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

Tropical Cyclone Forecast Programme
Report Dated 03rd December, 2022

Time of Issue: 1200 UTC

Synoptic features (based on 0600 UTC analysis):

➢ A cyclonic circulation is likely to emerge into south Andaman Sea on 04th December, 2022. Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining south Andaman Sea by 05th December. It is likely to move west-northwestwards and concentrate into a Depression over Southeast Bay of Bengal by 07th December morning. Thereafter, it is likely to continue to move west-northwestwards and reach Southwest Bay of Bengal near north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts by 08th December morning.

Dynamical and thermo-dynamical features

Parameter	Bay of Bengal (BoB)	Arabian Sea (AS)
Sea Surface Temperature (SST) ºC	About 30-32℃ over Andaman Sea, entire BoB except small pockets of southwest BoB, and Gulf of Mannar.	About 30-32℃ over the southeast and adjoining southwest AS off Karntaka and Kerala, south Gujarat coasts, north AS, 26-28℃ over eastcentral and adjoining north AS, along and off kerala and Karnataka coasts, 25-26℃ over southwest AS, less than 24℃ over southwest AS off Oman and Yemen coasts and adjoining sea areas.
Tropical Cyclone Heat Potential (TCHP) kJ/cm^2	>110 over south Andaman sea & adjoining southeast BoB, eastcentral BoB, 70-80 over north Andaman Sea, north parts of southwest BoB and adjoining westcentral BoB, off Sri Lanka, north BoB, and less than 40 over westcentral BoB, along and off Andhra Pradesh and Tamil Nadu coasts, west coast of SriLanka, Gulf of Mannar, some 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})	10-20 over small pockets of westcentral BoB off Sri Lanka coast.	10-20 over northeast AS, Comorin, Lakshadweep and Maldives, southeast AS.
Low Level convergence (X10^{-5} s^{-1})	5-10 over south Andaman sea, 05 over small pockets of southwest BoB.	5 over small pocket of southeast AS off Kerala coast

Upper Level divergence (X10⁻⁵ s⁻¹)	5-20 over southeast BoB, south Andaman sea & adjoining EIO.	5-20 over southeast AS off Kerala coast & adjoining EIO, Comorin, Lakshadweep & Maldives area 5 over southwest AS.
Vertical Wind Shear (VWS knots)	5-15 over Andaman Sea, south BoB. 20-40 over central and north BoB.	5-15 over Lakshadweep and Comorin area, southeast, southwest AS & adjoining EIO. 25-60 over central and north AS.
Wind Shear Tendency (knots)	Decreasing over north & central BoB	Decreasing over southeast AS off Kerala coast & central AS.
Upper tropospheric Ridge	Along 10.0°N over the BoB.	Along 8.0°N over the AS.
Trough in westerlies	No significant trough	

Satellite observations based on INSAT imagery (0300 UTC):

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

b) Over the Arabian Sea:-
Scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Arabian sea and Lakshadweep islands area. Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral Arabian sea, Comorin area. Scattered low and medium clouds with embedded isolated weak convection lay over north Arabian sea, gulf of Cambay and eastcentral Arabian sea.

M.J.O. Index:
The Madden Julian Oscillation (MJO) Index is currently in Phase 1 with amplitude less than 1. Thereafter, it would move across phases 2, 3 & 4 with amplitude remaining less than 1.

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	The LPA over south Andaman Sea on 4ᵗʰ will become depression over southeast & adjoining South Andaman Sea on 5ᵗʰ Dec morning, move west-northwestwards, intensify into a cyclonic storm at 0600 UTC of 5ᵗʰ over southeast BoB, into a severe cyclonic storm (SCS) over southeast BoB on 6ᵗʰ Dec morning and into a very severe cyclonic storm (VSCS) over southwest BoB on 7ᵗʰ morning. It is making landfall on 7ᵗʰ/1800 UTC near Nellore.	No significant system
IMD-GEFS		No significant system

	The LPA over south Andaman Sea on 4th become depression over southeast & adjoining South Andaman Sea on 5th Dec/0000 UTC, into a severe cyclonic storm (SCS) over southwest BoB on 6th Dec /1200 UTC and severe cyclonic storm (SCS) over southwest BoB near North Tamil Nadu, on 7th UTC. It is making landfall on 8th UTC near 12.5N/80E and lay as a LPA over south Tamil Nadu region on 9th	
GEFS Probabilistic guidance	Not available	Not available
IMD WRF	No significant system within forecast duration.	No significant system within forecast duration.
NCMRWF-NCUM	Cyclonic circulation over Gulf of Thailand on 3rd Dec, to emerge into South Andaman Sea on 4th Dec morning, extended low pressure area over southeast BoB on 5th, WML/depression over southeast BoB on 6th, deep depression over southwest BoB on 7th, CS over southwest BoB to the southeast of Chennai on 8th, WML over southwest BoB near Puducherry on 9th UTC.	No significant system
NCMRWF-NEPS	Cyclonic circulation over Gulf of Thailand on 3rd Dec, to emerge into South Andaman Sea on 4th Dec morning, LPA over south Andaman Sea and adjoining southeast BoB on 5th, depression over southeast BoB and adjoining south Andaman Sea on 6th, deep depression/CS over southwest BoB on 7th, CS over southwest BoB to the southeast of Chennai on 8th, crossing coast as an LPA near 11.5/80E on 9th.	No significant system
NCMRWF-UM (Regional)	Cyclonic circulation over Gulf of Thailand on 3rd Dec, to emerge into South Andaman Sea on 4th Dec morning, LPA over southeast BoB and adjoining south Andaman Sea on 5th , LPA over southeast BoB on 6th	No significant system
ECMWF	A cyclonic circulation from Gulf of Thailand to emerge into south Andaman Sea on 4th Dec morning, under its influence LPA over the south Andaman Sea on the same day, WML/depression over southeast BoB on 5th, Depression over southeast BoB on 6th, cyclonic storm over southwest BoB on 7th, system to maintain peak intensity during 8th/0000 to 8th/1200 UTC. Thereafter, slight weakening is indicated. System will cross the coast on 9th at 11.8N/80.0E around 18 UTC.	No significant system
ECMWF ensemble	Likely cyclogenesis over South Andaman Sea around 4th Dec, will track west-northwest wards with intensification up to Cyclonic Storm with 70-80% probability on 7th Dec.	No significant system

