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

Tropical Cyclone Forecast Programme
Report Dated 19th December 2022

Time of Issue: 1200 UTC

Synoptic features (based on 0600 UTC analysis):

- Yesterday's well marked low pressure area over westcentral Arabian Sea weakened into a low pressure area over the same region at 0600 UTC/1130 hours IST of today, the 19th December. It is very likely to move west-southwestwards and weaken slowly over the same region.

- Yesterday's Low Pressure Area over central parts of South Bay of Bengal persisted over the same region at at 0600 UTC/1130 hours IST of today, the 19th December. It is likely to move slowly west-northwestwards slowly towards Sri Lanka coast during next 2 days.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	28-29℃ over entire BoB except southern parts of southwest BoB and Gulf of Mannar where the same is 26-28.	26-27℃ over Eastcentral and southeast and adjoining southwest AS, 26-27 over Westcentral and southwest AS.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	90-100 over eastcentral BoB, 90-100 over south Andaman Sea, southeast BoB adjoining Equatorial Indian Ocean (EIO). Less than 40 along the Andhra Pradesh and Tamil Nadu coasts, Gulf of Mannar, western parts of southwest BoB.	70-90 over southeast and adjoining eastcentral and adjoining southwest AS, and less than 40 over remaining AS and also off west coast of India, Comorin area.
Cyclonic Relative vorticity (X10^{-6}s^{-1})	40-50 over Equatorial Indian Ocean & adjoining South Bay of Bengal. 30-40 over North Bay off Bangladesh coast.	30-40 over Southwest Arabian Sea.
Low Level convergence (X10^{-5} s^{-1})	10-15 over Equatorial Indian Ocean & adjoining Southwest Bay of Bengal off Sri Lanka coast. 05 over small pockets over south Bay of Bengal & South Andaman Sea.	5-10 over Southwest and adjoining Westcentral Arabian sea off North Somalia coast.
Upper Level divergence (X10^{-5} s^{-1})	20 over southwest BoB off South Sri Lanka Coast. 10 over Southeast BoB and adjoining South Andaman Sea.	05-10 over Westcentral Arabian Sea off Oman coast.

Vertical Wind Shear (VWS knots)	10-15 kt over South Bay of Bengal.	15-20 over Southeast Bay of Bengal off Kerala coast.
Wind Shear Tendency (knots)	Decreasing over southeast BoB and adjoining EIO and over eastcentral BoB.	Decreasing around system.
Upper tropospheric Ridge	11°N over the Bay of Bengal.	10°N over the Arabian Sea.
Trough in westerlies	Deep trough near 10°N / 45°E	

Satellite observations based on INSAT imagery (0600 UTC):--Santosh

a) Over the BoB & Andaman Sea: -

The associated clouds are scattered to broken low and medium clouds with embedded intense to very intense convection over south Bay of Bengal and south Andaman Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over northeast & central Bay of Bengal and north Andaman Sea.

b) Over the Arabian Sea: -

The associated clouds are scattered low and medium clouds with embedded intense to very intense convection over southeast Arabian Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral & southwest Arabian Sea and Comorin area. Scattered low and medium clouds with embedded weak to moderate convection lay over north Arabian Sea.

M.J.O. Index:

The Madden Julian Oscillation (MJO) Index is currently in Phase 2 with amplitude less than 1. It will remain in same phase for next two days with increasing in amplitude. Thereafter, it will move to phase 3.

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

NIL

Model guidance based on 0000 UTC for the next 7 days

MODEL GUIDANCE	Bay of Bengal (BoB)	Arabian Sea (AS)
IMD-GFS	A Low pressure area (LPA) over Southeast Bay of Bengal on 19th, to move gradually westwards reaching near Southeast Sri Lanka coast on 22nd, persisting near Sri Lanka till 23rd and less marked thereafter.	No significant system
IMD-GEFS	LPA over Southeast Bay of Bengal on 19th, moving westwards and reaching Southeast Sri Lanka coast on 21st Dec night. Becoming less marked thereafter.	No significant system
GEFS Probabilistic guidance	-	-

IMD WRF	LPA over Equatorial Indian Ocean (EOI) & adjoining Southeast Bay of Bengal on 19th Dec moving gradually westwards and becoming less marked on 21st Dec.	No significant system
NCMRWF-NCUM (G)	LPA over Southeast & adjoining Equatorial Indian Ocean (EOI). To move westwards reaching off South Sri Lanka coast as a WML on 23rd. Persisting over Same region till 26th. Not showing formation of depression during next 7 days. Crossing Sri Lanka and emerging into Comorin Area as depression on 27th Dec. Deep Depression over Lakshadweep area on 28th Dec. Severe Cyclonic Storm over Southeast Arabian Sea on 29th Dec.	No significant system
NCMRWF-NEPS	LPA over Southeast & adjoining Equatorial Indian Ocean (EOI). To move westwards reaching off South Sri Lanka coast as a WML on 23rd. Persisting over Same region till 26th. Not showing formation of depression during next 7 days. Crossing Sri Lanka and emerging into Comorin Area as depression on 27th Dec. Deep Depression over Lakshadweep area on 28th Dec. Severe Cyclonic Storm over Southeast Arabian Sea on 29th Dec.	No significant system
NCMRWF-UM (Regional)	LPA over Southeast & adjoining Equatorial Indian Ocean (EOI). To move westwards reaching off South Sri Lanka coast as a WML on 23rd.	No significant system
ECMWF	Low over southeast Bay of Bengal on 19th. To move westwards and lie as a depression over central parts of south Bay of Bengal during 20/00-20/03, as a low pressure area during 20/18 to 21/00. Depression over Southwest Bay of Bengal on 21/00. Depression over Southwest Bay of Bengal off Sri Lanka coast on 22/00. Then weakening into a well marked low pressure area. There is no consistency. Off and on model is showing depression and then weakening.	Depression over Comorin on 27th Dec. It is indicating west-northwestwards movement of system and significant intensification.
ECMWF ensemble	Moderate probability of Depression over south Bay of Bengal during 22nd -25th Dec..	No significant system
NCEP-GFS	No significant system	No significant system
IMD MME	No guidance available	No significant system
IMD HWRF	No guidance	No guidance
IMD-Genesis Potential Parameter (GPP)	A significant potential zone over Southeast Bay of Bengal on 20th Dec., moving gradually westwards towards Southwest & adjoining Westcentral Bay of Bengal till 22nd Dec and becoming less marked thereafter	No Significant area

Summary and conclusion:

- All of the models are indicating no significant system over Arabian Sea during next seven days. However, NCUM and ECMWF are indicating the low pressure area to emerge into Comorin area as a depression around 27th December with northwestwards movement and significant intensification.

