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

Tropical Cyclone Forecast Programme
Report Dated 12th November, 2022

Time of Issue: 1200 UTC

Synoptic features (based on 0600 UTC analysis):

- Yesterday's Well Marked Low Pressure area over Southwest Bay of Bengal & adjoining areas of north coastal Tamilnadu & Puducherry weakened into a Low Pressure area and lay over north coastal Tamilnadu, Puducherry & neighbourhood at 0600 UTC of 12th Nov. 2022. The associated cyclonic circulation extends upto mid-tropospheric levels. It is very likely to move west-northwestwards across north interior Tamilnadu and Kerala and emerge into Southeast & adjoining Eastcentral Arabian Sea as a Low Pressure Area/ Cyclonic circulation on 13th November, 2022.
- A fresh low pressure area is likely to form over Southeast Bay of Bengal & adjoining Andaman Sea 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 24-28°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 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, 90-100 KJ/cm^2 over southeast BoB and adjoining south Andaman Sea, 70-80 KJ/cm^2 over north BoB & southwest and adjoining westcentral BoB, north Andaman Sea, less than 40 KJ/cm^2 off Andhra Pradesh and Tamil Nadu & Sri Lanka coasts & less than 30 over a small pocket over southwest BoB & Comorin Area.	(a) 60-70 over southeast AS & adjoining eastcentral AS, 40-50 over norther parts of north 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 50-60 over southwest BoB off Tamil Nadu coast & adjoining EIO	Positive vorticity of 20-40 over southeast AS, 20-30 over southwest and adjoining westcentral AS.
Low Level convergence ($X10^{-5}$ s^{-1})	About 05-10 over southwest BoB off Tamil Nadu coast.	05-10 over southwest AS and adjoining EIO, 05 over off Maharashtra coast.
Upper Level divergence ($X10^{-5}$ s^{-1})	05-10 over southwest BoB and adjoining westcentral BoB, off Tamil Nadu coast.	Positive zone 05-10 over southwest AS and adjoining EIO.
Vertical Wind Shear (VWS knots)	Moderate 05-15 knots over southwest and adjoining westcentral BoB. 25-50 over north BoB and adjoining central BoB.	10-20 over southeast & adjoining eastcentral AS and over westcentral AS off Somalia & Yemen coasts. 25-50 over north AS and adjoining central AS.
Wind Shear Tendency (knots)	Decreasing over southwest BoB and off Andhra Pradesh, Odisha, West Bengal coasts.	Increasing over southeast AS and adjoining EIO.
Upper tropospheric Ridge	Along 19.0°N over the BoB.	Along 18.0°N over the AS.
Trough in westerlies	Along 82° E upto 22° N	

Satellite observations based on INSAT imagery (0600 UTC):

(a) Over the BoB & Andaman Sea:-

Scattered to low/medium clouds with embedded intense to very intense convection lay over westcentral, south BoB and Andaman Sea. Scattered low/medium clouds with embedded isolated weak to moderate convection lay over northeast abd eastcentral BoB.

(b) Over the Arabian Sea:-

Scattered to broken low/medium clouds with embedded intense to very intense convection lay over eastcentral AS off Karnataka coast, south AS and Lakshadweep area. Scattered to low/medium clouds with embedded moderate to intense convection lay over Comorin area.

M.J.O. Index:

MJO index is currently in Phase 4 with amplitude less than 1. It would move to phase 5 and remains same for next one week with increasing amplitude gradually.

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	Yesterday's WML over southwest BoB & adjoining areas of NE Sri Lanka off Tamil Nadu coasts weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into SE AS on 13th. A fresh cycir over south Andaman Sea & adjoining southeast BoB on 15th with west-northwestwards movement and gradual intensification into a low on 16th over southeast and adjoining southwest and eastcentral BoB, depression over southwest and adjoining westcentral BoB on 18th, deep depression on 19th, continue to move northwesterly and will become low on 22nd.	The remnant of Low will emerge into southeast AS off Kerala coast at 00 UTC of 13th extending upto 850 hPa. It would move west northwestward till 15th and less marked thereafter.
IMD-GEFS	A fresh cycir over south Andaman Sea & adjoining southeast BoB on 15th, LPA over southeast BoB on 16th, Depression over southwest & adjoining southeast, central BoB on 18th, deep depression over westcentral & adjoining southwest BoB on 19th	The remnant of Low will emerge into southeast AS off Kerala coast at 00 UTC of 13th extending upto 850 hPa. It would move west northwestward till 15th and less marked thereafter.
GEFS Probablistic guidance	Indicates westward movement of low across extreme south peninsula	The remnant of Low will emerge into southeast AS off Kerala coast at 00 UTC of 13th as cyclonic circulation and move nearly westwards while weakening gradually
IMD WRF	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into AS on 13th.	A cycir on 13th over southeast AS will move westwards.
NCMRWF-NCUM	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into southeast AS on 13th. Fresh cycir over south Andaman Sea on 14th, to move west-northwestwards, lay over southeast and adjoining southwest BoB on 17th as an extended low, LPA over southwest BoB on 18th and will move northwestwards towards north Tamil Nadu coast with slight intensification.	LPA over southeast AS on 14th, depression over southwest and adjoining southeast AS on 16th, to move west-northwestwards with slight intensification and will reach Yemen coast on 19th.

NCMRWF-NEPS	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into southeast AS on 13th. Fresh cycir over south Andaman Sea on 14th, 15th, LPA over southeast BoB and adjoining south Andaman sea on 17th, LPA over eastcentral and adjoining westcentral BoB on 18th, depression on 19th over westcentral and adjoining southwest BoB, move westwards and will become LPA on 20th, will move further westwards with same intensity.	LPA on 14th, depression over southeast & adjoining eastcentral AS on 15th, to intensify into deep depression on same day, to move west-northwestwards and intensify into CS over westcentral AS on 16th, severe CS over westcentral AS on 18th, extremely severe CS off Yemen coast on 19th, to cross Yemen as a very severe CS on 19th/1200 UTC and weaken rapidly into a depression over Yemen during 20th to 21st.
NCMRWF-UM (Regional)	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into southeast AS on 13th.	LPA over southeast AS on 14th will move westward with slight intensification.
ECMWF	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into southeast AS on 13th. A fresh cycir over south Andaman Sea on 14th with west-northwestwards movement and will become LPA on 16th Nov, depression on 17th Nov, it will move in the same direction till 19th/20th with slight intensification.	A cycir over southeast AS on 13th, will have westward movement thereafter.
ECMWF ensemble	Not available	Not available
NCEP-GFS	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region as a cycir on 13th and emerge as extended low over southeast AS on 14th, LPA on 16th till 18th. Fresh LPA over south Andaman Sea on 15th, WML over eastcentral BoB on 16th, depression over westcentral and adjoining eastcentral BoB on 17th, deep depression on 18th, CS on 19th, will move west-northwestward and will weaken further.	Feeble low over southeast AS on 14th, LPA on 15th-18th, less marked on 19th.
IMD MME	Yesterday's WML over southwest BoB and adjoining NE Sri Lanka off Tamil Nadu coast weakened into a Low Pressure area	LPA over southeast AS on 14th Nov will have west-northwestward movement with slight intensification.

	and now lies over north coastal Tamilnadu, Puducherry & neighbourhood. It will move across south peninsular region and emerge into southeast AS on 13th.	
IMD HWRF	Available during cyclonic disturbance period only	Available during cyclonic disturbance period only.
IMD-Genesis Potential Parameter	A potential zone over southwest BoB off Tamil Nadu coast during 12th will move wet-northwestwards.	A potential zone over southeast AS on 15th will move westwards till 17th.

