



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

**Tropical Cyclone Forecast Programme  
Report Dated 20<sup>th</sup> October, 2022**

**Time of Issue: 1200 UTC**

**Synoptic features (based on 0900 UTC analysis):**

- ❖ The Low Pressure Area over north Andaman Sea and adjoining areas of south Andaman Sea & Southeast Bay of Bengal with the associated cyclonic circulation extending upto 7.6 km above mean sea level persists. It is very likely to move west-northwestwards and concentrate into a Depression over eastcentral & adjoining southeast Bay of Bengal around 22nd October and into a Deep Depression on 23rd October. Subsequently, it is very likely to recurve northwards and intensify into a Cyclonic Storm over westcentral & adjoining eastcentral Bay of Bengal by 24th October. Thereafter, it is likely to move gradually north- northeastwards and reach near West Bengal - Bangladesh coasts on 25th October, skirting Odisha coast.
- ❖ The trough from cyclonic circulation associated with the low pressure area north Andaman Sea and adjoining areas of south Andaman Sea & Southeast Bay of Bengal to Tamilnadu coast across South Bay of Bengal extending upto 3.1 km above mean sea level persists.
- ❖ A cyclonic circulation lies over Southeast Arabian Sea and adjoining Kerala coast between 1.5 km & 5.8 km above mean sea level.
- ❖ The cyclonic circulation over Eastcentral Arabian sea off Maharashtra coast extending upto 1.5 km above mean sea level has become less marked.
- ❖ The north-south trough from Southeast Arabian Sea off Kerala coast to cyclonic circulation over Eastcentral Arabian Sea off Maharashtra coast extending upto 1.5 km above mean sea level has become less marked.
- ❖ The cyclonic circulation over Southwest Arabian Sea & neighbourhood extending upto 3.1 km above mean sea level has become less marked.

**Dynamical and thermo-dynamical features**

| <b>Parameter</b>                            | <b>Bay of Bengal (BoB)</b>   | <b>Arabian Sea (AS)</b>  |
|---|--|--|
| <b>Sea Surface Temperature (SST)<br/>°C</b> | About 29-31°C over entire bob and Andaman Sea except over some parts of southwest bob. | 30-31°C over eastcentral AS and off Maharashtra-South Gujarat coasts.<br>27-29°C over eastcentral, westcentral and southwest BoB. Less than 26°C off Oman & Somalia coast. |

|   |  |  |
|---|--|--|
| <b>Tropical Cyclone Heat Potential (TCHP) kJ/cm<sup>2</sup></b>     | (a) >100 over entire andaman sea, central bob and south BoB.<br>(b) 50-70 over western parts of BoB. | (a) 90-110 over northwest Equatorial Indian Ocean region.<br>(b) 60-80 over south AS & adjoining eastcentral AS.<br>(c) 30-40 over remaining AS off west coast of India. |
| <b>Cyclonic Relative vorticity (X10<sup>-6</sup>s<sup>-1</sup>)</b> | Positive vorticity of 100 to the southwest of system centre is extending upto 500 hpa level.         | (a) Positive vorticity of 30-40 over central AS, eastcentral AS and Comorin area.<br>(b) 30-40 over southwest AS off Yemen coasts.<br>(c) 20-30 over remaining south AS. |
| <b>Low Level convergence (X10<sup>-5</sup> s<sup>-1</sup>)</b>      | 10 to the west of system centre.   | Small zones of value 05 over central AS, southeast AS and Comorin Area.  |
| <b>Upper Level divergence (X10<sup>-5</sup> s<sup>-1</sup>)</b>     | 10 over andaman sea to the southwest of system centre.   | 05-10 over southwest AS & adjoining equatorial Indian Ocean region, Lakshadweep Islands and Comorin Area.<br>Small zones of 5 over northwest AS off Oman coast.          |
| <b>Vertical Wind Shear (VWS knots)</b>                              | Moderate (10-15 knots) over Andaman Sea.   | 5-15 (favourable) over central & adjoining south AS.<br>25-40 (unfavourable) over extreme south AS & adjoining EIO and Comorin area.                                     |
| <b>Wind Shear Tendency (knots)</b>                                  | Decreasing over south Andaman Sea and adjoining Thailand area  | Decreasing over westcentral AS off Yemen coast and Comorin area  |
| <b>Upper tropospheric Ridge</b>                                     | Along 19.0°N over the BoB.   | Along 19.0°N over the AS.  |

### **Satellite observations based on INSAT imagery (0900 UTC):**

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

At 0900 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Bay of Bengal and Andaman Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over northwest Bay of Bengal. Scattered low and medium clouds with embedded isolated weak to moderate convection over rest of Bay of Bengal.

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

At 0900 UTC, Scattered to broken low and medium clouds with embedded intense to very intense convection lay over eastcentral & southeast Arabian Sea and Lakshadweep Islands Area. Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral & southwest Arabian Sea and Comorin area.

**M.J.O. Index:**

MJO index is currently in Phase 6 with amplitude greater than 1. It will continue in same phase for next 7 days with amplitude remaining greater than 1.

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

Vortex (NESAT) over South China Sea and neighbourhood lay near 17.7N / 108.2E with intensity T.No./C.I. No. 1.5/1.5 at 0600 UTC. Associated scattered to broken low and medium clouds with embedded weak to moderate convection over southeast China, north Vietnam, Gulf of Tonkin and Hainan.