NCEP-GFS	A cyclonic circulation from Gulf of Thailand is likely to emerge into South Andaman Sea on 4th Dec morning. Under its influence, an LPA will form over south Andaman Sea on on the same day, WML over southeast BoB on 5th, depression over southwest and adjoining southeast BoB on 6th, CS on 7th Dec over southwest BoB. Continuing to move west-northwestwards, crossing North Tamil Nadu – Puducherry coast as a LPA on 10th Dec./0600 UTC	No significant system
IMD MME	A cyclonic circulation from Gulf of Thailand is likely to emerge into South Andaman Sea on 4th Dec morning. It will move west-northwestward and become an LPA over south Andaman Sea on 5th Dec., depression over southeast BoB on 6th, DD on 8th Dec over southwest BoB.	No significant system
IMD HWRF	Available during cyclonic disturbance period only	Available during cyclonic disturbance period only
IMD-Genesis Potential Parameter	No potential zone over Bay of Bengal till 4th December. A significant potential zone over south Andaman Sea on 5th Dec having west-northwestward movement.	No potential zone over Arabian Sea during next 7 days

Summary and conclusion:

➢ Most of the NWP models are indicating likely emergence of a cyclonic circulation over South Andaman Sea on 4th, LPA over southeast BoB and adjoining South Andaman Sea around 5th Dec. All the models are unanimously indicating west-northwestward movement of system with intensification into depression around 5th / 6th. ECMWF & GFS are indicating intensification into a cyclonic storm with ECMWF indicating intensification up to CS stage during 07/1200 UTC to 08/1200 UTC; GFS is indicating intensification up to very severe cyclonic storm stage and NCUM up to CS stage. Landfall time is also varying significantly with GFS showing landfall around 7th/1800 UTC, ECMWF around 9th/1800 UTC and NCUM around 9th/0600 UTC.

In view of all the above, it is inferred that
1. For the Bay of Bengal:

➢ A cyclonic circulation is likely to emerge into south Andaman Sea on 04th December, 2022. Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining south Andaman Sea by 05th December. It is likely to move west-northwestwards and concentrate into a Depression over Southeast Bay of Bengal by 07th December morning. Thereafter, it is likely to continue to move west-northwestwards and reach Southwest Bay of Bengal near north Tamil Nadu-Puducherry & adjoining south Andhra Pradesh coasts by 08th December morning.

2. For the Arabian Sea:
No significant system during next 7 days

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

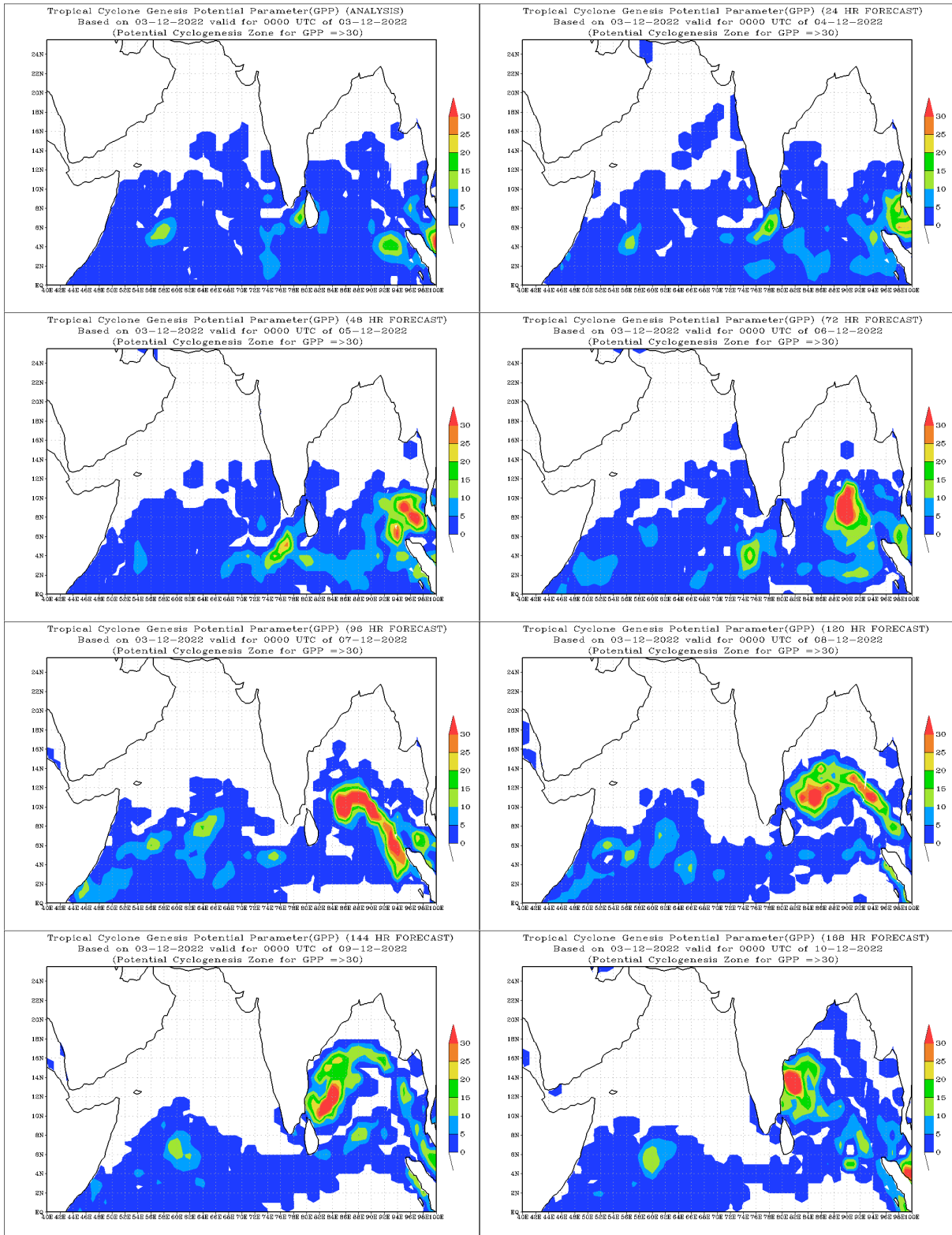| 24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	96-120 HOURS	120-144 HOURS	144-168 HOURS
NIL	NIL	NIL	LOW	MOD	HIGH	HIGH

