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TROPICAL CYCLONE OPERATIONAL PLAN FOR THE BAY OF BENGAL AND THE ARABIAN SEA

Edition 2026

SECRETARIAT OF THE WORLD METEOROLOGICAL ORGANIZATION
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C H A P T E R - I

GENERAL

1.1 Introduction

The loss of life, property and human suffering caused by tropical cyclones in coastal areas in various parts of the globe are well known. These disasters are on occasion, particularly severe in the Bay of Bengal region. The northern part of the Bay of Bengal is known for its potential to generate dangerous high storm tides, a major killer when associated with cyclonic storms. In the past, out of 10 recorded cases of very heavy loss of life (ranging from about 40,000 to well over 200,000) in the world due to tropical cyclones, 8 cases were in the Bay of Bengal and the Arabian Sea (5 in Bangladesh and 3 in India). The world's highest recorded storm tide of 45 feet occurred in this region (1876, Bakherganj cyclone near Meghna Estuary, Bangladesh). These facts amply illustrate the importance of an efficient cyclone warning service in this region. Recognizing these facts, the World Meteorological Organization (WMO) and the Economic and Social Commission for Asia and the Pacific (ESCAP) jointly established the Panel on Tropical Cyclones in 1972 as an intergovernmental body. Its membership comprises countries affected by tropical cyclones in the Bay of Bengal and the Arabian Sea. Originally its member countries were Bangladesh, India, Myanmar, Pakistan, Sri Lanka and Thailand. Later Maldives joined this Panel in 1982 followed by Sultanate of Oman in 1997, Yemen joined in 2016 and Iran, Qatar, Saudi Arabia & United Arab Emirates joined in 2018.

The Panel is one of the five regional tropical cyclone bodies established as part of the WMO Tropical Cyclone Programme (TCP) which aims at promoting and coordinating the planning and implementation of measures to mitigate tropical cyclone disasters on a worldwide basis.

The main objective of the WMO/ESCAP Panel on Tropical Cyclones is to promote measures to improve tropical cyclone warning system in the Bay of Bengal and the Arabian Sea.

As part of this endeavor, the Panel at its twelfth session adopted a comprehensive cyclone operational plan for this region. The basic purpose of the operational plan is to facilitate the most effective tropical cyclone warning system for the region with existing facilities. In doing so the plan defines the sharing of responsibilities among Panel countries for the various segments of the system and records the coordination and cooperation achieved. The plan records the agreed arrangements for standardization of operational procedures, efficient exchange of various data related to tropical cyclone warnings, issue of cyclone advisories from a central location having the required facilities for this purpose, archival of data and issue of a tropical weather outlook for the benefit of the region.

The operational plan contains an explicit formulation of the procedures adopted in the Bay of Bengal and Arabian Sea region for the preparation, distribution and exchange of information and warnings pertaining to tropical cyclones. Experience has shown that it is of great advantage to have an explicit statement of the regional procedures to be followed in the event of a cyclone, and this document is designed to serve as a valuable source of information always available for reference by the forecaster and other users, particularly under operational conditions. Relevant information, which is not subject to regional agreement, is given in the annexes to the plan.

A technical plan aiming at the development and improvement of the cyclone warning system of the region has been drawn up by the Panel. Implementation of some items under the technical plan would lead to a strengthening of the operational plan.

The operational plan is evolutionary in nature. It is intended that the text of the plan be updated or revised from time to time by the Panel and that each item of information given in the annexes to the plan be kept up to date by the member country concerned.

1.2 Terminology used in the region

1.2.1 General

Panel member countries or member countries
Zone of disturbed weather*

1.2.2 Classification of cyclonic disturbances and tropical cyclones

Cyclonic disturbance (generic term)
(i) Low or low pressure area
(ii) Well marked low pressure area**+**
(iii) Depression or tropical depression
(iv) Deep Depression*
Tropical cyclone (generic term)
(v) Cyclonic storm
(vi) Severe Cyclonic storm
(vii) Very severe cyclonic storm
(viii) Extremely severe cyclonic storm
(ix) Super cyclonic storm

1.2.3 Tropical cyclone characteristics

i) Position or location
ii) Eye
iii) Centre
iv) Centre fix
v) Central pressure
vi) Pressure depth
vii) Direction of movement
viii) Speed of movement
ix) Mean wind speed or sustained wind speed
x) Maximum wind speed
xi) Gust
xii) Storm surge
xiii) Storm tide
xiv) Coastal inundation
xv) Heavy rainfall

1.2.4 Terms related to the warning and warning system

i) Name of the Tropical Cyclone
ii) Tropical cyclone season or cyclone season
iii) Tropical weather Outlook
iv) Tropical cyclone advisories
v) Satellite and Radar information
vi) Pre-cyclone watch******
vii) Cyclone Alert*****
viii) Cyclone Warning*****
ix) Post landfall outlook******

x) Dewarning Message**
xi) Visual storm signal
xii) Squally wind and gale wind
xiii) High sea area bulletin and Coastal weather bulletin
xiv) Bulletin or cyclone warning bulletin for India coast
xv) Warning graphics on observed and forecast track with cone of uncertainty
xvi) Observed and forecast winds in four geographical quadrants
xvii) Heavy rainfall warning graphics**
xviii) Storm surge warning graphics

** Term used nationally in India. * Term used nationally in Bangladesh, India and Pakistan, + Term used nationally in Bangladesh and India

1.3 Meaning of terms used for international exchange

Average wind speed: Speed of the wind averaged over the previous 10 minutes (mean surface wind) as read from the anemogram or the 3 minutes mean determined with the non recording anemometer or estimated wind at sea by the mariners using the Beaufort scale.

Bulletin: Cyclone warning bulletin or cyclone advisory bulletin

Central pressure of a tropical cyclone: Surface pressure at the centre of the tropical cyclone as measured or estimated.

Centre fix of the tropical cyclone: The estimated location of the centre of a tropical cyclone (obtained by means other than the aircraft probing of the cyclone i.e. fixation of the centre with the help of land based and other radars, satellite and conventional observations like surface and upper air observations, ships' reports, commercial aircraft observations, etc.)

Centre of the tropical cyclone: The centre of the cloud eye or if not discernible, of the wind / pressure centre.

Coastal Inundation forecast: IMD issues the coastal inundation forecast during the warning period of the tropical cyclone based on Advanced Circulation (ADCIRC) model run at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad. It provides location specific combined height of storm surge and astronomical tide and area of inundation.

Confidence in the centre position: Degree of confidence in the centre position of a tropical cyclone expressed as the radius of the smallest circle within which the centre may be located by the analysis.
"Position good" implies a radius of 30 nautical miles (55 kilometers) or less,
"Position fair", a radius of 30 to 60 nautical miles (55 to 110 km) and
"Position poor", a radius of greater than 60 nautical miles (110 km).

Cyclone: Tropical cyclone

Cyclone Alert*: A priority message for the Government officials containing tropical cyclone information and advisories issued generally 48 hours before the commencement of adverse weather in case of cyclogenesis occurring in deep sea. This is not applicable in case of the genesis taking place close to coast or in case of rapid intensification near the coast. In such situation, the cyclone warning can be issued directly without issuing the pre-cyclone watch or cyclone alert bulletin.

Cyclone warning*: A priority message containing tropical cyclone warning and advisories issued generally 24 hours in advance of the commencement of adverse weather in case of cyclogenesis occurring in deep sea. This is not applicable in case of the genesis taking place close to coast or in case of rapid intensification near the coast. In such situation, the cyclone warning can be issued immediately without issuing the pre-cyclone watch and alert bulletins.

Cyclone warning bulletin: A priority message for exchange of tropical cyclone information and advisories.

Cyclonic disturbance: A non-frontal synoptic scale low pressure area originating over tropical waters with organized convection and definite cyclonic wind circulation. RSMC New Delhi considers depression and above intensity systems as cyclonic disturbance.

Cyclonic storm: A cyclonic disturbance in which the maximum average surface wind speed is in the range of 34 to 47 knots (62 to 88 km/h).

Depression*: A cyclonic disturbance in which the maximum sustained surface wind speed is between 17 and 27 knots (31 and 51 km/h). If the maximum sustained wind speed lies in the range 28 knots (52 km/h) to 33 knots (61 km/h) the system may be called a "deep depression".

Direction of movement of the tropical cyclone: The past direction and speed of movement mentioned in the bulletin is the average speed and direction during past six hours. The direction and speed mentioned in TCAC advisory bulletin is the forecast speed and direction of movement for next six hours.

Dewarning Message: As and when a given coastal belt is expected to become free from the impact of TCs, a dewarning message is issued to the ports and disaster management agencies as a part of four stage warning system.

Extremely Severe Cyclonic Storm: A cyclonic disturbance in which the maximum average surface wind speed is in the range of 90 to 119 knots (167 to 221 km/h).

Extended Range forecast: Forecast for a period of two weeks

Eye of the tropical cyclone: The relatively clear and calm area inside the circular wall of convective clouds, the geometric centre of which is the centre of the tropical cyclone.

Gale force wind: Average surface wind speed of 34 to 47 knots (62 to 88 km/h).

GMDSS: Global Maritime Distress and Safety System.

Gust: Instantaneous peak value of surface wind speed recorded or expected reaching atleast 17 kt.

Hurricane force wind: Average maximum sustained surface wind speed ≥64 knots.

Low or low pressure area: An area enclosed by 1 closed isobar within 5^0 laltitude and longitude with minimum pressure inside and the associated maximum sustained wind speed is less than 17 knots (31 km/h).

Maximum sustained wind: Average wind speed at the surface calculated over a period of 3 minutes.

Mean wind speed: Average wind speed over a given period of time (e.g. RSMC New Delhi uses 3-minutes average wind speed).

Name of the Tropical Cyclone: Once maximum sustained wind speed in a cyclonic disturbance attains a 34 knots threshold value, anywhere within the TC field, it will be given an identification name by RSMC tropical cyclones, New Delhi from the consolidated name list.

Panel members countries or member countries: Countries constituting the WMO/ESCAP Panel on Tropical Cyclones viz. Bangladesh, India, Iran, Maldives, Myanmar, Oman (Sultanate of), Pakistan, Qatar, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates (UAE) and Yemen.

Post Landfall Outlook: This bulletin is issued 12 hours before cyclone landfall and contains more specific forecasts about place and time of landfall.

***Pre Cyclone Watch:** This bulletin contains early warning about likely development of a cyclonic storm and an indication of the coastal belt likely to experience adverse weather. This is a priority message for the Government officials containing information on the formation of a tropical disturbance as soon as it is detected and which is expected to affect the coast. It is issued at least 72 hours in advance of commencement of adverse weather along the coast in case of cyclogenesis occurring in deep sea. This is not applicable in case of the genesis taking place close to coast or in case of rapid intensification near the coast. In such situation, the cyclone alert or warning can be issued directly without issuing the pre-cyclone watch.

Pre-Genesis Forecast: It is the forecast of track and intensity provided at the stage of low pressure area/ well marked low pressure area, before the formation of depression (genesis) for next 72 hours. It is issued once daily. RSMC New Delhi commenced issue of pre-genesis forecast in March, 2022.

Radius of Maximum Wind: It is the distance from the centre to the location of maximum sustained surface wind in association with a cyclone.

Severe cyclonic storm: A cyclonic disturbance in which the maximum average surface wind speed is in the range of 48 to 63 knots (89 to 118 km/h).

Severe cyclonic storm with a core of hurricane winds^{+}: A cyclonic disturbance in which the maximum average surface wind speed is 64 knots (119 km/h) or more.

Speed of movement of the tropical cyclone: Speed of movement of the centre of the tropical cyclone averaged over a period of 6 hours.

Squally wind: When sudden increases of wind speed occur in squalls with the increased speed reaching a minimum of 22 knots (41 kmph) and persist for at least one minute.

Storm force wind: Average maximum sustained surface wind speed in the range 34 to 63 knots.

Storm season: The periods April to June and October to December during which most of the cyclonic storms occur in the Bay of Bengal and Arabian Sea.

Storm surge: The difference between the actual water level under the influence of a meteorological disturbance (storm tide) and the level, which would have been reached in the absence of the meteorological disturbance (i.e. astronomical tide). (Storm surge results mainly from the shoreward movement of water under the

action of wind stress. A minor contribution is also made by the hydrostatic rise of water resulting from the lowered barometric pressure).

Storm tide: The actual water level as influenced by a weather disturbance. The storm tide consists of the normal astronomical tide and the storm surge.

Super cyclonic storm: A cyclonic disturbance in which maximum sustained wind speed is 120 knots and above (222 km/h and above).

Tropical cyclone: Generic term for a non frontal synoptic scale cyclone originating over tropical or subtropical waters with organized convection and definite cyclonic surface wind circulation. The term is also used for a storm in the Southwest Indian Ocean in which the maximum of the sustained wind speed# is estimated to be in the range of 64 to 90 knots and in the South Pacific and Southeast Indian Ocean with the maximum of the sustained wind speed over 33 knots.)
(Note: # Maximum sustained wind speed: Average period of one, three or ten minutes depending upon the regional practices).

Tropical cyclone advisory: A priority message for exchanging information, internationally, on tropical cyclones in the north Indian Ocean including Bay of Bengal and the Arabian Sea.

Tropical depression: Depression.

Tropical storm: Tropical cyclone.

Tropical Weather Outlook: A priority message for exchange between the Panel countries of synoptic and satellite inferences for the north Indian Ocean including Bay of Bengal and the Arabian Sea region. It is issued daily based on 0300 UTC observations.

TCAC Bulletin: The tropical cyclone advisory bulletin issued every six hourly by Tropical Cyclone Advisory Centre (TCAC), New Delhi for the purpose of international civil aviation valid for next 24 hours.

TCAC Graphics Bulletin: The tropical cyclone advisory bulletin is also issued every six hourly by Tropical Cyclone Advisory Centre (TCAC), New Delhi in graphics form (PNG format) for the purpose of international civil aviation and transmitted through GTS and website.

TCAC Bulletin for Aviation Disaster Risk Reduction (ADRR): The tropical cyclone advisory bulletin in text format is issued every six hourly through ftp by Tropical Cyclone Advisory Centre (TCAC), New Delhi to WMO's ADRR centre, Hong Kong for the purpose of international civil aviation

TC Vital Bulletin for modeling group: The TC Vital Bulletin is issued every six hourly to the modeling group in text form to generate track, intensity and storm surge forecast. It contains information about the location, past movement (speed & direction), intensity of the system (estimated central pressure, maximum sustained wind speed), size of the system (radius of outermost closed isobar), radius of maximum wind and radial extension of 34 knots wind in four geographical quadrants around the system centre in a coded form. It is transmitted by email and through ftp to the modeling group. This information is mainly utilised for synthetic vortex generation and model initialisation as per existing conditions.

Very severe cyclonic storm: A cyclonic disturbance in which maximum sustained wind speed is 64 knots to 89 knots (118 to 166 km/h).

Visual storm signals: Visual signals displayed at coastal points of the port to warn ships of squally winds, gales and tropical cyclones.

Weather warning: Meteorological message issued to provide appropriate warnings of hazardous weather conditions.

Well marked low pressure area: An area enclosed by 2 closed isobars with 1 isobar within 5^0 laltitude & longitude and another isobar beyond it. The isobars are drawn at an interval of 2 hPa. The associated maximum sustained surface wind is less than 17 knots (31 km/h).

WWMIWS: The IMO/WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS) is the internationally coordinated service for the promulgation of meteorological warnings and forecasts to vessels undertaking international or national voyages. Tropical cyclone warnings issued for the WWMIWS are promulgated through GMDSS satellite and radio communication channels.

Zone of disturbed weather: A zone in which the pressure is low relative to the surrounding region and there is convective cloud masses which are not organized.

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+ Meaning of term as used nationally in Bangladesh

1.4 Units used

1.4.1 Units used in international exchange

(i) Distance in nautical miles and km, the unit (nm and km) being stated.
(ii) Location (position) by degrees and where possible tenths of degrees of latitude and longitude preferably expressed by words.
(iii) Direction to the nearest sixteen points of the compass given in words.
(iv) Speed (wind speed and direction of movement of tropical cyclones) in knots and kilometer per hour, the unit (kt and kmph) being stated.

1.4.2 Units used in national bulletins

(i) Distance in kilometers (km).
(ii) Location in longitude and latitude (degrees and tenths of degrees) or bearing in sixteen points of compass and distance from two or three well known fixed place.
(iii) Direction in sixteen points of compass.
(iv) Speed in km/h.

1.4.3 Units used in WWMIWS marine warnings

The following units/indicators are used for marine purposes, in accordance with the WMO Manual on Marine Meteorological Services (WMO No.558):
Distance in nautical miles, the unit (nm) being stated;
Location (position) by degrees and where possible tenths of degrees of latitude and longitude, preferably expressed in numbers; e.g. "12.2S, 168.4E"

Direction of motion to the nearest sixteen points of the compass or in degrees to the nearest ten, given in figures; e.g. "SOUTHSOUTHEAST" or "160 DEGREES"

Speed (wind speed and direction of movement of tropical cyclones) in knots, the unit (kt) being stated;

Pressure in hectopascals (hPa), the unit being stated;

Time in Universal Time Co-ordinated (UTC), unit being stated.

TC warnings for the WWMIWS shall use the following wind warning category labels:

- Gale force wind warning (Beaufort force 8 or 9);
- Storm-force wind warning (Beaufort force 10 or 11);
- Hurricane-force wind warning (Beaufort force 12 or over).

C H A P T E R - II

TROPICAL CYCLONE WARNINGS AND ADVISORIES

2.1 General

The responsibility of warning for the human settlements on land which are threatened by a tropical cyclone rest in all cases with the National Meteorological Services (NMS). These national responsibilities are not subject to regional agreement. Therefore, the cyclone warning systems pertaining to shipping (WWMIWS), and other international users, and exchanges among the Panel countries are described in this chapter. The cyclone warning systems for Panel countries are described briefly in the annex to this chapter.

2.2 Classification of cyclonic disturbances followed by RSMC, New Delhi

Classifications of cyclonic disturbances for the north Indian Ocean region for the exchange of messages among the Panel countries are given below:

S No.	Weather Systems	Maximum Wind Speed
1	Low pressure area	Wind speed less than 17 kt (31 km/h)
2	Depression	Wind speed between 17 and 27 kt (31 and 49 km/h)
3	Deep Depression	Wind speed between 28 and 33 kt (50 and 61 km/h)
4	Cyclonic storm	Wind speed between 34 and 47 kt (62 and 88 km/h)
5	Severe cyclonic storm	Wind speed between 48 and 63 kt (89 and 117 km/h)
6	Very severe cyclonic storm	Wind speed between 64 and 89 kt (118 and 166 km/h)
7	Extremely severe cyclonic storm	Wind speed between 90 and 119 kt (167 and 221 km/h)
8	Super cyclonic storm	Wind speed 120 kt (222 km/h) and above

2.3 Identification of tropical cyclones

As soon as wind speed in a cyclonic disturbance attains a 34 kt threshold value, it will be given an identification name by RSMC Tropical Cyclones, New Delhi from the consolidated name list **(Table II-1).** The identification system will cover the whole north Indian Ocean.

In case of migration from neighboring region:

If there is migration of a cyclonic disturbance from the area under RSMC Tokyo to area under RSMC New Delhi or vice versa, following procedure will be adopted for issue of take-over message and giving name to the system:

When a tropical cyclone is expected to migrate from one RSMC (refer to as *former*) into the neighboring (refer to as *latter*) RSMC's area of service within at least 24 hours with tropical storm (TS) / cyclonic storm (CS) intensity or higher, the former RSMC will inform the latter RSMC of the possibility of cross-border migration via e-mail and through GTS. When a tropical cyclone is expected to cross the border within around 6 hours, the former RSMC will issue advisory with remark referring to the take-over according to its issuance time (00, 03, 06, 09, 12, 15, 18 and 21 UTC for RSMC New Delhi and 00, 06, 12 and 18 UTC for RSMC

Tokyo). The latter RSMC uses the name given by the former RSMC for the tropical cyclone's entire lifetime. However, if a named tropical cyclone weakens to a tropical depression (TD) / deep depression (DD) or depression (D) and again develops to be a named tropical cyclone, RSMC New Delhi will give a new name for it, while RSMC Tokyo will use the same name except when it re-develops after once transformed into an extratropical cyclone.

Table II-1: New list of tropical cyclone names adopted by WMO/ESCAP Panel Member Countries in April 2020 for naming of tropical cyclones over North Indian Ocean including Bay of Bengal and Arabian Sea (First name was used in June, 2021 with Nisarga crossing Maharashtra coast). So far 18 names have been used from this list.

WMO/ESCAP Panel Member countries	Column 1		Column 2		Column 3		Column 4	
	Name	Pron'	Name	Pron'	Name	Pron'	Name	Pron'
Bangladesh	Nisarga	Nisarga	Biparjoy	Biporjoy	Arnab	Ornab	Upakul	Upokul
India	Gati	Gati	Tej	Tej	Murasu	Murasu	Aag	Aag
Iran	Nivar	Nivar	Hamoon	Hamoon	Akvan	Akvan	Sepand	Sepand
Maldives	Burevi	Burevi	Midhili	Midhili	Kaani	Kaani	Odi	Odi
Myanmar	Taukatae	Tau'Te	Michaung	Migjaum	Ngaman	Ngaman	Kyarthit	Kjathi
Oman	Yaas	Yass	Remal	Re-Mal	Sail	Sail	Naseem	Naseem
Pakistan	Gulab	Gul-Aab	Asna	As-Na	Sahab	Sa-Hab	Afshan	Af-Shan
Qatar	Shaheen	Shaheen	Dana	Dana	Lulu	Lulu	Mouj	Mouj
Saudi Arabia	Jawad	Jowad	Fengal	Feinjal	Ghazeer	Razeer	Asif	Aasif
Sri Lanka	Asani	Asani	Shakhti	Shakhti	Gigum	Gigum	Gagana	Gagana
Thailand	Sitrang	Si-Trang	Montha	Mon-Tha	Thianyot	Thian-Yot	Bulan	Bu-Lan
United Arab Emirates	Mandous	Man-Dous	Senyar	Sen-Yaar	Afoor	Aa-Foor	Nahhaam	Nah-Haam
Yemen	Mocha	Mokha	Ditwah	Ditwah	Diksam	Diksam	Sira	Sira

WMO/ESCAP Panel Member countries	Column 5		Column 6		Column 7		Column 8	
	Name	Pron’	Name	Pron’	Name	Pron’	Name	Pron’
Bangladesh	Barshon	Borshon	Rajani	Rojoni	Nishith	Nishith	Urmi	Urmi
India	Vyom	Vyom	Jhar	Jhor	Probah	Probaho	Neer	Neer
Iran	Booran	Booran	Anahita	Anahita	Azar	Azar	Pooyan	Pooyan
Maldives	Kenau	Kenau	Endheri	Endheri	Riyau	Riyau	Guruva	Guruva
Myanmar	Sapakyee	Zabagji	Wetwun	We’wum	Mwaihout	Mwei’hau	Kywe	Kjwe
Oman	Muzn	Muzn	Sadeem	Sadeem	Dima	Dima	Manjour	Manjour
Pakistan	Manahil	Ma-Na-Hil	Shujana	Shu-Ja-Na	Parwaz	Par-Waaz	Zannata	Zan Naa Ta
Qatar	Suhail	Es’hail	Sadaf	Sadaf	Reem	Reem	Rayhan	Rayhan
Saudi Arabia	Sidrah	Sadrah	Hareed	Haareed	Faid	Faid	Kaseer	Kusaer
Sri Lanka	Verambha	Ve-Ram-Bha	Garjana	Garjana	Neeba	Neeba	Ninnada	Nin-Na-Da
Thailand	Phutala	Phu-Ta-La	Aiyara	Ai-Ya-Ra	Saming	Sa-Ming	Kraison	Krai-Son
United Arab Emirates	Quffal	Quf-Faal	Daaman	Daa-Man	Deem	Deem	Gargoor	Gar-Goor
Yemen	Bakhur	Bakhoor	Ghwyzi	Ghwayzi	Hawf	Hawf	Balhaf	Balhaf

(contd.)

WMO/ ESCAP Panel Member countries	Column 9		Column 10		Column 11		Column 12		Column 13	
	Name	Pron'	Name	Pron'	Name	Pron'	Name	Pron'	Name	Pron'
Bangladesh	Meghala	Meghla	Samiron	Somiron	Pratikul	Protikul	Sarobor	Sorobo	Mahanisha	Mohanisha
India	Prabhanjan	Prabhanjan	Ghurni	Ghurni	Ambud	Ambud	Jaladhi	Jaladhi	Vega	Vega
Iran	Arsham	Arsham	Hengame	Hengame	Savas	Savas	Tahamtan	Tahamtan	Toofan	Toofan
Maldives	Kurangi	Kurangi	Kuredhi	Kuredhi	Horangu	Horangu	Thundi	Thundi	Faana	Faana
Myanmar	Pinku	Pinnku	Yinkaung	Jin Gaun	Linyone	Lin Joun	Kyeekan	Kji Gan	Bautphat	Bau'hpat
Oman	Rukam	Roukam	Watad	Wa Tad	Al-jarz	Al-Jarouz	Rabab	Ra Bab	Raad	Raad
Pakistan	Sarsar	Sar-Sar	Badban	Baad-Baan	Sarrab	Sarrab	Gulnar	Gul-Nar	Waseq	Waa-Seq
Qatar	Anbar	Anbar	Oud	Oud	Bahar	Bahar	Seef	Seef	Fanar	Fanaar
Saudi Arabia	Nakheel	Nakheel	Haboob	Haboob	Bareq	Bariq	Alreem	Areem	Wabil	Wobil
Sri Lanka	Viduli	Viduli	Ogha	Ogha	Salitha	Salitha	Rivi	Rivi	Rudu	Rudu
Thailand	Matcha	Mat-Cha	Mahingsa	Ma-Hing-Sa	Phraewa	Phrae-Wa	Asuri	A-Su-Ri	Thara	Tha-Ra
United Arab Emirates	Khubb	Khubb	Degl	Degl	Athmad	Ath-Md	Boom	Boom	Saffar	Saf-Faar
Yemen	Brom	Brom	Shuqra	Shuqrah	Fartak	Fartak	Darsah	Darsah	Samhah	Samhah

Note:

1. **Panel Members name are listed alphabetically country wise**
2. **The names will be used sequentially column-wise**
3. **The first name will start from the first row of column one and continue sequentially to the last row in the column thirteen**
4. **Table will be used only once**
5. **The names already used from the list till December 2025 are shown in red colour.**

Table.II-2: Table for naming tropical cyclones for the north Indian Ocean region (including Bay of Bengal and Arabian Sea) effective from September, 2004 (All names in this list have been used).

Panel Member	Column one		Column two		Column three		Column four	
	Names	Pron'	Names	Pron'	Names	Pron'	Names	Pron'
Bangladesh	Onil	Onil	Ogni	Og-ni	Nisha	Ni-sha	Giri	Gi-ri
India	Agni	Ag'ni	Akash	Aakaa'sh	Bijli	Bij'li	Jal	Jal
Maldives	Hibaru	--	Gonu	--	Aila	--	Keila	--
Myanmar	Pyarr	Pyarr	Yemyin	Ye-myin	Phyan	Phyan	Thane	Thane
Oman	Baaz	Ba-az	Sidr	Sidr'	Ward	War'd	Murjan	Mur'jaan
Pakistan	Fanoos	Fanoos	Nargis	Nar gis	Laila	Lai la	Nilam	Ni lam
Sri Lanka	Mala	--	Rashmi	Rash'mi	Bandu	--	Viyaru	Viyaru
Thailand	Mukda	Muuk-dar	Khai Muk	Ki-muuk	Phet	Pet	Phailin	Pi-lin

Panel Member	Column five		Column six		Column seven		Column eight	
	Names	Pron'	Names	Pron'	Names	Pron'	Names	Pron'
Bangladesh	Helen	Helen	Chapala	Cho-po-la	Ockhi	Ok-khi	Fani	Foni
India	Lehar	Le'har	Megh	Me'gh	Sagar	Saa'gar	Vayu	Vaa'yu
Maldives	Madi	--	Roanu	--	Mekunu	--	Hikaa	--
Myanmar	Nanauk	Na-nauk	Kyant	Kyant	Daye	Da-ye	Kyarr	Kyarr
Oman	Hudhud	Hud'hud	Nada	N'nada	Luban	L'luban	Maha	M'maha
Pakistan	Nilofar	Ni lofar	Vardah	Var dah	Titli	Titli	Bulbul	Bul bul
Sri Lanka	Ashobaa	Ashobaa	Maarutha	Maarutha	Gaja	Gaja	Pawan	Pavan
Thailand	Komen	Goh-men	Mora	Moh-rar	Phethai	Pay-ti	Amphan	Um-pun

2.4 Bulletins issued by RSMC, New Delhi

2.4.1 Extended range outlook:

IMD started issuing Extended Range Outlook (ERO) for cyclogenesis during next two weeks every Thursday from 22nd April, 2018. The impact expected over the area of cyclogenesis was introduced from 07th May, 2022. IMD also introduced guidance on expected formation of cyclonic circulation and low pressure area over the region from June, 2021. The role of equatorial waves in cyclogenesis commenced from 16th Dec. 2021. The ERO contains information about large scale features over the region, guidance on probable cyclogenesis from various global/regional models, probability of cyclogenesis as LOW (0-33%), MODERATE (34-67%) and HIGH (68-100%) along with verification of forecast issued during last two weeks. The product is available on RSMC website at http://www.rsmcnewdelhi.imd.gov.in/images/bulletin/eroc.pdf. The archive of all ERO bulletins since May 2018 is also available on RSMC website.

Example 1: Extended Range Outlook issued on 13th November 2025 is presented below.

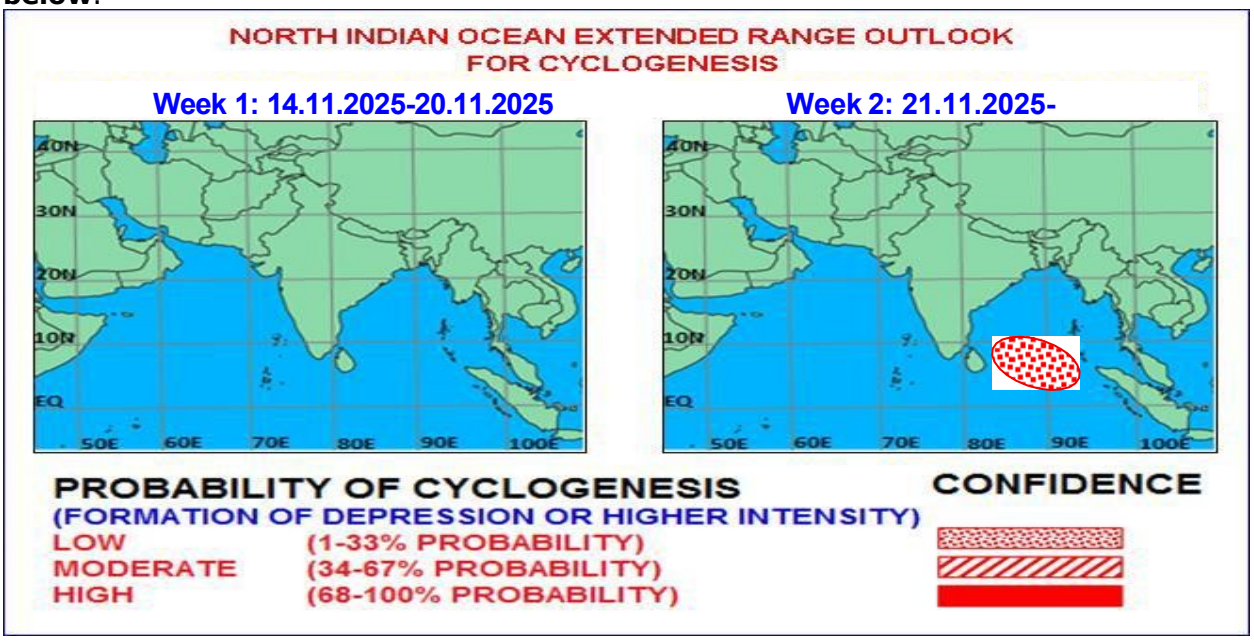


Fig. 2.4.1(a): Graphical cyclogenesis forecast over NIO during next two weeks

I. Environmental features:

The guidance from the various models indicates that the Madden Julian Oscillation (MJO) index is presently in phase 6 with an amplitude close to 1.5 in the phase diagram. Most of the models suggest that the MJO is likely to remain in phase 6 with a slow eastward propagation and decreasing amplitude during the first week. Thereafter, the models' forecasts show a good agreement about the looping movement of MJO around its transition period from phase 6 to 7, with its amplitude close to 1 during week 2. Accordingly, the phases of MJO are not favourable for the convective activities over the North Indian Ocean (NIO) during the entire forecast period.

The tropical monitoring guidance from the NCICS indicates westerly wind anomaly (3-5 mps) over the southern parts of the North Indian Ocean (NIO), including the south Arabian Sea (AS) and south Bay of Bengal (BoB) adjacent to the North Equatorial Indian Ocean (NEIO) during the first week. A comparatively weaker westerly wind anomaly is likely to prevail over the central parts of AS, southern peninsular India and the central parts of BoB during the first half of week 1. The easterly wind anomaly (1-3 mps) is likely over the northern parts of AS and BoB during the entire week 1. The easterly wind anomaly is likely to appear gradually over central BoB and adjacent parts of south BoB, whereas the westerly wind anomaly strengthened (5-7 mps) over south & central AS and the southern part of BoB adjacent to NEIO during the second half of week 1. The Equatorial Rossby Wave (ERW) is likely to be moving westwards across peninsular India and then central AS during first half of week 1. In the second half of week 1, another spell of ERW is likely to propagate across the south BoB and adjoining NEIO. During week 2, the westerly wind anomaly (1-5 mps) is likely to prevail over the entire AS as well as over the south BoB & adjoining NEIO. There is a likely development of a dipole with strong easterly (5-7 mps) and westerly wind (7-9 mps) anomalies over central BoB and south BoB, respectively, starting at the end of week 1 and continuing till the middle of week 2. During the same duration, the ERW is also likely to propagate across south BoB and southeast AS and adjoining NEIO. The low-frequency background wave is persisting over south BoB and southeast & eastcentral AS during the entire forecast period. Therefore, the zonal wind anomalies, along with the presence of the other equatorial waves, are creating a favourable environmental condition for the genesis of low pressure system over the south BoB and adjoining NEIO.

The latest weekly sea surface temperature SST departure over NINO 3.4 region is -0.84ºC (9th November update), indicating a weak La Niña condition. Negative IOD conditions (IOD index with a weekly value of -1.57°C on 9th November) are likely to continue during November - December 2025. All these provide a favourable environment for convective activity over the NIO region.

II. Model guidance:

(a) Guidance from Extended Range models:

Mean wind field at 850 hPa of IMD ERF (CFS V-2) model is indicating prevalence of northerly/northeasterly winds nearly over the entire AS and BoB with a shear zone lying along 6°N latitude across north Equatorial Indian Ocean (EIO) during week 1. The respective anomaly wind field indicates northeasterly winds over the Andaman Sea and the south BoB. A feeble upper-air cyclonic circulation over central India is also visible in the anomaly wind field of week 1. Similar to the mean wind, the anomaly wind field also indicates a shear zone along 6°N latitude. An upper-air cyclonic circulation is indicated over South China Sea in the wind anomaly field of week 1. There is no anomalous trough associated with the ITCZ during week 1. The environmental condition is becoming favourable for the active phase of the northeast monsoon during week 1. The mean wind forecast for week 2 is furnishing stronger northeasterly winds over the entire AS and BoB compared to week 1. There is a well-established cyclonic circulation in the 850 hPa mean wind field over the southeast BoB and adjoining south Andaman Sea during week 2. However, respective wind anomaly furnishes westerly winds over the south & central AS and the south BoB. The anomaly wind field of week 2 forecast is also indicating a cyclonic circulation over the south BoB and adjoining south Andaman Sea. Another cyclonic circulation is also seen over the northeast and

adjoining eastcentral AS during week 2. As both the mean and anomaly wind fields of week 2 forecast are showing a prominent cyclonic circulation over southeast BoB, which is extending up to 500 hPa pressure level, there is a high probability for the formation of an intense low pressure system over the same region. Accordingly, the model also indicates a potential belt over south BoB and adjoining NEIO with a low to moderate (30-40%) probability of cyclogenesis, with the largest value (60-70 %) over the Comorin area during week 1. During week 2, the probability of cyclogenesis increases, becoming 40-60% over the entire south BoB and adjoining Andaman Sea. The prominent zone of cyclogenesis also extends over westcentral BoB with low probability (20-30%) during week 2.

ECMWF ensemble forecast indicates a low probability (10-20%) over the southwest BoB off Sri Lanka-south Tamil Nadu coasts around 18th November. The region is likely to move west-northwestwards across southeast AS, reaching upto the central part of AS during the subsequent 4-5 days. Another zone over south BoB with prominent probability of cyclogenesis, with the largest value over the southeast BoB is indicated by the model around 23rd November. The sub-seasonal range forecast of ECMWF indicates 20–30% probability of cyclogenesis over the southwest BoB during 17th to 24th November.

(b) Guidance from Medium-Range NWP models:

Various deterministic medium-range global models (IMD GFS, GEFS, BFS, NCUM, NEPS, NCEP GFS, ECMWF, ECAI) indicate the prevalence of existing cyclonic circulation over southeast & adjoining southwest BoB during next 2-3 days with slow west-northwestwards movement. Further, the models are also indicating the emergence of a fresh cyclonic circulation into South Andaman Sea towards the end of week 1 (around 20th November). There is a good consensus among various models with respect to the formation of low pressure area and its further intensification into a depression. However, there is a large variation in area and timing of formation. Considering the consensus, there is likelihood of formation of low pressure area over the southeast Bay of Bengal towards the beginning of week 2 (around 21st November) and depression over the same region during the middle of week 2 (around 23rd November).

II. Inference:

Considering various large-scale environmental features, climatology and model guidance, it is inferred that,

- **a.** the existing upper air cyclonic circulation over southeast Bay of Bengal is likely to move nearly westwards across the southwest Bay of Bengal towards south Sri Lanka coast during the next 48 hours. Thereafter, it is likely to continue to move westwards across south Sri Lanka and Comorin area and reach over southeast Arabian Sea during the subsequent 2 days.
- **b.** another upper air cyclonic circulation is likely to emerge over the South Andaman Sea towards the end of week 1 (around 19th November). Under its influence, a low pressure area is likely to form over the southeast Bay of Bengal towards the beginning of week 2 (around 21st November) and, with a low probability, further intensify into a depression over the same region during the middle of week 2 (around 23rd November).

III. Verification of forecast issued during the previous two weeks:

An extended range outlook issued on 30th October indicated no cyclogenesis over the region during the next two weeks.

Extended range outlook issued on 6th November indicated upper air cyclonic circulation over eastcentral and adjoining northeast Bay of Bengal (BoB) (remnant of the well-marked low pressure area over eastcentral BoB and adjoining Myanmar-Bangladesh coasts) to move southwestwards and reach southeast BoB around 12th November. Simultaneously, the remnant of typhoon Kalmaegi was indicated to move nearly westwards and emerge over the north Andaman Sea, as an upper air cyclonic circulation around 11th November. Both these cyclonic circulations were indicated to merge over southeast & adjoining eastcentral BoB around 12th November. Under its influence, a low-pressure area is likely to form over southwest BoB off Sri Lanka coast around 14th November.

Actually, the upper air cyclonic circulation over eastcentral and adjoining northeast BoB (remnant of the well-marked low pressure area over eastcentral BoB and adjoining Myanmar-Bangladesh coasts) moved south-southwestwards and lay over southwest and adjoining southeast BoB on 13th November. Remnant of typhoon Kalmaegi weakened over Thailand.

NCMRWF-IMD satellite gauge merged data plots of 24 hours accumulated realized rainfall during 9th May to 15th May, 2024 are presented in **Fig. 2.4.1(b)**.

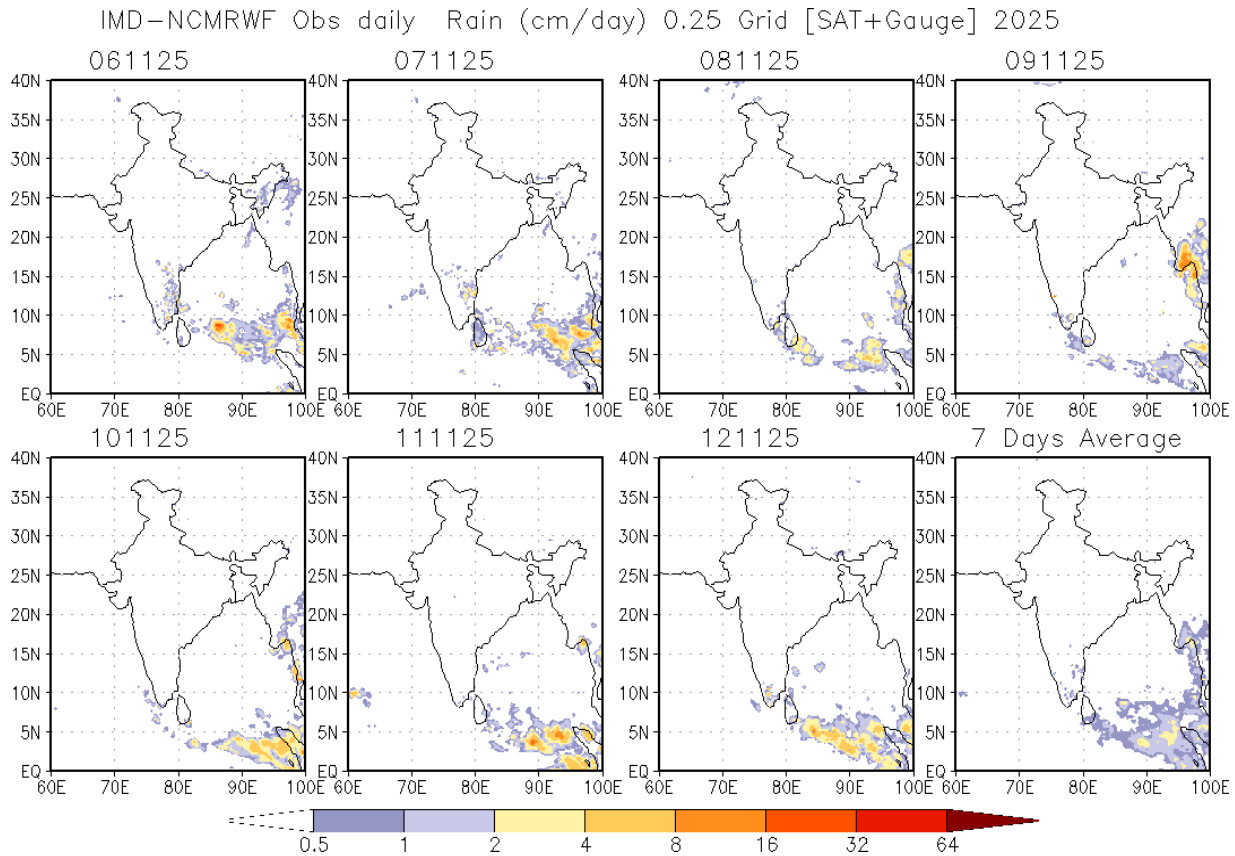


Fig. 2.4.1(b): NCMRWF-IMD satellite gauge merged data plots of 24-hour accumulated rainfall from 6th to 12th November, 2025

Example 2: Extended Range Outlook issued on 20th November, 2025 is presented below.

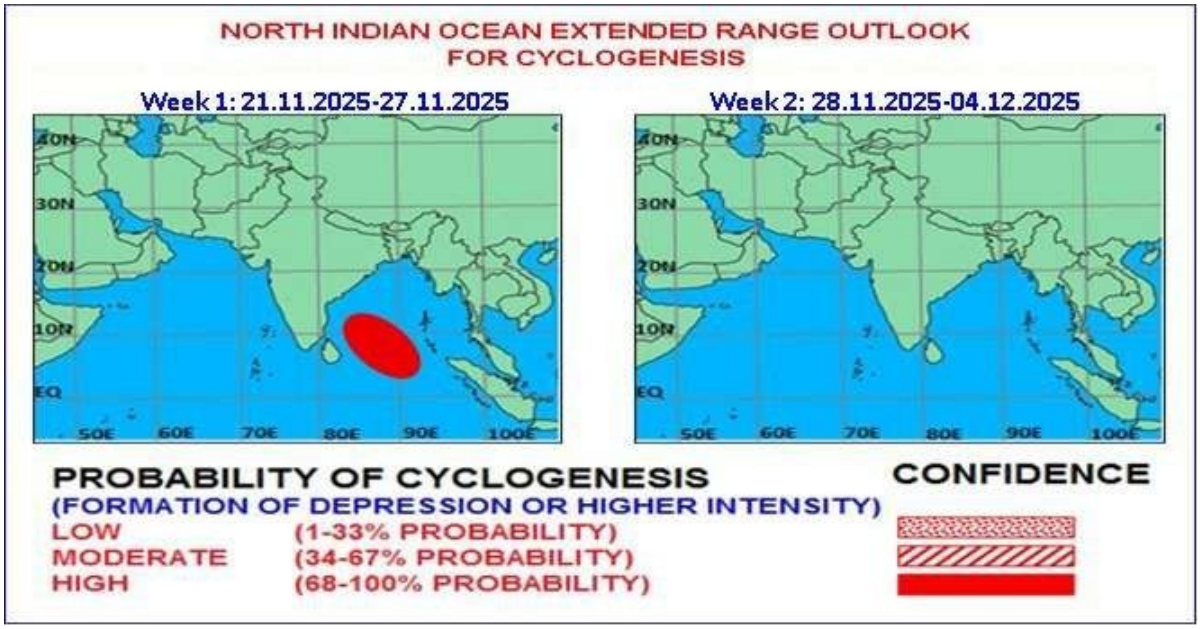


Fig. 2.4.2(a): Graphical Cyclogenesis over north Indian Ocean during next two weeks

I. Environmental features:

The guidance from various models indicates that the Madden Julian Oscillation (MJO) index is presently in phase 6 with amplitude more than 1 in the phase diagram. Most of the models suggest that the MJO index is likely to remain in phase 6 with a slow eastward propagation and increasing amplitude during the first week. Thereafter, it is likely to enter into phase 7 with amplitude remaining more than 1 during week 2. Thus, the MJO index which show amplitude is very strong with amplitude more than 1 in week 1 and also in week 2 is not favourable for enhancement of convective activities over the North Indian Ocean (NIO) during the entire forecast period. However, The tropical monitoring guidance from the NCICS indicates westerly wind anomaly (5-7 mps) over the southern parts of the North Indian Ocean (NIO) including south Bay of Bengal (BoB) and southeast Arabian Sea (AS) alongwith prevalence of MJO, Equatorial Rossby wave (ERW), low frequency background wave (LW) and easterly wind anomaly (3-5 mps) during first half of week 1 during 20th-24th November. These features indicate a favourable environment for cyclogenesis (development of depression) over southeast BoB during first half of week 1. During later part of week 1, there is prevalence of westerly wind anomaly (3-7 mps) over entire BoB and major parts of south & adjoining central AS alongwith MJO, ERW, LW over the same region & KW over northern parts of BoB. There is likely prevalence of weak easterly wind anomaly (1-3 mps) over extreme North BoB & adjoining Bangladesh & Odisha during that period. Thus, during later part of week 1, the equatorial waves may support enhancement of convective activity over the westcentral and adjoining northwestern parts of BoB. Thereafter, during week 2, there are no anomalous easterlywinds over the northern parts of BoB. However, westerly wind anomaly (3-7mps) alongwith ERW, MJO and LW are very likely to prevail over south BoB & southeast AS. Thus, equatorial waves may support enhancement of convective activity over

the south & adjoining central BoB and southeast & eastcentral Arabian Sea region during week 2.

The latest weekly sea surface temperature SST departure over NINO 3.4 region is -0.84ºC (9th November update), indicating a weak La Niña condition. Negative IOD conditions (IOD index with a weekly value of -1.57°C on 9th November) are likely to continue during November - December 2025. All these provide a favourable environment for convective activity for genesis over the BoB.

II. Model guidance:

(a) Guidance for Extended Range models:
Mean wind field at 850 hPa of IMD ERF (CFS V-2) model is indicating prevalence of northeasterly/easterly winds over the north & westcentral AS and north & westcentral-southwest BoB during week 1. There is a prominent and strong cyclonic circulation over westcentral and adjoining southwest BoB with an east-west trough from the centre of the cyclonic circulation extending upto westcentral AS during week 1. The cyclonic circulation is vertically extending up to mid-tropospheric levels which indicates the likely formation of an intense low pressure system over the central part of the south BoB and adjoining central BoB during the first week. The respective anomaly wind field also suggests anomalous westerly flow over south & central AS, as well as over south BoB. There is an obvious prominent cyclonic circulation over central parts of south BoB and adjoining central BoB during week 1. This feature confirms the cyclogenesis during week 1. There is also a feeble trough from the cyclonic circulation extending up to northeast AS. The mean wind forecasts at 850 hPa is mainly northeasterly/northerly over entire AS, and over north & western BoB in the second week. There is a feeble cyclonic circulation over central BoB during week 2. Similar to the first week, the anomaly wind field of week 2 also indicates westerly wind over south AS & BoB and adjoining areas of central AS & BoB. There is an east-west oriented trough along 18°N latitude with an embedded cyclonic circulation over central India.

The mean wind field at 850 hPa of NCMRWF extended range model is indicating strong easterly winds over central & adjoining south BoB extending upto eastcentral & northeast AS during week 1. There is an east-west shear zone along 7°N. The associated anomaly field is indicating predominant easterly winds over entire BoB and a southeast-northwest oriented trough from southeast BoB extending upto northeast AS with strong westerly wind anomaly over south AS during week 1. However, during week 2, the mean wind field is indicating cyclonic circulation over central parts of south BoB and associated anomaly field is indicating prominent cyclonic circulation over westcentral & adjoining southwest BoB. These features suggest formation of low pressure system over central parts of south BoB during first half of week 2, indicating delay in genesis compared to IMD CFS V2.

IMD CFS V-2 model is indicating 60-70% probability of cyclogenesis over central parts of south BoB during week 1. Model is also indicating another prominent zone of cyclogenesis (60-70%) over southeast & adjoining southwest AS during week 1. During week 2, no probable zone of cyclogenesis is indicated over the NIO region. ECMWF ensemble forecast indicates a prominent zone i.e. moderate to high probability of cyclogenesis (70-80%) over central parts of south BoB during 24th to 28th November with west-northwestwards movement towards North tamil Nadu and South Andhra Pradesh coasts. The sub-seasonal range forecast of ECMWF indicates 20–30% probability of cyclogenesis over the southwest BoB during 24th November to 1st December, 2025.

(b) Guidance from Medium-Range NWP models:

The guidance from various deterministic models indicate development of low pressure area over southeast BoB & adjoining south Andaman Sea during 22nd to 25th (GFS group around 22nd, ECMWF around 24th and NCUM group around 25th November). There is good consensus among various models with respect to further intensification of the system into a depression over central parts of south BoB. However, there is variation among various models wrt time of genesis, with GFS group & ECMWF indicating development of depression around 24th and NCUM group around 27th/28th November. Models are also indicating further intensification and west-northwestwards movement of the system towards westcentral BoB. ECAIFS model is indicating genesis over southwest BoB off South Sri Lanka coast around 26th November with initial northwards movement towards westcentral BoB till 30th November and north-northeastwards movement towards northeast BoB off South Bangladesh-Myanmar coasts till 3rd December. The guidance from ECAIFS is totally off the guidance from other models.

III. Inference:

Considering various large-scale environmental features, climatology and model guidance, it is inferred that,

- The Low-Pressure area over southeast Arabian Sea & adjoining Lakshadweep area is likely to move slowly west-northwestwards during next 24 hours.
- Under the influence of an upper air cyclonic circulation over central parts of Strait of Malacca, a low pressure area is likely to form over southeast Bay of Bengal around 22nd November, 2025. Thereafter, it is very likely to move west-northwestwards and intensify into depression over central parts of south Bay of Bengal around 24th November 2025. Continuing to move west-northwestwards, it is very likely to intensify further over southwest Bay of Bengal during subsequent 48 hours.

IV. Verification of forecast issued during the previous two weeks:

An extended range outlook issued on 06th November for week 2(14.11.2025-20.11.2025) indicated formation of upper air cyclonic circulation / low pressure area over South Andaman Sea towards the end of week 2 (around 19th November).

Extended range outlook issued on 13th November for week 1 (14.11.2025-20.11.2025) indicated the existing upper air cyclonic circulation over southeast Bay of Bengal will move nearly westwards across the southwest Bay of Bengal towards south Sri Lanka coast and reach over southeast Arabian Sea during the subsequent 2 days.

Another upper air cyclonic circulation is likely to emerge over the South Andaman Sea towards the end of week 1 (around 19th November).

Actually, the existing upper air cyclonic circulation over southeast Bay of Bengal is likely to move nearly westwards across the southwest Bay of Bengal towards south Sri Lanka coast till 14th November 2025 and under its influence a Low-Pressure area has formed over Southwest Bay of Bengal off Sri Lanka coast on 15th November 2025 and persisted over Southwest Bay of Bengal & neighborhood till 19th November and become less marked on 20th November, 2025. Another upper air cyclonic circulation formed over Southeast Arabian

Sea and adjoining South Kerala coast on 15th November 2025 and become less marked on17th November, 2025. Another Low-Pressure area formed over Comorin area and neighborhood on 19th November and persisted on 20th November 2025.

NCMRWF-IMD satellite gauge merged data plots of 24 hours accumulated realized rainfall during 16th May to 22nd May, 2024 are presented in **Fig. 2.4.2(b)**.

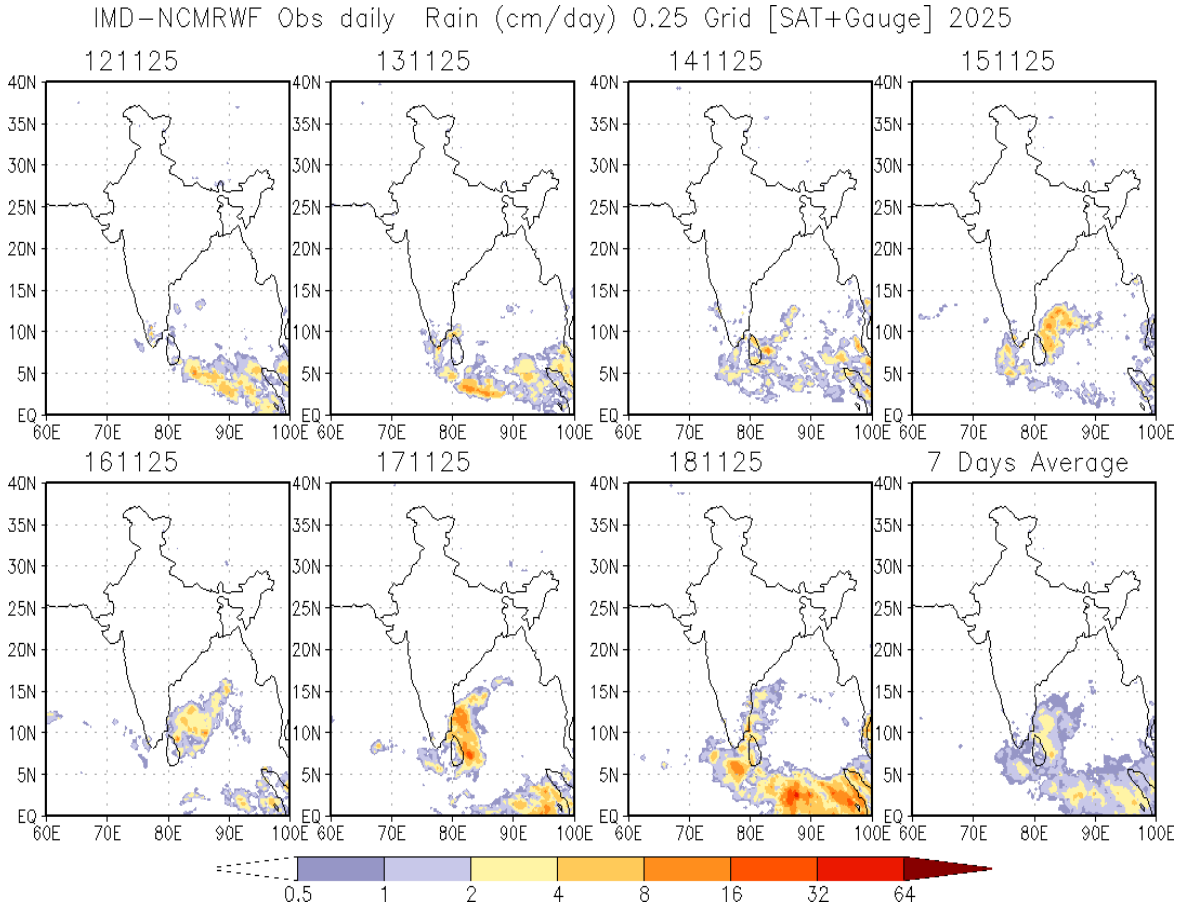


Fig.2.4.2(b): NCMRWF-IMD satellite gauge merged data plots of 24 hours accumulated realized rainfall during 12th November to 18th November, 2025

2.4.2. Tropical Weather Outlook

The tropical weather outlook is prepared once daily by RSMC tropical cyclones, New Delhi throughout the year. It is transmitted through GTS at 06 UTC every day. The outlook covering the North Indian Ocean indicates possible development of tropical depressions over the Sea. The probability of cyclogenesis (formation of depression) has been extended from 3 to 5 days since April 2018 over the Bay of Bengal and Arabian Sea. It has further been extended to 7 days since September, 2023. The terms used are (i) NIL (0%), LOW (1-33%), MODERATE (34-67%) and HIGH (68-100%). An example of this bulletin is given below. It includes the description of convective clouds over the region and the satellite imagery of the day with probability of cyclogenesis for next 24 hours in addition to above. Tropical Weather outlook will be replaced by Special Tropical Weather Outlook when a depression is located over the north Indian Ocean region based on 0000, 0300, 0600, 1200 and 1800 UTC

observations or at any other synoptic hour depending upon the development of depression. The additional bulletins will be issued as and when felt necessary by RSMC, New Delhi.

Examples-1 (Tropical Weather Outlook under normal conditions)

REGIONAL SPECIALISED METEOROLOGICAL CENTRE-TROPICAL CYCLONES, NEW DELHI

TROPICAL WEATHER OUTLOOK

DEMS-RSMC TROPICAL CYCLONES NEW DELHI DATED 23.11.2025

TROPICAL WEATHER OUTLOOK FOR THE NORTH INDIAN OCEAN (THE BAY OF BENGAL AND THE ARABIAN SEA) VALID FOR THE NEXT 168 HOURS ISSUED AT 0900 UTC OF 23.11.2025 BASED ON 0300 UTC OF 23.11.2025.

BAY OF BENGAL:

A. Well Marked Low pressure area over Strait of Malacca and adjoining south Andaman Sea

Yesterday's low pressure area over Strait of Malacca and adjoining south Andaman Sea lay as a well marked low pressure area over the same region at 0830 hours IST of today, the 23rd November, 2025. It is very likely to move west-northwestwards and intensify into a depression over southeast Bay of Bengal and adjoining south Andaman Sea on 24th November 2025. Continuing to move further west-northwestwards, it is very likely to intensify into a cyclonic storm over southeast Bay of Bengal during subsequent 48 hours.

As per INSAT 3DS at 0300 UTC, vortex over Strait of Malacca and adjoining South Andaman Sea & neighbourhood centered within half a degree of 5.5^0N/99.3^0E. Intensity T1.0. Associated scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Andaman Sea, Strait of Malacca & neighbourhood (minimum CTT minus 70-90 degree Celsius). Scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Bay of Bengal and south Andaman Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over westcentral Bay of Bengal.

The estimated central pressure is about 1011 hPa. The associated maximum sustained wind speed is about 15-20 knots gusting to 30 knots. Sea condition is moderate over Malacca Strait and adjoining south Andaman Sea.

B. Likely formation of a low pressure area over Comorin and adjoining areas of southwest Bay of Bengal & Sri Lanka

An upper air cyclonic circulation lay over Comorin area and neighbourhood at 0830 hours IST of today, the 23rd November, 2025. Under its influence, a low-pressure area is likely to form over Comorin and adjoining areas of southwest Bay of Bengal & Sri Lanka around 25th November.