- Most of the models are indicating that the low-pressure area over central parts of south Bay of Bengal would move nearly west-northwestwards slowly towards Sri Lanka coast during next 2 days. However, ECMWF is indicating slight intensification of this system.

In view of all the above, it is inferred that

1. For the Bay of Bengal:

The low pessure area over central parts of South Bay of Bengal is likely to move slowly west-northwestwards towards Sri Lanka coast during next 2 days.

2. For Arabian Sea:

The low pressure area over westcentral Arabian Sea is very likely to move west-southwestwards and weaken slowly over the same region.

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	NIL	NIL	NIL

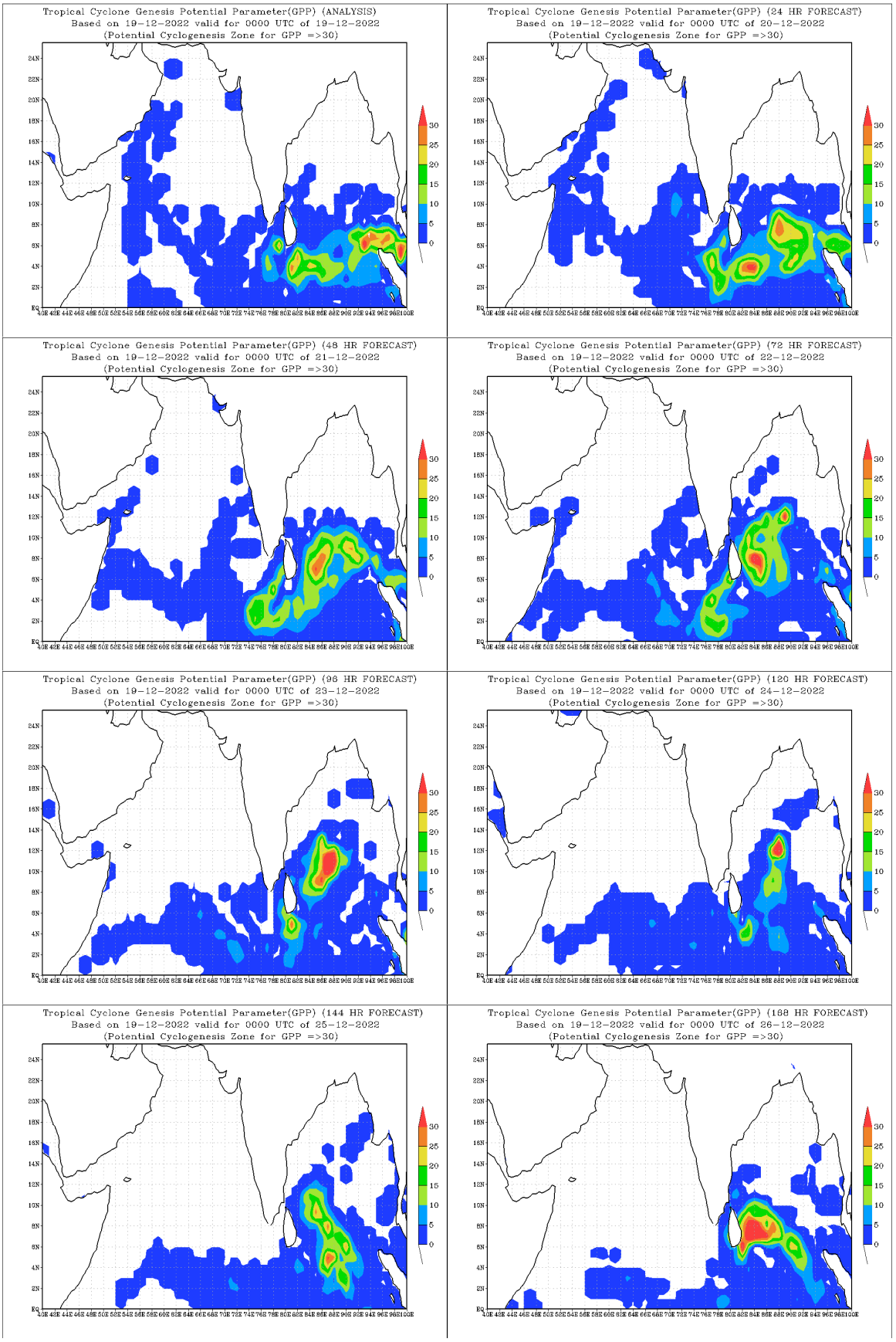
Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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 emergence of existing low pressure area over Bay of Bengal into Comorin Area around 27th December and it's further movement and intensification need to be critically monitored.

IOP: NIL

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 19-12-2022 valid for 0000 UTC of 19-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 20-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 21-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 22-12-2022
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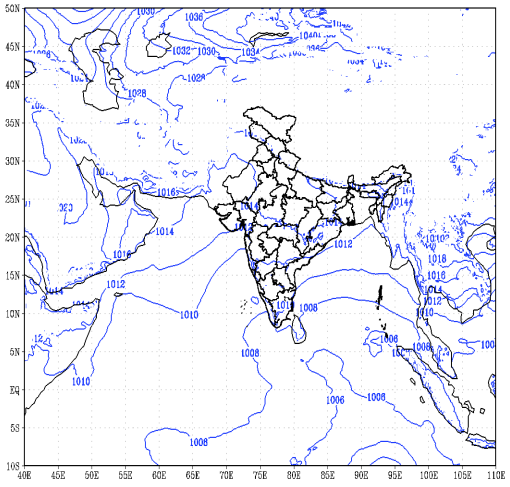
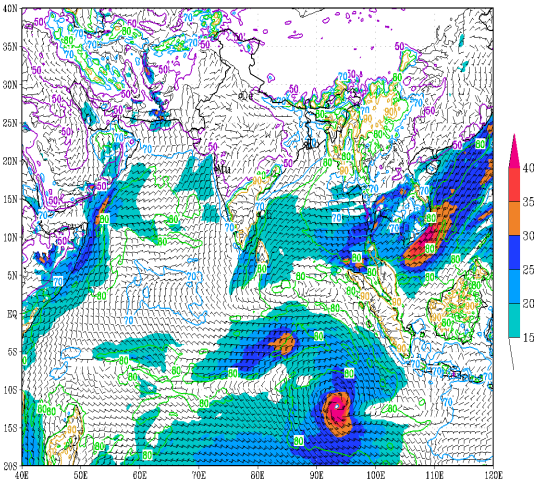
Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 23-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 24-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 25-12-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 19-12-2022 valid for 0000 UTC of 26-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (00 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 19-12-2022



