



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

**Tropical Cyclone Forecast Programme  
Report Dated 14<sup>th</sup> December 2022**

**Time of Issue: 1200 UTC**

**Synoptic features (based on 0600 UTC analysis):**

Well marked low pressure Area over Eastcentral and adjoining Southeast Arabian Sea moved northwestwards, concentrated into a depression over the same region and lay centered at 1430 hrs IST of today, the 14th December 2022 near latitude 13.5°N and longitude 69.6°E about 430 km west-northwest of Aminidivi (Lakshadweep), about 500 km west-southwest of Panjim (Goa) and 1710 km east-southeast of Salalah (Oman). It is very likely to move westnorthwestwards over Eastcentral Arabian Sea away from India coast and intensify further into a deep depression by morning of tomorrow, the 15th December 2022.

Under the influence of the cyclonic circulation over South Andaman Sea and adjoining Strait of Malacca & Sumatra, a Low Pressure Area has formed over Equatorial Indian Ocean and adjoining areas of south Andaman Sea & Southeast Bay of Bengal at 1430 hrs IST of today, 14th December, 2022. It is likely to move gradually westwards and become well marked low pressure area over Southeast Bay of Bengal and adjoining Equatorial Indian Ocean by 15th Dec. Thereafter, it would continue to move westward and maintain its intensity over the sea till morning of 17th December 2022.

**Dynamical and thermo-dynamical features**

<b>Parameter</b>	<b>Bay of Bengal (BoB)</b>	<b>Arabian Sea (AS)</b>
<b>Sea Surface Temperature (SST) °C</b>	Around 28-30°C over almost entire BoB, 26-28°C over southwestern parts of southwest BoB, Gulf of Mannar. Less than 25 over north BoB off Bangladesh & West Bengal coast.	About 28-30°C over the southeast and adjoining eastcentral, southwest AS, along and off south Gujarat, Maharashtra coasts, north AS. About 26-28°C over along and off Kerala, Karnataka coasts, central AS, southwest AS. Less than 24°C along and off Oman and Yemen coasts and adjoining sea areas.
<b>Tropical Cyclone Heat Potential (TCHP) kJ/cm<sup>2</sup></b>	90-100 over eastcentral BoB, 90-100 over south Andaman Sea and adjoining southeast BoB. 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.

<b>Cyclonic Relative vorticity (<math>X10^{-6}s^{-1}</math>)</b>	20-30 over southern parts of southwest & southeast BoB.	50-60 around the system center.
<b>Low Level convergence (<math>X10^{-5}s^{-1}</math>)</b>	5-20 over southeast BoB off Sumatra coast.	5-10 to the northeast of system center.
<b>Upper Level divergence (<math>X10^{-5}s^{-1}</math>)</b>	20-30 over south Bay of Bengal & adjoining Andaman sea.	20-30 around system center.
<b>Vertical Wind Shear (VWS knots)</b>	10-15 over southeast BoB, 25-60 over most parts of remaining BoB.	5-10 around system center.
<b>Wind Shear Tendency (knots)</b>	Increasing over south BoB.	Decreasing around system center.
<b>Upper tropospheric Ridge</b>	Along 15.0°N over the BoB.	Along 13.0°N over the AS.
<b>Trough in westerlies</b>	No significant trough	

**Satellite observations based on INSAT imagery (0600 UTC):**

**a) Over the BoB & Andaman Sea: -**

Scattered to broken low and medium clouds with embedded intense to very intense convection lay over southeast Bay of Bengal and Andaman & Nicobar islands. Scattered low and medium clouds with embedded moderate to intense convection lay over southwest Bay of Bengal.

**b) Over the Arabian Sea: -**

Vortex (wml) over eastcentral AS & neighbourhood has further intensified and now lay centred within half deg of 13.3°N 70.2°E. Intensity T1.5/1.5 and Scattered to broken low and medium clouds with embedded intense to very intense convection lay over eastcentral Arabian sea & adjoining southeast Arabian sea and Lakshadweep islands area and neighbourhood. Minimum Cloud Top Temperature is -93 degree celsius.