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 movement and intensification of low pressure area/depression (remnant from South China Sea) likely to emerge into south Andaman Sea around 4th December need to be monitored through various observations.

IOP: NIL

Annexure

Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 03-12-2022 valid for 0000 UTC of 03-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 04-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 05-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 06-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 07-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 08-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 09-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 03-12-2022 valid for 0000 UTC of 10-12-2022
(Potential Cyclogenesis Zone for GPP =>30)

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based on 00 UTC of 03-12-2022 valid for 00 UTC of 03-12-2022
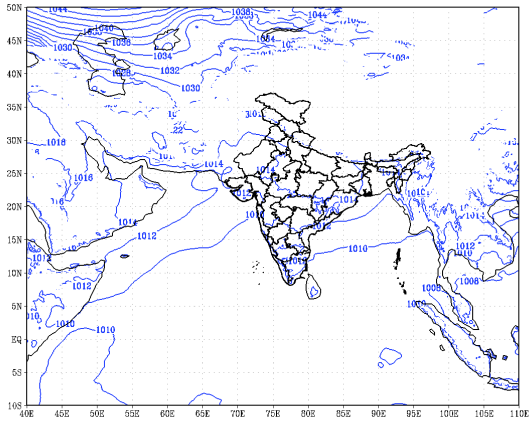
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 03-12-2022
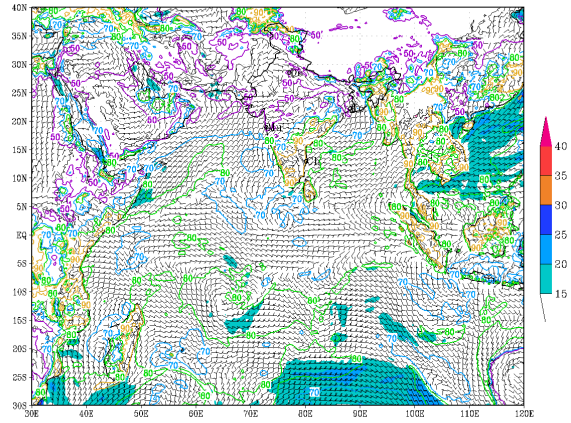
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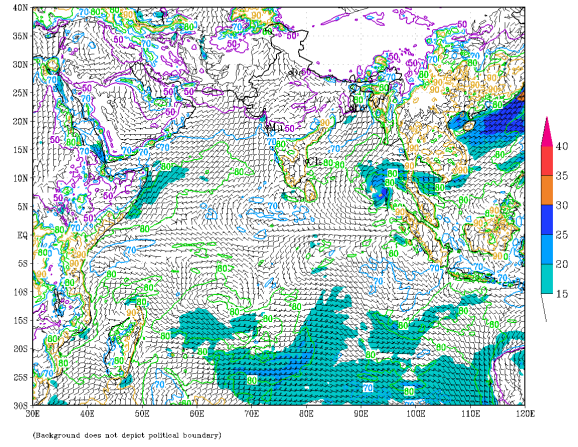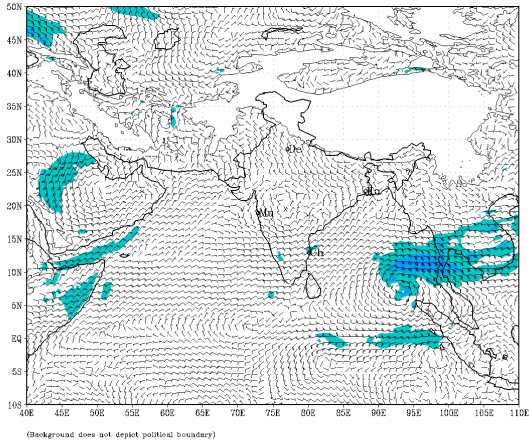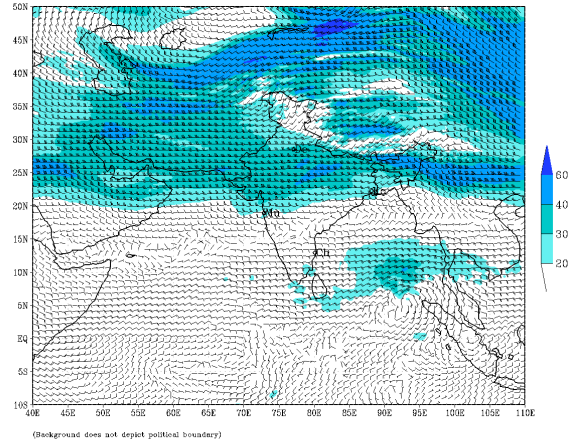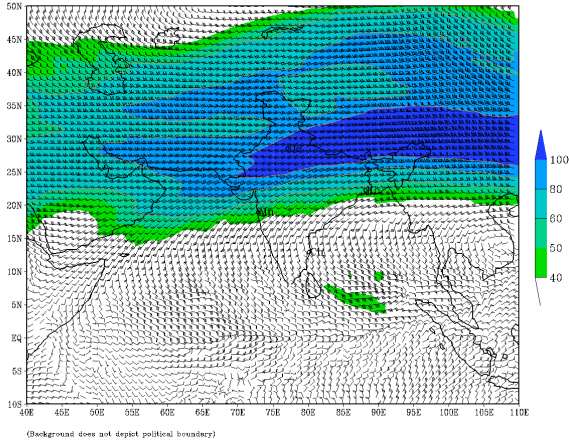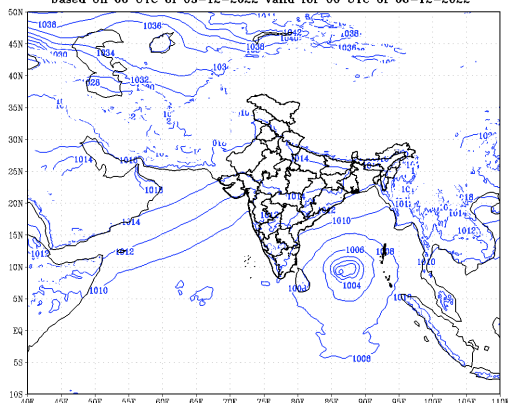based on 00 UTC of 03-12-2022 valid for 00 UTC of 03-12-2022