*PROBABILITY OF CYCLOGENESIS (FORMATION OF DEPRESSION) DURING NEXT 168 HRS

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

*NOTE: EVERY 24HR FORECAST IS VALID UPTO 0300 UTC (0830 IST) OF NEXT DAY

ARABIAN SEA:

Yesterday's upper air cyclonic circulation over southeast Arabian Sea persisted over the same region at 0300 UTC of today, the 23rd November.

As per INSAT 3DS at 0300 UTC, scattered to broken low and medium clouds with embedded moderate to intense convection lay over eastcentral & south Arabian Sea, Lakshadweep Islands, Maldives and Comorin area.

*PROBABILITY OF CYCLOGENESIS (FORMATION OF DEPRESSION) DURING NEXT 168 HRS:

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

*NOTE: EVERY 24HR FORECAST IS VALID UPTO 0300 UTC (0830 IST) OF NEXT DAY

REMARKS:

The guidance from various models indicates that the Madden Julian Oscillation (MJO) index is presently in phase 6 with amplitude more than 1. Most of the models suggest that the MJO index is likely to remain in phase 6 with a slow eastward propagation and increasing amplitude during the next six days. The sea surface temperature is around 28^0C over south Andaman Sea adjoining Malacca Strait and southeast Bay of Bengal (BoB). It is higher around 30^0C over central BoB and along & off Odisha and Andhra Pradesh coasts. Ocean thermal energy is 150-175 KJ/cm^2 over south Andaman Sea and 100-120 KJ/cm^2 over southeast BoB. However, it is less than 50 KJ/cm^2 over westcentral BoB and along & off Odisha and Andhra Pradesh coasts.

The guidance from NCICS model indicates westerly wind anomaly (5-7 mps) alongwith prevalence of MJO, Equatorial Rossby wave (ERW), low frequency background wave (LW) over the southern parts of the North Indian Ocean (NIO) including south BoB and southeast Arabian Sea (AS) and easterly wind anomaly (3-5 mps) to its north over south & adjoining central parts of BoB during 23rd - 24th November. These features indicate a favorable environment for cyclogenesis (development of depression) over southeast BoB around 24th November. Model is also indicating a Kelvin Wave (KW) over northern parts of BoB, which is opposing the normal easterly flow over central parts of BoB. Similarly, during 25th to 30th, the model is indicating strong westerly wind anomaly (7-9 mps) alongwith prevalence of MJO, ERW, LW & KW over the southern parts of the North Indian Ocean (NIO) including south BoB and southeast Arabian Sea (AS) and easterly wind anomaly (5-7 mps) over north BoB. These features are favourable for further intensification of the system over southwest & westcentral BoB. Model is also indicating weakening of easterlies during 1st to 3rd December over northern parts of BoB, which may lead to weakening of system as it recurves north-northeastwards and reaches central & adjoining North BoB.

Thermodynamic features:

(A) Well marked low pressure area over Malacca Strait & adjoining South Andaman Sea:

The low level relative vorticity at 850 hPa is the same and is about 90-100 $\times$ 10^{-6} s^{-1} over Malacca Strait. Vertically, the positive vorticity zone over Malacca Strait is extending upto 500hPa. Upper-level divergence has increased and is around 30×10^{-6} s^{-1} over Malacca Strait

and and adjoining south Andaman Sea. Low-level convergence is the same (around 20×10^{-6} s^{-1}) over Malacca Strait. Mid-level vertical wind shear (VWS) of horizontal wind is low (5-10 kt) and cyclonic over entire south Bay & south Andaman Sea. Upper tropospheric ridge runs along 10°N over the BoB. The system is lying to the south of ridge. East-southeasterly winds prevailing to the south of ridge are steering the system nearly west-northwestwards.

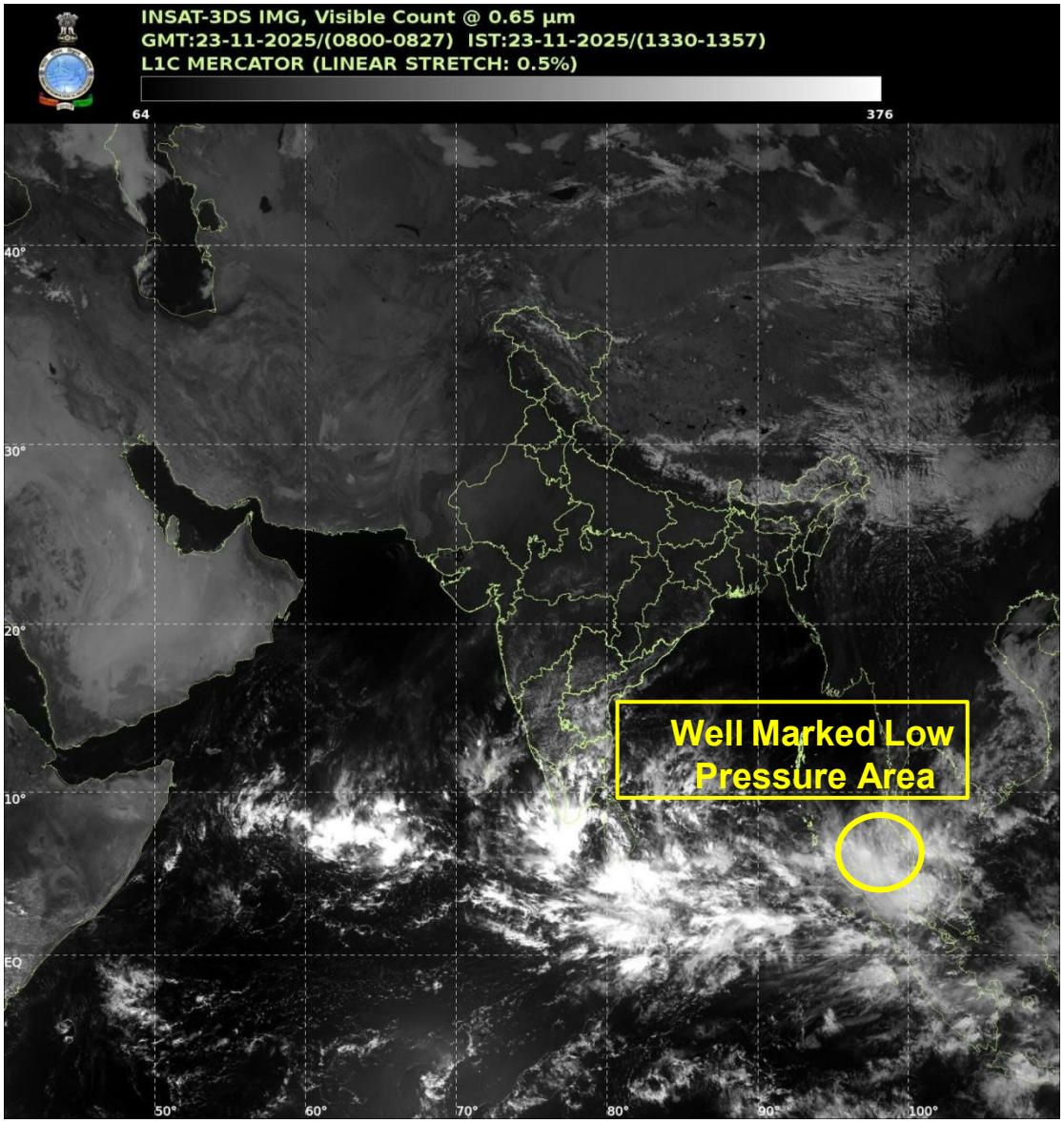
(B) **Upper air cyclonic circulation over Comorin Area:**

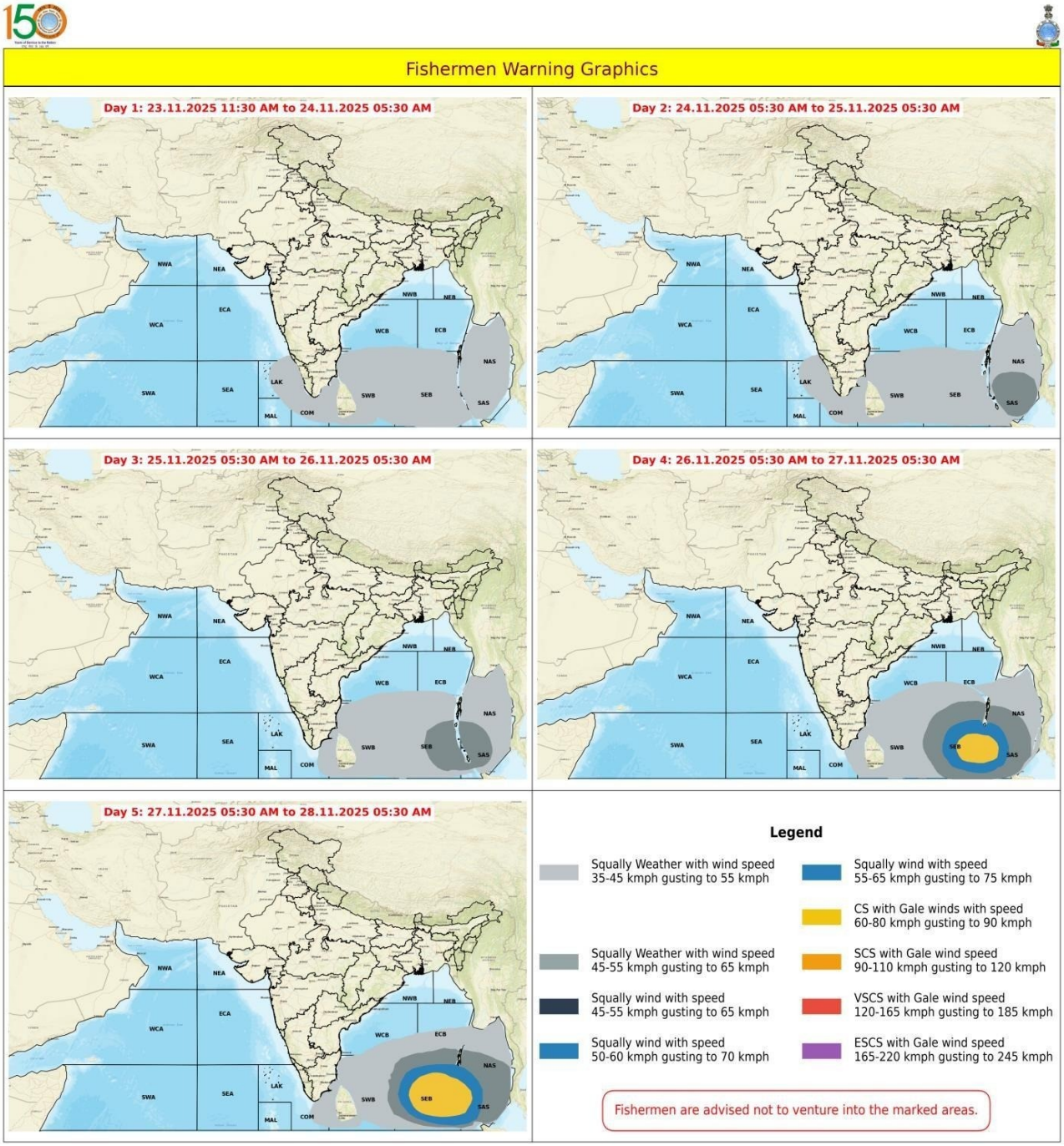
The low level relative vorticity at 850 hPa is about 70-80 × 10^{-6} s^{-1} over Comorin Area and adjoining southwest Sri Lanka. Vertically, the positive vorticity zone is extending upto 500hPa. Upper-level divergence is around 30×10^{-6} s^{-1} over Comorin Area and adjoining southwest Sri Lanka. Low-level convergence is around 30×10^{-6} s^{-1} lay over Comorin and adjoining areas. Mid-level vertical wind shear (VWS) of horizontal wind is low (5-10 kt) and cyclonic over the region.

Most of the models (GFS & NCUM group) are indicating the well-marked low pressure area over Malacca Strait as on today the 23rd November 2025. Models are also indicating its west-northwestward movement and intensification into a depression during 24th/25th November over south Andaman Sea & adjoining southeast Bay of Bengal. There is consensus that the system over Malacca Strait is likely to intensify into a CS around 26th/27th November. Models are also indicating initial west-northwestward movement till 27th November towards southwest Bay, followed by north-northwestwards movement till 30th November, as it is expected to be closer to the south of ridge and gradual northeastwards re-curvature thereafter towards northeast Bay, as it crosses the ridge. However, ECMWF is indicating development of depression over Malacca & adjoining south Andaman Sea around 24th with intensification, but movement over the same region and weakening over south Andaman Sea around 2nd December. It is also indicating the cyclonic circulation over Comorin Area to gradually move along the South Sri Lanka coast and emerge into southwest BoB around 27th, intensify further and over southwest BoB. However, while moving northwards, it is weakening over sea near North Andhra Pradesh coast. There is large variation among various models with respect to point and time of re-curvature.

In view of above, the low pressure area over Strait of Malacca and adjoining South Andaman Sea is very likely to move west-northwestwards and intensify into a depression over southeast Bay of Bengal around 24th November 2025. Continuing to move west-northwestwards, it is very likely to intensify further over southwest Bay of Bengal during subsequent 48 hours.

i. Confidence level in determination of location of well marked low pressure area: High
ii. Confidence level in determination of intensity well marked low pressure area: High
iii. Confidence level in forecast of intensification (formation of Depression): High
iv. Confidence level in forecast of location of Depression: Moderate


INSAT-3DS IMG, Visible Count @ 0.65 µm
GMT:23-11-2025/(0800-0827) IST:23-11-2025/(1330-1357)
L1C MERCATOR (LINEAR STRETCH: 0.5%)
64
376
40°
30°
20°
10°
EQ
50°
60°
70°
80°
90°
100°
Well Marked Low Pressure Area


Fishermen Warning Graphics
Day 1: 23.11.2025 11:30 AM to 24.11.2025 05:30 AM
Day 2: 24.11.2025 05:30 AM to 25.11.2025 05:30 AM
Day 3: 25.11.2025 05:30 AM to 26.11.2025 05:30 AM
Day 4: 26.11.2025 05:30 AM to 27.11.2025 05:30 AM
Day 5: 27.11.2025 05:30 AM to 28.11.2025 05:30 AM
NWA
NEA
NWB
NEB
WCA
ECA
WCB
ECB
NAS
SWA
SEA
LAK
SWB
SEB
SAS
MAL
COM
Legend
Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
Squally wind with speed 55-65 kmph gusting to 75 kmph
CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
Squally wind with speed 45-55 kmph gusting to 65 kmph
VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
Squally wind with speed 50-60 kmph gusting to 70 kmph
ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph
Fishermen are advised not to venture into the marked areas.

Examples-2 (Tropical Weather Outlook in association with Low Pressure Area)

REGIONAL SPECIALISED METEOROLOGICAL CENTRE-TROPICAL CYCLONES, NEW DELHI TROPICAL WEATHER OUTLOOK

DEMS-RSMC TROPICAL CYCLONES NEW DELHI DATED 25.11.2025
SPECIAL TROPICAL WEATHER OUTLOOK FOR THE NORTH INDIAN OCEAN (THE BAY OF BENGAL AND THE ARABIAN SEA) VALID FOR THE NEXT 168 HOURS ISSUED AT 0800 UTC OF 25.11.2025 BASED ON 0300 UTC OF 25.11.2025.

BAY OF BENGAL:

A. Depression over Strait of Malacca
B. Low pressure area over southwest Bay of Bengal & adjoining areas of south Sri Lanka & Equatorial Indian Ocean

A. Depression over Strait of Malacca
Yesterday's well marked low pressure area over Malaysia and adjoining Strait of Malacca moved west-northwestwards, intensified into a Depression and lay over Strait of Malacca, near Latitude
5.4 and Long 99.7E about 70km west of George Town (Malaysia), 290km east of Kuta Makmur (Indonesia), 740km east-southeast of Nancowry (43382) and 870 Km east-southeast of Car Nicobar (43367) at 0300 UTC of today, the 25th November, 2025.It is very likely to move slowly west-northwestwards and intensify further during next 48 hours

As per INSAT 3DS at 0300 UTC, vortex over Strait of Malacca & neighbourhood centered within half a degree of 5.0^0N/99.8^0E. IntensityT1.0. Associated scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Andaman Sea, north Sumatra, Strait of Malacca adjoining Malaysia & neighbourhood (minimum CTT minus 70-90 degree Celsius). Scattered to broken low and medium clouds with embedded intense to very intense convection lay over south Bay of Bengal and south Andaman Sea. Scattered low and medium clouds with embedded moderate to intense convection lay over west central Bay of Bengal and north Andaman Sea.

The estimated central pressure is about 1006 hPa. The associated maximum sustained wind speed is about 20-25 knots gusting to 35 knots. Sea condition is rough to very rough over south Andaman Sea, Strait of Malacca and along and off Nicobar Islands & adjoining Malaysia, west Indonesia and Thailand.

B. Low pressure area over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean
Under the influence of yesterday's upper air cyclonic circulation over Comorin area and neighbourhood, a low-pressure area formed over the Comorin and adjoining areas of southwest Bay of Bengal & Sri Lanka at 0000 UTC of today, the 25th November, 2025. It lay over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean at 0300 UTC of today, the 25th November, 2025. It is very likely to move north-northwestwards and become well marked low pressure area during next 24 hours and intensify further into a depression during subsequent 24hours.

As per INSAT 3DS at 0300 UTC, Low Level Circulation (LLC) over Comorin and adjoining areas of southwest Bay of Bengal & Sri Lanka. The associated scattered to broken low and medium clouds with embedded intense to very intense convection lay over Comorin area, Gulf of Mannar, Sri Lanka and southwest Bay of Bengal (minimum CTT minus 70-90 degree Celsius).

REMARKS:

The guidance from various models indicates that the Madden Julian Oscillation (MJO) index is presently in phase 6 with amplitude more than 1. Most of the models suggest that the MJO index is likely to remain in phase 6 with a slow eastward propagation and increasing amplitude during the next six days. The sea surface temperature is around 28^0C over south Andaman Sea adjoining Malacca Strait and southeast Bay of Bengal (BoB). It is higher around 30^0C over central BoB and along & off Odisha and Andhra Pradesh coasts. Ocean thermal energy is 150-175 KJ/cm^2 over south Andaman Sea and 100-120 KJ/cm^2 over southeast BoB. However, it is less than 50 KJ/cm^2 over westcentral BoB and along & off Odisha and Andhra Pradesh coasts.

The guidance from NCICS model indicates westerly wind anomaly (5-7 mps) alongwith prevalence of MJO signal, Equatorial Rossby Wave (ERW), low frequency background wave (LW) over the southern parts of the North Indian Ocean (NIO) including south BoB and southeast Arabian Sea (AS) and easterly wind anomaly (3-5 mps) to its north over south & adjoining central parts of BoB during 24th to 28th November. These features indicate a favorable environment for cyclogenesis (development of depression) over south BoB and south Andaman Sea during this period. The signature of Kelvin Wave (KW) propagating eastward gradually across central AS and south BoB during 25th November to 1 December which will be active over south BoB along with other convectively coupled equatorial waves during 26th November to 1st December. This is likely to oppose the normal easterly flow over central parts of BoB. The environmental condition is likely to remain favourable for further intensification of the system over southwest & westcentral BoB till 1 Dec. Model is also indicating weakening of easterlies thereafter from 2nd December onwards, which may lead to weakening of system as it moves northwards to reach over central & adjoining North BoB.

Depression over strait of Malacca: The low level relative vorticity at 850 hPa is about 100 $\times$ 10^{-6} s^{-1} over Malacca Strait. Vertically, the positive vorticity zone over Malacca Strait is extending upto 500hPa. Upper-level divergence is around 20×10^{-6} s^{-1} over Malacca Strait and adjoining south Andaman Sea. Low-level convergence is around 30×10^{-6} s^{-1} over Malacca Strait and adjoining south Andaman Sea. Mid-level vertical wind shear (VWS) of horizontal wind is around 10-15 kt) over entire south Bay & south Andaman Sea. Upper tropospheric ridge runs along 12˚N across the BoB. The system is lying to the south of ridge. East-southeasterly winds prevailing to the south of ridge is likely to steer the system nearly west-northwestwards.

The models are varying in terms of their forecasts as there are multiple systems along the ITCZ evolving together. The GFS group of models (IMDGFS & NCEP GFS) are indicating the depression to move nearly northwestwards with further intensification during next 24 hours. Thereafter, NCEP GFS is indicating north-northeastwards movement with gradual weakening whereas IMD GFS is indicating northwestwards with gradual intensification up to 28th November. The ECMWF model is indicating depression over Malacca Strait with initial northwestwards movement till 26th November. It is likely to further move east-northeastwards across Malaysia and gradually weaken thereafter during subsequent 72 hours.
Confidence level in location of Depression: High

i. Confidence level in estimation of intensity: High
ii. Confidence level in forecast of intensification: High
iii. Confidence level in forecast of track: Moderate

Low pressure area over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean: The low level relative vorticity at 850 hPa has increased and is about 150 $\times$ 10^{-6} s^{-1} over Comorin Area and adjoining southwest Sri Lanka. Vertically,

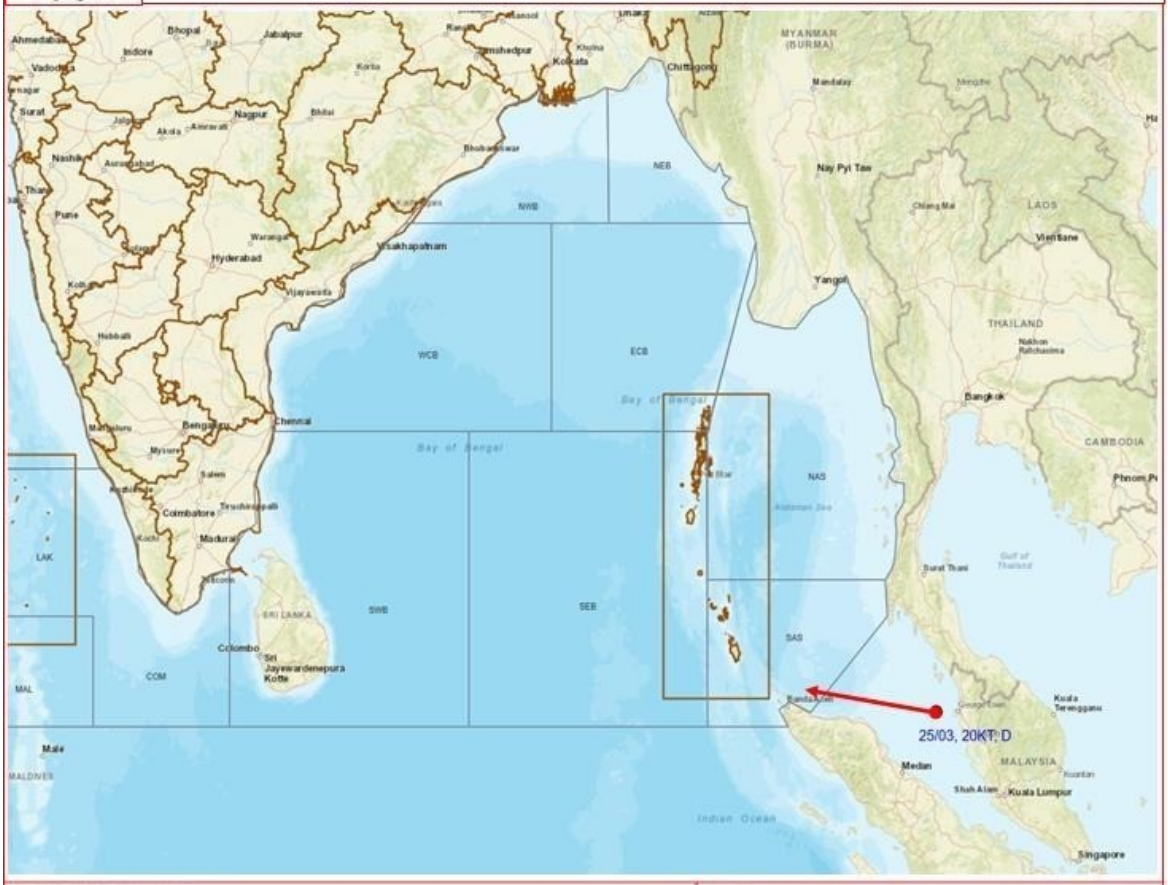
the positive vorticity zone is extending up to 500hPa. Upper-level divergence is around 30×10^{-6} s^{-1} over Comorin Area and adjoining southwest Sri Lanka. Low-level convergence is around 30×10^{-6} s^{-1} lay over Comorin and adjoining areas. Mid-level vertical wind shear (VWS) of horizontal wind is low (5-10 kt) and cyclonic over the region.

ECMWF models are indicating low pressure area over Comorin and adjoining south Srilanka. It is forecasted to intensify into a depression during 24 hours over the same region. It will then skirt Srilanka coast and intensify further during subsequent 72 hours. Thereafter, the model is indicating northwestward towards north Tamilnadu coast with gradual weakening. NCEP GFS is indicating a well-marked low pressure area over Comorin region and forecasted to move east-northeastwards across Srilanka during next 72 hours with gradual intensification and emerge into southwest Bay of Bengal during subsequent 24 hours. Thereafter, it will move northwards with gradual intensification. NCUM model is indicating a low pressure area over southwest Bay of Bengal off south Sri Lanka coast with initial eastward movement during next 24 hours. Thereafter, the model is indicating northwestward movement with gradual intensification during subsequent 48 hours. Most of the models are indicating low pressure area/ well marked low pressure area over Comorin area and adjoining Sri Lanka coast on 25th. All the models are in agreement to further intensification upto depression during subsequent 24 hours. The models exhibit large variability in the track and further intensification thereafter

In view of above, the depression over Strait of Malacca is very likely to slowly move west-northwestwards and intensify further during next 48 hours.
The Low pressure area over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean is very likely to move north-northwestwards and become well marked low pressure area during next 24 hours and intensify further into a depression during subsequent 24hours.

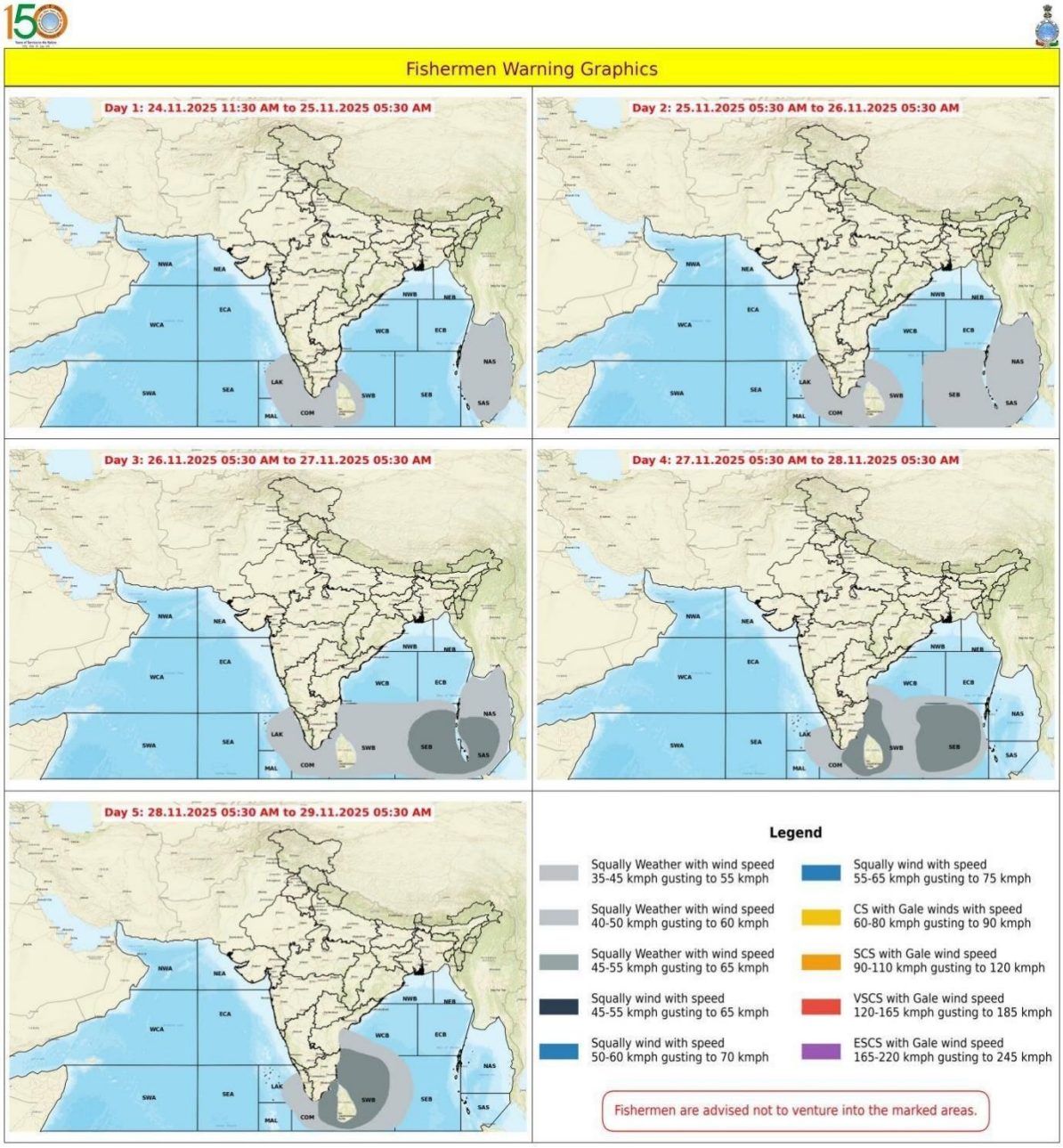
i. Confidence level in location of Low Pressure Area: High
ii. Confidence level in estimation of intensity: High
iii. Confidence level in forecast of intensification: High
iv. Confidence level in forecast of track: Moderate

OBSERVED AND FORECAST TRACK OF DEPRESSION OVER STRAIT OF MALACCA BASED ON 0300 UTC (0830 Hrs. IST) OF 25TH NOVEMBER 2025.



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY


Fishermen Warning Graphics
Day 1: 24.11.2025 11:30 AM to 25.11.2025 05:30 AM
Day 2: 25.11.2025 05:30 AM to 26.11.2025 05:30 AM
Day 3: 26.11.2025 05:30 AM to 27.11.2025 05:30 AM
Day 4: 27.11.2025 05:30 AM to 28.11.2025 05:30 AM
Day 5: 28.11.2025 05:30 AM to 29.11.2025 05:30 AM
NWA
NEA
ECA
WCA
NWB
NEB
WCB
ECB
NAS
SWA
SEA
LAK
SWB
SEB
SAS
MAL
COM
Legend
Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
Squally Weather with wind speed 40-50 kmph gusting to 60 kmph
Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 50-60 kmph gusting to 70 kmph
Squally wind with speed 55-65 kmph gusting to 75 kmph
CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph
Fishermen are advised not to venture into the marked areas.

2.4.3 Special Tropical Weather Outlook

The special tropical weather outlook issued in association with the depression/deep depression will provide brief descriptions of tropical depressions affecting the area. It will give the location, intensity and movement of the system as well as a general statement of land areas coming under threat. It will also contain description of the convective clouds in satellite imageries and diagnostic & prognostic features of the system. It is issued five times a day based on 0000, 0300, 0600, 1200 and 1800 UTC observations will in addition contain the 120 hrs forecast track and intensity of the system in a tabular form. These track and intensity forecasts are issued for +6, +12, +18, +24, +36, +48, +60, +72, +84, +96, +108 and +120 hrs since May 2013. Since 2018, the above objective track and intensity forecast is also being issued from depression stage for next +12, +24, +36, +48, +60, +72 hrs, if the depression is expected to intensify into a cyclonic storm.

When a system reaches the cyclonic storm stage (wind speed 34 kt), RSMC tropical cyclones, New Delhi will issue cyclonic storm advisories.

2.4.4 Tropical cyclone advisories

When a tropical low pressure system reaches the cyclonic storm stage, or is shortly expected to reach that intensity, RSMC tropical cyclones, New Delhi will issue tropical cyclone advisories. Advisories will be issued three hourly at 00, 03, 06, 09, 12, 15, 18 and 21 UTC. The area of responsibility for the issue of tropical cyclone advisories by RSMC Tropical Cyclones, New Delhi cover sea areas of north Indian Ocean has been extended between 40^0E to 100^0E from 2018 onwards from long. 45° E to 100° E.

Example 3: (TROPICAL CYCLONE ADVISORY IN ASSOCIATION WITH TROPICAL CYCLONE)

REGIONAL SPECIALISED METEOROLOGICAL CENTRE -TROPICAL CYCLONES, NEW DELHI

TROPICAL CYCLONE ADVISORY

DEMS-RSMC SPECIAL TROPICAL CYCLONES NEW DELHI DATED 27.11.2025
FROM: RSMC –TROPICAL CYCLONES, NEW DELHI
TO: STORM WARNING CENTRE, NAYPYI TAW
(MYANMAR) STORM WARNING CENTRE, BANGKOK
(THAILAND) STORM WARNING CENTRE, COLOMBO
(SRILANKA) STORM WARNING CENTRE, DHAKA
(BANGLADESH) STORM WARNING CENTRE, KARACHI
(PAKISTAN) METEOROLOGICAL OFFICE, MALE
(MALDIVES)
OMAN METEOROLOGICAL
DEPARTMENT, MUSCAT (THROUGH RTH
JEDDAH) YEMEN METEOROLOGICAL
SERVICES,
REPUBLIC OF YEMEN (THROUGH RTH JEDDAH)
NATIONAL CENTRE FOR METEOROLOGY, UAE (THROUGH RTH JEDDAH)
PRESIDENCY OF METEOROLOGY AND ENVIRONMENT,
SAUDI ARABIA (THROUGH RTH JEDDAH)
IRAN METEOROLOGICAL ORGANISATION, (THROUGH RTH JEDDAH)
QATAR METEOROLOGICAL DEPARTMENT (THROUGH RTH JEDDAH)
TROPICAL CYCLONE ADVISORY NO. 11 FOR NORTH INDIAN OCEAN (THE BAY OF

BENGAL AND ARABIAN SEA) VALID FOR NEXT 120 HOURS ISSUED AT 0900 UTC OF 27.11.2025 BASED ON 0600 UTC OF 27.11.2025

A. Cyclonic Storm Ditwah over southwest Bay of Bengal and adjoining Sri Lanka Coast

The Deep Depression over southwest Bay of Bengal and adjoining Sri Lanka coast moved north- northwestwards with the speed of 15 kmph during past 6 hours, intensified into the Cyclonic Storm Ditwah [Pronunciation: Ditwah] and lay centered at 0600 UTC of today, the 27th November 2025 over the same region near latitude 6.9°N and longitude 81.9°E, close east of Pottuvil (43475), about 90 km south-southeast of Batticaloa (43436), 120 km northeast of Hambantota (43497), 200 km south-southeast of Trincomalee (43418), 610 km south-southeast of Puducherry (43331) and 700 km south-southeast of Chennai (43279).

It is very likely to continue to move north-northwestwards across southwest Bay of Bengal & adjoining Sri Lanka coast and reach over southwest Bay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by 2100UTC of 29th November. Forecast track and intensity are given in Table below

Date/Time (IST)	Position (Lat°N/Long°E)	Maximum Sustained Surface Wind Speed (Kmph)	Category Of Cyclonic Disturbance
27.11.25/0600	6.9/81.9	60-70 gusting to 80	Cyclonic Storm
27.11.25/1200	7.5/81.6	65-75 gusting to 85	Cyclonic Storm
27.11.25/1800	8.0/81.3	65-75 gusting to 85	Cyclonic Storm
28.11.25/0000	8.6/81.1	70-80 gusting to 90	Cyclonic Storm
28.11.25/0600	9.1/80.9	70-80 gusting to 90	Cyclonic Storm
28.11.25/1800	9.7/80.8	75-85 gusting to 95	Cyclonic Storm
29.11.25/0600	10.5/80.6	80-90 gusting to 100	Cyclonic Storm
29.11.25/1800	11.4/80.5	80-90 gusting to 100	Cyclonic Storm
30.11.25/0600	12.2/80.5	70-80 gusting to 90	Cyclonic Storm
30.11.25/1800	12.9/80.5	65-75 gusting to 85	Cyclonic Storm

As per INSAT 3DS at 0600 UTC, the clouds are organized in curved band pattern. Intensity of the system is characterized as T2.5. Intense convection is seen over Southwest Sri Lanka. The associated scattered to broken low and medium clouds with embedded intense to very intense convection lay over southwest Bay of Bengal & adjoining Equatorial Indian Ocean, Sri Lanka, Comorin area, Palk Strait & Gulf of Mannar, south Kerala & Tamil Nadu (minimum CTT minus 70-90 degree Celsius).

The estimated central pressure is about 1001 hPa. The associated maximum sustained wind speed is about 35 knots gusting upto 45 knots.

B. Deep Depression [Remnant of Cyclonic Storm "Senyar"] over the Strait of Malacca

The **Deep Depression** [**Remnant of Cyclonic Storm "Senyar"**] over the Strait of Malacca moved nearly eastwards with a speed of 12 kmph in past 6 hours, weakened into a depression and lay centred at 1130 hours IST of today, the 27th November 2025 over the same region near latitude 3.6°N and longitude 99.8°E, about 210 km south-southwest of George Town (43041), 340 km east-southeast of Kuta Makmur (42867), 850 km east-southeast of Nancowry (43382) and 990 km southeast of Car Nicobar (43367).

It is very likely to move nearly eastwards and weaken further into a well marked low pressure area during next 12 hours.

As per INSAT 3DS at 0600 UTC, the intensity is characterized as T2.0. Associated scattered to broken low and medium clouds with embedded intense to very intense convection lay over South Andaman Sea and adjoining Southeast Bay of Bengal & adjoining Equatorial Indian

Ocean, north Sumatra, Strait of Malacca and minimum cloud top temperature is minus 70-90 degree Celsius.
The estimated central pressure is about 1004 hPa. The associated maximum sustained wind speed is about 25 knots gusting upto 35 knots.

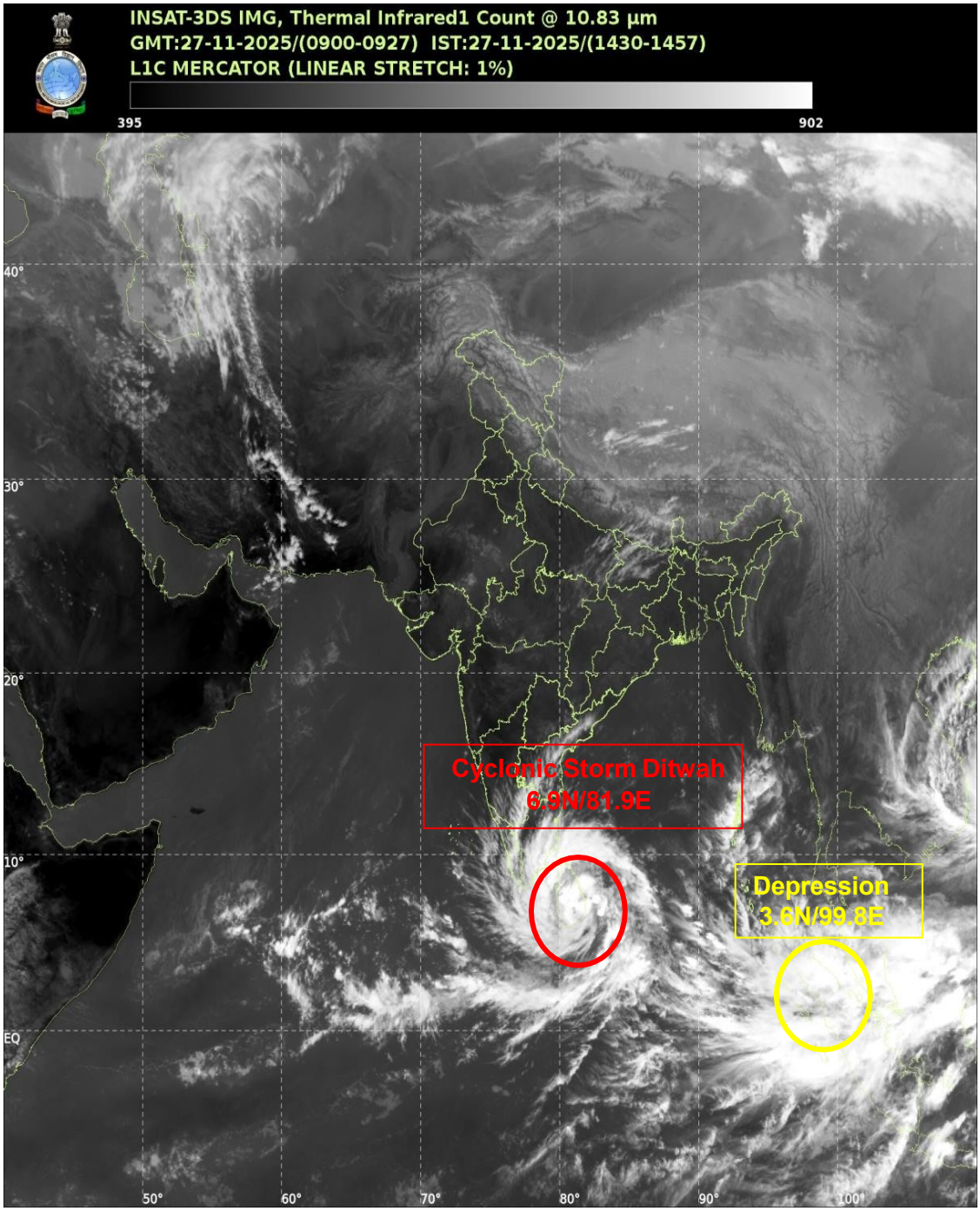
REMARKS:
The guidance from various models indicates that the Madden Julian Oscillation (MJO) index is presently in phase 7 with amplitude more than 1 and is likely to continue in same phase during next 5 days. The sea surface temperature is around 28^0C over southwest Bay of Bengal and along & off Sri Lanka, Tamil Nadu & South Andhra Pradesh coast along the forecast track. The sea surface temperature is around 28^0C over south Andaman Sea adjoining Malacca Strait and southeast Bay of Bengal (BoB).
The guidance from NCICS model indicates westerly wind anomaly (7-9 mps) alongwith prevalence of Equatorial Rossby Wave (ERW), low frequency background wave (LW) over the southern parts of the Southwest BoB and adjoining southeast Arabian Sea (AS) and easterly wind anomaly (3-5 mps) to its north over southwest BoB off Tamil Nadu coast during 27th to 28th November. Kelwin wave (KW) is also approaching from west. Similar features are likely to continue till 1st December. These features indicate that equatorial waves would contribute to further intensification of system.

(a) Deep Depression over southwest Bay of Bengal and adjoining areas of Southeast Sri Lanka: The low level relative vorticity at 850 hPa is about 150×10^{-6} s^{-1} over southwest Bay of Bengal and adjoining south Sri Lanka. Vertically, the positive vorticity zone is extending up to 200hPa. Upper-level divergence has increased and is around 30×10^{-6} s^{-1} over Comorin Area to the west of system centre. Low-level convergence around 10×10^{-6} s^{-1} over southwest Bay of Bengal and adjoining Sri Lanka. Vertical wind shear (VWS) of horizontal wind is low (10-15 kt) over the system area.

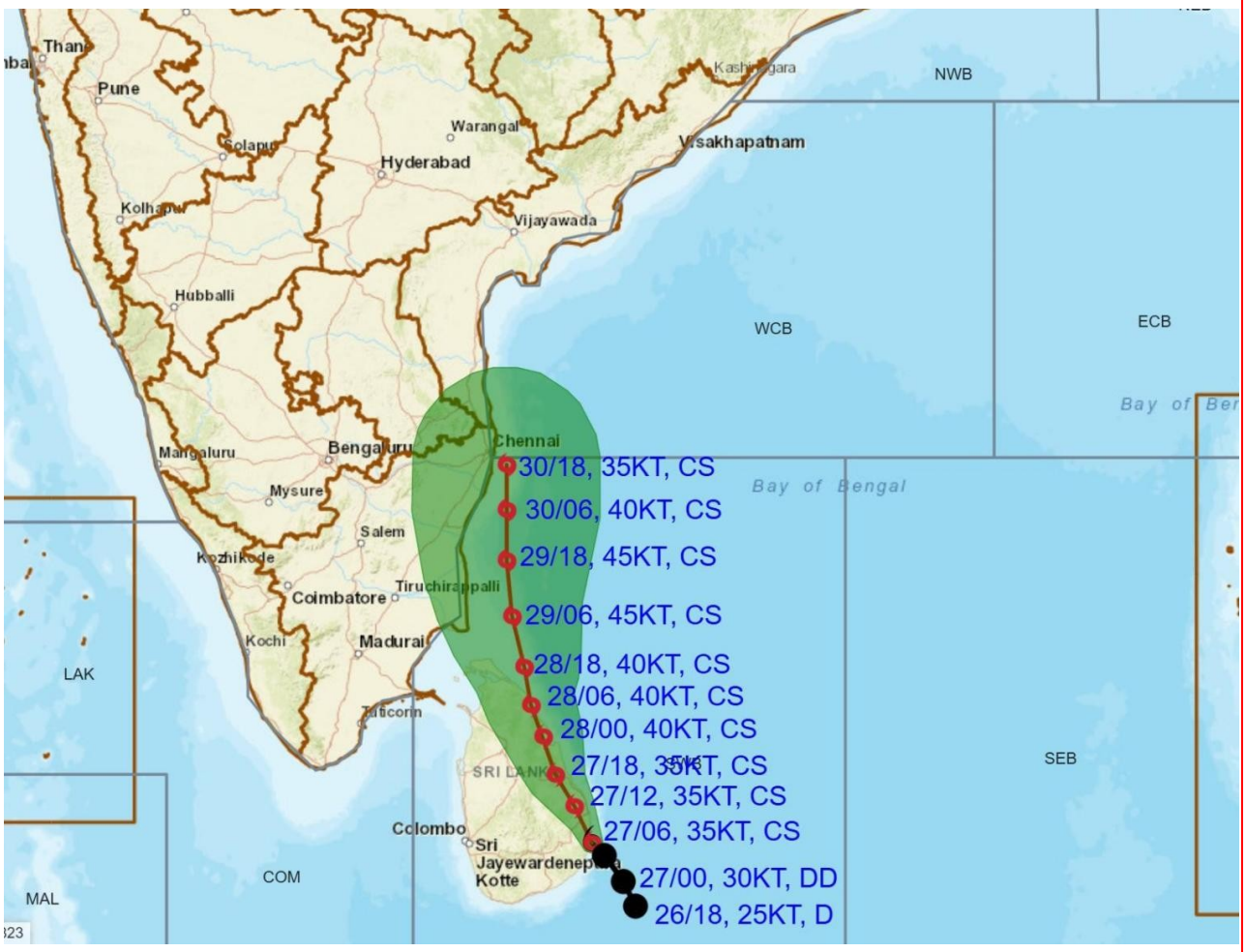
There is good consensus among various models wrt to further intensification of the system into a cyclonic storm and nearly north-northwestwards movement of the system very close to Sri Lanka coast towards Tamil Nadu-Andhra Pradesh coasts. However, models are also indicating marginal weakening of the system from 30th November onwards.

(b) Deep Depression over strait of Malacca: The low level relative vorticity at 850 hPa has decreased and is about 70-80 $\times$ 10^{-6} s^{-1} over Malacca Strait and adjoining areas and vertically extending upto 500 hPa. Upper-level divergence is around 30×10^{-6} s^{-1} over Indonesia & adjoining Equatorial Indian Ocean, Malacca Strait and south Andaman Sea. Low-level convergence is around $30\text{-}40\times10^{-6}$ s^{-1} over Indonesia & adjoining Malacca Strait and south Andaman Sea. Mid-level vertical wind shear (VWS) of horizontal wind is around (10-15 kt) over Malacca Strait. Upper tropospheric ridge runs along 12°N across the BoB.
Most of the models are indicating weakening of the system during next 24 hours over Malacca Strait.

(i) Confidence level in estimation of current location of Deep Depression: High
(ii) Confidence level in estimation of estimation of current intensity: High
(iii) Confidence level in forecast intensity: High
(iv) Confidence level in forecast track: High


INSAT-3DS IMG, Thermal Infrared1 Count @ 10.83 µm
GMT:27-11-2025/(0900-0927) IST:27-11-2025/(1430-1457)
L1C MERCATOR (LINEAR STRETCH: 1%)
395
902
40°
30°
20°
10°
EQ
50°
60°
70°
80°
90°
100°
Cyclonic Storm Ditwah
6.9N/81.9E
Depression
3.6N/99.8E

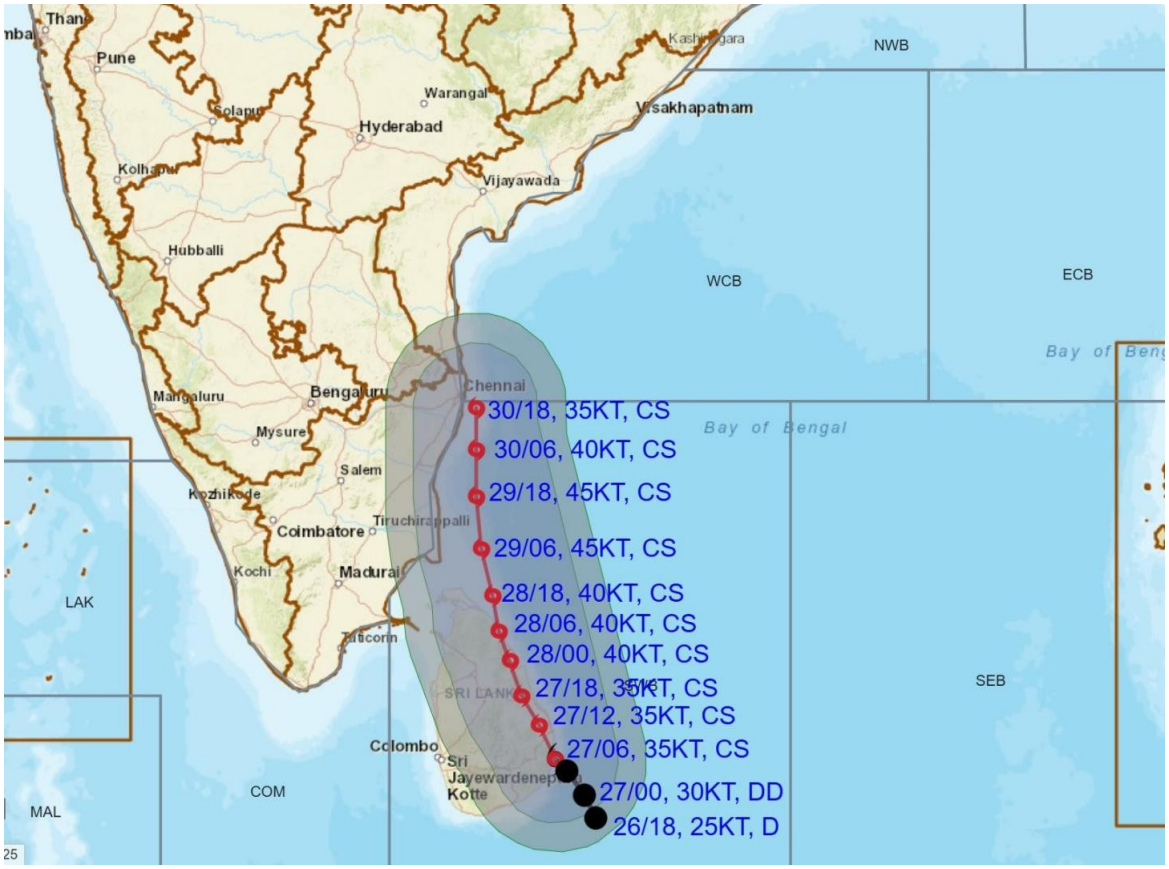
OBSERVED AND FORECAST TRACK OF CYCLONIC STORM "DITWAH" OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

OBSERVED AND FORECAST TRACK ALONGWITH QUADRANT WIND DISTRIBUTION OF CYCLONIC STORM "DITWAH" OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
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SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY
AREA OF MAXIMUM SUSTAINED WIND SPEED:
28-33 KT (52-61 KMPH)
34-49 KT (62-91 KMPH)
50-63 KT (92-117 KMPH)
≥ 64 KT (≥118 KMPH)

IMPACT OVER THE SEA

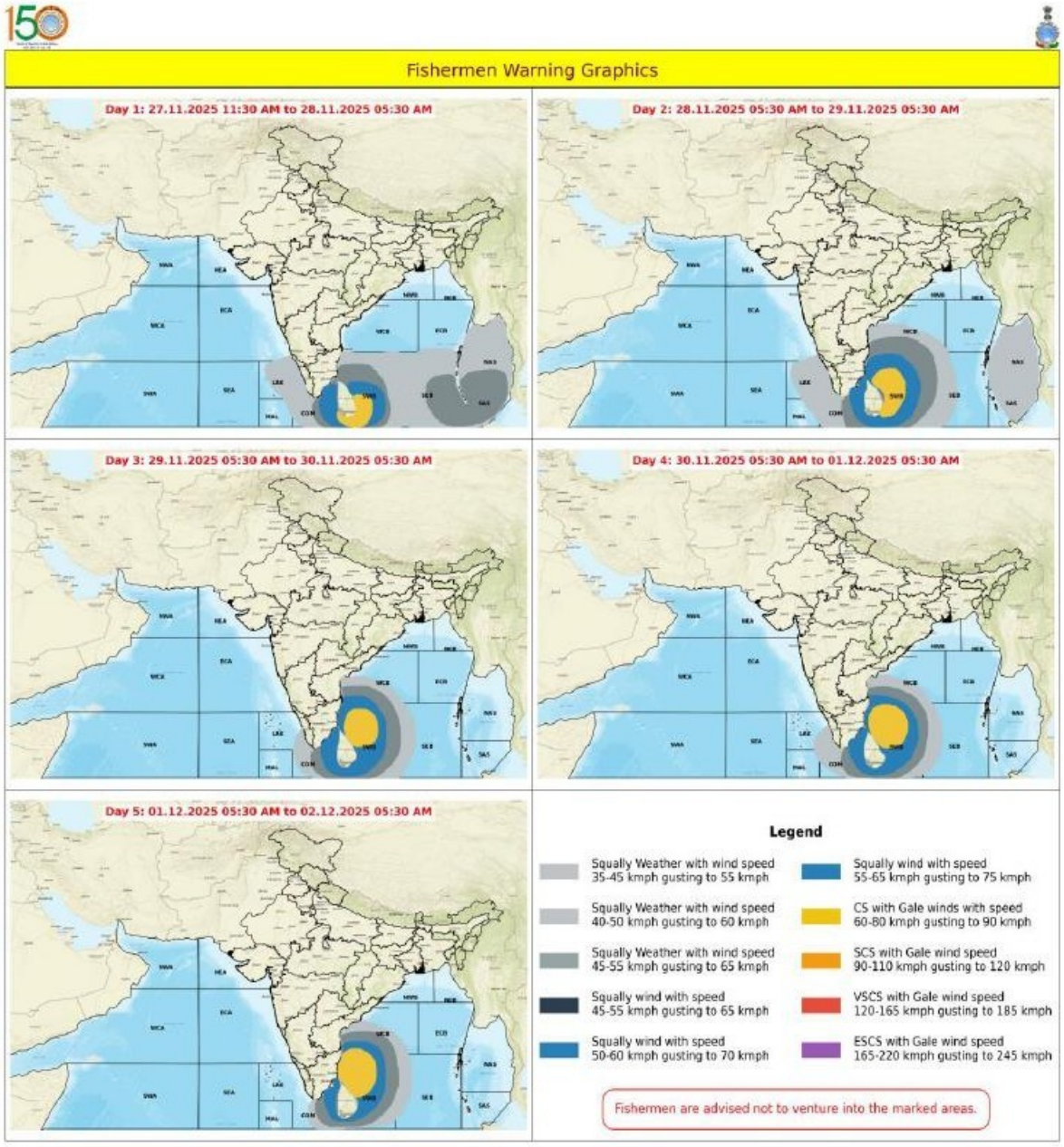
MSW (knot/kmph)	Impact	Action
28-33 (52-61)	Very rough seas	Total suspension of fishing operations
34-49 (62-91)	High to very high seas	Total suspension of fishing operations
50-63 (92-117)	Very high seas	Total suspension of fishing operations
≥ 64 (≥118)	Phenomenal	Total suspension of fishing operations

OBSERVED AND FORECAST TRACK OF DEPRESSION (REMANANT OF CYCLONIC STORM "SENYAR") OVER STRAIT OF MALACCA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY


Fishermen Warning Graphics
Day 1: 27.11.2025 11:30 AM to 28.11.2025 05:30 AM
Day 2: 28.11.2025 05:30 AM to 29.11.2025 05:30 AM
Day 3: 29.11.2025 05:30 AM to 30.11.2025 05:30 AM
Day 4: 30.11.2025 05:30 AM to 01.12.2025 05:30 AM
Day 5: 01.12.2025 05:30 AM to 02.12.2025 05:30 AM
Legend
Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
Squally Weather with wind speed 40-50 kmph gusting to 60 kmph
Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 50-60 kmph gusting to 70 kmph
Squally wind with speed 55-65 kmph gusting to 75 kmph
CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph
Fishermen are advised not to venture into the marked areas.

2.4.5. Hourly update bulletin

The hourly update bulletin of system before landfall has been introduced in October, 2014 since Cyclone 'Hudhud' (7-14 October, 2014). This bulletin contains location (lat/long) and intensity of the system. A sample of hourly bulletin issued is given below:

EXAMPLE 4: Sample Hourly bulletin issued during Cyclonic storm (MONTHA).