**Input for FDP Cyclone based on 0000 UTC for the next 7 days**

| <b>MODEL GUIDANCE</b>             | <b>BoB</b>   | <b>AS</b>   |
|-----------------------------------|--|---|
| <b>IMD-GFS</b>                    | GFS is indicating a low pressure area (LPA) over southeast BOB on 20 <sup>th</sup> . It is very likely to move west & northwestwards till 21 <sup>st</sup> . It would lie as a deep depression over central BoB on 21 <sup>st</sup> morning, a deep depression (DD) over southeast BoB on 23 <sup>rd</sup> , cyclonic storm (CS) over westcentral BoB on 24 <sup>th</sup> and further intensification into a very severe cyclonic storm on 25 <sup>th</sup> over westcentral BoB. Thereafter, it will move gradually north-northwestwards and cross West Bengal coast near 21.8/88.0 around 26 <sup>th</sup> /03-06 UTC. | A cycir lies over southeast AS off kerala and adjoining Karnataka coast on 21st Oct 2022. It would extend westwards and would move gradually westwards till 24th. |
| <b>IMD-GEFS</b>                   | Two low pressure areas over North Andaman Sea and southeast BoB on 21 <sup>st</sup> . Well marked low pressure area (WML) over southeast BoB on 22 <sup>nd</sup> . Depression over central & adjoining southeast BoB on 23 <sup>rd</sup> , deep depression/CS over the westcentral & adjoining southwest BoB on 24 <sup>th</sup> . Thereafter, the system would recurve gradually north-northeastwards and weaken over northwest BoB and cross Odisha coast around 27 <sup>th</sup> /0000 UTC near 18.5/89.0.  | A cycir lies over southeast AS off kerala and adjoining Karnataka coast on 21st Oct 2022. It would extend westwards and would move gradually westwards till 24th. |
| <b>GEFS Probablistic guidance</b> | About 70-80% ensemble members are indicating initial westwards movement towards northwest & adjoining westcentral BoB. 50-60 % members are indicating initially northwestwards movement followed by northeastwards recurvature and crossing varying from Odisha coast to Bangladesh coast.   | No guidance available   |
| <b>IMD WRF</b>                    | Two low pressure areas over North Andaman Sea and southeast BoB on 20 <sup>th</sup> . Well marked low pressure area (WML) over southeast BoB on 21st. Depression over central & adjoining southeast BoB on 22 <sup>nd</sup> , deep depression/CS over the westcentral & adjoining southwest BoB on 23 <sup>rd</sup> .  | A cycir lies over southeast AS off kerala and adjoining Karnataka coast on 21st Oct 2022. It would extend westwards and would move gradually westwards till 24th. |

|                             |   |  |
|-----------------------------|---|--|
| <b>NCMRWF-NCUM</b>          | NCUM is indicating a low pressure area (LPA) over over Andaman Sea and adjoining southeast BOB on 20th Oct 2022 it is very likely to move west & northwestwards, till 21st Oct 2022 and would lie as depression. It would maintain as depression over east-central and adjoining southeast BoB till 22nd morning, and would become as deep depression (DD) over west-central and adjoining southwest BoB on 23rd, it would move north-northwest wards and would become cyclonic storm (CS) over westcentral BoB on 24th, and will have further intensification of the system on the same day over northwest BoB, Moving north-northwestwards, the syetem would then recurve towards West Bengal and would cross the West Bengal -Bangladesh coast on 24th night as severe cyclonic storm. | A cycir lies over southeast AS off kerala and adjoining Karnataka coast on today ie., 20th Oct 2022. It would extend westwards and would move gradually westwards till 25th.       |
| <b>NCMRWF-NEPS</b>          | NCUM-NEPS is indicating a low pressure area (LPA) over Andaman Sea and adjoining southeast BOB on 20th Oct 2022 it is very likely to move west & northwestwards, till 21st Oct 2022 and would lie as depression. It would move north-northwest ward and gradually intensify into deep depression and further to cyclonic storm over west-central and adjoining northwest BoB by 23rd morning, it would then initially move north-northwest wards and would intensify into severe cyclonic storm by 24th October 2022 morning, and would recurve further towards West Bengal and would cross the West Bengal -Bangladesh coast on 24th night as very severe cyclonic storm.  | A cycir would lies over southeast AS off kerala and adjoining Karnataka coast on today ie., 21st Oct 2022. It would extend westwards and would move gradually westwards till 24th. |
| <b>NCMRWF-UM (Regional)</b> | A low pressure area (LPA) over Andaman Sea and adjoining southeast BOB on 20th Oct 2022 is very likely to move west - northwestwards and would lie as depression over southeast and adjoining east-central BoB by 22st Oct 2022. It would further move north-northwest wards and would become deep depression over west central Bob by 23rd Oct 2022.   | A cycir over southeast As on 23rd becoming less marked thereafter.   |
| <b>ECMWF</b>                | LPA over Andaman Sea on 20 <sup>th</sup> , depression over central parts of Andaman & adjoining southeast BoB on 22 <sup>nd</sup> , DD over eastcentral & adjoining westcentral BoB 23 <sup>rd</sup> , CS over westcentral BoB on 24 <sup>th</sup> . Thereafter, the system would move nearly northwards and cross West Bengal-Bangladesh coasts near 21.0N/89.0E around 26 <sup>th</sup> /0600 UTC.  | A extended cycir over central AS on 20th becoming less marked thereafter.  |
| <b>ECMWF-EPS</b>            | 60-70% cyclogenesis probability over Andaman Sea and adjoining southeast BoB during next 2 days. Large variation in track with some members indicating nearly west-northwestwards movent towards westcentral & adjoining southwest BoB and some members indicating initial west-northwestwards movement, followed by nearly northwards movement towards north BoB and crossing West Bengal-Bangladesh coasts.   | Model is indicating 20-30% probability of cyclogenesis over central & adjoining south AS during next 3-5 days.   |
| <b>NCEP-GFS</b>             | Model is indicating an LPA over southeast BoB on 23 <sup>rd</sup> , depression over southeast & adjoining eastcentral BoB on 24 <sup>th</sup> , with marginal intensification on 25 <sup>th</sup> and crossing over Bangladesh coast on 25 <sup>th</sup> .  | No significant system  |

|  |  |                       |
|--|--|-----------------------|
| <b>IMD-Genesis Potential Parameter</b> | <p>Potential zone over North Andaman Sea on 20th &amp; 21st which move north-northwestward over east-central BoB on 22nd and 23rd, and further move northwards over north BoB and adjoining central BoB. It would move further north east wards and cross Bangladesh coast on early hours of 25th Oct 2022. Another Potential zone over southeast BoB on 20th &amp; 21st, over southwest and adjoining southeast BoB move southwestward till 23rd Oct 2022.</p> <p>The guidance product is indicating further northward movement of the potential zone reaching over North West Bengal. till 25th October.</p> | No significant system |
|--|--|-----------------------|

