	a. 90-100 over south parts of Maldives, 70-80 over southeast AS & adjoining eastcentral AS, adjoining southwest AS. b. Less than 30 KJ/cm^2 over remaining AS and also off west coast of India.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	Positive vorticity of 40-50 over south Andaman Sea, 20-30 off Sri Lanka coast, Gulf of Mannar & adjoining EIO, northeast BoB.	Positive vorticity of 40-50 over southeast AS, 20-30 over northern parts of central AS, southwest parts of central AS.

Low Level convergence ($X10^{-5}$ s^{-1})	About 05-10 over southeast and adjoining southwest BoB, 05 over south Andaman Sea, o5-10 over Gulf of Mannar.	10-15 over off kerala coast, Maldives, Lakshadweep, Comorin areas, 05 over south parts of central AS
Upper Level divergence ($X10^{-5}$ s^{-1})	05-10 over southwest BoB and adjoining westcentral BoB.	Positive zone 05-10 over southeast AS and adjoining eastcentral AS.
Vertical Wind Shear (VWS knots)	Moderate 10-20 knots over southwest and adjoining westcentral BoBm off Tamil Nadu coast, 25 over central parts of BoB and north BoB.	05-10 over southeast & central AS, 10-15 over westcentral and adjoining southwest AS and over off Somalia & Yemen coasts. 30-40 over north AS.
Wind Shear Tendency (knots)	Decreasing over southeast BoB and south Andaman Sea. Increasing over westcentral BoB and adjoining south and north BoB.	Decreasing over southeast AS, central and adjoining north AS. Increasing over southwest AS and off Oman coast.
Upper tropospheric Ridge	Along 16.0°N over the BoB.	Along 17.0°N over the AS.
Trough in westerlies		

Satellite observations based on INSAT imagery (0900 UTC):

(a) Over the BoB & Andaman Sea:-

Scattered to broken low/medium clouds with embedded intense to very intense convection lay over south and adjoining central BoB and Andaman Sea. Scattered to broken low/medium clouds with embedded intense to very intense convection lay over eastcentral BoB.

(b) Over the Arabian Sea:-

Scattered to broken low/medium clouds with embedded intense to very intense convection lay over central AS, Lakshadweep Islands and Comorin area.

M.J.O. Index:

MJO index is currently in Phase 5 with amplitude more than 1. It will continue in same phase for next 5 days. Thereafter, it would move to phase 6 with amplitude remaining more 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	BoB	AS
IMD-GFS	A cycir over south Andaman Sea & adjoining southeast BoB on 14th & 15th, LPA over Andaman Sea on 16th, Well marked Low Pressure Area (WML) over	Cycir over southeast Arabian Sea to move nearly westwards towards Somalia coast till 19th October.

	southeast BoB on 17th, over southeast & adjoining southwest BoB on 18th, over southwest BoB on 19th,, 20th, 21st,, LPA over southwest BoB on 22nd, 23rd, LPA off south Sri Lanka coast on 24th,	
IMD-GEFS	A cycir over south Andaman Sea & adjoining southeast BoB on 14th & 15th, LPA over Andaman Sea on 16th, WML over southeast BoB on 17th, over southeast & adjoining southwest BoB on 18th, depression over southwest BoB on 19th, WML over southwest BoB on 19th, WML/depression over southwest BoB on 20th & 21st, WML over southwest BoB near TN coast on 22nd.	Cycir over southeast Arabian Sea to move nearly westwards towards Somalia coast till 18th October.
GEFS Probablistic guidance	Not available	Not available
IMD WRF	A cycir over south Andaman Sea & adjoining southeast BoB on 14th & 15th, LPA over Andaman Sea on 16th, Well marked Low Pressure Area (WML) over southeast BoB on 17th.	Cycir over southeast Arabian Sea to move nearly westwards towards southwest Arabian Sea coast till 17th October.
NCMRWF-NCUM	Cycir over south Andaman Sea on 15th, to move west-northwestwards, LPA over south Andaman Sea on 16th, WML over eastcentral & adjoining southeast BoB on 17th, WML over same region on 18th & 19th, weakening indicated on 19th and system is lying as an LPA over westcentral BoB on 20th, over westcentral BoB off North TN-South A coasts on 21st	The cycir over SE AS on 14th to move nearly westwards towards Somalia coast till 19th
NCMRWF-NEPS	Cycir over south Andaman Sea on 14th, 15th, LPA over southeast BoB on 16th, WML over southeast BoB on 17th, WML/depression over eastcentral BoB on 18th, 19th, over westcentral BoB on 20th, depression over westcentral BoB on 21st , LPA over westcentral BoB off North TN coast on 21st.	Cycir over southeast AS to move westwards towards southwest AS till 17th.
NCMRWF-UM (Regional)	Cycir over south Andaman Sea on 15th, to move west-northwestwards, LPA over south Andaman Sea on 16th, WML over eastcentral & adjoining southeast BoB on 17th	The cycir over SE AS on 14th to move nearly westwards towards Somalia coast till 17th
ECMWF	A cycir over south Andaman Sea on 14th with west-northwestwards movement and will become LPA on 16th Nov, to move westwards towards TN coast without significant intensification. Fresh low pressure likely over central Andaman Sea on 23rd/24th.	A cycir over southeast AS on 14th to move westwards till 19th Nov.
ECMWF ensemble	30-40% probability of cyclogenesis over south BoB during 17th-20th.	30-40% probability of cyclogenesis over south AS during next 2-3 days
NCEP-GFS	LPA over south Andaman Sea and adjoining southeast BoB on 15th, WML over eastcentral BoB on 16th, depression over westcentral and adjoining eastcentral BoB on 17th/18th, deep depression on 18th/19th, will move west-northwestward and will weaken	The cycir over SE AS would move west northwestward till 20th.

	further.	
IMD MME	-	-
IMD HWRF	Available during cyclonic disturbance period only	Available during cyclonic disturbance period only.
IMD-Genesis Potential Parameter	A potential zone over Andaman Sea on 16th Nov, over south BoB & another over south Andaman Sea on 17th, over southeast & adjoining eastcentral BoB on 18th, eastcentral BoB on 19th, westcentral BoB on 20th, westcentral BoB off AP coast on 21st	No potential zone over Arabian Sea

Summary and conclusion:

- Most of the models IMD GFS, GEFS, NCEP GFS, ECMWF suggest that the cyclonic circulation over southeast Arabian Sea would move westwards without any significant intensification during next 3-4 days.
- Most of models are also indicating development of fresh cyclonic circulation over south Andaman Sea around 14th, low pressure area over southeast BoB and adjoining Andaman Sea around 16th. Regarding further intensification only NEPS and ECMWF EPS are indicating development into a depression over southwest & adjoining westcentral BoB around 18th. It may maintain intensity of depression for two days and weaken thereafter gradually while moving west-northwestwards towards Tamil Nadu and Puducherry coast.
- A Fresh low pressure is also likely over central Andaman Sea on 23rd/24th.