Summary and conclusion:

- Most of the models like IMD GFS, GEFS, NCEP GFS, ECMWF, ECMWF ensemble and NCUM are indicating the weakening of yesterday's WML, move across south peninsular region and will emerge into southeast AS by 13th Nov as cycir. These models also indicating that the remanant will intensify further and move northwestwards towards Yemen coast. However, NCUM-NEPS is indicating intensification of this system into severe cyclonic storm and above and movement towards Yemen-Oman coasts till 20th evening (1200 UTC). GFS, GEFS, NCEP GFS, NCUM and ECMWF are not indicating any significant intensification of the system over Arabian Sea upto low pressure area.
- 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 and depression over southwest & adjoining westcentral BoB around 18th. However, GFS group is indicating significant intensification of this system into a deep depression/cyclonic storm around 19th. It weakens the system into a depression as it moves closer to north TN coast. NCUM group is not indicating any significant intensification of this system.
- Overall, Models are indicating simultaneous development of cyclonic disturbances over the BoB and the AS from 15th onwards. NCEP GFS and ECMWF are indicating no significant intensification of both the systems. GFS group is indicating the system over BoB to intensify into a depression around 18th and further into a deep depression/cyclonic storm around 19th and NCUM and NEPS are showing intensification of AS system into Depression and very severe cyclonic storm respectively.

1. For the Bay of Bengal:

In view of all the above, it is inferred that

- **There is likelihood of development of a fresh cyclonic circulation over south Andaman Sea/ southeast BoB around 14th 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.**

2. For the Arabian Sea:

- **There is likelihood of emergence of the existing low pressure area/it's remnant into southeast Arabian Sea around 13th. The system is likely to move west-northwestwards and intensify gradually into a depression around 16th.**
- **Thereafter, the intensification and movement of this system need to be monitored.**

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	LOW	Moderate

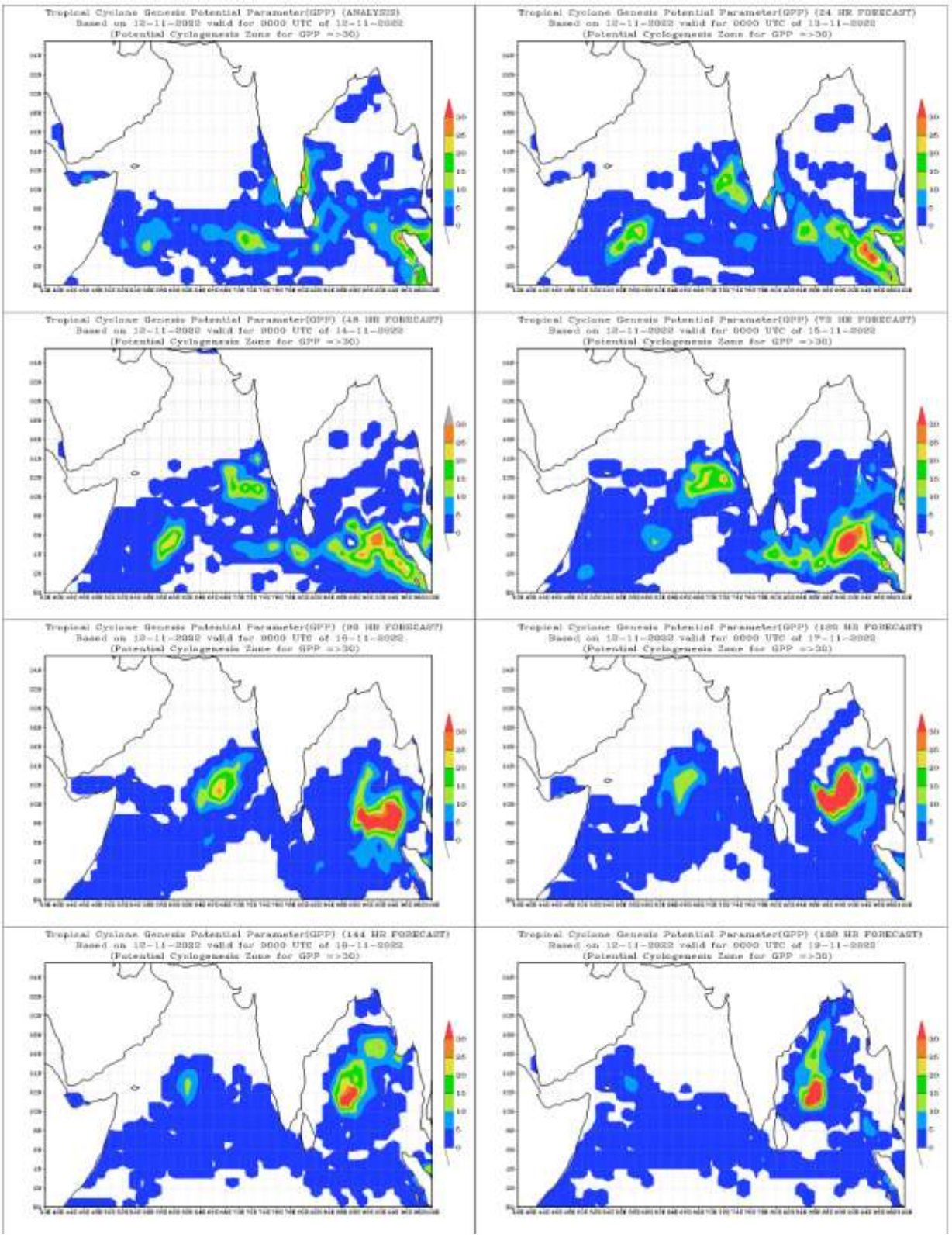
Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:

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

Advisory:
The possible cyclogenesis as indicated above needs to be watched and monitored.

IOP: Tamil Nadu-Puducherry and Kerala during 12th to 13th.