**Summary and conclusion:**

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

The guidance from various numerical models indicate that the depression would form over southeast & adjoining eastcentral BoB around 22nd (ECMWF predicting depression close to central parts of Andaman Sea on 22nd , IMD GFS indicating depression over southeast & adjoining eastcentral BoB on 23rd, NCUM indicating depression over eastcentral BoB on 22nd, NCEP GFS indicating depression over adjoining eastcentral BoB on 24th). Further most of the models are indicating further intensification of the system into a cyclonic storm on by 24th over westcentral BoB (ECMWF & IMD GFS, GEFS over westcentral BoB, NCUM & NEPS over westcentral & northwest BoB). Models are also indicating gradual north-northeastwards recurvature of the system towards West Bengal-Bangladesh coast. Landfall is indicated over West Bengal – Bangladesh coast (ECMWF over West Bengal- Bangladesh border around 26th/0600 UTC, GFS over West Bengal coast around 26th/ 0300-0600 UTC, NCUM over West Bengal- Bangladesh border around 24th/2100 UTC, NCEP GFS over Bangladesh coast around 25th/0000 UTC). Various extended range models are also indicating likely formation of another cyclonic circulation over eastcentral BoB during week 2 with low probability of it's intensification into a depression.

**In view of all the above, it is inferred that the low pressure area over north Andaman Sea and neighbourhood is very likely to move west-northwestwards and concentrate into a Depression over eastcentral & adjoining southeast Bay of Bengal around 22<sup>nd</sup> October and into a Deep Depression on 23<sup>rd</sup> October. Subsequently, it is very likely to recurve northwards and intensify into a cyclonic storm over westcentral and adjoining eastcentral Bay of Bengal by 24th October. Thereafter, it is likely to move gradually north-northeastwards and reach near West Bengal - Bangladesh coasts on 25th October, skirting Odisha coast.**

The environmental conditions like SST and ocean thermal energy are favourable over south & central BoB for formation of low/depression. The La Nina conditions supported with negative IOD conditions will support the movement of remnant circulations from South China Sea to Andaman Sea with possible further intensification. However, MJO being in phase 6 with amplitude more than 1, will not be supportive for amplification of convection and hence the system.

**2. For the Arabian Sea:**

No significant system is likely to develop over Arabian Sea 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: an 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         | MODERATE    | MODERATE    | HIGH         | HIGH          | HIGH          |

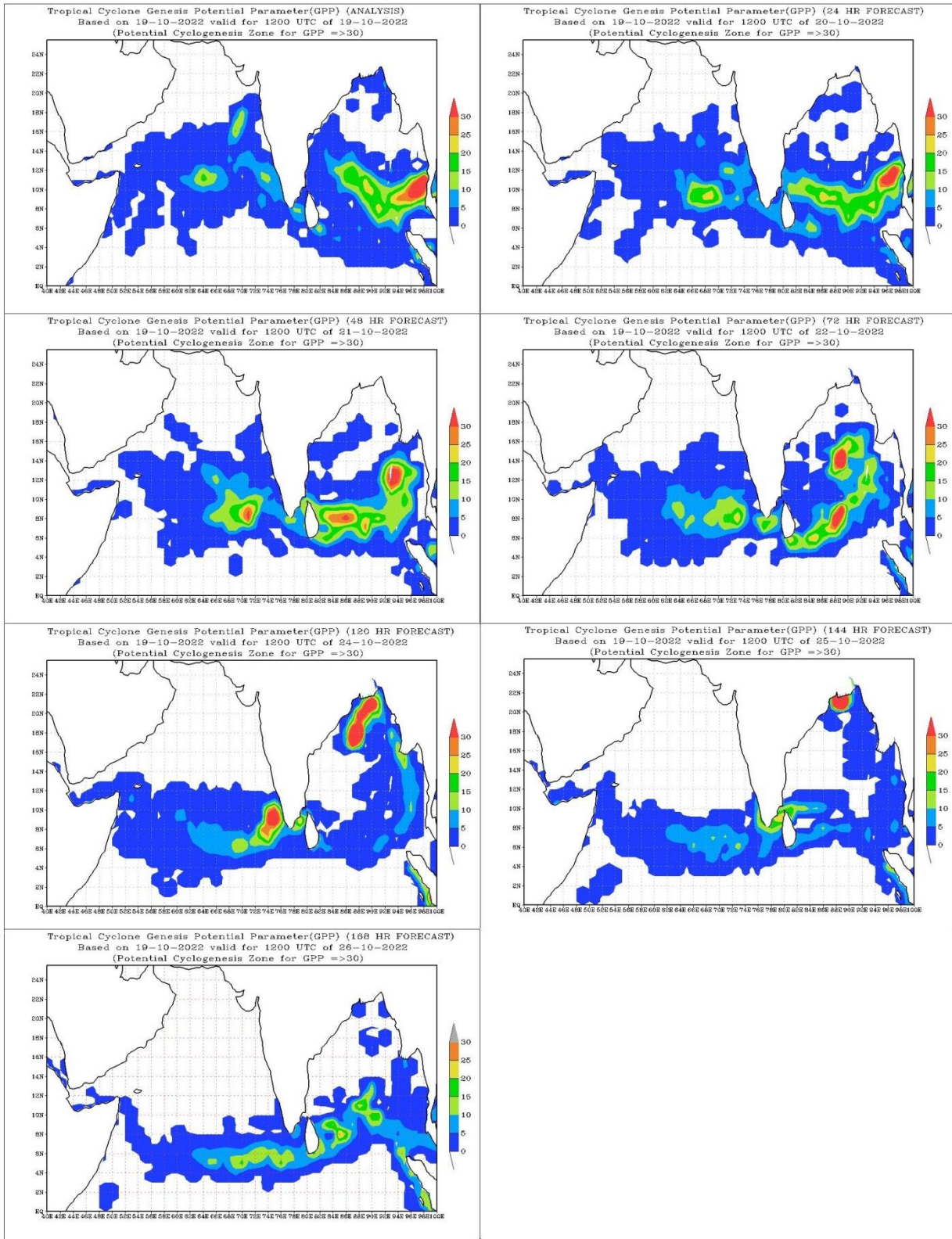
**Probability of cyclogenesis (formation of depression and above intensity systems) over the Arabian Sea**