(Background does not depict political boundary)

IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (00 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 19-12-2022



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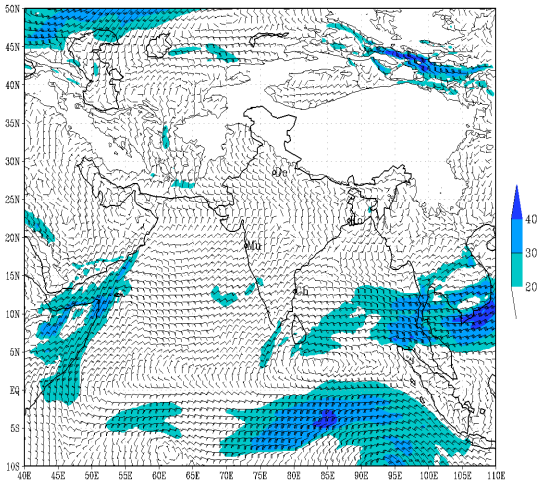

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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (00 HR)
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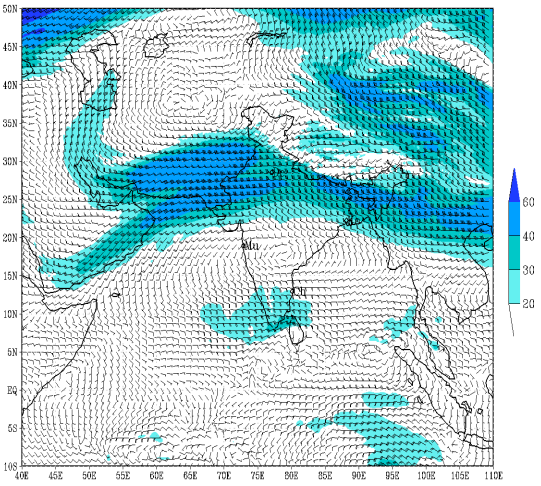

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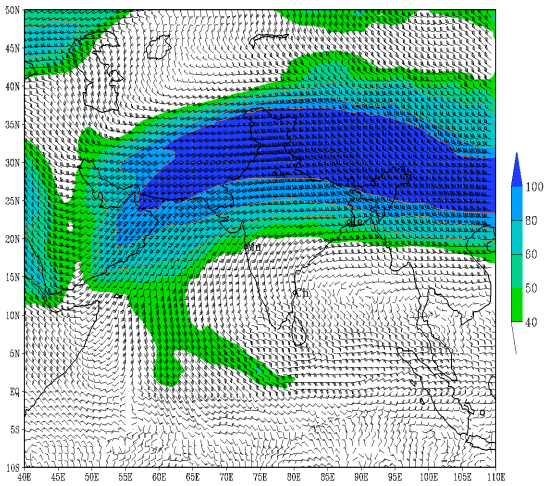

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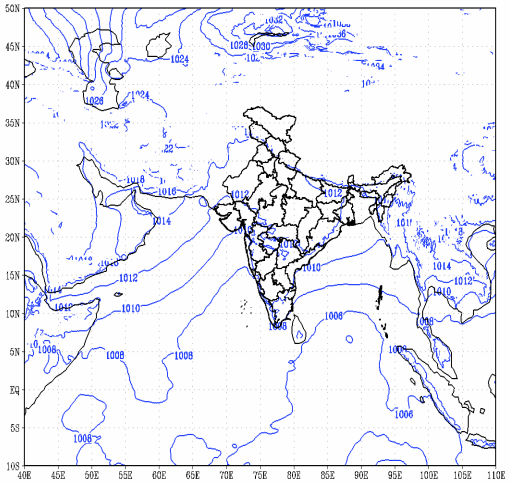
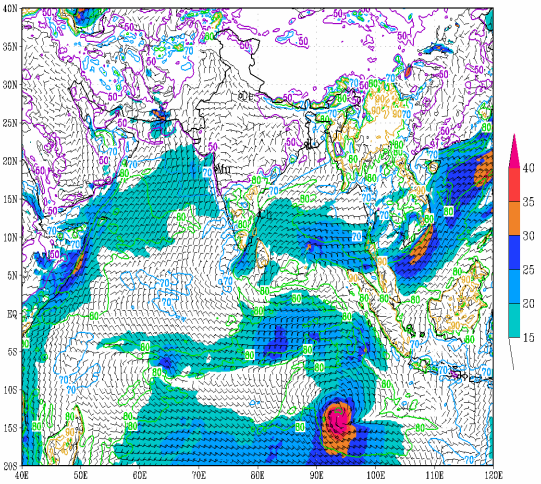
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 20-12-2022



IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (24 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 20-12-2022