Annexure


Tropical Cyclone Genesis Potential Parameter(GPP) (ANALYSIS)
Based on 12-11-2022 valid for 0000 UTC of 12-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (24 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 13-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (48 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 14-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (72 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 15-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (96 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 16-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (120 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 17-11-2022
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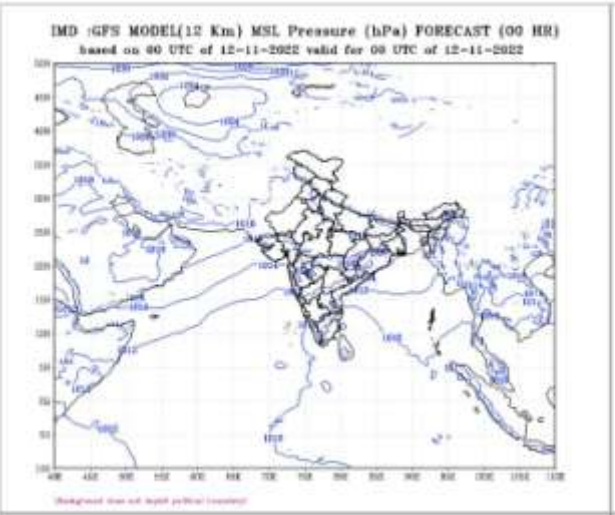
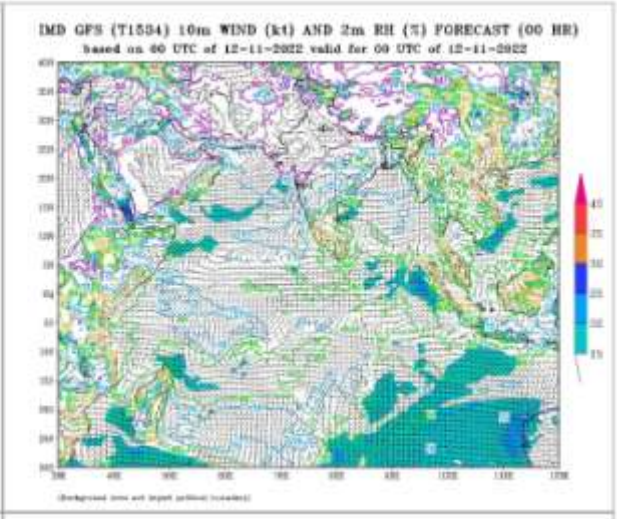
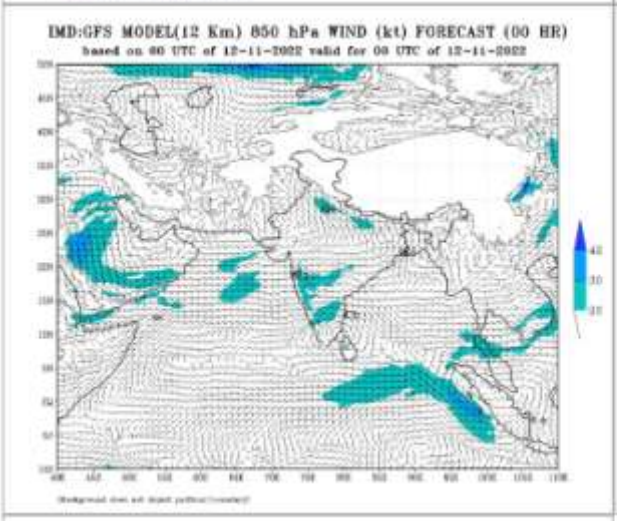
Tropical Cyclone Genesis Potential Parameter(GPP) (144 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 18-11-2022
(Potential Cyclogenesis Zone for GPP =>30)
Tropical Cyclone Genesis Potential Parameter(GPP) (168 HR FORECAST)
Based on 12-11-2022 valid for 0000 UTC of 19-11-2022
(Potential Cyclogenesis Zone for GPP =>30)


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


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (00 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 12-11-2022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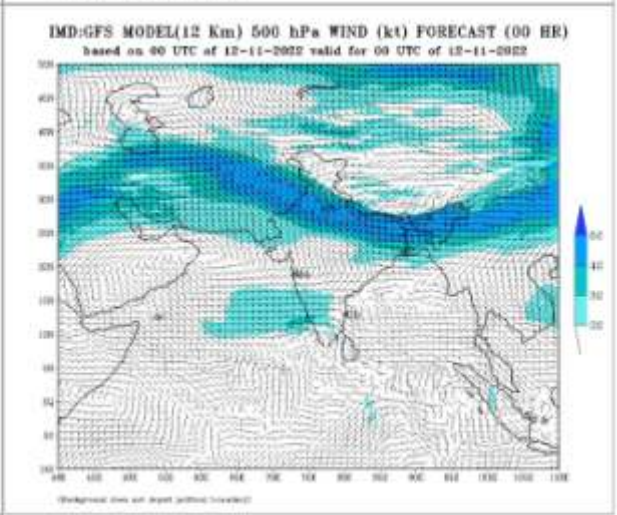
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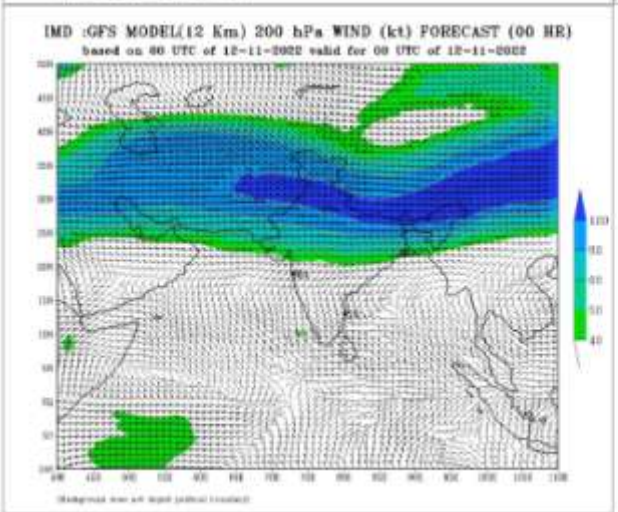
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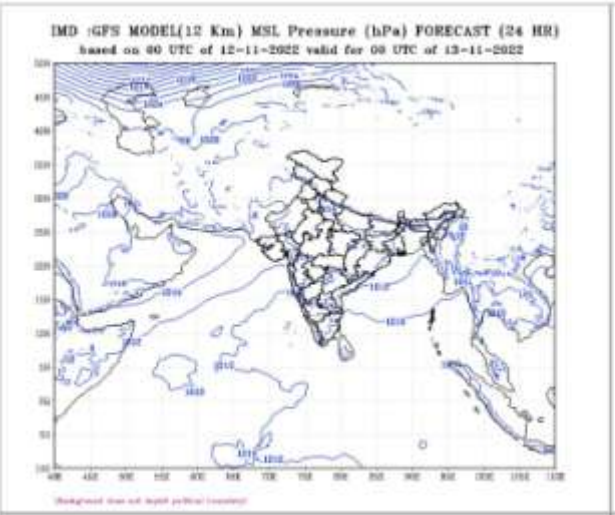
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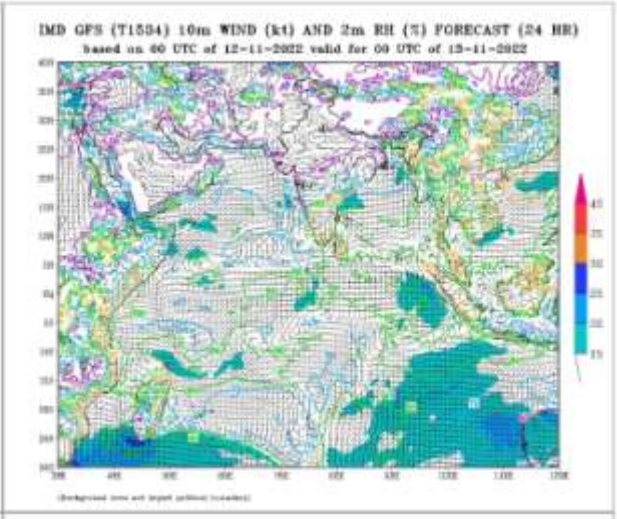
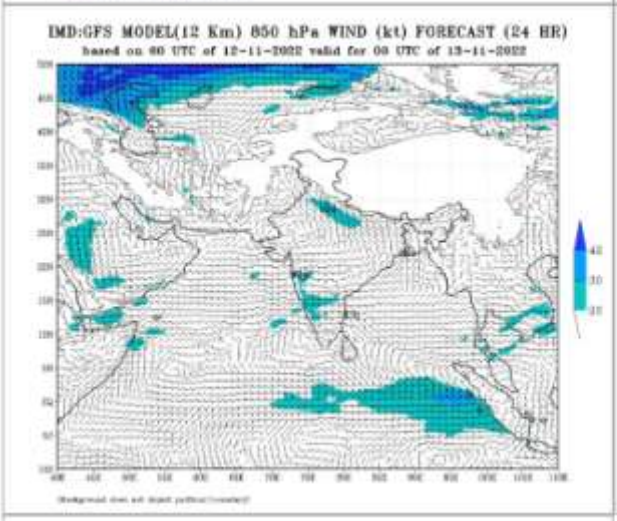
based on 00 UTC of 12-11-2022 valid for 00 UTC of 13-11-2022