India Meteorological Department
(Ministry of Earth Sciences)

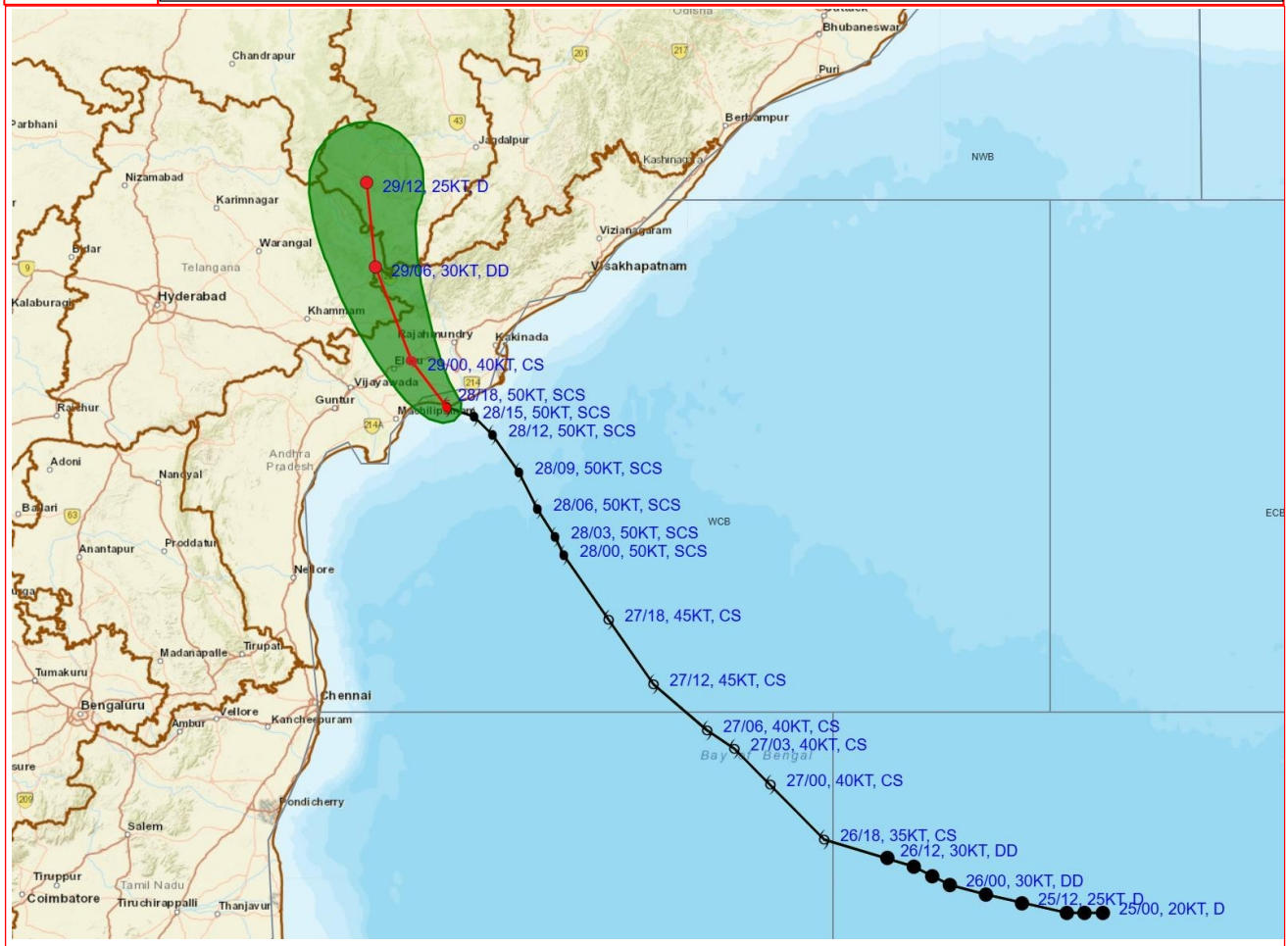
HOURLY UPDATE ON CYCLONIC STORM "MONTHA"

BULLETIN NO. 13

DATE: 29-10-2025 TIME OF ISSUE 0030 HRS IST

DATE/TIME (IST) OF OBSERVATION	**BASED ON 28-10-2025 (2330 HRS IST)**
ION LATITUDE/LONGITUDE	The Severe Cyclonic Storm "Montha" [Pronunciation: Mon-Tha] over westcentral Bay of Bengal moved west-northwestwards with a speed of 12 kmph during past six hours and lay centered at 2330 hrs IST of 28th October 2025, over westcentral Bay of Bengal, close to Andhra Pradesh & Yanam coasts near latitude 16.3°N & longitude 81.7°E, about 50 km east-northeast of Machilipatnam (Andhra Pradesh), 90 km southwest of Kakinada (Andhra Pradesh), 230 km southwest of Visakhapatnam (Andhra Pradesh) and 470 km southwest of Gopalpur (Odisha). The latest observations indicate that the severe cyclonic storm, "Montha" crossed the Andhra Pradesh & Yanan coasts between Machilipatnam and Kalingapatnam, to the south of Kakinada, close to Narsapur near latitude 16.35°N and longitude 83.70°E during midnight (2330 hrs IST of 28th and 0030 hrs IST of 29th October 2025).
CURRENT INTENSITY WIND SPEED	Severe Cyclonic Storm 90-100 kmph gusting to 110 kmph
FORECAST	It is likely to move northwestwards across coastal Andhra Pradesh, and weaken into a cyclonic storm during next 6 hours. The rear sector of the severe cyclonic storm "Montha" will move completely into land within next 1-2 hours.
OBSERVED WIND SPEED REPORTED	Machilipatnam: 64 kmph Kakinada: 38 kmph Rajahmundry Airport: 37 kmph Kavali: 32 kmph, Bapatla: 46 kmph, Visakhapatnam: 40 kmph
CUMULATIVE RAINFALL (mm) SINCE 0830 IST OF TODAY	Ulavapadu: 170, Kavali: 210, Dagadarthi: 180, Nellore: 110, Prakasham-CS Puram: 100, Chirala: 117 mm

OBSERVED AND FORECAST TRACK ALONGWITH CONE OF UNCERTAINITY OF SEVERE CYCLONIC STORM "MONTHA" OVER COASTAL ANDHRA PRADESH BASED ON 1800 UTC (2330 Hrs. IST) OF 28TH OCTOBER 2025.

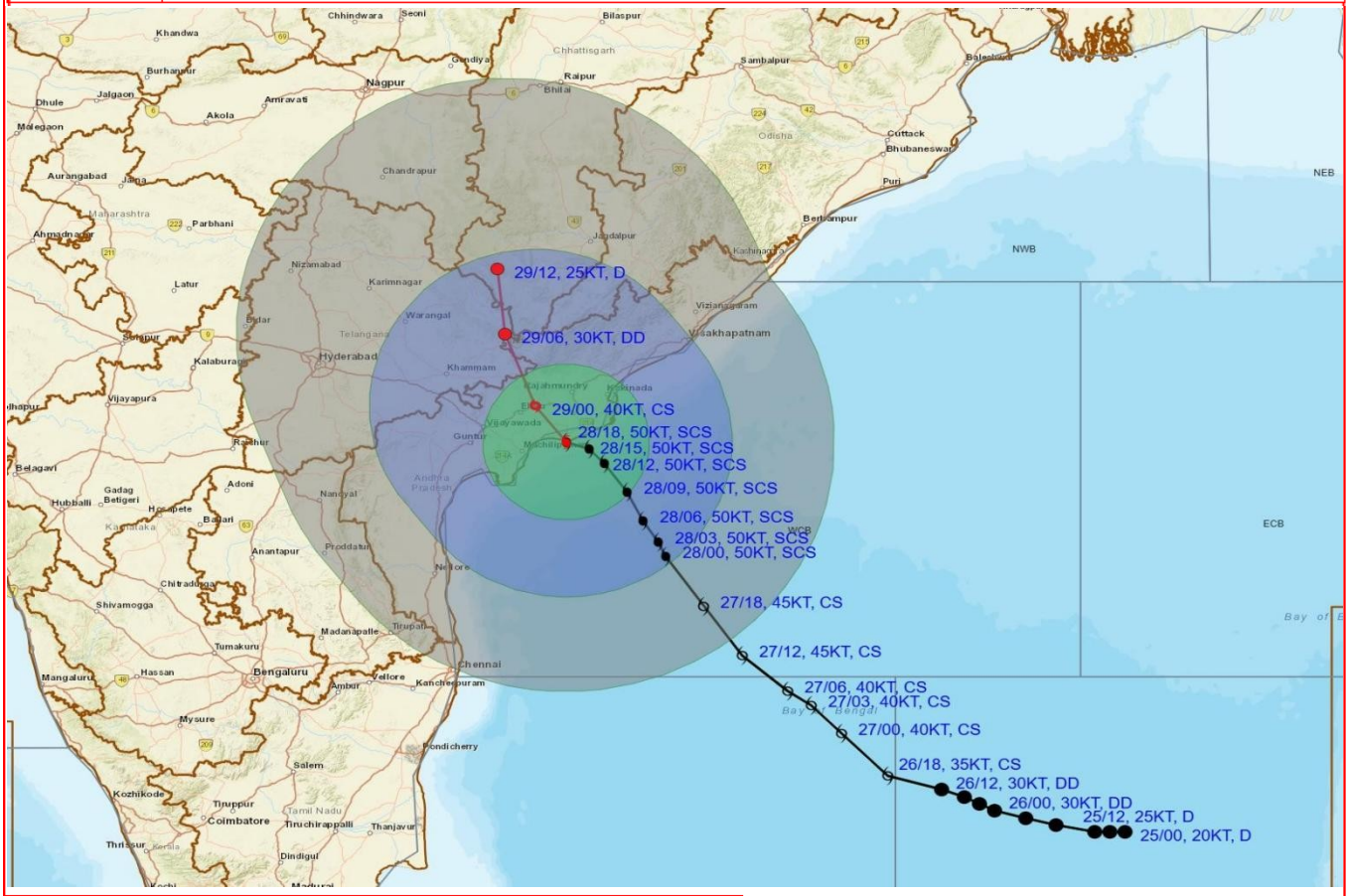


DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
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SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

OBSERVED AND FORECAST TRACK ALONGWITH QUADRANT WIND DISTRIBUTION OF SEVERE CYCLONIC STORM "MONTHA" OVER COASTAL ANDHRA PRADESH BASED ON 1800 UTC (2330 Hrs. IST) OF 28TH OCTOBER 2025.

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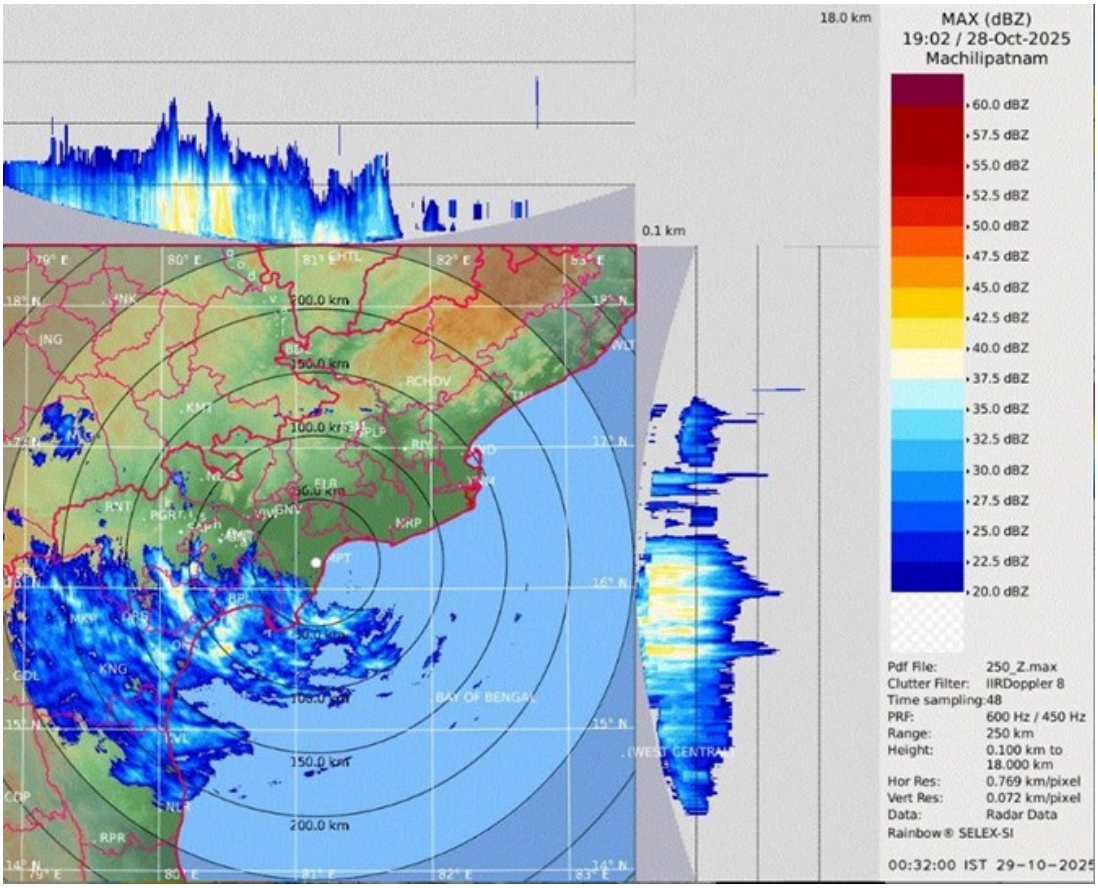


DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
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SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY
AREA OF MAXIMUM SUSTAINED WIND SPEED:
28-33 KT (52-61 KMPH)
34-49 KT (62-91 KMPH)
50-63 KT (92-117 KMPH)
≥ 64 KT (≥118 KMPH)

IMPACT OVER THE SEA

MSW (knot/kmph)	Impact	Action
28-33 (52-61)	Very rough seas	Total suspension of fishing operations
34-49 (62-91)	High to very high seas	Total suspension of fishing operations
50-63 (92-117)	Very high seas	Total suspension of fishing operations
≥ 64 (≥118)	Phenomenal	Total suspension of fishing operations



2.4.6 Tropical cyclone warnings for the high Seas (WWMIWS)

The IMO/WMO Worldwide Met-Ocean Information and Warning Service (WWMIWS) is the internationally coordinated service for the promulgation of meteorological warnings and forecasts.

The WWMIWS guidance and coordination for marine meteorological maritime safety information messages issued on EGC (SafetyNET), NAVTEX and HF NBDP communication systems covering the following areas:

- warnings and forecasts for the High Seas;
- warnings and forecasts for coastal, offshore and local waters (including ports, lakes,harbour areas).

Operational guidance for handling and formatting meteorological information is given in detail in the Annex IV of the WMO Technical Regulations (Manual on Marine Meteorological Services – WMO-No. 558). The provision of warnings for weather systems that produce average wind speeds of 34 knots and greater are a mandatory requirement of the WWMIWS.

In relation to international marine requirements, the WWMIWS coordinates the broadcast of forecasts and warnings to vessels at sea through the Global Maritime Distress and Safety System (GMDSS), which includes SafetyNET satellite communications.

As part of the WWMIWS coordination, there are the following types of Centres:

Issuing service means a National Meteorological Service which has accepted responsibility for ensuring that meteorological warnings and forecasts for shipping are disseminated through

the Inmarsat SafetyNET service to the designated area (METAREA) for which the Service has accepted responsibility under the WWMIWS.

Preparation service means a National Meteorological Service which has accepted responsibility for the preparation of warnings and forecasts for parts of or an entire designated area (METAREA) in the WMO system for the dissemination of meteorological forecasts and warning to shipping under the WWMIWS and for their transfer to the relevant Issuing Service for broadcast.

The METAREA Coordinator is responsible for ensuring that TC warnings for the WWMIWS in their METAREA are issued onto the appropriate GMDSS communication system.

Areas of responsibility (METAREAs) of the WWMIWS for the purpose of disseminating tropical storm warnings to vessels are given in **Fig.2.4.3.**

The cyclone warning centres broadcasting forecasts and warnings on coastal radio stations for the benefit of the ships in the Panel countries are listed in the **Table II-2.** The area covered by these stations in their bulletins, name of the coastal radio stations with their call signs from where the tropical cyclone warnings are broadcast, are also given in **Table II-2.**

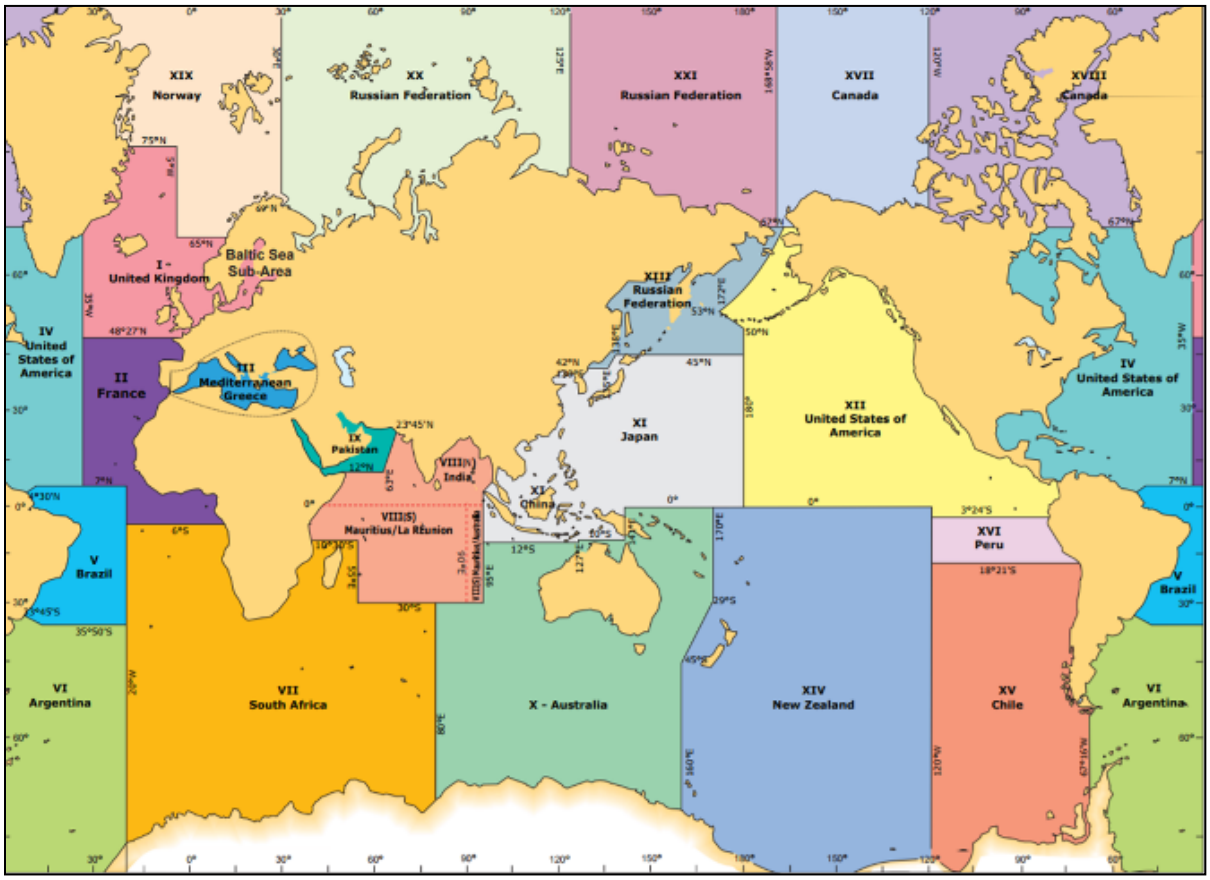


Fig. 2.4.3: AREAS OF RESPONSIBILITY AND DESIGNATED NATIONAL METEOROLOGICAL SERVICES FOR THE ISSUE OF WARNINGS AND WEATHER AND SEA BULLETINS FOR THE WWMIWS

The cyclone warning centres issuing forecasts and warnings for the benefit of the ships on the high seas in the Panel countries are listed in the **Table II-2.** The area covered by these stations in their bulletins, name of the coastal radio stations with their call signs from where the tropical cyclone warnings are broadcast, are also given in **Table II-2.**

TABLE II- 2: Stations issuing cyclone warnings for ships on the high seas

Station	Call sign of Coastal Radio Station	Area covered
Bangladesh, Chittagong	ASC	Bay of Bengal north of 18°N Lat.
India, Mumbai		Arabian Sea north of Lat. 5°N and east of Long. 60°E excluding the area north of Lat. 20°N and west of Long. 68°E. The eastern boundary of the Arabian Sea for which these bulletins are issued by Mumbai is Long. 80°E meridian excluding the Gulf of Mannar.
India, Kolkata		Bay of Bengal north of Lat. 5°N except the area between the coastline on the east and the line drawn through the points 18°N 94.5°E, 18°N 92°E, 13.5°N 92°E, 13.5°N 94°E, 10°N 94°E, 10°N 95°E and 5°N 95°E. The western boundary of the sea area for which bulletins are issued by Kolkata is up to and inclusive of the Gulf of Mannar (i.e., 77.5°E meridian).
India, Chennai		Bay of Bengal bulletins issued by ACWC Kolkata are being broadcast through Navtex, Chennai by Narrow Band Direct Printing (NBDP)
Myanmar, Yangon	XYR	Bay of Bengal except area west of Long. 92°E and South of 10°N Lat.
Oman (Sultanate of)	A4M	Muscat Coastal Radio Station
Pakistan, Karachi	ASK	Arabian Sea north of 20°N, Gulf of Oman and Persian Gulf (12°N-63°E)
Sri Lanka, Colombo	4PB	Indian Ocean, Arabian Sea and Bay of Bengal from the equator to 10°N between 60°E and 95°E. The area 5°N to 10°N between 60°E and 95°E is an overlap with India.
Thailand, Bangkok of Malacca	HSA	Gulf of Thailand, west of southern Thailand, Strait and South China Sea.
Qatar		Arabian Gulf North of 26.5°N - AAA=AGN Arabian Gulf South of 26.5°N including the Strait of Hormuz - AAA=AGS (in association with Pakistan Met Department)

Format and content of warnings for the WWMIWS
The format and content of warnings issued for the WWMIWS, as outlined below, has been derived from guidance provided in the Manual on Marine Meteorological Services (WMO No.558).

TC warnings for the WWMIWS shall use the following wind warning category labels:
- Gale force wind warning (Beaufort force 8 or 9);
- Storm-force wind warning (Beaufort force 10 or 11);
- Hurricane-force wind warning (Beaufort force 12 or over).

Any TC-related wind warning issued for the WWMIWS should include the following content (excluding any relevant system metadata requirements):

Tropical cyclone warnings for the high Seas contain the following information:
(a) Header label for marine radio broadcast purposes ("SECURITE")
Note: This label needs to be visible on any product provided to mariners with the potential to be read out on marine radio systems.
(b) Type of warning (GALE, STORM-FORCE, HURRICANE-FORCE WIND WARNING)
(c) Name of the issuing centre
(d) Name of the system and name of the basin
(e) Date and time of reference in UTC
(f) Type of disturbance (Tropical cyclone)
(g) Location of disturbance (latitude and longitude)
(h) Central pressure (hPa)
(i) Intensity (maximum 10-minute average winds in knots)
(j) Direction and speed of movement of the disturbance
(k) Extent of affected area in nautical miles
(l) Wind speed (knots) and direction in the affected areas
m) Sea and swell condition in affected areas (in qualitative terms)
(n) Expected location and intensity at 12 and 24 hours time periods.
(o) Indication of when next warning will be issued.

<u>Example 5:</u> Sample GMDSS Bulletin is presented here:

GLOBAL MARITIME 271330 IST
DATE/TIME OF ISSUE: 27-11-2025/0800 UTC GMDSS BULLETIN I 270900
ISSUED BY: INDIA METEOROLOGICAL DEPARTMENT, NEW DELHI HIGH SEA FORECAST FOR MET. AREA VIII (N)
AREA OF COVERAGE: AREA OF THE INDIAN OCEAN ENCLOSED BY LINES FROM THE INDO-PAKISTAN FRONTIER AT 23°45'N 68 DEG E TO 00 DEG N 6 DEG E, THECE TO CAPE GARDAFUI; THE EAST AFRICAN COAST SOUTH TO THE EQUATOR, THENCE TO 95 DEG E, TO 6 DEG N, THENCE NORTH EASTWARDS TO MYANMAR/THAIL FRONTIER IN 10 DEG N 98 DEG
30'E NORTHWARDS COVERING ENTIRE BAY OF BENGAL.

VALID FROM 09 UTC OF 27TH NOVEMBER 2025 TO 00 UTC OF 29TH NOVEMBER 2025.

PART-I STORM WARNING:

A. DEEP DEPRESSION OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA COAST
THE DEEP DEPRESSION OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA COAST MOVED NORTH-NORTHWESTWARDS WITH A SPEED OF 17 KMPH DURING PAST 6 HOURS, AND LAY CENTERED AT 0300 UTC OF TODAY, THE 27TH NOVEMBER 2025 OVER THE

SAME REGION NEAR LATITUDE 6.7 DEG N AND LONGITUDE 82.1 DEG E, ABOUT 120 KM SOUTH-SOUTHEAST OF BATTICALOA (SRI LANKA), 130 KM EAST-NORTHEAST OF HAMBANTOTA (SRI LANKA), AND, 640 KM SOUTH-SOUTHEAST OF PUDUCHERRY (INDIA) AND 730 KM SOUTH-SOUTHEAST OF CHENNAI (INDIA).

IT IS VERY LIKELY TO CONTINUE TO MOVE NEARLY NORTH-NORTHWESTWARDS ACROSS SOUTHWEST BAY OF BENGAL & ADJOINING SRI LANKA AND INTENSIFY FURTHER INTO A CYCLONIC STORM DURING NEXT 03 HOURS. THEREAFTER, IT IS VERY LIKELY TO CONTINUE TO MOVE NORTH-NORTHWESTWARDS ACROSS SOUTHWEST BAY OF BENGAL & ADJOINING SRI LANKA COAST TOWARDS NORTH TAMIL NADU, PUDUCHERRY AND ADJOINING SOUTH ANDHRA PRADESH COASTS DURING SUBSEQUENT 48 HOURS.

FORECAST TRACK AND INTENSITY ARE GIVEN IN TABLE BELOW

Date/Time (UTC)	**Position (Lat°N/Long°E)**	**Maximum Sustained Surface Wind Speed (Kmph)**	**Category Of Cyclonic Disturbance**
27.11.25/0300	6.7/82.1	55-65 gusting to 75	Deep Depression
27.11.25/0600	7.0/81.9	60-70 gusting to 80	Cyclonic Storm
27.11.25/1200	7.5/81.6	60-70 gusting to 80	Cyclonic Storm
27.11.25/1800	8.0/81.3	65-75 gusting to 75	Cyclonic Storm
28.11.25/0000	8.6/81.1	70-80 gusting to 90	Cyclonic Storm
28.11.25/1200	9.3/80.9	75-85 gusting to 95	Cyclonic Storm
29.11.25/0530	10.1/80.7	80-90 gusting to 100	Cyclonic Storm
29.11.25/1730	11.0/80.5	80-90 gusting to 100	Cyclonic Storm
30.11.25/0530	11.9/80.3	80-90 gusting to 100	Cyclonic Storm

27.11.2025/0600:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

27.11.2025/1200:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.
27.11.2025/1800:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

28.11.2025/0000:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.
WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

28.11.2025/1200:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

29.11.2025/0000:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

29.11.2025/1200:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

30.11.2025/0000:
WINDSPEEDS REACHING 30 KT AT AROUND 90 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 95 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 85 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

WINDSPEEDS REACHING 34 KT AT AROUND 60 NM RADIUS FROM THE CENTRE IN THE SE AND SW, AROUND 65 NM RADIUS FROM THE CENTRE IN THE NE QUADRANTS, AROUND 50 NM FROM THE CENTRE IN THE NW QUADRANTS RESPECTIVELY.

PART-II SYNOPTIC WEATHER SYSTEM AT 0300 UTC:

PART-III AREA FORECAST:

AREA: ARB A1 (ARABIAN SEA)-EQUATOR TO 10 DEG N W OF 80 DEG E.
ARB A1-FORECAST VALID FROM 09 UTC OF 27TH NOVEMBER 2025 TO 00 UTC OF 28TH NOV 2025.

I) WIND DIRECTION AND SPEED: 1) W OF 70 DEG E: NE/N-LY 10/20 KTS BEC NW/W-LY 10/15 KTS TO THE S OF 3 DEG N.
2)W OF 75 DEG E: CYCLONIC 10/15 KTS AT 73 DEG E AND 6 DEG N.
3)REST AREA: NE/N-LY 20/25 KTS BEC NW-LY 10/25 KTS.
II) WAVE HEIGHT: 1.5-4.0 MTR.
III) WEATHER: 1) E OF 60 DEG E: WIDESPREAD RA/TS.
2) REST AREA: FAIRLY WIDESPREAD RA/TS.
IV) VISIBILITY: 1) E OF 60 DEG E: VERY POOR.
2) REST AREA: POOR.

ARB A1-FORECAST VALID FROM 00 UTC OF 28TH NOVEMBER 2025 TO 00 UTC OF 29TH NOV 2025.

I) WIND DIRECTION AND SPEED: 1) W OF 60 DEG E: NE/N-LY 10/20 KTS.
2) E OF 60 DEG E TO 70 DEG E: NE/N-LY 10/15 KTS BEC W/SW-LY 10/15 KTS TO THE S OF 5 DEG N.
3) REST AREA: CYCLONIC 10/20 KTS AT 77 DEG E AND 5 DEG N.
II) WAVE HEIGHT: 1.5-3.5 MTR.
III) WEATHER: WIDESPREAD RA/TS.
IV) VISIBILITY: VERY POOR.

ARB A2-ARABIAN SEA: -23 DEG 45 MIN N 68 DEG E TO 00 DEG N 63 DEG E TO CAPE GARDAFUI TO N OF 10 DEG N. 55.
ARB A2-FORECAST VALID FROM 09 UTC OF 27TH NOVEMBER 2025 TO 00 UTC OF 28TH NOV 2025.

I) WIND DIRECTION AND SPEED: NE-LY 10/15 KTS.
II) WAVE HEIGHT: 1.0-2.5 MTR.
III) WEATHER: 1) E OF 58 DEG E TO THE S OF 13 DEG N: ISOLATED RA/TS.
2) REST AREA: FAIR.
IV) VISIBILITY: 1) E OF 58 DEG E TO THE S OF 13 DEG N: GOOD.
2) REST AREA: GOOD.

ARB A2-FORECAST VALID FROM 00 UTC OF 28TH NOVEMBER 2025 TO 00 UTC OF 29TH NOV 2025.WIND DIRECTION AND SPEED: NE-LY 10/15 KTS.
I) WAVE HEIGHT: 1.0-2.5 MTR.
II) WEATHER: 1) E OF 60 DEG E TO THE S OF 12 DEG N: ISOLATED RA/TS.
2) REST AREA: FAIR.
III) VISIBILITY: 1) E OF 60 DEG E TO THE S OF 12 DEG N: GOOD.
2) REST AREA: GOOD.

BOB A3-BAY OF BENGAL: EQUATOR TO 10 DEG N BETWEEN E OF 80 DEG E WEST OF 10 DEG N/98 DEG 30 MIN E TO 6 DEG N/95 DEG E THENCE S-WARDS TO EQUATOR.
BOB A3-FORECAST VALID FROM 09 UTC OF 27TH NOVEMBER 2025 TO 00 UTC OF

28TH NOV 2025.

I) WIND DIRECTION AND SPEED: 1) W OF 85 DEG E: CYCLONIC 35/40 KTS AT 82.2.7 DEG E AND 6.8 DEG N.
2) REST AREA: NE-LY 15/20 KTS BEC CYCLONIC 25/30 KTS AT 99.7 DEG E AND 3.7 DEG N.
II) WAVE HEIGHT: 6.0–9.0 MTR.
III) WEATHER: WIDESPREAD RA/TS.
IV) VISIBILITY: VERY POOR.

BOB A3-FORECAST VALID FROM 00 UTC OF 28TH NOVEMBER 2025 TO 00 UTC OF 29TH NOV 2025.

I) WIND DIRECTION AND SPEED: 1) E OF 86 DEG E: CYCLONIC 35/40 KTS AT 97 DEG E AND 4.2 DEG N.
2) REST AREA: CYCLONIC 10/25 KTS AT 81 DEG E AND 5 DEG N.
II) WAVE HEIGHT: 6.0–9.0 MTR.
III) WEATHER: WIDESPREAD RA/TS.
IV) VISIBILITY: VERY POOR.

BOB: A4: BAY OF BENGAL N OF 10 DEG N E OF 80 DEG E.
BOB A4-FORECAST VALID FROM 09 UTC OF 27TH NOVEMBER 2025 TO 00 UTC OF 28TH NOV 2025.

I) WIND DIRECTION AND SPEED: NE/E-LY 10/15 KTS BEC CYCLONIC 40/45 KTS AT 80.9 DEG E AND 9.4 DEG N.
II) WAVE HEIGHT: 1.0–3.0 MTR.
III) WEATHER: 1) S OF 12 DEG N: ISOLATED RA/TS.
2) REST AREA: FAIR.
IV) VISIBILITY: 1) S OF 12 DEG N: GOOD.
2) REST AREA: GOOD.

BOB A4-FORECAST VALID FROM 00 UTC OF 28TH NOVEMBER 2025 TO 00 UTC OF 29TH NOV 2025.

I) WIND DIRECTION AND SPEED: NE/E-LY 10/20 KTS.
II) WAVE HEIGHT: 1.0–3.0 MTR.
III) WEATHER: 1) W OF 87 DEG E: WIDESPREAD RA/TS.
2) REST AREA: FAIR.
IV) VISIBILITY: 1) W OF 87 DEG E: VERY POOR.
2) REST AREA: GOOD.

ADVISORY: PLEASE BE AWARE. WIND WAVE FORECASTS ARE AVERAGES. WIND GUSTS CAN BE 40 PER CENT STRONGER THAN THE FORECAST. MAXIMUM WAVE HEIGHT CAN BE TWICE THE FORECAST WAVE HEIGHT.

NEXT FORECAST WILL BE ISSUED AT 27/1700 UTC.
==========
TOO: 27/1330.

2.4.7. Search & Rescue and Marine Emergency Response Bulletin:

IMD and INCOIS have jointly agreed to provide bulletin for weather and ocean state and forecast as Regional Specialised Meteorological Centre for Marine Emergency Response RSMC (MER-SAR). The area of responsibility extends between 10^0S & 35^0N and longitude 40^0E & 100^0E. The bulletin is issued as and when request from the member country is received by RSMC (MER-SAR). The test messages in this regard were issued in November, 2023 to WMO.

Typical example of Marine Emergency Response Bulletin

India Meteorological Department

Regional Specialised Meteorological Centre –
Marine Emergency Response (RSMC-MER):
Indian National Centre for Ocean Information Services, Hyderabad–
India Meteorological Department, New Delhi
Ministry of Earth Sciences, Govt of India

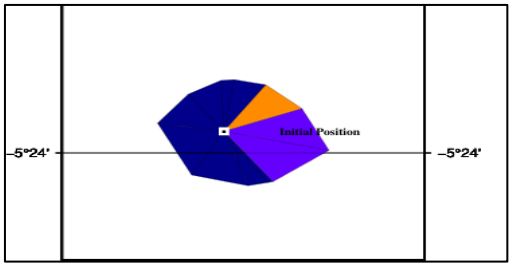
MER Search and Rescue Bulletin (SAR-20231127-01)

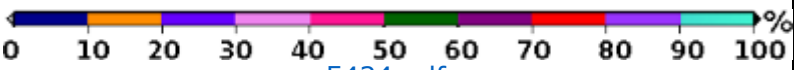
Issued at**: 28/11/2023 0600 UTC** **Valid up to: 30/11/2023 0600 UTC**

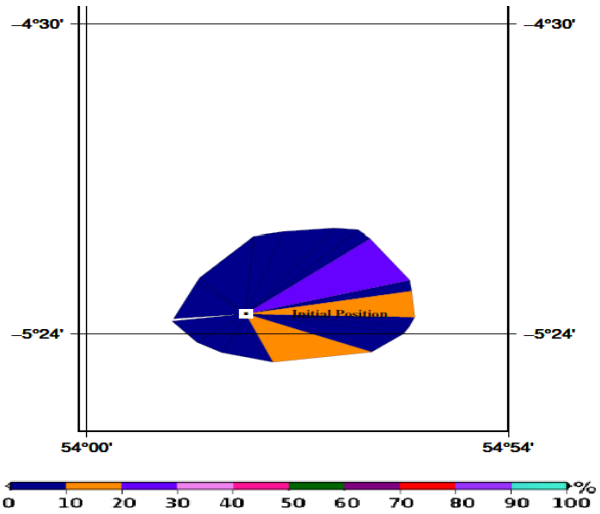
Probable drift areas information generated using the Search and Aid Rescue Tool (SARAT) to search for the lost object/person (From the Last Known Time to 48 hrs)
Last Known Position (LKP): -5^{0}20′30′′, 54^{0}20′23′′
Last Known Time (LKT): 28/11/2023 0700 UTC
Object Type: Person in water (PIW)

Probable drift areas information generated using the Search and Aid Rescue Tool (SARAT) to search for the lost object/person (From the Last Known Time to 48 hrs)

Last Known Position (LKP): 5^{0}20′30′′ S & 54^{0}20′23′′ E
Last Known Time (LKT): 28/11/2023 0700 UTC (corresponds to 28/11/2023 1230 IST)
Object Type: Person in water (PIW)

S.No.	Time afterLKT	Probability regions with coordinates
1	+ 6 Hours	

		Coordinates of the highest probable region(s): REGION 1: Advised to search the triangular are bounded by the following lat. Lon. Positions for finding the missing objects with 30 % probability. 1) 54 deg 20 min 24 sec, -5 deg 20 min 31 sec 2) 54 deg 26 min 34 sec, -5 deg 28 min 36 sec 3) 54 deg 30 min 10 sec, -5 deg 16 min 51 sec 4) 54 deg 33 min 34 sec, -5 deg 23 min 34 sec REGION 2: Advised to search the triangular are bounded by the following lat. Lon. Positions for finding the missing objects with 20 % probability. 1) 54 deg 20 min 24 sec, -5 deg 20 min 31 sec 2) 54 deg 25 min 39 sec, -5 deg 13 min 8395385742188400 sec 3) 54 deg 30 min 10 sec, -5 deg 16 min 51 sec **Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-  5424.pdf
2	**+ 12 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5426.pdf
3	**+ 18 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5427.pdf
4	**+ 24 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5428.pdf
5	**+ 30 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5430.pdf
6	**+ 36 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5431.pdf
7	**+ 42 hours**	**Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5433.pdf

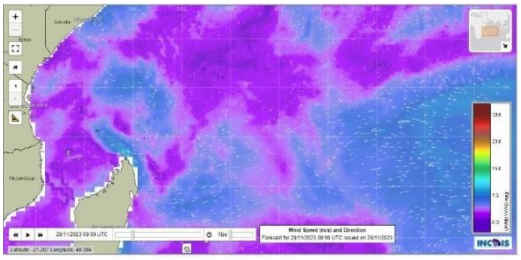
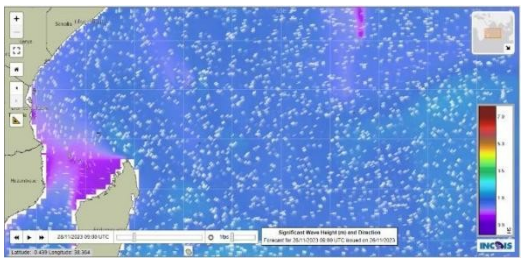
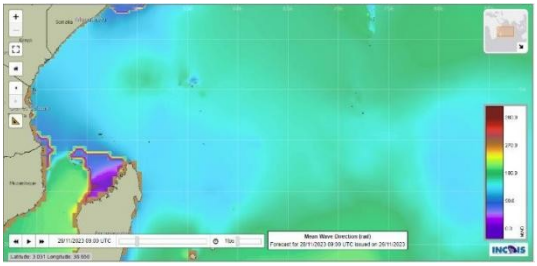
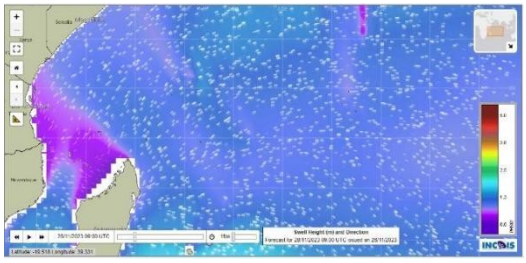
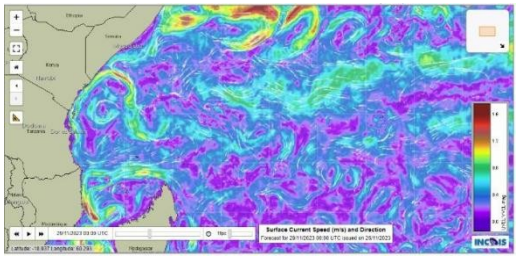
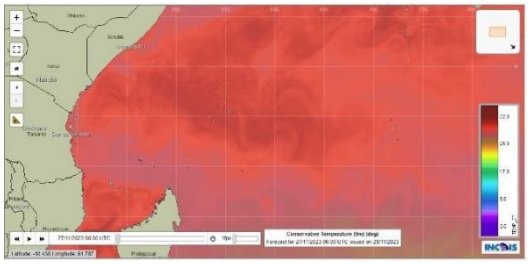
8	**+ 48 hours**	**Coordinates of the highest probable region(s):**  REGION 1: Advised to search the triangular are bounded by the following lat. Lon. Positions for finding the missing objects with 30 % probability. 1) 54 deg 20 min 24 sec, -5 deg 20 min 31 sec 2) 54 deg 36 min 17 sec, -5 deg 7 min 25 sec 3) 54 deg 41 min 22 sec, -5 deg 14 min 38 sec REGION 2: Advised to search the triangular are bounded by the following lat. Lon. Positions for finding the missing objects with 20 % probability. 1) 54 deg 20 min 24 sec, -5 deg 20 min 31 sec 2) 54 deg 23 min 53 sec, -5 deg 28 min 55 sec 3) 54 deg 36 min 28 sec, -5 deg 27 min 10 sec 4) 54 deg 41 min 38 sec, -5 deg 16 min 32 sec 5) 54 deg 42 min 1 sec, -5 deg 21 min 4 sec **Link to SARAT advisory in PDF format:** https://sarat.incois.gov.in/sarat/data/pdf/bulletein-5425.pdf

SAR Advisory:

Based on the RSMC-MER simulations, REGION 1 indicates the highest probable region. REGION 2 and 3 indicate the next highest probable regions and so on. The coordinates enclosing thetriangular/polygonal regions are provided. The corresponding SAR advisories in a .pdf format can be obtained from the links provided. Depending on the time when the SAR operation is conducted at sea, the SARAT simulation closest to the time can be considered. For example, if the search time is after 7 hours after the object was lost, the SARAT simulation for the LKT+12 (i.e., > 6 hours) hours may be considered. The SAR authorities may search for the lost object or person in the highest probability region first. If the object cannot be located there, then they can search in the region of the next highest probability, and so on. Further, if high-probability regions of almost equal probabilities happen to be adjacent to each other, then the combined region may be treated as one region for SAR operations. However, if such high-probability regions of almost equal probabilities

are not adjacent to each other, then simultaneous SAR operations may have to be planned. This can enhance the chance of finding the object or saving a life and reduce the cost of operations. The coordinates enclosing such combined areas or polygonal region is already provided in the .pdf format, for the convenience of the user.

Forecast of Ocean State and Weather Parameters

<table>
<tr><td colspan="2">Graphical Products available at
https://incois.gov.in/oceanservices/rsmc.jsp
(Forecast at specific location and parameter can be obtained by clicking on interactive webmap)
https://incois.gov.in/portal/osf/osfRegional.jsp?region=regional&area=northern_indian_ocean& param=wind (6 hourly animations)</td></tr>
<tr><td>Wind Speed and Direction
  </td><td>Significant Wave Height and Direction
  </td></tr>
<tr><td>Animated Images:
https://incois.gov.in/oceanservices/rsmc_waves.jsp#</td><td>Animated Images:
https://incois.gov.in/oceanservices/rsmc_waves.jsp#</td></tr>
<tr><td>Mean Wave Direction
  </td><td>Swell Wave Height and Direction
  </td></tr>
<tr><td>Animated Images:
https://incois.gov.in/oceanservices/rsmc_waves.jsp#</td><td>Animated Images:
https://incois.gov.in/oceanservices/rsmc_waves.jsp#</td></tr>
<tr><td>Oceean Currents Speed and Direction
  </td><td>Sea Surface Temparature
  </td></tr>
<tr><td>https://incois.gov.in/oceanservices/</td><td>https://incois.gov.in/oceanservices/</td></tr>
</table>

rsmc_ocean.jsp (24 hourly in UTC) https://incois.gov.in/portal/osf/osfRegional.jsp?regio n=regional&area=northern_indian_ocean&param=s urfacecurrents (3 hourly in IST (UTC + 5.30)	rsmc_ocean.js p (24 hourly in UTC) https://incois.gov.in/portal/osf/osfRegional.jsp?re gion=regional&area=northern_india n_ocean&par am=sst (3 hourly in IST (UTC + 5.30)

The six-hourly animations of ocean state II-41 forecast and SAR advisories are also available atINCOIS FTP server.

Server URL: ftpser.incois.gov.in
Path: /home1/incois/RSMC-MER/SAR/SAR-20231128-01

Username: incois
Password: incois@123

Meteorological Guidance:

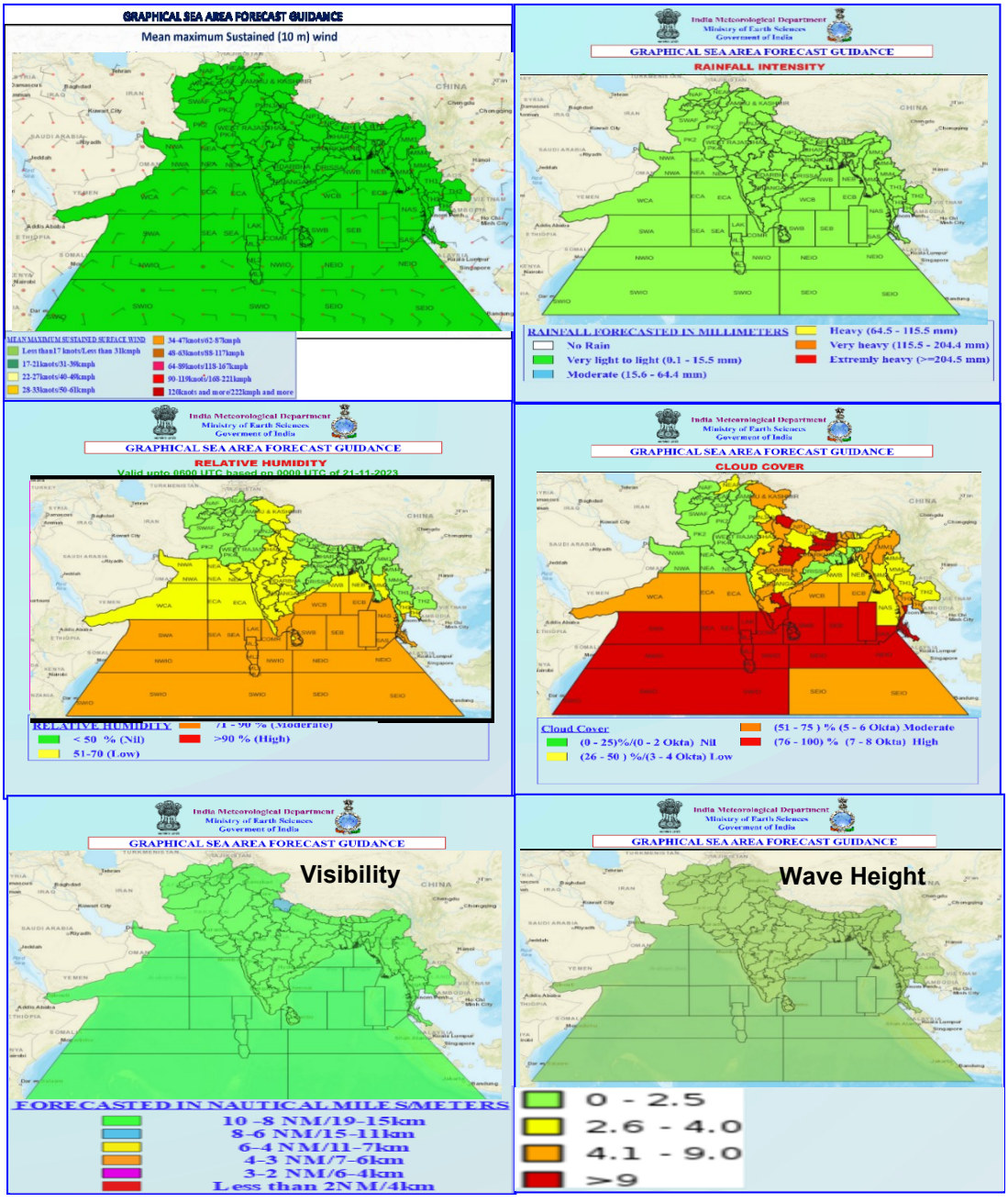
• **Significant Weather**: (Low Pressure system if any): No significant weather
• **Wind**: North-northeasterly to North-northwesterly/05-10 knots during 0600 UTC of 28th to 0600 UTC of 29th November. South-southwesterly to southeasterly/ 05-10 knots during 0600 UTC of 29th to 0600 UTC of 30th November.
• **Rainfall:** Light to moderate rainfall (0.5-3.0 mm) during next 48 hours.
• **Visibility:** Good to fair during next 48 hours.
• **Cloud Cover:** Mainly cloudy sky (6-8 oktas) during 0600 UTC of 28th November to 0600 UTC of 30th November.
• **Surface Relative Humidity:** It is likely to be 60-70% over the Area of concern during next 48 hours.

Location Specific MME based 6 hourly forecasts for the search region during next 48 hours based on 0600 UTC model run:
(Location: **-5⁰20′30′′, 54⁰20′23′′)**

Hour	Rainfall (mm)	10m Wind speed (knots)	10m Wind Direction	2m Relative Humidity (%)	Total Cloud Cover (%)
6	0	6.0	NNE	70	100
12	0	4.0	NNW	67	100
18	0	2.0	NNW	67	100
24	0	2.5	N	68	100
30	3.0	3.5	ENE	70	100
36	0.1	2.5	SSW	69	100
42	0.0	2.0	S	70	100
48	0.0	2.0	SE	70	96

Annexure – I

Multi Model Ensemble based Graphical Forecast for Weather State Parameters: (Mean maximum Sustained Wind, Rainfall Intensity, Relative Humidity, Cloud Cover, Visibility, Wave Height)



2.4.8 Warnings and advisories for Aviation

In accordance with the International Civil Aviation Organization (ICAO) Annex 3 — *Meteorological Service for International Air Navigation*/ WMO Technical Regulations [C.3.1], tropical cyclone warnings, required
for the international air navigation, are issued by designated Meteorological Watch Offices (MWO) as SIGMET messages, including an outlook, giving information up to 24 hours ahead concerning the expected positions and maximum surface wind of the centre of the tropical cyclone. Each MWO provides information for one or more specified Flight Information Regions (FIRs) or Upper Information Regions (UIRs). The boundaries of the FIRs/UIRs are defined in ICAO Air Navigation Plans (ANP) for the Asia (ASIA), Middle East (MID) and Pacific (PAC) Regions.

The content and order of elements in a SIGMET message for tropical cyclone shall be in accordance with WMO Technical Regulations [C.3.1]. The data type designator to be included in the WMO abbreviated header of such messages shall be T1T 2 = WC (WMO No. 386, Manual on GTS refers).

The designated Tropical Cyclone Advisory Centre (TCAC), New Delhi shall monitor the development of tropical cyclones in its area of responsibility, in accordance with the ASIA/PAC ANP and issue advisory information concerning the positions of the centre of the cyclone, its direction and speed of movement, central pressure and maximum surface wind near the centre. These advisories are disseminated to the MWOs in the TCAC New Delhi area of responsibility, to be used in the preparation of the OUTLOOK appended to SIGMETs for tropical cyclones. In addition, the tropical cyclone advisories shall be disseminated to the other TCACs, whose areas of responsibility may be affected, to the World Area Forecast Centers (WAFC) London and Washington and international OPMET data banks and centers operating the satellite distribution systems (SADIS and ISCS).
[C.3.1]. The data type designator to be included in the WMO abbreviated header of such messages shall be T1T2 = FK (WMO-No. 386, Manual on GTS, refers).

TCAC New Delhi is issuing Tropical Cyclone Advisories for its area of responsibility, for each tropical cyclone, as necessary, in the format specified by ICAO every six hourly since 2003 and along with graphics from 2012.

TC ADVISORY

(i) Text message: A text message is sent through GTS under the header BMBB01 to various users as per the following format

TC ADVISORY
TCAC: NEW DELHI
DTG: 20251127/0600Z
TC: DITWAH
NR: 02
PSN: N0654 E08154
MOV: NNW07KT
INTST CHANGE: INTSF
C: 1001HPA
MAX WIND: 35KT
FCST PSN+06HR: 27/1200Z N0730 E08136
FCST MAX WIND +06HRS: 35 KT
FCST PSN+12HR: 27/1800Z N0800 E08118
FCST MAX WIND +12HRS: 35 KT
FCST PSN+18HR: 28/0000Z N0836 E08106

FCST MAX WIND +18HRS: 40 KT
FCST PSN+24HR: 28/0600Z N0906 E08054
FCST MAX WIND +24HRS: 40 KT
RMK: NIL
NEXT MSG: 20251127/1500Z
TOO: 271458HRS IST
(**) Change in intensity at the time of observation hours. Reported as "INTSF" (intensifying), "WKN" (weakening) and "NC" (no change). (This practice has been introduced in November, 2020)

(ii) Graphical TC advisory: The graphical advisory is sent in graphics in PNG format including text in it through GTS under the header T_PZXE89_C_DEMS. An example is shown in **Fig.2.4.4**.

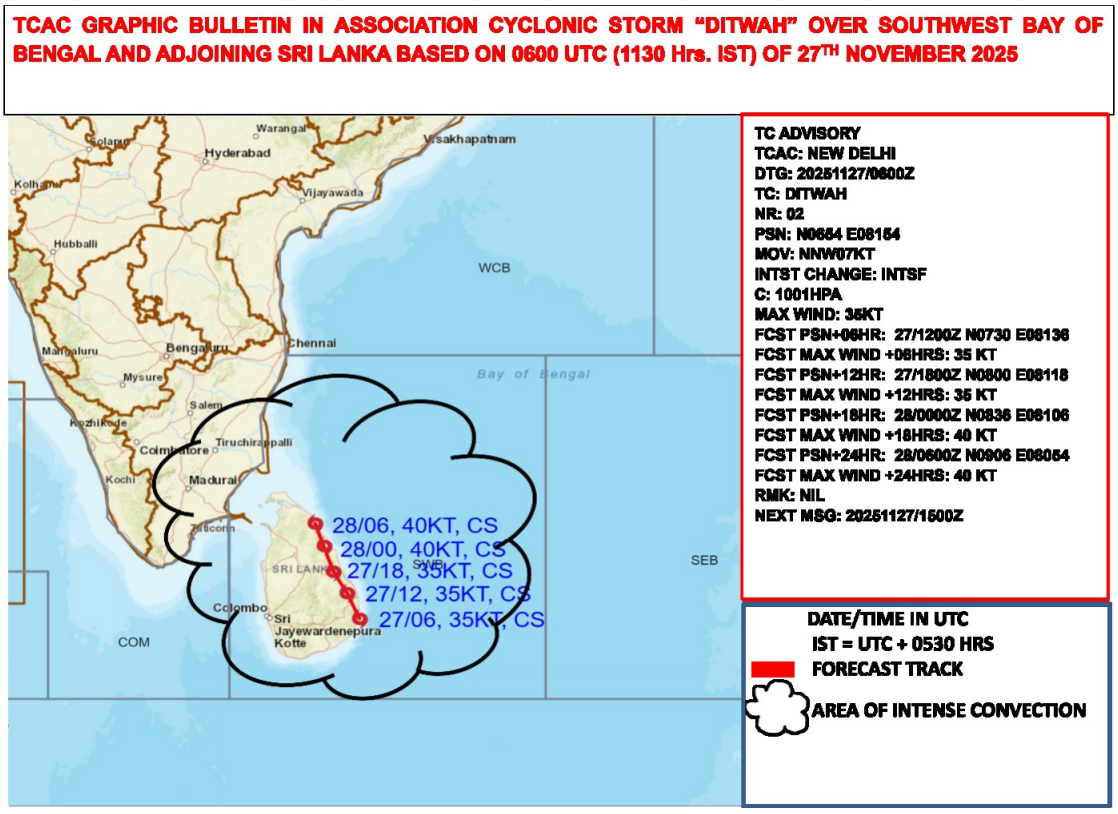


Fig 2.4.4: Typical graphical TCAC bulletin during CS DITWAH

(iii) TC Advisory to ADRR Hong Kong: TC advisory containing 24 hours forecast is also given to ADRR Hong Kong through FTP based on 00, 06, 12 and 18 UTC observation in the following format.

Example:
0004
DITWAH
202511261800 05.9 082.6 025 O
202511270000 06.3 082.4 030 O
202511270600 06.9 081.9 035 O

202511271200 07.5 081.6 035 F
202511271800 08.0 081.3 035 F
202511280000 08.6 081.1 040 F
202511280600 09.1 080.9 040 F

2.4.9 Tropical cyclone warnings for national purposes

Information on tropical cyclone warnings provided nationally by Panel member countries, including the port warning system, is given in Annex II- A to Annex II- I to this Chapter.

2.4.10 Storm surge guidance

Storm surge warnings will be the responsibility of the National Meteorological Services. However, storm surge guidance will be issued and incorporated in the tropical cyclone advisory bulletin by RSMC- New Delhi based on IIT, Delhi Storm Surge prediction model and INCOIS, Hyderabad Advanced Circulation coastal inundation model. The storm surge guidance is appended in the Tropical Cyclone Advisory bulletin for Panel member countries. The graphical product from IIT Delhi and INCOIS, Hyderabad is also uploaded in cyclone page of IMD website. An example of this product is shown in Fig. II-11. The textual message is given in bulletin.

STORM SURGE GUIDANCE BASED ON 0300 UTC OF 28th November, 2025

Storm surge of height about 1.0 to 1.5 m above the astronomical tide is likely to inundate the low-lying coastal areas of north Sri Lanka till 29th evening. An example is shown in **Fig.2.4.5**.

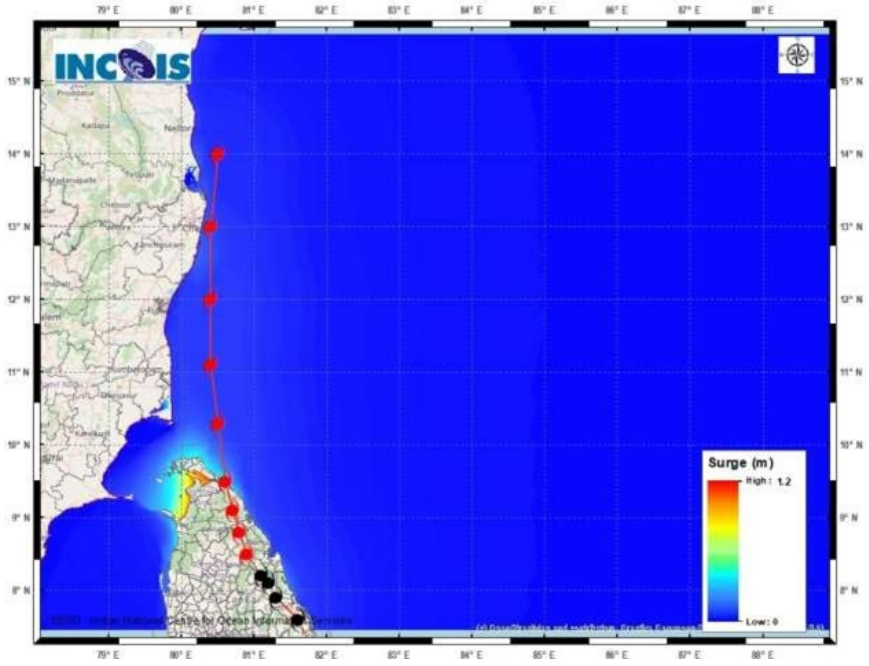


Fig 2.4.5: Storm Surge Warning Graphics issued at 0300 UTC of 28th November, 2025

2.5 Graphical presentation of track and intensity

The track and intensity of the system are updated and put in cyclone page of IMD website time to time, based on the special tropical weather outlook and tropical cyclone advisory bulletin issued by RSMC, New Delhi from the stage of depression and based on 00, 06, 12 and 18 UTC. This information is also available on GIS Platform since 2020 at the link (**https://ddgmui.imd.gov.in/dwr_img/GIS/cyclone.html**). These are also sent by e-mail to the Panel member countries. An example of this product is shown in **Fig. 2.5.1(a)**.

2.5.1 Cone of uncertainty:

The cone of uncertainty in the forecast was introduced with effect from the cyclone, 'WARD' during December, 2009 for the lead time 72 hours at an interval of 12 hrs. It was further revised with effect from cyclone 'VIYARU' during May, 2013 and extended upto 120 hrs for the same interval of time. It is helpful to the decision makers as it indicates the standard forecast errors in the forecast for different periods like 00, 06, 12, 18, 24, 36, 48, 60, 72, 84, 96, 108, 120 hrs. During 2019, it has been revised w.e.f. cyclone FANI based on the errors during 2014-18. There has been a reduction of 20-30% errors for various lead periods in 2019 as compared to the values during 2014 due to reduction in track forecast errors during 2014-18 as compared to that during 2009-13. Thereafter, again, the COU values have been revised from post monsoon season 2025 based on the operational errors during 2020-24. The standard errors (nm) forecast for 00, +06, +12, +18, +24, +36, +48, +60, +72, +84, +96, +108 and +120 hrs lead period as radius of the circle around the forecast position (lat/long) so as to construct the cone of uncertainty in the track forecast are given in **Table 2.5.1**.

Table 2.5.1: The standard errors (nm) as radius of the circle around the forecast position (lat/long)

Forecast lead time (hrs)	COU since Dec, 2009	COU since May,2013	COU since April, 2019	COU since April, 2025
0	10	10	10	10
6	20	20	20	20
12	40	30	30	25
18	60	45	40	35
24	80	60	45	40
36	115	80	55	50
48	135	100	70	60
60	165	120	85	70
72	185	135	95	85
84	-	150	115	100
96	-	165	130	115
108	-	180	145	130
120	-	195	160	145

In March, 2022, pre-genesis track & intensity forecast was introduced at the stage of low pressure area. The standard errors (nm) as radius of the circle around the forecast position

(lat/long) so as to construct the cone of uncertainty in the track forecast at the stage of low pressure area are given in **Table 2.5.2**.