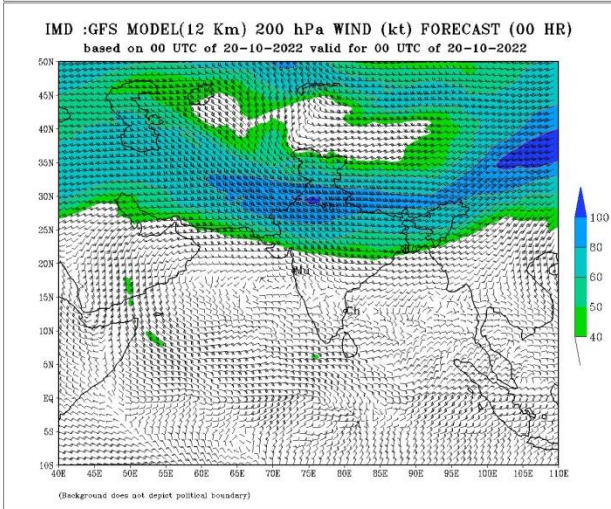
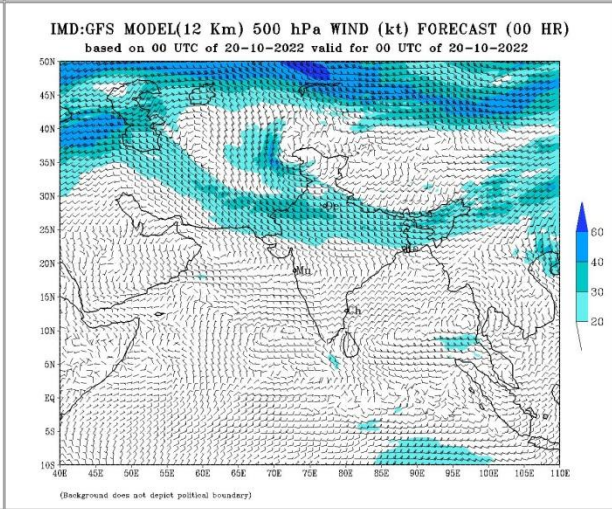
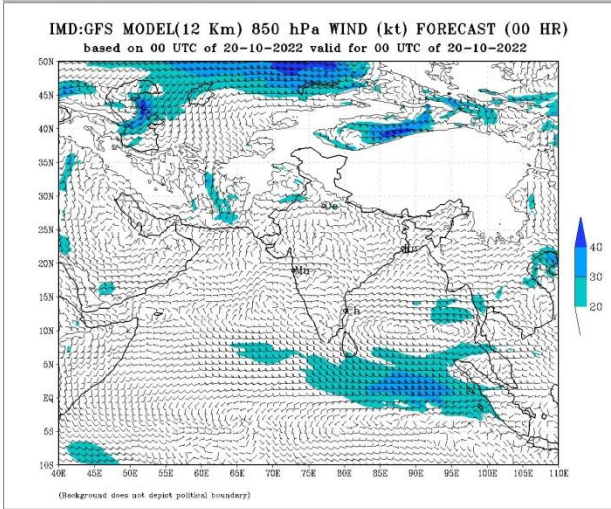
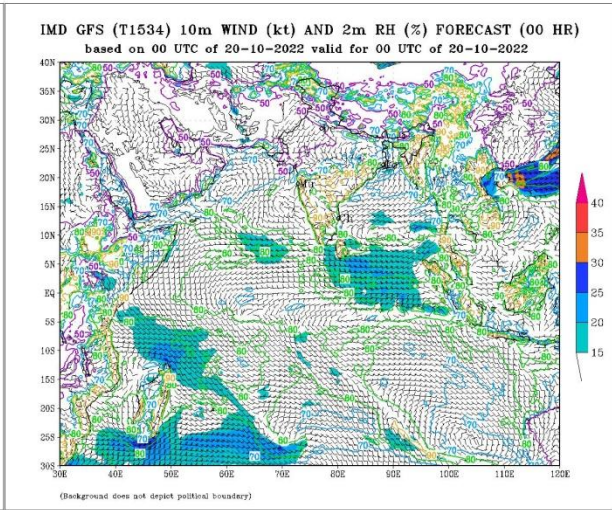
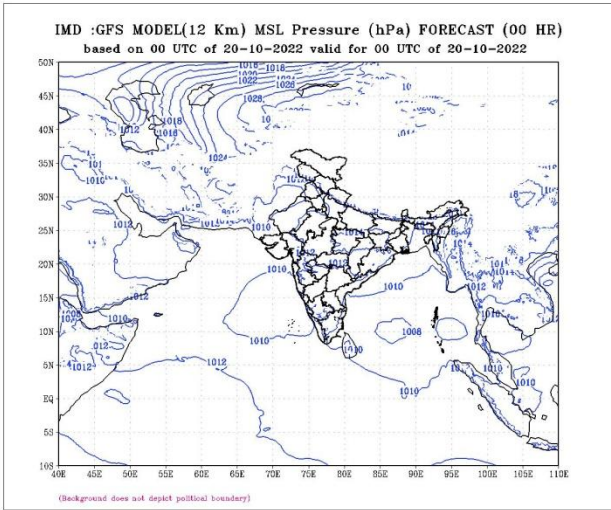
| 24 HOURS | 24-48 HOURS | 48-72 HOURS | 72-96 HOURS | 96-120 HOURS | 120-144 HOURS | 144-168 HOURS |
|----------|-------------|-------------|-------------|--------------|---------------|---------------|
| NIL      | NIL         | NIL         | NIL         | NIL          | NIL           | NIL       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

**Advisory:**

The intensification & movement of depression likely to form over central Bay of Bengal by 22<sup>nd</sup> October morning need to be monitored closely.