In view of all the above, it is inferred that

1. For the Bay of Bengal:

- **There is likelihood of development of a fresh cyclonic circulation over south Andaman Sea/ southeast BoB around 15th Nov. It is likely to move west-northwestwards and intensify gradually becoming low pressure area around 16th and depression around 18th. Thereafter, the intensification and movement of this system need to be monitored.**
- **A Fresh low pressure is also likely over central Andaman Sea on 23rd/24th.**

2. For the Arabian Sea:

- **The cyclonic circulation over southeast Arabian Sea is likely to move nearly westwards maintaining intensity upto 16th and weaken gradually thereafter.**

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

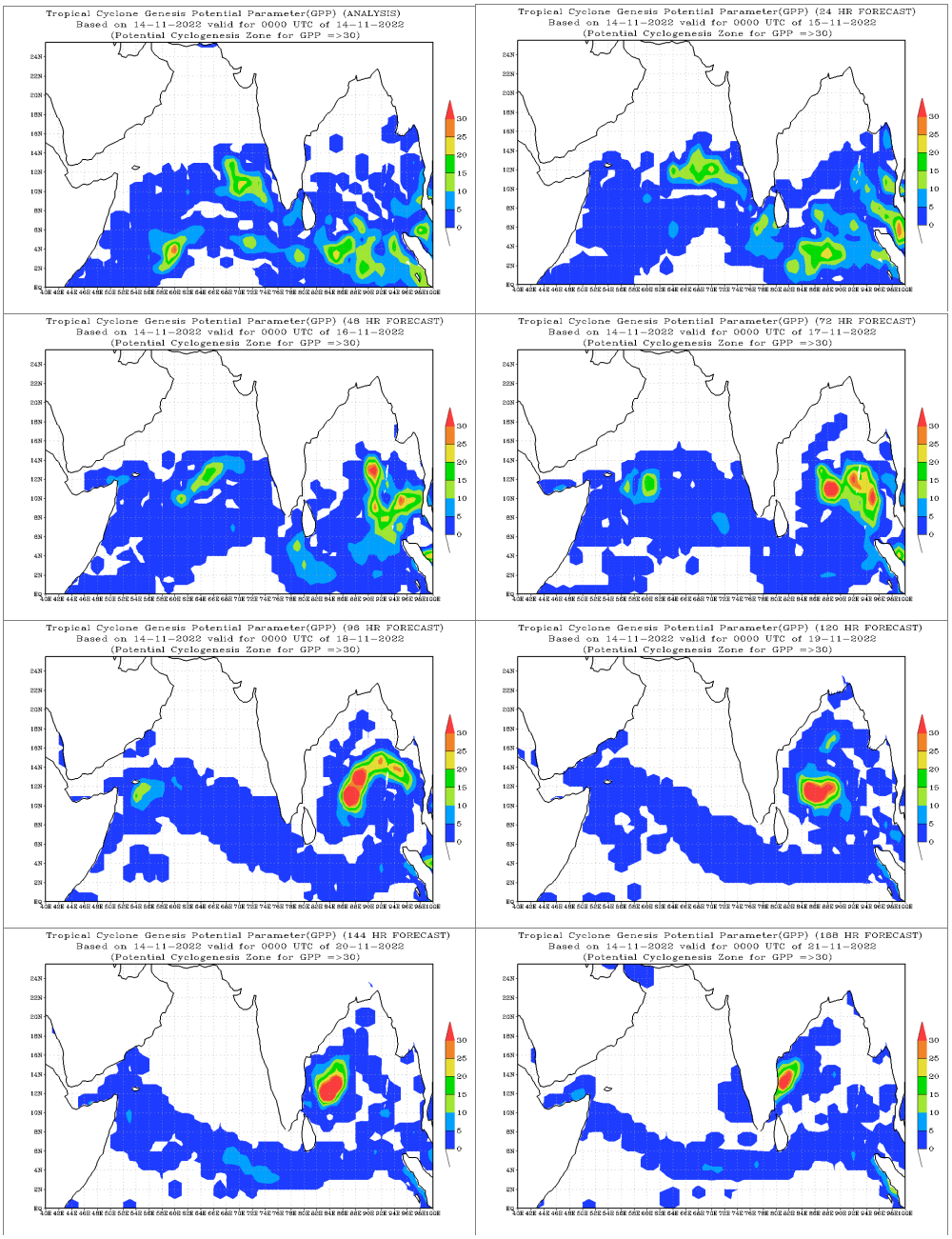
24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	NIL	LOW	LOW	LOW

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 possible cyclogenesis as indicated above needs to be watched and monitored.
IOP: Nil.

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 14-11-2022 valid for 0000 UTC of 14-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 14-11-2022 valid for 0000 UTC of 15-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 14-11-2022 valid for 0000 UTC of 16-11-2022
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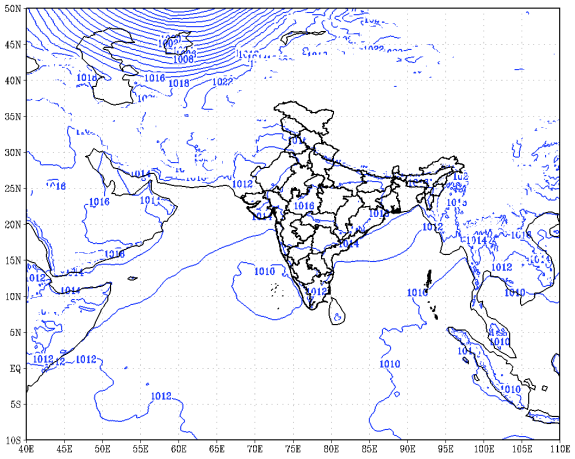
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 14-11-2022 valid for 0000 UTC of 20-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 14-11-2022 valid for 0000 UTC of 21-11-2022
(Potential Cyclogenesis Zone for GPP =>30)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 14-11-2022