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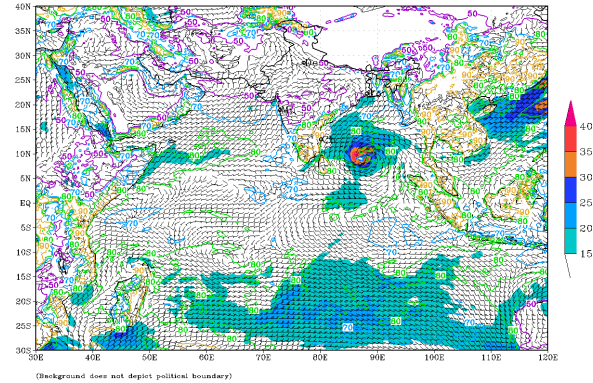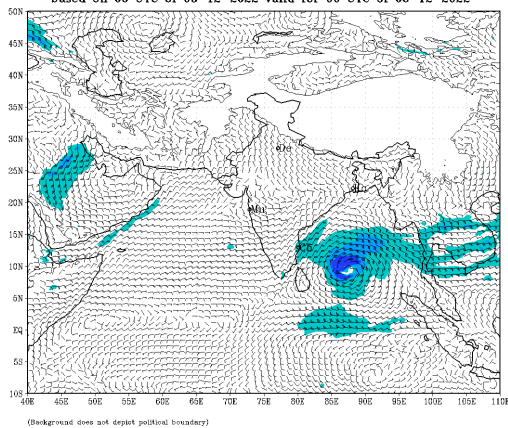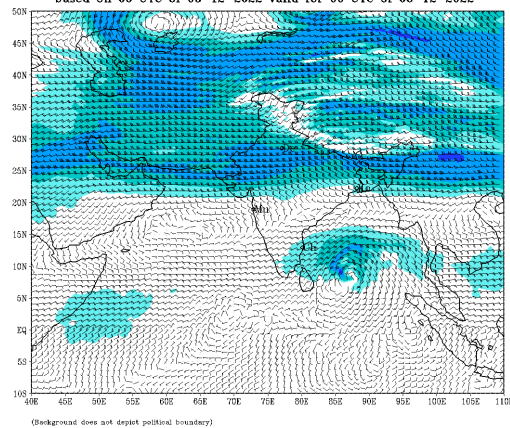based on 00 UTC of 03-12-2022 valid for 00 UTC of 03-12-2022