Table 2.5.2: The standard errors (nm) as radius of the circle around the forecast position (lat/long) at the stage of low pressure area

Lead Period	COU values wef March, 2022	COU values wef April, 2025
00	10	10
06	20	20
12	35	25
18	50	30
24	65	40
36	80	50
48	95	60
60	110	73
72	125	90
84	140	110
96	155	110
108	170	120
120	185	130

Uncertainty in intensity forecast:

RSMC New Delhi introduced uncertainty in intensity forecast, based on the intensity forecast errors during 2020-24 corresponding to different categories for lead period extending from 00 to 120 hours, the uncertainty in intensity forecast is given in T**able 2.5.3**.

Table 2.5.3: Uncertainty in forecast intensity (in kt) based on operational intensity forecast errors during 2020-24

Lead Period	D	DD	CS	SCS	VSCS	ESCS	SuCS
0	3	3	3	2	2	2	2
12	3	4	4	5	5	6	7
24	4	5	7	8	8	10	12
36	5	6	9	11	12	14	14
48	7	7	11	13	14	16	18
60	8	9	12	14	15	17	19
72	9	10	12	14	17	18	19

84	10	11	12	14	19	19	19
96	12	13	14	16	20	20	20
108	14	15	16	18	20	20	21
120	14	15	16	18	20	20	23

Confidence level:
RSMC New Delhi introduced confidence level in current and forecast location & intensity as low, moderate and high wef post monsoon cyclone season 2025. Location and Intensity estimate is based on multiple data sources including satellite, scatterometer, multi-satellite based winds, radar, synoptic and guidance from other centres etc. Considering the spread in location/variation in the estimate of intensity by different sources, probability or confidence in estimation of intensity and location is decided as given in **Table 2.5.4 and Table 2.5.5** respectively.

Table 2.5.4: Confidence level for estimation of location and intensity

Range for location	Range for intensity	Confidence Level
$<0.4^0$	<10 kt	High
0.4^0- 0.7^0	10-20 kt	Moderate
$>0.7^0$	>20 kt	Low

Table 2.5.5: Confidence level in estimation of forecast location corresponding to various lead period

Lead time (hr)	Confidence level		
	Low	Moderate	High
0	$>0.5^0$	0.3^0 - 0.5^0	0.3^0
+24	$>1.0^0$	0.5^0 - 1.0^0	0.5^0
+48	$>1.5^0$	1.0^0 - 1.5^0	1.0^0
+72	$>2.0^0$	1.5^0 - 2.0^0	1.5^0
+96	$>2.5^0$	2.0^0 - 2.5^0	2.0^0
+120	$>3.0^0$	2.5^0 - 3.0^0	2.5^0
+144	$>3.5^0$	3.0^0 - 3.5^0	3.0^0
+168	$>4.5^0$	4.0^0 - 4.5^0	4.0^0

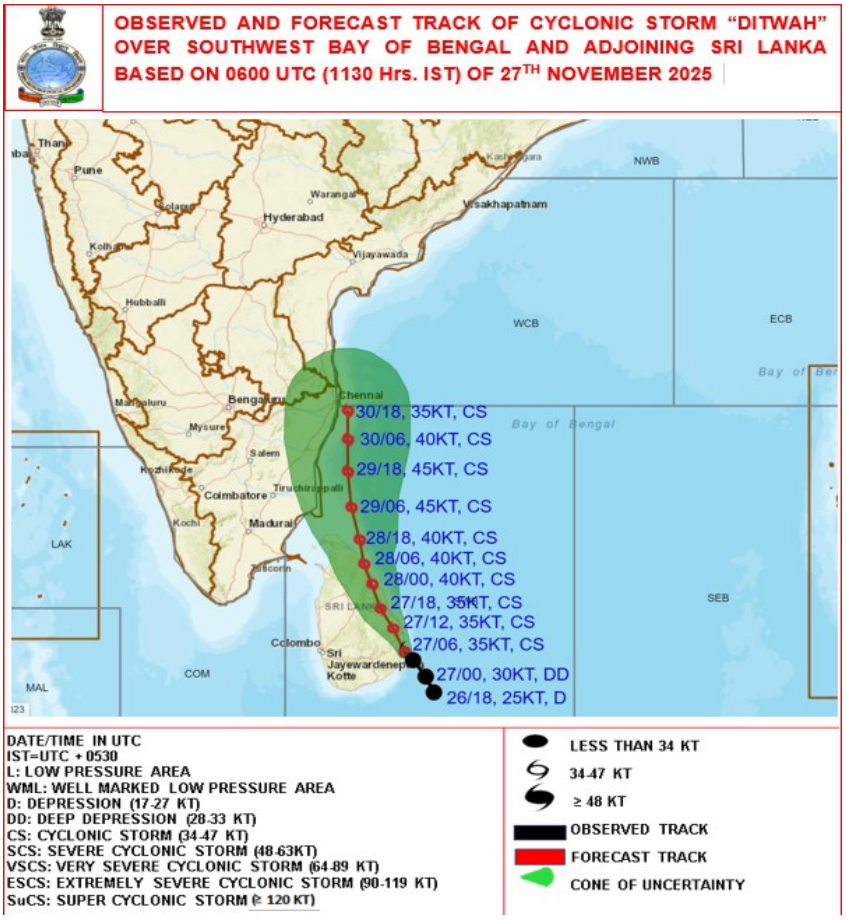


Fig.2.5.1 (a) Observed and forecast track based on 0600 UTC of 27th November in association with CS DITWAH.

2.5.2 Quadrant wind forecast:

(i) Graphical Product:

The forecast of maximum wind in four quadrants of a cyclone commenced with effect from cyclone, GIRI during October 2010. In this forecast, the radius of 28, 34, 50 and 64 knot winds were given for various forecast periods like +06, +12, +18, +24, +36, +48, +60 and +72 hrs. It was further revised with effect from cyclone 'Viyaru' during May, 2013 and extended upto 120 hrs for same interval of time. A typical graphical presentation of this forecast is shown in Fig.2.5.1 (b). This bulletin is issued from Deep Depression stage onwards based on 00, 06, 12 and 18 UTC. It is uploaded in IMD website and sent to focal points of WMO/ESCAP Panel countries by e-mail.

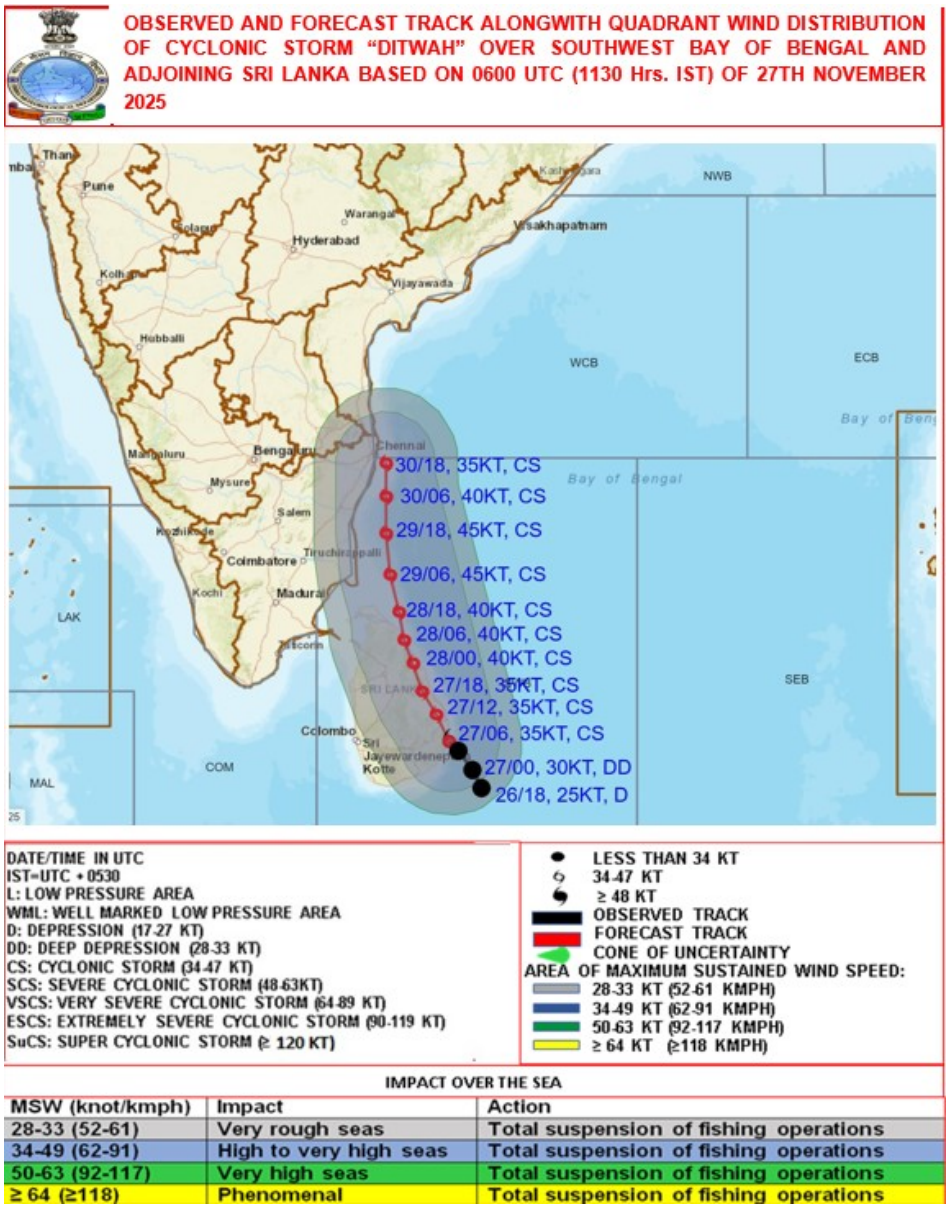


Fig.2.5.1 (b): A typical example of observed track and forecast area of maximum sustained wind in association based on 0600 UTC of 27th November in association With CS DITWAH.

(ii) Graphical Presentation of Estimated Maximum Sustained Wind Speed:

After dissipation of the system, operational best track and best intensity estimates are carried out. The example of best estimated track and intensity is presented in Fig. 2.5.1(c) in association with CS DITWAH

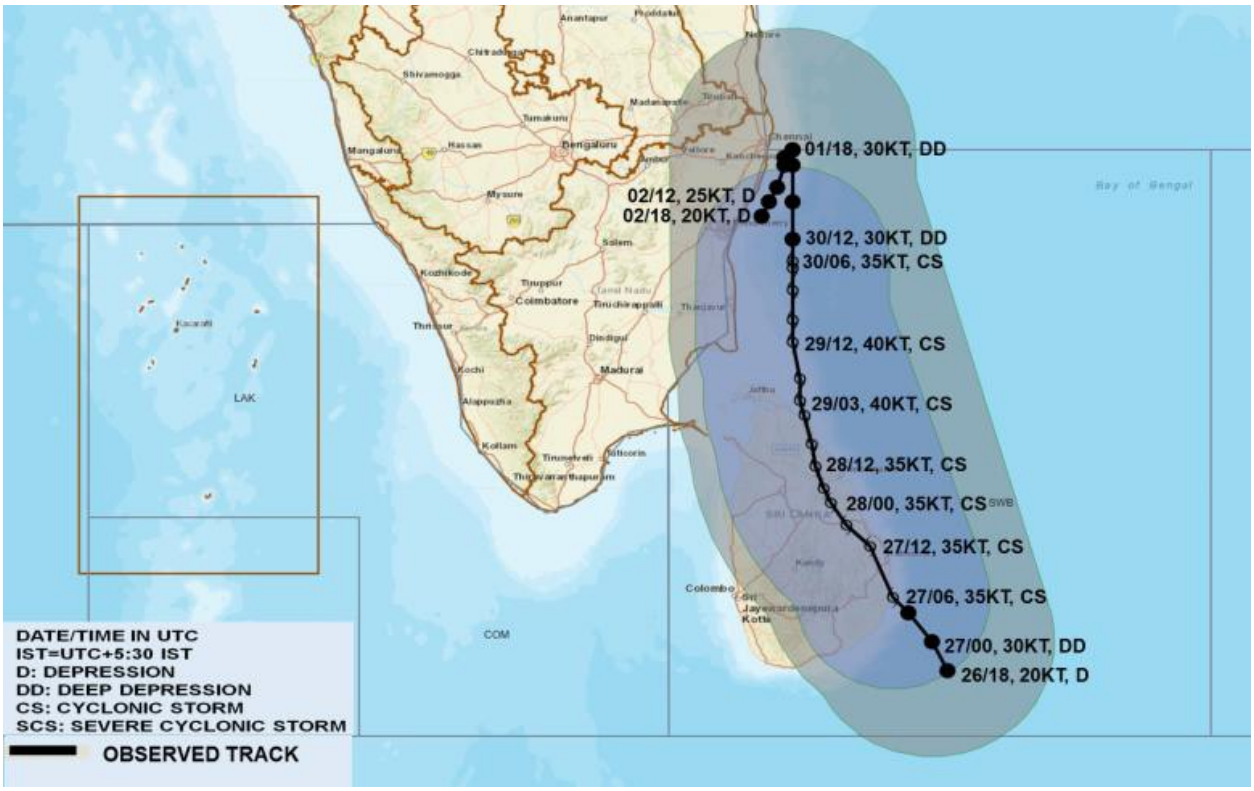


Fig. 2.5.1(c): Estimated maximum sustained wind during the life cycle of CS DITWAH

(iii) Text Product:

The quadrant wind is also issued in text format and sent to various users through-email and GTS under the header-WTIN31. It is also sent to various NWP modeling groups including NCMRWF, IIT Delhi
for vortex relocation in coded form through ftp. It is provided to IIT Delhi & INCOIS storm surge modeling group also for their use.

Example:

QUADRANT WIND DISTRIBUTION IN ASSOCIATION WITH DITWAH OVER BAY OF BENGAL
ON 0600 UTC OF 27-11-2025 FOR WHICH FORECAST IS PREPARED:
PRESENT DATE AND TIME: **270600**
PRESENT POSITION: **6.9°N/81.9°E**
POSITION ACCURATE TO 20 KM
PRESENT MOVEMENT (DDD/FF) PAST SIX HOURS: 320/08KT
PRESENT WIND DISTRIBUTION:
MAX SUSTAINED WINDS: 35 KT, GUSTS 45 KT
RADIUS OF MAXIMUM WIND **30 NM**
WINDS VARY IN EACH QUADRANT
RADII ARE LARGEST RADII EXPECTED ANYWHERE IN THE QUADRANT
WIND RADII VALID OVER OPEN WATER ONLY

RADIUS OF 027KT WINDS:

95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT

90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

FORECASTS:
06 HRS, VALID AT:
271200Z 7.5°N/81.6°E
MAX SUSTAINED WINDS: 35 KT, GUSTS 45 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

12 HRS, VALID AT:
271800Z 8°N/81.3°E
MAX SUSTAINED WINDS: 35 KT, GUSTS 45 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

18 HRS, VALID AT:
280000Z 8.6°N/81.1°E
MAX SUSTAINED WINDS: 40 KT, GUSTS 50 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT

55 NM NORTHWEST QUADRANT

24 HRS, VALID AT:
280600Z 9.1°N/80.9°E
MAX SUSTAINED WINDS: 40 KT, GUSTS 50 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

36 HRS, VALID AT:
281800Z 9.7°N/80.8°E
MAX SUSTAINED WINDS: 40 KT, GUSTS 50 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

48 HRS, VALID AT:
290600Z 10.5°N/80.6°E
MAX SUSTAINED WINDS: 45 KT, GUSTS 55 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

60 HRS, VALID AT:
291800Z 11.4°N/80.5°E
MAX SUSTAINED WINDS: 45 KT, GUSTS 55 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT

90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

72 HRS, VALID AT:
300600Z 12.2°N/80.5°E
MAX SUSTAINED WINDS: 40 KT, GUSTS 50 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

84 HRS, VALID AT:
301800Z 12.9°N/80.5°E
MAX SUSTAINED WINDS: 35 KT, GUSTS 45 KT
RADIUS OF 027KT WINDS:
95 NM NORTHEAST QUADRANT
90 NM SOUTHEAST QUADRANT
90 NM SOUTHWEST QUADRANT
85 NM NORTHWEST QUADRANT

RADIUS OF 034KT WINDS:
65 NM NORTHEAST QUADRANT
60 NM SOUTHEAST QUADRANT
60 NM SOUTHWEST QUADRANT
55 NM NORTHWEST QUADRANT

****

2.5.3 <u>TC Vital</u>:

TC vital sent through email and ftp has been introduced in 2013. The format of TC vital bulletin sent to NWP modelers is given below

Format

No. of characters	**Description of characters**	**Example**
character*4 tcv_center	Hurricane Center Acronym	IMD
character*3 tcv_storm_id	Storm Identifier (02B, etc)	03B
character*9 tcv_storm_name	Storm name	DITWAH
integer tcv_century	2-digit century id (19 or 20)	20
integer tcv_yymmdd	Date of observation	20251127
integer tcv_hhmm	Time of observation (UTC)	0600
integer tcv_lat	Storm Lat (X10), always >0	0690 (for 69.0^0N)
character*1 tcv_latns	'N' or 'S'	N
integer tcv_lon	Storm Lon (*10), always >0	0819 (for 81.9^0 E)
character*1 tcv_lonew	'E' or 'W'	E
integer tcv_stdir	Storm motion vector (in degree)	330 (Past six hours) (north-northwestwards)
integer tcv_stspd	Speed of storm movement (m/sX10)	041 (Past six hours Reported in 3 digits)
integer tcv_pcen	Min central pressure (mb)	1001 (Reported in 4 digits)
integer tcv_penv	outermost closed isobar(mb)	1008 (Reported in 4 digits)
integer tcv_penvrad	rad outermost closed isobar(km)	0250 (Reported in 4 digits) (250 km)
integer tcv_vmax	max sfc wind speed (m/s)	018 (Reported in 3 digits)
integer tcv_vmaxrad	rad of max sfc wind spd (km)	060 (Reported in 4 digits) (half of average of radius of MSW)
integer tcv_r15ne	NE rad of 34 knots winds (km)	0120 (Reported in 4 digits)
integer tcv_r15se	SE rad of 34 knots winds (km)	0110 (Reported in 4 digits)
integer tcv_r15sw	SW rad of 34 knots winds (km)	0110 (Reported in 4 digits)
integer tcv_r15nw	NW rad of 34 knots winds (km)	0100 (Reported in 4 digits)
character*1 tcv_depth	Storm depth (S,M,D,X) S stands for shallow (for D), M stands for Medium (for DD), D stands for Deep (for CS and above) and X stands for missing	D

Example:

IMD 03B DITWAH 20251127 0600 069N 0819E 330 041 1001 1008 0250 018 060 0120 0110 0110 0100 D

2.5.4 Customised Location Specific Forecast:

IMD commenced customized location specific forecast for offshore/onshore industries in October 2022. The bulletin contains information about the system, information about track, intensity, maximum sustained wind speed, radial extension of winds in the threshold of ≥28 knots, ≥34 knots, ≥50 knots, ≥64 knots, state of sea, significant wave height and uncertainty in track and intensity. This service has been extended for other important installations as well in 2024 including Indian Air Force stations, HPCIL installations and Indian Oil Corporation installations. Typical sample bulletin is presented herewith.

Contact details: Email: cyclonewarningdivision@gmail.com
Tel: 011-47100160

BULLETIN NO.	**BOB/01/2025**
CYCLONE / DISTURBANCE NAME	NONAME
ISSUED ON	27 NOVEMBER 2025
BASED ON	0530 IST
CURRENT LOCATION OF CYCLONIC DISTURBANCE	LATITUDE 6.3°N AND LONGITUDE 82.4°E
GEOGRAPHIC REFERENCE	Southwest Bay of Bengal and adjoining areas of Southeast Sri Lanka & Equatorial Indian Ocean
CENTRAL PRESSURE	1001 HPA
DIRECTION AND SPEED OF MOVEMENT DURING PAST 6 HOURS	north-northwestwards with a speed of 8 kmph during past 6 hours
SYNOPSIS	The Depression over southwest Bay of Bengal and adjoining Sri Lanka coast movednorth-northwestwards with a speed of 8 kmph during past 6 hours, intensified into a deep depression and lay centered at 0530 hrs IST of today, the 27th November 2025 over the same region near latitude 6.3°N and longitude 82.4°E, about 150 km east of Hambantota (Sri Lanka) and 170 km south-southeast of Batticaloa (Sri Lanka). It is very likely to continue to move nearly north-northwestwards across southwest Bay of Bengal & adjoining Sri Lanka and intensify further into a cyclonic storm during next 12 hours. Thereafter, it is very likely to continue to move north-northwestwards across southwest Bay of Bengal & adjoining Sri Lanka coast towards North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coast during subsequent 48 hours.

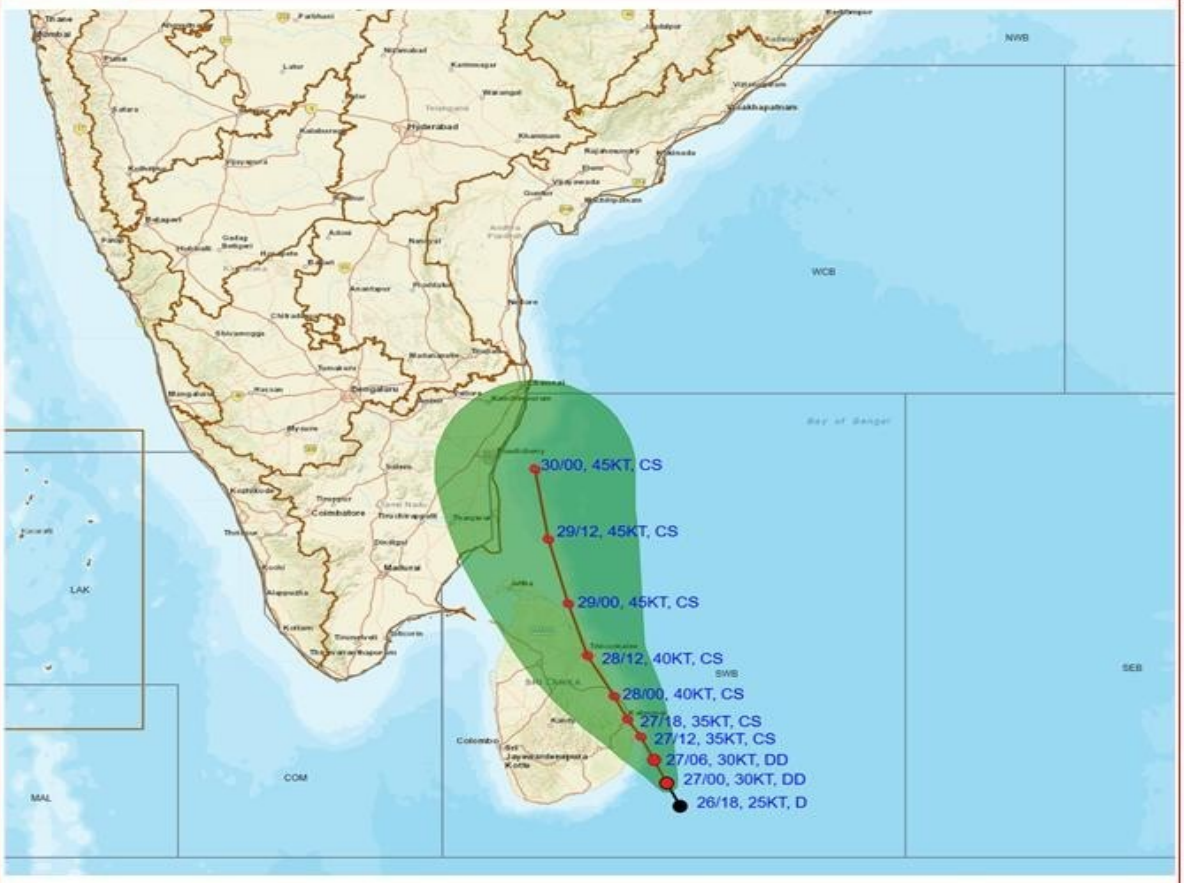
Table 1: General forecast in association with cyclonic disturbance over the Bay of Bengal based on 0530 hrs IST of 27th November, 2025

FORECAST HOUR	DATE/ TIME (IST)	POSITION		FORECAST INTENSITY CATEGORY	FORECAST MOVEMENT		FORECAST WIND(KT)		UNCERTAINTY IN FORECAST		SIGNIFICANT WAVE HEIGHT(M)	STATE OF SEA
		LAT (°N)	LONG (°E)		SPEED (KMPH)	DIRECTION	MSW	GUST	PATH (NM)	INTENSITY (KT)		
0	27.11.25/ 0530	6.3	82.4	DD			30	40	10	5	4-6	Very Rough
6	27.11.25/ 1130	6.7	82.2	DD	8	NNW	30	40	20	5	4-6	Very Rough
12	27.11.25/ 1730	7.1	82.0	CS	8	NNW	35	45	30	5	6-9	High
18	27.11.25/ 2330	7.4	81.8	CS	7	NNW	35	45	40	5	6-9	High
24	28.11.25/ 0530	7.8	81.6	CS	8	NNW	40	50	45	10	9-14	Very High
36	28.11.25/ 1730	8.5	81.2	CS	7	NNW	40	50	55	10	9-14	Very High
48	29.11.25/ 0530	9.4	80.9	CS	9	NNW	45	55	70	10	9-14	Very High
60	29.11.25/ 1730	10.5	80.6	CS	11	NNW	45	55	85	10	9-14	Very High
72	30.11.25/ 0530	11.7	80.4	CS	11	N	45	55	95	10	9-14	Very High

Table 2: Wind forecast with radii of influence in association with cyclonic disturbance over the Bay of Bengal based on 0530 hrs IST of 27th November, 2025

FORECAST HOUR	DATE/ TIME (IST)	POSITION		FORECAST INTENSITY CATEGORY	WIND(KT)		RADII OF INFLUENCE (NM)															
							R28				R34				R50				R64			
		LAT (°N)	LONG (°E)		MSW	GUST	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE
0	27.11.25/ 0530	6.3	82.4	DD	30	40	85	95	90	90												
6	27.11.25/ 1130	6.7	82.2	DD	30	40	85	95	90	90												
12	27.11.25/ 1730	7.1	82.0	CS	35	45	85	95	90	90	55	65	60	60								
18	27.11.25/ 2330	7.4	81.8	CS	35	45	85	95	90	90	55	65	60	60								
24	28.11.25/ 0530	7.8	81.6	CS	40	50	85	95	90	90	55	65	60	60								
36	28.11.25/ 1730	8.5	81.2	CS	40	50	85	95	90	90	55	65	60	60								
48	29.11.25/ 0530	9.4	80.9	CS	45	55	85	95	90	90	55	65	60	60								
60	29.11.25/ 1730	10.5	80.6	CS	45	55	85	95	90	90	55	65	60	60								
72	30.11.25/ 0530	11.7	80.4	CS	45	55	85	95	90	90	55	65	60	60								

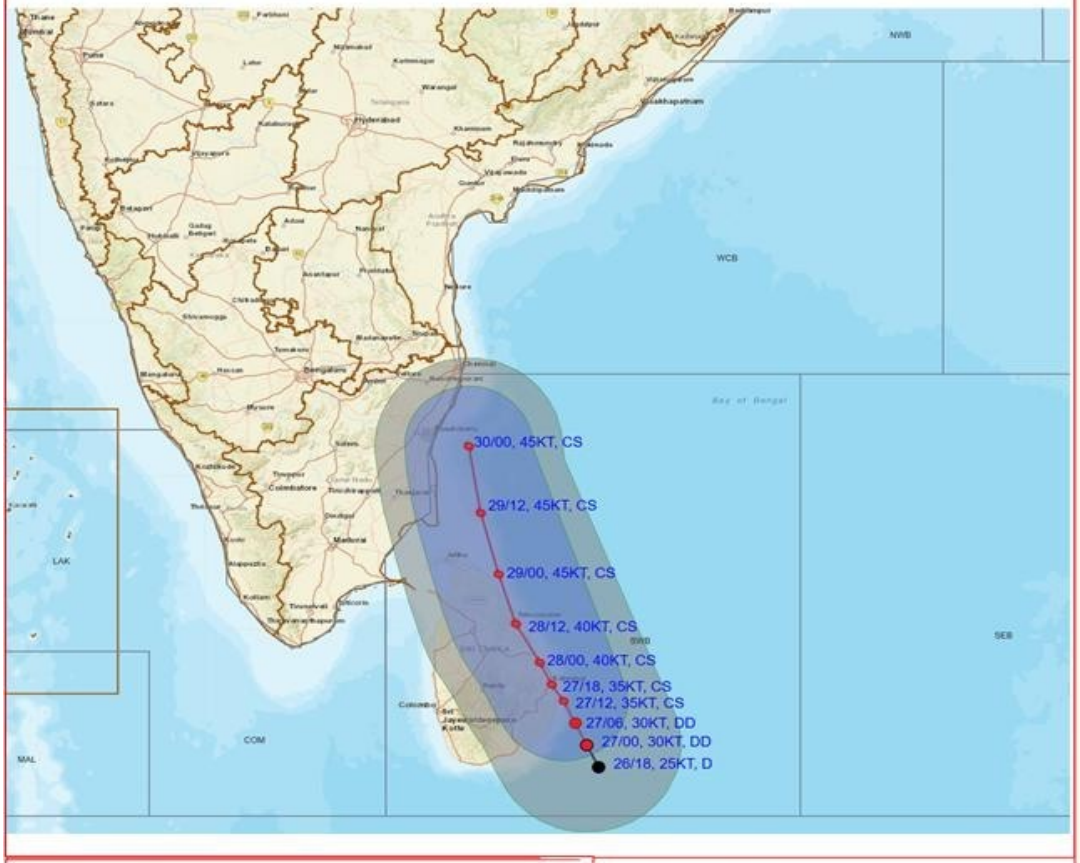
OBSERVED AND FORECAST TRACK OF DEEP DEPRESSION OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0000 UTC (0530 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

OBSERVED AND FORECAST TRACK ALONGWITH QUADRANT WIND DISTRIBUTION OF DEEP DEPRESSION OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0000 UTC (0530 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC +0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

- LESS THAN 34 KT
- 34-47 KT
- ≥ 48 KT
- OBSERVED TRACK
- FORECAST TRACK
- CONE OF UNCERTAINTY

AREA OF MAXIMUM SUSTAINED WIND SPEED:
- 28-33 KT (52-61 KMPH)
- 34-49 KT (62-91 KMPH)
- 50-63 KT (92-117 KMPH)
- ≥ 64 KT (≥118 KMPH)

IMPACT OVER THE SEA

MSW (knot/kmph)	Impact	Action
28-33 (52-61)	Very rough seas	Total suspension of fishing operations
34-49 (62-91)	High to very high seas	Total suspension of fishing operations
50-63 (92-117)	Very high seas	Total suspension of fishing operations
≥ 64 (≥118)	Phenomenal	Total suspension of fishing operations

TABLE 4: CYCLONIC DISTURBANCE FORECAST FOR BAY OF BENGAL & MAJOR AREAS OF E&P OPERATIONS BASED ON 0530 hrs IST of 27th November,2025

SI	DESCRIPTION OF SITE NAME(LAT^{0}N /LON^{0}E)	LOCATION		CURRENT LOCATION FROM CENTRE OF CYCLONIC DISTURABANCE		FORECAST PARAMETERS WHEN THE SITE WOULD BE NEAREST TO THE CYCLONE PATH							
		LAT (°N)	LON (°E)	DISTANCE (NM)	DIRECTION	DATE/ TIME(IST) OF OCCURRENCE	DISTANCE OF SITE FROM PATH	DIRECTION OF SITE FROM PATH	UNCERTAINTY IN DISTANCE OVER PATH(NM)	MSW OVER SITE(KTS)	UNCERTAINTY IN MSW OVER SITE(KT)	SIGNIFICANT WAVE HEIGHT	STATE OF SEA
BAY OF BENGAL													
1.	Southwest Bay of Bengal (SWB) (13.25,81.5)	6.3	82.4	421	N	30.11.25/0530	113	NE	95	<27	5	<4	Rough
2.	Westcentral Bay of Bengal (WCB) (15.0,83)	6.3	82.4	524	N	30.11.25/0530	250	NE	95	<27	5	<4	Rough
3.	Eastcentral Bay of Bengal (ECB) (14.25,92)	6.3	82.4	742	NE	30.11.25/0530	696	ENE	95	<27	5	<4	Rough
4.	Northwest Bay of Bengal (NWB)-1 (18.5,85.5)	6.3	82.4	755	NNE	30.11.25/0530	504	NE	95	<27	5	<4	Rough
5.	Northwest Bay of Bengal (NWB)-2 (20.25,88)	6.3	82.4	900	NNE	30.11.25/0530	675	NE	95	<27	5	<4	Rough
MAJOR E&P AREA IN THE BAY OF BENGAL													
6.	PY1/PY3/ TAHARA (SWB) (11.5,79.95)	6.3	82.4	344	NNW	30.11.25/0530	29	WSW	95	45	5	<4	Rough
7.	KG Basin (WCB) (15.33,80.58)	6.3	82.4	553	N	30.11.25/0530	218	N	95	<27	5	<4	Rough

Color Code for generating impact-based forecast:

ZONE	PARAMETERS
GREEN	NORMAL SITUATION, NO FORECAST OF CYCLONE
YELLOW	(1) THE STORM CENTRE WITHIN 800 NM FROM LOCATION AND (2) THE FORECAST TRACK IS FORECAST TO BE WITHIN 300 NM FROM LOCATION AND (3) SUSTAINED WIND SPEED ALONG THE PATH IS FORECAST TO EXCEED 28 KTS
ORANGE	(1) THE STORM CENTRE WITHIN 600 NM FROM LOCATION AND (2) THE FORECAST TRACK IS FORECAST TO BE WITHIN 200 NM FROM LOCATION AND (3) SUSTAINED WIND SPEED ALONG THE PATH IS FORECAST TO EXCEED 50 KTS
RED	(1) THE STORM CENTRE WITHIN 300 NM FROM LOCATION AND (2) THE FORECAST TRACK IS FORECAST TO BE WITHIN 150 NM FROM LOCATION AND (3) SUSTAINED WIND SPEED ALONG THE PATH IS FORECAST TO EXCEED 65 KTS

Notes:

(1) Under each zone, all three parameters are to be fulfilled to declare the site under that zone

(2) The distance from Forecast Track in Sl No.2 of each zone is the minimum distance of the site from the track/path when it is passing through; i.e., when it is closest to the site

ANNEX II-A-1

CLASSIFICATION OF TROPICAL CYCLONE WARNING SYSTEMS IN THE PANEL COUNTRIES

Existing classifications of low pressure systems (cyclonic disturbances) in the Panel countries are given below together with the WMO classifications.

Classification of low pressure systems (cyclonic disturbances) Presently in use by Panel countries for national purposes)

Country	**Type of Disturbance**	**Corresponding Wind Speed**
Bangladesh	Low pressure area	Less than 17 knots (less than 31km/h)
	Well marked low	17- 21 knots (31-40km/h)
	Depression	22- 27 knots (41-51km/h)
	Deep Depression	28- 33 knots (52-61km/h)
	Cyclonic storm	34 -47 knots (62-88 km/h)
	Severe cyclonic storm	48- 63knots (89-117 km/h)
	Very Severe cyclonic storm	64 – 119 knots (118-221km/h)
	Super Cyclonic Storm	120 knots and above (222 km/h or more)
Iran	Low pressure area	Less than17 knots (less than31 km/h)
	Well marked low	17- 21 knots (31-40 km/h)
	22- 27 knots (41-51km/h)	Depression
	28- 33 knots (52-61km/h)	Deep Depression
	34 -47 knots (62-88 km/h)	Cyclonic storm
	48- 63knots (89-117 km/h)	Severe cyclonic storm
	64 – 119 knots (118-221km/h)	Very Severe cyclonic storm
	120 knots and above (222 km/h or more)	Super Cyclonic Storm
India	Low pressure area	Less than 17 knots
	Depression	17 -27 knots
	Deep Depression	28- 33 knots
	Cyclonic storm	34 -47 knots
	Severe cyclonic storm	48 -63 knots
	Very severe cyclonic storm	64 -89 knots

	Extremely severe cyclonic storm	90 -119 knots
	Super cyclonic storm	120 knots and above
Maldives	Low pressure area	Less than 17 knots
	Depression	17- 27 knots
	Deep Depression	28 -33 knots
	Cyclonic storm	34 -47knots
	Severe cyclonic storm	48 -63knots
	Very severe cyclonic storm	64 -119knots
	Super cyclonic storm	120 knots and above
Myanmar	Low pressure area	Less than 17 knots
	Depression	17- 27 knots
	Deep Depression	28 -33 knots
	Cyclonic storm	34 -47 knots
	Severe cyclonic storm	48 -63 knots
	Very severe cyclonic storm	64 -119 knots
	Extremely Severe Cyclonic Storm	90 -119 knots
	Super cyclonic storm	120 knots and above
Oman (Sultanate of Oman)	Low	Less than 17 knots
	Depression	17-27 knots
	Deep depression	28-33 knots
	Tropical storm	34-63 knots
	Tropical cyclone	64 knots or more
	Tropical cyclone:	
	Category 1	64-82 knots
	Category 2	83-95 knots
	Category 3	96- 112 knots
	Category 4	113-136 knots
	Category 5	More than 136 knots
Pakistan	Depression	22- 27knots
	Deep Depression	28- 33knots
	Cyclonic storm	34 -47knots

	Severe cyclonic storm	48- 63knots
	Very severe cyclonic storm	64- 119 knots
	Super cyclonic storm	120 knots or more
Qatar	Depression	less than 34 knots
	Tropical storm	34-63 knots
	Tropical cyclone	64 knots or more
	Tropical cyclone:	
	Category 1	64-82 knots
	Category 2	83-95 knots
	Category 3	96- 112 knots
	Category 4	113-136 knots
	Category 5	More than 136 knots
Sri Lanka	Low pressure area	Less than 17 knots (31 km/h)
	Depression	17- 27 knots (31 and 49 km/h)
	Deep Depression	28- 33 knots (50 and 61 km/h)
	Cyclonic storm	34 -47 knots (62 and 88 km/h)
	Severe cyclonic storm	48- 63 knots (89 and 117 km/h)
	Very severe cyclonic storm	64 -119 knots (118 and 166 km/h)
	Extremely severe cyclonic storm	90 -119 knots (167 and 221 km/h)
	Super cyclonic storm	120 knots and above (≥ 222 km/h)
Thailand	Tropical depression	27 - 33 knots
	Tropical Cyclones	34 knots and more
UAE	Tropical Depression	<63 kmph
	Tropical Storm	63-118 kmph

	Tropical Cyclone CAT (1)	119-153 kmph
	Tropical Cyclone CAT (2)	154-177 kmph
	Tropical Cyclone CAT (3)	178-208 kmph
	Tropical Cyclone CAT (4)	209-251 kmph
	Tropical Cyclone CAT (5)	>251 kmph
Yemen	Low pressure area	Less than 17 knots
	Depression	17 -27 knots
	Deep Depression	28- 33 knots
	Cyclonic storm	34 -47 knots
	Severe cyclonic storm	48 -63 knots
	Very severe cyclonic storm	64 -89 knots
	Extremely severe cyclonic storm	90 -119 knots
	Super cyclonic storm	120 knots and above
WMO Classification	Tropical depression	Up to 34 knots
(Vide WMONo.471)	Moderate tropical storm	34- 47 knots
	Severe tropical storm	48 -63 knots
	Hurricane (or local synonym) Winds	64 knots and more
	Tropical disturbance of Unknown intensity	Wind speed uncertain

ANNEX II-B-1

Tropical Cyclone Warning System in Bangladesh

Organization

The Bangladesh Meteorological Department is responsible for providing tropical cyclone warnings to Bangladesh and its coastal areas and for a designated portion of the high Seas in the Bay of Bengal. Warnings and forecasts are issued under the authority of the Director, Bangladesh Meteorological Department. The tropical storm warnings are provided from the Storm Warning Centre, E-24, Agargaon, Dhaka. This Centre is also responsible for issuing the weather warnings like "Nor'westers" (severe local storms) warning, etc.

Tracking

The tropical cyclones are tracked with the help of conventional observations, radar, satellite observations and model derived products.

Tropical cyclone warnings

Tropical cyclone warnings are provided to:

(i) The Honorable President
(ii) The Honorable Prime Minister
(iii) Control room, Ministry of Disaster Management and Relief (MoDMR)
(iv) All Ministries
(v) The Sea Port Authorities at Chittagong, Mongla, Payra and Cox's Bazar
(vi) The Cyclone Preparedness Programme (CPP), Bangladesh Red Crescent Society
(vii) The Armed Forces division, Bangladesh Navy, Bangladesh Air Force
(viii) Inland River Port Authorities
(ix) Airport Authorities
(x) Concerned Government Officials
(xi) The general public (through Betar (Radio) Television, print and electronic media & mass media)

Stages of warnings

Warnings are issued in four stages for the Government Officials. The first stage called "Alert" is issued to all concerned whenever a disturbance is detected in the Bay as per Standing Orders for Disasters (SOD) of Bangladesh. In the second stage, cyclone warnings are issued in four stages as detailed below:

(i) (a) Distant Cautionary Signal- issued if a ship might run into danger during its voyage after leaving the harbour.
(b) Distant Warning Signal issued when there is no immediate danger of the port but a ship might run into the storm after leaving the port.

(ii) (a) Local Cautionary Signal – issued when port is threatened by squally weather from tropical disturbances like cyclone, monsoon low, monsoon depression, synoptic forcing or nor'westers.
(b) Local Warning Signal issued when the port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution. It is issued minimum 24 hours before the landfall.

(iii) Danger Signal issued when the port is likely to experience severe weather from a storm of slight or moderate intensity. The Signal is issued minimum 18 hours before the landfall. Great Danger Signal issued when the port is likely to experience severe weather from a storm of great intensity. The signal is issued minimum 10 hours before the landfall.

ANNEX II-B-2

Format of the cyclone warning bulletin

Cyclone warning bulletins contain the following information:
(i) Name of the storm
(ii) Position of the storm centre
(iii) Direction and speed of movement in knots for international use and km/h for national use.
(iv) Distance of the storm centre from the ports.
(v) Maximum sustained wind within the radius of maximum wind of the disturbance.
(vi) Signals for the maritime ports.
Areas likely to be affected specifying Administrative Districts or sub-districts (Upazila) as far as possible.
(vii) Approximate time of commencement of gale winds (speed more than 51 km/ h).
(viii) Storm surge height in feet and areas likely to be inundated.
(ix) Advisory for fishing boats and trawlers over North Bay and Deep Sea.

Tropical cyclone warnings for the high seas

Tropical cyclone warnings for the high seas in Bangladesh are provided from the Storm Warning Centre at Dhaka and are broadcast from the coastal radio station at Chittagong (ASC). Warnings are issued for the Bay of Bengal region north of 18° N latitude.
India is an Issuing Service for METAREA VII(N) of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at sea.

Warnings to ports

In accordance with international procedure, ports are warned and advised to hoist "Signals" whenever adverse weather is expected over the ports for the oceanic areas, in which it is located due to the tropical cyclone. However, regional difference exists. The warning messages normally contain information on the location, intensity, direction and speed of movement of the tropical cyclone and the expected weather over the port. The tropical cyclone signals used in Bangladesh ports along with their meaning are given in Attachment to Annex II-B**.**

Dissemination

Warnings are disseminated through high priority landline telephone, fax, e-mail & website. In addition, warnings are also transmitted to Betar (Radio) Bangladesh, Dhaka, Chittagong, Khulna, Rangpur, Rajshahi and Sylhet for broadcast. Alert messages are broadcast four to five times or as frequent as require a day. "Warnings" are broadcast every hour and "Danger" and "Great Danger" messages are broadcast more frequently.

Dissemination of tropical cyclone warnings

Fax
Telephones
Automatic Message Switching System (AMSS)
Bangladesh Betar (Radio)
Television
Through print & electronic media
Wireless Transmission (W/T)
Internet, by keeping information on BMD website (http:www.bmd.gov.bd).
Mobile App (BMD Weather App)
IVR (Interactive Voice Response)
E-mail
Social Media (Facebook)
SMS

ANNEX II-C-1

Cyclone warning system in India

The India Meteorological Department is responsible for providing tropical cyclone warnings in India. The tropical cyclone warning service is one of the most important functions of the India Meteorological Department and it was the first service undertaken by the Department in 1865 with the issue of Port Warnings for Calcutta. Thus, cyclone warning service is more than 150 years old.

Organization

Tropical cyclone warnings in India are provided through three Area Cyclone Warning Centres (ACWCs) located at Kolkata, Chennai and Mumbai and four Cyclone Warning Centres at Bhubaneswar, Visakhapatnam, Ahmedabad and Thiruvananthapuram. The entire cyclone warning work is coordinated by the Cyclone Warning Division at Headquarter.

Tracking of tropical cyclones

Tracking of the tropical cyclones in India is done with the help of:

(i) Conventional surface and upper air observations from inland and island stations, coastal Automatic Weather Station (AWS), ships and buoy observations;
(ii) Cyclone detection radar including Doppler Weather Radar;
(iii) Satellite cloud pictures from the Geostationary Satellite (INSAT 3D, INSAT 3DR) and polar orbiting satellites.

More details on the observing system are provided in a separate chapter.

Tropical Cyclone Forecasting

Details about tropical forecasting procedures are discussed in Chapter-IV.

Tropical cyclone warnings

The bulletins and warnings issued in connection with tropical cyclones in India may be divided into the following broad categories:

(i) Warning bulletins for shipping on the high Seas.
(ii) Warning bulletins for ships plying in the coastal waters.
(iii) Port warnings.
(iv) Fisheries warnings. (Fishermen & Fisheries Officials)
(v) Four stage warnings for the State and Central Government officials.
(vi) Warnings for recipients who are registered with the department (Designated/registered users).
(vii) Warning for aviation.
(viii) Warnings for the general public through All India Radio, TV (including Doordarshan), Press and other electronic media.
(ix) Warning for Indian Navy.

Format and examples of all these bulletins are shown as Attachment to Annex II-C-2

Bulletins for the high Seas

These bulletins are for the shipping interests on the high Seas. The area covered by these bulletins is the Sea area between the Asian Coast and the line joining the points 24^0 N 68^0 E, 20^0 N 68^0 E, 20^0 N 60^0 E, 5^0 N 60^0 E, 5^0 N 95^0 E, 10^0 N 95^0 E, 10^0 N 94^0 E, 13^0 30'N 94^0 E, 13^0 30'N 92^0 E, 18^0 N 92^0 E and 18^0 N 94^0 30'E. The exact area of coverage is shown below (**Fig.-II-C-1**).

India is an Issuing Service for METAREA VII (N) of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at Sea. These bulletins are issued by the Area Cyclone Warning Centres at Kolkata and are broadcast by the Coastal Radio Stations of the Department of Telecommunication (DoT) and ”NAVTEX Chennai”. These bulletins are issued by the Area Cyclone Warning Centres; Mumbai is available to the users through e-mail/fax and uploaded in the website of RMC Mumbai. The bulletins for the Arabian Sea are broadcast from Mumbai Radio. For the Bay of Bengal the bulletins are broadcast from Kolkata and Chennai Radio and issued by the Area Cyclone Warning Centre at Kolkata.

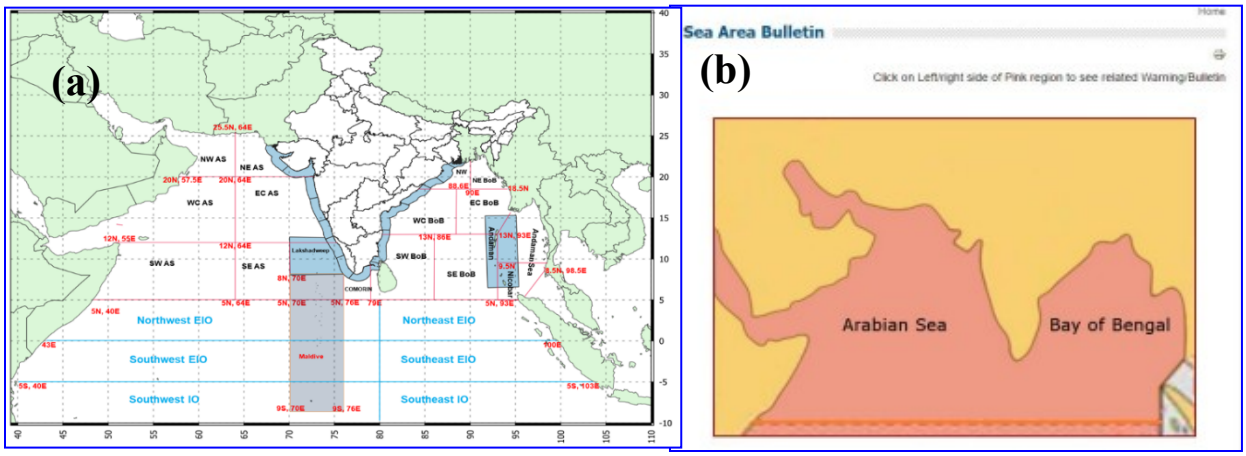


Fig II-C-1. (a): The exact area of responsibility of RSMC New Delhi and (b) area coverage as indicated on RSMC website for sea area bulletin

In normal undisturbed weather, two bulletins are broadcast at fixed hours known as "Daily" bulletins. In the event of disturbed weather (depression in the Bay of Bengal and the Arabian Sea), a third bulletin known as "Extra" bulletin is broadcast. When a cyclonic storm has developed, three additional bulletins known as 'Storm' bulletins are broadcast. In addition to these six bulletins, if any unexpected development of weather warrants urgent communication to ships, a "Special" bulletin is issued which may be broadcast at any time. These bulletins are broadcast according to a schedule at fixed hours. Sample bulletin is presented in **Fig. II-C-2.**

Government of India
India Meteorological Department
Regional Meteorological Centre,Alipore, Kolkata - 700027

AURORA OBSERVATION: Dated - Thursday 24/10/2024

From: Area Cyclone Warning Center Kolkata (Alipore Weather office) To: Port Blair Radio,

Part One

TTT SEVERE CYCLONE WARNING OVER BAY OF BENGAL 240300UTC

Kolkata Port Wireless, Directorate General of Shipping, Directorate General of Lighthouses

Part Two

Yesterday's cyclonic storm intensified in to severe cyclonic storm “DANA” (pronounced as Dana) over northwest & adjoining central Bay of Bengal moved north northwestwards with a speed of 12 kmph during past 6 hours and lay centered at 0830 hrs IST of today, the 24th October, over northwest Bay of Bengal, near latitude 18.9° N and longitude 88.0°E, about 210 km southeast of Paradip (Odisha), 240 km south-southeast of Dhamara (Odisha) and 310 km south of Sagar Island (West Bengal).It is very likely to move north-northwestwards and cross north Odisha and West Bengal coasts between Puri and Sagar Island close to Bhitarkanika and Dhamara (Odisha) during mid-night of 24th to morning of 25th October, 2024 as a severe Cyclonic Storm with a wind speed of 100-110 kmph gusting 120 kmph.

And Lightships

Part Three : Sea area forecast valid from 9 UTC to 21 UTC of 24/10/2024		
North West Bay	Wind	CYCLONIC 55 TO 60 KNOTS GUSTING TO 65 KNOTS AROUND 100 NM OF CYCLONIC STORM CENTRE ELESEWHERE 40 TO 45 KNOTS GUSTING TO 50 KNOTS
	Weather	WIDESPREAD RAIN OR THUNDERSHOWERS WITH SCATTERED HEAVY TO VERY HEAVYRAIN, ISOLATED EXTREMELY HEAVY RAIN
	Visibility	POOR BECOMING VERY POOR IN VERY HEAVY RAIN TO EXTREMELY VERY HEAVY RAIN
	Sea condition	HIGH TO VERY HIGH
North East Bay	Wind	MAINLY SOUTHEASTERLY 30 TO 35 KNOTS GUSTING TO 40 KNOTS

	Weather	WIDESPREAD RAIN OR THUNDERSHOWERS
	Visibility	MODERATE BECOMING POOR IN HEAVY RAIN
	Sea condition	VERY ROUGH TO HIGH
West Central Bay	Wind	SOUTHWEST TO WESTERLY 40 TO 45 KNOTS GUSTING 50 KNOTS
	Weather	SCATTERED RAIN OR THUNDERSHOWERS
	Visibility	MODERATE BECOMING POOR IN HEAVY RAIN
	Sea condition	HIGH TO VERY HIGH
East Central Bay(WEST OF LONG. 92° EAST)	Wind	SOUTHEAST TO SOUTHERLY 25 TO 35 KNOTS GUSTING 40 KNOTS
	Weather	FAIRLY WIDESPREAD RAIN OR THUNDERSHOWERS
	Visibility	MODERATE BECOMING POOR IN HEAVY RAIN
	Sea condition	ROUGH TO VERY ROUGH AAA
South Bay	Wind	:MAINLY SOUTHWESTERLY 15 TO 20 KNOTS
	Weather	SCATTERED RAIN OR THUNDERSHOWERS
	Visibility	GOOD BECOMING MODERATE IN RAIN
	Sea condition	SLIGHT TO MODERATE
Andaman Sea(WEST OF LONG. 95° EAST)	Wind	SOUTH TO SOUTHWESTERLY 15 TO 20 KNOTS
	Weather	FAIRLY WIDESPREAD RAIN OR THUNDERSHOWERS
	Visibility	GOOD BECOMING MODERATE IN RAIN
	Sea condition	SLIGHT TO MODERATE

Part Four

NIL

NIL

AAXX 02403 99942 807 21495 80703 10256 40085 811 21496 80703 10250 40077 901 21496

80208 10250 40049 806 21496 80205 10248 40072 903 22596 80408 10252 40054 895 21495 99943 049 21495 82906 10256 40054 053 21495 83406 10248 40027 105 31996 63202 10260

40061 150 31596 72904 10284 40076 185 31596 73203 10266 40088 245 32597 42705 10286

40101 346 32597 62504 10296 40112 279 32597 73202 10274 40108

TOO: 12.30 IST 24/10/2024

RSMC New Delhi has commenced preparation of these bulletins in graphical format using QGIS tool and are also available over GIS platform since January, 2021 based on multi model ensemble guidance. Sample graphical products on QGIS are placed at Fig. II-C--3.

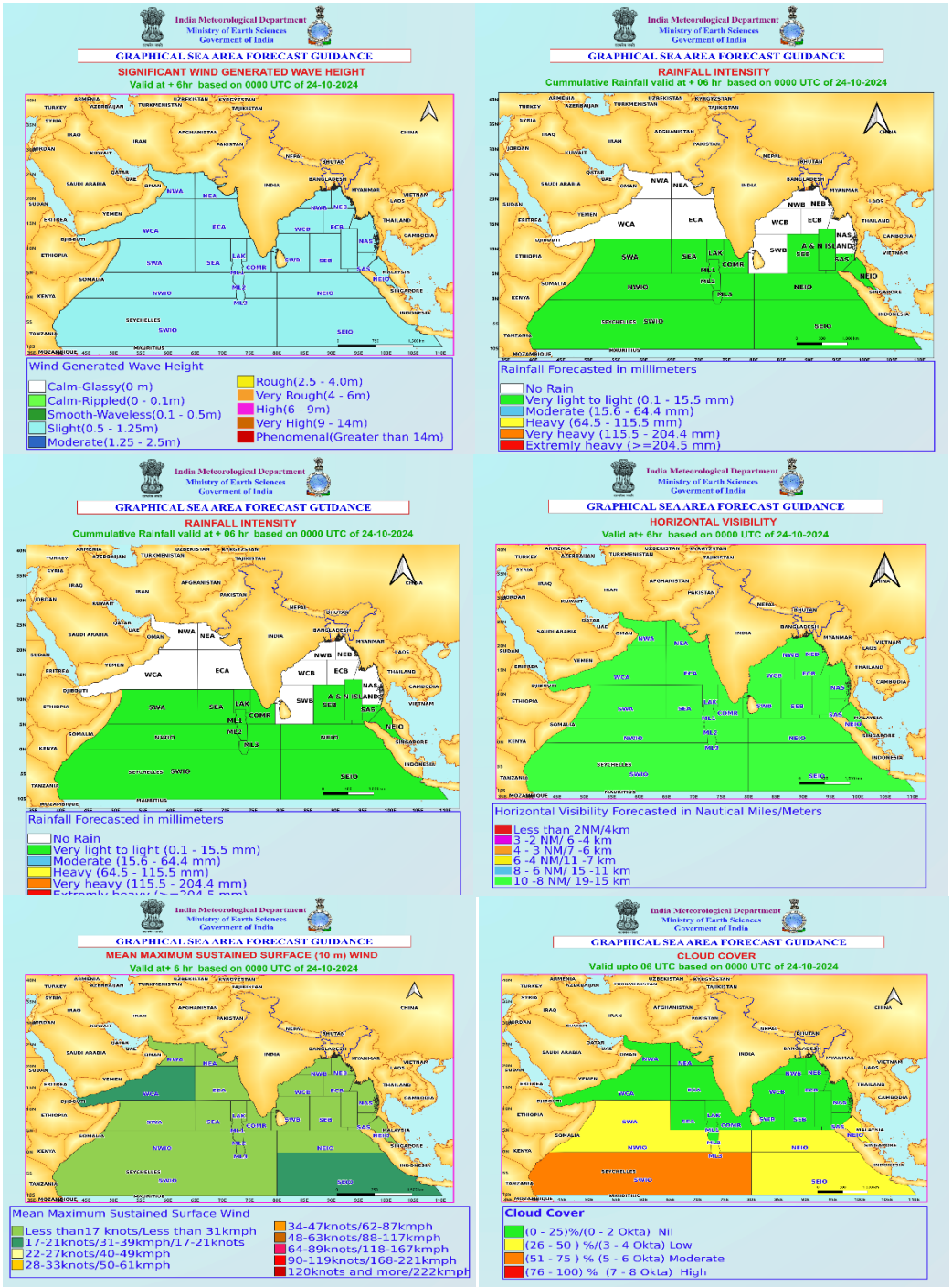


Fig. II-C-3: Sample Sea Area bulletin on QGIS based on multi model ensemble guidance

ANNEX II-C-2

Coastal Weather Bulletins

These bulletins give weather information in greater detail in the coastal areas for the benefit of ships plying mainly in coastal areas. For the purpose of these bulletins, the coastal area is defined as the sea area up to 75 km off the coastline.

As in the case of sea bulletins for merchant ships, the coastal bulletins are broadcast from Navtex, Chennai. In normal weather, coastal bulletins are broadcast twice daily (Daily One at 0630 UTC and Daily Two at 1830 UTC respectively). These are known as "Daily" bulletins. Whenever a depression, tropical cyclone or some other phenomenon influences the weather of the coastal strip concerned "Extra", "Storm" and "Special" bulletins for the coastal strip are also broadcast in addition to "Daily" bulletins.

Each bulletin first gives the name of the coastal strip to which it pertains followed by the details of the weather system, if any, affecting the coastal area. It also includes a forecast of wind, weather, visibility and state of sea for the coastal strip. Information on storm surges/tidal waves and areas likely to be affected are given whenever necessary. The bulletins also give information regarding storm warning signals, if any, hoisted at the ports in the coastal strip concerned.

The coastal bulletins pertaining to India coast are sent to control room of Director General of Lighthouse and Light ships (DGLL) at Mumbai though e-mail and Automated message switching System (AMSS) at IMD, Mumbai for broadcast through 11 Navtex stations along the coast. These bulletins are also uploaded on RSMC Website (www.rsmcnewdelhi.imd.gov.in). Areal coverage for coastal weather bulletin is shown in **Fig. II C-4. Sample bulletin is placed at Fig. II-C-5**.