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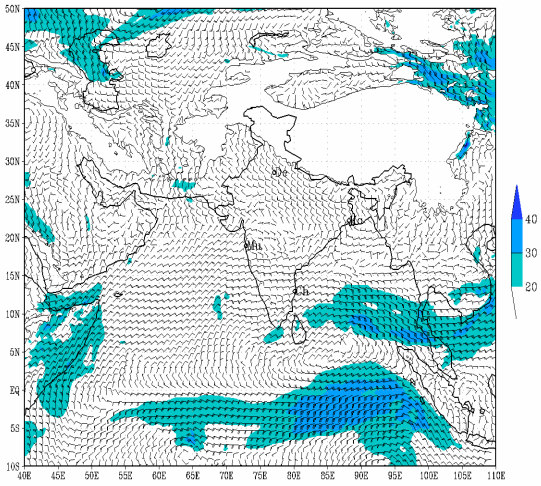
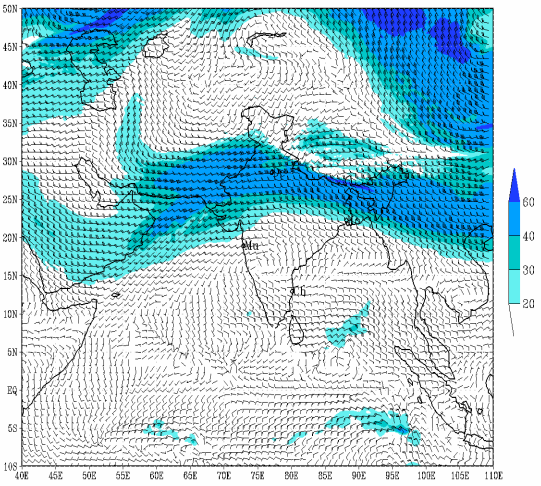
based on 00 UTC of 19-12-2022 valid for 00 UTC of 20-12-2022



IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (24 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 20-12-2022



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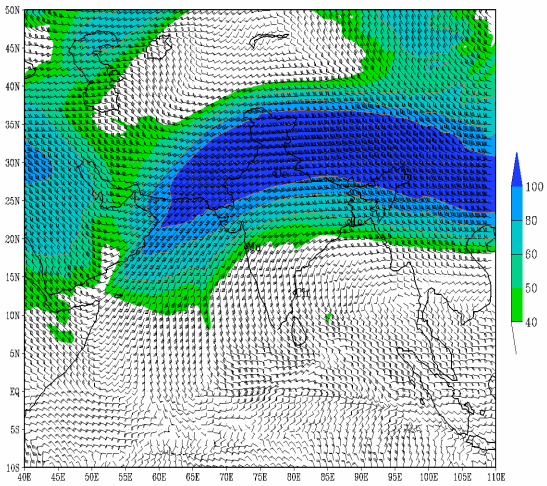
based on 00 UTC of 19-12-2022 valid for 00 UTC of 20-12-2022



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

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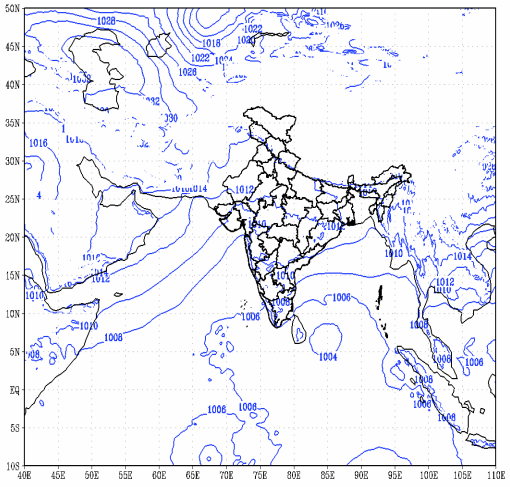

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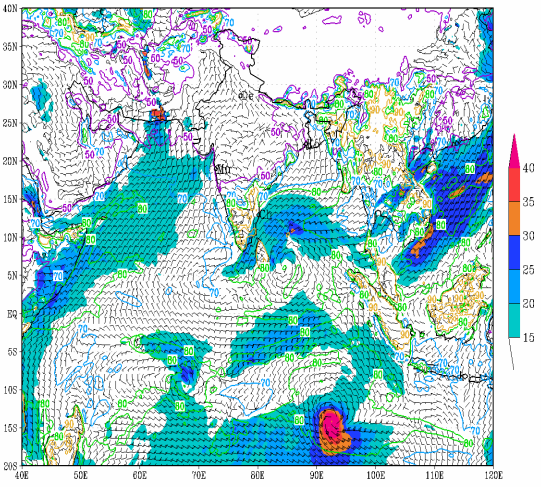
IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (48 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 21-12-2022



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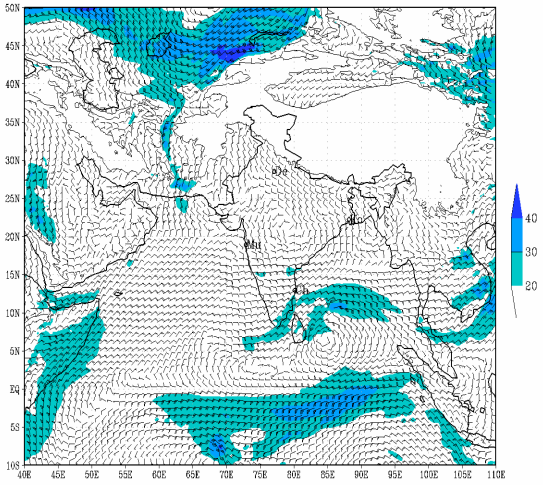
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (48 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 21-12-2022



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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (48 HR)

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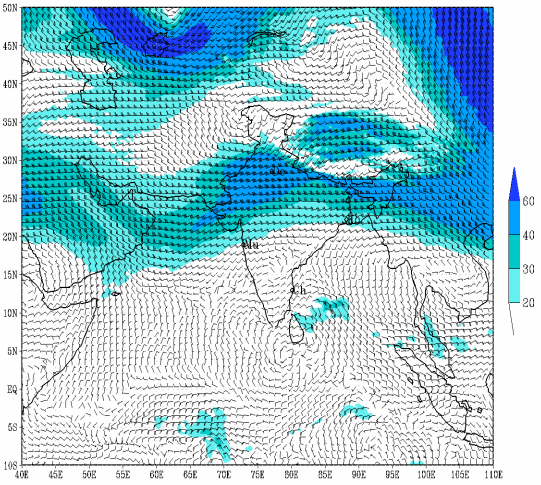