**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 tomorrow. Thereafter, it will move to phase 2,3 for next 5 days.

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

NIL

**Model guidance based on 0000 UTC for the next 7 days**

<b>MODEL GUIDANCE</b>	<b>Bay of Bengal (BoB)</b>	<b>Arabian Sea (AS)</b>
<b>IMD-GFS</b>	A cyclonic circulation over South Andaman Sea, Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining Equatorial India Ocean by morning of 15th Dec, it will have westward movement and will become	A well marked low pressure area over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression by morning of 15 <sup>th</sup> Dec, it will move northwestward with reducing intensity till 16 <sup>th</sup> Dec morning.

	depression by 16 <sup>th</sup> Dec morning, it will continue in same direction with reducing intensity till 17 <sup>th</sup> Dec morning.	
<b>IMD-GEFS</b>	A cyclonic circulation over southeast Bay of Bengal and adjoining South Andaman Sea as on today. Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining Equatorial India Ocean by morning of 15 <sup>th</sup> Dec, it will continue in same direction and will become less marked by 17 <sup>th</sup> Dec morning.	A well marked low pressure area over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression/deep depression by morning of 15 <sup>th</sup> Dec, it will move northwestward and become depression by 16 <sup>th</sup> Dec morning, it will become less marked thereafter.
<b>GEFS Probabilistic guidance</b>	-	-
<b>IMD WRF</b>	A cyclonic circulation over southeast Bay of Bengal and adjoining South Andaman Sea as on today. Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining Equatorial India Ocean by morning of 15 <sup>th</sup> Dec, it will become less marked thereafter.	A well marked low pressure area over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression by morning of 15 <sup>th</sup> Dec, it will move northwestward and will become deep depression by 16 <sup>th</sup> Dec morning. It will continue in same direction and will become depression by 17 <sup>th</sup> Dec morning.
<b>NCMRWF-NCUM</b>	A cyclonic circulation over southeast Bay of Bengal and adjoining South Andaman Sea as on today. Under its influence, a Low Pressure Area is likely to form over Southeast Bay of Bengal & adjoining Equatorial India Ocean by morning of 16 <sup>th</sup> Dec, it will have westward movement till 17 <sup>th</sup> Dec and will become less marked thereafter.	A low pressure area over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards with same intensity till 17 <sup>th</sup> Dec morning.
<b>NCMRWF-NEPS</b>	A cyclonic circulation over southeast Bay of Bengal and adjoining South Andaman Sea as on today. Under its influence, a feeble low is likely to form over Southeast Bay of Bengal & adjoining Equatorial India Ocean by	A WML over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression by 15 <sup>th</sup> Dec morning, continue moving in same direction and lay over westcentral Arabian Sea by 16 <sup>th</sup> Dec morning, it will move in same direction and lay over westcentral Arabian Sea as depression by 17 <sup>th</sup> morning.