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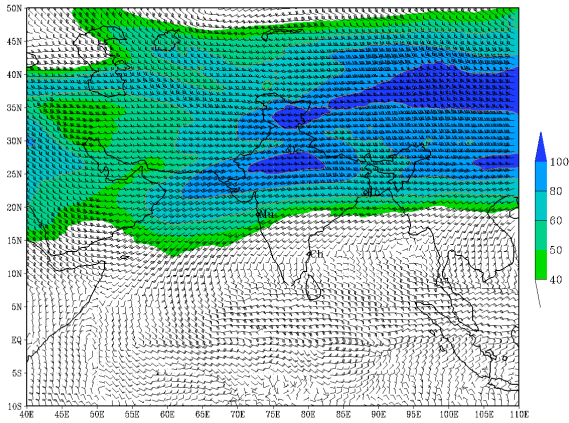
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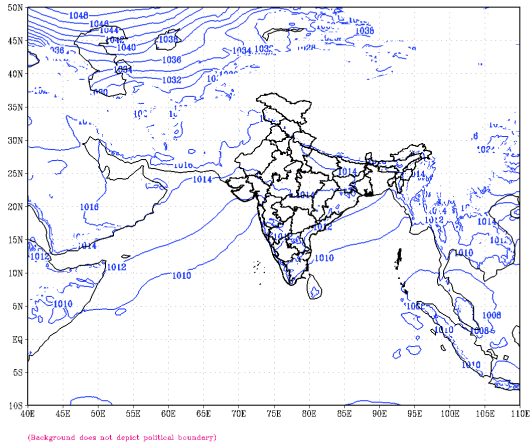
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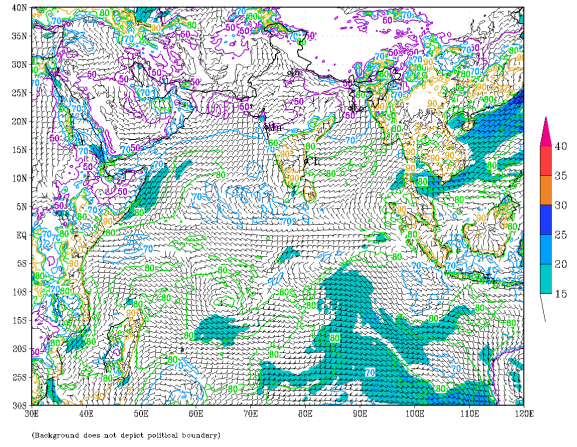
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based on 00 UTC of 03-12-2022 valid for 00 UTC of 04-12-2022
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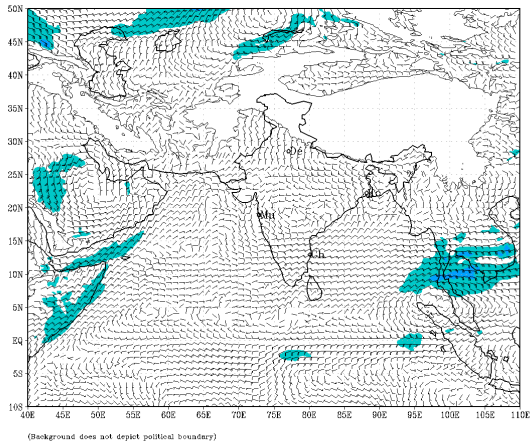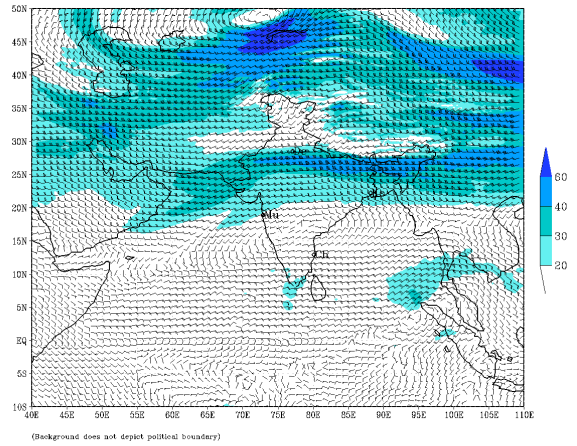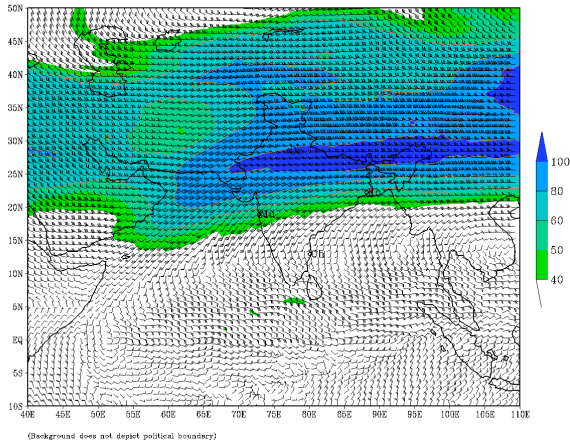
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (48 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 05-12-2022
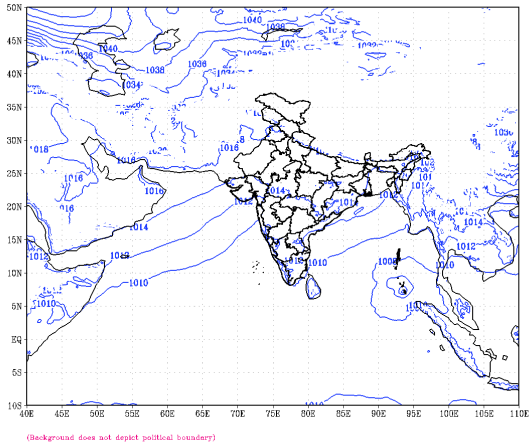
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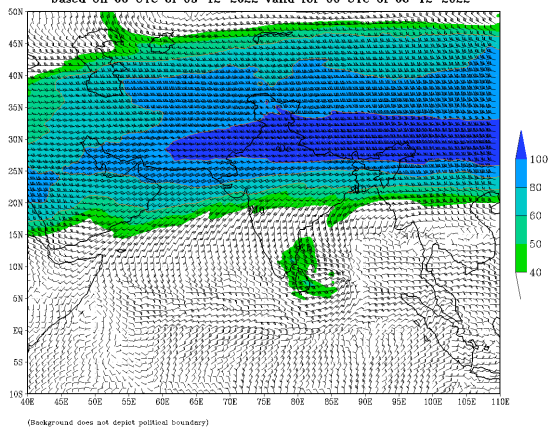based on 00 UTC of 03-12-2022 valid for 00 UTC of 05-12-2022