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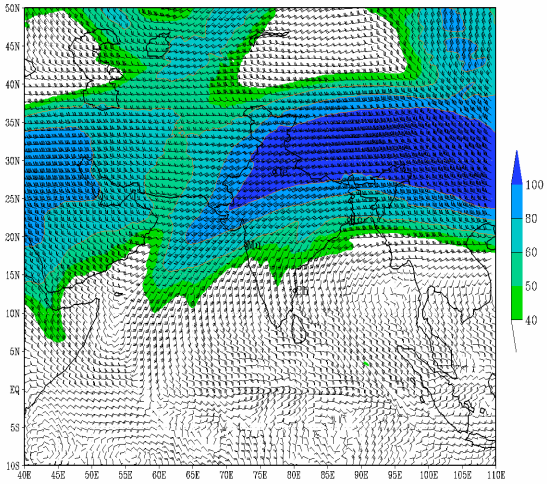

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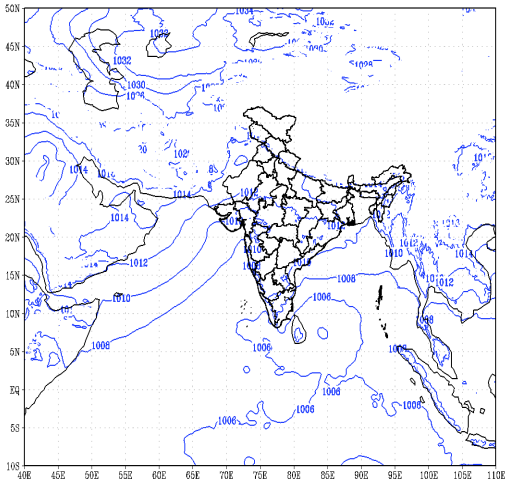
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 22-12-2022



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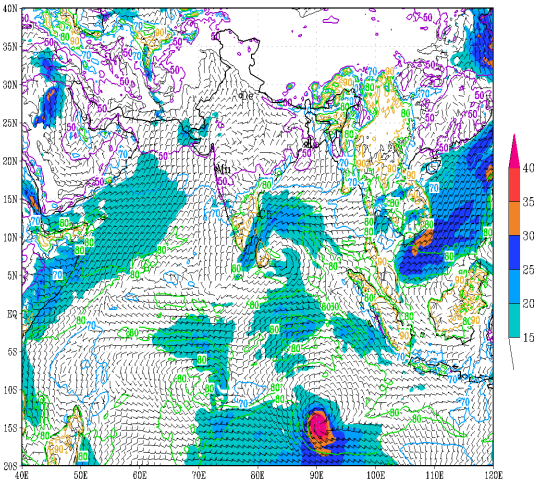
IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (72 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 22-12-2022



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IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (72 HR)

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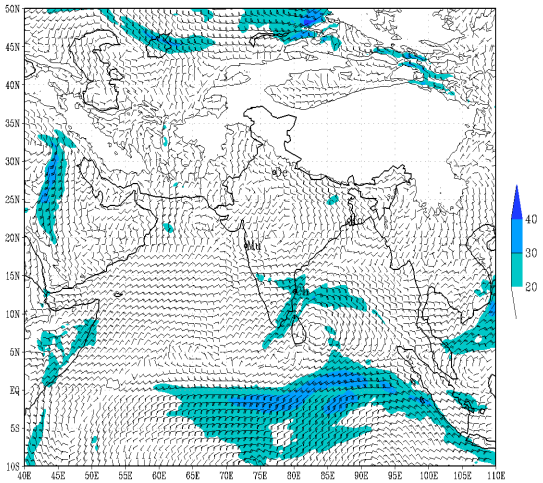

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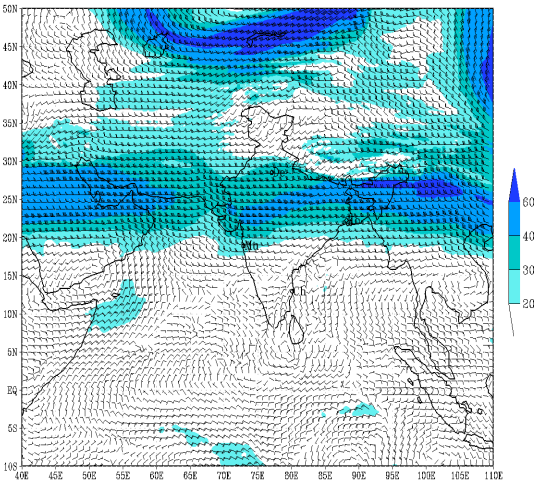
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (72 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 22-12-2022



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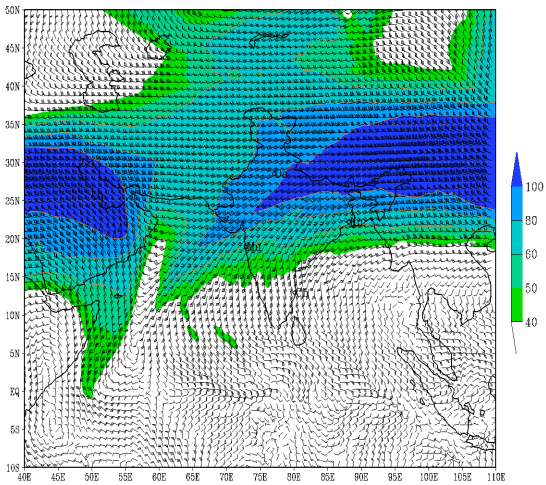
based on 00 UTC of 19-12-2022 valid for 00 UTC of 22-12-2022



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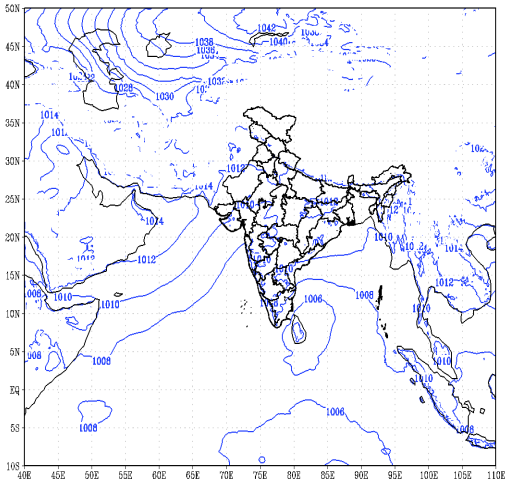
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 23-12-2022