	morning of 15 <sup>th</sup> Dec, LPA will form over the same region by 16 <sup>th</sup> morning, it will have westward movement till 17 <sup>th</sup> Dec and will become less marked thereafter.	
<b>NCMRWF-UM (Regional)</b>	A cyclonic circulation over southeast Bay of Bengal and adjoining South Andaman Sea as on today will have westward movement without further intensification	A WML over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression by 15 <sup>th</sup> Dec morning, continue in same direction and will become LPA over westcentral AS by 17 <sup>th</sup> morning.
<b>ECMWF</b>	A cyclonic circulation over South Andaman Sea on 14 <sup>th</sup> with nearly westwards movement and no significant intensification	A WML over Eastcentral and adjoining Southeast Arabian Sea as on today will move northwestwards and will become depression by 15 <sup>th</sup> Dec morning, continue in the same direction without change in intensity and lay over westcentral and adjoining eastcentral AS by 16 <sup>th</sup> morning, continue in the same direction without change in intensity and lay over westcentral AS by 17 <sup>th</sup> morning.
<b>ECMWF ensemble</b>	60-70% probability for a fresh LPA over southeast BoB to track west-northwestwards.	High probability of depression over central Arabian Sea during 15 <sup>th</sup> -19 <sup>th</sup> with west-northwestwards movement.
<b>NCEP-GFS</b>	A cyclonic circulation over South Andaman Sea on 14 <sup>th</sup> , under its influence a LPA will form over same region, it will move in the same direction till 18 <sup>th</sup> morning without further intensification.	A low pressure area (LPA) over southeast and adjoining eastcentral AS on 14 <sup>th</sup> Dec will have west-northwestwards till 17 <sup>th</sup> morning.
<b>IMD MME</b>	No guidance	Depression likely over Southeast Arabian Sea by 15 <sup>th</sup> morning will have west-northwestwards with reducing intensity till 18 <sup>th</sup> morning.
<b>IMD HWRF</b>	No guidance	No guidance
<b>IMD-Genesis Potential Parameter</b>	-	A potential zone over southeast and adjoining eastcentral AS on 13 <sup>th</sup> Dec will have its west-northwest ward movement till 17 <sup>th</sup> Dec.

### Summary and conclusion:

- ❖ Most of the models captured formation of depression over eastcentral and adjoining southeast Arabian Sea on 14<sup>th</sup> December over eastcentral AS except NCMRWF-NCUM which did not indicate intensification into depression. Most of the models are showing its west-northwestward movement till 17<sup>th</sup> morning as a depression/ deep depression and weaken gradually thereafter
- ❖ Most of the models predicted formation of LPA over southeast BoB and adjoining EIO today and its westward movement towards Sri Lanka coast with slight intensification till 17<sup>th</sup> morning and weaken thereafter.

**In view of all the above, it is inferred that**

**1. For the Bay of Bengal:**

The existing low pressure area over east equatorial Indian Ocean and adjoining south Andaman Sea and southeast bay of Bengal is likely to be well marked by 15<sup>th</sup> and move nearly westwards. It would maintain its intensity till 17<sup>th</sup> morning and weaken gradually thereafter while moving towards Sri Lanka coast.

**2. For Arabian Sea:**

Yesterday's LPA over Eastcentral and adjoining Southeast Arabian Sea off north Kerala-Karnataka coasts moved northwestwards and became a well marked low pressure area over the same region as of today morning. It moved northwestwards away from India coast and concentrated into a depression the same region and lay centered at 1430 hrs IST of today, the 14<sup>th</sup> December 2022 near latitude 13.5<sup>o</sup>N and longitude 69.6<sup>o</sup>E. It is very likely to move west-northwestwards over Eastcentral Arabian Sea away from India coast and intensify further into a deep depression by morning of tomorrow, the 15<sup>th</sup> December 2022.