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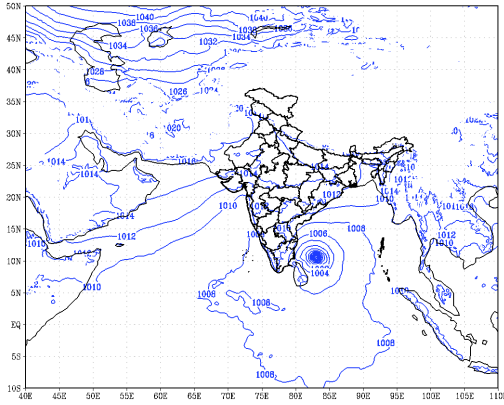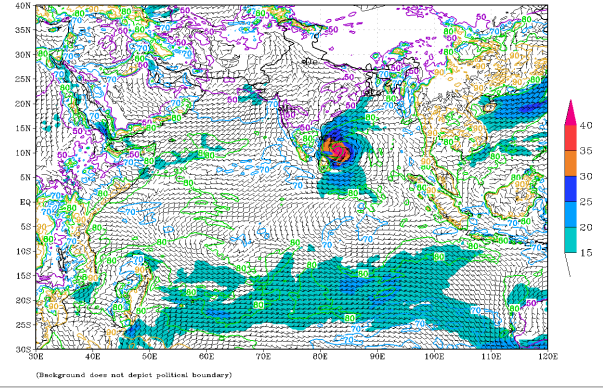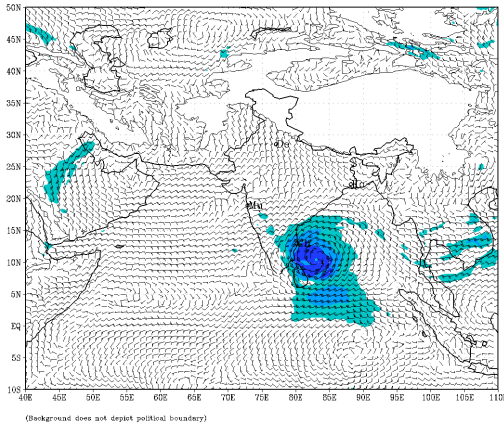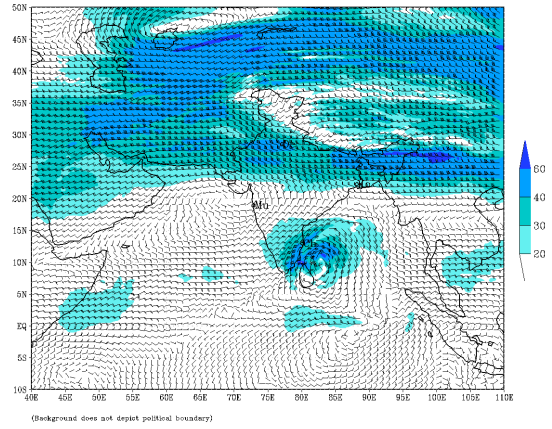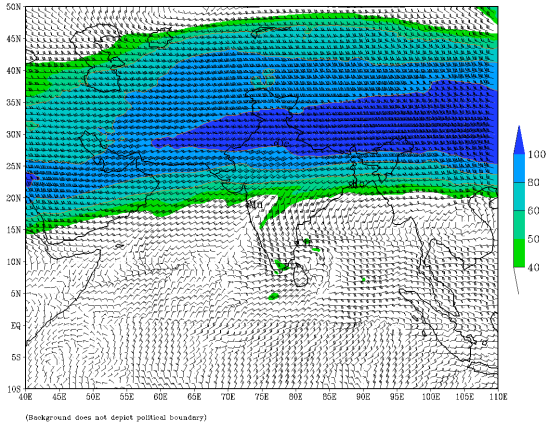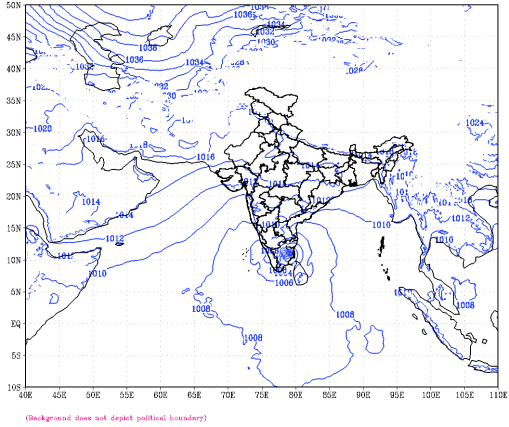based on 00 UTC of 03-12-2022 valid for 00 UTC of 05-12-2022