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 13-11-2022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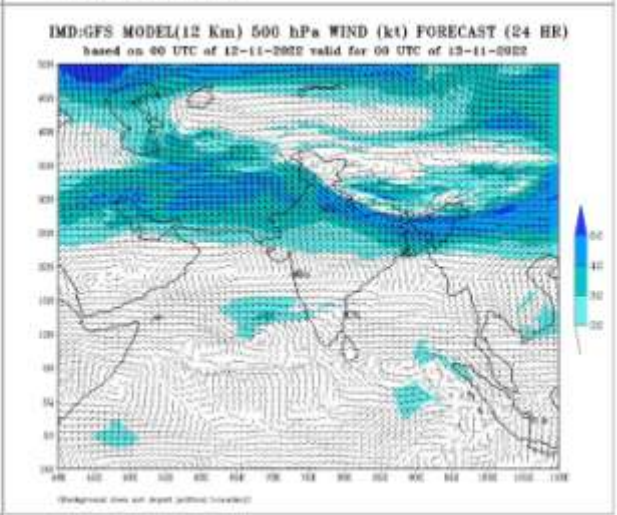
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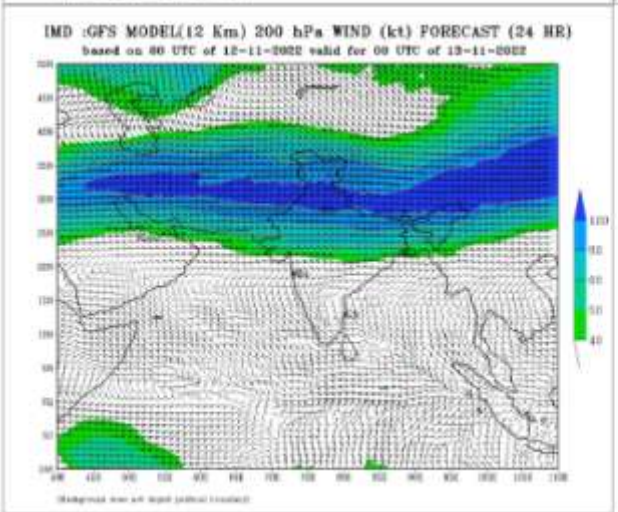
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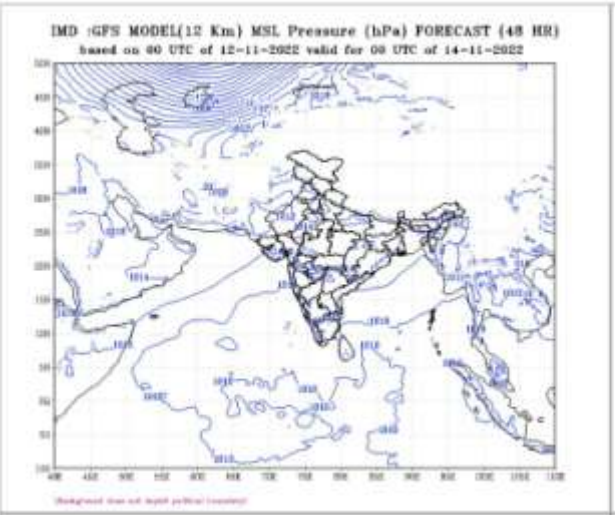
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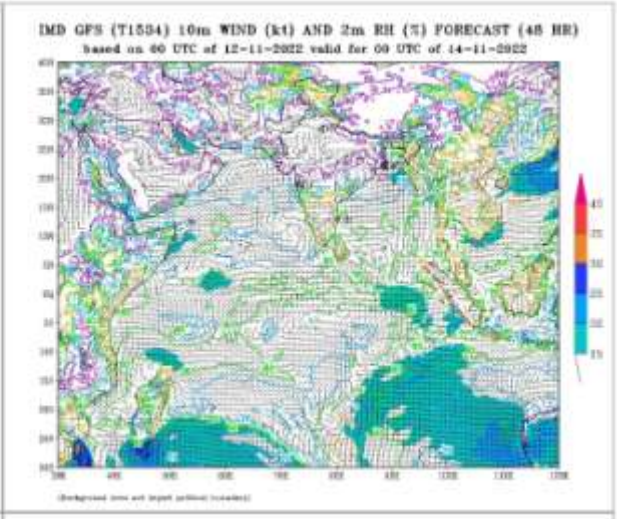
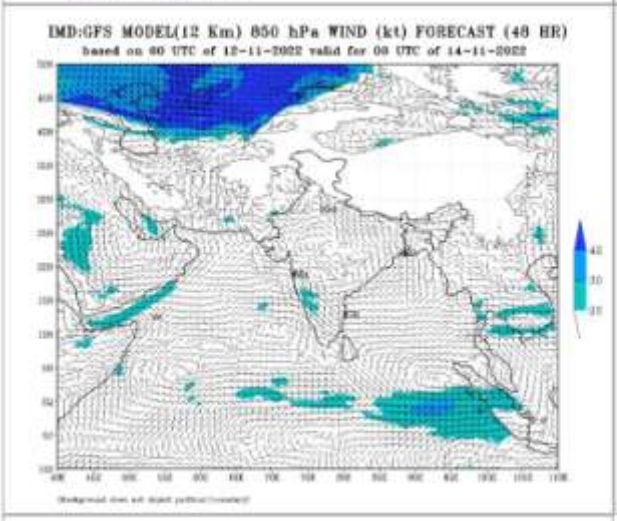
based on 00 UTC of 12-11-2022 valid for 00 UTC of 14-11-2022


IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (48 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 14-11-2022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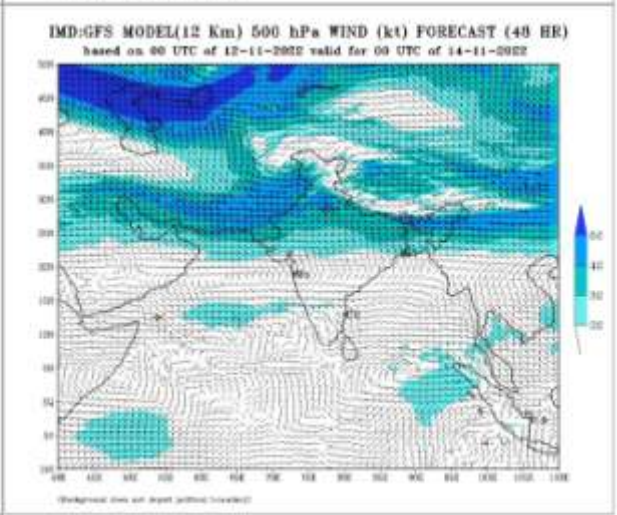
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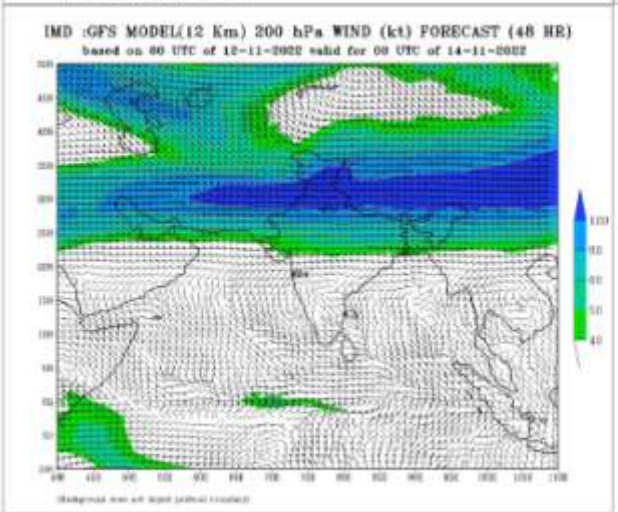
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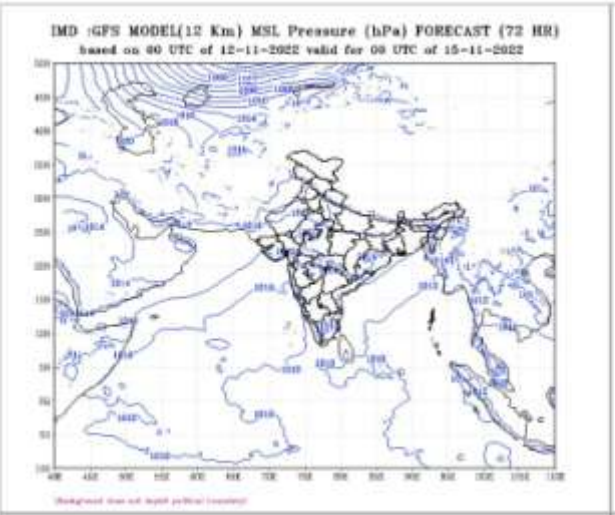
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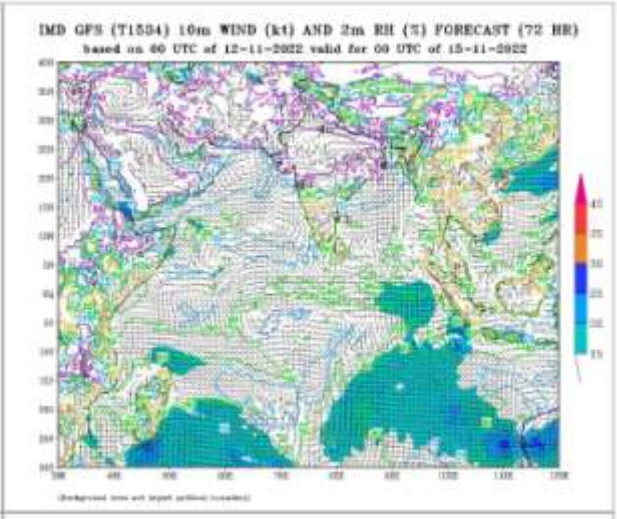
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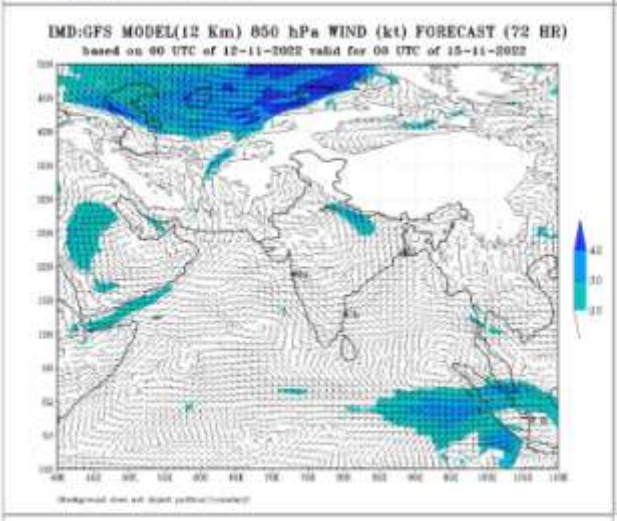