**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	Low	Low	NIL	NIL	NIL	NIL

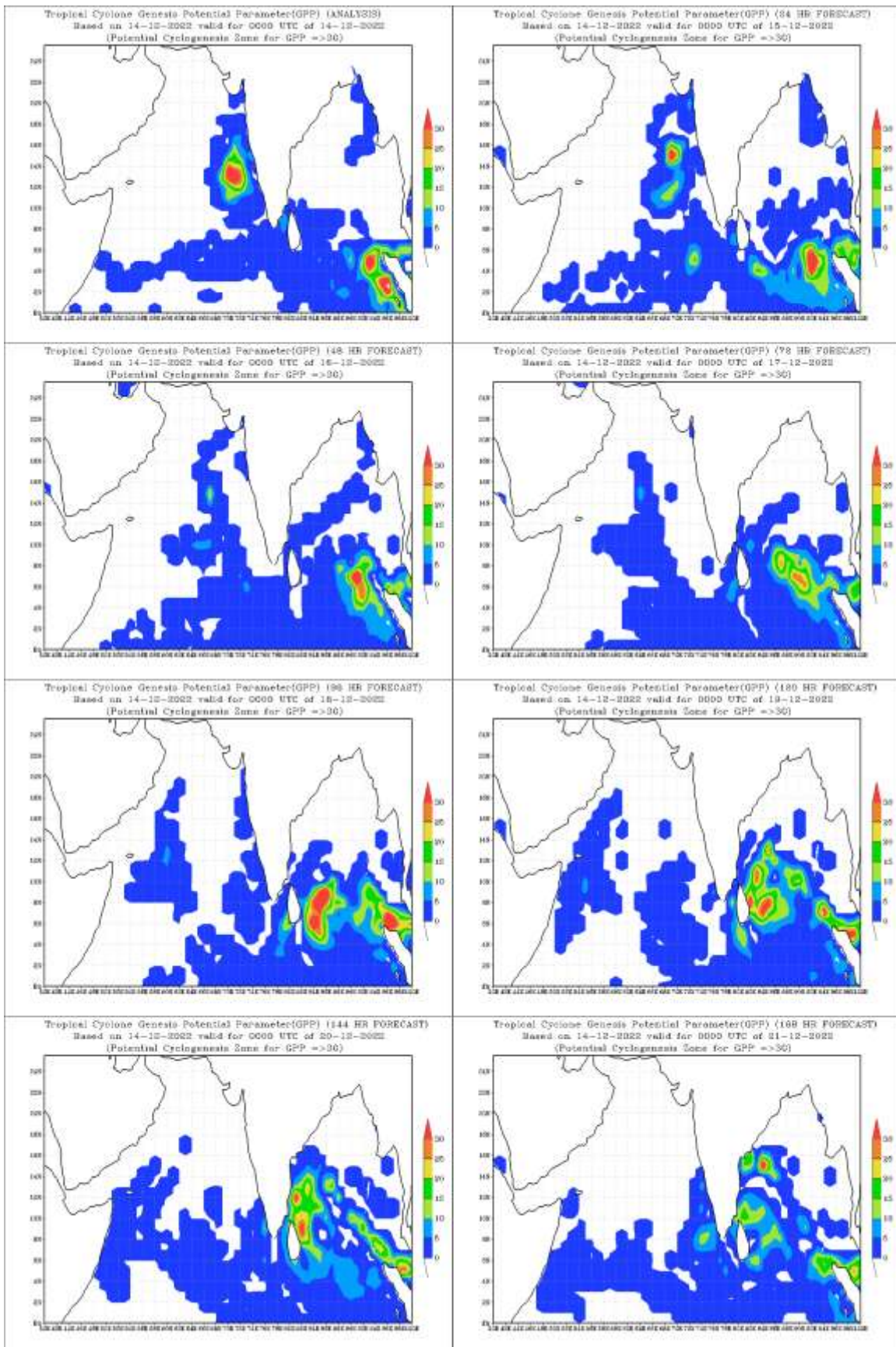
**Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea during next 168 hours:**