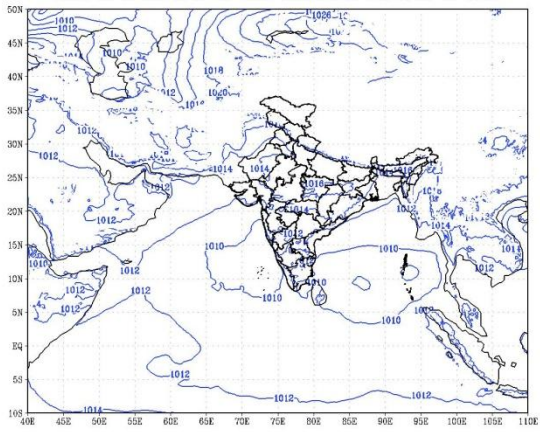
**IOP is suggested for Andaman & Nicobar Islands on 20<sup>th</sup> & 21<sup>st</sup>.**



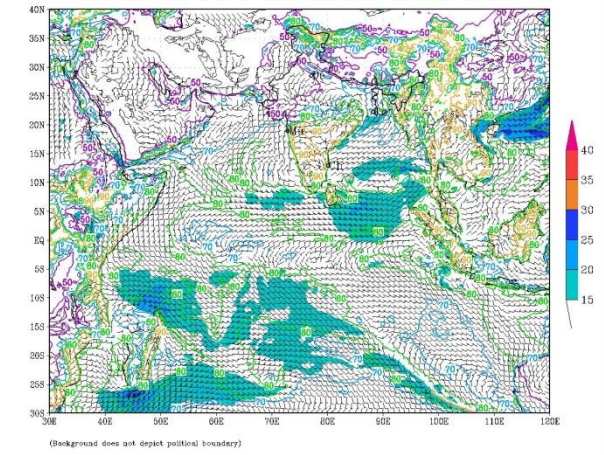




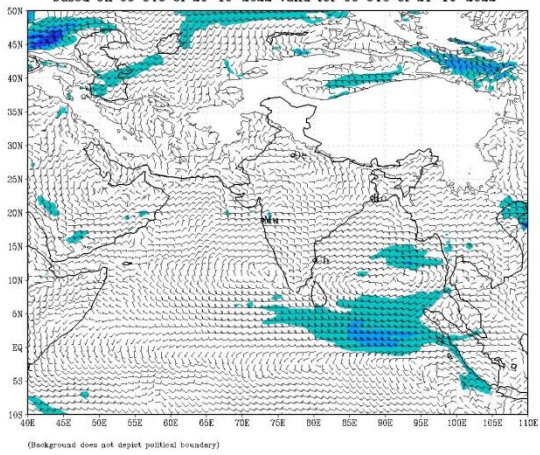
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (24 HR)  
based on 00 UTC of 20-10-2022 valid for 00 UTC of 21-10-2022



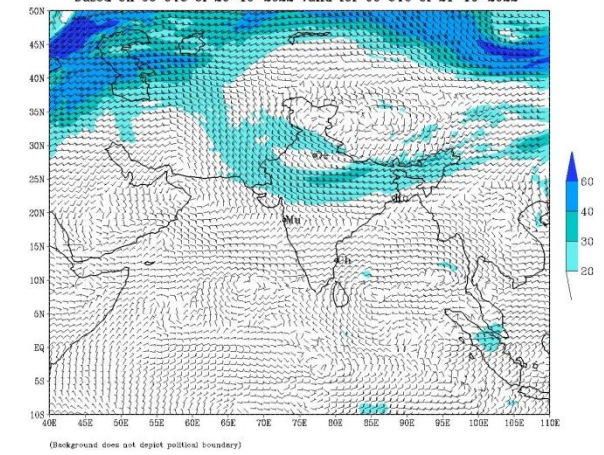
IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (24 HR)  
based on 00 UTC of 20-10-2022 valid for 00 UTC of 21-10-2022



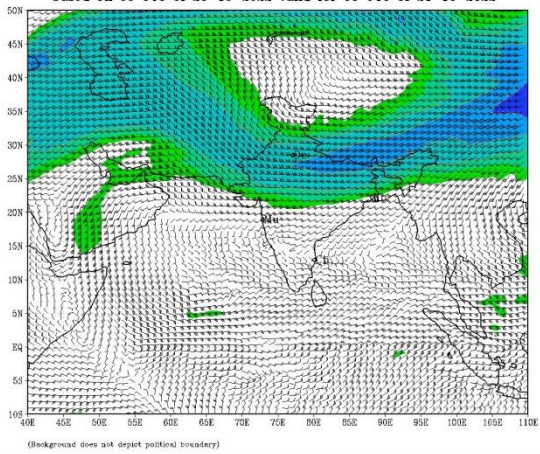
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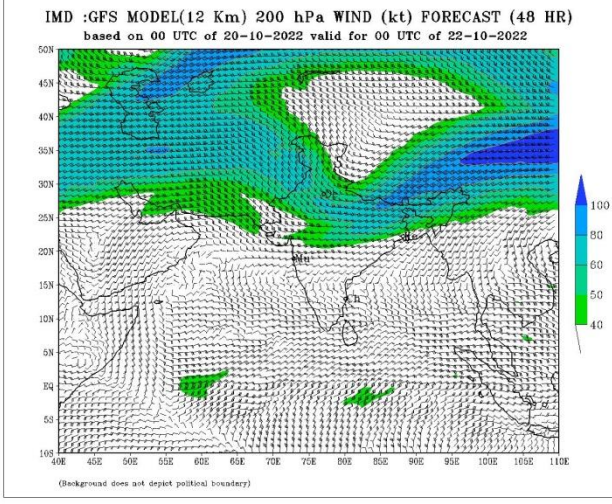
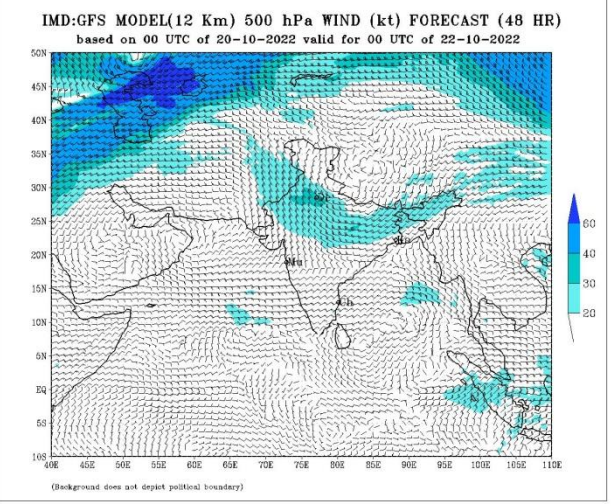
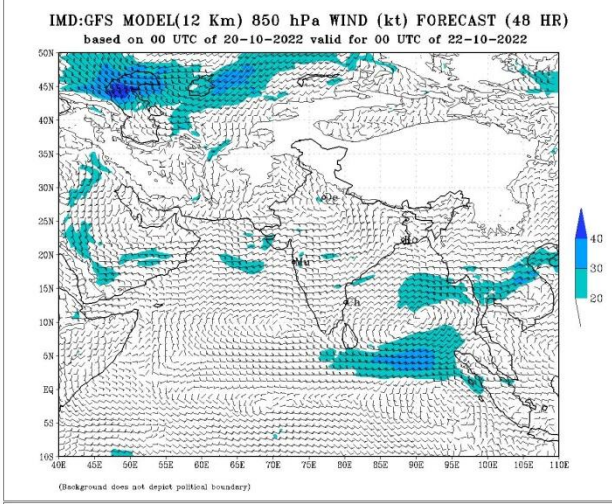
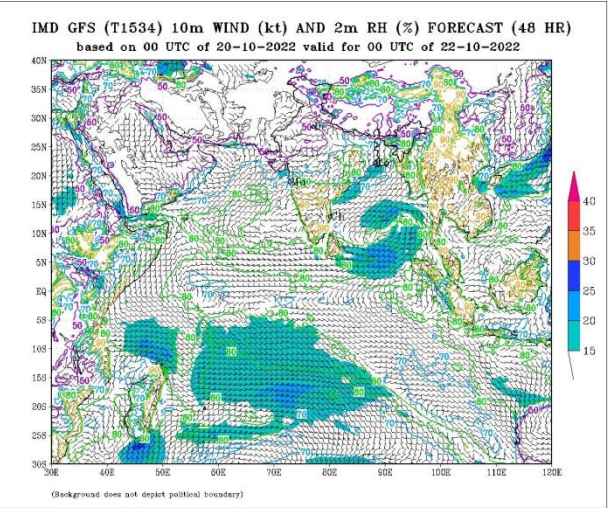
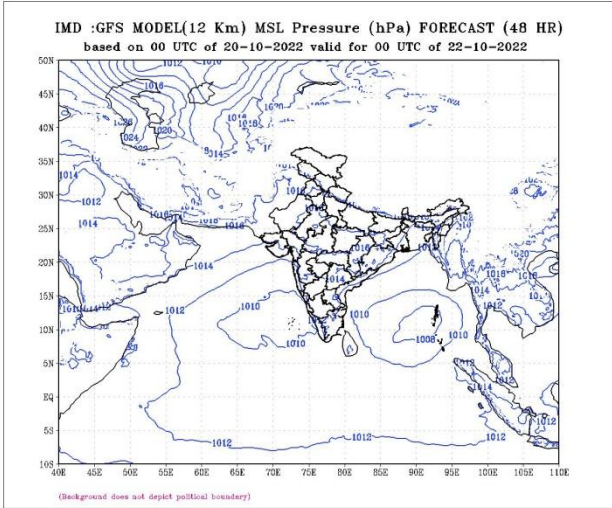