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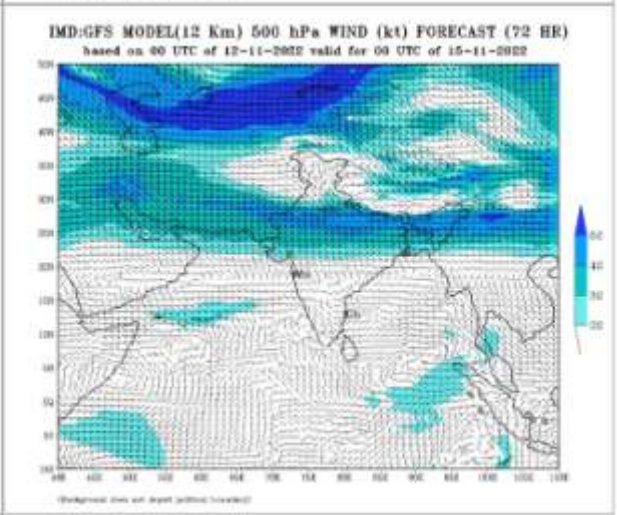
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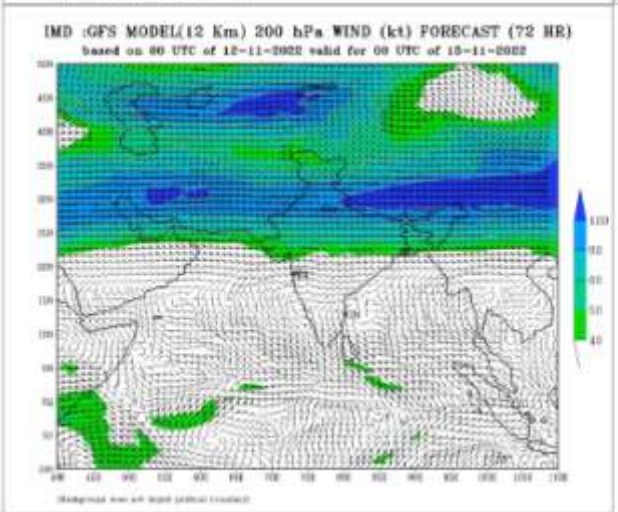
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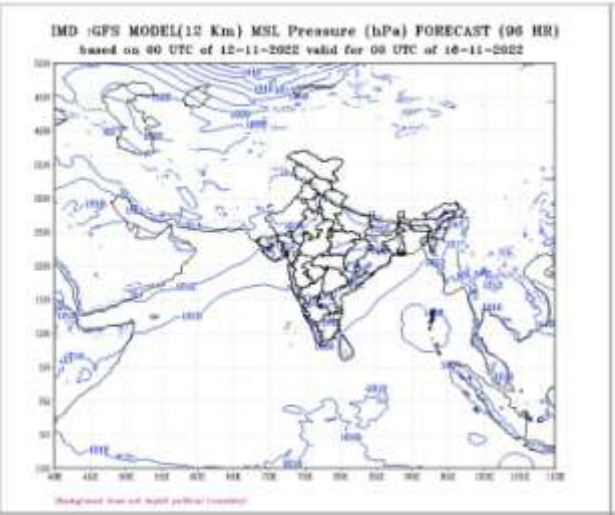
based on 00 UTC of 12-11-2022 valid for 00 UTC of 15-11-2022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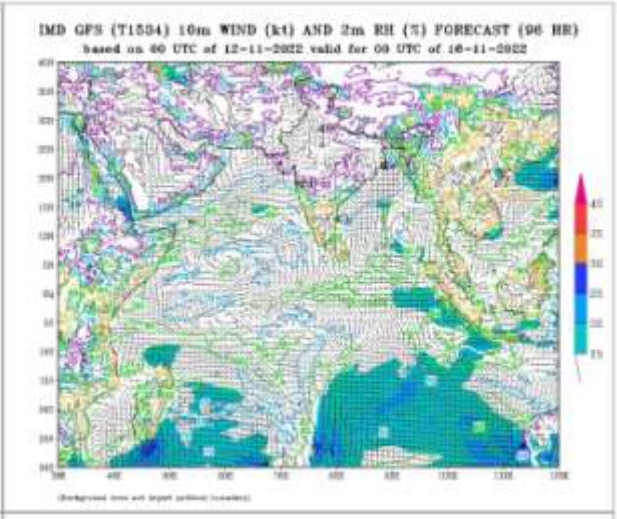
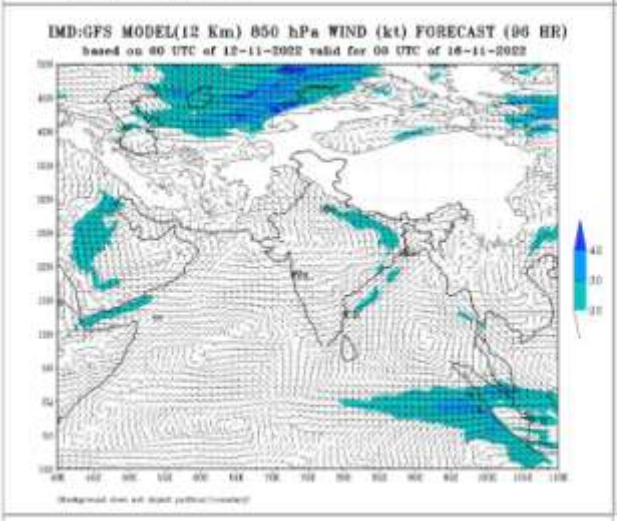
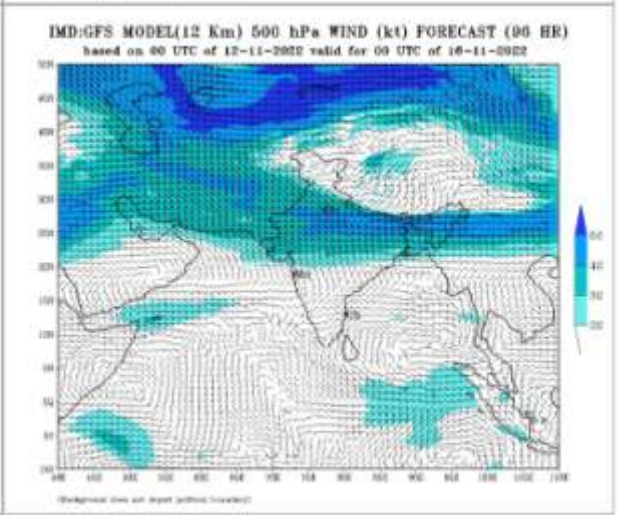
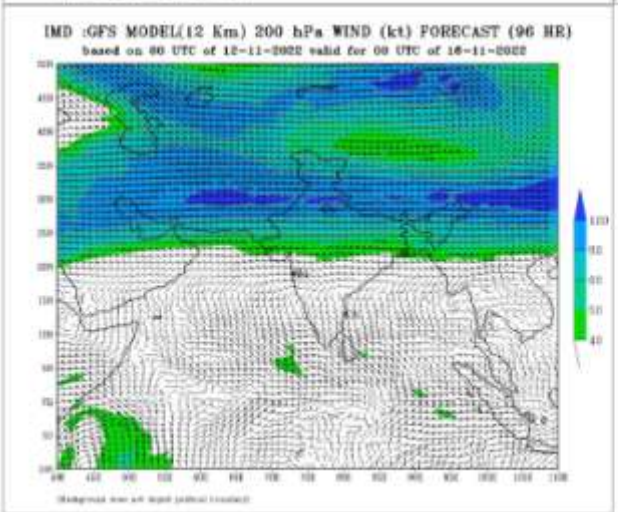
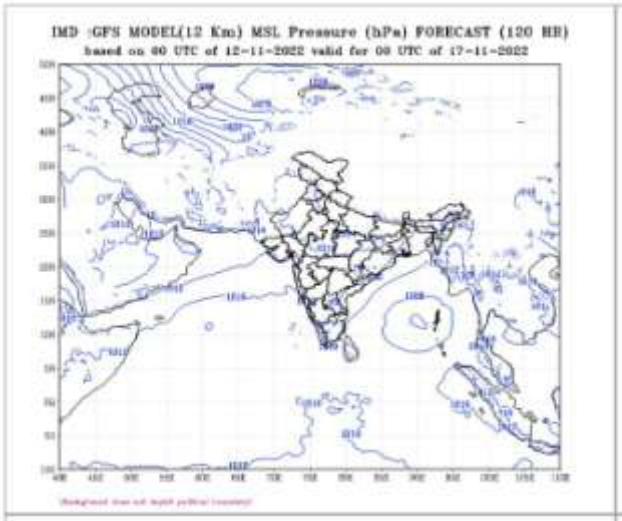
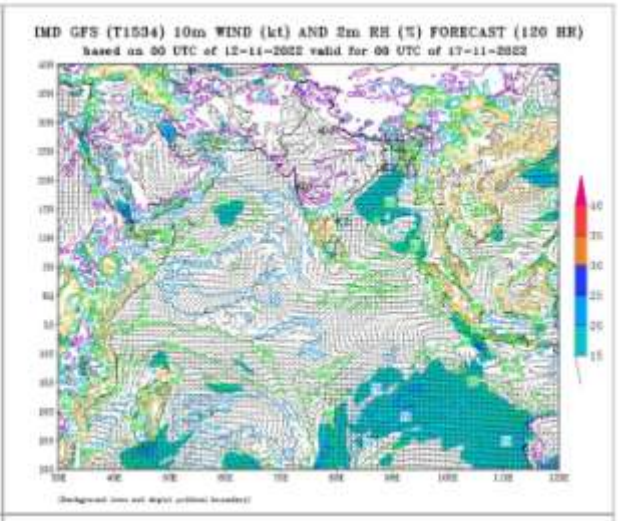