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

**Advisory: The movement and intensification of both the systems need to be monitored.**

**IOP: NIL**

**Annexure**



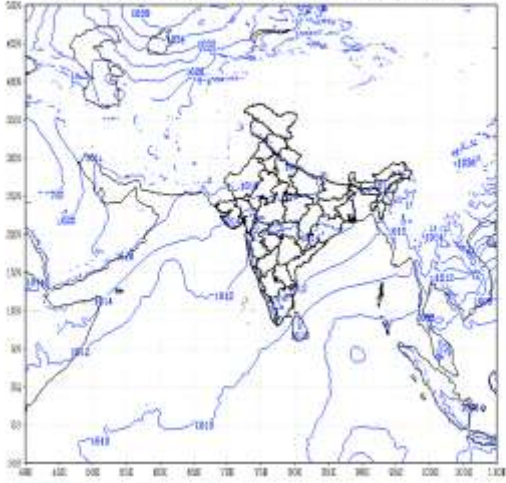






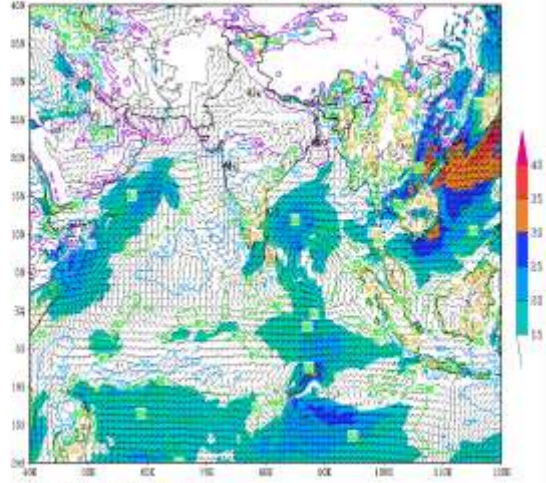


IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)  
 based on 00 UTC of 14-12-2022 valid for 00 UTC of 17-12-2022



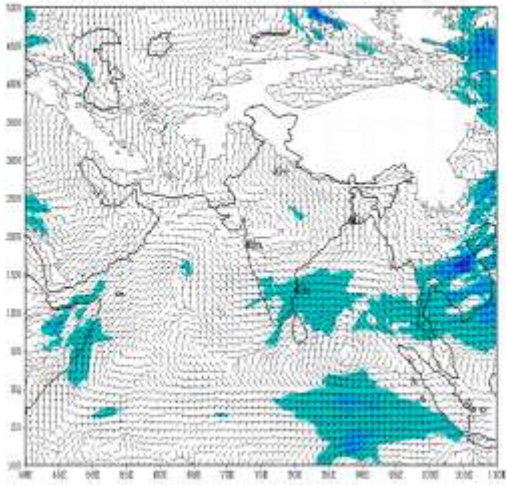
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IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (72 HR)  
 based on 00 UTC of 14-12-2022 valid for 00 UTC of 17-12-2022



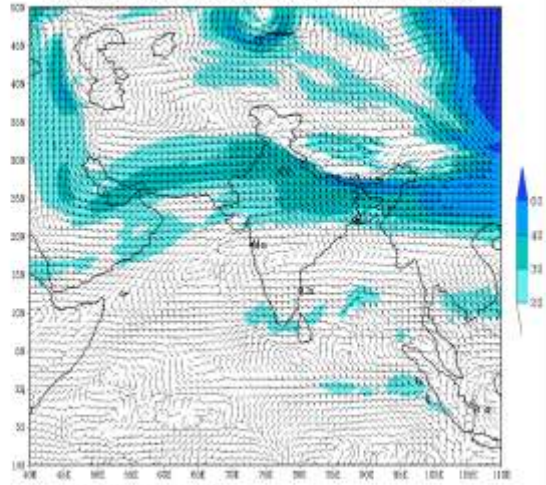
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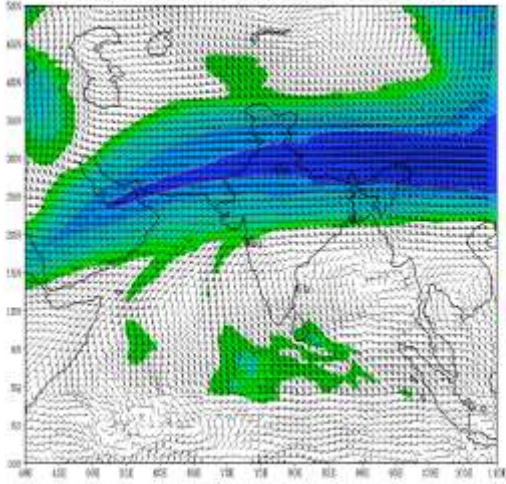
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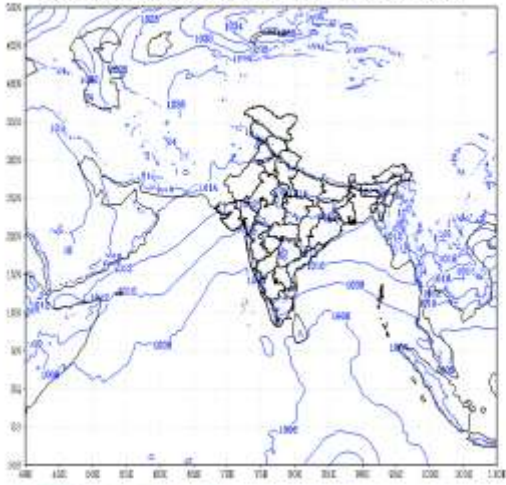
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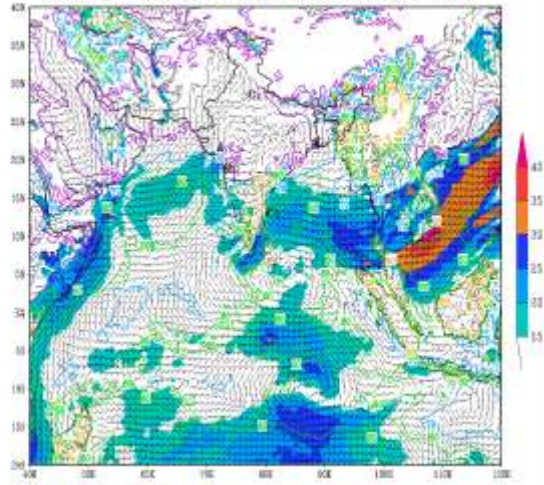