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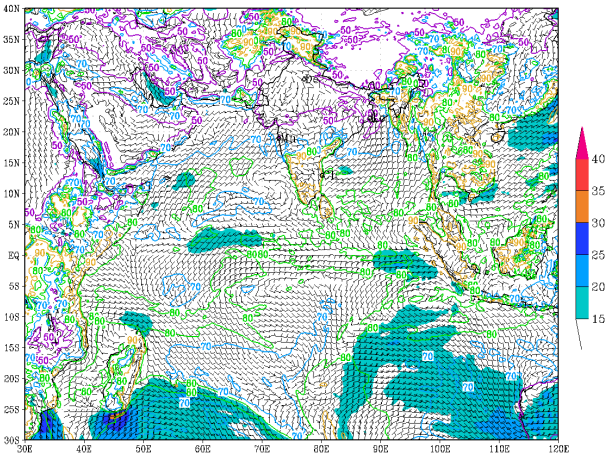
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 14-11-2022



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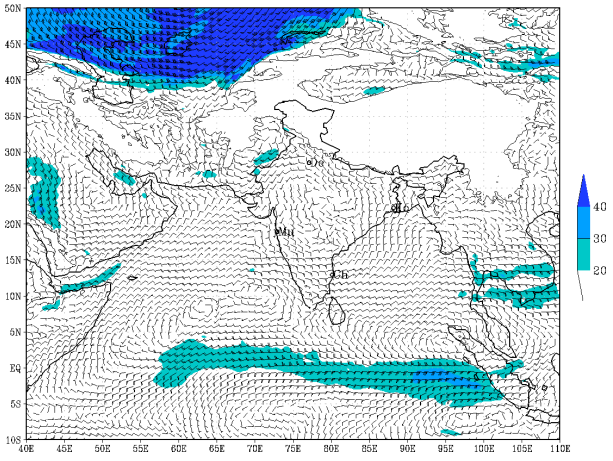

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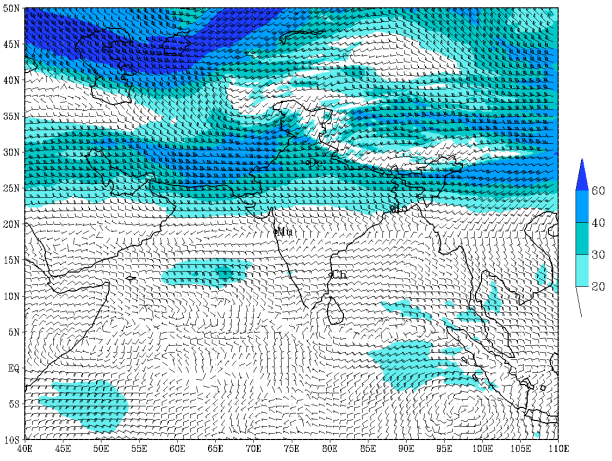

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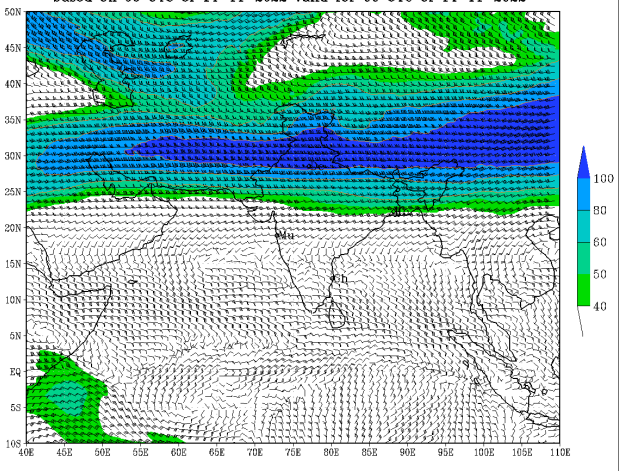

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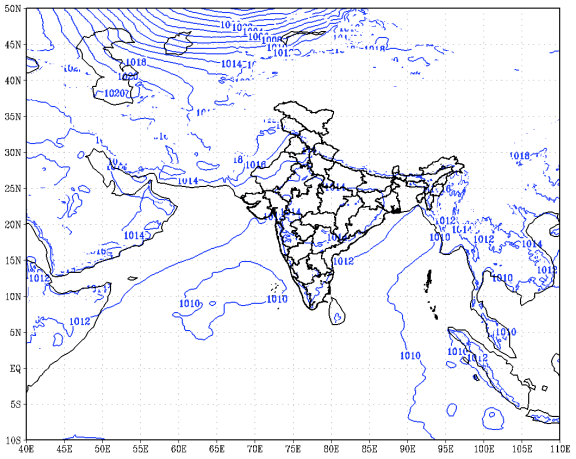

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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)

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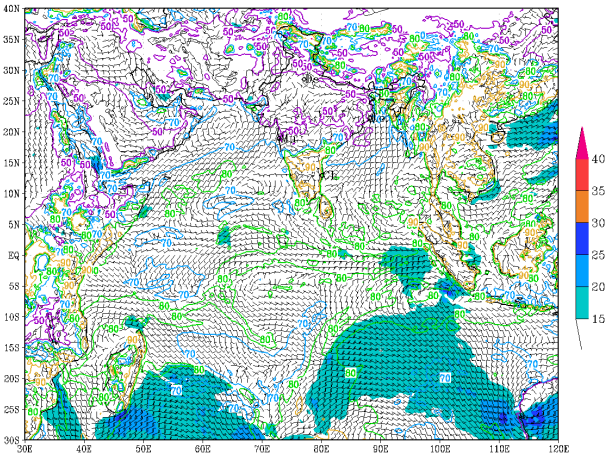

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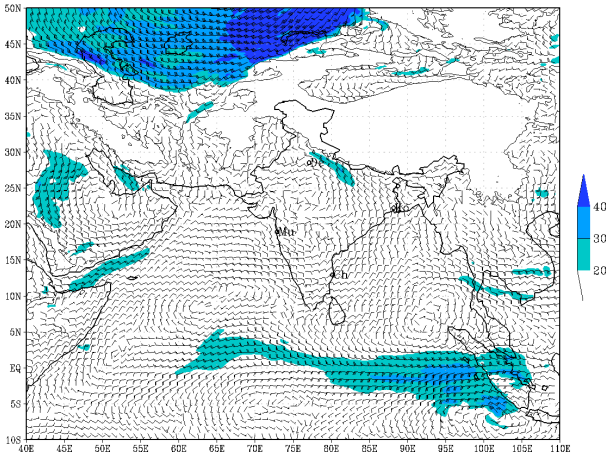