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 16-11-2022

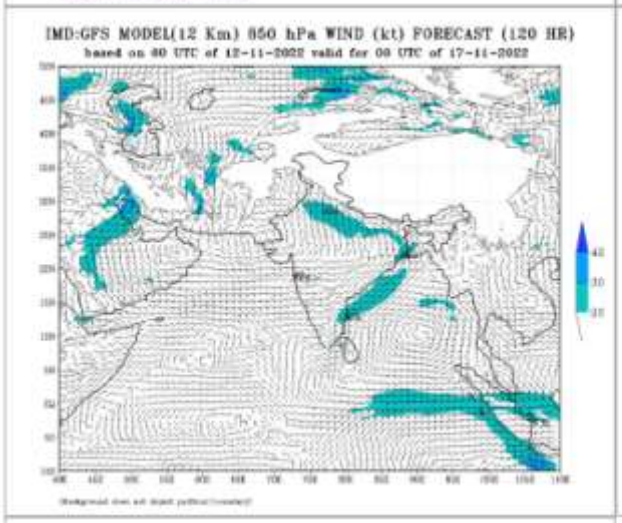

IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 16-11-2022

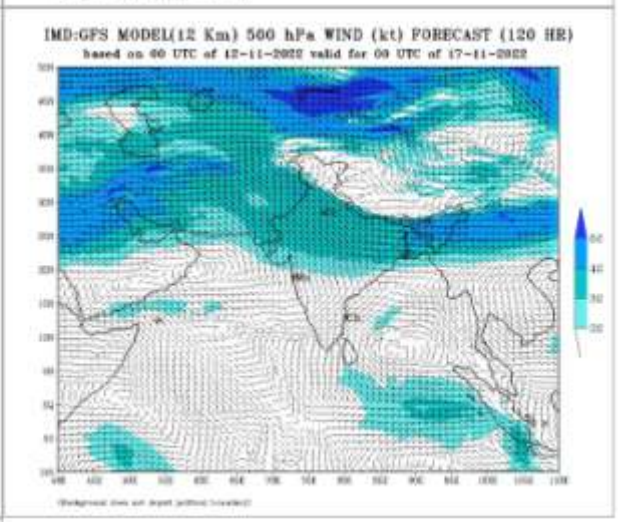

IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 16-11-2022

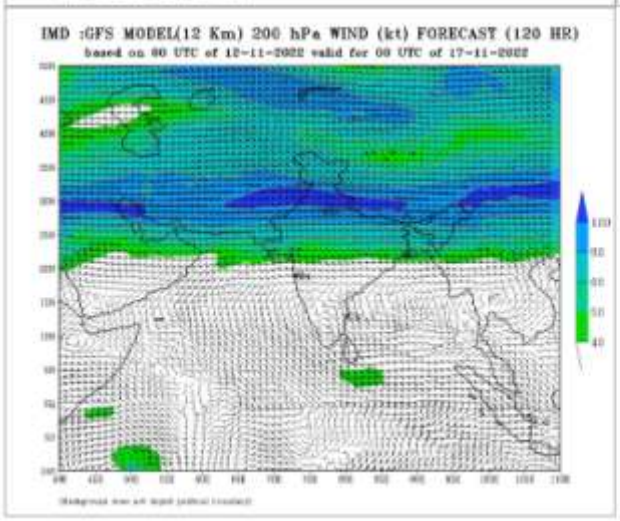

IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (96 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 16-11-2022