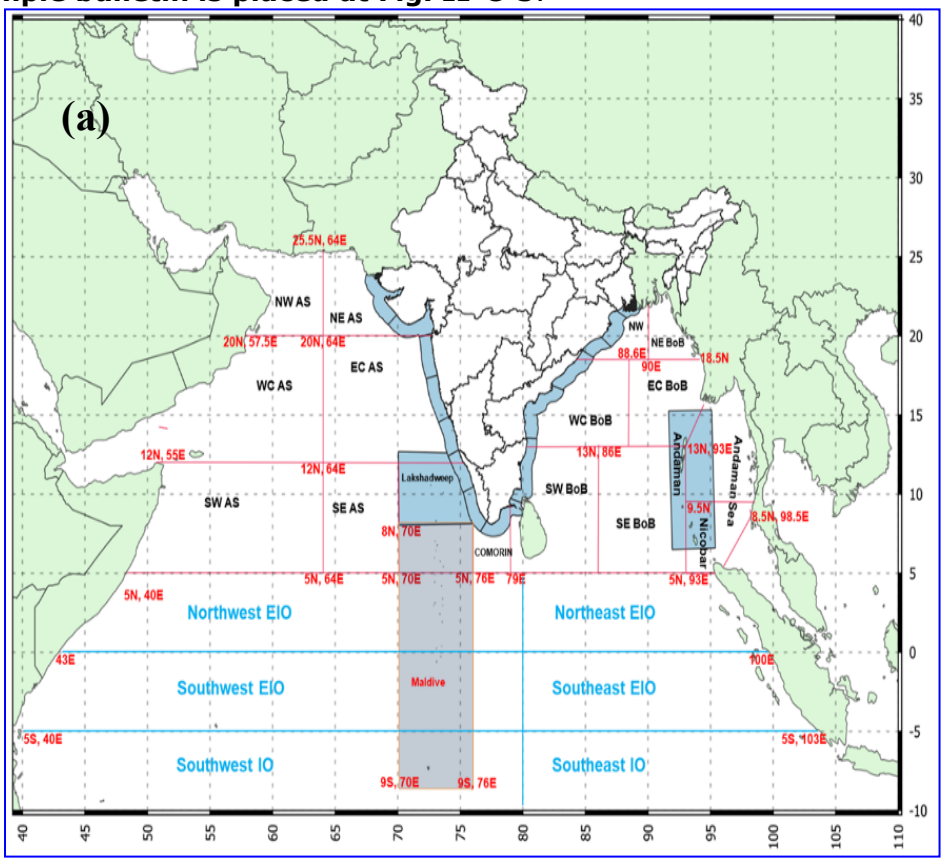


Fig. II-C-4: Sample areal coverage for coastal Weather bulletin along the coast of India

இந்தியஅரசு
இந்திய வானிலை ஆய்வு துறை
மண்டல வானிலை ஆய்வு மையம்
6, கல்லூரி சாலை,
சென்னை600006-
தொலைபேசி: 044- 28271951

GOVERNMENT OF INDIA
INDIA METEOROLOGICAL DEPARTMENT
Regional Meteorological Centre
No. 6, College Road,
Chennai–600006
Phone: 044- 28271951

DATE: 27-11-2025 **TIME OF ISSUE:**

1200 UTC FROM: AREA CYCLONE WARNING CENTRE CHENNAI

SYNOPTIC SYSTEM: The **Cyclonic Storm Ditwah** [Pronunciation: Ditwah] over southwest Bay of Bengal and adjoining Sri Lanka coast moved north-northwestwards with the speed of 10 kmph during past 6 hours and lay centered at 1430 hrs IST of today, the 27th November 2025 over coastal Sri Lanka and adjoining southwest Bay of Bengal near latitude 7.2°N and longitude 81.8°E, about 60 km south-southeast of Batticaloa (Sri Lanka),
140 km north-northeast of Hambantota (Sri Lanka), 170 km south-southeast of Trincomalee (Sri Lanka), 570 km south-southeast of Puducherry (India) and 670 km south-southeast of Chennai (India).
It is very likely to continue to move north-northwestwards across Sri Lanka coast & adjoining southwest Bay of Bengal and reach over southwest Bay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November.

B1: L

B2: B

PRIORITY OF MESSAGE: VITAL

STROM TWO BULLETIN FOR SOUTH TAMIL NADU COAST VALID FOR 12 HRS FROM 27/1200 UTC TO 28/0000 UTC:

WIND	**:** MAINLY NORTHERLY 25-30 KNOTS GUSTING TO 35 KNOTS OCCASIONALLY.
WEATHER	**:** SCATTERED RAIN/THUNDERSHOWERS; WITH ISOLATED HEAVY FALLS.
VISIBILITY	**:** MODERATE; BECOMING POOR IN HEAVY FALLS.
SEA CONDITION	**:** ROUGH TO VERY ROUGH; BECOMING HIGH IN GUST.
PORT SIGNAL	**:** LOCAL WARNING SIGNAL NUMBER FOUR (IV) KEPT HOISTED AT PAMBAN AND THOOTHUKUDI PORTS.

OCEAN CURRENT/SWELL SURGE ALERT: Swell Surge Alert for the coast of KANNIYAKUMARI, TAMIL NADU from Neerodi to Arockiyapuram. Swell waves in the range of 16.0 - 17.0 sec period with 0.7 - 1.0 m height are forecasted during 23:30 hours

on 26-11-2025 to 23:30 hours on 28-11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
High Wave Alert for the coast of NAGAPPATTINAM SOUTH,TAMIL NADU from Point Calimer To Samanthanpettai. High waves in the range of 2.9 - 3.5 meters are forecasted during 23:30 hours on 27-11-2025 to 23:30 hours on 28-11-2025. It advised that to be careful while doing marine operations and nearshore recreation.
Swell Surge Alert for the coast of TIRUNELVELI,TAMIL NADU from Kuttapulli To Kooduthalai. Swell waves in the range of 16.0 - 17.0 sec period with 0.8 - 1.1 m height are forecasted during 02:30 hours on 27-11-2025 to 23:30 hours on 28-11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.

RSMC New Delhi has commenced preparation of these bulletins in graphical format using QGIS tool and are also available over GIS platform since January, 2021 based on multi model ensemble Sample graphical products on QGIS dated 12th November 2024 (as a represented example) are placed at Fig. II-C--6.

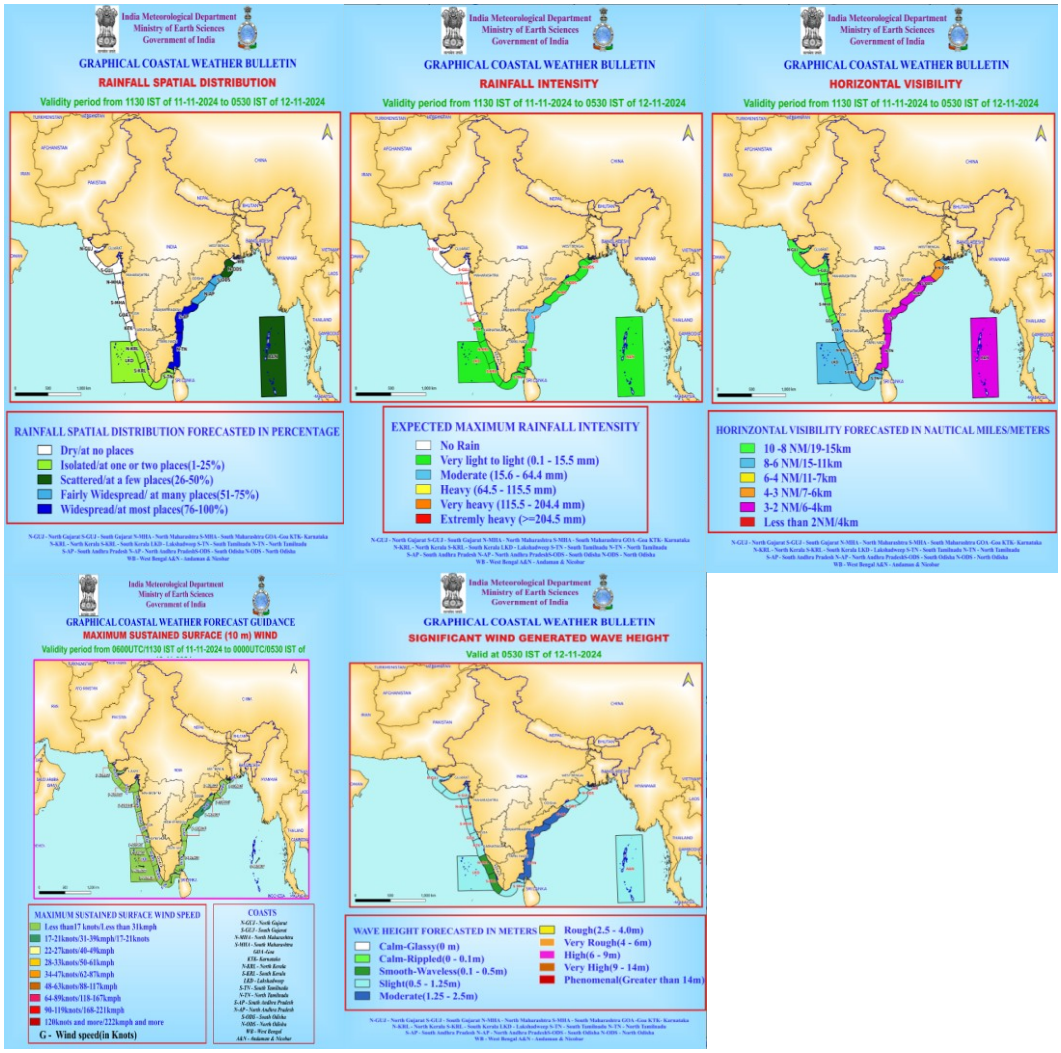


Fig. II-C-6: Sample Coastal area bulletin on QGIS based on multi model ensemble guidance

ANNEX II-C-3

Storm warnings to ports

A visual storm warning signal system for the Bay of Bengal ports, chiefly for the port of Kolkata, has been in existence since 1865. A similar system for the ports on the west coast was started in 1880. A uniform system applicable to all Indian ports was introduced in 1898. The India Meteorological Department issues storm warnings to port officers whose ports are likely to be affected by adverse weather. They are also advised to hoist visual storm warning signals for the benefit of ships at the port and those out at Sea. The information is, in most cases, conveyed by very high priority telegrams/fax/e-mail.

The storm warning signals, which are displayed prominently on masts in ports, are in the form of cones and cylinders for day signals and red and white lamps for night signals. In addition to hoisting signals, port officers have, in most cases, arrangements for disseminating the information and warnings received by them to country crafts and sailing vessels in the harbor. These bulletins are also uploaded on RSMC Website **(www.rsmcnewdelhi.imd.gov.in)**. A sample is shown in **Fig. II-C-7**.

The meaning of the signals used in Indian ports is given in attachment to ANNEX II-C3

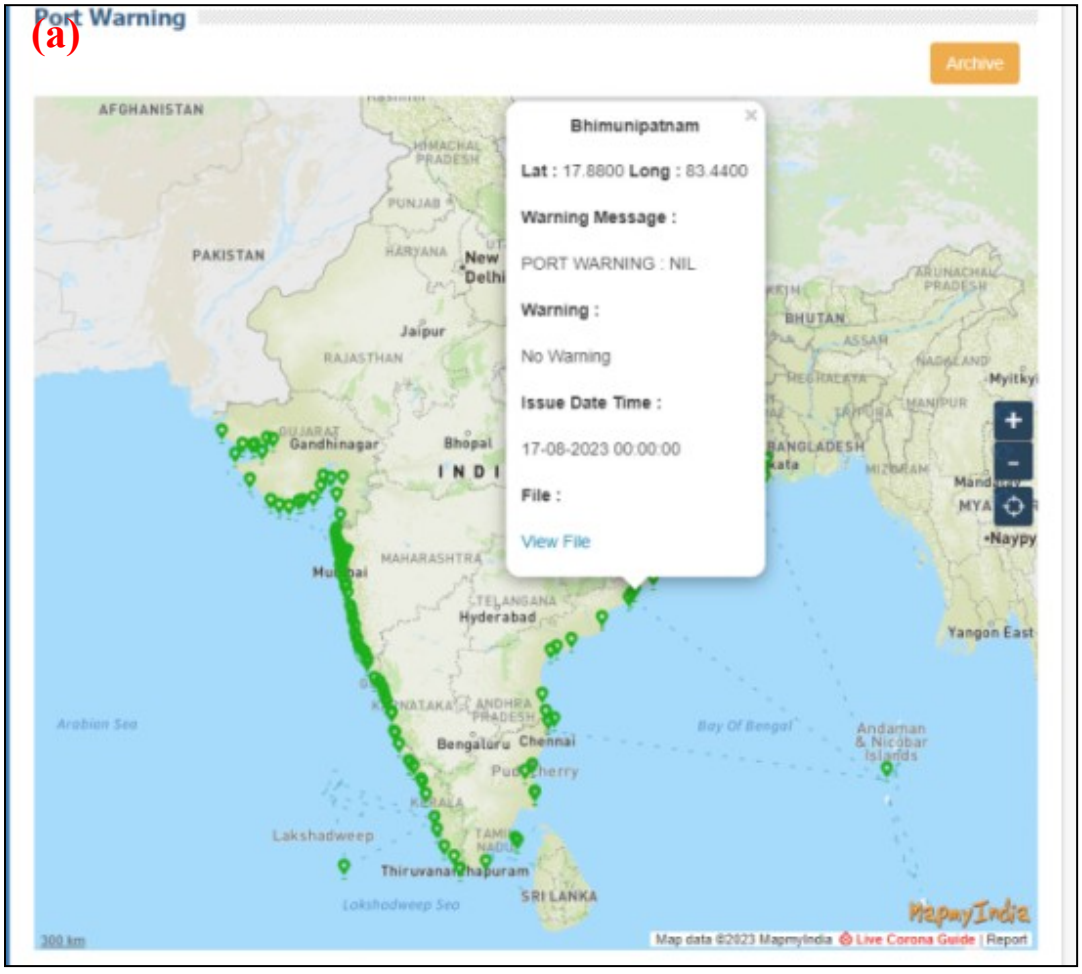


Fig. II-C-7: Sample Port Warning bulletin available at RSMC New Delhi website

Sample Port Warning bulletin issued by ACWC Chennai based on 1800 IST of 27th November 2025 in association with CS DITWAH.

DATE:27-11-2025	Time of Issue:18:00 Hrs.IST

WARNING FOR TAMIL NADU PORTS
Bulletin No:5

SYNOPTIC SITUATION
The Cyclonic Storm Ditwah [Pronunciation: Ditwah] over southwest Bay of Bengal and adjoining Sri Lanka coast moved north-northwestwards with the speed of 10 kmph during past 6 hours and lay centered at 1430 hrs IST of today, the 27th November 2025 over coastal Sri Lanka and adjoining southwest Bay of Bengal near latitude 7.2°N and longitude 81.8°E, about 60 km south-southeast of Batticaloa (Sri Lanka), 140 km north-northeast of Hambantota (Sri Lanka), 170 km south-southeast of Trincomalee (Sri anka), 570 km south-southeast of Puducherry (India) and 70 km south-southeast of Chennai (India).

FORECAST
It is very likely to continue to move north-northwestwards across Sri Lanka coast & adjoining southwest Bay of Bengal and reach over southwest ay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November.

ADVICE FOR HOISTING STORM WARNING SIGNALS:

S.No	Name of the Port	Advice
1	CHENNAI	Keep hoist Distant warning Signal Number II (DW TWO) with Section Signal Number IV.
2	CUDDALORE	Keep hoist Distant warning Signal Number II (DW TWO) with Section Signal Number IV.
3	NAGAPATTINAM	Keep hoist Local Warning Signal Number IV.(LW FOUR)
4	ENNORE	Keep hoist Distant warning Signal Number II (DW TWO)
5	KATTUPALLI	Keep hoist Distant warning Signal Number II (DW TWO)
6	PUDUCHERRY	Keep hoist Distant warning Signal Number II (DW TWO)
7	KARAIKAL	Keep hoist Local Warning Signal Number IV. (LW FOUR)
8	PAMBAN	Keep hoist Local Warning Signal Number IV. (LW FOUR)
9	THOOTHUKUDI	Keep hoist Local Warning Signal Number IV. (LW FOUR)
10	RAMESWARAM	For information
11	COLACHAL	For information

A). PRINCIPOFF CHENNAI & B) TANMARINE CHENNAI: For Information.

Duty Officer For Director In-Charge
Area Cyclone Warning Centre Regional Meteorological Centre, Chennai

ANNEX II-C-4

Fisherman Warnings

Warnings for fisherman and fishery officials are issued by Area Cyclone Warning Centres as per their area of responsibility and uploaded on RSMC website. Fishermen warnings in graphical form for next 5 days commenced w.e.f. April, 2018 and are available at RSMC website. RSMC New Delhi has commenced development of fishermen graphics on GIS platform based on multi model ensemble (MME) guidance along with probability of exceedance of maximum sustained winds speed (MSW) of 25 knots & more since 28th July, 2022. Sample areal coverage is presented in Fig. II-C-8. Fishermen warning graphics bulletin issued during cyclone REMAL is presented in Fig. II-C-9. Sample graphics showing fishermen warning area based on MME and graphics showing probability of exceedance of MSW≥25 knots is presented in **Fig. II-C-8 and II-C-9**.



Fig.II-C-8: Areal coverage for fisherman warning

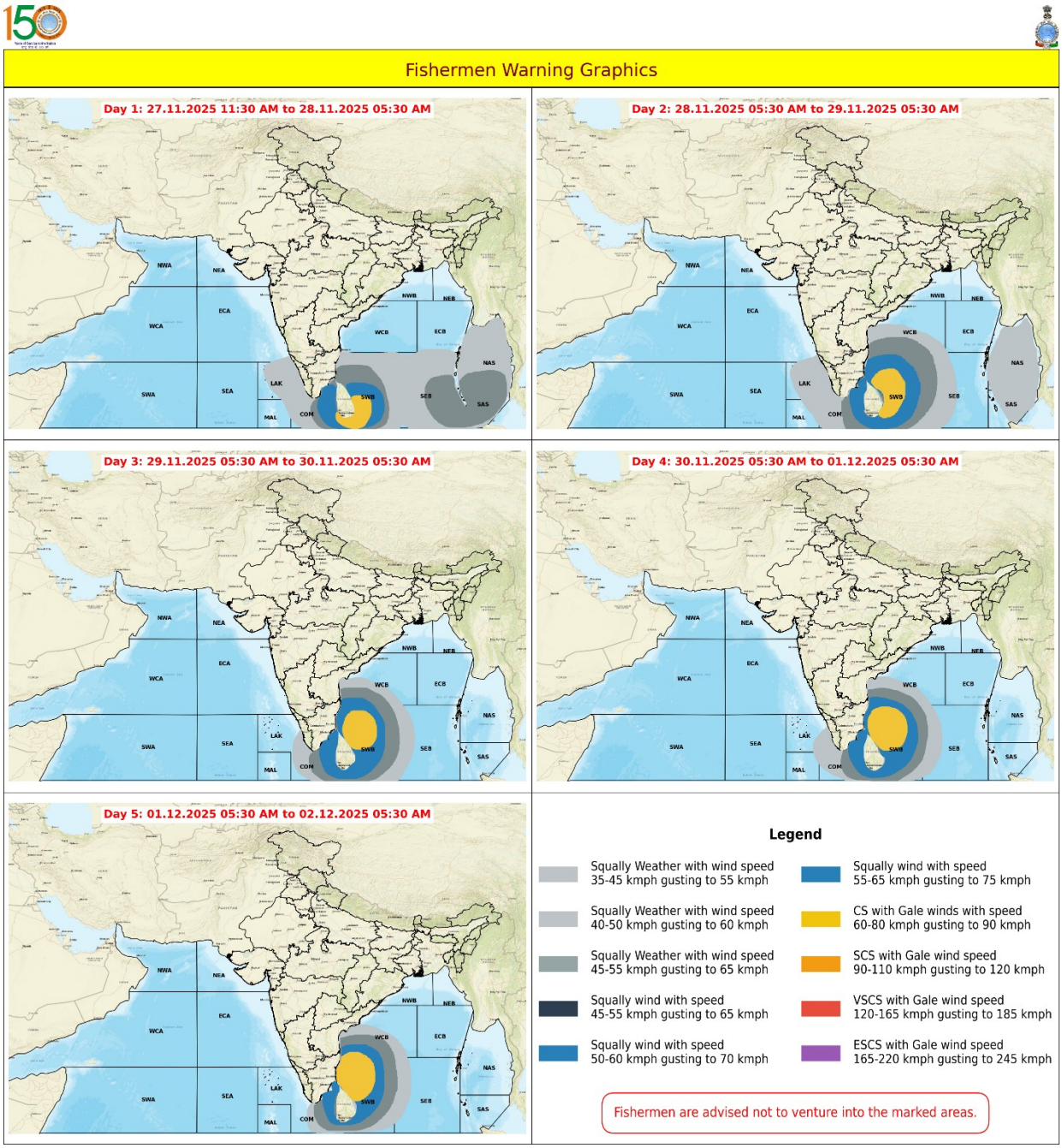


Fig.II-C-9: Sample graphics showing fishermen warning area based on MME issued on 27th November, 2025

ANNEX II-C-5

Tropical storm warnings to government officials (Four stage warnings)

At the initial stage a special **"Informatory Message"** is issued at low pressure area stage when it has the potential to intensify into a cyclonic storm at 0300 UTC or at any synoptic hour depending upon time of formation of low pressure system to all the disaster managers and press.

A **"pre-cyclone watch**" bulletin is issued by DGM himself soon after the formation of a depression informing senior central government officials including chief secretary of coastal maritime States about likely development of a cyclonic storm, its movements, coastal belt of India likely to experience adverse weather. This bulletin is issued at least 72 hours in advance of commencement of adverse weather.

At the second stage, a **"cyclone alert"** is issued at least 48 hours in advance of the expected commencement of adverse weather in association with the cyclonic storm over the coastal area.

The third stage of the warning, known as **"cyclone warning"** is issued at least 24 hours in advance of commencement of severe weather.

The last stage of warning covering the **post-landfall** scenario is included in the cyclone warnings issued 12 hrs before the expected time of landfall and is continued till the cyclonic wind force is maintained in the core area of the cyclonic storm over land.
However, this is not applicable in case of cyclonic disturbances developing near the coast and in case of rapidly intensifying systems. In such cases, the cyclone warning can be issued directly without issuing cyclone alert and watch bulletins and similarly cyclone watch can be issued directly without issuing pre-cyclone watch.

Post landfall outlook

Post-landfall outlook will be issued as a part of cyclone warning at least 12 hours in advance of the landfall of the system by RSMC New Delhi and the concerned ACWC. On the basis of this outlook, the concerned RMC/MC which are likely to be affected will also issue cyclone warnings for the interior area. This is the regular cyclone warning.

Dewarning Message

As and when a given coastal belt is expected to become free from the impact of TCs, a dewarning message is issued to the ports and disaster management agencies in India as a part of four stage warning system.

Tropical cyclone bulletins to All India Radio (AIR) for broadcast

In general, weather bulletins are issued by the meteorological offices to the AIR stations for broadcast in the midday transmissions. These are based on 0300 UTC charts. The areas covered by the bulletins are the areas served by the respective AIR stations (AM and FM). These bulletins include:

(i) A summary of the past weather;
(ii) special weather warnings for public services such as the Public Works Department, Irrigation, DoT, Railways, etc. &
(iii) General forecast including warnings.

Points (ii) and (iii) are valid until the morning of the second day. The summary of weather includes information about tropical storms and depressions affecting the area. The centre of the system is included with reference to the nearest well-known place and latitude and longitude. Warnings in bulletins once included are repeated in the subsequent daily bulletins also as long as adverse weather is anticipated. In addition, meteorological centres in the maritime states include suitable warnings for fishermen. These general bulletins are broadcast at a fixed time (midday) by the AIR stations and are intended to meet the requirements of the public in general and the needs of various categories of officials in particular.

In addition, special AIR bulletins containing cyclone alert messages issued 48 hours prior to the commencement of the adverse weather and tropical cyclone warning messages issued 24 hours prior to the commencement of the adverse weather in the coastal areas due to an approaching tropical storm are broadcast. These broadcasts are meant to alert the agencies entrusted with the responsibility of carrying out cyclone preparedness works and also the general public.

(For framing the tropical storm warning bulletins to AIR and Doordarshan abbreviated terms like "cyclone" for cyclonic storm, "severe cyclone" for the severe cyclonic storm and "super cyclone" for super cyclonic storm etc. are also used.)
The height of the storm surge is included in the bulletin in meters and it represents height above the normal tide level. The coastal districts likely to be affected by the storm are mentioned in the first sentence of the bulletins. The types of damage likely to be expected from systems of various intensities along with the suggested action are also included. For this purpose, the following table is referred

These bulletins are generally issued at the time of each sea area bulletin. The frequency of the bulletin can be raised when the tropical storm is tracked with the help of radar and previous warnings issued needs modification.

A third set of bulletins issued to AIR is the coastal weather bulletins. Whenever a cyclonic storm is likely to affect the Indian coastal areas, coastal weather bulletins issued by the India Meteorological Department are broadcast in the All India News Cycles of All India Radio from New Delhi in English, Hindi and in the regional language of the area affected. These bulletins contain information on the following:
1) Time of issue of bulletin in IST
2) Coastal strip for which bulletin issued and period of validity
3) Position, intensity and movement of cyclonic storm
4) Forecast point and time of landfall
5) Signals hoisted at the ports in the coastal strip
6) Information of storm surges/tidal waves

ANNEX II-C-6

Table II-C.1: Damage Potential and Action Suggested

Category/ T.No/ Wind Speed	Structures	Communication & Power	Road /Rail	Agriculture	Marine Interests	Coastal Zone	Overall Damage Category	Suggested Actions
Deep Depression T 2.0 52 – 61 kmph (28-33 knots)	Minor damage to loose / unsecured structures		Some breaches in Kutcha Road due to flooding.	Minor damage to Banana trees and near coastal agriculture due to salt spray. Damage to ripe paddy crops.	Very rough seas. Sea waves about 4-6 m high.	Minor damage to Kutcha embankments.	Minor	Fishermen advised not to venture into the open seas.
Cyclonic Storm T 2.5-T 3.0 62 – 87 kmph (34-47 knots)	Damage to thatched huts.	Minor damage to power and communication lines due to breaking of branches.	Major damage to Kutcha and minor damage to Pucca roads.	Some damage to paddy crops, banana, papaya trees and orchards.	High to very high sea waves about 6-9 m high.	Sea water inundation in low lying areas after erosion of Kutcha embankments.	Minor to moderate.	Total suspension of fishing operations.
Severe Cyclonic Storm T 3.5 88-117 kmph (48-63 knots)	Major damage to thatched houses/ huts. Roof tops may blow off. Unattached metal sheets may fly.	Minor damage to power and communication lines.	Major damage to Kutcha and some damage to Pucca roads. Flooding of escape routes.	Breaking of tree branches, uprooting of large avenue trees. Moderate damage to banana and papaya trees. Large dead limbs blown from trees.	Phenomenal seas with wave height 9-14 m. Movement in motor boats unsafe.	Major damage to coastal crops. Storm surge upto 1.5 m (area specific) causing damage to embankments/ salt pans. Inundation upto 5 km in specific areas.	Moderate	Total suspension of fishing operations. Coastal hutment dwellers to be moved to safer places. People in affected areas to remain indoors.

Very Severe Cyclonic Storm T 4.0- T 4.5 118-166 kmph (64-89 knots)	Total destruction of thatched houses/ extensive damage to kutcha houses. Some damage to pucca houses. Potential threat from flying objects.	Bending / uprooting of power and communication poles.	Major damage to Kutcha and Pucca roads. Flooding of escape routes. Minor disruption of railways, overhead powerlines and signaling systems.	Widespread damage to standing crops, plantations, orchards, falling of green coconuts and tearing of palm fronds. Blowing down of bushy trees like mango.	Phenomenal seas with wave height more than 14 m. Visibility severely affected. Movement in motor boats and small ships unsafe.	Storm surge upto 2 m. Inundation upto 10 km in specific areas. Small boats, country crafts may get detached from moorings.	Large	Total suspension of fishing operations. Mobilise evacuation from coastal areas. Judicious regulation of rail and road traffic. People in affected areas to remain indoors.
Extremely Severe Cyclonic Storm T 5.0- T 6.0 167-221 kmph (90-119 knots)	Extensive damage to all types of kutcha houses, some damage to old badly managed Pucca structures. Potential threat from flying	Extensive uprooting of communication and power poles.	Disruption of rail/road link at several places.	Extensive damage to standing crops, plantations, orchards. Blowing down of Palm and coconut trees. Uprooting of large bushy trees.	Phenomenal seas with wave height more than 14 m. Movement in motor boats and small ships not advisable.	Storm surge upto 2-5 m. Inundation may extend upto 10-15 km in specific areas. Large boats and ships may get torn from their moorings.	Extensive	Total suspension of fishing operations. Extensive evacuation from coastal areas. Diversion or suspension of rail and road traffic. People in affected areas to

	objects.							remain indoors.
Super Cyclonic Storm T 6.5 and above 222 kmph and more (120 knots and more)	Extensive damage to non-concrete residential and industrial buildings. Structural damage to concrete structures. Air full of large projectiles.	Uprooting of communication and power poles. Total disruption of communication and power supply.	Extensive damage to Kutcha roads and some damage to poorly repaired pucca roads. Large scale submerging of coastal roads due to flooding and sea water inundation. Total disruption of railway and road traffic due to major damages to bridges, signals and railway tracks. Washing away of rail/road links at several places.	Total destruction of standing crops/ orchards. Uprooting of large trees and blowing away of palm and coconut crowns, stripping of tree barks.	Phenomenal seas with wave heights of more than 14m. All shipping activities unsafe.	Extensive damage to port installations. Storm surge more than 5m, inundation upto 40 km in specific areas and extensive beach erosion. All ships torn from their moorings. Flooding of escape routes.	Catastrophic	Total suspension of fishing operations. Large-scale evacuation of coastal population. Total suspension of rail and road traffic in vulnerable areas. People in affected areas to remain indoors.

ANNEX II-C-7

Dissemination of tropical cyclone warnings

The modes of telecommunication used for the dissemination of tropical cyclone warnings in India are:

- Telefax
- Telephones
- Automatic Message Switching System (AMSS)
- All India Radio
- Television
- FM Radio
- Community Radio
- DTH
- W/T (especially police W/T)
- Internet, by keeping information on IMD website (http://:www.mausam.gov.in)/ RSMC website(www.rsmcnewdelhi.imd.gov.in).
- Microwave link of the railways
- IVRS
- e-mail
- SMS and Mobile App.
- GMDSS
- Warnings to fishermen in deep sea through through NavIC system*
- NAVTEX for coastal weather bulletin
- Social Media (Face Book, Whatsapp, Twitter, Instagram, Blog)
- Common Alert Protocol
- Application Programming Interface
- Crowd sourcing (January, 2021)

CAP feeds are automatically aggregated to the WMO Alert Hub at https://cap-sources.s3.amazonaws.com/in-imd-en/rss.xml. These alerts are also disseminated to Google,AccuWeather, Global Multi-Hazard Alert System (GMAS) portal (https://gmas.asia/). IMD also participates as one of the alert generating agencies for the CAP alert projects of NDMA developed by CDOT.

* NavIC is the operational name of the Indian Regional Navigation Satellite System (IRNSS) developed by ISRO. Unlike GPS which is a Global tracking constellation, NavIC has been designed to focus especially on India and adjoining regions (1500 Kms around India) and is a very significant achievement for the country.

Application Programming Interface (API) has been developed for various products like heavy cyclones, rainfall, thunder storms, heat wave etc in 2021. It is used by various stake holders within the country and outside including Global Multi-hazard Alert System (GMAS) of WMO, Google, Apple etc. Stakeholders include Uttar Pradesh Government, Telangana Government, Kerala Government, Umang App, DD News, NDMA, Incredible India, KRC

Network, NITI Aayog, Kerala State Disaster Management, Chandigarh Smart City Limited, Apple.com, Tomorrow.io, Uttarakhand Toursim, National Rice Research Institute Odisha, Madhya Pradesh Government, RMSI private limited, TV-9, CDAC etc.

India Meteorological Department launched its Crowd source web interface in January 2021 to allow users to make their own observations and share with service provider. This feature can be found in the "Public Observation" section of Mausam website of IMD (https://city.imd.gov.in/citywx/crowd/enter_th_datag.php). There is no need to register to send observations and the associated weather damages caused. User can report their observations (textual and .png format) along with their location and time of the events.

Rain, Thunder/lightning, Hailstorm, Duststorm, Fog, Snow, Gusty wind and the associated damage caused such as breaking of tree branches, uprooting of small/big trees, Telephone pole / Transmission tower damaged by bending, Telephone pole / Transmission tower uprooting, Damage to Kutcha structures (houses, cowsheds), Damage to Pukka structures (houses, shelters), Flooding of land, Damage/Death to livestock, Damage/Death to

Humans, Damage to vegetation/crops.Member countries can also share observations in realtime through website for validation of forecast.

RSMC New Delhi commenced dissemination of warnings through whatsapp with member countries in March, 2022. Bulletins were shared with Department of Meteorology & Hydrology, Myanmar in march 2022.

The following warnings/advisory products are given in the dynamic page of cyclone page of IMD's website/RSMC website. When one type of communication channel fails, the alternate channel is used.

Home page of RSMC website is presented in **Fig. II-C-10**

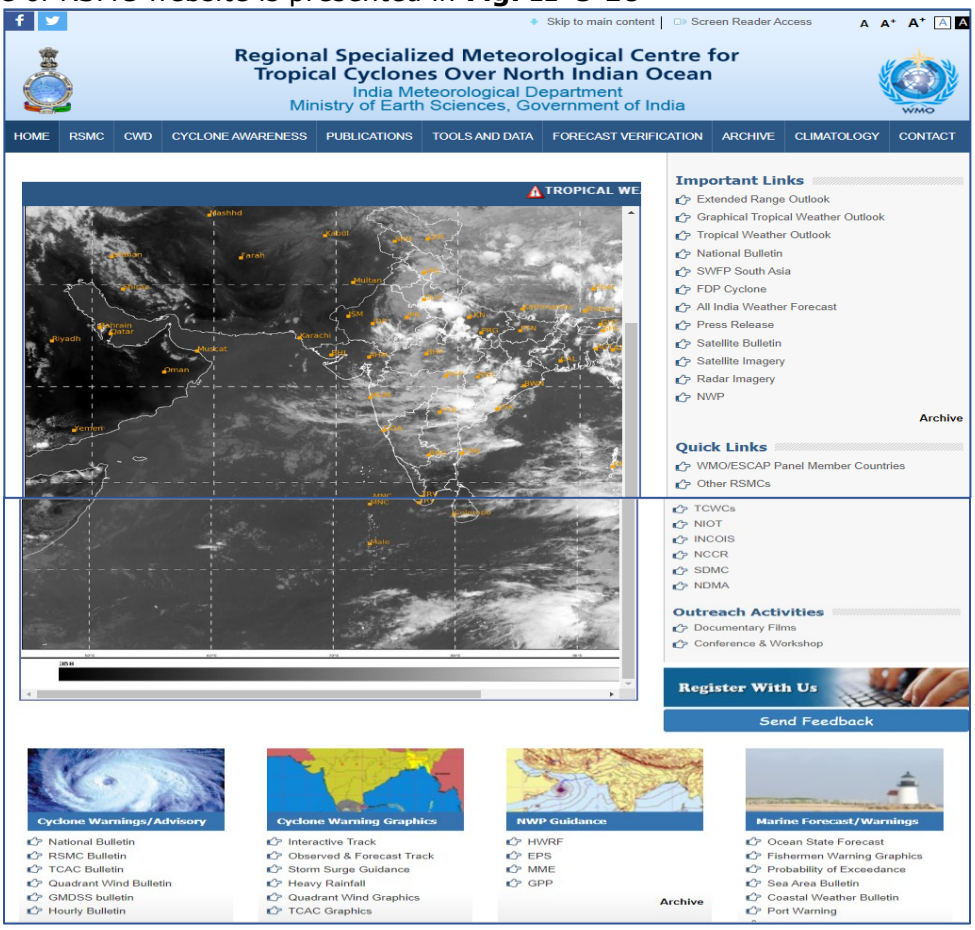


Fig.II-C-10: RSMC Website

ANNEX II-D-1

Cyclone warning system in Maldives

The Maldives Meteorological Service (MMS) issue tropical cyclone and severe weather warning to the public and travelers across the country.

Tracking of Tropical Cyclone

Conventional observations, such as surface, upper air observations, automatic weather stations, ship reports, and radar and satellite observations are utilized for observing, detecting and tracking tropical cyclones. Numerical Weather Prediction models produced in-house and NWP charts provided by ECMWF, UK Met Office, IMD Website, RIMES and advisories from RSMC are also used by forecasters.

Advisories and Warnings

Weather Advisories and Warnings are issued for:
Heavy Rain and Flood, Thunderstorms, Strong Winds and Rough Seas, Squalls (*frequent gust*), Swell & Tidal Waves, Tropical Cyclone

Advisories and Warnings are sent to:
Government's Executive Management, National Disaster Management, Maldives National Defense Force, Maldives Police Service, Coast Guard, Aviation Sectors, Tourism, Transport, Health Sectors, Fisheries, Agriculture, Education Sectors, TV media, Radio service etc.

Dissemination of Warning

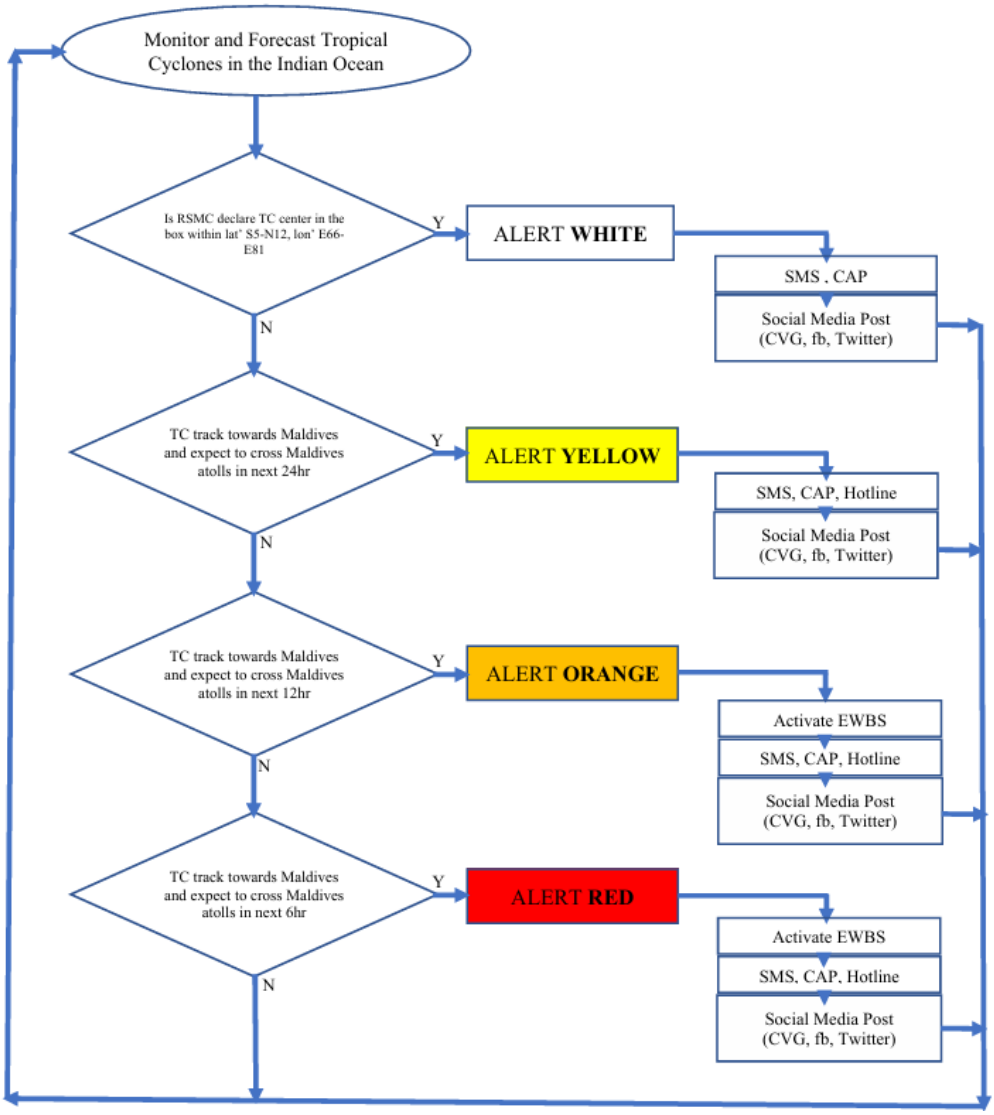
The National Meteorological Centre has established the following means of communication for the dissemination of the warning.
Hotlines - Dedicated point to point telephone line between major stake holders and NMC
SMS text messages, Mobile App (named "moosun" for Android and iOS), Local TV Channels
Local Radio Channels, Internet (http://www.meteorology.gov.mv) and email

ANNEX II-D-2

***TC Alert and Warning criteria* Alert Level**

Alert Criteira for Tropical Cyclone		
CAP categories of Severity		Alert Criteria
Minor	Alert level 1, WHITE	RSMC declare TC center in the box within lat' S5-N12, lon' E66-E81
Moderate	Alert level 2, YELLOW	TC track towards Maldives and expect to cross Maldives atolls in next 24hr
Severe	Alert level 3, ORANGE	TC track towards Maldives and expect to cross Maldives atolls in next 12hr
Extreme	Alert level 4, RED	TC track towards Maldives and expect to cross Maldives atolls in next 6hr

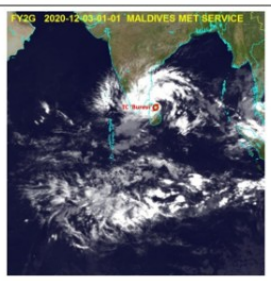
TC Alert and Warning Flow Chart

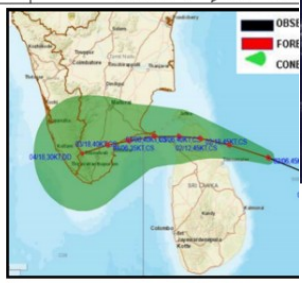


Sample TC Alert issued

ALERT WHITE
Period: 03/0230 hrs – 03/1430 hrs
Tropical Cyclone **"BUREVI"** located approximately 870 *km NE* of HA.Kela. System is moving WNW direction, north of Maldives into Gulf of Mannar.

Issued: 0200hrs , 03 Dec 2020



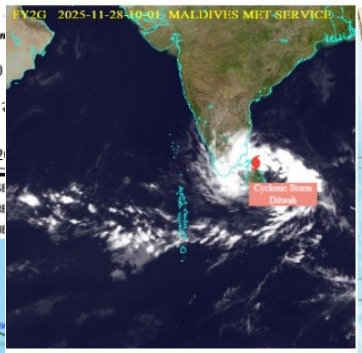


MMS Alert Criteria for Tropical Cyclone

Hazard	CAP Categories of Severity			
	Minor (Alert level 1, WHITE)	Moderate (Alert level 2, YELLOW)	Severe (Alert level 3, ORANGE)	Extreme
Tropical Cyclone (TC)	RSMC declare TC center in the box within lat' S5-N12, lon' E66-E81	TC track towards Maldives and expect to cross Maldives atolls in next 24hr	TC track towards Maldives and expect to cross Maldives atolls in next 12hr	TC track t and expe atolls in

Note: Alert WHITE is issued as TC has moved into the concerned area identified in the Alert Criteria. We are monitoring the system very closely.

Tropical Cyclone "Ditwah" Moving Away from the Maldives





Tropical Cyclone "Ditwah" is currently located over the northern coastal region of approximately 876 km northeast of Ha. Kelaa. The system is moving in a north–nort (NNW) direction, toward the North Tamil Nadu, Puducherry, and adjoining Sou Pradesh coasts of India, moving away from the Maldives.

A White Alert has been issued for the tropical cyclone, as the system is currently with of concern and meets the MMS Tropical Cyclone Alert criteria. Under its influence showers and a few thunderstorms are expected over the central and southern atolls next 24 hours, with weather conditions likely to improve from Tuesday, 2nd onwards.

Maldives Meteorological Service

ANNEX II-E-1

Cyclone warning system in Myanmar

Organization

Tropical cyclone warnings in Myanmar are provided by the Department of Meteorology and Hydrology (DMH), Myanmar. Tropical cyclone warnings are provided from the Multi-Hazard Early Warning Center of DMH in Nay Pyi Taw.

Tracking of Tropical Cyclone

Conventional observations, such as surface and upper air observations, ships' reports, and radar and satellite observations are utilized for observing, detecting and tracking tropical cyclones.

Tropical cyclone warnings

The Multi-Hazard Early Warning Center of DMH in Nay Pyi Taw is responsible for providing tropical cyclone and storm surge warnings to its coastal population, the ports along the Myanmar coast and for the designated area of the high Seas in the Bay of Bengal. 24x7 Storm Watch Centers: Nay Pyi Taw Multi Hazard Early Warning Centre, Yangon Forecasting office, Mingaladon International Airport Aviation Forecasting office and all coastline observatories watch the storms whenever cyclones develop in the Bay of Bengal. Storm news and warnings are issued at frequent intervals for national and international users in various sectors. Special storm warnings accompanied with color code and possible storm affected specific areas are issued hourly to all news media. National televisions televised all hourly news continuously in footnote rolling format frequently. These storm news and warnings include the 5 stage warnings viz. Yellow Stage, Orange Stage, Red Stage, Brown Stage and Green Stage during cyclone situations. The area designated for Myanmar for providing warnings is the area of the Bay of Bengal east of 92° E and north of 10° N. Warnings are broadcast through the coastal radio station at Yangon (call sign XYR). Port warning signals and their meanings used in the ports of Myanmar are given in Attachment to Annex II-E.

Dissemination of Storm Warning

Collection and dissemination of meteorological data and warnings are done with the Phone, Single Side Band Transceiver (SSB), Email, Fax, SMS, GTS through RTHs and RSMC New Delhi. The modes of telecommunication used for the dissemination of tropical cyclone warnings in Myanmar are:

Telephone
Facsimile
Local TV (3 Channel)
Myanmar Radio
FM Radio
DMH website- www.moezala.gov.mm/www.dmh.gov.mm
Single Side Band Transceiver (SSB)
DMH Facebook
EDMS (Electronic Document Management System)
Email
SMS (Short Message Service)
Through print

ANNEX II-E-2

Tropical storm news and warnings for various sectors in Myanmar
(Five stage warnings)

Yellow Color Stage

Yellow color means a storm is formed but it not moving towards Myanmar Coasts.

Orange color Emergency Stage

Orange color means storm is heading towards Myanmar Coasts.

Red color Emergency stage

Red color emergency stage mean the storm is heading towards Myanmar Coasts and cross within next (12) hours.

Brown color Emergency Stage

Brown color Emergency Stage means the storm is crossing Myanmar Coasts currently.

Green color Stage

Green color Stage means the storm abated and situation is clear by storm.

ANNEX II-F-1

Tropical Cyclone Warning System in Oman

Organization

Tropical cyclone warnings in Oman are provided by the Central Forecasting Office under the Directorate General of Meteorology (DGMET) which falls under Public Authority for Civil Aviation in co-operation with the National Committee for Emergency Management (NCEM).

Tracking

The Oman Regional Model as well as other international numerical weather prediction products are used for early warning. The Tropical Cyclones are tracked with the help of surface and upper air observation, satellite imagery and aircraft observations.

The tropical cyclones are tracked with the help of conventional surface, upper air observations, weather radars, and satellite images from Eumetsat and NOAA. Images from Indian Satellites are being utilized via IMD website.

Tropical Cyclone Warning

Tropical cyclone warnings are provided for:

(i) The high Seas
(ii) Coastal waters
(iii) Ports
(iv) Civilian and military aviation
(v) Governmental officials
(vi) General public including fishermen
(vii) Recipients registered with the DGMET

Warning Procedures

Directorate General of Meteorology (DGMET) will issue tropical storm reports, advisories, warnings and amendments every 24 hours, 12 hours, 6 hours, or more frequently if required by changing conditions according to an internal SOP. The Advisory or warning will contain the following information

(i) Number
(ii) Date and time
(iii) Name of Storm
(iv) Classification
(v) Position of the Tropical storm
(vi) Intensity
(vii) Central pressure
(viii) Movement the direction and speed
(ix) Wind direction and speed around the centre

Destination from a coastal point
Outlook

In the event the storm is expected to approach the coast of Oman, the following bulletins will be issued according to the stage:

ANNEX II-F-2

Reports
When it is expected that a depression, storm, severe storm or cyclone may approach Oman coast before 72 hours, a report will be issued and it will be renewed every other 48 hours.

Advisory
When it is expected that a depression, storm, severe storm or cyclone May approach Oman coast within 72 hours an advisory will be issued and it will be renewed every other 24 hours.

Alert
When it is expected that a depression, storm, severe storm or cyclone May approach Oman coast within 48 hours an alert will be issued and it will be renewed every other 12 hours.

Warning
When it is expected that a depression, storm, severe storm or cyclone may approach Oman coast within 24 hours a warning will be issued and it will be renewed every other 6 hours.

Last Report
When it is expected that a depression, storm, severe storm or cyclone is dissipating a report will be issued clearing the event.

Bulletins for high sea
Tropical cyclones warnings for the high seas in Oman are provided by the Central Forecasting Office located at Muscat International Airport and broadcasted from the Muscat coastal radio station at Muscat whose call sign is A4M.
Pakistan is an Issuing Service for METAREA IX of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at sea.

Warnings for Ports
Directorate General of Meteorology (DGMET) issues warnings to ports whenever adverse weather is expected to affect them
The main ports are:
Mina Sultan Qaboos in Muscat
Mina Salalah
Mina Sohar
Wudam Naval Base
Khasab
Qalhat
Al-Duqm

Dissemination of the Tropical Cyclone Warnings
The modes of telecommunication used for the dissemination of tropical cyclone warnings and advisories to different categories of recipients are:
1- Telephones
2- Telefax
3- Internet (E-mail, web site & Facebook and Twitter Page)
4- Short Massages Service (SMS)
5- Wireless Application protocol WAP
6- Voice Mail Pager System
7- Oman Radio
8- Oman Television
Muscat Radio Coastal Station
Cell Broadcast System (CBS)

ANNEX II-G-1

Tropical cyclone warning system in Pakistan

Pakistan Meteorological Department is responsible for the preparation and issuance of tropical cyclone warnings in Pakistan. The tropical cyclone warnings are issued by Marine Meteorology & Tropical Cyclone Warning Centre of PMD.

Tracking of the tropical cyclones

Tracking of the tropical cyclone in Pakistan is done with the help of following:

(i) Conventional surface and upper air observations from inland stations and ships' observations

Model outputs and guidance from the global tropical cyclones warning centres

The NWP products of High resolution Regional Model (implemented at PMD)

(iv) Cyclone detection radar

(v) Meteorological satellites data products.

(vi) AWSs installed at coast along Sindh and Makran (Balochistan)

Tropical cyclone Watch, Alert and Warning

Tropical cyclone Watch, Alert and Warning are issued by PMD's Marine Meteorology & Tropical Cyclone Warning Centre as per following criteria:

Tropical cyclone Watch is issued when a tropical cyclone gets formed or enters the Arabian Sea north of Lat. 10°N. Tropical cyclone Watch is issued irrespective of cyclone's threat to affect Pakistan's coastal areas. The issuance of tropical cyclone Watch requires the concerned authorities to be watchful.

Tropical cyclone Alert is issued when there is likelihood that tropical cyclone may affect Pakistan's coastal areas.

Tropical cyclone Warning is issued when there is very likelihood that tropical cyclone may affect Pakistan coast. Tropical cyclone warnings are issued every three (3) or six (6) hours and/or whenever necessary and imperative.

Tropical cyclone warnings

The bulletins and warnings issued in connection with tropical cyclones in Pakistan are divided into the following broad categories:

Warning bulletins for shipping on the high seas

Warning bulletins for ships plying in the coastal waters

Port warnings

Fisheries warnings

Warnings for Government officials and functionaries including National Disaster Management Authority (NDMA) and Provincial Disaster Management Authorities (PDMAs) and District Management Authorities (DDMAs)

Warnings for recipients who are registered with PMD

Warnings for aviation

Warnings for the general public through electronic and print media

Warnings to CBOs, NGOs and INGOs

Warning to Search and Rescue (SAR) Operations

ANNEX II-G-2

Types of warnings

Bulletins for the high seas

These bulletins are for the shipping interests on the high seas. The area covered includes the North Arabian Sea (north of 20° N). Coverage is shown in Fig. II-C-1
These bulletins are issued by the PMD's Marine Meteorology -Tropical Cyclone Warning Centre, Karachi and are broadcast by the Coastal Radio Stations.

Pakistan is an Issuing Service for METAREA IX of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at sea.

Storm warnings to ports

PMD's Marine Meteorology &Tropical Cyclone Warning Centre issues warnings to the Ports whose parts are likely to be affected by adverse weather. They are also advised to hoist the visual storm warning signals for the benefit of ships at the port and those out at sea. The information is, in most cases, conveyed by facsimile, SMS and telephone. The meaning of the port warning signals used in Pakistan ports is given in Attachment to Annex-II-G.

Dissemination of tropical cyclone warnings

The modes of telecommunication used for the dissemination of tropical cyclone warnings in Pakistan is:
Coastal Radio (ASK)
Telephones
Electronic and print media
Radio Pakistan
Pakistan television
Telex/Telefax
Internet, PMD's website: www.pmd.gov.pk
SMS and
FM radios

The mode of telecommunication differs for different types of messages. When one type of communication channel fails, the alternate channel is used.

Storm Surge Analysis

The storm surge analysis (using IIT_D model) is carried out on the basis of available climatological data for the guidance and awareness of public in general and concerned authorities in particular for preparedness and evacuation of coastal communities and safety of lives and properties; well in advance.

ANNEX II-H-1

Cyclone warning system in Sri Lanka

Organization

The responsibility of the cyclone warning in Sri Lanka rests with the Department of Meteorology, Sri Lanka. Tropical cyclone warnings are provided from the National Meteorological Centre (NMC) Colombo.

When the cyclone is located in the Colombo Flight Information Region, SIGMET/AIRMERT provided by Aviation Meteorological Watch Office, Bandaranaike International Airport Katunayake.

Tracking

Tropical cyclones are tracked with the help of conventional observations, radar, satellite observations and aircraft reports. These are dealt with in more detail in a separate chapter.

Tropical cyclone warnings

Tropical cyclone advisories/ alerts/ warnings are issued under two criteria, viz., Distance from the Coast and Intensity of the System, each criterion having key stages.

(a). Distance Criterion

When a depression or a cyclonic storm is less than 600 km off the coast.

In addition to distance of storm centre from coast, this bulletin indicates forecast conditions on the (a) speed and direction of movement and (b) maximum surface wind speed likely. This bulletin is issued every twelve (12) hours with validity period of 48 to 72 hours and wherever imperative.

When the cyclonic storm is less than 500 km off the coast.

In addition to distance of storm centre from coast, this bulletin indicates forecast conditions on the (a) speed and direction of movement and (b) maximum surface wind speed likely. This bulletin is issued every six (6) hours with validity period of 36 to 48 hours and wherever imperative.

When the cyclonic storm is less than 300 km off the coast.

If landfall is indicated, a bulletin is issued every three (3) hour and wherever imperative. This bulletin includes additional information on point of landfall, landfall time, storm surges and areas likely to be inundated with validity period of 18 hours.

Four colour code with flags are used for easy and quick under standing

Signal No.	Colour	Description	Action required
1	White  Information	Potential area of possibility to development of vortex /disturbance / Cyclone has formed	Information only, Vessels at sea to be vigilant and avoid the area, Listen to media
2	Amber  Alert	Cyclone has formed in the vicinity, Heavy rain and strong wind, rough sea (30-40kts, 50-80kmph)	Stay away from beach/sea, vessels in danger/be inside building
3	Amber  Alert	Cyclone has formed in the vicinity, very heavy rain with very strong winds, very rough seas (Winds > 40kts, 80kmph)	Be ready to leave buildings with weak structures (in relevant areas only) and low lying (flood prone) areas, secure your home/valuables.

4	Red  Warning	Heavy rain with very strong wind >40 kts, cyclone expected to cross land Cyclone is expected to cross land, Very heavy rain/very strong winds (v>50kts,100kmph)	Evacuate to pre-designated safe places
5	Green  Threat over	Cyclone warning cancellation/withdrawal bulletin	

(b). Intensity Criterion (Signal levels)

(i) When the cyclonic storm is less than 300 km off the coast.

If landfall is indicated, a bulletin is issued every three (3) hour and wherever imperative. This bulletin includes additional information on point of landfall, landfall time, storm surges and areas likely to be inundated with validity period of 18 hours.

Tropical cyclone warnings for different users

Relevant Government Officials including HE President & Prime Minister
Disaster Management Centre (DMC)
General Public
Media
The Armed Services & Police
Local Administrations of relevant districts and
Irrigation, National Building Research organization, Ministry of Health, Highways etc.

Specific users

Coastal fishing
Shipping
Port and Habours
Aviation

Tropical cyclonic warnings for the high seas

For the high seas, the tropical cyclone warnings are provided from NMC Colombo and broadcast through the coastal radio station Colombo Radio (4PB). The area covered by the warnings is the Indian Ocean, Arabian Sea and the Bay of Bengal from the equator to 10^0 N between 60^0 E and 95^0 E. The port warning signal used are given in Attachment to Annex II- India is an Issuing Service for METAREA VII(N) of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at Sea.

Dissemination of tropical cyclone warnings

The warnings/bulletins for the high seas are disseminated through Colombo (4PB). Other modes are:

State and Private Radio
State and Private Television
Press/Print Media
Telephones/Pager/ SMS
Police Communication
Tele-printer
Telefax
Internet SLMD website (http://www.meteo.gov.lk)
Through warning towers of Disaster Management Centre
Social Media/Facebook/WhatsApp

ANNEX II-I-1

Cyclone warning system in Qatar

There are no direct impacts of tropical cyclones on the country. However, Qatar Meteorology Department is responsible to provide marine weather-related services to shipping and other coastal communities for the Arabian Gulf (sub area No 5) as part of METAREA IX in cooperation with Pakistan Met Department. Qatar Meteorology Department has a lot of tools and capabilities available to track tropical cyclones such as access of real time satellite and radar images, high resolution numerical weather prediction models as well as real time access to surface, upper air observations and ship reports.

Four colour code with flags are used for easy and quick under standing

Signal No	Colours	Description	Action Required
1	white 	Potential area of possibility to development of vortex /disturbance /	Information only, Vessels at sea to be vigilant and avoid the area, Listen to media
2	 Yellow	Cyclone has formed in the vicinity, heavy rain with strong winds, rough seas (30-40 kts, 55-75kmph)	Stay away from beach/sea, vessels in danger/be inside building/ Be ready to leave weak buildings and low-lying areas (flood prone areas), secure your home valuables
3	Red 	Cyclone is expected to cross land, very heavy rain/very strong winds (v>50kts,100kmph)	Evacuate to predesignated areas
4	Green 	Cyclone warning cancellation/withdrawal bulletin	

(b). Intensity Criterion (Signal levels)

(i) When the cyclonic storm is 300 km off the coast.

In addition to above contents, information on areas likely to be affected are provided. This bulletin is issued every six (6) hours and wherever imperative and

(ii) When the cyclonic storm is 200 km off the coast and if landfall is indicated, a bulletin is issued every three (3) hour and wherever imperative. This bulletin includes additional information on point of landfall, storm surges and areas likely to be inundated.

Tropical cyclone warning

Tropical cyclone warnings for different users

Relevant Government Officials including HE President & Prime Minister
Disaster Management Centre (DMC)
General Public
Media
The Armed Services & Police
Local Administrations of relevant districts and
Irrigation, Highways etc.

Specific users

Coastal fishing
Shipping and
Aviation

Tropical cyclonic warnings for the high seas

For the high seas, the tropical cyclone warnings are provided from NMC Colombo and broadcast through the coastal radio station Colombo Radio (4PB). The area covered by the warnings is the Indian Ocean, Arabian Sea and the Bay of Bengal from the equator to 100 N between 600 E and 950 E. The port warning signal used are given in Attachment to Annex II-H

India is an Issuing Service for METAREA VII(N) of the WWMIWS, and is responsible for broadcasting the products on SafetyNET to mariners at Sea.

Dissemination of tropical cyclone warnings

The warnings/bulletins for the high seas are disseminated through Colombo (4PB). Other general modes are:
State and Private Radio
State and Private Television
Press/Print Media
Telephones/Pager/ SMS
Police Communication
Tele-printer
Telefax
Internet SLMD website (http://www.meteo.gov.lk)
Through warning towers of Disaster Management Centre

ANNEX II-J-1

Tropical cyclone warnings in Thailand

Organization

Tropical cyclone and severe weather warnings and advisories in Thailand are provided by the Thai Meteorological Department (TMD), Thailand, from the Weather Forecast Bureau, TMD Headquarters at Bangkok to the government agencies concerned, specific users, high seas and general public throughout the country.