IMD:GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (24 HR)  
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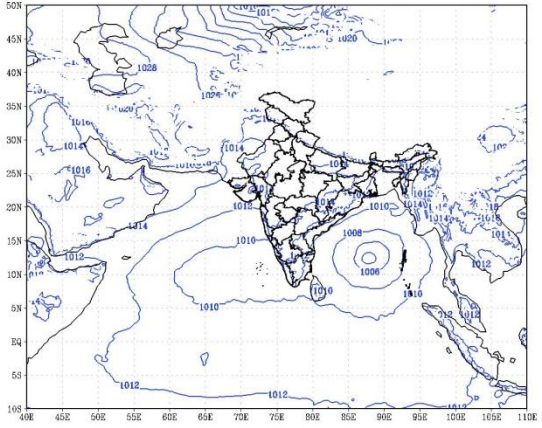


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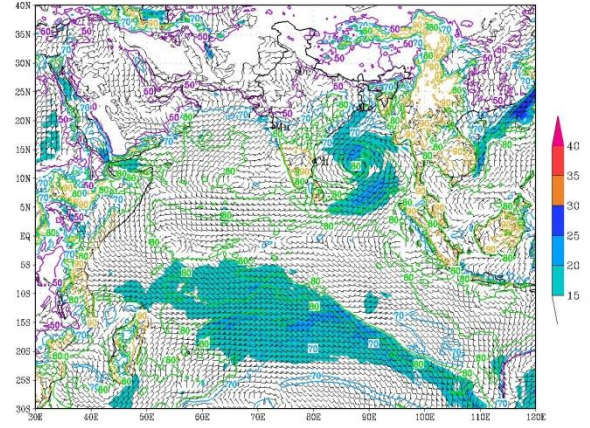


**IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (72 HR)**  
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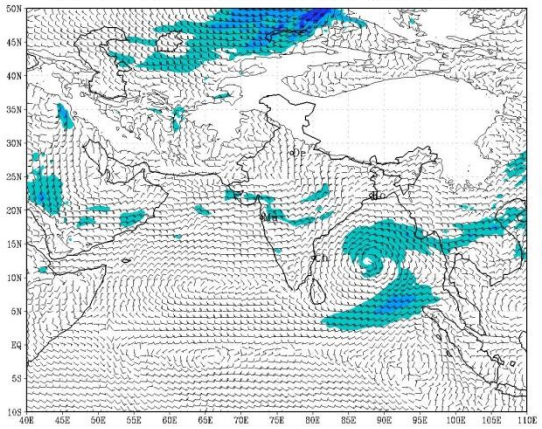
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**IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (72 HR)**  
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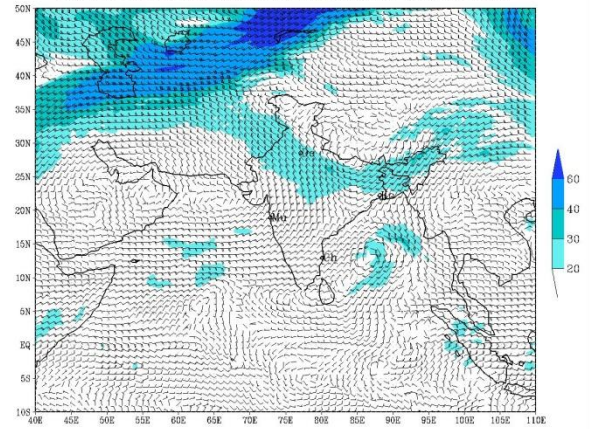
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**IMD:GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (72 HR)**  
 based on 00 UTC of 20-10-2022 valid for 00 UTC of 23-10-2022