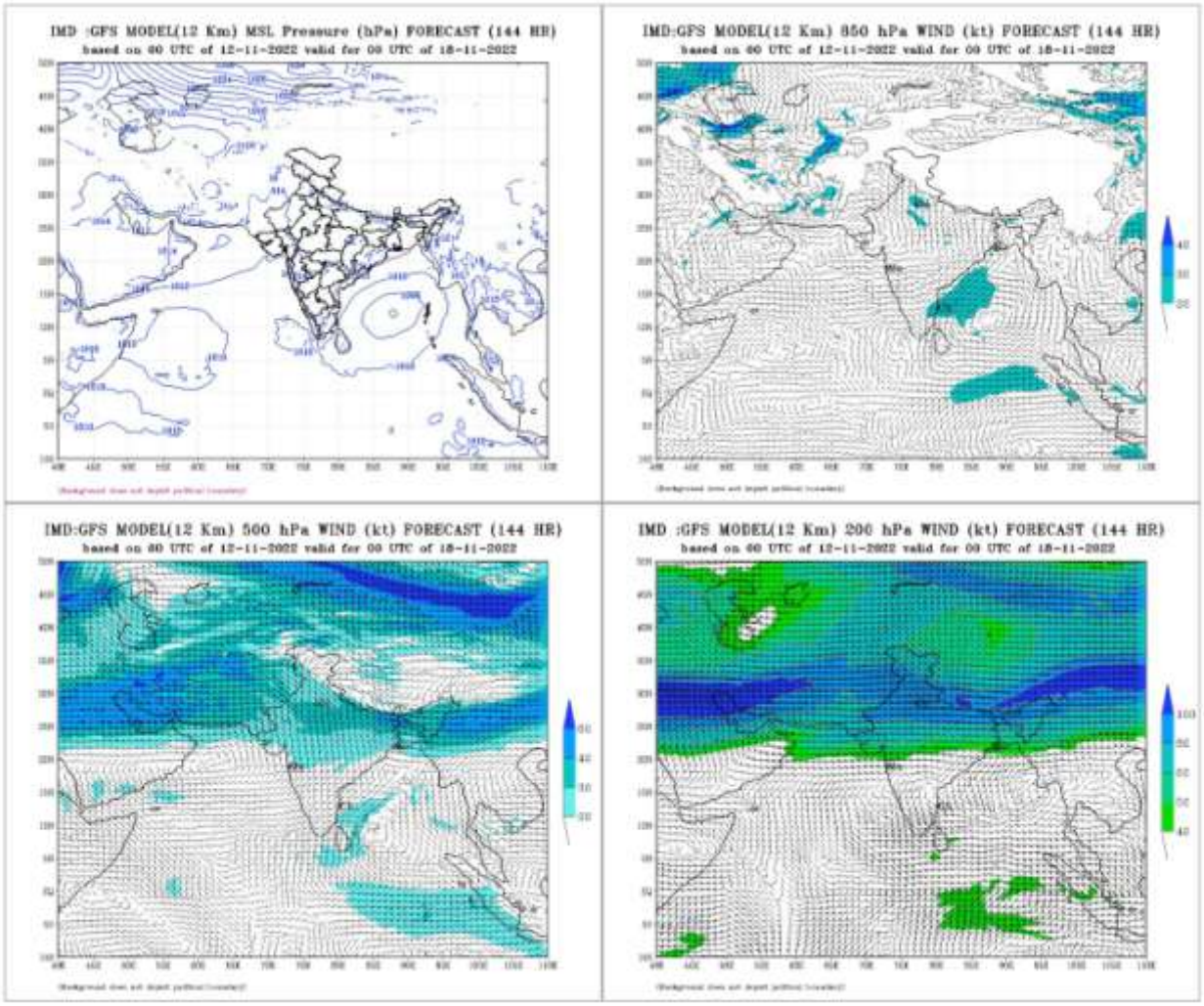

IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (120 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 17-11-2022

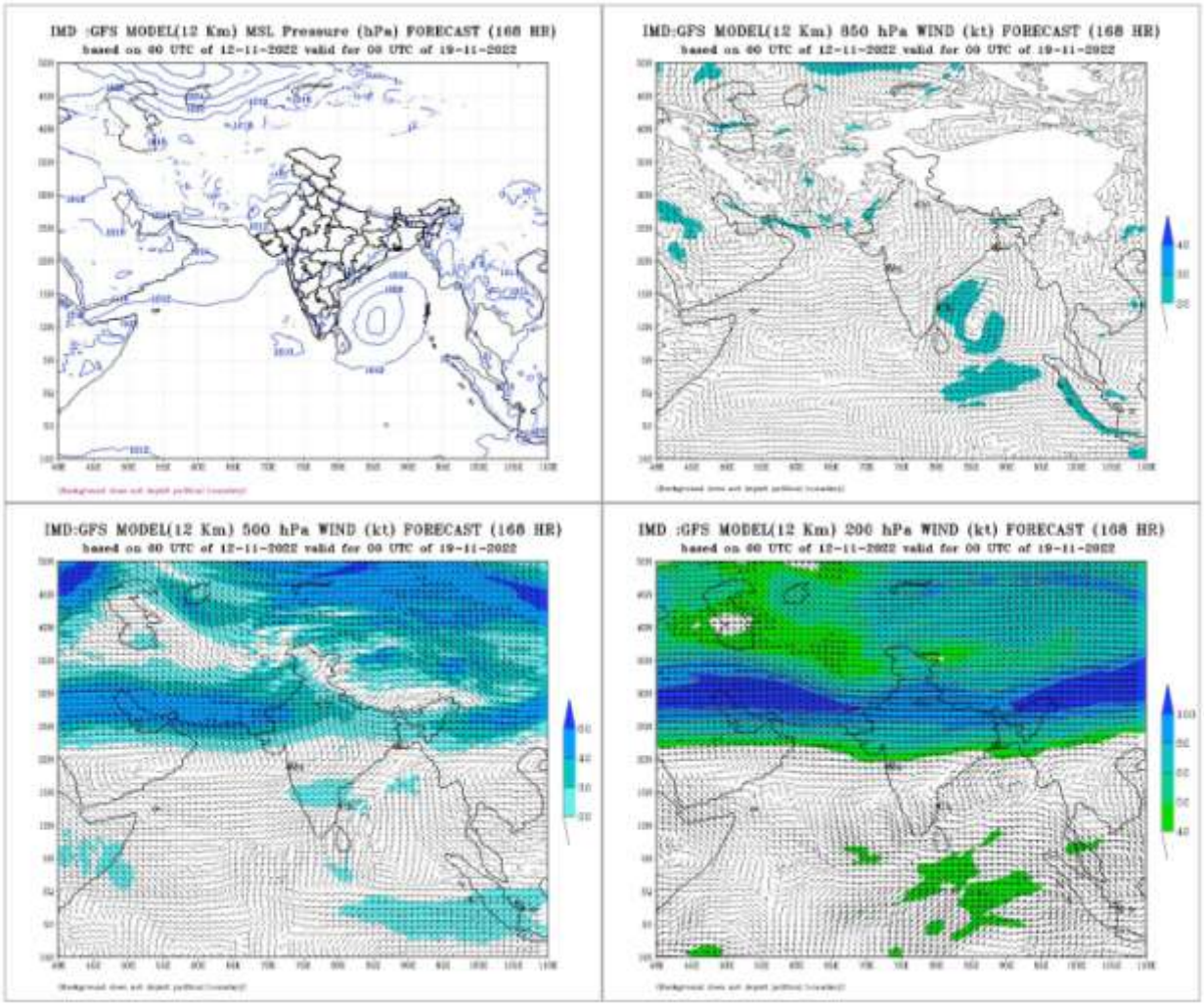

IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (120 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 17-11-2022


IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 17-11-2022


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 17-11-2022


IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (120 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 17-11-2022


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 18-11-2022
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 18-11-2022
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 18-11-2022
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 18-11-2022


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (168 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 19-11-2022
IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 19-11-2022
IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 19-11-2022
IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (168 HR)
based on 00 UTC of 12-11-2022 valid for 00 UTC of 19-11-2022