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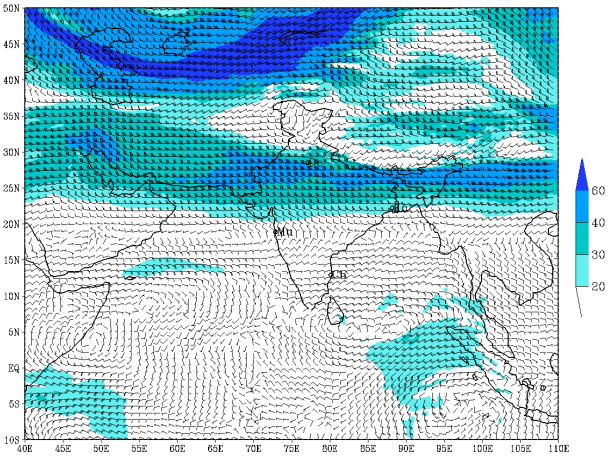

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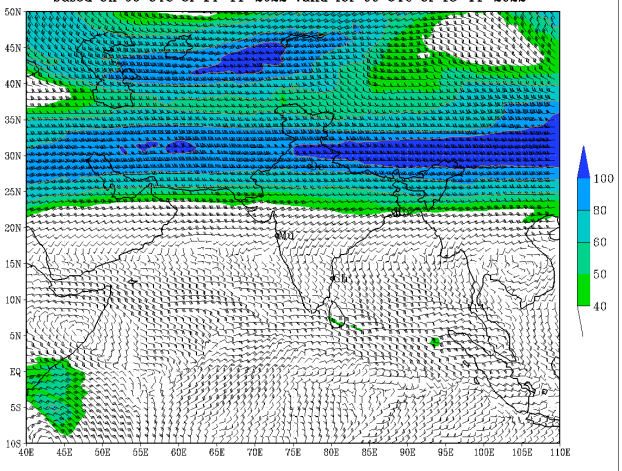

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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (48 HR)

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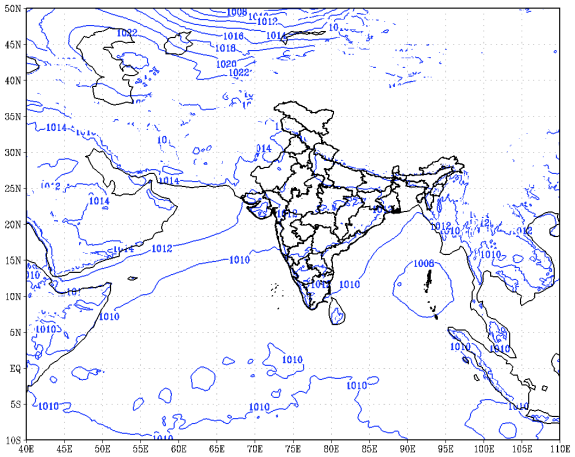

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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)

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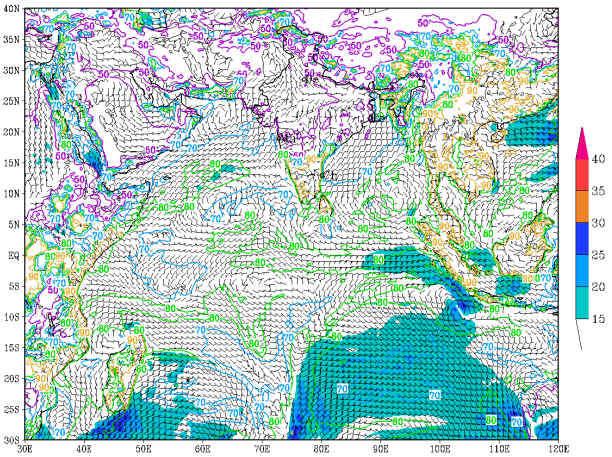

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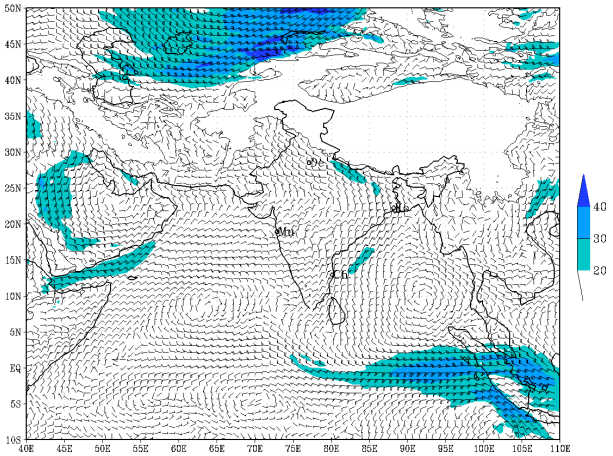

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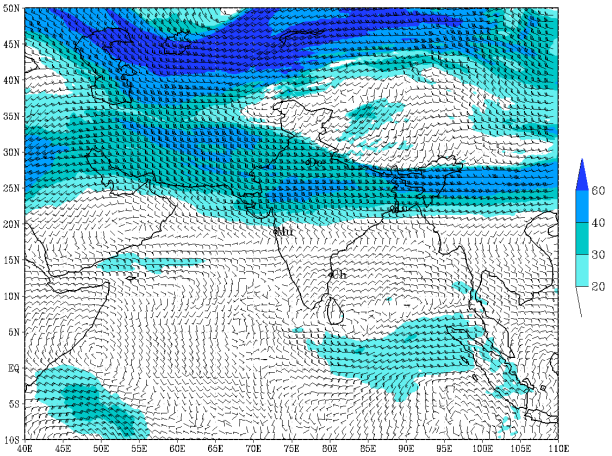