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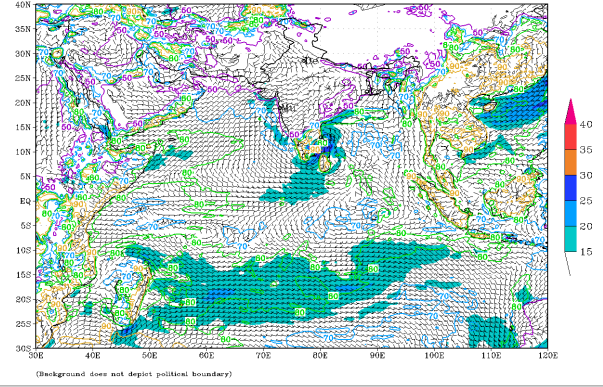based on 00 UTC of 03-12-2022 valid for 00 UTC of 05-12-2022

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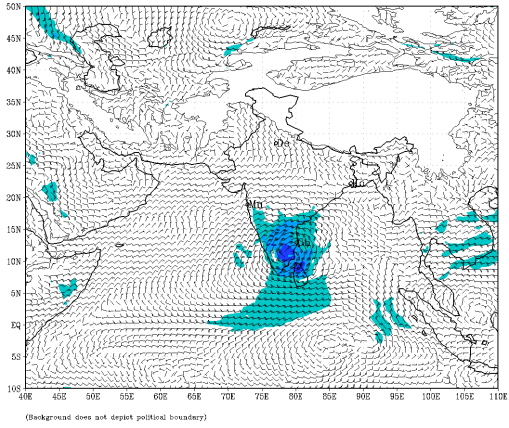based on 00 UTC of 03-12-2022 valid for 00 UTC of 05-12-2022

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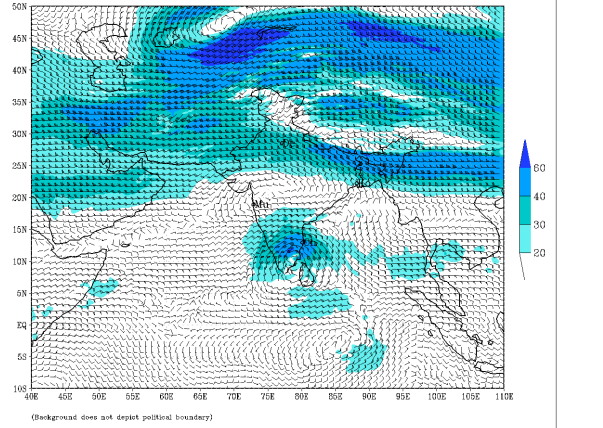based on 00 UTC of 03-12-2022 valid for 00 UTC of 06-12-2022

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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 06-12-2022

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IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (72 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 06-12-2022

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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (72 HR)
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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (96 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 07-12-2022

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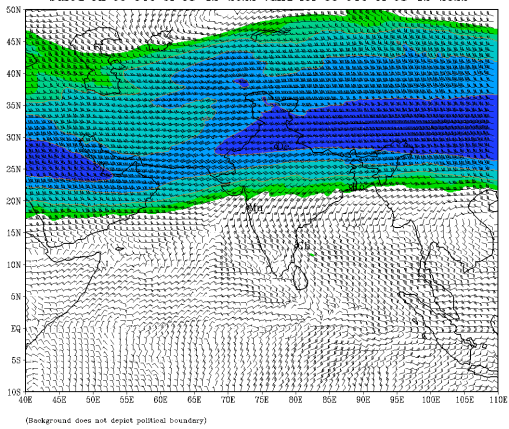based on 00 UTC of 03-12-2022 valid for 00 UTC of 07-12-2022

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based on 00 UTC of 03-12-2022 valid for 00 UTC of 07-12-2022

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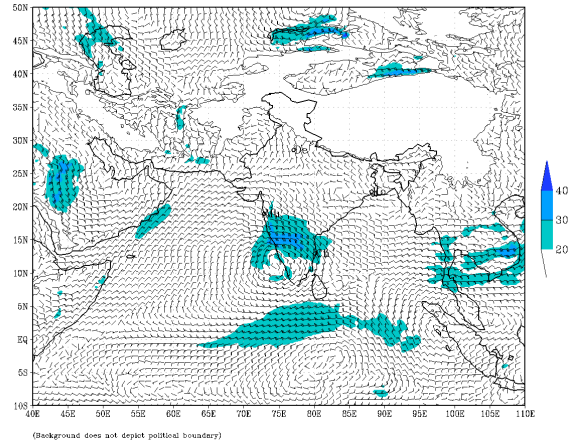based on 00 UTC of 03-12-2022 valid for 00 UTC of 07-12-2022

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IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 08-12-2022
(Background does not depict political boundary)

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 08-12-2022
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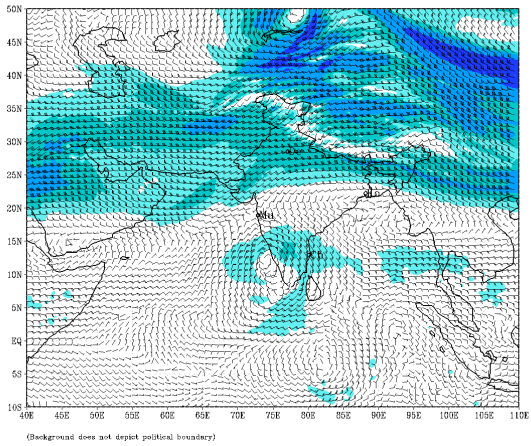(Background does not depict political boundary)