Tracking of Tropical Cyclones

Tracking of tropical cyclones in Thailand is done with the help of conventional surface and upper air observations, ships and buoy observations, radar and satellites observations, model outputs and guidance from the global tropical cyclones warning centers. These are deal with in more details in a separate chapter.

Tropical Cyclones Warning Procedure

<table>
<tr><th>System Intensity</th><th>Action taken by TMD</th><th>Dissemination and Modes of Telecommunications</th></tr>
<tr><td rowspan="2">Active low trends to be storm (Less than 27 Knots)</td><td rowspan="2">Weather Report will be issued every 6 hours containing information on date and time, weather situation, and weather forecasting.</td><td>To high seas
By broadcasting through the Bangkok coastal radio stations (HSA,) for the areas covered by the Gulf of Thailand, west of Southern Thailand, Strait of Malacca and the South China Sea.
(every 3 hours)</td></tr>
<tr><td>To coastal stations and ports
By: Telephone, Facsimile, Email, SMS, social media (Facebook, Line), Thailand Radios/ and Thailand TVs, TMD Mobile Application, TMD Radio, TMD Website: www.tmd.go.th, http://www.metalarm.tmd.go.th
(every 6 hours)</td></tr>
<tr><td rowspan="3">Tropical depression (27-33 Knots)</td><td rowspan="3">Comprehensive Warning/
Advisory will be issued every 6 hours containing:
Issuing number
(ii) Date and time
(iii) Classification by intensity
(iv) Position of the tropical storm
(v) Central pressure
(vi) Movement the direction and speed
(vii) Wind direction and</td><td>To high seas
By broadcasting through the Bangkok coastal radio stations (HSA,) for the areas covered by the Gulf of Thailand, west of Southern Thailand, Strait of Malacca and the South China Sea.
(every 3 hours)</td></tr>
<tr><td>To coastal stations and ports
By: Telephone, Facsimile, Email, SMS, social media (Facebook, Line), Thailand Radios/ and Thailand TVs, TMD Mobile Application, TMD Radio, TMD Website: www.tmd.go.th, http://www.metalarm.tmd.go.th
(every 6 hours)
Port warning signals used in Thailand Ports are given in Attachment to Annex II-I.</td></tr>
<tr><td>To government agencies concerned namely:
Department of Disaster Prevention and Mitigation (DDPM)</td></tr>
</table>

	maximum wind near the centre (viii) Destination from a coastal point	Port Authority of Thailand (PAT) Marine Department (MD) National Disaster Warning Center (NDWC) Governors of risk provinces **To specific users (aviation, fishery, etc.), media and general public** By: Telephone, Facsimile, Email, SMS, social media (Facebook, Line), Thailand Radios/ and Thailand TVs, TMD Mobile Application, TMD Radio, TMD Website: www.tmd.go.th, http://www.metalarm.tmd.go.th (every 6 hours)
Tropical Cyclones (34 knots and more)	Comprehensive Warning/ Advisory will be issued every 3 hours containing: Issuing number (ii) Date and time (iii) Name of storm (iv) Classification by intensity (v) Position of the tropical storm (vi) Central pressure (vii) Movement the direction and speed (viii) Wind direction and maximum wind near the centre (ix) Destination from a coastal point	**To high seas** By broadcasting through the Bangkok coastal radio stations (HSA,) for the areas covered by the Gulf of Thailand, west of Southern Thailand, Strait of Malacca and the South China Sea. **(every 3 hours)**
		To coastal stations and ports By: Telephone, Facsimile, Email, SMS, social media (Facebook, Line), Thailand Radios/ and Thailand TVs, TMD Mobile Application, TMD Radio, TMD Website: www.tmd.go.th, http://www.metalarm.tmd.go.th **(every 3 hours)** Port warning signals used in Thailand Ports are given in Attachment to Annex II-I.
		To government agencies concerned namely: Department of Disaster Prevention and Mitigation (DDPM) Port Authority of Thailand (PAT) Marine Department (MD) National Disaster Warning Center (NDWC) Governors of risk provinces **To specific users (aviation, fishery, etc.), media and general public** By: Telephone, Facsimile, Email, SMS, social media (Facebook, Line), Thailand Radios/ and Thailand TVs, Mobile Application, TMD Radio, TMD Website: www.tmd.go.th, http://www.metalarm.tmd.go.th **(every 3 hours)**

ANNEX II-K-1

Tropical Cyclone Warning System in United Arab Emirates

Organization

Tropical cyclone warnings and advisories in United Arab Emirates are provided by the Meteorological Department, National Center of Meteorology (NCM) in cooperation with the National Emergency Crisis and Disasters Management Authority (NCEMA).

Tracking of tropical cyclones

The tropical cyclones tracking is done through satellite Imageries, conventional surface, ship and upper air observations, weather radar, regional Model outputs and RSMCs reports.

Tropical cyclone warning

Tropical cyclone warnings are provided for:
National Emergency Crisis and Disasters Management Authority (NCEMA).
Ministry of Interior (MOI).
Coast Guard.

General public.
(ii) Sea Ports.
(iii) Gas, Oil and shipping Marine companies.
(iv) Civilian and military aviation.
Governmental and non-Governmental entities.

Dissemination of the Tropical Cyclone Warnings

The modes of telecommunication used for the dissemination of tropical cyclone warnings and advisories to different categories of recipients are:
Hot line landline and hot mobile-line connected with stakeholders.
Secured intranet connected with stakeholders.
Decoded fax-ware connected with stakeholders.
Internet (E-mail, website: ncm.ae & albahar.ncm.ae, mobile applications, social media).
SMStext messages.
Media (Local radio channels, local TV channels, local press).

Attachment to ANNEX II-B

Day Signals*	Specifications	Night Signals*	Remarks

Bangladesh (8.XI.1976)

Signals Meant for Maritime Ports

16a I. Distant Cautionary Signal Number One 3b)

There is a region of squally weather in which a storm may be forming (well marked low or depression with surface winds up to 61 km/h. (33 knots))) These signals indicate that ships may be exposed to danger after leaving the harbour

10a II. Distant Warning Signal Number Two 2b)

A storm has formed (cyclonic storm with surface winds 62-88 kmph. (34-47 knots)

3a III. Local Cautionary Signal Number Three 5b)

The port is threatened by squally weather (cyclonic circulation with surface winds 40-50 km/h. (22-27 knots)) or squalls due Nor'westers)) These signals indicate that the port itself and the ships in it are in danger

2a IV. Local Warning Signal Number Four 4b)

The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution (cyclonic circulation with surface winds 51-61 km/h. (28-33 knots))

17a V. Danger Signal Number Five 16b)

The port will experience severe weather from a storm of light or moderate intensity (wind speed of 62-88 km/h (34-47 knots) That is expected to cross the coast to the South of Chattogram Port or Cox's Bazar Port and to the east of Mongla Port) These signals indicate that the port itself and the ships in it are in danger

* The national systems of visual storm warning signals (day signals and night signals) are reproduced in WMO Publication - WMO-No. 9, TD. 4, Volume D, Part D - Visual Storm Warning Signals Annexes II and III respectively.

Bangladesh - continued

Day Signals*	Specifications	Night Signals*	Remarks
18a VI. Danger Signal Number Six		17b	
The port will experience severe weather from a storm, of light or moderate intensity that is expected to cross the coast to the north of the port Chattogram (or Cox's Bazra and to the west of the port of Mongla) (wind speed same as in Signal No. V)			
19a VII. Danger Signal Number Seven		18b	
The port will experience severe weather from a storm of light or moderate intensity that is expected to cross over or near to the port (wind speed as in Signal No. V)			
20a VIII. Great Danger Signal Number Eight		19b	
The port will experience severe weather from a storm of great intensity (wind speed of 89 km/h or 48 knots or more) that is expected to cross the coast to the south of the port of Chattogram or Cox's Bazra and to the east of the port of Mongla.			These signals indicate that the port itself and the ships in it are in danger
21a IX. Great Danger Signal Number Nine		20b	
The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the north of the port of Chattogram or Cox's Bazar and to the west of the port Mangla) (wind speed same as in Signal No. VIII)			

* See footnote on page 1 of Attachment to Annex II-B

Bangladesh - continued

Day Signals*	Specifications	Night Signals*	Remarks
22a X.	Great Danger Signal Number Ten The port will experience severe weather from a storm of great intensity that is expected to cross the coast over or near to the port (wind speed same as in Signal No. VIII)	21b	these signals indicate that the port itself and the ships in it are in danger
23a XI.	Failure of Communications Communications with the Meteorological Warning Centre have broken down and the local officer considers that a devastating cyclone is following.	7b	
	Signals Meant for River Ports		
24a (I)	Cautionary Signal Number One	5b	
	The area is threatened by squally winds of transient nature (Nor'wester squalls) of wind speed not exceeding 60 km/h (32 knots).		these signals are used for the river ports, river and police stations in Bangladesh
	A storm (wind speed of 61 km/h) or a nor'wester (wind speed 61 km/h or more) is likelt to strike the area (vessels of 65 feet and under in length are to seek shelter immediately)		these signals are used for the river ports, river and police stations in Bangladesh
2a (III)	Danger Signal Number Three	2b	
	A storm (wind speed of 62-88 km/h or more) is likely to strike the area soon (All vessel will seek shelter immediately).		

*****See footnote on page 1 of Attachment to Annex II-B

Day Signals*	Specifications	Night Signals*	Remarks
10a (IV)	Great Danger Signal Number Four A violent storm (wind speed of 89 km/h or more) will strike the area soon (All vessels will take shelter immediately).	31b	

Attachment to Annex II-C1

Bulletins issued by India for Indian coast

1. **EXTENDED RANGE OUTLOOK FOR CYCLOGENESIS:**

   Same as issued for PTC member countries

2. Special Message at the stage of Low pressure area

Example 01: Special message/National bulletin in association with Low pressure area

India Meteorological Department

(Ministry of Earth Sciences)

National Bulletin No. 1 (BOB/08/2025)

TIME OF ISSUE: 1300 HOURS IST **DATED: 25.11.2025**

FROM: INDIA METEOROLOGICAL DEPARTMENT (FAX NO. 24643965/24699216/24623220)

TO: CONTROL ROOM, NDM, MINISTRY OF HOME AFFAIRS (FAX.NO. 23093750)
CONTROL ROOM NDMA (FAX.NO. 26701729)
CABINET SECRETARIAT (FAX.NO.23012284, 23018638)
PS TO HON'BLE MINISTER FOR S & T AND EARTH SCIENCES (FAX NO.23316745)
SECRETARY, MOES (FAX NO. 24629777)
H.Q. (INTEGRATED DEFENCE STAFF AND CDS) (FAX NO. 23005137/23005147)
DIRECTOR GENERAL, DOORDARSHAN (23385843)
DIRECTOR GENERAL, AIR (23421105, 23421219)
PIB MOES (FAX NO. 23389042)
UNI (FAX NO. 23355841)
D.G. NATIONAL DISASTER RESPONSE FORCE (NDRF) (FAX NO. 26105912, 2436 3260) DIRECTOR, PUNCTUALITY, INDIAN RAILWAYS (FAX NO. 23388503)
CHIEF SECRETARY, ODISHA (FAX NO. 0674-2536660)
CHIEF SECRETARY, WEST BENGAL (FAX NO. 033-22144328)
CHIEF SECRETARY, ANDAMAN & NICOBAR ISLANDS (FAX NO. 03192-232656)
CHIEF SECRETARY, TAMIL NADU (FAX NO. 044-25672304)
CHIEF SECRETARY, ANDHRA PRADESH (FAX NO. 0863-2441029)
CHIEF SECRETARY, PUDUCHERRY (FAX NO. 0413-2334145)
CHIEF SECRETARY, KERALA (FAX NO. 0471-2327176)
CHIEF SECRETARY, LAKSHADWEEP (FAX NO. 048-96268124)

Subject: (A) Depression over Strait of Malacca and (B) Low pressure area over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean

Depression over Strait of Malacca

Yesterday's well marked low pressure area over Malaysia and adjoining Strait of Malacca moved west-northwestwards, intensified into a depression and lay centred at 0830 hours IST of today, the 25th November, 2025 over Strait of Malacca, near latitude 5.4°N and longitude 99.7°E, about 70 km west of George Town (Malaysia), 290 km east of Kuta Makmur (Indonesia), 740 km east-southeast of Nancowry (Nicobar Islands) and 870 km east-southeast of Car Nicobar (Nicobar Islands).

It is very likely to move slowly west-northwestwards and intensify further during next 48 hours.

Low pressure area over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean

Under the influence of yesterday's upper air cyclonic circulation over Comorin area and neighbourhood, a low-pressure area formed over the Comorin and adjoining areas of southwest Bay of Bengal & Sri Lanka at 0530 hours IST of today, the 25th November, 2025. It lay over southwest Bay of Bengal and adjoining areas of South Sri Lanka & Equatorial Indian Ocean at 0830 hours IST of today, the 25th November, 2025. It is very likely to move north-northwestwards and become well marked low pressure area during next 24 hours and intensify further into a depression during subsequent 24 hours.

Rainfall Warning:

Nicobar Islands: Light to moderate rainfall at many places with **heavy rainfall (07-11 cm)** at isolated places is very likely on 25th November. Thereafter, it is very likely to increase becoming light to moderate rainfall at most places with **heavy to very rainfall (07-20 cm)** at isolated places during 26th to 27th November. It would decrease gradually becoming **heavy rainfall** at isolated places during 28th and 29th November, 2025.

Andaman Islands: Light to moderate rainfall at many places with **heavy rainfall** at isolated places is also likely during 26th to 28th November. Thereafter, it would decrease gradually.

Tamil Nadu & Puducherry: Light to moderate rainfall at many places with **heavy rainfall** at isolated places during 25th to 27th November, 2025. The rainfall activity would increase thereafter and light to moderate rainfall at most places with **heavy to very rainfall** at isolated places is very likely during 28th to 30th November, 2025. Thereafter, it will decrease gradually.

Kerala: Light to moderate rainfall at many places with **heavy rainfall** at isolated places is very likely during 25th to 26th November. Thereafter, it will decrease gradually.

Andhra Pradesh: Light to moderate rainfall at many places with **heavy rainfall** at isolated places is very likely on 29th November. Thereafter, it is very likely to increase becoming light to moderate rainfall at most places with **heavy to very rainfall** at isolated places on 30th November. It would then decrease gradually becoming light to moderate rainfall at many places with **heavy rainfall** at isolated places on 1st December.

Wind Warning:

South Andaman Sea, Strait of Malacca and along & off Nicobar Islands & adjoining Malaysia, western Indonesia & Thailand:

Squally weather with wind speed reaching 40-50 gusting to 60 kmph is very likely to prevail on 25th November. Winds speed would gradually increase becoming squally winds reaching 50-60 gusting to 70 kmph during 26th to 28th November. The winds speed would gradually decrease thereafter.

Adjoining areas of North Andaman Sea

Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely to prevail during 25th to 28th November.

Southeast Bay of Bengal:

Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely on 25th November. It would gradually increase becoming squally winds speed reaching 45-55 gusting to 65 kmph during 26th to 28th November.

Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts
Squally weather with wind speed reaching 35-45 kmph gusting to 55 kmph likely to prevail during 25th to 26th November. It is very likely to increase becoming squally winds speed reaching 45-55 kmph gusting to 55 kmph from 27th morning and 55-65 gusting to 75 kmph during 28th to 30th November.

Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast:
Squally weather with wind speed reaching 35-45 kmph gusting to 55 kmph likely to prevail during 25th to 27th November.

(e) Westcentral Bay of Bengal and along & off Andhra Pradesh coast:
Squally weather with wind speed reaching 35-45 kmph gusting to 55 kmph likely to commence from 27th November. It is very likely to increase thereafter, becoming squally winds speed reaching 40-50 kmph gusting to 60 kmph during 28th – 30th November.

Sea Condition:

South Andaman Sea, Strait of Malacca and along & off Nicobar Islands & adjoining Malaysia, western Indonesia & Thailand:
Rough to very rough sea conditions are very likely during 25th to 27th November. Sea condition would gradually improve thereafter.

Adjoining areas of North Andaman Sea
Moderate to rough sea conditions are very likely during 25th to 28th November.

Southeast Bay of Bengal:
Moderate to rough sea conditions are very likely on 25th November, becoming rough to very rough during 26th to 28th November.

Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts
Moderate to rough sea conditions are very likely on 25th and 26th November, becoming rough to very rough from 27th to 30th November.

Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast:
Moderate to rough sea conditions are very likely during 25th to 27th November.

(e) Westcentral Bay of Bengal and along & off Andhra Pradesh coast:
Moderate to rough sea conditions are very likely from 27th November, becoming rough to very rough during 28th to 30th November.

Fishermen Warning:

Fishermen are advised not to venture into

- South Andaman Sea, Strait of Malacca and along & off Nicobar Islands & adjoining Malaysia, western Indonesia & Thailand till 28th November.
- Southeast Bay of Bengal during 25th to 28th November.
- Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts till 30th November

- Adjoining areas of westcentral Bay of Bengal and along & off Andhra Pradesh coast from 27th to 30th November
- Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast during 25th to 27th November.
- Those out at sea should avoid South Andaman Sea, Strait of Malacca and along & off Nicobar Islands & adjoining Malaysia, western Indonesia & Thailand till 28th, Southeast Bay of Bengal during 26th to 28th, southwest Bay of Bengal till 30th and westcentral Bay of Bengal during 27th to 30th November.
- The fishermen along & off South Andhra Pradesh coast should return to coast before 27th November.

Impact Expected over Andaman & Nicobar Islands, Tamil Nadu & Puducherry, Kerala and Lakshadweep

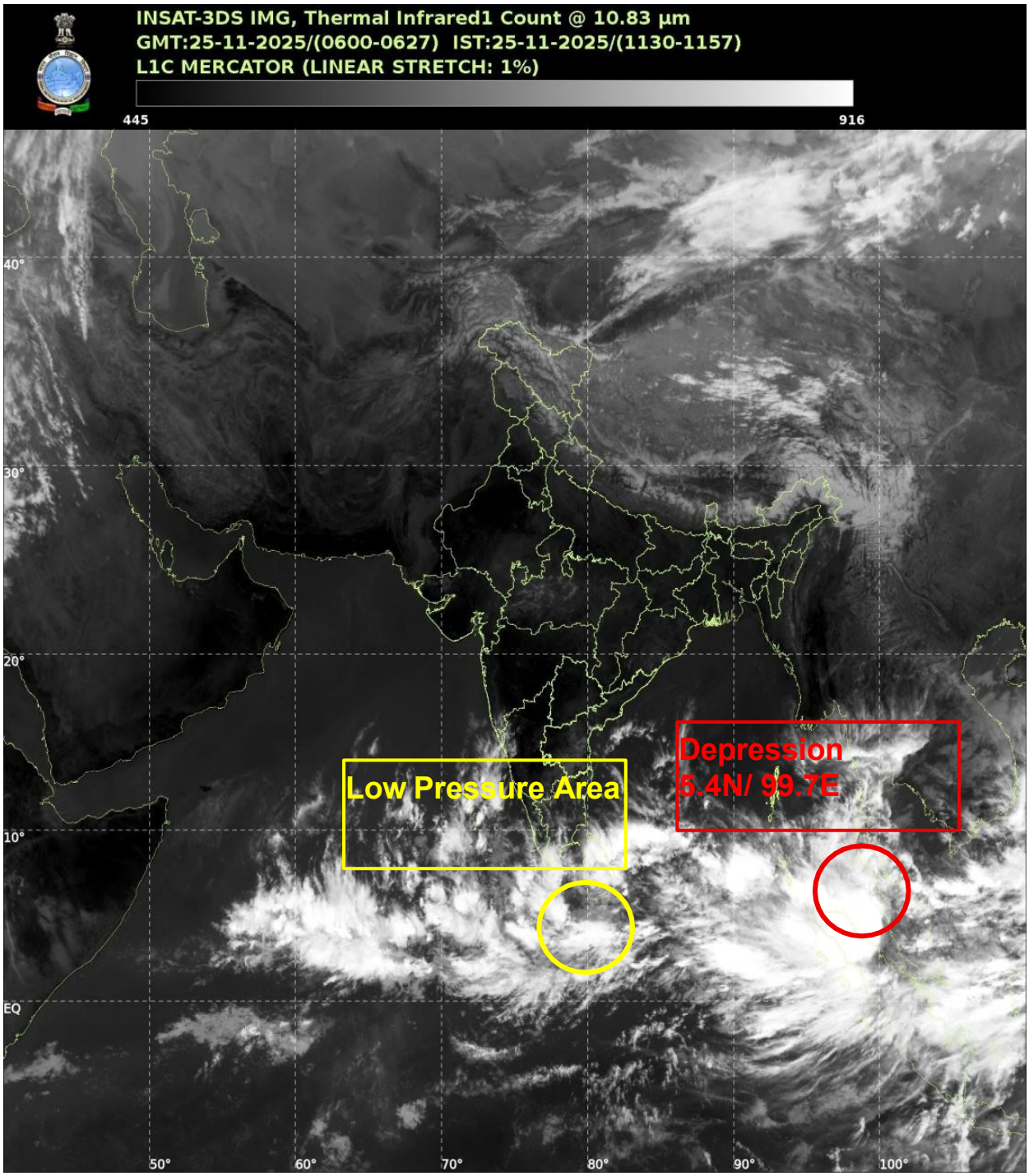
- Minor damage to Kutcha and some damage to Pucca roads. Flooding of escape routes.
- Damage to horticulture and standing crops due to inundation and wind.
- Localized Flooding of roads, water logging in low lying areas and closure of underpasses mainly in urban areas of the above region.
- Occasional reduction in visibility due to heavy rainfall.
- Disruption of traffic in city areas and roadways due to water logging in roads and poor visibility due to heavy rain leading to increased travel time and incidents
- Likely disruption of marine and inland water transportation like small boats and trawlers.
- Movement in motor boats unsafe

Action Suggested over Andaman & Nicobar Islands Tamil Nadu & Puducherry, Kerala and Lakshadweep

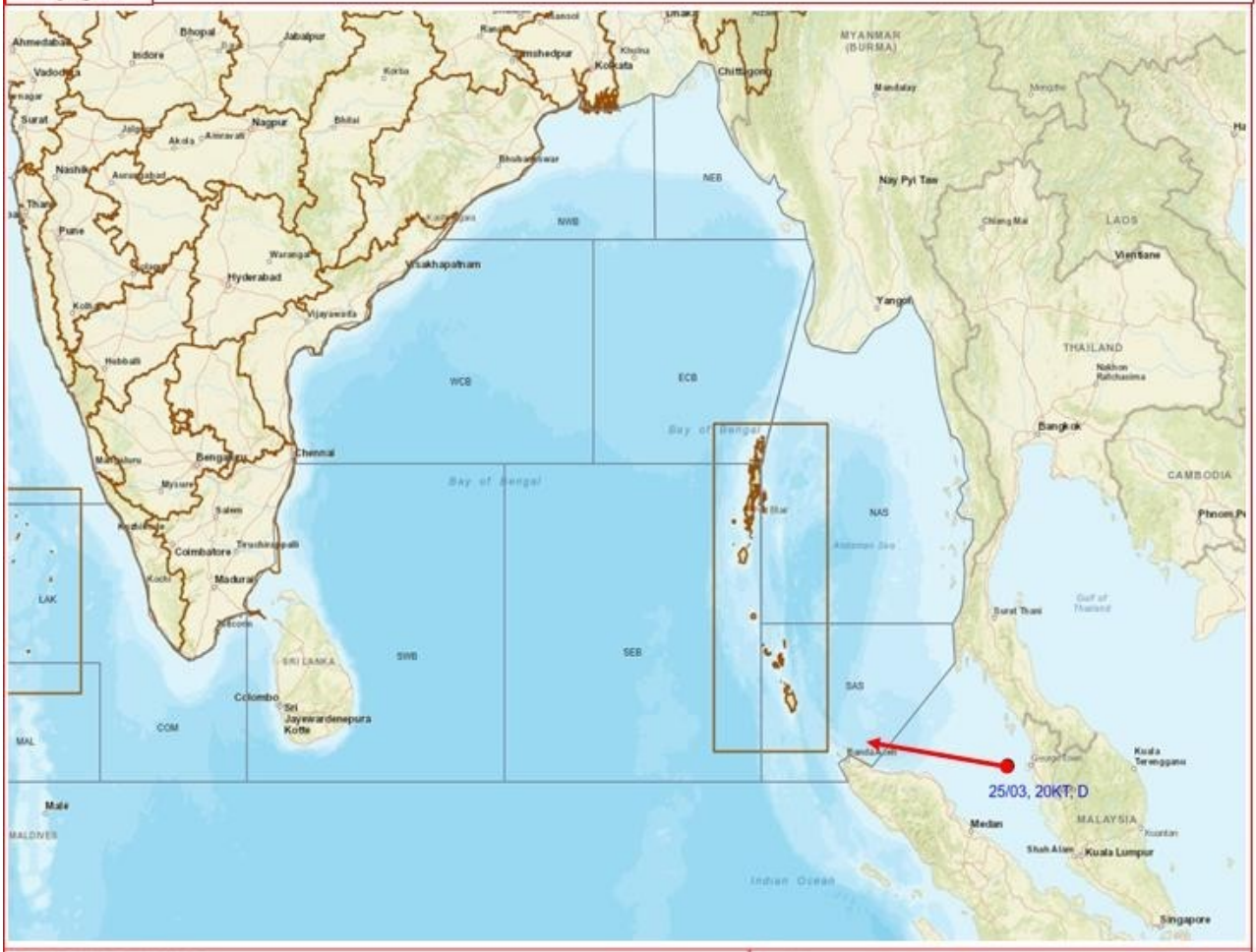
- Judicious regulation of onshore/offshore, Port and maritime activities
- Judicious regulation of tourism activities in coastal areas.
- Judicious regulation of surface transports including railways and roadways.
- Avoid going to areas that face the water logging problems often.

Next bulletin will be issued at 1430 hours IST of today, the 25th November, 2025.

Copy to: ACWC Kolkata/ACWC Chennai/CWC Bhubaneswar/CWC Vishakhapatnam/CWC Thiruvananthapuram/ Meteorological Centre Port Plair/ and Meteorological Centre Amaravati/ Meteorological Centre Port Blair


INSAT-3DS IMG, Thermal Infrared1 Count @ 10.83 µm
GMT:25-11-2025/(0600-0627) IST:25-11-2025/(1130-1157)
L1C MERCATOR (LINEAR STRETCH: 1%)
445
916
40°
30°
20°
10°
EQ
50°
60°
70°
80°
90°
100°
Low Pressure Area
Depression
5.4N/ 99.7E

OBSERVED AND FORECAST TRACK OF DEPRESSION OVER STRAIT OF MALACCA BASED ON 0300 UTC (0830 Hrs. IST) OF 25TH NOVEMBER 2025.



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

WEATHER WARNING GRAPHICS

Heavy Rain

Very Heavy Rain

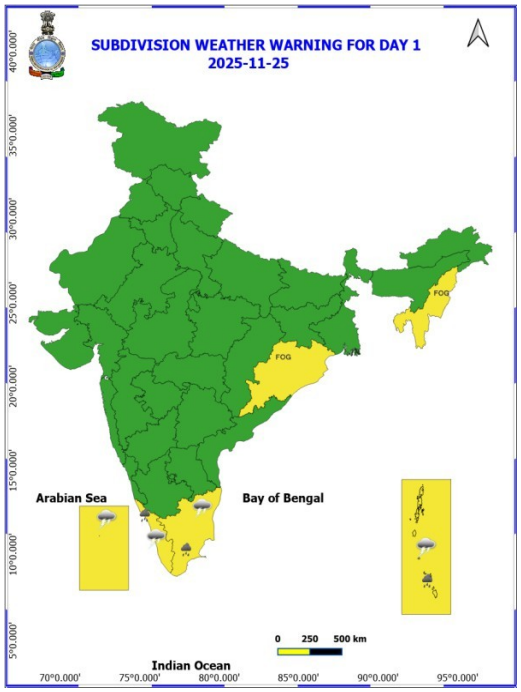
Extremely Heavy Rain

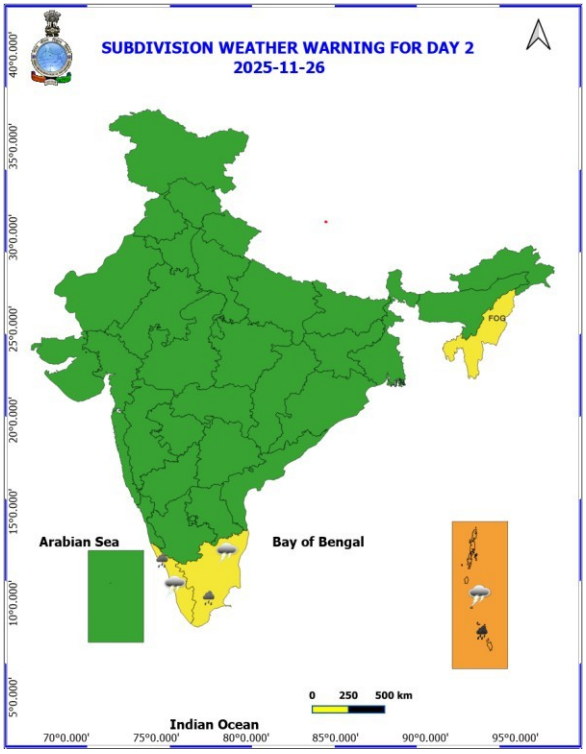
COLOUR CODED WARNING

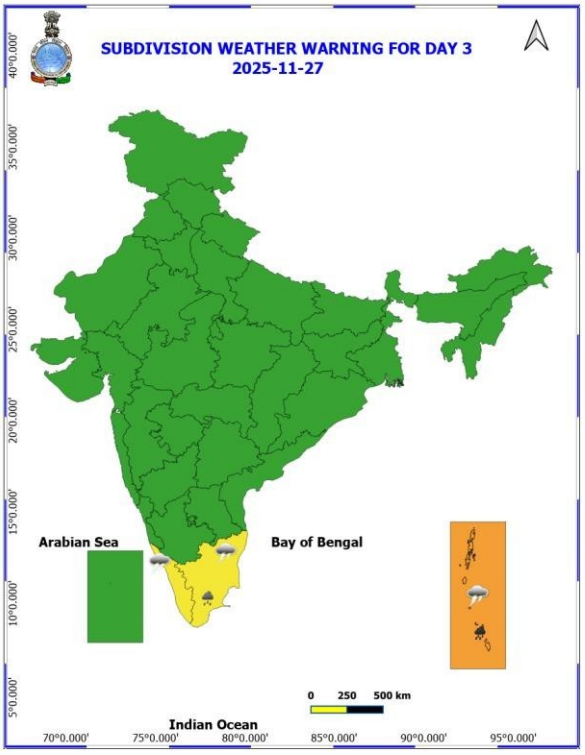
No Warning (No Action)
Watch (Be Aware)
Alert (Be Prepared To Take Action)
Warning (Take Action)

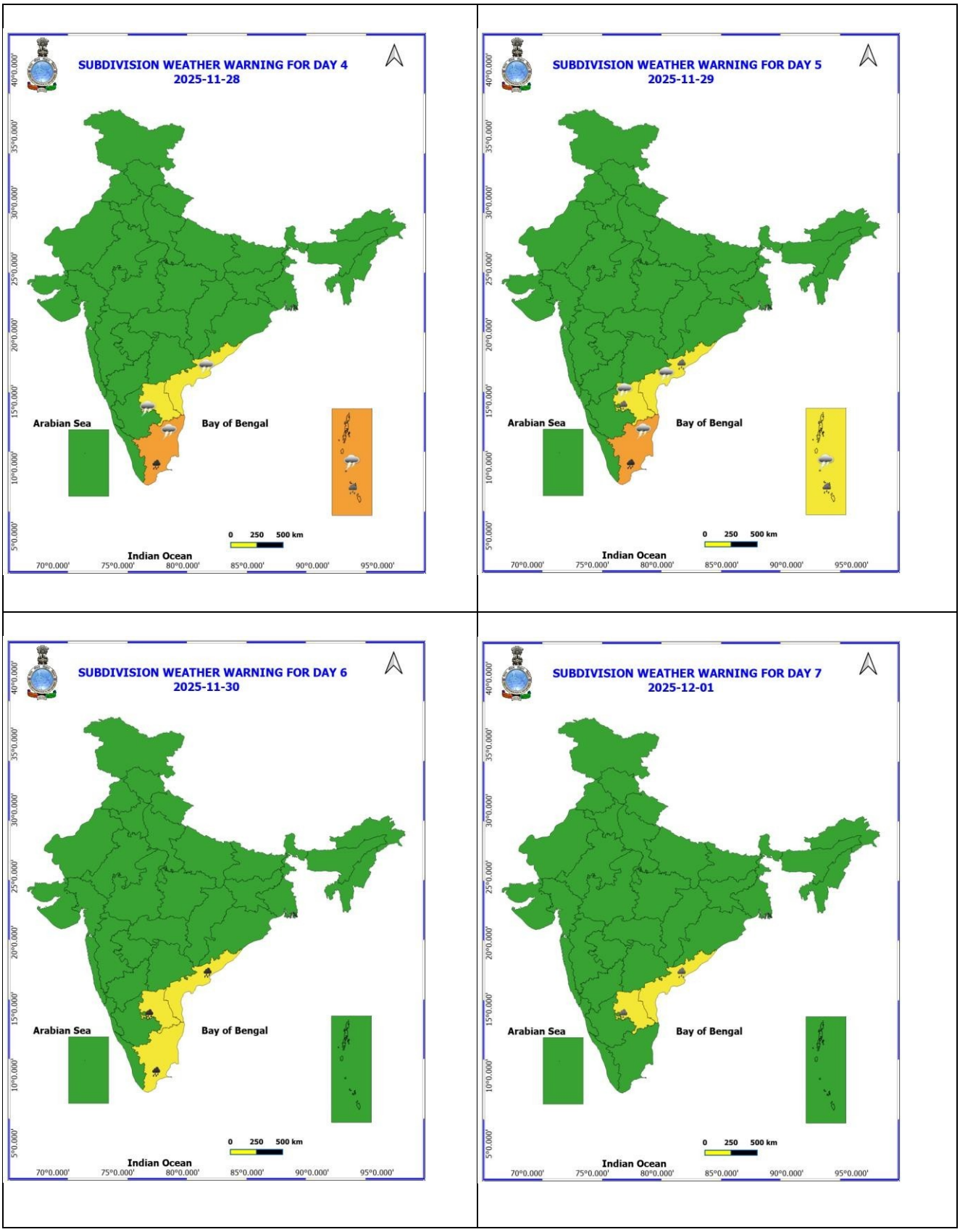
Probabilistic Forecast

Terms	Probability of Occurrence (%)
Unlikely	< 25
Likely	25 - 50
Very Likely	50 - 75
Most Likely	> 75

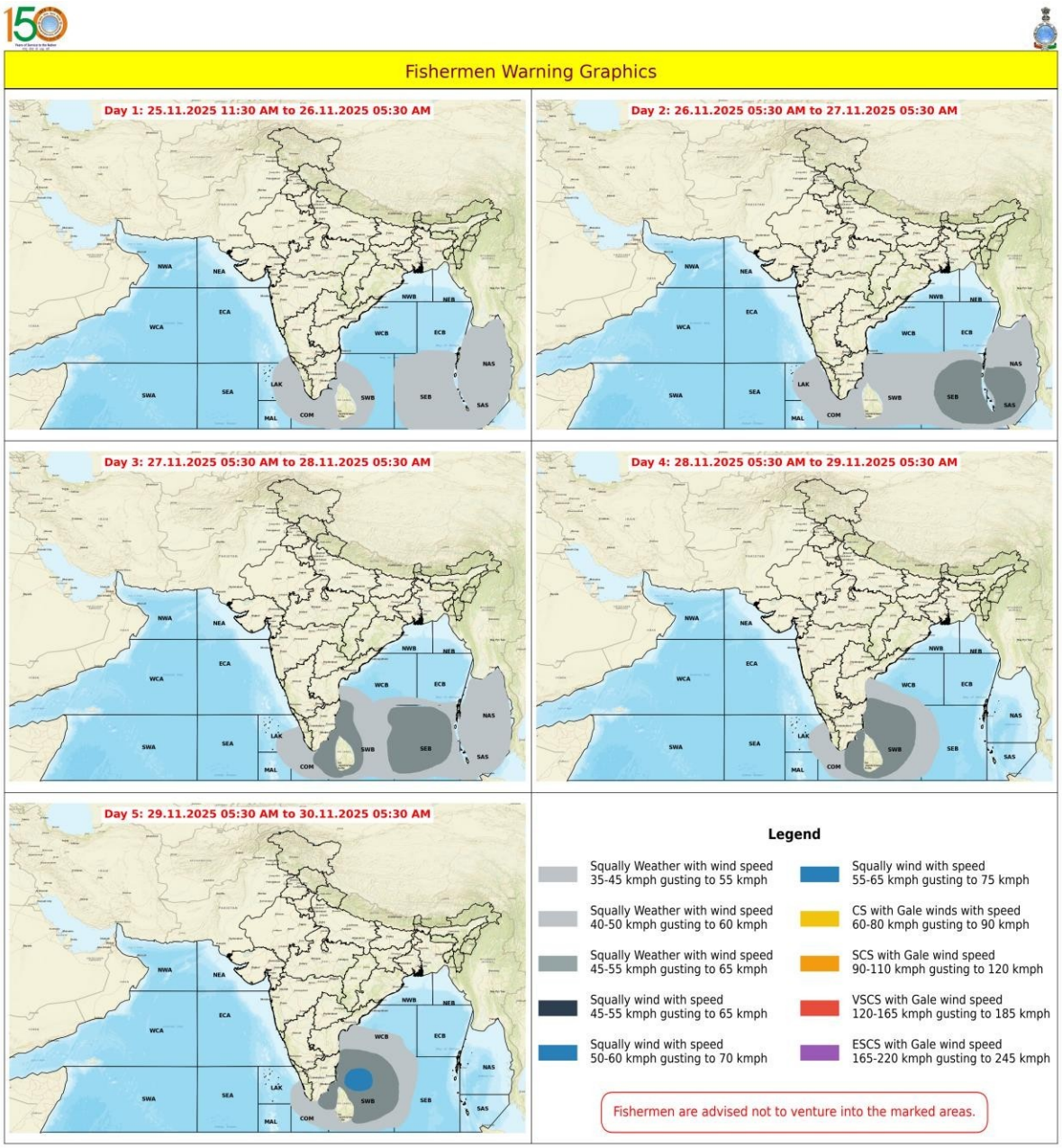








Action may be taken based on ORANGE AND RED COLOUR warnings.
Vulnerable regions likely urban and hilly areas action may be initiated for heavy rainfall warning.
As the lead period increases forecast accuracy decreases.


Fishermen Warning Graphics
Day 1: 25.11.2025 11:30 AM to 26.11.2025 05:30 AM
Day 2: 26.11.2025 05:30 AM to 27.11.2025 05:30 AM
Day 3: 27.11.2025 05:30 AM to 28.11.2025 05:30 AM
Day 4: 28.11.2025 05:30 AM to 29.11.2025 05:30 AM
Day 5: 29.11.2025 05:30 AM to 30.11.2025 05:30 AM
NWA
NEA
NWB
NER
WCA
ECA
WCB
ECB
NAS
SWA
SEA
LAK
SWB
SEB
SAS
MAL
COM
Legend
Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
Squally Weather with wind speed 40-50 kmph gusting to 60 kmph
Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 50-60 kmph gusting to 70 kmph
Squally wind with speed 55-65 kmph gusting to 75 kmph
CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph
Fishermen are advised not to venture into the marked areas.

Example 02: National bulletin associated with cyclonic storm DITWAH.

India Meteorological Department
(Ministry of Earth Sciences)

National Bulletin No. 15 (BOB/08/2025)

TIME OF ISSUE: 1540 HOURS IST **DATED: 27.11.2025**

FROM: INDIA METEOROLOGICAL DEPARTMENT (FAX NO. 24643965/24699216/24623220)

TO: CONTROL ROOM, NDM, MINISTRY OF HOME AFFAIRS (FAX.NO. 23093750)
CONTROL ROOM NDMA (FAX.NO. 26701729)
CABINET SECRETARIAT (FAX.NO.23012284, 23018638)
PS TO HON'BLE MINISTER FOR S & T AND EARTH SCIENCES (FAX NO.23316745) SECRETARY, MOES (FAX NO. 24629777)
H.Q. (INTEGRATED DEFENCE STAFF AND CDS) (FAX NO. 23005137/23005147) DIRECTOR GENERAL, DOORDARSHAN (23385843)
DIRECTOR GENERAL, AIR (23421105, 23421219) PIB MOES (FAX NO. 23389042)
UNI (FAX NO. 23355841)
D.G. NATIONAL DISASTER RESPONSE FORCE (NDRF) (FAX NO. 26105912, 2436 3260) DIRECTOR, PUNCTUALITY, INDIAN RAILWAYS (FAX NO. 23388503)
CHIEF SECRETARY, ODISHA (FAX NO. 0674-2536660)
CHIEF SECRETARY, WEST BENGAL (FAX NO. 033-22144328)
CHIEF SECRETARY, ANDAMAN & NICOBAR ISLANDS (FAX NO. 03192-232656)
CHIEF SECRETARY, TAMIL NADU (FAX NO. 044-25672304)
CHIEF SECRETARY, ANDHRA PRADESH (FAX NO. 0863-2441029) CHIEF SECRETARY, PUDUCHERRY (FAX NO. 0413-2334145) CHIEF SECRETARY, KERALA (FAX NO. 0471-2327176)
CHIEF SECRETARY, LAKSHADWEEP (FAX NO. 048-96268124)

Subject: (A) Cyclonic Storm Ditwah [Pronunciation: Ditwah] over southwest Bay of Bengal and adjoining Sri Lanka Coast: Pre-Cyclone Watch for north Tamil Nadu & Puducherry and adjoining south Andhra Pradesh coasts (Yellow Message) and (B) Depression [Remnant of Cyclonic Storm "Senyar"] over the Strait of Malacca

(A) Cyclonic Storm Ditwah over southwest Bay of Bengal and adjoining Sri Lanka Coast

The Deep Depression over southwest Bay of Bengal and adjoining Sri Lanka coast moved north-northwestwards with the speed of 15 kmph during past 6 hours, intensified into the **Cyclonic Storm Ditwah [Pronunciation: Ditwah]** and lay centered at 1130 hrs IST of today, the 27th November 2025 over the same region near latitude 6.9°N and longitude 81.9°E, close east of Pottuvil (Sri Lanka), about 90 km south-southeast of Batticaloa (Sri Lanka), 120 km northeast of Hambantota (Sri Lanka), 200 km south-southeast of Trincomalee (Sri Lanka), 610 km south-southeast of Puducherry (India) and 700 km south-southeast of Chennai (India).

It is very likely to continue to move north-northwestwards across southwest Bay of Bengal & adjoining Sri Lanka coast and reach over southwest Bay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November.

Forecast track and intensity are given in Table below

Date/Time (IST)	Position (Lat. °N/ Long. °E)	Maximum Sustained Surface Wind Speed (Kmph)	Category Of Cyclonic Disturbance
27.11.25/1130	6.9/81.9	60-70 gusting to 80	Cyclonic Storm
27.11.25/1730	7.5/81.6	65-75 gusting to 85	Cyclonic Storm
27.11.25/2330	8.0/81.3	65-75 gusting to 85	Cyclonic Storm
28.11.25/0530	8.6/81.1	70-80 gusting to 90	Cyclonic Storm
28.11.25/1130	9.1/80.9	70-80 gusting to 90	Cyclonic Storm
28.11.25/2330	9.7/80.8	75-85 gusting to 95	Cyclonic Storm
29.11.25/1130	10.5/80.6	80-90 gusting to 100	Cyclonic Storm
29.11.25/2330	11.4/80.5	80-90 gusting to 100	Cyclonic Storm
30.11.25/1130	12.2/80.5	70-80 gusting to 90	Cyclonic Storm
30.11.25/2330	12.9/80.5	65-75 gusting to 85	Cyclonic Storm

(B) Depression [Remnant of Cyclonic Storm "Senyar"] over the Strait of Malacca

The **Deep Depression** [**Remnant of Cyclonic Storm "Senyar"**] over the Strait of Malacca moved nearly eastwards with a speed of 12 kmph in past 6 hours, weakened into a depression and lay centred at 1130 hours IST of today, the 27th November 2025 over the same region near latitude
3.6°N and longitude 99.8°E, about 210 km south-southwest of George Town (Malaysia), 340 km east-southeast of Kuta Makmur (Indonesia), 850 km east-southeast of Nancowry (Nicobar Islands) and 990 km southeast of Car Nicobar (Nicobar Islands).

It is very likely to move nearly eastwards and weaken further into a well marked low pressure area during next 12 hours.

(i) Rainfall Warning:

- **Tamil Nadu & Puducherry**: Light to moderate rainfall at many places with **heavy rainfall** at isolated places during 27th November, 2025. The rainfall activity would increase thereafter and light to moderate rainfall at most places with **heavy to very heavy at many places & extremely heavy rainfall (>20 cm**) **at isolated places** on 28th and 29th November, 2025. Thereafter, it would gradually decrease with light to moderate rainfall at many places with **heavy to very heavy rainfall** at isolated places on 30th November, 2025.

- **Coastal Andhra Pradesh**: Light to moderate rainfall at many places with **heavy rainfall** at isolated places is very likely over south coastal Andhra Pradesh on 28th November. Thereafter, it is very likely to increase becoming light to moderate rainfall at most places with **heavy to very rainfall** at isolated places on 29th November and **heavy to very heavy at a few places & extremely heavy rainfall (>20 cm**) **at isolated places on 30th November**. It would then decrease gradually becoming light to moderate rainfall at many places with **heavy to very heavy rainfall** at isolated places on 1st December and **heavy rainfall** at isolated places on 02nd December.

- **Rayalaseema:** Light to moderate rainfall at many places with **heavy rainfall** at isolated places is very likely on 28th November. Thereafter, it is very likely to increase becoming light

to moderate rainfall at most places with **heavy to very rainfall** at isolated places on 29th November and **heavy to very heavy at a few places & extremely heavy rainfall (>20 cm**) **at isolated places on 30th November**. It would then decrease gradually becoming light to moderate rainfall at many places with **heavy rainfall** at isolated places on 1st December.

- **Kerala & Mahe:** Light to moderate rainfall at many places with **heavy rainfall** at isolated places is very likely during 27th-29th November.

- **Telangana:** Light to moderate rainfall at a few places with **heavy rainfall** at isolated places is very likely on 30th November and 01st December.

(ii) Wind Warning:

(a) Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts

Gale wind speed reaching 60-70 gusting to 80 kmph is prevailing and is likely to increase further becoming 70-80 kmph gusting to 90 kmph by 28th morning. Thereafter, the winds would continue to increase becoming 80-90 kmph gusting to 100 kmph by 29th morning till 30th morning. Thereafter it is likely to decrease gradually becoming 65-75 gusting to 85 kmph by 30th midnight.

(b) Adjoining Westcentral Bay of Bengal and along & off Andhra Pradesh coast:
Squally weather with wind speed reaching 35-45 kmph gusting to 55 kmph is prevailing. It is very likely to increase becoming squally winds speed reaching 50-60 kmph gusting to 70 kmph from 28th evening and Gale wind speed reaching 60-70 kmph gusting to 80 kmph from 29th evening till 30th November. Thereafter it is likely to decrease gradually on 01st December.

(c) Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast:
Squally weather with wind speed reaching 40-50 kmph gusting to 60 kmph likely to prevail during 27th-29th November.

(d) adjoining Southeast Bay of Bengal:
Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely till 28th November.

(e) Strait of Malacca, Malaysia and adjoining areas of South Andaman Sea, along & off Nicobar Islands, Indonesia, and Thailand:
Squally winds speed reaching 45-55 gusting to 65 kmph is prevailing and likely to decrease gradually becoming 40-50 gusting to 60 kmph by evening of today, the 27th November.

(f) Adjoining areas of North Andaman Sea
Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely to prevail on 27th November.

(iii) Sea Condition:

(a) Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts
Sea conditions would be high till 01st December morning. It is likely to improve gradually thereafter.

(b) Adjoining Westcentral Bay of Bengal and along & off Andhra Pradesh coast:

Rough sea conditions are prevailing. It is very likely to become rough to very rough from 28th evening and very rough to High from 29th evening till 30th November. Thereafter it is likely to improve gradually on 01st December.

(c) Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast:

Rough to very rough sea conditions are likely to prevail during 27th-29th November.

(d)adjoining Southeast Bay of Bengal:

Rough sea conditions are very likely to prevail till 28th November.

(e)Strait of Malacca, Malaysia and adjoining areas of South Andaman Sea, along & off Nicobar Islands, Indonesia, and Thailand:

Sea conditions would be rough on today, the 27th November.

(f) Adjoining areas of North Andaman Sea

Sea conditions would be moderate today, the 27th November.

(iv) Fishermen Warning:

(a) Total suspension of fishing operations in coastal areas of Sri Lanka, Tamil Nadu, Puducherry and south Andhra Pradesh coasts till 01st December.

(b) Fishermen are advised not to venture into:

(i) Southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts till 01st December.
(ii) Adjoining areas of Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast till 30th November.
(iii) Southeast Bay of Bengal till 28th November.
(iv) Adjoining areas of westcentral Bay of Bengal and along & off Andhra Pradesh coast from 27th to 30th November
(v) Indonesia & Malaysia, Strait of Malacca, and adjoining areas of South Andaman Sea, along & off Nicobar Islands, and Thailand till 28th November.

(c) Those out at sea should avoid southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry & Sri Lanka coasts; adjoining westcentral Bay of Bengal till 01st December and Southeast Arabian Sea, Lakshadweep, Maldives and along & off Kerala coast till 30th November.

(d) The fishermen along & off South Andhra Pradesh coast should return to coast.

(v) Impact Expected and Action Suggested due to heavy rain and strong winds (Tamil Nadu, Puducherry and south Andhra Pradesh)

Impact Expected

- Major damage to thatched houses/ huts. Roof tops may blow off. Unattached metal sheets may fly.
- Damage to power and communication lines.
- Major damage to Kutcha and some damage to Pucca roads. Flooding of escape routes.
- Breaking of tree branches, uprooting of large avenue trees. Large-scale damage to banana and papaya trees. Large dead limbs blown from trees.
- Damage to paddy crops, horticultural and standing crops and orchards due to inundation & winds.
- Inundation of low-lying areas in coastal districts due to heavy rainfall and flash flood

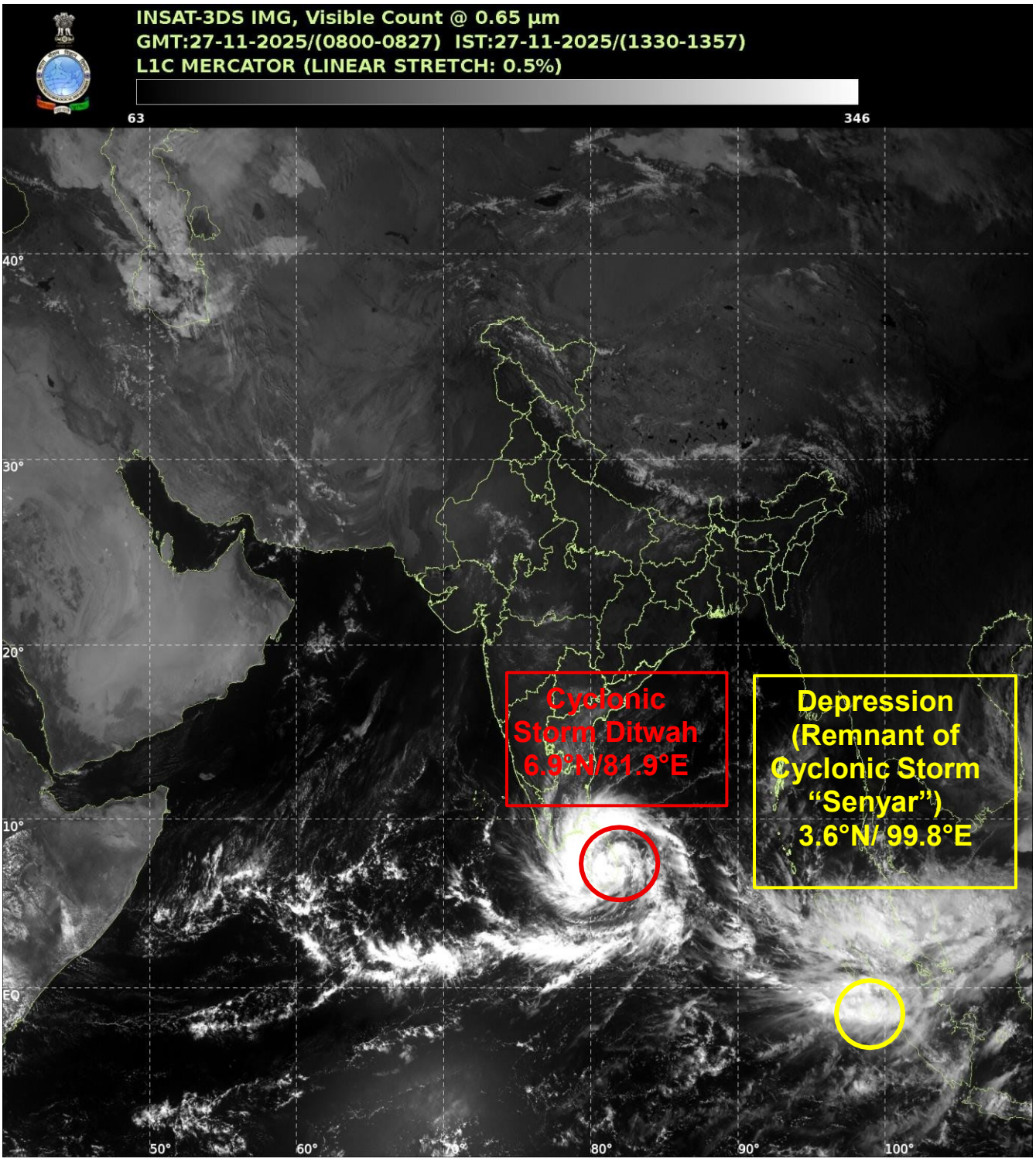
- Localized Flooding of roads, water logging in low lying areas and closure of underpasses mainly in urban areas.
- Occasional reduction in visibility due to heavy rainfall.
- Disruption of traffic due to water logging and squally winds
- Localized Landslides/Mudslides It may lead to riverine flooding in some river catchments (for riverine flooding please visit Web page of CWC)
- Damage to embankments/ salt pans.
- Possibility of coastal flooding and coastal erosion is also very likely over coastal districts of Tamil Nadu and Puducherry and south Andhra Pradesh & Yanam.

Action suggested:

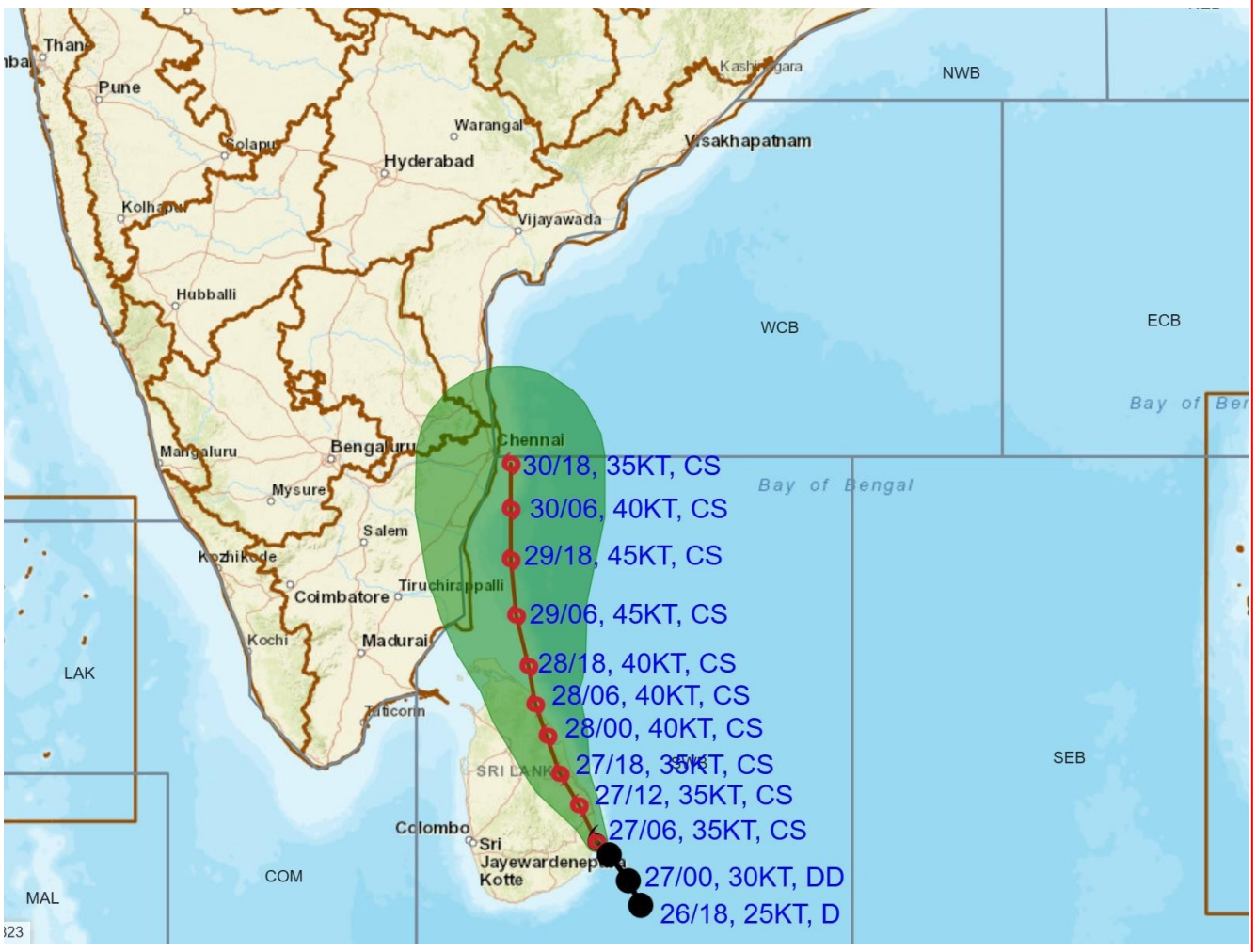
- Total suspension of fishing operations.
- Coastal hutment dwellers to be moved to safer places. People in affected areas to remain indoors.
- Movement in motor boats unsafe.
- Judicious regulation of offshore/onshore operations
- People are advised to keep a watch on the weather for worsening conditions and be ready to move to safer places accordingly.
- Take safe shelters; do not take shelter under trees, as there could be lightning.
- In case of expected lightning, unplug electrical/ electronic appliances, immediately, get out of water bodies and keep away from all the objects that conduct electricity.
- Tourism and recreational activities to be regulated.
- Surface transport and helicopter services to be regulated.

Next bulletin will be issued at 1730 hours IST of today, the 27th November, 2025.