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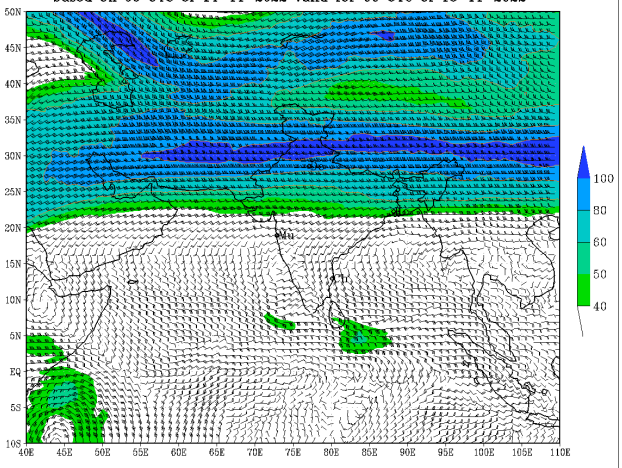

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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)

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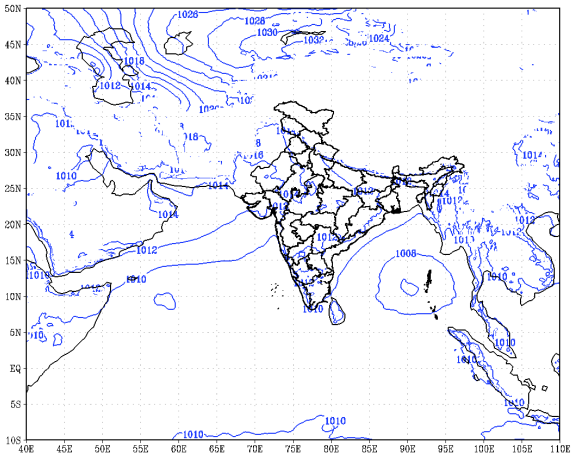

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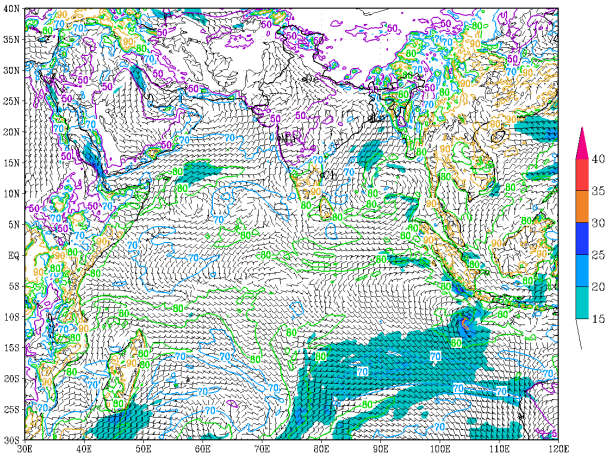
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)

based on 00 UTC of 14-11-2022 valid for 00 UTC of 17-11-2022



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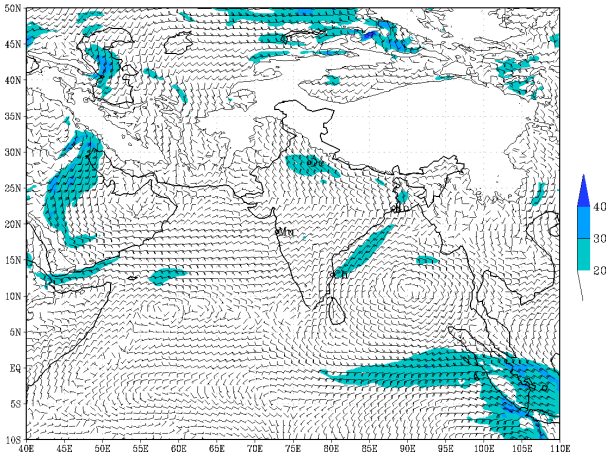

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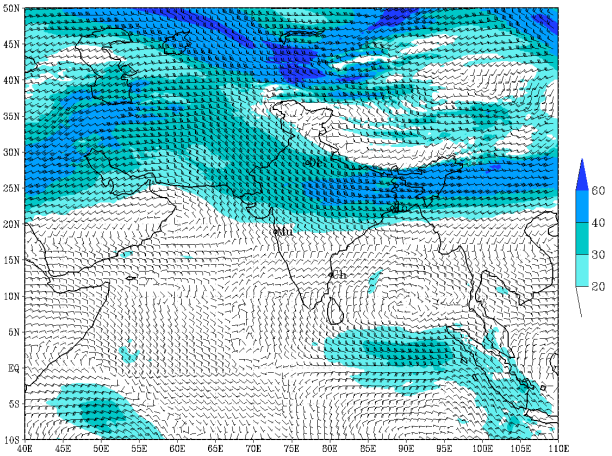

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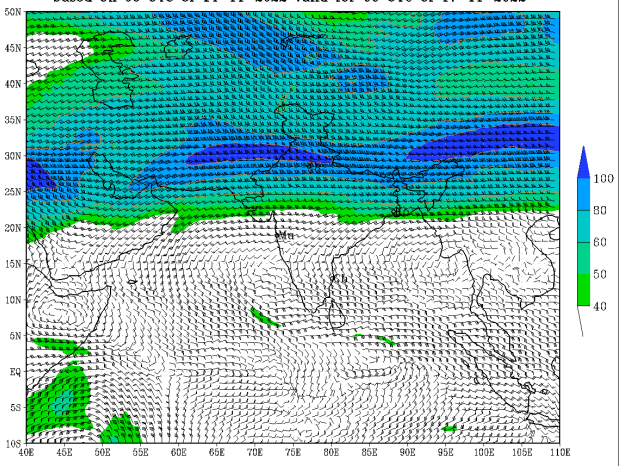