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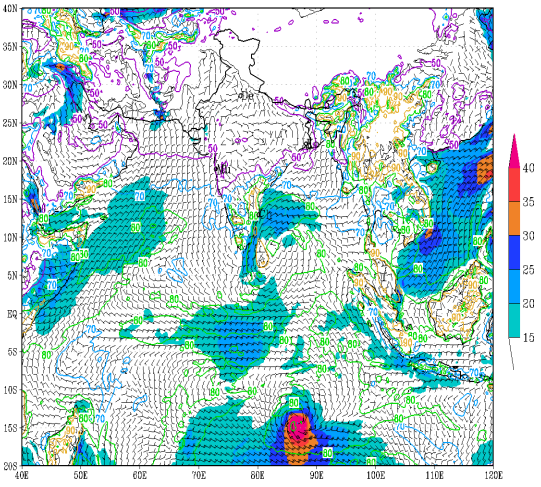
IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (96 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 23-12-2022



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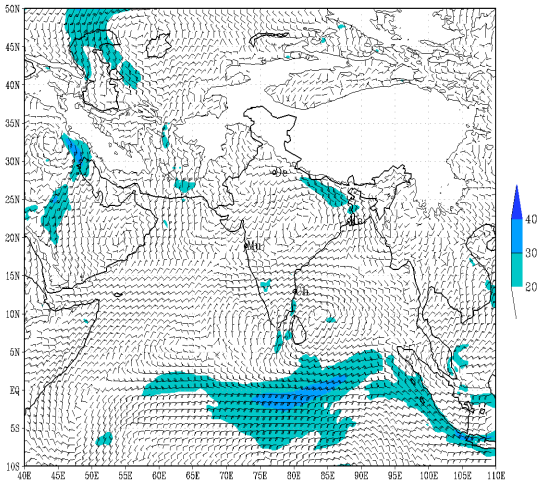
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 23-12-2022



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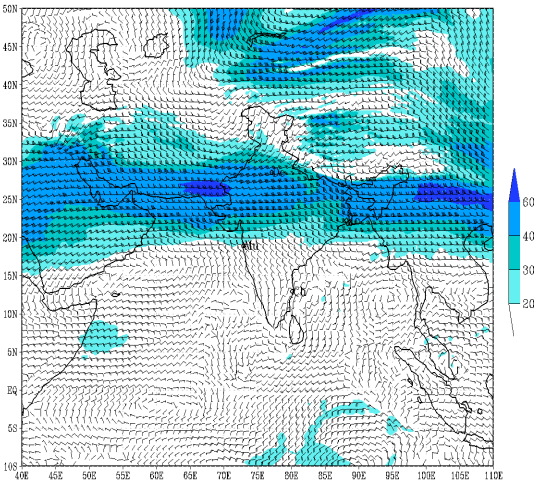
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 23-12-2022



(Background does not depict political boundary)

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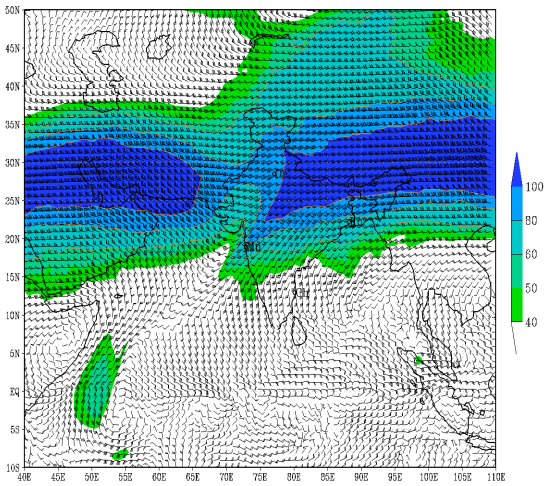
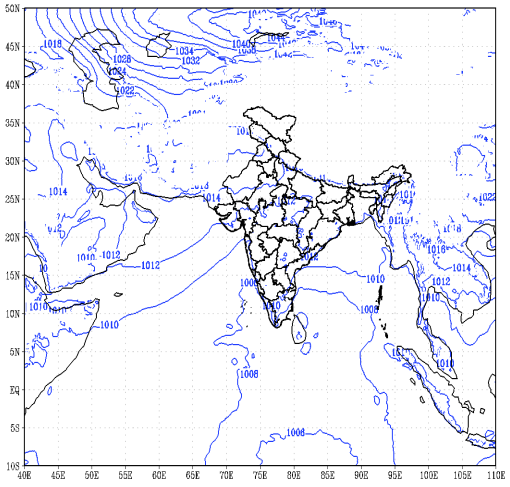
based on 00 UTC of 19-12-2022 valid for 00 UTC of 23-12-2022



(Background does not depict political boundary)

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)

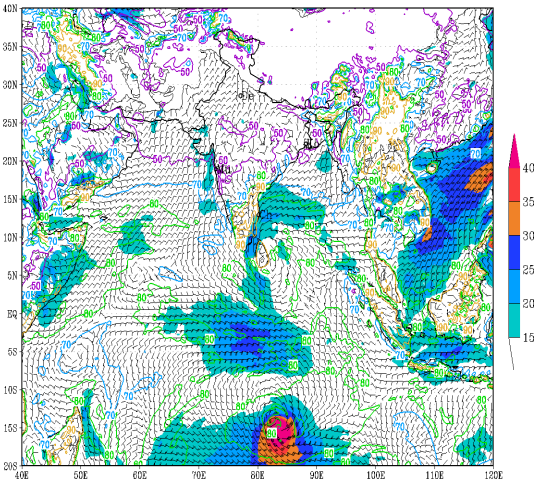
based on 00 UTC of 19-12-2022 valid for 00 UTC of 24-12-2022



(Background does not depict political boundary)

IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (120 HR)

based on 00 UTC of 19-12-2022 valid for 00 UTC of 24-12-2022



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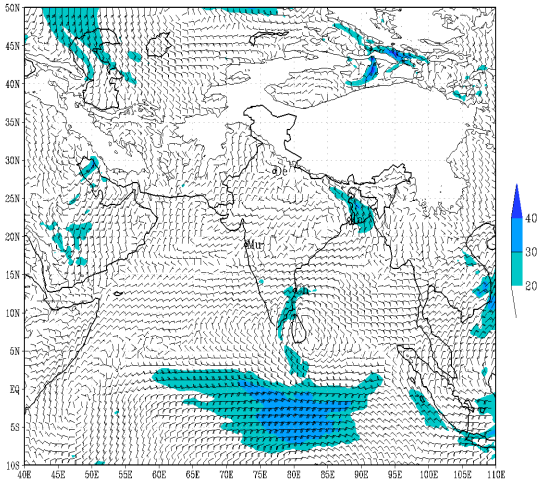
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)

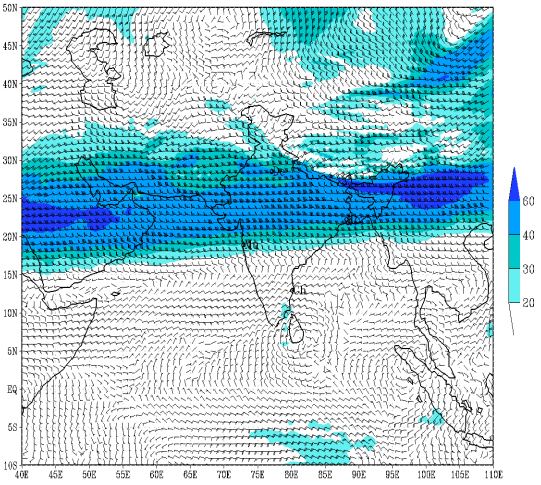
based on 00 UTC of 19-12-2022 valid for 00 UTC of 24-12-2022



(Background does not depict political boundary)

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)

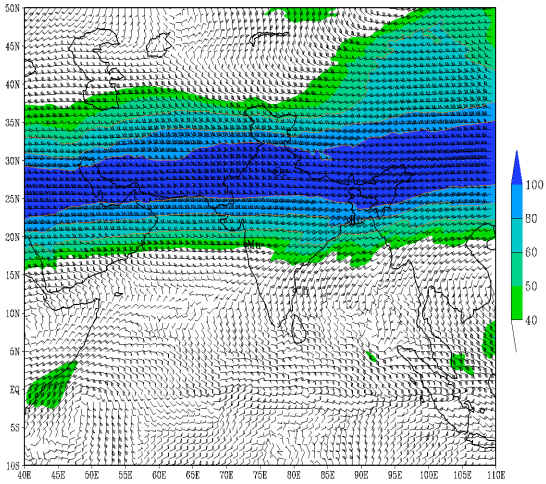
based on 00 UTC of 19-12-2022 valid for 00 UTC of 25-12-2022



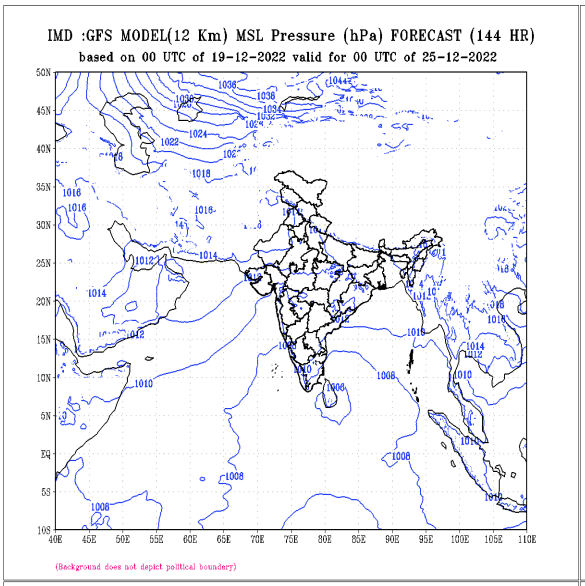
(Background does not depict political boundary)

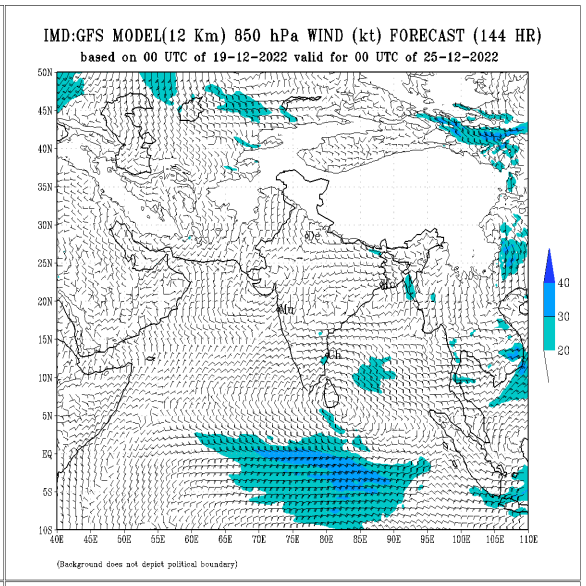
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)

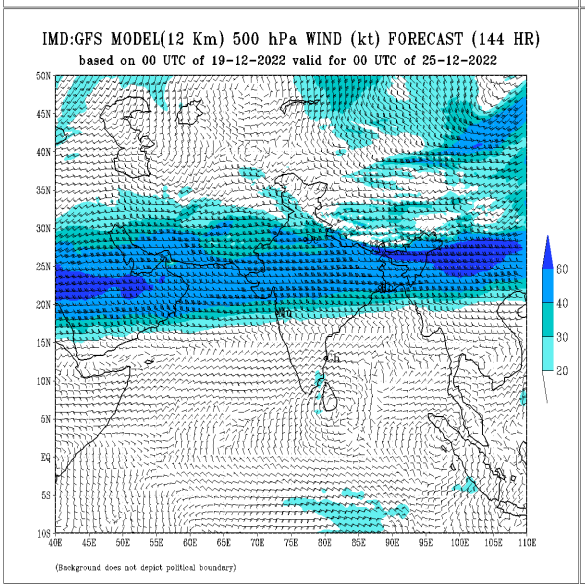
based on 00 UTC of 19-12-2022 valid for 00 UTC of 24-12-2022