Copy to: ACWC Kolkata/ACWC Chennai/CWC Bhubaneswar/CWC Vishakhapatnam/CWC Thiruvananthapuram/ Meteorological Centre Vijay Puram/ and Meteorological Centre Amaravati


INSAT-3DS IMG, Visible Count @ 0.65 µm
GMT:27-11-2025/(0800-0827) IST:27-11-2025/(1330-1357)
L1C MERCATOR (LINEAR STRETCH: 0.5%)
63
346
40°
30°
20°
10°
EQ
50°
60°
70°
80°
90°
100°
Cyclonic Storm Ditwah 6.9°N/81.9°E
Depression (Remnant of Cyclonic Storm "Senyar") 3.6°N/ 99.8°E

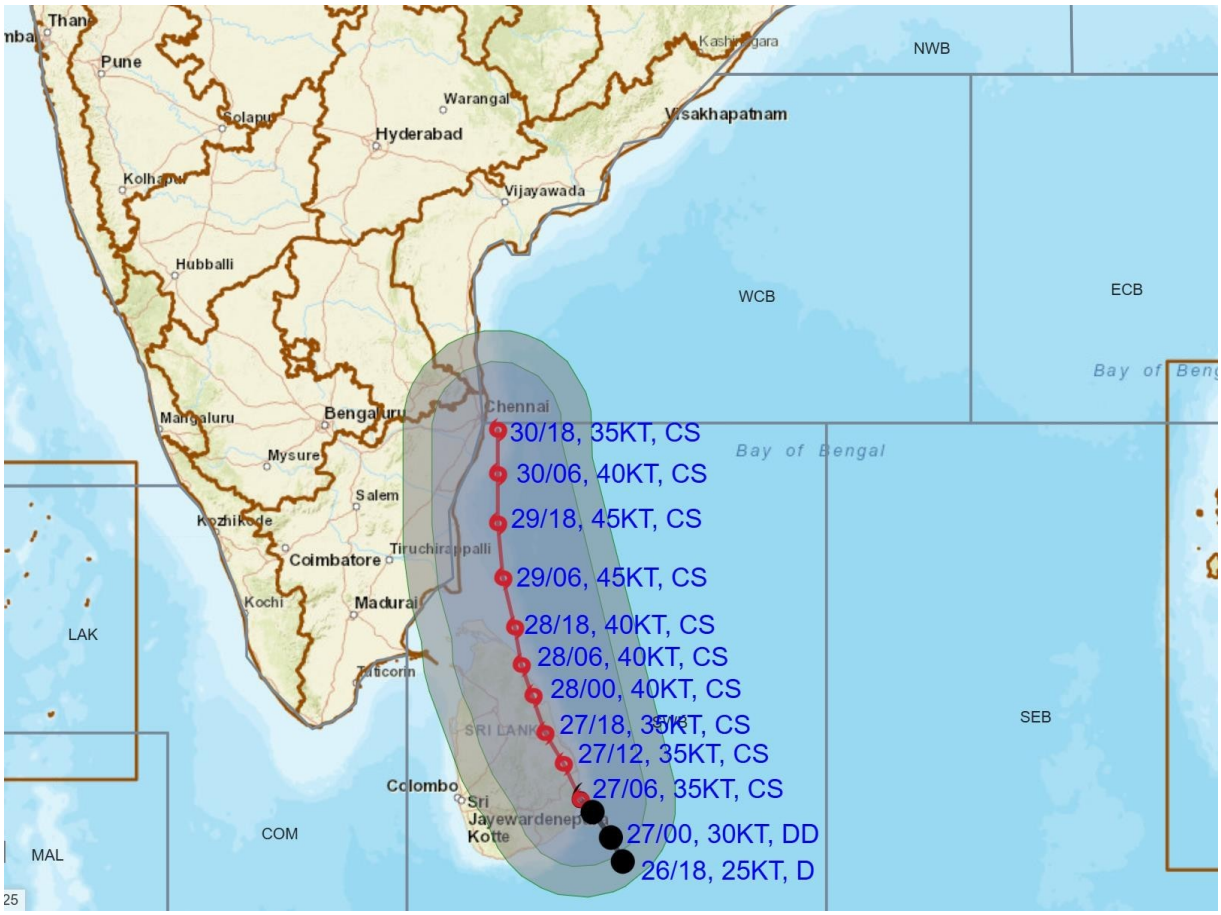
OBSERVED AND FORECAST TRACK OF CYCLONIC STORM "DITWAH" OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
CS: CYCLONIC STORM (34-47 KT)
SCS: SEVERE CYCLONIC STORM (48-63KT)
VSCS: VERY SEVERE CYCLONIC STORM (64-89 KT)
ESCS: EXTREMELY SEVERE CYCLONIC STORM (90-119 KT)
SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

OBSERVED AND FORECAST TRACK ALONGWITH QUADRANT WIND DISTRIBUTION OF CYCLONIC STORM "DITWAH" OVER SOUTHWEST BAY OF BENGAL AND ADJOINING SRI LANKA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



DATE/TIME IN UTC
IST=UTC +0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
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SuCS: SUPER CYCLONIC STORM (≥ 120 KT)

LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY
AREA OF MAXIMUM SUSTAINED WIND SPEED:
28-33 KT (52-61 KMPH)
34-49 KT (62-91 KMPH)
50-63 KT (92-117 KMPH)
≥ 64 KT (≥118 KMPH)

IMPACT OVER THE SEA

MSW (knot/kmph)	Impact	Action
28-33 (52-61)	Very rough seas	Total suspension of fishing operations
34-49 (62-91)	High to very high seas	Total suspension of fishing operations
50-63 (92-117)	Very high seas	Total suspension of fishing operations
≥ 64 (≥118)	Phenomenal	Total suspension of fishing operations

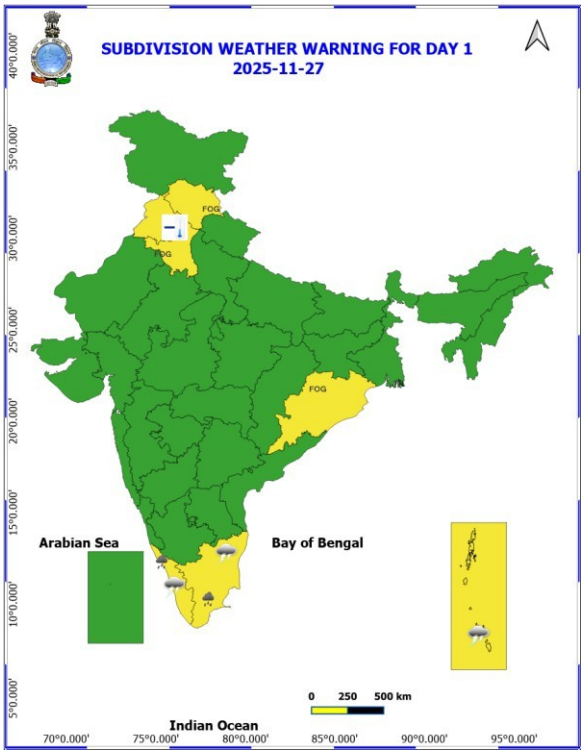
OBSERVED AND FORECAST TRACK OF DEPRESSION (REMANANT OF CYCLONIC STORM "SENYAR") OVER STRAIT OF MALACCA BASED ON 0600 UTC (1130 Hrs. IST) OF 27TH NOVEMBER 2025



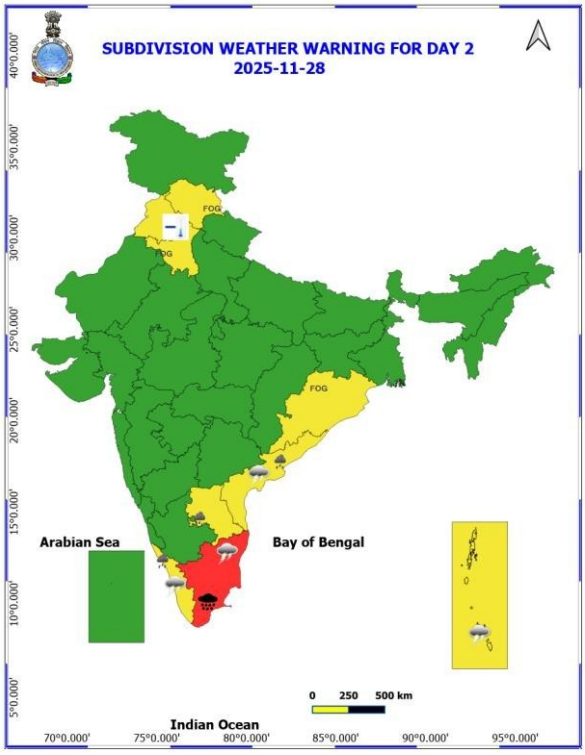
DATE/TIME IN UTC
IST=UTC + 0530
L: LOW PRESSURE AREA
WML: WELL MARKED LOW PRESSURE AREA
D: DEPRESSION (17-27 KT)
DD: DEEP DEPRESSION (28-33 KT)
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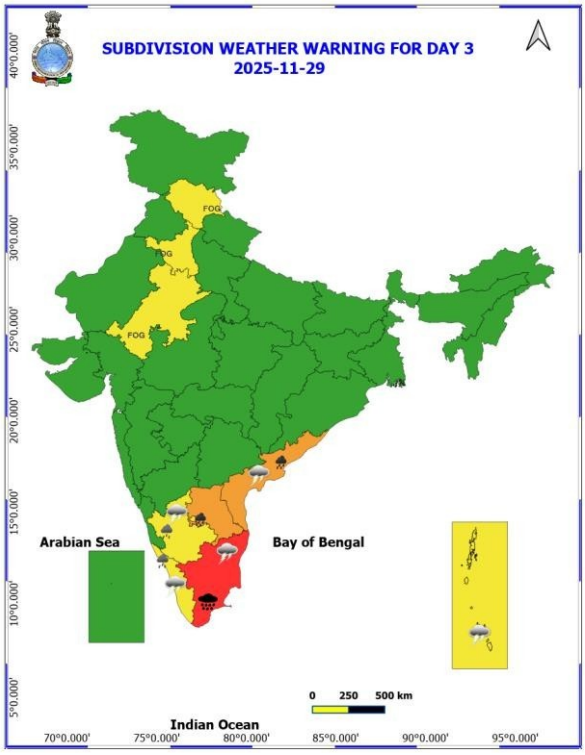
LESS THAN 34 KT
34-47 KT
≥ 48 KT
OBSERVED TRACK
FORECAST TRACK
CONE OF UNCERTAINTY

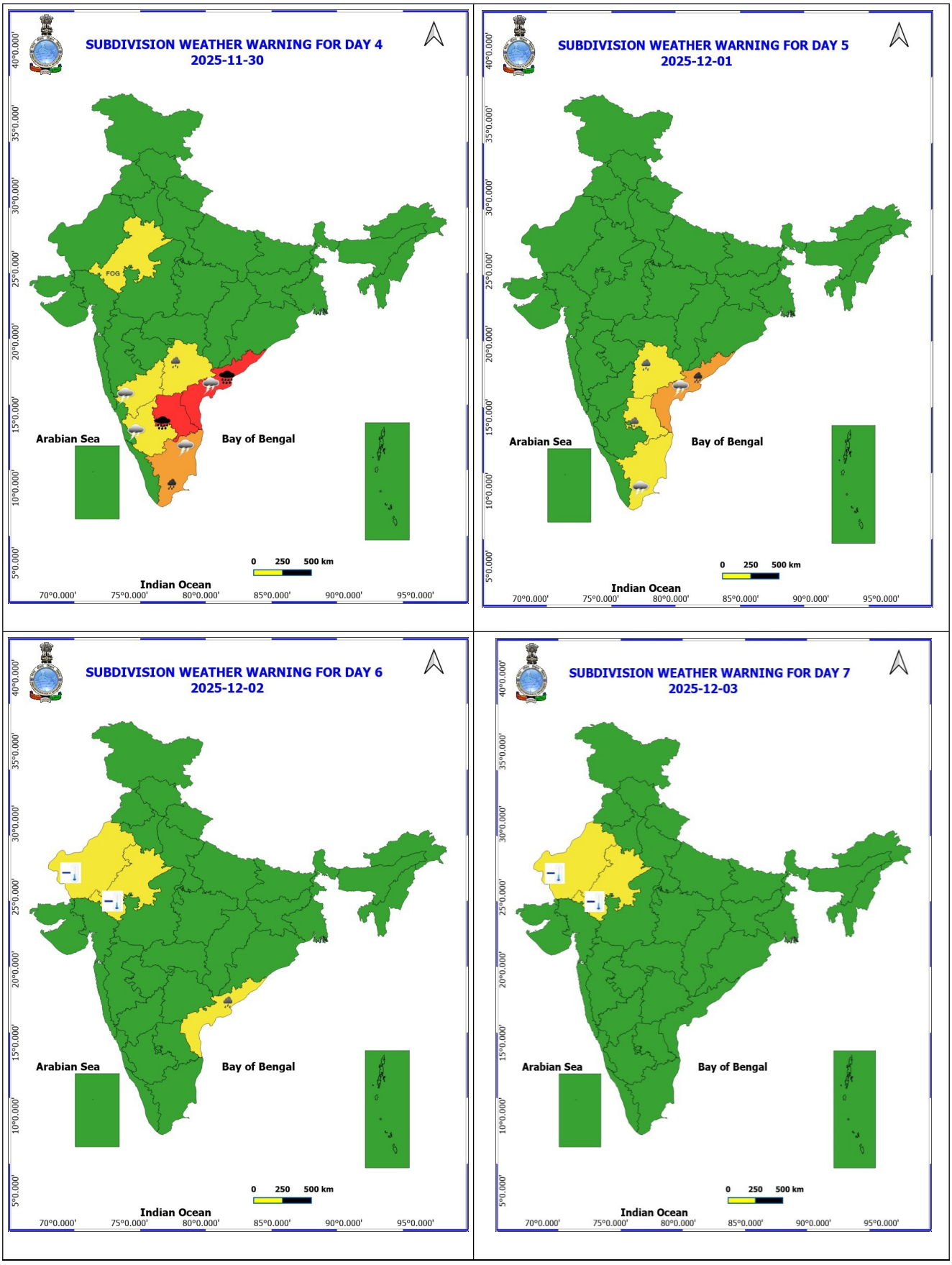
WEATHER WARNING GRAPHICS





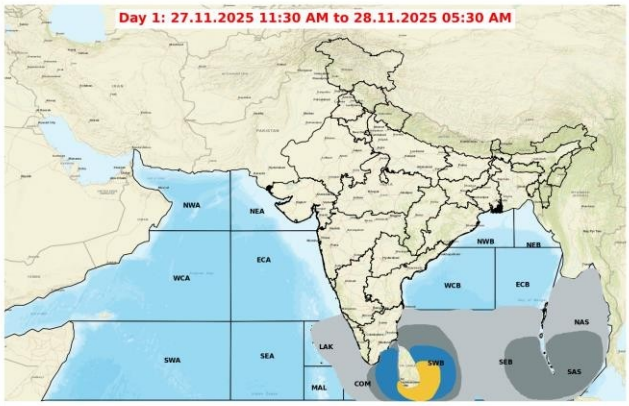


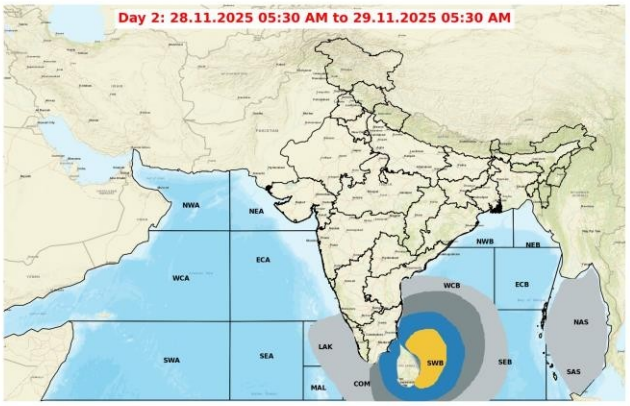


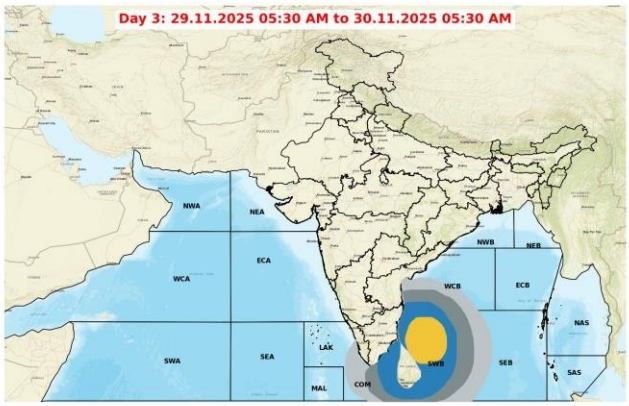


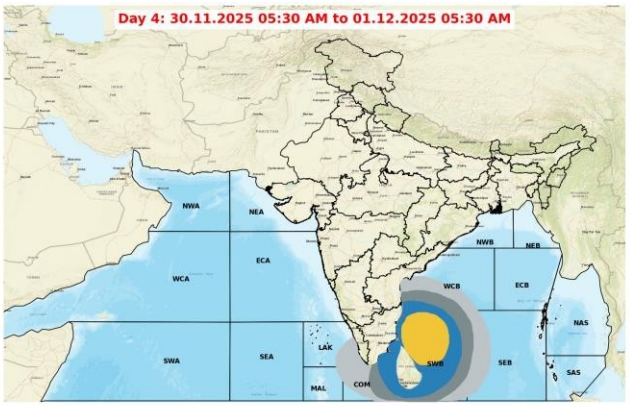
- **Action may be taken based on ORANGE AND RED COLOUR warnings.**
- **Vulnerable regions likely urban and hilly areas action may be initiated for heavy rainfall warning.**
- **As the lead period increases forecast accuracy decreases.**

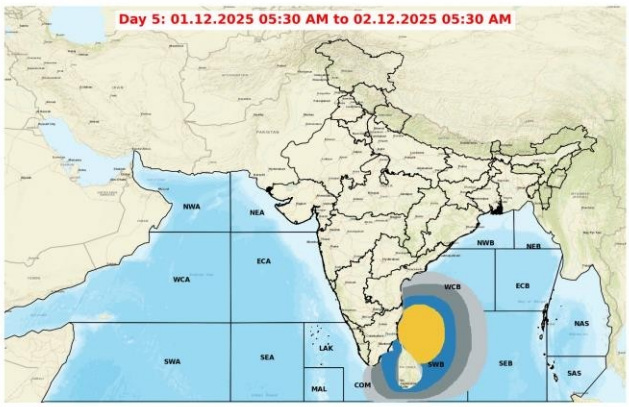
Fishermen Warning Graphics











Legend

- Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
- Squally Weather with wind speed 40-50 kmph gusting to 60 kmph
- Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
- Squally wind with speed 45-55 kmph gusting to 65 kmph
- Squally wind with speed 50-60 kmph gusting to 70 kmph
- Squally wind with speed 55-65 kmph gusting to 75 kmph
- CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
- SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
- VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
- ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph

Fishermen are advised not to venture into the marked areas.

Example: Port Warning

DATE:27-11-2025	Time of Issue:18:00 Hrs.IST

WARNING FOR TAMIL NADU PORTS
Bulletin No:5

SYNOPTIC SITUATION
The Cyclonic Storm Ditwah [Pronunciation: Ditwah] over southwest Bay of Bengal and adjoining Sri Lanka coast moved north-northwestwards with the speed of 10 kmph during past 6 hours and lay centered at 1430 hrs IST of today, the 27th November 2025 over coastal Sri Lanka and adjoining southwest Bay of Bengal near latitude 7.2°N and longitude 81.8°E, about 60 km south-southeast of Batticaloa (Sri Lanka), 140 km north-northeast of Hambantota (Sri Lanka), 170 km south-southeast of Trincomalee (Sri anka), 570 km south-southeast of Puducherry (India) and 70 km south-southeast of Chennai (India).

FORECAST
It is very likely to continue to move north-northwestwards across Sri Lanka coast & adjoining southwest Bay of Bengal and reach over southwest ay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November.

ADVICE FOR HOISTING STORM WARNING SIGNALS:

S.No	Name of the Port	Advice
1	CHENNAI	Keep hoist Distant warning Signal Number II (DW TWO) with Section Signal Number IV.
2	CUDDALORE	Keep hoist Distant warning Signal Number II (DW TWO) with Section Signal Number IV.
3	NAGAPATTINAM	Keep hoist Local Warning Signal Number IV.(LW FOUR)
4	ENNORE	Keep hoist Distant warning Signal Number II (DW TWO)
5	KATTUPALLI	Keep hoist Distant warning Signal Number II (DW TWO)
6	PUDUCHERRY	Keep hoist Distant warning Signal Number II (DW TWO)
7	KARAIKAL	Keep hoist Local Warning Signal Number IV. (LW FOUR)
8	PAMBAN	Keep hoist Local Warning Signal Number IV. (LW FOUR)
9	THOOTHUKUDI	Keep hoist Local Warning Signal Number IV. (LW FOUR)
10	RAMESWARAM	For information
11	COLACHAL	For information

A). PRINCIP OFF CHENNAI & B) TANMARINE CHENNAI: For Information.

Area Cyclone Warning Centre
Regional Meteorological Centre, Chennai

	இந்ெ◌ாயஅரB இந்ெ◌ாயவானிை◌லஆய்uF ைற மண்டலவானிை◌லஆய்யை◌ மயம் 6, கல்சுரிசாை◌ல, ெ◌சன்ை◌ன600006 - ெ◌தாை◌லேப□: 044- 28271951		**GOVERNMENT OF INDIA** **INDIA METEOROLOGICAL DEPARTMENT** **Regional Meteorological Centre** **No. 6, College Road,** **Chennai - 600006** **Phone: 044- 28271951**

DATE: 27-11-2025	**Time of Issue: 1400 hrs. IST**

FISHERMEN WARNING

The **Well Marked Low Pressure Area** over Southwest Bay of Bengal and adjoining areas of Southeast Sri Lanka & Equatorial Indian Ocean concentrated into a **Depression** at 2330 hrs IST of 26th November 2025 over Southwest Bay of Bengal and adjoining Srilanka coast. It moved north-northwestwards intensified into **Deep Depression** at 0530 hrs IST of today, the 27th November 2025 and persisted at 0830 hrs IST of today over the same region near latitude 6.7°N and longitude 82.1°E, about 120 km south-southeast of Batticaloa (Sri Lanka), 130 km east-northeast of Hambantota (Sri Lanka), and, 640 km south-southeast of Puducherry (India) and 730 km south-southeast of Chennai.

It is very likely to continue to move nearly north-northwestwards across southwest Bay of Bengal & adjoining Sri Lanka and intensify further into a **Cyclonic Storm** during next 03 hours. Thereafter, it is very likely to continue to move north-northwestwards across Southwest Bay of Bengal & adjoining Sri Lanka coast towards North Tamilnadu, Puducherry and adjoining south Andhra Pradesh coasts during subsequent 48 hours.

FOR TAMILNADU COASTS

Along & off Tamil Nadu and Puducherry, Southwest Bay of Bengal, Gulf of Mannar and Comorin area: Squally weather with wind speed reaching 55-65 gusting to 75 kmph is prevailing and likely to become Gale wind speed reaching 60-70 gusting to 80 kmph from afternoon of today, the 27th November and increase further becoming 70-80 kmph gusting to 90 kmph by 28th morning and 80-90 kmph gusting to 100 kmph by 29th morning till 30th November. Thereafter it is likely to decrease gradually on 01st December. Rough to very rough sea conditions are prevailing and likely to become very rough to High from afternoon of today, the 27th November till 30th November. Thereafter it is likely to improve gradually on 01st December.

Fishermen are advised not to venture into the above sea areas during the above mentioned Period. Those out at sea should avoid southwest Bay of Bengal, Gulf of Mannar, Comorin area and along & off Tamil Nadu, Puducherry coasts till 01st December.

FOR OTHER THAN TAMILNADU COASTS

Along & off Andhra Pradesh coast and Westcentral Bay of Bengal:

Squally weather with wind speed reaching 35-45 kmph gusting to 55 kmph is prevailing on 27th November. It is very likely to increase becoming squally winds speed reaching 50-60 kmph gusting to 70 kmph from 28th evening and Gale wind speed reaching 60-70 kmph gusting to 80 kmph from 29th evening till 30th November. Thereafter it is likely to decrease gradually on 01st December.

Rough sea conditions are prevailing. It is very likely to become rough to very rough from 28th evening and very rough to High from 29th evening till 30th November. Thereafter it is likely to improve gradually on 01st December.

Along & off Kerala coast, Lakshadweep and Adjoining areas of Southeast Arabian Sea:

Squally weather with wind speed reaching 40-50 kmph gusting to 60 kmph likely to prevail during 27th - 29th November.

Rough to very rough sea conditions are likely to prevail during 27th -29th November.

Squally weather with wind speed reaching 40-50 kmph gusting to 60 kmph likely to prevail during 30th - 01th November over South Kerala coast, Lakshadweep and adjoining areas of Southeast Arabian Sea.

Adjoining Southeast Bay of Bengal:

Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely till 28th November. Rough sea conditions are very likely to prevail till 28th November.

Adjoining areas of South Andaman Sea, along & off Nicobar Islands:

Squally winds speed reaching 55-65 gusting to 75 kmph is prevailing and likely to decrease gradually becoming 45-55 gusting to 65 kmph by evening of today, the 27th November.
Very rough to rough sea conditions are prevailing and likely to become rough sea conditions by evening of today, the 27th November.

Adjoining areas of North Andaman Sea:

Squally weather with wind speed reaching 35-45 gusting to 55 kmph is very likely to prevail on 27th

November.

Rough sea conditions are very likely to prevail on 27th November.

Fishermen are advised not to venture into the above sea areas during the above mentioned period.
The fishermen along & off South Andhra Pradesh coast should return to coast.

Those out at sea should avoid adjoining westcentral Bay of Bengal till 01st December and Southeast Arabian Sea, Lakshadweep and along & off Kerala coast till 30th November.

OCEAN CURRENT ALERT/SWELL SURGE ALERT/HIGH WAVE ALERT BY INCOIS

1. TAMIL NADU		
KANNIYAKUMARI	SWELL SURGE ALERT	Swell Surge Alert for the coast of KANNIYAKUMARI,TAMIL NADU from Neerodi To Arockiyapuram. Swell waves in the range of 16.0 - 17.0 sec period with 0.7 - 1.0 m height are forecasted during 23:30 hours on 26-11-2025 to 23:30 hours on 28-11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
KARAIKAL	HIGH WAVE ALERT	High Wave Alert for the coast of KARAIKAL,TAMIL NADU from Nagore To Pattinacherry. High waves in the range of 2.7 - 3.3 meters are forecasted during 08:30 hours on 28-11-2025 to 23:30 hours on 28- 11-2025. It advised that to be careful while doing marine operations and nearshore recreation.
NAGAPPATTINAM NORTH	HIGH WAVE ALERT	High Wave Alert for the coast of NAGAPPATTINAM NORTH,TAMIL NADU from Chinnorpettai To Pazhayar. High waves in the range of 2.7 - 3.2 meters are forecasted during 11:30 hours on 28-11-2025 to 23:30 hours on 28-11-2025. It advised that to be careful while doing marine operations and nearshore recreation.
NAGAPPATTIN AM SOUTH	HIGH WAVE ALERT	High Wave Alert for the coast of NAGAPPATTINAM SOUTH,TAMIL NADU from Point Calimer To Samanthanpettai. High waves in the range of 2.9 - 3.5 meters are forecasted during 23:30 hours on 27-11-2025 to 23:30 hours on 28-11-2025. It advised that to be careful while doing marine operations and nearshore recreation.

TIRUNELVELI	SWELL SURGE ALERT	Swell Surge Alert for the coast of TIRUNELVELI,TAMIL NADU from Kuttapulli To Kooduthalai. Swell waves in the range of 16.0 - 17.0 sec period with 0.8 - 1.1 m height are forecasted during 02:30 hours on 27- 11-2025 to 23:30 hours on 28-11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
KERALA COAST AND ADJOINING SOUTHEAST ARABIAN SEA		
PUDUCHERRY		
NIL		
KOLLAM	SWELL SURGE ALERT	Swell Surge Alert for the coast of KOLLAM,KERALA from Alappattu To Edava. Swell waves in the range of 16.0 - 18.0 sec period with 0.5 -0.7 m height are forecasted during 23:30 hours on 26-11-2025 to 23:30 hours on 28-11-2025. It advised that no immediate action is required. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
KOZHIKODE	SWELL SURGE ALERT	Swell Surge Alert for the coast of KOZHIKODE,KERALA from Chombala FH To Ramanattukara. Swell waves in the range of 15.0 - 19.0 sec period with 0.4 - 0.6 m height are forecasted during 17:30 hours on 26-11-2025 to 23:30 hours on 28-11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
THIRUVANANTHAPURAM	SWELL SURGE ALERT	Swell Surge Alert for the coast of THIRUVANANTHAPURAM, KERALA from Kappil To Pozhiyoor. Swell waves in the range of 16.0 - 18.0 sec period with 0.6 - 0.8 m height are forecasted during 20:30 hours on 26-11-2025 to 23:30 hours on 28- 11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
4. LAKSHADWEEP AREA		
AGATTI	SWELL SURGE ALERT	Swell Surge Alert for the coast of AGATTI,LAKSHADWEEP. Swell waves in the range of 15.0 - 16.0 sec period with 0.8 - 1.2 m height are forecasted during 23:30 hours on 26-11-2025 to 20:30 hours on 28-11- 2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
AMINI	SWELL SURGE ALERT	Swell Surge Alert for the coast of AMINI,LAKSHADWEEP. Swell waves in the range of 15.0 - 16.0 sec period with 0.8 - 1.1 m height are forecasted during 02:30 hours on 27-11-2025 to 23:30 hours on 28-11- 2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.

ANDROTH	SWELL SURGE ALERT	Swell Surge Alert for the coast of ANDROTH,LAKSHADWEEP. Swell waves in the range of 15.0 - 16.0 sec period with 0.9 - 1.2 m height are forecasted during 23:30 hours on 26-11-2025 to 20:30 hours on 28-11- 2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
KAVARATTI	SWELL SURGE ALERT	Swell Surge Alert for the coast of KAVARATTI,LAKSHADWEEP. Swell waves in the range of 15.0 - 16.0 sec period with 0.9 - 1.2 m height are forecasted during 23:30 hours on 26-11-2025 to 20:30 hours on 28- 11-2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.
MINICOY	SWELL SURGE ALERT	Swell Surge Alert for the coast of MINICOY,LAKSHADWEEP. Swell waves in the range of 15.0 - 16.0 sec period with 1.0 - 1.3 m height are forecasted during 17:30 hours on 26-11-2025 to 11:30 hours on 28-11- 2025. It advised that there is a possibility of surging of waves, boats to ply with utmost vigilance, recreation with due care.

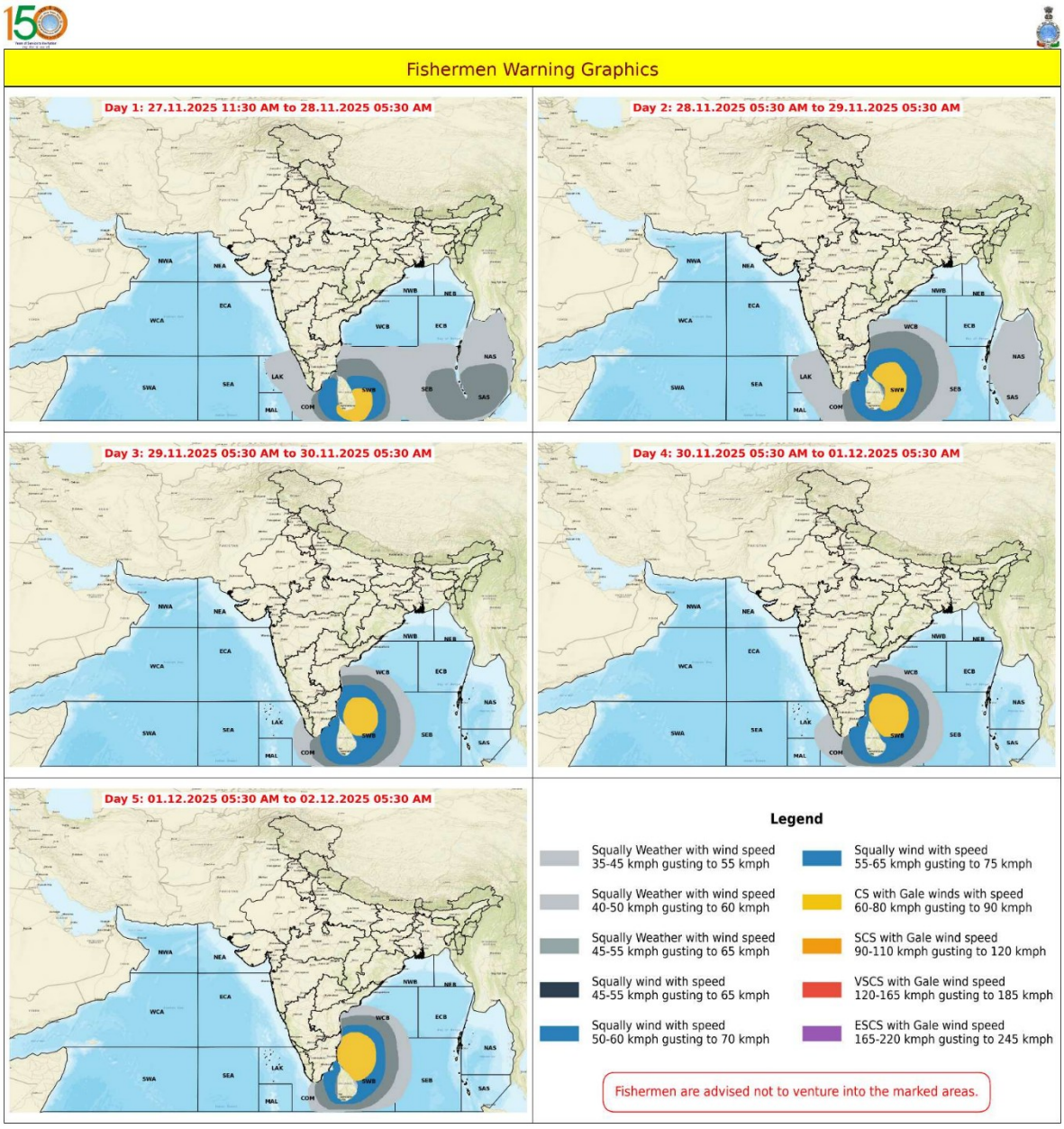
5. KARNATAKA COASTS AND ADJOINING EASTCENTRAL ARABIAN SEA
NIL

6. ANDHRA PRADESH
NIL

Duty Officer, For Director In-Charge
Regional Weather Forecasting Centre Regional Meteorological Centre Chennai

FOR SWELL SURGE WATCH/OCEAN CURRENT WATCH PLEASE VISIT:

https://incois.gov.in/site/services/hwa.jsp


Fishermen Warning Graphics
Day 1: 27.11.2025 11:30 AM to 28.11.2025 05:30 AM
Day 2: 28.11.2025 05:30 AM to 29.11.2025 05:30 AM
Day 3: 29.11.2025 05:30 AM to 30.11.2025 05:30 AM
Day 4: 30.11.2025 05:30 AM to 01.12.2025 05:30 AM
Day 5: 01.12.2025 05:30 AM to 02.12.2025 05:30 AM
NWA
NEA
NWB
NEB
WCA
ECA
WCB
ECB
NAS
SWA
SEA
LAK
SWB
SEB
SAS
MAL
COM
Legend
Squally Weather with wind speed 35-45 kmph gusting to 55 kmph
Squally Weather with wind speed 40-50 kmph gusting to 60 kmph
Squally Weather with wind speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 45-55 kmph gusting to 65 kmph
Squally wind with speed 50-60 kmph gusting to 70 kmph
Squally wind with speed 55-65 kmph gusting to 75 kmph
CS with Gale winds with speed 60-80 kmph gusting to 90 kmph
SCS with Gale wind speed 90-110 kmph gusting to 120 kmph
VSCS with Gale wind speed 120-165 kmph gusting to 185 kmph
ESCS with Gale wind speed 165-220 kmph gusting to 245 kmph
Fishermen are advised not to venture into the marked areas.

Example: Sea Area Bulletin

India Meteorological Department/ भारत मौसम विज्ञान विभाग

ACWC KOLKATA / ए .सी .डब्लू .सी कोलकाता

Sea Area Bulletin

Bulletin Valid for 12 hrs from 09 UTC of 2025-11-28 to 21 UTC of 2025-11-28

TTT Warning	Cyclone "Ditwah [Pronunciation: Ditwah]" warning over coastal Sri Lanka and adjoining southwest Bay of Bengal.
Synoptic Situation	The cyclonic storm Ditwah [Pronunciation: Ditwah] over coastal Sri Lanka and adjoining southwest Bay of Bengal moved north-northwestwards with the speed of 10 kmph during past 6 hours and lay centered at 0830 hrs IST of today, the 28th November 2025 over the same region, near latitude 8.3°N and longitude 81.0°E, about 40 km southwest of Trincomalee (Sri Lanka), 100 km northwest of Batticaloa (Sri Lanka), 320 km south-southeast of Karaikal (India), 430 km south-southeast of Puducherry (India) and 530 km south of Chennai (India). It is very likely to continue to move north-northwestwards across Sri Lanka coast & adjoining southwest Bay of Bengal and reach over southwest Bay of Bengal near north Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November. Weather seasonal over rest Bay of Bengal and Andaman Sea.

South West Bay

Wind	Cyclonic 35 to 40 knots gusting to 45 knots within 100 nm around storm centre; elsewhere 25 to 30 knots gusting to 35 knots.
Weather	Widespread rain or thundershowers with Isolated heavy to very heavy rain
Visibility	Poor becoming very poor in heavy to very heavy rain or thundershowers
Sea Condition	High around 100 nm of storm centre elsewhere rough to very rough

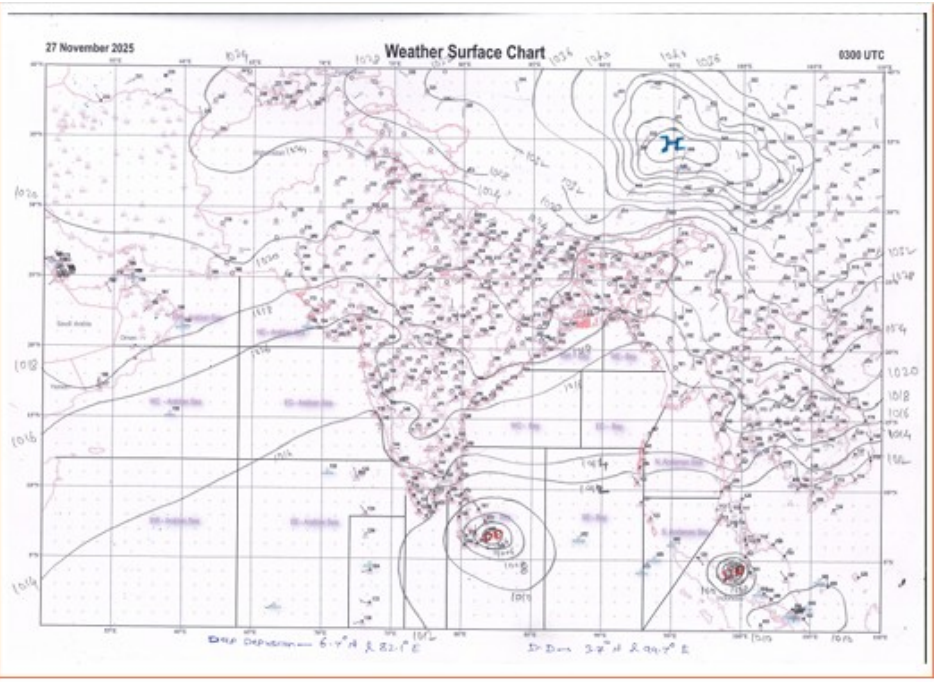
South East Bay

Wind	East to southeasterly 20 to 25 knots gusting to 30 knots
Weather	Fairly widespread rain or thundershowers
Visibility	Moderate becoming Poor in heavy rain/thundershower
Sea Condition	Moderate to Rough

West Central Bay

Wind	Northeast to easterly 15 to 20 knots
Weather	Isolated rain/thundershower
Visibility	Good becoming Moderate in rain
Sea Condition	Slight to Moderate

East Central Bay	
Wind	Mainly easterly 10 to 15 knots
Weather	Fair
Visibility	Good
Sea Condition	Smooth to Slight
North West Bay	
Wind	Mainly northeasterly 05 to 10 knots
Weather	Fair
Visibility	Good
Sea Condition	Smooth
North East Bay	
Wind	Mainly northeasterly 05 to 10 knots
Weather	Fair
Visibility	Good
Sea Condition	Smooth
South Andaman Sea	
Wind	Northeast to easterly 10 to 15 knots
Weather	Scattered rain or thundershowers
Visibility	Good becoming moderate in rain
Sea Condition	Smooth to slight
North Andaman Sea	
Wind	Northeast to easterly 10 to 15 knots
Weather	Scattered rain or thundershowers
Visibility	Good becoming moderate in rain
Sea Condition	Smooth to slight

Part 4	
Part 5	NIL
Part 6	AAXX 02803 99942 807 31994 03601 10216 40173 811 31994 03601 10214 40172 901 32996 00204 10196 40164 806 31995 03402 10220 40171 895 31995 03201 10210 40179 976 31995 33203 10210 40169= 99943 049 31995 23204 10186 40171 053 32996 03603 10210 40168 105 31996 10202 10202 40162 150 31996 23606 10234 40163 185 31596 30203 10228 40149 245 32597 43403 10244 40147 346 32496 80210 10270 40104 279 31596 73604 10270 40139=
Time of Issue	13:36 IST of 2025-11-28

Example: Coastal Area Bulletin

இந்தியஅரசு
இந்திய வானிலை ஆய்வு துறை
மண்டல வானிலை ஆய்வு மையம்
6, கல்லூரி சாலை,
சென்னை600006-
தொலைபேசி: 044- 28271951

GOVERNMENT OF INDIA
INDIA METEOROLOGICAL DEPARTMENT
Regional Meteorological Centre
No. 6, College Road,
Chennai–600006
Phone: 044- 28271951

DATE : 27-11-2025 **TIME OF ISSUE:**

1200 UTC FROM: AREA CYCLONE WARNING CENTRE CHENNAI

SYNOPTIC SYSTEM: The **Cyclonic Storm Ditwah** [Pronunciation: Ditwah] over southwest Bay of Bengal and adjoining Sri Lanka coast moved north-northwestwards with the speed of 10 kmph during past 6 hours and lay centered at 1430 hrs IST of today, the 27th November 2025 over coastal Sri Lanka and adjoining southwest Bay of Bengal near latitude 7.2°N and longitude 81.8°E, about 60 km south-southeast of Batticaloa (Sri Lanka),
140 km north-northeast of Hambantota (Sri Lanka), 170 km south-southeast of Trincomalee (Sri Lanka), 570 km south-southeast of Puducherry (India) and 670 km south-southeast of Chennai (India).
It is very likely to continue to move north-northwestwards across Sri Lanka coast & adjoining southwest Bay of Bengal and reach over southwest Bay of Bengal near North Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts by early morning of 30th November.

B1: L
B2: B
PRIORITY OF MESSAGE: VITAL

STROM TWO BULLETIN FOR SOUTH TAMIL NADU COAST VALID FOR 12 HRS FROM 27/1200 UTC TO 28/0000 UTC:

WIND **:** MAINLY NORTHERLY 25-30 KNOTS GUSTING TO 35 KNOTS OCCASIONALLY.

WEATHER **:** SCATTERED RAIN/THUNDERSHOWERS; WITH ISOLATED HEAVY FALLS.

VISIBILITY **:** MODERATE; BECOMING POOR IN HEAVY FALLS.

SEA CONDITION: ROUGH TO VERY ROUGH; BECOMING HIGH IN GUST.

PORT SIGNAL **:** LOCAL WARNING SIGNAL NUMBER FOUR (IV) KEPT HOISTED AT PAMBAN AND THOOTHUKUDI PORTS.

FORMATS:

Date and Time of Issue:

(i) Information on cyclone: The cyclonic storm lay over..... Bay of Bengal/Arabian Sea Center ..... km. ..... (Direction) of ..... place.

(ii) Forecast

Further intensification:Direction of Movement: Expected landfall area: Expected time of landfall:

(iii) Weather Warning

- (a) Rainfall ..... in ..... Districts (Names)
- (b) Gales reaching ..... in ..... Districts (Names)
- (c) Gale force winds reaching 35 knots in ..... Districts
- (d) Tidal waves ..... in coastal areas of ..... Districts (Names)
- (e) Sea condition:
- (f) Damage (As per IMD instruction) ..... Districts (Names)

(g) Likely impacts as per IMD Monograph on "Damage Potential of Tropical [Depending on Intensity of Storm (T-No)]

- (a) Fishermen not to venture into open sea.
- (b) Evacuation of people from low lying areas to safer places/Cyclone Shelters.
- (c) General public in the threat area advised to be indoors.
- (d) Rail & road transport to be regulated.

2. Port Warning FORMAT:

Port Warning No. Date and Time for Issue

(i) Information on cyclone: The cyclonic storm lay over Bay of Bengal/Arabian Sea near Lat.__/Long. _____ at a distance _____ km. from _____ at _____ IST _____ Estimated Central Pressure _____ hPa.

(ii) Forecast : Further intensification: Direction of Movement: Expected Landfall Area : Expected Time of Landfall :

(iii) Advice for hoisting Storm Warning Signals:

(i) Likely impacts and actions: Depending on intensity of the storm as per IMD Monograph on "Damage Potential of Tropical Cyclones"

3. Cyclone Warning Bulletin for AIR/Press / Public:

FORMAT:

Cyclone Alert / Warning Bulletin No. _____ issued by _____ at _____ Hrs. IST on _____ (Date) for repeated broadcast at hourly / half hourly intervals. Cyclone Alert / Warning for _____ Districts. Cyclone centred at _____ hrs. IST of _____ (date) about _____ km. _____ of (direction) _____(Place). Expected to intensify further and move in a _____ direction and cross _____ coast near / between _____ (Place)_____ (day/time). Under its influence heavy to very heavy rain likely cause floods in _____ districts commencing from _____ (time/day). Gales speed reaching _____ kmph causing _____ damage _____in districts commencing from _____ (Date/Time) Gale force winds reaching 70 kmph likely extend into _____ Districts, causing damage _____ in _____ districts. Tidal wave of _____ m likely inundate low lying area of _____ Districts at the time of crossing coast.

Fishermen advised not to venture out. Public advised to cooperate with the State authorities in disaster management efforts.

4. Fisheries Warning

FORMAT:

Fisheries warning No. _____

Date and Time of Issue _____

(i) Information on Cyclone: Cyclonic Storm lay over _____ Bay of Bengal / Arabian Sea at a distance _____ km. _____ from _____ at _____ time (IST) on _____ (date)

(ii) Forecast: Further intensification Direction of Movement

Expected landfall area Expected time of landfall

(iii) Warnings: Wind Sea Condition Tidal Waves

(iv) Storm Warning Signals at ports

Advice and Action: i) Fishermen not to venture into open seas ii) Fishermen at Sea not to come to the ports (names) _____ in coast.

5. Post Landfall Outlook

FORMAT:

1.EVEN AFTER LANDFALL, THE SYSTEM IS LIKELY TO MAINTAIN ITS INTENSITY FOR ……. HOURS AND WEAKEN GRADUALLY AAA UNDER ITS INFLUENCE RAINS AT MOST/MANY PLACES WITH HEAVY TO VERY HEAVY FALLS AT …… LIKELY COMMENCE/CONTINUE IN …… (COASTAL DISTRICTS) FROM …… (TIME)…….. (DAY) …… (DATES) CAUSING INUNDATION OF LOW-LYING AREAS AAA GALE WINDS/SQUALLY WINDS SPEED REACHING ……. KMPH LIKELY COMMENCE/CONTINUE IN ……..(COASTAL DISTRICTS) FROM ……(TIME)ON……(DAY)…… (DATE) CAUSING DAMAGES TO ……. (PROPERTY AS INDICATED IN IMD MONOGRAPH ON "DAMAGE POTENTIAL OF TROPICAL CYCLONE") AND …… (VEGETATION) AND GENERAL DISRUPTION OF COMMUNICATION AND POWER SUPPLY FOR ……

2. AS THE CYCLONE MOVES INLAND …….. INTERIOR DISTRICTS MAY ALSO EXPERIENCE HEAVY/VERY HEAVY RAIN ACCOMPANIED WITH GALE WITH SPEEDREACHING ……. KMPH COMMENCING FROM …… (TIME) ON ……. (DAY) ……. (DATE) FOR …….. HRS, CAUSING FLOODING OF LOW LYING AREAS AND DAMAGE TO PROPERTY AS INDICATED IN IMD MONOGRAPH ON "DAMAGE POTENTIAL OF TROPICAL CYCLONE" (AS PER IMD INSTRUCTION)

PEOPLE ARE ADVISED TO REMAIN INDOORS/IN SAFE PLACES AND COOPERATE WITH STATE GOVERNMENT OFFICIALS AND DISASTER MANAGEMENT AGENCIES.

Attachment to ANNEX II-C2

India Port warnings used

Day Signals*	Specifications	Night Signals*	Remarks
16a	I. Distant Cautionary Signal Number OneThere is a region of squally weather in which a storm may be forming (well-marked low or depression with surface winds up to 61 km/h (33 knots)).	3b	These signals indicate that ships may be exposed to danger after leaving the harbour.
10a	II. Distant Warning Signal Number TwoA storm has formed (Cyclonic Storm with surface winds 63–87 km/h (34–47 knots)).	2b	These signals indicate that ships may be exposed to danger after leaving the harbour.
3a*	III. Local Cautionary Signal Number ThreeThe port is threatened by squally weather (cyclonic circulation with surface winds 40–50 km/h (22–27 knots)) or squalls due to Nor'Westers.	5b	These signals indicate that the port itself and the ships in it are in danger.
2a*	IV. Local Warning Signal Number FourThe port is threatened by a storm, but it does not appear that the danger is yet sufficiently great to justify extreme measures of precaution (cyclonic circulation with surface winds 52–61 km/h (28–33 knots)).	4b	These signals indicate that the port itself and the ships in it are in danger.
17a	V. Danger Signal Number FiveThe port will experience severe weather from a storm of slight or moderate intensity expected to cross the coast, keeping the port to the left of its track (to the east of the port in the case of Mangla) (Cyclonic Storm with surface winds 63–87 km/h (34–47 knots)).	16b	These signals indicate that the port itself and the ships in it are in danger.
8a	VI. Danger Signal Number SixThe port will experience severe weather from a cyclone expected to move keeping the port to the right of its track.	17b	These signals indicate that the port itself and the ships in it are in danger.
19a*	VII. Danger Signal Number SevenThe port will experience severe weather from a cyclone expected to move over or close to the port.	18b	This signal is also hoisted when a storm is expected to skirt the coast without actually crossing it.
20a	VIII. Great Danger Signal Number EightThe port will experience severe weather from a Severe Cyclonic Storm expected to move keeping the port to the left of its track.	19b	These signals indicate that the port itself and the ships in it are in danger.
21a	IX. Great Danger Signal Number NineThe port will experience severe weather from a Severe	20b	These signals indicate that the port itself

Day Signals*	Specifications	Night Signals*	Remarks
	Cyclonic Storm expected to move keeping the port to the right of its track.		and the ships in it are in danger.
22a*	X. Great Danger Signal Number TenThe port will experience severe weather from a Severe Cyclonic Storm expected to move over or close to the port.	21b	This signal is also hoisted when a storm is expected to skirt the coast without actually crossing it.
23a*	XI. Failure of CommunicationCommunications with the Meteorological Warning Centre have broken down, and the local office considers there is a danger of bad weather.	7b	Indicates that communication with the Meteorological Warning Centre has failed and caution should be exercised.

Brief System
In the brief system only one of the five signals marked by an asterisk of the general system is hoisted, and the Port Officers are kept informed of the prospects of local bad weather associated with any disturbance in the sea, for the general information of shipping.
Extended System
Special section signals, in addition to those of the general system, are exhibited at certain ports in the Bay of Bengal belonging to the extended system.

If the port itself is threatened, the appropriate local signals of the general system are hoisted. But, if there is an area of squally weather or a storm that does not threaten the port, the distant cautionary or distant warning signal of the general system is hoisted, and one or more of the locality signals (described in the next paragraph) are hoisted under the distant signals, to indicate the position of the disturbance in the Bay.

The following shapes, when hung below a distant cautionary or warning signal, become locality signals, indicating the six divisions into which the Bay of Bengal has been divided for this purpose) . If, however, the centre of the storm is near the boundary of a division, the hoisting of two locality signals is requested, the first indicating the division in which the centre is thought to be situated and the second the division nearest to the first.

In the event of a storm centre being near the corner where three divisions meet, the hoisting of three locality signals is requested, the first indicating the division in which the storm is estimated to be centred, the second the nearest adjoining division, and the third the remaining division.

Signal	3a	10a	24a	16a	2a	23a
Section	I	II	III	IV	V	VI

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* See footnote on page 1 of Attachment to Annex II-B

1) The divisions are as indicated on the chart given on page II A6. Thus, if there is squally weather in Section I of the Bay, the signal 25a would be hoisted at the various ports, and if a storm has formed in Section II, the signal 11a would be hoisted at all ports which were not directly threatened. As already stated, the ports directly threatened would hoist one or other

of the local signals. The Meteorological Department endeavours to keep the number of locality signals on each hoist as small as possible, and generally the number of only that section in which the centre of the storm is situated is given in the Warning bulletin.

ANNEX II-D-1

Cyclone warning system in Maldives

The Maldives Meteorological Service (MMS) issue tropical cyclone and severe weather warning to the public and travelers across the country.

Tracking of Tropical Cyclone

Conventional observations, such as surface, upper air observations, automatic weather stations, ship reports, and radar and satellite observations are utilized for observing, detecting and tracking tropical cyclones. Numerical Weather Prediction models produced in-house and NWP charts provided by ECMWF, UK Met Office, IMD Website, RIMES and advisories from RSMC are also used by forecasters.

Advisories and Warnings

Weather Advisories and Warnings are issued for:

- Heavy Rain and Flood , Thunderstorms, Strong Winds and Rough Seas, Squalls (*frequent gust*) , Swell & Tidal Waves, Tropical Cyclone

Advisories and Warnings are sent to:

- Government's Executive Management , National Disaster Management , Maldives National Defense Force, Maldives Police Service , Coast Guard , Aviation Sectors , Tourism, Transport, Health Sectors , Fisheries, Agriculture, Education Sectors , TV media, Radio service etc.

Dissemination of Warning

The National Meteorological Centre has established the following means of communication for the dissemination of the warning.

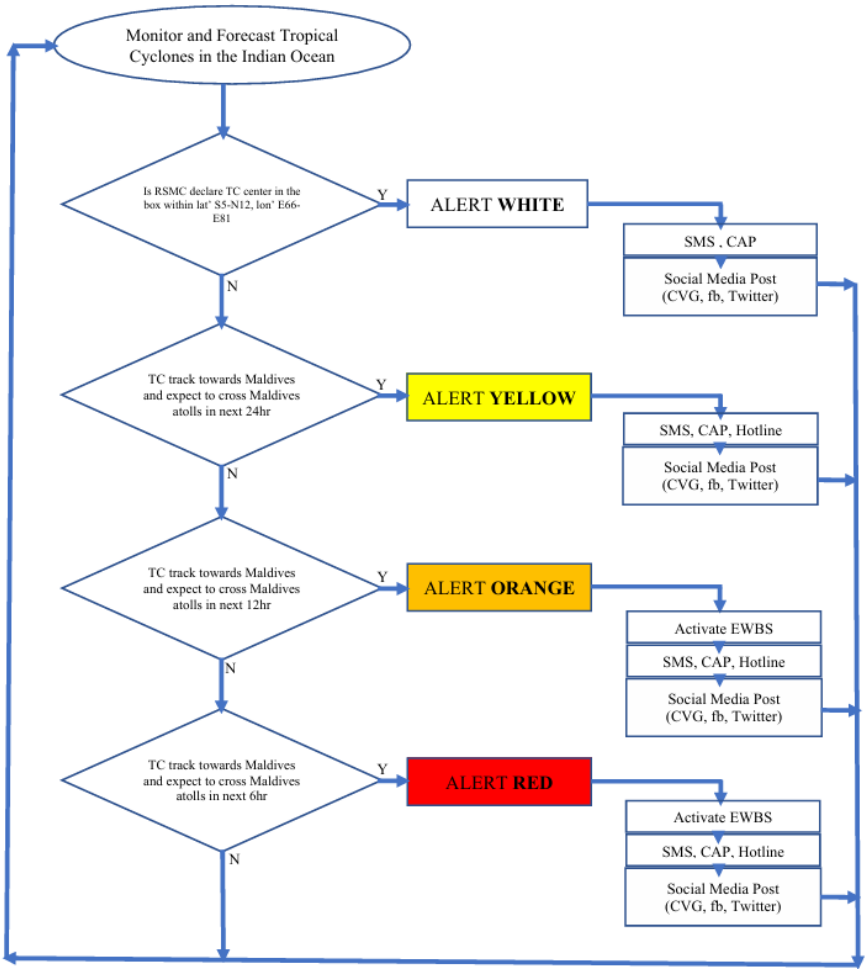
Hotlines - Dedicated point to point telephone line between major stake holders and NMC
SMS text messages , Mobile App (named "moosun" for Android and iOS), Local TV Channels Local Radio Channels , Internet (http://www.meteorology.gov.mv) and email

ANNEX II-D-2

***TC Alert and Warning criteria* Alert Level**

Alert Criteira for Tropical Cyclone		
CAP categories of Severity		Alert Criteria
Minor	**Alert level 1, WHITE**	RSMC declare TC center in the box within lat' S5-N12, lon' E66-E81
Moderate	**Alert level 2, YELLOW**	TC track towards Maldives and expect to cross Maldives atolls in next 24hr
Severe	**Alert level 3, ORANGE**	TC track towards Maldives and expect to cross Maldives atolls in next 12hr
		TC track towards Maldives and expect to cross Maldives atolls in next 6hr

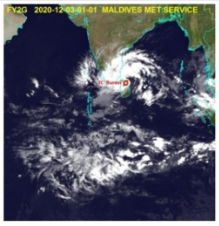
TC Alert and Warning Flow Chart

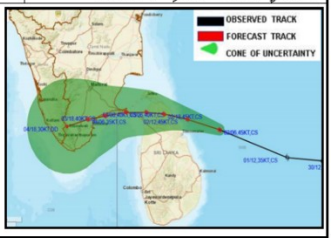


Sample TC Alert issued

ALERT WHITE
Period: 03/0230 hrs – 03/1430 hrs
Tropical Cyclone **"BUREVI"** located approximately 870 *km NE* of HA.Kela. System is moving WNW direction, north of Maldives into Gulf of Mannar.

Issued: 0200hrs , 03 Dec 2020



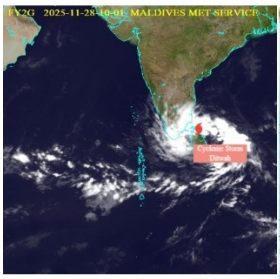


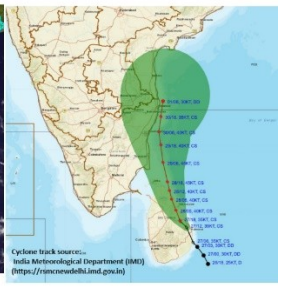
MMS Alert Criteria for Tropical Cyclone

Hazard	CAP Categories of Severity			
	Minor (Alert level 1, WHITE)	Moderate (Alert level 2, YELLOW)	Severe (Alert level 3, ORANGE)	Extreme (Alert level 3, RED)
Tropical Cyclone (TC)	RSMC declare TC center in the box within lat' 5S-N12, lon' E66-E81	TC track towards Maldives and expect to cross Maldives atolls in next 24hr	TC track towards Maldives and expect to cross Maldives atolls in next 12hr	TC track towards Maldives and expect to cross Maldives atolls in next 6hr

Note: Alert WHITE is issued as TC has moved into the concerned area identified in the Alert Criteria. We are monitoring the system very closely.

Tropical Cyclone "Ditwah" Moving Away from the Maldives





Tropical Cyclone "Ditwah" is currently located over the northern coastal region of Sri Lanka, approximately 876 km northeast of Ha. Kelaa. The system is moving in a north–northwestward (NNW) direction, toward the North Tamil Nadu, Puducherry, and adjoining South Andhra Pradesh coasts of India, moving away from the Maldives.

A White Alert has been issued for the tropical cyclone, as the system is currently within our area of concern and meets the MMS Tropical Cyclone Alert criteria. Under its influence, scattered showers and a few thunderstorms are expected over the central and southern atolls during the next 24 hours, with weather conditions likely to improve from Tuesday, 2nd December, onwards.