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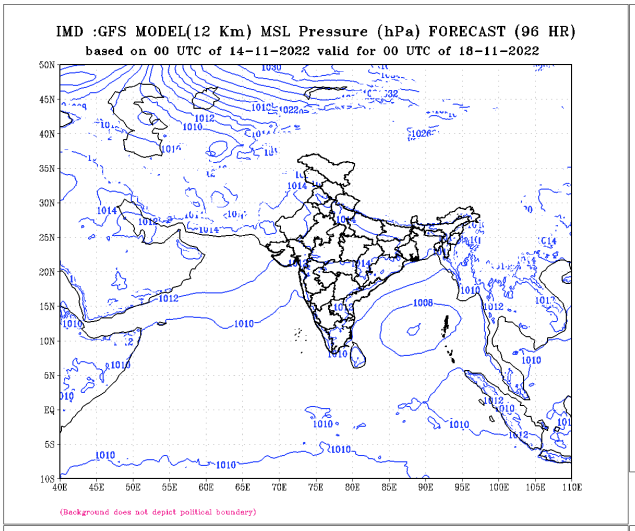
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 18-11-2022
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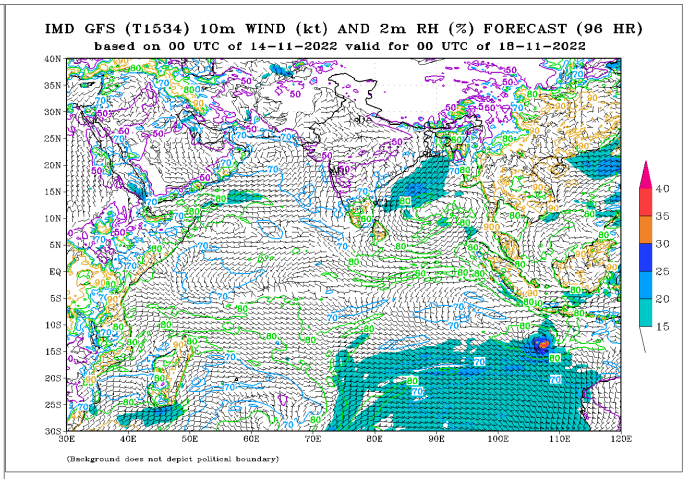
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 18-11-2022
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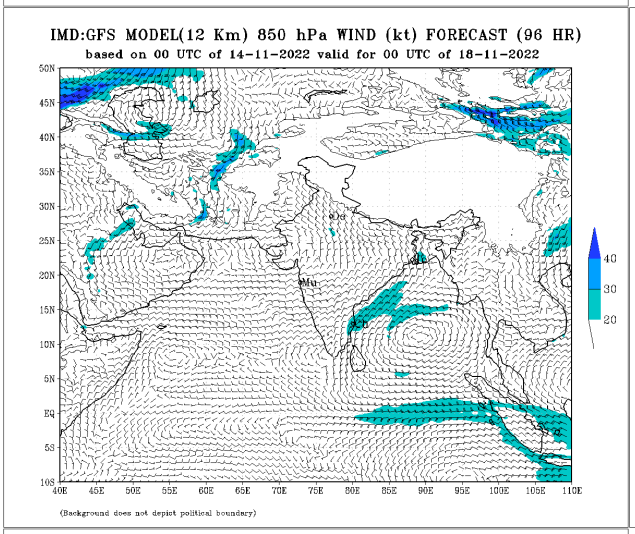
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 18-11-2022
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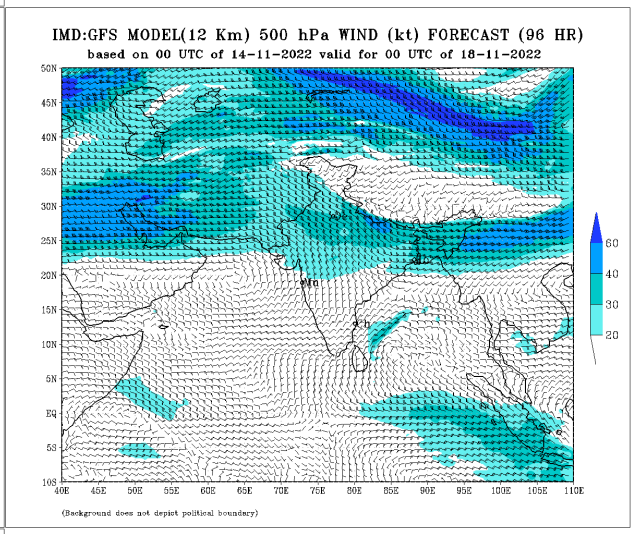
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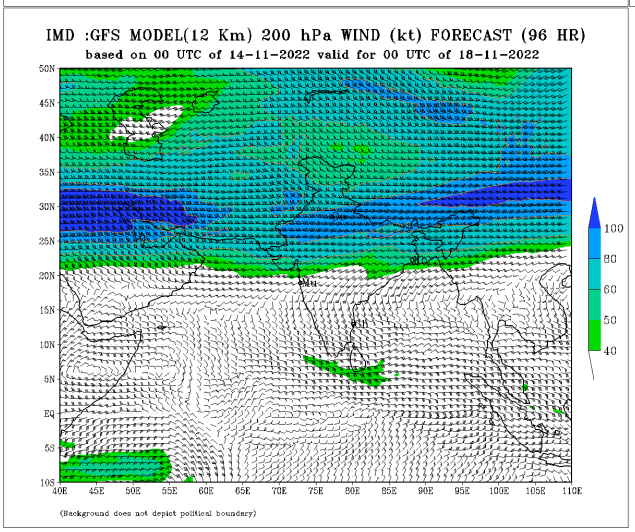
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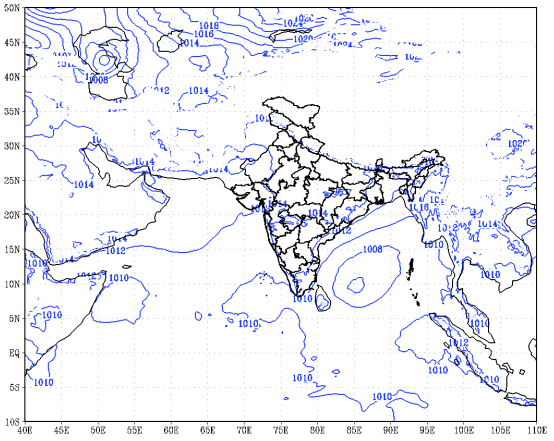
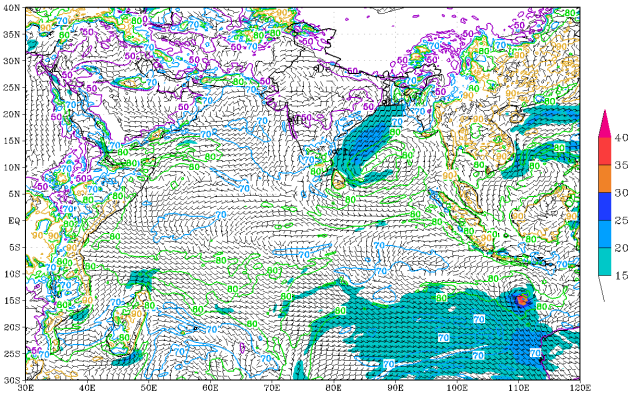
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 19-11-2022