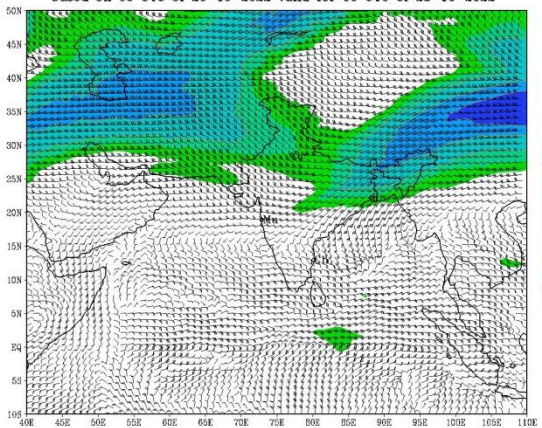
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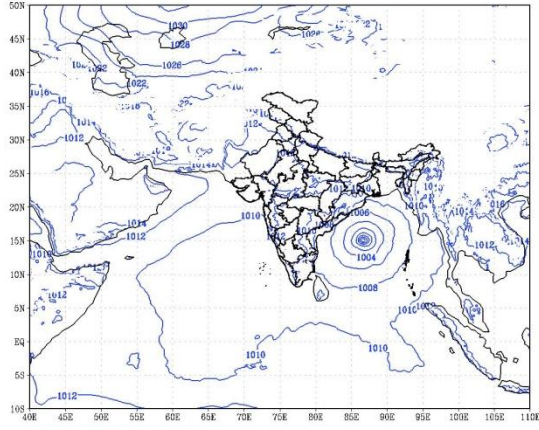
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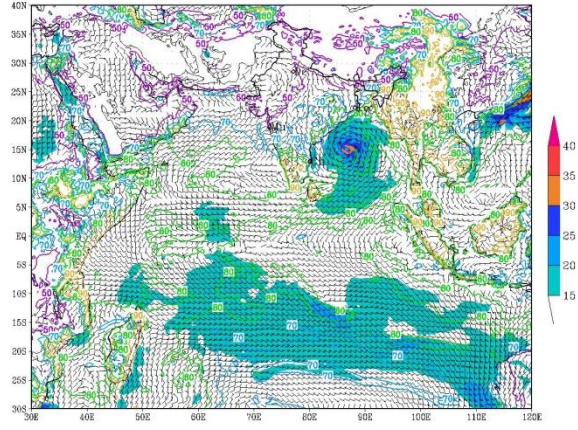
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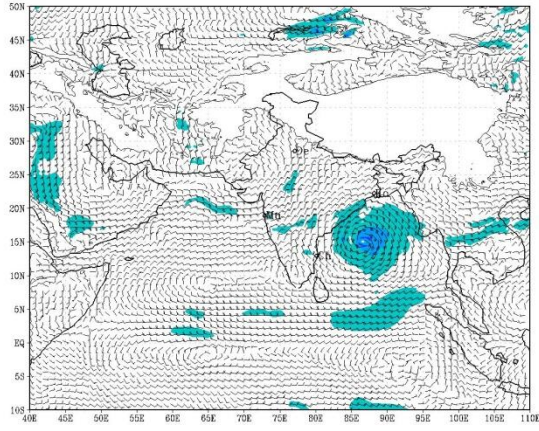
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IMD GFS (T1534) 10m WIND (kt) AND 2m RH (%) FORECAST (96 HR)  
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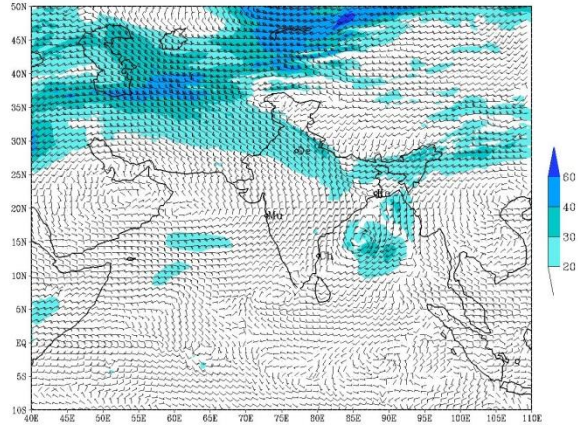
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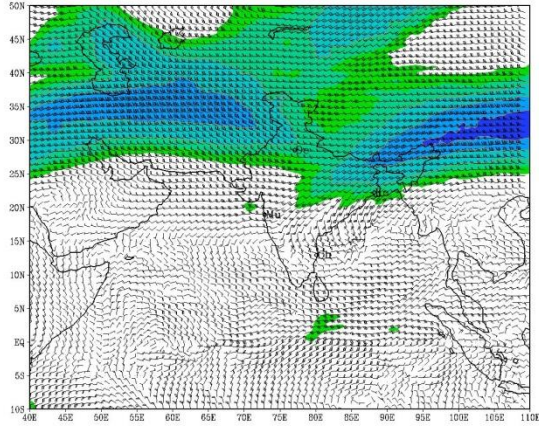
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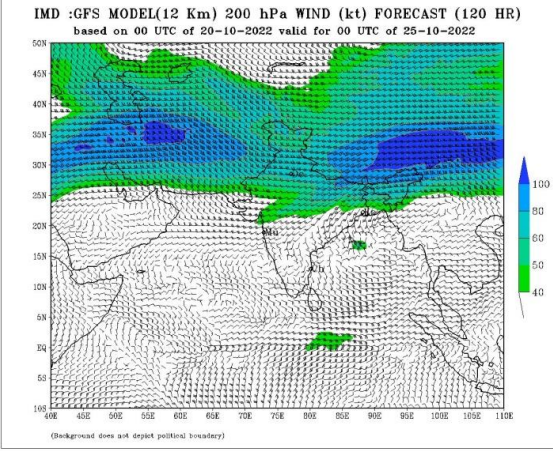
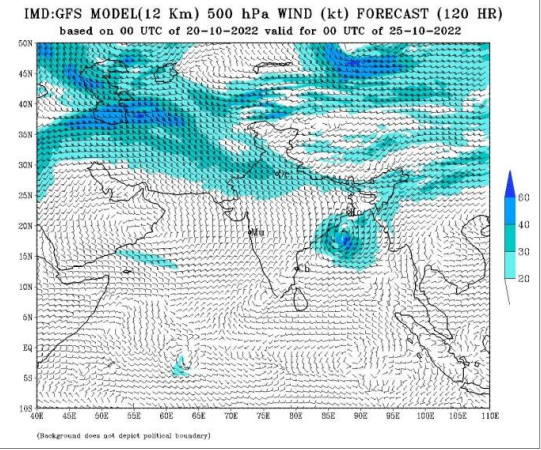
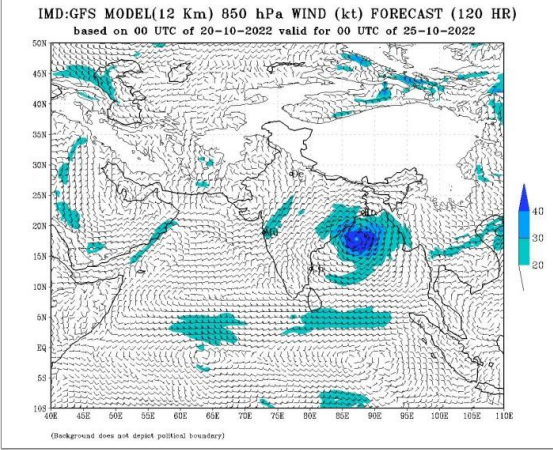
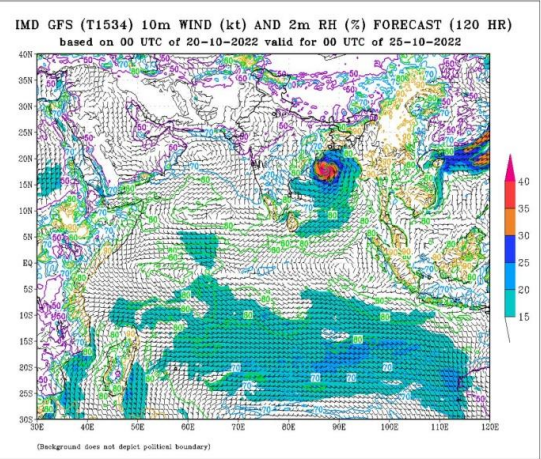
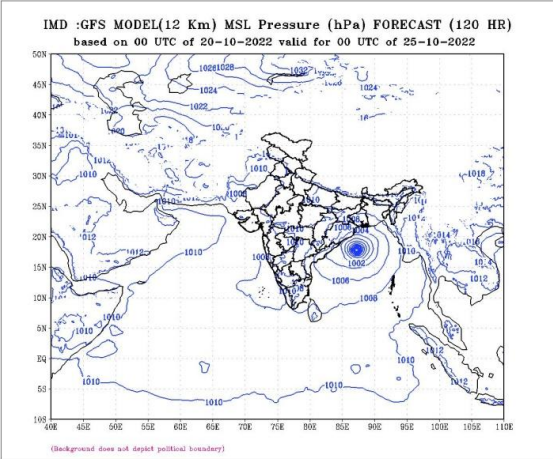