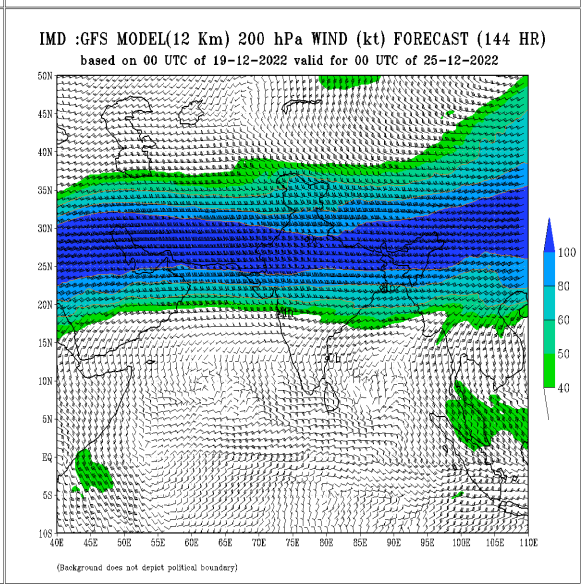


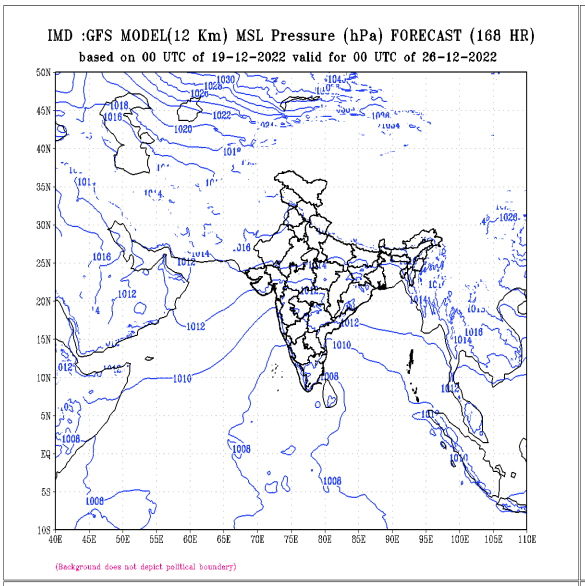
(Background does not depict political boundary)

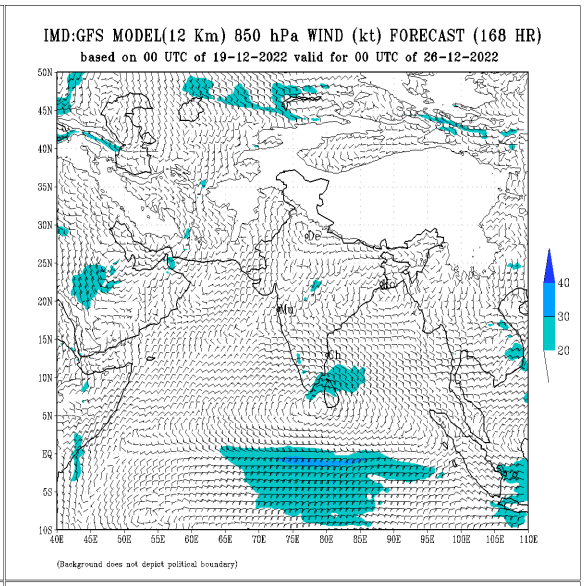

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 25-12-2022
(Background does not depict political boundary)

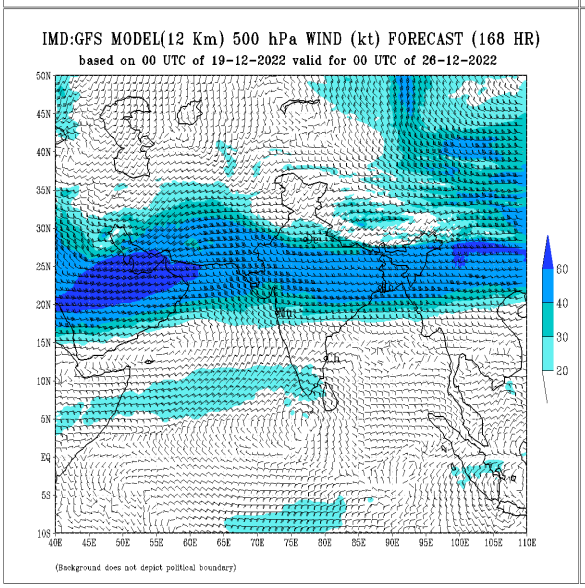

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 25-12-2022
40
30
20
(Background does not depict political boundary)

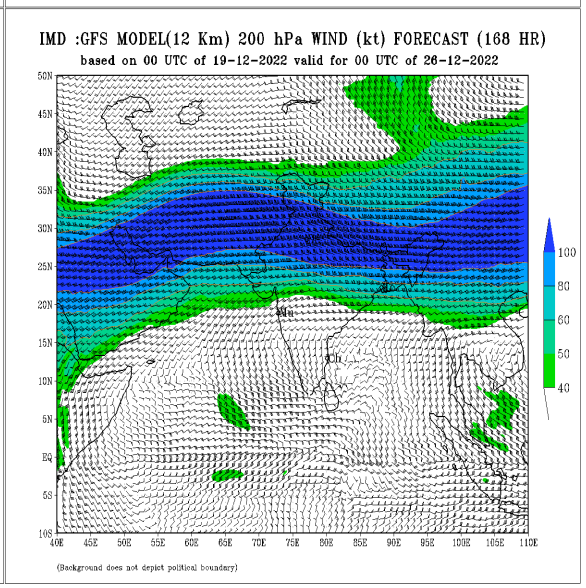

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 25-12-2022
60
40
30
20
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 25-12-2022
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 19-12-2022 valid for 00 UTC of 26-12-2022
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 26-12-2022
40
30
20
(Background does not depict political boundary)


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 26-12-2022
60
40
30
20
(Background does not depict political boundary)


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 19-12-2022 valid for 00 UTC of 26-12-2022
100
80
60
50
40
(Background does not depict political boundary)