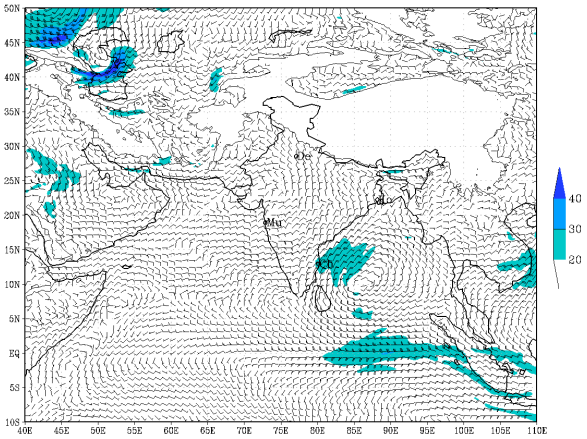
(Background does not depict political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 19-11-2022



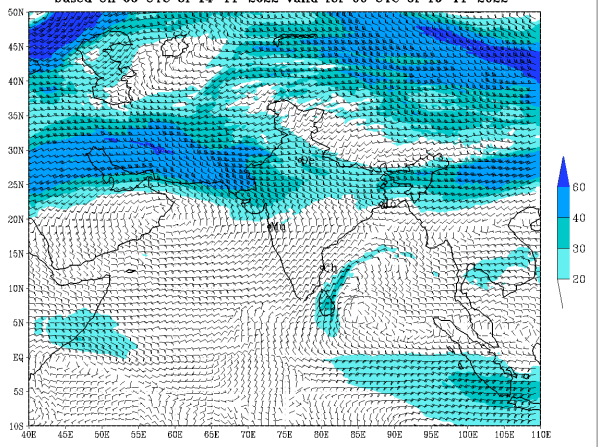
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 19-11-2022



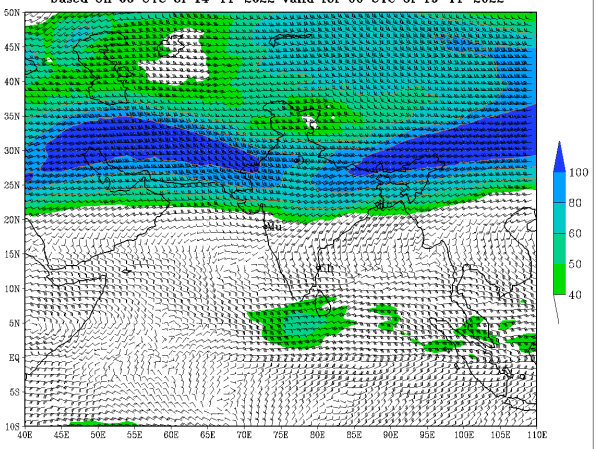
(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 19-11-2022

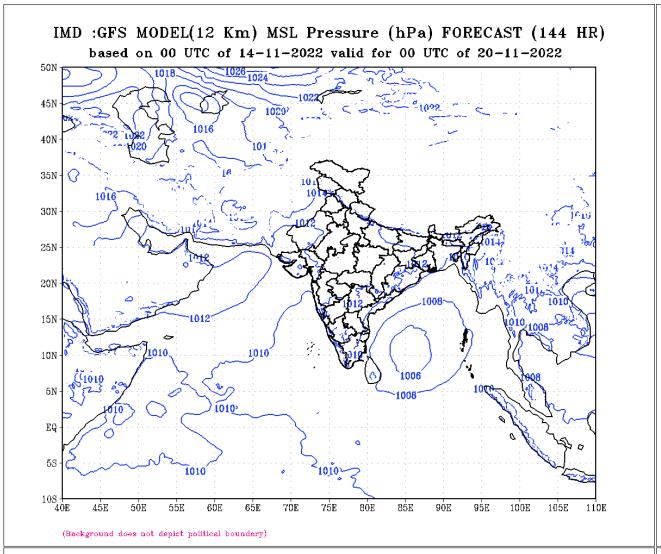


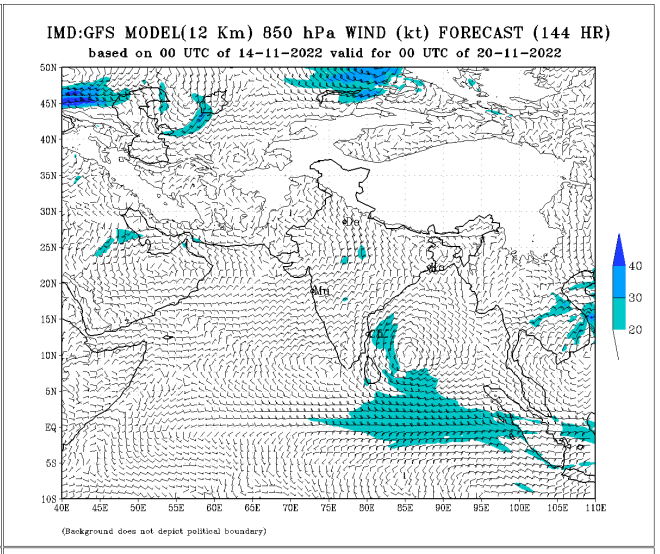
(Background does not depict political boundary)

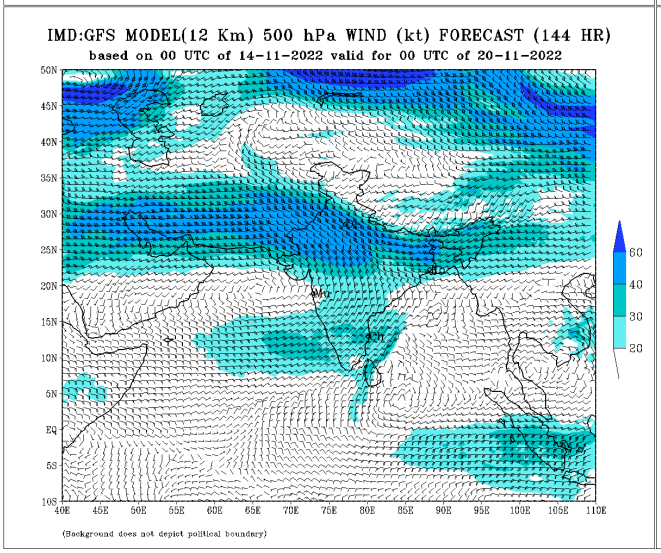
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 19-11-2022