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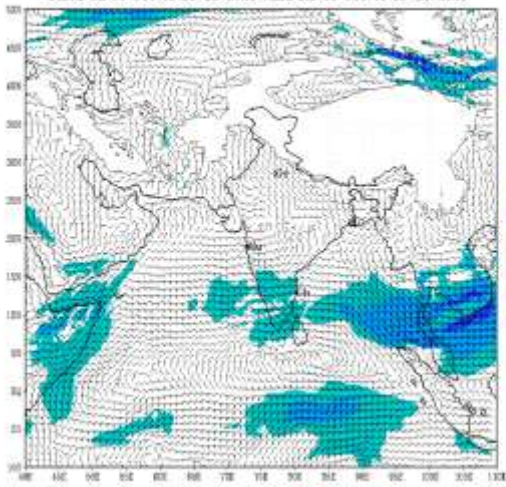
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IMD: GFS(12Km) 10m WIND (barb)& GUST (shaded:kt) FORECAST (120 HR)  
 based on 00 UTC of 14-12-2022 valid for 00 UTC of 19-12-2022



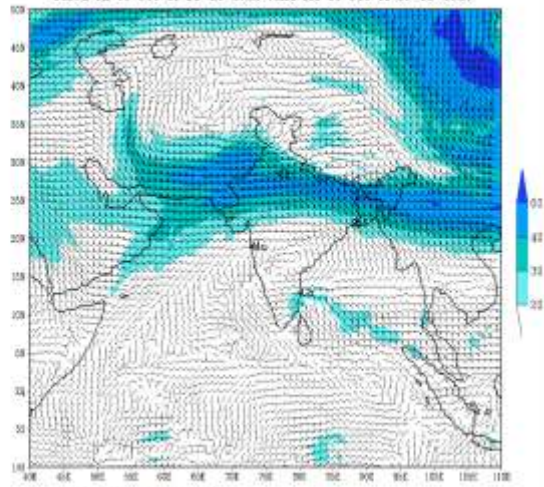
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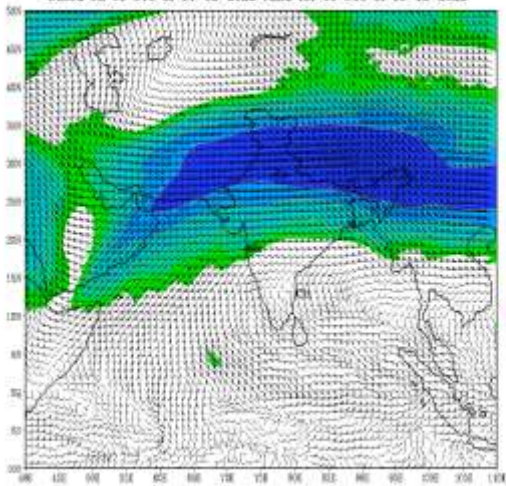
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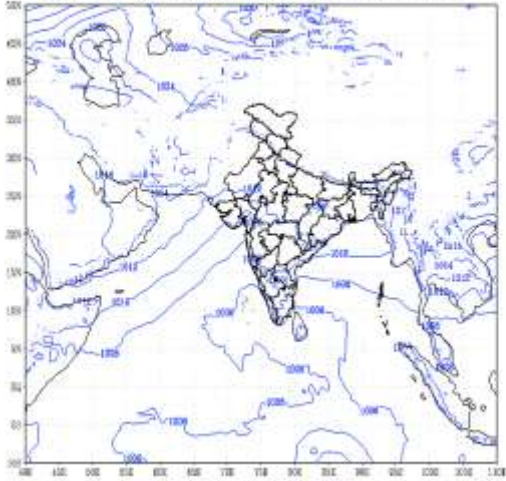
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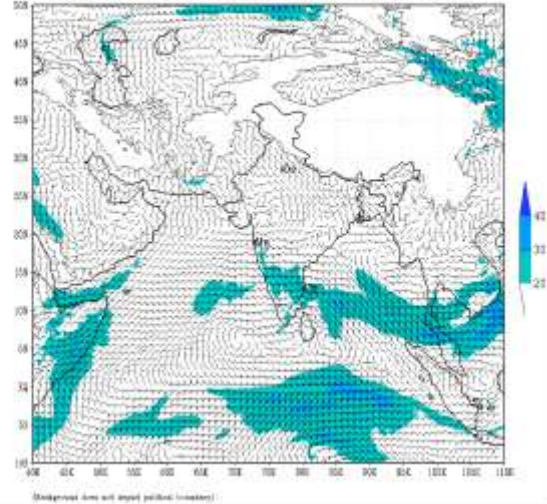