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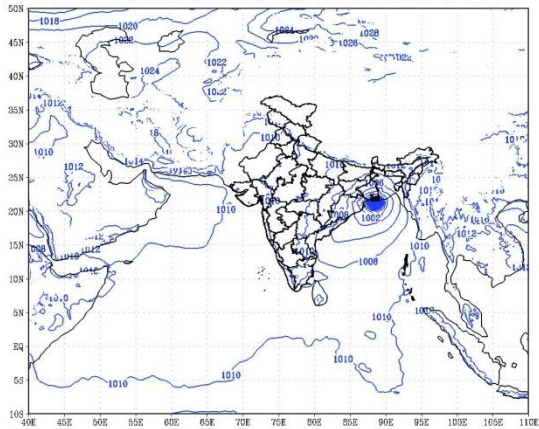
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based on 00 UTC of 20-10-2022 valid for 00 UTC of 24-10-2022



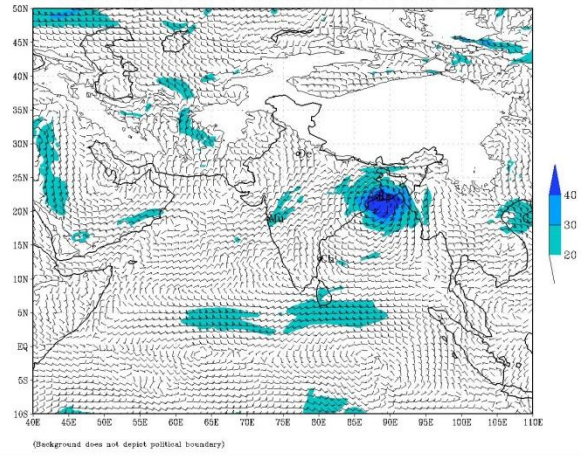
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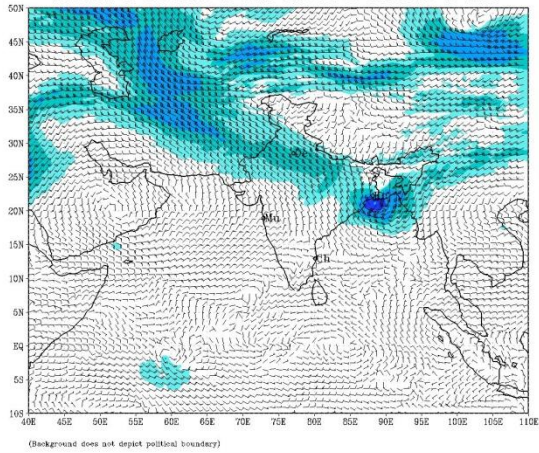
IMD :GFS MODEL(12 Km) MSL Pressure (hPa) FORECAST (144 HR)  
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IMD :GFS MODEL(12 Km) 850 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 20-10-2022 valid for 00 UTC of 26-10-2022



IMD :GFS MODEL(12 Km) 500 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 20-10-2022 valid for 00 UTC of 26-10-2022



IMD :GFS MODEL(12 Km) 200 hPa WIND (kt) FORECAST (144 HR)  
based on 00 UTC of 20-10-2022 valid for 00 UTC of 26-10-2022