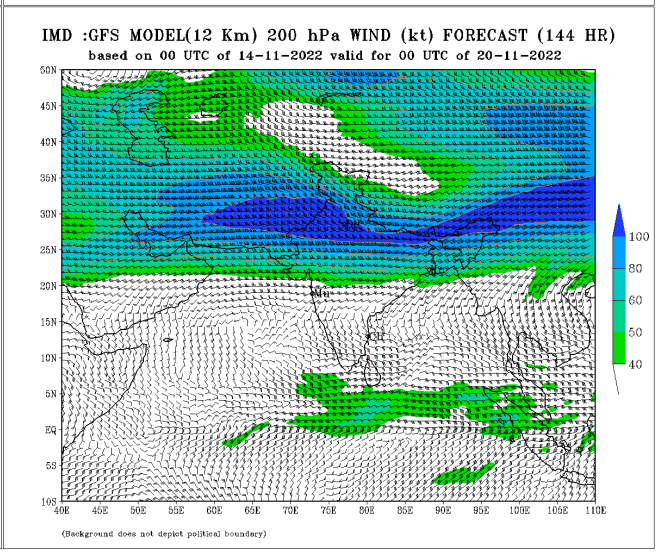


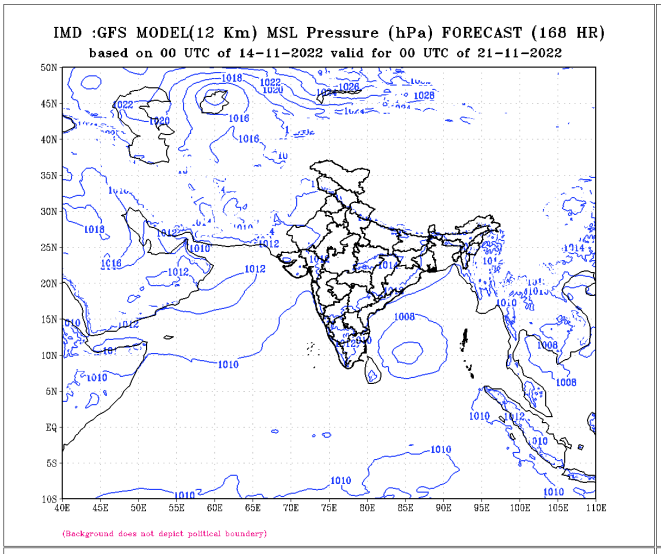
(Background does not depict political boundary)

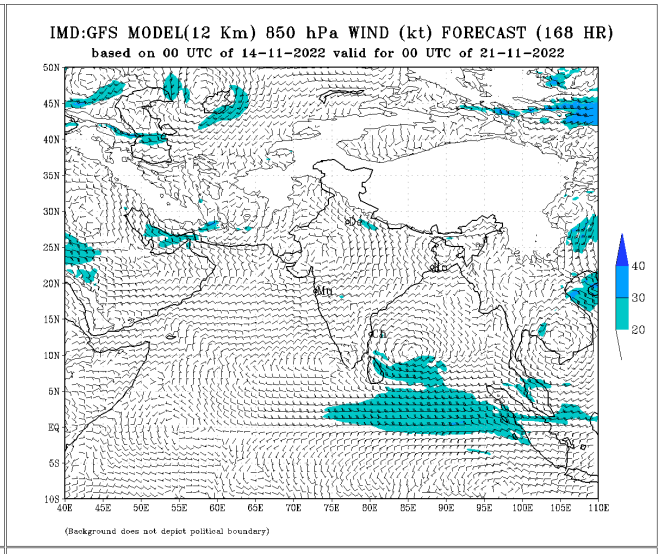

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 20-11-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 20-11-2022
40
30
20
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 20-11-2022
60
40
30
20
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 20-11-2022
100
80
60
50
40
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 21-11-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 21-11-2022
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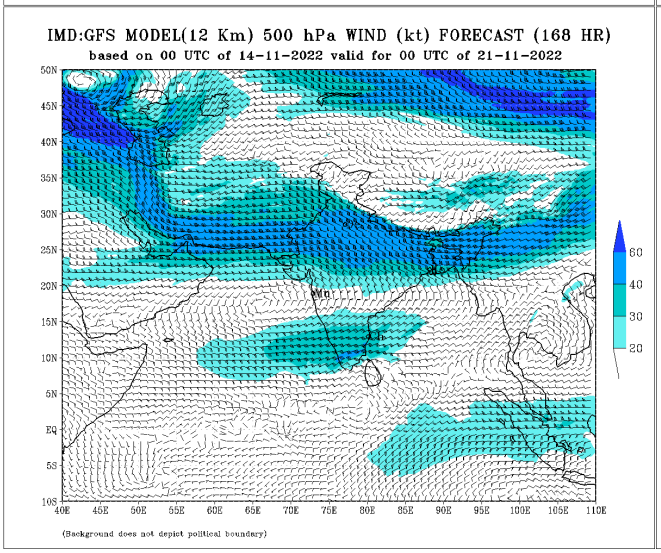
20
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 21-11-2022
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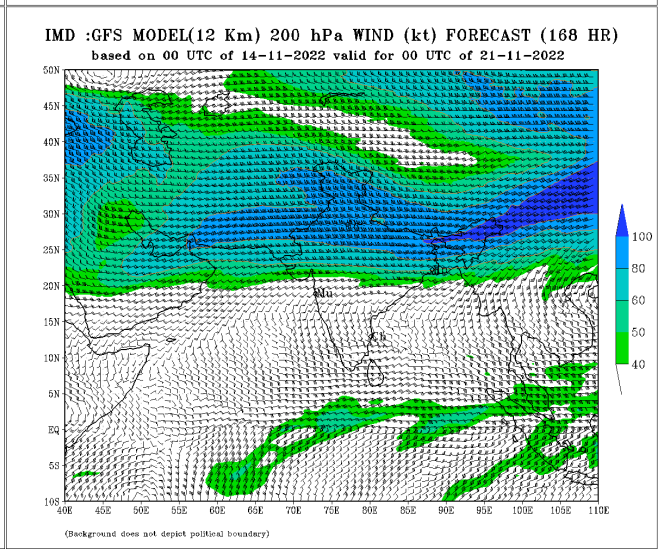
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 14-11-2022 valid for 00 UTC of 21-11-2022
100
80
60
50
40
(Background does not depict political boundary)