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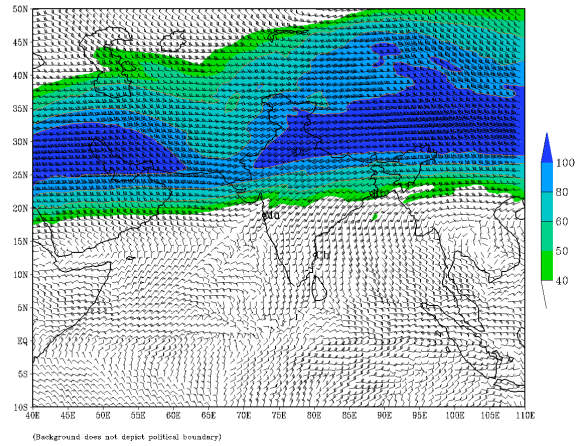based on 00 UTC of 03-12-2022 valid for 00 UTC of 09-12-2022
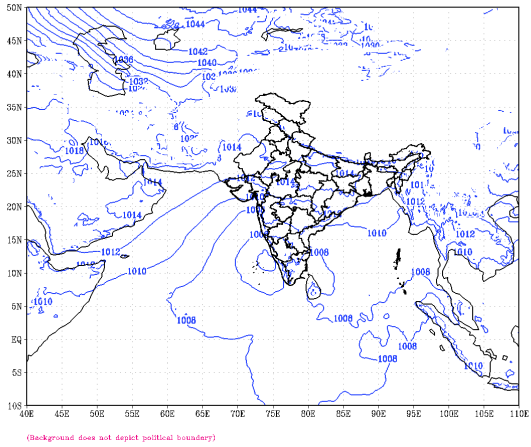
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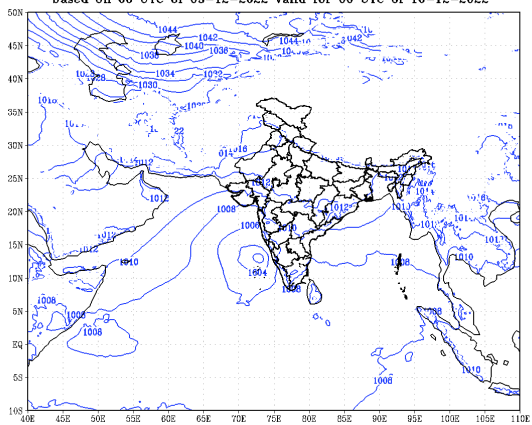based on 00 UTC of 03-12-2022 valid for 00 UTC of 09-12-2022

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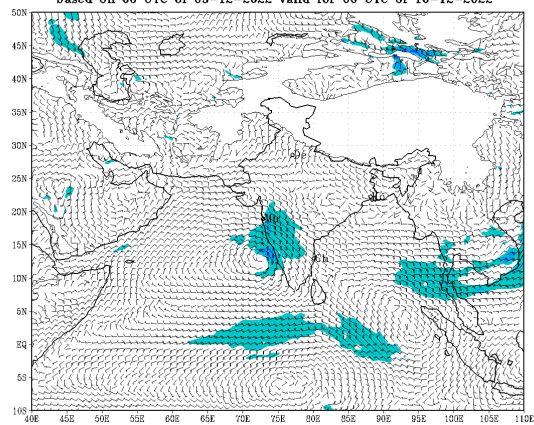based on 00 UTC of 03-12-2022 valid for 00 UTC of 09-12-2022

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based on 00 UTC of 03-12-2022 valid for 00 UTC of 09-12-2022

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
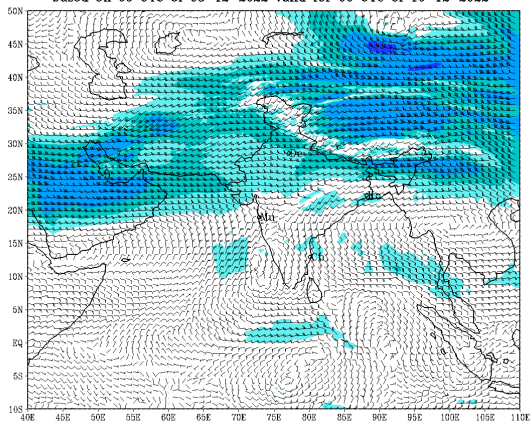based on 00 UTC of 03-12-2022 valid for 00 UTC of 10-12-2022

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 10-12-2022

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 03-12-2022 valid for 00 UTC of 10-12-2022

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
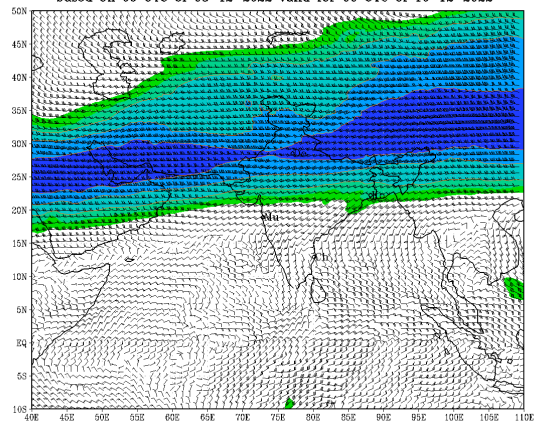based on 00 UTC of 03-12-2022 valid for 00 UTC of 10-12-2022