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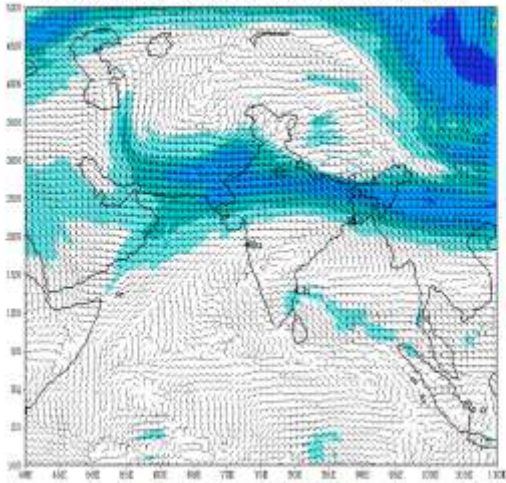
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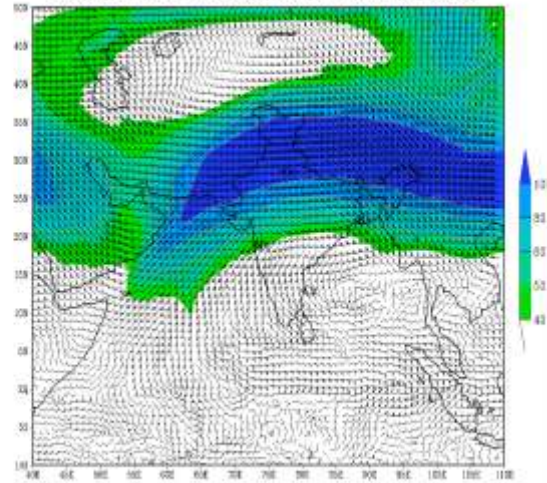
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IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 14-12-2022 valid for 00 UTC of 20-12-2022



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IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 14-12-2022 valid for 00 UTC of 20-12-2022



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