Maldives Meteorological Service

Attachment to ANNEX II-F-1

Day Signals*	Specifications	Night Signals*	Remarks
Myanmar (21.II.1977)			
	General System		
16a	There is a region of squally weather in which a storm may be forming	3b	Distant cautionary signal
10a	A storm has formed	2b	Distant warning signal
3a	The port is threatened by squally weather	5b*	Local cautionary signal
2a*	The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution	4b*	Local warning signal. The existence of a storm can often be determined before its direction of motion can be fixed In this case all those ports which the storm could possibly strike are warned by this signal
17a	The port will experience severe weather from a storm, of slight or moderate intensity, that is expected to cross the coast to the south of the port (or to the east in the case of Yangon, Pathein and Diamond Island)	16b	Local danger signal
18a	The port will experience severe weather from a storm, of slight or moderate intensity, that is expected to cross the coast to the north of the port (or to the west in the case of Yangon and Moulmein)	17b	Local danger signal
19a*	The port will experience severe weather from a storm, of slight or moderate intensity, that is expected to cross over or near to the port	18b*	Local danger signal
20a	The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the south of the port (or to the east in the case of Yangon, Pathein and Diamond Island)	19b	Local great danger signal

* See footnote on page 1 of Attachment to Annex II-B

Myanmar - continued

Day Signals*	Specifications	Night Signals*	Remarks
21a	The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the north of the port (or to the west in the case of Yangon and Moulmein)	20b	Local great danger signal
22a*	The port will experience severe weather from a storm of great intensity that is expected to cross over or near to the port	21b*	Local great danger signal
23a*	Communications with the meteorological warning centre have broken down, and the local officer considers that there is a danger of bad weather	7b*	Local failure of communications signal

Brief System

In the brief system only one of the five signals marked by an asterisk of the general system is hoisted, and the Port Officers are kept informed of the prospects of local bad weather associated with any disturbance in the sea, for the general information of shipping.

Extended System

Special signals, in addition to those of the general system, are exhibited at certain ports in the Bay of Bengal belonging to the extended system.

If the port itself is threatened, the appropriate local signals of the general system are hoisted. But, if there is an area of squally weather or a storm that does not threaten the port, the distant cautionary or distant warning signal of the general system is hoisted, and one or more of the locality signals (described in the next paragraph) are hoisted under the distant signals, to indicate the position of the disturbance in the Bay.

The following shapes, when hung below a distant cautionary or warning signal, become locality signals, indicating the six divisions into which the Bay of Bengal has been divided for this purpose 1) . If, however, the centre of the storm is near the boundary of a division, the hoisting of two locality signals is requested, the first indicating the division in which the centre is thought to be situated and the second the division nearest to the first.

In the event of a storm centre being near the corner where three divisions meet, the hoisting of three locality signals is requested, the first indicating the division in which the storm is estimated to be centred, the second the nearest adjoining division, and the third the remaining division.

Signal	3a	10a	24a	16a	2a	23a
Section	I	II	III	IV	V	VI

_____

* See footnote on page 1 of Attachment to Annex II-B

1) The divisions are as indicated on the chart given on page 26 Thus, if there is squally weather in Section I of the Bay, the signal 25a would be hoisted at the various ports, and if a storm has formed in Section II, the signal 11a would be hoisted at all ports which were not directly threatened. As already stated, the ports directly threatened would hoist one or other of the local signals. The Department of Meteorology and Hydrology endeavours to keep the number of locality signals on each hoist as small as possible, and generally the number of only that section in which the centre of the storm is situated is given in the Warning bulletin.

Attachment to ANNEX II-G-1

Day Signals*	Specifications	Night Signals*	Remarks
Pakistan- (10.VI.1984) **Port warnings largely used**			
16a	There is a region of squally weather in which a storm may be forming	3b	These signals indicate that ships may be exposed to danger after leaving the harbour
10a	A storm has formed	2b	
3a	Port is threatened by squally weather	5b	These signals indicate that the port itself and the ships in it are in danger
2a	Port is threatened by a storm, but it does not appear that danger justifies extreme measures of precaution	4b	
17a	Severe weather from a storm of slight or moderate intensity, expected to cross the coast to south or east of port	16b	
18a	Severe weather from a storm of slight or moderate intensity, expected to cross the coast to north or west of port	17b	These signals indicate that the port itself and the ships in it are in danger
19a	Severe weather from a storm of slight or moderate intensity, expected to cross over or near to the port	18b	
20a	Severe weather from a storm of great intensity, expected to cross the coast to south or east of port	19b	

See footnote on page 1 of Attachment to Annex II-B

Pakistan - continued

Day Signals*	Specifications	Night Signals*	Remarks
21a	Severe weather from a storm of great intensity, expected to cross the coast to north or west of port	20b	These signals indicate that the port itself and the ships in it are in danger
22a	Severe weather from a storm of great intensity, expected to cross over or near to the port	21b	
23a	Communications with the meteorological warning centre have broken down, and the local office considers there is a danger of bad weather	7b	These signals indicate that the port itself and the ships in it are in danger

Attachment to ANNEX II-H-1

Sri Lanka (20.II.1978) Port Warnings

Day Signals*	Specifications	Night Signals*	Remarks
16a	There is a region of squally weather in which a storm may be forming	3b	These signals indicate that ships may be exposed to danger after leaving the harbour
10a	A storm has formed	2b	These signals indicate that ships may be exposed to danger after leaving the harbour
3a	The port is threatened by squally weather	5b	These signals indicate that the port itself and the ships in it are in danger
2a	The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution	4b	These signals indicate that the port itself and the ships in it are in danger
17a	The port will experience severe weather from a storm of slight or moderate and intensity that is expected to cross coast keeping the port to the left of its course	16b	These signals indicate that the port itself and the ships in it are in danger
8a	Port will experience severe weather from a cyclone expected	17b	These signals indicate that the port itself and the ships in it are in danger
19a	Port will experience severe weather from a cyclone expected to move over the coast without (actually) crossing it	18b	This signal is also hoisted when a storm is expected to skirt or close to the port
20a	Port will experience severe weather from a severe cyclone expected to expected to cross the coast to the South of Port	19b	These signals indicate that the port itself and the ships in it are in danger
21a	Port will experience severe weather from a severe cyclone expected to expected to cross the coast to the South or east of Port	20b	These signals indicate that the port itself and the ships in it are in danger
22a	Port will experience severe weather from a severe cyclone expected to expected to cross over or near the Port	21b	These signals indicate that the port itself and the ships in it are in danger
23a	Communications with the meteorological warning centre have broken down, and the local officer considers that there is a danger of bad weather	7b	Local failure of communications signals

Attachment to ANNEX II-I-1

Thailand (11.IV.1984)

Day Signals*	Specifications	Night Signals*	Remarks
Signals indicating the intensity of storms			
35a	Tropical depression or storm with wind speeds near centre not exceeding 33 knots	1.	Signals indicating the occurrence of storms in the Gulf of Thailand and adjacent seas to be displayed at Port Area (Bangkok) and at Bangkok Harbour Limit I (Pong Pachjamit Fort, Pagklongsarn, Dhonburi)
36a	Tropical storm or storm with wind speeds near centre from 34 knots and over but not exceeding 63 knots		
56a	Typhoon or cyclone or storm with wind intensity speeds near centre 64 knots or more	2	Signals indicating the and locality of storms will be hoisted on the same yard-arm with the pennant indicating the intensity and the flag indicating the locality of the storm. The flag is always hoisted below the pennant

Day Signals*	Specifications	Night Signals*	Remarks
Signals indicating the locality of storms			
37a	Area 1 : Gulf of Thailand east coast to Lat. 5°N and Long. 105°E		
38a	Area 2 : Gulf of Thailand west coast to Lat. 5°N		
43a	Area 3: Andaman Sea bounded by west coast of southern Myanmar, west coast of southern Thailand, Long. 97°E, Lat. 5°N and Lat. 14°N		
51a	Area 4 : South China Sea bounded by southern Viet Nam coast, Lat. 12°N, Lat. 5°N, Long. 105°E and Long. 112°E		

Note: In normal weather conditions (no tropical depression, storm or typhoon) the white pennant with red circle (52a) will be displayed at the upper yard-arm at Bangkok Harbour Limit I (Pong Pachjamit Fort, Pagklongsarn, Dhonburi).

* See footnote on page 1 of Attachment to Annex II-B

C H A P T E R III

THE OBSERVING SYSTEM AND OBSERVING PROGRAMME

3.1 Networks of surface and upper air stations

3.1.1 Observations from basic network

The list of implemented regional basic synoptic networks of surface and upper air stations of the Panel countries is given in **Table III-1.** The network of stations adopted for regional exchange by the World Weather Watch is considered adequate for routine tracking of weather systems. However, in the cyclone season, particularly when a tropical depression or storm exists in the region, special efforts will be made by the national meteorological services to improve the collection and distribution of surface synoptic reports from the coastal stations.

3.1.2 Special observations from the WWW network

National meteorological services will endeavor to arrange for additional observations in areas coming within the circulation of a tropical cyclone. These stations will make round the clock three hourly or hourly observations when the system is of tropical storm intensity and close to the coast and the observations will be passed on real time to the Panel countries.

3.1.3 Special observations from stations other than those of the regional basic synoptic network

National Meteorological Services (NMS) have established a large number of meteorological observing stations, in addition to those in the regional basic synoptic network, observations from which are received by the NMS. When there is a tropical cyclone in the Bay of Bengal or in the Arabian Sea, observations from these stations, particularly from coastal stations, will be exchanged on real time basis on priority. If the observations are not received during a tropical cyclone situation a request for them could be sent to the NMS concerned. A list of these stations is given in **Table III-2 & III-3.**

TABLE III-1: LIST OF IMPLEMENTED REGIONAL BASIC SYNOPTIC NETWORK STATIONS

Name of station			Surface							
1			2							
			0	3	6	9	12	15	18	21
42027	SRINAGAR		X	X	X	X	X	X	X	X
42071	AMRITSAR		X	X	X	X	X	X	X	X
42101	PATIALA		X	X	X	X	X	X	X	X
42111	DEHRADUN		X	X	X	X	X	X	X	X
42131	HISAR		X	X	X	X	X	X	X	X
42165	BIKANER		X	X	X	X	X	X	X	X
42182	NEW DELHI		X	X	X	X	X	X	X	X
42189	BAREILLY		X	X	X	X	X	X	X	X
42259	AGRA		X	X	X	X	X	X	X	X
42309	NORTH LAKHIMPUR		X	X	X	X	X	X		
42314	DIBRUGARH/ MOHANBARI		X	X	X	X	X	X	X	X
42328	JAISALMER		X	X	X	X	X	X	X	X
42339	JODHPUR		X	X	X	X	X	X	X	X
42348	JAIPUR/SANGANER		X	X	X	X	X	X	X	X
42361	GWALIOR		X	X	X	X	X	X	X	X
42369	LUCKNOW/AMAUSI		X	X	X	X	X	X	X	X
42379	GORAKHPUR		X	X	X	X	X	X	X	X
42410	GUWAHATI		X	X	X	X	X	X	X	X
42415	TEZPUR		X	X	X	X	X	X	X	X
42452	KOTA AERODROME		X	X	X	X	X	X	X	X
42474	PRAYAGRAJ		X	X	X	X	X	X	X	X
42492	PATNA		X	X	X	X	X	X	X	X
42559	GUNA		X	X	X	X	X	X	X	X
42571	SATNA		X	X	X	X	X	X	X	X
42587	DALTONGANJ				X	X	X			
42591	GAYA		X	X	X	X	X	X	X	X
42623	IMPHAL TULIHAL		X	X	X	X	X	X	X	X
42634	BHUJ-RUDRAMATA			X	X	X	X			
42779	PENDRA ROAD		X	X	X	X	X	X	X	X
42798	JAMSHEDPUR		X	X	X	X	X	X	X	X
42809	KOLKATA / DUMDUM		X	X	X	X	X	X	X	X
42840	SURAT			X	X	X	X			
42867	NAGPUR /SONEGAON		X	X	X	X	X	X	X	X
42874	RAIPUR		X	X	X	X	X	X	X	X
42886	JHARSUGUDA		X	X	X	X	X	X	X	X
42895	BALASORE		X	X	X	X	X	X	X	X
42909	VERAVAL			X	X	X	X			
42921	NASHIK		X	X	X	X	X	X	X	X
42933	AKOLA		X	X	X	X	X	X	X	X
42971	BHUBANESWAR		X	X	X	X	X	X	X	X
43003	MUMBAI (SANTACRUZ)		X	X	X	X	X	X	X	X

43014	AURANGABAD CHIKALTHANA		X	X	X	X	X	X	X	X
43041	JAGDALPUR		X	X	X	X	X	X	X	X
43063	PUNE		X	X	X	X	X	X	X	X
43086	RAMAGUNDAM		X	X	X	X	X	X	X	X
43110	RATNAGIRI		X	X	X	X	X	X	X	X
43117	SOLAPUR		X	X	X	X	X	X	X	X
43128	HYDERABAD AIRPORT		X	X	X	X	X	X	X	X
43150	VISHAKHAPATNAM/ WALTAIR		X	X	X	X	X	X	X	X
43185	MACHILIPATNAM (FRANCHPET)		X	X	X	X	X	X	X	X
43189	KAKINADA		X	X	X	X	X	X	X	X
43192	GOA/PANJIM		X	X	X	X	X	X	X	X
43198	BELGAUM/SAMBRE		X	X	X	X	X	X	X	X
43201	GADAG		X	X	X	X	X	X	X	X
43213	KURNOOL		X	X	X	X	X	X	X	X
43226	HONAVAR		X	X	X	X	X	X	X	X
43233	CHITRADURGA		X	X	X	X	X	X	X	X
43237	ANANTAPUR		X	X	X	X	X	X	X	X
43245	NELLORE		X	X	X	X	X	X	X	X
43279	CHENNAI/MEENAMBAKKAM		X	X	X	X	X	X	X	X
43284	MANGALORE/BAJPE		X	X	X	X	X	X	X	X
43295	BANGALORE		X	X	X	X	X	X	X	X
42830	PORBANDAR		X	X	X	X	X	X	X	X
43049	GOPALPUR		X	X	X	X	X	X	X	X
43221	ONGOLE		X	X	X	X	X	X	X	X
43348	ADIRAMPATTINAM		X	X	X	X	X	X	X	X
43311	AMINI DIVI		X	X	X	X	X	X	X	X
43314	KOZHIKODE		X	X	X	X	X	X	X	X
43321	COIMBATORE/PEELAMEDU		X	X	X	X	X	X	X	X
43329	CUDDALORE		X	X	X	X	X	X	X	X
43333	SRI VIJAYA PURAM		X	X	X	X	X	X	X	X
43344	TIRUCHIRAPALLI		X	X	X	X	X	X	X	X
43346	KARAIKAL		X	X	X	X	X	X	X	X
43353	KOCHI WILLINGTON		X	X	X	X	X	X	X	X
43369	MINICOY		X	X	X	X	X	X	X	X
43371	THIRUVANANTHAPURAM		X	X	X	X	X	X	X	X

NOTE:
1. Observation Hours may be confirmed with RMC / MC.

2. Details of Radio Wind and Radio Sonde may be obtained from UAID.

TABLE III-1: LIST OF IMPLEMENTED REGIONAL BASIC SYNOPTIC NETWORK STATIONS

	Name of station	Surface								Radiowind				Radiosonde	
		00	03	06	09	12	15	18	21	00	06	12	18	00	12
41859	RANGPUR	x	x	x	X	x	x	x	x	x	x	x	x		
41883	BOGRA	x	x	x	X	x	x	x	x	x	x	x	x	x	.
41886	MYMENSINGH	x	x	x	X	x	x	x	x						
41891	SYLHET	x	x	x	x	x	x	x	x	x	x	x	x	x	.
41907	ISHURDI	x	x	x	x	x	x	x	x	x	x	x	x		
41923	DHAKA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
41936	JESSORE	x	x	x	x	x	x	x	x	x	x	x	x		
41943	FENI	x	x	x	x	x	x	x	x	x	x	x	x		
41950	BARISHAL	x	x	x	x	x	x	x	x	x	x	x	x		
41953	MAIJDI COURT	x	x	x	x	x	x	x	x						
41963	HATIYA	x	x	x	x	x	x	x	x						
41964	SANDWIP	x	x	x	x	x	x	x	x						
41977	CHITTAGONG(AMBAGAN)	.	.	.	.	.	.	.	.	x	x	x	x	x	.
41978	CHITTAGONG(PATENGA)	x	x	x	x	x	x	x	x						
41984	KHEPUPARA	x	x	x	x	x	x	x	x						
41989	KUTUBDIA	x	x	x	x	x	x	x	x						
41992	COX'S BAZAR	x	x	x	x	x	x	x	x	x	x	x	x		

Name of station			Surface									Radiowind					Radio sonde	
1			2									3					4	
43418	TRINCOMALEE		X	X	X	X	X	X	X	X		X	X	X				
43421	ANURADHAPURA		X	X	X	X	X	X	X	X								
43424	PUTTALAM		X	X	X	X	X	X	X	X								
43436	BATTICALOA		X	X	X	X	X	X	X	X								
43450	KATUNAYAKE		X	X	X	X	X	X	X	X								
43466	COLOMBO		X	X	X	X	X	X	X	X		X	X	X				
43473	NUWARA ELIYA		X	X	X	X	X	X	X	X								
43486	RATNAPURA		X	X	X	X	X	X	X	X								
43495	GALLE		X	X	X	X	X	X	X	X								
43497	HAMBANTOTA		X	X	X	X	X	X	X	X		X	X	X				
43533	HANIMADHOO		X	X	X	X	X	X	X	X								
43555	MALE		X	X	X	X	X	X	X	X								
43577	KADHDHOO		X	X	X	X	X	X	X	X								
43588	KADEHDHOO		X	X	X	X	X	X	X	X								
43599	GAN		X	X	X	X	X	X	X	X								X
48001	PUTAO		X	X	X	X	X											
48004	HKAMTI		X	X	X	X	X											
48008	MYITKYINA		X	X	X	X	X		X									
48010	HOMALIN		X	X	X	X	X		X									
48018	KATHA		X	X	X	X	X		X									
48019	BHAMO		X	X	X	X	X											
48020	MAWLAIK		X	X	X	X	X											
48024	KALEMYO		X	X	X	X	X											
48025	KALEWA		X	X	X	X	X		X									

48030	HAKHA		X	X	X	X	X											
48031	FALAM		X	X	X	X	X											
48033	SHWEBO		X	X	X	X	X											
48034	MOGOKE		X	X	X	X	X											
48035	LASHIO		X	X	X	X	X											
48036	GANGAW																	
48037	MONYWA		X	X	X	X	X											
48039	SAGAING		X	X	X	X	X											
48040	HSIPAW																	
48042	MANDALAY		X	X	X	X	X		X									
48043	PYINOOLWIN		X	X	X	X	X											
48045	MINDAT		X	X	X	X	X											
48047	MYINGYAN																	
48048	NYUNG-U		X	X	X	X	X											
48051	KYAUKTAW		X	X	X	X	X											
48052	CHAUK		X	X	X	X	X											
48053	MEIKTILA		X	X	X	X	X		X									
48055	NAMSAM		X	X	X	X	X											

Name of station			Surface									Radiowind					Radiosonde	
1			2									3					4	
			0	3	6	9	12	15	18	21		0	6	12	18		0	12
48057	TAUNGGYI		X	X	X	X	X											
48058	LOILEM																	
48060	KENGTUNG		X	X	X	X	X		X									

48062	SITTWE		X	X	X	X	X		X									
48064	MINBU		X	X	X	X	X		X									
48065	MAGWAY		X	X	X	X	X		X									
48068	PINLAUNG																	
48070	MONGHSAT																	
48071	KYAUKPYU		X	X	X	X	X		X									
48072	MANAUNG		X	X	X	X	X											
48074	PYINMANA		X	X	X	X	X											
48075	LOIKAW		X	X	X	X	X											
48077	PROME		X	X	X	X	X											
48078	TOUNGOO		X	X	X	X	X											
48080	THANDWE		X	X	X	X	X		X									
48085	GWA		X	X	X	X	X											
48087	HINTHADA		X	X	X	X	X											
48088	THARWADY																	
48089	SHWEGYIN																	
48092	HMAWBI		X	X	X	X	X											
48093	BAGO		X	X	X	X	X		X									
48094	PATHEIN		X	X	X	X	X		X									
48095	MAUBIN		X	X	X	X	X											
48096	MINGALADON		X	X	X	X	X		X									
48097	YANGON		X	X	X	X	X		X									
48099	HPAAN		X	X	X	X	X		X									
48101	PYAPON		X	X	X	X	X											
48103	MAWLAMYINE		X	X	X	X	X											
48107	YE		X	X	X	X	X											

48108	DAWEI		X	X	X	X	X		X									
48109	COCO ISLAND		X	X	X	X	X		X									
48110	MYEIK		X	X	X	X	X											
48112	KAWTHOUNG		X	X	X	X	X		X									
48300	MAE HONG SON		X	X	X	X	X	X	X	X								
48303	CHIANG RAI		X	X	X	X	X	X	X	X								
48327	CHIANG MAI		X	X	X	X	X	X	X	X			X		X		X	X
48328	LAMPANG		X	X	X	X	X	X	X	X								
48330	PHRAE		X	X	X	X	X	X	X	X								
48331	NAN		X	X	X	X	X	X	X	X								
48351	UTTARADIT		X	X	X	X	X	X	X	X								
48353	LOEI		X	X	X	X	X	X	X	X								
48354	UDON THANI		X	X	X	X	X	X	X	X								
48356	SAKON NAKHON		X	X	X	X	X	X	X	X								
48375	MAE SOT		X	X	X	X	X	X	X	X								
48376	TAK		X	X	X	X	X	X	X	X								
48377	BHUMIBOL DAM		X	X	X	X	X	X	X	X								
48378	PHITSANULOK		X	X	X	X	X	X	X	X			X		X		X	X
48379	PHETCHABUN		X	X	X	X	X	X	X	X								
48381	KHON KAEN		X	X	X	X	X	X	X	X			X		X		X	X
48400	NAKHON SAWAN		X	X	X	X	X	X	X	X								
48407	UBON RATCHATHANI		X	X	X	X	X	X	X	X			X		X		X	X
48431	NAKHON RATCHASIMA		X	X	X	X	X	X	X	X			X		X		X	X

UAE

Name of station			Surface									Radiowind					Radiosonde	
1			2									3					4	
			0	3	6	9	12	15	18	21		0	6	12	18		0	12
48432	SURIN		X	X	X	X	X	X	X	X								
48453	BANGKOK		X	X	X	X	X	X	X	X			X		X		X	X
48456	DON MUANG		X	X	X	X	X	X	X	X								
48462	ARANYAPRATHET		X	X	X	X	X	X	X	X								
48475	HUA HIN		X	X	X	X	X	X	X	X								
48477	SATTAHIP		X	X	X	X	X	X	X	X								
48480	CHANTHABURI		X	X	X	X	X	X	X	X			X		X		X	X
48500	PRACHUAP KHIRIKHAN		X	X	X	X	X	X	X	X			X		X		X	X
48517	CHUMPHON		X	X	X	X	X	X	X	X								
48532	RANONG		X	X	X	X	X	X	X	X								
48551	SURAT THANI		X	X	X	X	X	X	X	X		X	X	X	X			
48565	PHUKET AIRPORT		X	X	X	X	X	X	X	X			X		X		X	X
48567	TRANG		X	X	X	X	X	X	X	X								
48568	SONGKHLA		X	X	X	X	X	X	X	X			X		X		X	X
48569	HAT YAI		X	X	X	X	X	X	X	X								
48583	NARATHIWAT		X	X	X	X	X	X	X	X								

Station Name	WMO	ICAO	SYNOP SURFACE	RADIOSONDE
Abu Dhabi International Airport	41217	OMAA	Every 3 hours	0000 – 1200
Dubai International Airport	41194	OMDB	Every 3 hours	-
Sharjah International Airport	41196	OMSJ	Every 3 hours	-
Fujairah International Airport	41198	OMFJ	Every 3 hours	-
RasAlkhaimah International Airport	41184	OMRK	Every 3 hours	-
Abu DhabBateen Airport	41216	OMAD	Every 3 hours	-
Al-Ain International Airport	41218	OMAL	Every 3 hours	-

TABLE III-2: List of stations other than those in the WWW network from which special observations are Available in cyclone situations

Country: Bangladesh

	Name of station	Surface								Radiowind				Radiosonde	
		00	03	06	09	12	15	18	21	00	06	12	18	00	12
41850	TETULIA	x	x	x	x	x	x	x	x						
41851	DIMLA	x	x	x	x	x	x	x	x						
41856	RAJARHAT	x	x	x	x	x	x	x	x						
41858	SAYEDPUR	x	x	x	x	x	x	x	x						
41859	RANGPUR	x	x	x	x	x	x	x	x	x	x	x	x		
41863	DINAJPUR	x	x	x	x	x	x	x	x						
41881	BADALGACHI	x	x	x	x	x	x	x	x						
41883	BOGRA	x	x	x	x	x	x	x	x	x	x	x	x	x	
41886	MYMENSINGH	x	x	x	x	x	x	x	x						
41888	NETROKONA	x	x	x	x	x	x	x	x						
41891	SYLHET	x	x	x	x	x	x	x	x	x	x	x	x	x	
41895	RAJSHAHI	x	x	x	x	x	x	x	x						
41897	TARASH	x	x	x	x	x	x	x	x						
41902	NIKLI	x	x	x	x	x	.	.	.						
41906	BAGHABARI	.	.	.	.	.	.	.	.						
41907	ISHURDI	x	x	x	x	x	x	x	x	x	x	x	x		
41915	SRIMONGAL	x	x	x	x	x	x	x	x						
41916	ASHUGANJ	.	.	.	.	.	.	.	.						
41923	DHAKA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
41924	NARSINGDI	.	.	.	.	.	.	.	.						
41926	CHUADANGA	x	x	x	x	x	x	x	x						
41927	KUMARKHALI	x	x	x	x	x	x	x	x						
41929	FARIDPUR	x	x	x	x	x	x	x	x						
41930	ARICHA	.	.	.	.	.	.	.	.						
41933	COMILLA	x	x	x	x	x	x	x	x						

41936	JESSORE	x	x	x	x	x	x	x	x	x	x	x	x		
41938	GOPALGANJ	x	x	x	x	x	x	x	x						
41939	MADARIPUR	x	x	x	x	x	x	x	x						
41940	MAWA	.	.	.	.	.	.	.	.						
41941	CHANDPUR	x	x	x	x	x	x	x	x						
41943	FENI	x	x	x	x	x	x	x	x	x	x	x	x		
41944	DIGHINALA	.	.	.	.	.	.	.	.						
41946	SATKHIRA	x	x	x	x	x	x	x	x						
41947	KHULNA	x	x	x	x	x	x	x	x						
41948	KOYRA	x	.	.	.	x	.	.	.						
41950	BARISHAL	x	x	x	x	x	x	x	x	x	x	x	x		
41951	BHOLA	x	x	x	x	x	x	x	x						
41953	MAIJDI COURT	x	x	x	x	x	x	x	x						
41955	SAINT MARTIN	.	.	.	.	.	.	.	.						
41958	MONGLA	x	x	x	x	x	x	x	x						
41960	PATUAKHALI	x	x	x	x	x	x	x	x						
41961	RAMGATI	x	.	.	.	x	.	.	.						
41962	HIZLA	.	.	.	.	.	.	.	.						
41963	HATIYA	x	x	x	x	x	x	x	x						
41964	SANDWIP	x	x	x	x	x	x	x	x						
41965	SITAKUNDA	x	x	x	x	x	x	x	x						
41966	RANGAMATI	x	x	x	x	x	x	x	x						
41977	CHITTAGONG(AMBAGAN)	.	.	.	.	.	.	.	.	x	x	x	x	x	
41978	CHITTAGONG(PATENGA)	x	x	x	x	x	x	x	x	.	.	.	.		
41979	KAWKHALI	.	.	.	.	.	.	.	.						
41980	BANDARBAN	.	.	.	.	.	.	.	.						
41981	MONPURA	.	.	.	.	.	.	.	.						
41984	KHEPUPARA	x	x	x	x	x	x	x	x	.	.	.	.		
41989	KUTUBDIA	x	x	x	x	x	x	x	x	.	.	.	.		
41992	COX'S BAZAR	x	x	x	x	x	x	x	x	x	x	x	x		
41998	TEKNAF	x	x	x	x	x	x	x	x						

TABLE III-3
Buoys over north India Ocean

Buoy's ID	00	03	06	09	12	15	18	21
Indian Buoys								
AD02 (ARB)	X	X	X	X	X			X
AD03 (ARB)	X	X		X	X	X	X	X
AD04 (ARB)	X	X		X	X	X	X	X
AD05 (ARB)	X	X	X	X	X	X	X	X
CB02 (ARB)	X	X		X	X		X	X
CB03 (ARB)	X	X		X	X		X	X
SW02 (ARB)	X	X		X	X		X	X
BD02 (BOB)	X	X	X	X	X	X	X	X
BD07 (BOB)	X	X	X	X	X	X	X	X
BD08 (BOB)	X	X	X	X	X	X	X	X
BD10 (BOB)	X	X		X	X	X	X	X
BD11 (BOB)	X	X	X	X	X	X	X	X
BD12 (BOB)	X	X		X	X	X	X	X
BD13 (BOB)	X	X		X	X		X	X
CB01 (BOB)	X	X		X	X		X	X

3.1.4 Upper air stations

Additional upper wind observations will be made as appropriate whenever a tropical cyclone is centered within 500 nautical miles of the station. The minimum required is two observations per day, but for a better understanding of the ambient wind field three or even four flights on some days will be made when possible. All these additional upper air observations will be distributed among the Panel countries.

3.2 Observations from mobile ships

Efforts will be made to obtain the maximum number of ships' observations from the cyclone field by the NMSs and to pass on these observations to RSMC New Delhi. Whenever there is a tropical cyclone in the Bay of Bengal or in the Arabian Sea, additional ships' reports at frequent intervals will be requested by the storm warning centre/meteorological office concerned.

3.3 Aircraft reports

All reports from aircraft in flight in the area will be passed on real time to RSMC, New Delhi and to other Panel countries. In case the national meteorological service collecting the report deems it to be of interest in the analysis or forecasting of a tropical cyclone situation, it will be prefixed with an agreed high priority symbol.

3.4 Radar observations

As long as a tropical cyclone remains within range of one of the cyclone detection radars in the region, the meteorological centre concerned will keep the system under continuous surveillance and will transmit the radar observations through GTS to RSMC New Delhi and other Panel countries. These reports will be made in accordance with a reestablished schedule, Radar observations and products shall be generated at operational intervals and disseminated to RSMC New Delhi through approved communication channels as soon as the data available in the central Server.

The report will be in the RADOB code (FM20VRADOB) or the code given in **Annex IIIA** and will be transmitted twice to ensure reception of the complete message. The radar imagery will be exchanged through website or e-mail.

In case the report is in plain language, the full range of information available at the radar station will be given. The message will therefore include, where available, the confirmation of the determination of the centre; the shape, definition, size and character tendency of the eye, the distance between the end of the outermost band and the centre of the cyclone and the direction and speed of movement with a statement of the interval of time over which the movement was calculated.

A list of the cyclone detection radar stations in the Panel area is given in **Table III-4**.

DWR TABLE III-4
WEATHER RADAR STATIONS KEEPING WATCH
OVER THE ARABIAN SEA AND THE BAY OF BENGAL
WEATHER RADAR STATIONS KEEPING WATCH OVER THE ARABIAN SEA AND THE BAY OF BENGAL

Country		Station	N	E	Type	Op. Since	
Bangladesh	41992	Cox's Bazar	21°20'	92°17'	Doppler	1970	
	41984	Khepupara	21°59'	90°14'	Doppler	1982	
	41923	Dhaka	23°46'	90°23'	10 cm	1970	
	41859	Rangpur	25°44'	89°14'	10 cm	1999	
		Moulvibazar	24°29'8''	91°46'30''	Doppler	2009	
India	42724	Agartala	23°52'	91°14'	10 cm DWR		
	42807	Kolkata	22°33'	88°20'	10 cm DWR	1973	2002
	42976	Paradip	20°15'	86°39'	10 cm DWR	1973	
	43049	Gopalpur	19°15'	84°53'	10 cm DWR	2017	
	43149	Visakhapatnam	17°44'	83°20'	10 cm DWR	2006	1970
	43185	Machilipatnam	16°10'	81°08'	10 cm DWR	2004	1981
	----	Sriharikota	13°39'	80°13'	10 cm DWR	2004	
	43278	Chennai	13°04'	80°16'	10 cm DWR	1973	2002
		Pallikaranai	12°56'	80°12'	03 cm DWR		
	43346	Karaikal	10°54'	79°50'	10 cm DWR	1989 2016	
	43371	Thiruvananthapuram	08°31'	76°51'	05 cm DWR	2017	
	43353	Kochi	09°55'	76°15'	10 cm DWR	1987 2016	
		Mangaluru	12°53'	74°51'	05 cm DWR		
	43192	Goa	15°29'	73°49'	10 cm DWR	2002 2016	
	43057	Mumbai	18°54'	72°48'	10 cm DWR	1989 2016	
	42909	Veraval	20°54'	70°24'	10 cm DWR	2025	
	42634	Bhuj	23°14'	69°38'	10 cm DWR	1987 2016	
Maldives	43555	Male	04°09'	73°11'	10 cm(DWR)		2008

Myanmar	48071 Kyaukpyu	19°17'	93°31'	Doppler	2015
	48097 Yangon	16°52'	96°09'	Doppler	2016
	48042 Mandalay	21°47'	96°02'	Doppler	2018
Pakistan	41780 Karachi	24°54'	67°08'	5.6 cm	1991
Thailand	48455 Bangkok	13° 55'	100°36'	10 cm (DWR)	1992
	48475 Hau Hin	12°35'	99°57'	10 cm (DWR)	1995
	48517 Chumphon	10°29'	99°11'	5.6 cm (DWR)	2008
	48551 Surat Thani	09°08'	99°9'	10 cm (DWR)	1993
	48565 Phuket	08°08'	98°19'	5.6 cm (DWR)	2006
	48569 HAT Yai	06°56'	100°23'	5.6 cm (DWR)	2004
	48563Krabi	08°06'	98°58'	5.6 cm (DWR)	2006
	48568Songkhla	07°26'	100°27'	5.6 cm (DWR)	2011
	48583 Narathiwat	06°25'	101°45'	5.6 cm (DWR)	2014

ANNEX III-A-1

CODE FOR REPORTING RADAR OBSERVATIONS RELATING TO CYCLONIC DISTURBANCES

Part "A" (to be reported when centre of the storm can be determined).

CYREP FFAA STATION IIiiiYYGGg 4R wLaLaLa 1LoLoLoLo EYE or SPIRAL
6CSDT Pdsdsfsfs
Explanatory Notes

CYREP FFAA : Radar Report giving centre of a cyclone
STATION : Name of station in plain language
Iiiii : Station Index Number
YY : UTC date
GGg : Time of observation in hours and tens of minutes UTC
4 : Indicator figure
1 : Quadrant of globe '1' for our area as per WMO definition
Rw : Wavelength of radar
3 for 3 cm radar, 5 for 5.6 cm radar, 8 for 10 cm radar
LaLaLa : Latitude } In tenths of a degree.
Tenths are
} obtained by dividing the number of minutes
LoLoLoLo : Longitude } by six and discarding the remainder.
EYE or SPIRAL : Either the word "EYE" or the word "SPIRAL" will be reported, but not both.
The word "EYE" will be reported if a partial or complete eye is seen by the radar.
If a double walled eye is seen "DOUBLE EYE" will be reported instead of "EYE".
If the storm centre is estimated using only spiral bands the word "SPIRAL" will be reported.
6 : Indicator figure to show that eye characteristics and/or confidence of fix follow.
C : Confidence of fix (Vide Table 1).
S : Shape of eye and length of arc of eyewall seen (Vide Table 2).
D : Diameter or length of major axis of the eye (Vide Table 3).
T : Tendency of the eye determined over the period since the last observation (Vide Table 4).

NOTE: S, D and T will be reported as solidus (/) if the storm centre is fixed from spiral bands only.
P: Period over which the movement of the storm centre has been determined (Vide Table 5).
dsds: Direction in tens of degree towards which the storm centre is moving.
fsfs: Speed of movement of storm centre in kilometres per hour.

If movement over a period of 3 hours or more cannot be estimated, the group pdsdsfsfs will be dropped.
NOTE: The radar meteorologist may at his discretion add any other operationally useful information not covered above, in plain language at the end of Part A of the message.

ANNEX III-A-2

TABLE 1

Confidence of Fix (C)

Code Figure	Category	Radar echo pattern	Likely accuracy about
1.	Very poor	Spiral bands, ill defined or too few or too short	100 km
2.	Poor	Centre estimated from well defined spiral bands --------- eye not visible	50 km
3.	Fair	Partial eye wall seen	30 km
4.	Good	Closed or nearly closed eye whose geometric centres can be located with confidence	10 km

NOTE: The accuracy and criteria as given above are only illustrative and not definitive.

TABLE 2

Shape of eye and length of arc of eyewall seen (S)

Code Figure	Length of arc	Shape
0	-------	Ill-defined
1	Less than 180^0	{ Shape other than
2	More than 180^0	{ circular or elliptical
3	Closed	{
4	Less than 180^0	{
5	More than 180^0	{ Elliptical
6	Closed	{
7	Less than 180^0	{
8	More than 180^0	{ Circular
9	Closed	{

TABLE 3

D- Diameter or length of major axis of the eye of the tropical cyclone

Code Figure		Code Figure	
0	less than 10 km	6	60 to 69 km
1	10 to 19 km	7	70 to 79 km
2	20 to 29 km	8	80 to 89 km
3	30 to 39 km	9	90 km and greater
4	40 to 49 km	/	undetermined
5	50 to 59 km		

TABLE 4

T- Tendency of the eye, determined over the period since the last observation

Code Figure	
0	Eye has first become visible since the last observation.
1	No significant change in the characteristics or size of the eye.
2	Eye has become smaller with no other significant change in characteristics.
3	Eye has become larger with no other significant change in characteristics.
4	Eye has become less distinct with no significant change in size.
5	Eye has become less distinct and decreased in size.
6	Eye has become less distinct and increased in size.
7	Eye has become more distinct with no significant change in size.
8	Eye has become more distinct and decreased in size.
9	Eye has become more distinct and increased in size.
/	Change in character and size of eye cannot be determined.

ANNEX III-A-3

TABLE 5

P- Period over which the movement of the storm centre has been determined

Code Figure	**Period**
7	During the preceding 3 hours
8	During the preceding 6 hours
9	During a period of more than 6 hours

(To be reported whenever any radar echo is seen)

RAREP FFBB IIiiiYYGGg CHARACTER (b1b1b1/r1r1r1 ----------bnbnbn/rnrnrn) INTENSITY TENDENCY dsdsfsfs ALTD (bbb/HtHt/rrr)

NOTE:

1. Part B will normally be reported only at synoptic hours. In the case of any break in observations or rapid development, additional Part B messages may be transmitted as necessary.
2. Part A messages are to be prepared and transmitted as close to the observation time as possible. Part B can be transmitted separately, after Part A has been sent. When Part A and Part B are transmitted together, the code groups RAREP, IIiii, YYGGg need not be included in Part B.

Character:

EYE : An echo identified definitely as the eye wall of a tropical cyclone.

SPRL BND : A continuous or broken curved line of echoes recognizable as a spiral band associated with a cyclonic system.

SQL LN : This pattern should normally have a length to width ratio of about 10 to 1 and length about 60 km or more.

BRKN LN : A broken line of echoes.

SLD : An area fully covered with echoes.

BRKN : An area 4/8 to 7/8 covered with echoes.

SCT : An area 1/8 to 4/8 covered with echoes.

WDLY SCT : An area less than 1/8 covered with echoes.

ISLTD : Isolated solid mass of echo.

ECHO ALDFT : Echo seen only at elevations higher than half the beam width.

bbb : Azimuth in three digits (degrees) of points on the periphery of an echo area.
rrr : Range (three digits) in units of kilometers.

NOTE:

(1) The groups within the brackets ( ) may be reported as many times as necessary.

(2) In the case of line echoes, in spiral bands and eye wall, as many bbb/rrr points along the line as necessary may be given to define the shape of the line. The points should preferably be given along the line in the anticlockwise direction.

(3) In the case of areas, as many bbb/rrr points as necessary to define the shape may preferably be given in the anticlockwise order starting from the northernmost point. The first point should be repeated as the last point to indicate that it is a closed area.

ANNEX III-A-4

(4) In any one RAREP message, the character of echoes will be reported in the order given in the group description above.

(5) If an echo system with a distinct characteristic is partly or wholly embedded in another, the two systems should be reported in separate groups. For example, a SPRL BND, or BRKNLN (which may be distinguished as such by using the attenuator or isoecho system) embedded in a larger area of echoes will be reported as SPRL BND or BRKN LN in addition to the area reported separately.

(6) The number of features or groups should be as few as possible, and should be just sufficient
to convey an overall picture of the system.

Intensity:

	For radars having facility for quantitative measurement		
Code	**dBZ**	**Approximate rainfall rate mm/hr**	**Other radars**
WK	23 to 32	less than 4	Qualitatively
MDT	33 to 42	4 to 15	determined as in
STG	43 to 52	16 to 63	Weather Radar
VRY STG	53 or more	64 and above	Manual

NOTE: (1) The intensity of the strongest echo in the group is to be reported.
(2) The rainfall rates indicated are based on the relationship Z = 200R 1.6 and may be taken only as a rough guide.
(3) Intensity is to be reported only of echoes within 200 km range

Tendency:
INCG : Increasing
DCG : Decreasing
NO CHG : No change

In view of the difficulties in finding out the tendency of echoes of large areal extent as in a depression or cyclone, tendency should be reported only in case of isolated cells or groups of cells or a line mainly for aviation purposes. The radar meteorologist will take into consideration the change in height, area, length and intensity of echoes over a period of time in judging the tendency.

dsds : Direction in tens of degrees towards which the echo or group of echoes is moving.
fsfs : Speed in kmph of the echo or group of echoes.

ANNEX III-A-5

Doppler Weather Radar (DWR):

Doppler Weather Radars provide vital information on radial velocity within tropical cyclone which is not available in conventional radars. Conventional radar provides information on reflectivity and range only, whereas a DWR provides velocity and spectral width data along with various meteorological, hydrological and aviation products which are very useful for forecasters in estimating the storm's center, its intensity and predicting its future movement. The DWR processing system generates these products using standard radar signal processing and meteorological algorithms.

NOTE: (1) In case of a group of echoes or of a line, only the overall movement of the group of echoes will be reported.

(2) The movement will be observed over a period of, say 30 to 60 minutes.

ALTD: Indicator for echo height information.

HtHt: Height of top of echo above mean sea level in kilometers.

NOTE: (1) Reports of heights should be restricted to a maximum range of 200 km from the station.

(2) In the case of echoes of large areas, the height group may be repeated as necessary for including a number of prominent echoes.

The radar meteorologist will have discretion to report any other special phenomena such as Bright Band and Anomalous Propagation in plain language at the end of the message.

Parts A and B both shall be used whenever the echo pattern observed is recognized as relating to tropical cyclone. Part B only will be used for reporting echoes other than connected with tropical cyclone.

In the IMD website these products are uploaded at 10 minutes interval when a cyclone comes within a coastal Radar range and could be used by member countries. The products available from DWR of IMD which are available in IMD website include MAX(Z) Product (MAX_Z), Plan Position Indicator (PPI_Z), Volume Velocity processing (VVP_2), Plan Position Indicator (PPI_V), Surface Rainfall Intensity (SRI_150), Precipitation Accumulation (PAC) 24 hrs at 0300 UTC (HOURS_24)

Typical example of the Hourly radar bulletin issued by DWR stations at Paradeep in association with SCS Dana, 2024 in India during the cyclone period is given below:

DWR KARAIKAL CYCLONE BULLETIN

Cyclone: DITWAH **Time: 30/11/2025 23:30 IST**

Ditwah Bulletin 30 Nov 2025 / 18UTC			
Name of reporting Radar		Doppler Weather Radar, Karaikal	
Date and Time		30 November 2025	1800 UTC
Geo-Coordinates of Radar		10.9254° N, 79.8380° E	
Name of the Cyclone		Ditwah	
	Is the eye visible(Yes/No)	No(center estimated from animation of the pictures)	
	Shape	NA	

Centre	Diameter(Km)	NA			
	Location	Latitude(Deg)	Longitude(Deg)	Azimuth(Deg)	Range(Km)
		11.99N	81.16 E	50.1	188.3
Maximum Radar Reflectivity	In the eye wall/spiral wall region	Reflectivity(dBZ)	Height (km)	Azimuth(Deg)	Range(km)
		24.0	3.0	100.0	49.8
	Any other area	Reflectivity(dBZ)	Height (km)	Azimuth(Deg)	Range(km)
		NA	NA	NA	NA
Maximum Radial Velocity	In the eye wall/spiral wall region	Radial Velocity(m/s)	Height (km)	Azimuth(Deg)	Range(km)
		12.1	1.5	114.3	32.7
	Any other area	Radial Velocity(m/s)	Height (km)	Azimuth(Deg)	Range(km)
		NA	NA	NA	NA
Vertical Extend in Km (20dBZ Echo Top)		3.0			
Tendency during the past hour	Intensity	Decreasing			
	Direction of movement(Deg)	NA			
	Speed (km/hr)	NA			
Other features, if any		Nil			
Remarks		Nil			

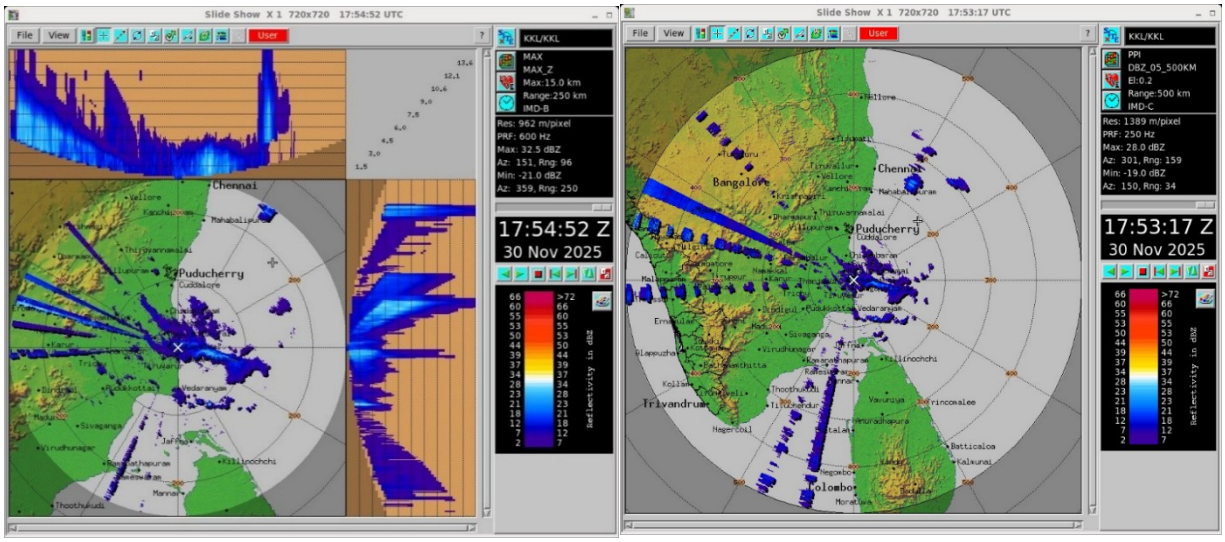


Fig 3.1.: Radar Images issued at 1800 UTC of 30th November, 2025

ANNEX III-B-1

Satellite cloud imagery monitoring facilities in the Panel countries

Bangladesh

Bangladesh Meteorological Department (BMD) has the facilities of Himawari Satellite Receiving System of Japan. The satellite imageries of all of the available channels are updated on BMD website (http://www.bmd.gov.bd) regularly. With this system BMD is receiving images of Himawari 9. Satellite Images from 14 different channels have been received with 10 minutes intervals which is disseminated from Japanese communication satellite JC-SAT 2B. To analyze these satellite images SATAID data processing tool is used. BMD also has CMACast reception system. From this system BMD is receiving satellite images from Satellite FY-2D, FY-2E and FY-2F satellites. To analyze the images MICAPS data processing tool is used. Both of these reception systems are being used in operational weather forecasting.

Installation of the Receiving System of GK-2A (Korean Satellite) at BMD is under process and the available data will be utiled in operational forecasting.

India

Multi Mission Meteorological Data Receiving and Processing System (MMDRPS) is being used on an operational basis to receive and process meteorological data from INSAT-3D and INSAT3-DR satellites on round the clock basis in Satellite Meteorological Division. MMDRPS systems consist of advance & latest state of art servers capable to process the complete set of data within 7 minutes after completion of scanning along with the storage capacity of order 2.0/2.0PB (Main/ Mirror) & 324TB SSD which will facilitate online sharing of processed data for all Indian meteorological satellites to the registered users as per IMD data policy through Web based secured satellite Data Supply System.

The MMDRPS facility generated more than 30,000 images and data products from INSAT 3DR & 3DS, and handles around 800 GB of geostationary data each. It amounts to approximately 10 lakh images and data products, as well as 20 TB of data handling, each month, while running 24x7x365. The system is maintained to run around-the-clock without any failures, and intermittent maintenance issues are addressed as per the needs and escalation process. One significant failure issue arose on 01st July 2025, due to an electrical supply line failure, and the entire facility went blacked out, resulting in the shutdown of the MMDRPS facility. The division's satellite services were affected until they were restored on 04th July 2025.

Imager payload of these satellites (INSAT3DS/R) are operated in a staggered mode to get images every 15 minutes. Sounder payload of INSAT 3DS and INSAT 3DR satellite is operated in an integrated mode so that every hourly data of Indian land region and every one and half hour hourly data of Indian Ocean region is obtained for generating multi-level imageries and vertical profiles of humidity and temperature. Cloud Imagery and derived products data are disseminated to forecasting offices of the IMD as well as to the other users in India and foreign countries through dedicated web pages and online analysis and visualization tool (RAPID). All the received and processed data from the satellite are archived on a dedicated storage of MMRDPS

The following products derived from the satellite are useful for monitoring of tropical cyclones Enhanced grey scale imagery of cyclone.

1. Enhanced coloured imagery of cyclone.
2. Enhanced coloured imagery of cyclone.
3. Outgoing Long wave Radiation (OLR) at pixel resolution
4. The following Quantitative Precipitation Estimation (QPE)

- GPI three hourly accumulated at 1x1 degree resolution,

- ❖ Hydro estimator (HE) at pixel level
- ❖ INSAT-Multi spectral Rainfall (IMR)at 0.1x0.1-degree resolution
- ❖ Improved IMR at pixel level.

5. Sea Surface Temperature (SST) at pixel resolution
6. Upper Tropospheric Humidity (UTH) at pixel resolution
7. Cloud Motion Vector (CMV)
8. Water Vapour Wind (WVW)
9. Vis/MIR wind
10. Wind derived products such as: Lower level Vorticity, Upper level Divergence, Lower level convergence, Vertical wind shear & Wind shear tendency
11. Temperature, Humidity profile
12. Value added parameters from sounder products

- Geo-potential Height
- Layer Precipitable Water
- Total Precipitable Water
- Lifted Index
- Dry Microburst Index
- Maximum Vertical Theta-E Differential
- Wind Index
- Ozone

At present, Dvorak technique is used but manually applied. Recently, efforts have been made for automation of this technique. Automated Dvorak technique version (8.2.1) is running in experimental mode at Satellite Application Unit. Satellite Application Unit is also using microwave imageries operationally from NOAA, NASA-GPM, AMSR2, Metop, DMSP satellites for locating the tropical systems. Satellite Application Unit issues three hourly bulletins in general, and hourly and half hourly bulletins in case of tropical cyclones and other severe weather events.

ISRO successfully launched EOS-06 in November 2022. Satellite Meteorology Division, IMD had started receiving operational Scatterometer data from ISRO from May 2023. Satellite division, IMD, has indigenously devised a software module for operational handling of the Scatterometer data. Data are fetched between dual swath mode in a calendar day through file transfer protocol (FTP) and end products are generated by utilizing various Python libraries on a real time basis. Satellite division has also established a direct file transfer protocol access to the NRSC data repositories for seamless data transfer and product generation. The data output is currently generated in jpg format. The software code for this visualization has been exclusively made at SATMET division for the forecasters and end users. Typical OceanSat imagery during cyclone "SHAKHTI" is presented in Fig. 3.2.

Satellite based Land Surface temperature product is currently generated on a pilot mode for Delhi-NCR region. The region-specific land surface temperature values from INSAT 3D and 3DR are generated for improved understanding of the urban hotspots over the city. This module is also planned for other smart cities in near future. An example is presented is Fig 3.3.

Real-time Analysis of Product and Information Dissemination (RAPID) is a visualization tool developed jointly by IMD & ISRO for monitoring and analysis of satellite imageries and products of INSAT 3DS and INSAT 3D(R). A satellite based nowcast tool for its prediction is also available in RAPID. As RAPID is a geo-reference platform, it provides real time information

on genesis, growth and decay along with its location and other geo-physical parameters to help forecasters to provide more objective nowcast. This tool is available in IMD website at the link: http://www.rapid.imd.gov.in/

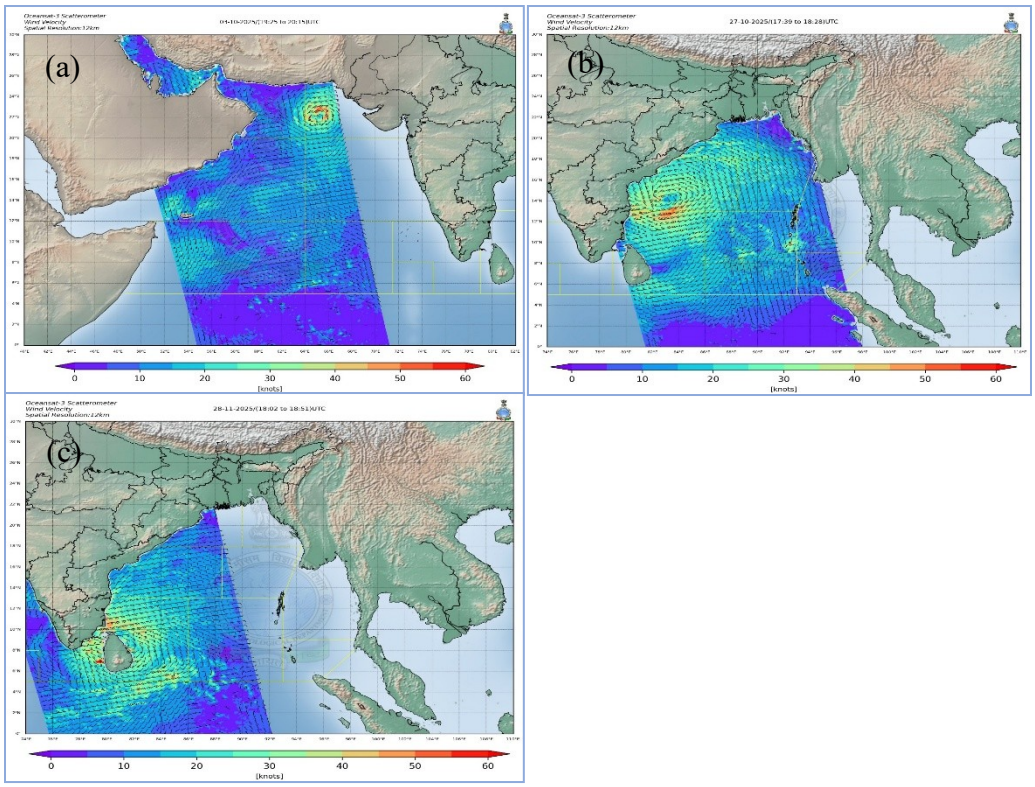


Fig.3.2: Oceansat-3 image of cyclones (a)Shakhti, (b)Montha & (c) Ditwah during 2025

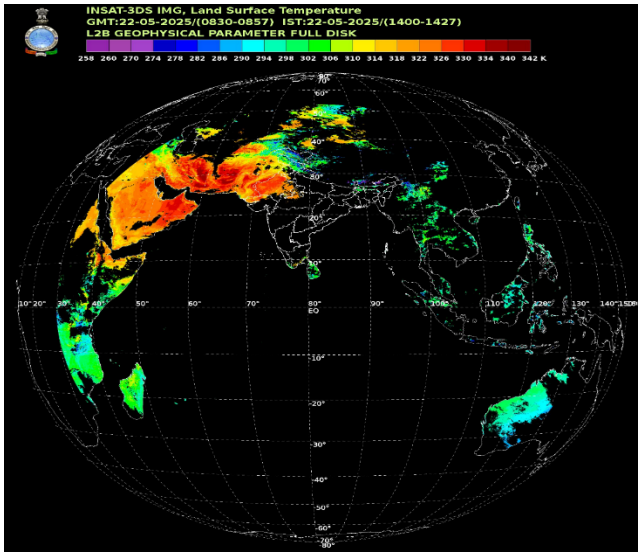


Fig 3.3: Satellite based land surface temperature

With the Web Archival System developed at IMD, INSAT-3DS and INSAT 3DR products & imageries are archived. Spectral Band images and product images are archived online for last 6 months. The generation of around ten new products has been put in operational chain of MMDRPS to meet the NWP, Forecaster and Agromet services requirement.

INSAT-3DR Imager payload is used to conduct rapid scans during active cyclones following a standard operating procedure. Each Rapid scan cover up 3 degree in N-S direction (6 Blocks/240 scan lines) in 4.5 minutes. Rapid scan data are being used to track these cyclones in real time basis. The processed data is being disseminated on a dedicated webpage (http://satellite.imd.gov.in/ rapid/rapid_scan.htm).

Advanced Capabilities of Modern Indian Satellites:

Modern Indian satellites are equipped with sophisticated instruments that provide comprehensive atmospheric observations. These instruments include:

- Multispectral Imagers: These imagers capture images in multiple spectral bands, allowing for detailed analysis of cloud cover, land surface conditions, and ocean features.
- Sounders: Sounders measure the temperature and moisture profiles of the atmosphere, providing crucial information for weather forecasting and climate studies.

The recently launched **INSAT-3DS**, with its improved blackbody calibration and advanced sounder payload, further enhances India's capabilities in satellite meteorology.

By harnessing the power of satellite technology, India has significantly improved its weather forecasting and climate monitoring capabilities, contributing to the safety and well-being of its citizens and the global community.

INSAT-3DS, launched on February 17, 2024, is the latest addition to India's geostationary satellite fleet. It is designed to provide enhanced meteorological observations and monitoring of land and ocean surfaces, significantly improving weather forecasting and disaster warning capabilities.

Key Features of INSAT-3DS:

- Advanced Payloads: Similar to INSAT-3D and INSAT-3DR, INSAT-3DS carries a 6-channel imager and a 19-channel sounder.
- Improved Capabilities: The satellite incorporates advancements in radiometric accuracy, black body calibration, thermal management, and imaging throughput.
- Enhanced Data Quality: Provides higher-quality data for more precise weather analysis and forecasting.
- Real-time Monitoring: Contributes to real-time monitoring of weather systems, including cyclones, thunderstorms, and fog.
- Improved Disaster Warning: Helps in early warning systems for extreme weather events like floods, droughts, and heatwaves.

Contribution to Weather Forecasting:

INSAT-3DS, along with INSAT-3DR, plays a crucial role in:

- Accurate Weather Prediction: Provides high-resolution imagery and atmospheric profiles for precise weather forecasting.
- Tropical Cyclone Tracking: Enables real-time monitoring of cyclone formation, intensification, and movement.
- Monsoon Monitoring: Helps in understanding and predicting the Indian monsoon, a vital weather system for the country.

- Extreme Weather Event Monitoring: Detects and tracks extreme weather events like heatwaves, cold waves, and heavy rainfall.
- Climate Studies: Contributes to long-term climate studies and monitoring climate change impacts.

By leveraging the capabilities of these advanced satellites, India is strengthening its capacity to monitor weather patterns, issue timely warnings, and mitigate the impacts of natural disasters

Lightning monitoring:

The occurrence of lightning in India is being monitored with the help of lightning detectors established by Ministry of Earth Sciences and Indian Air Force. Currently, there are 300 No. of lightning detectors in the country. The area of lightning during preceding 5 min, 10 min and 15 min are superimposed with satellite and radar imageries. It helps in proper monitoring of thunderstorm and lightning activities and nowcasting of such events.

A nationwide lightning detection network has been established by IITM Pune. Lightning observations are collected at a 1-minute temporal resolution and are provided to the India Meteorological Department (IMD) on a real-time basis. A merged real-time product combining lightning observations with satellite-derived cloud information from INSAT-3DR/3DS is generated as a half-hourly animation. In this animation, lightning data are categorized into three temporal bins of 10, 20, and 30 minutes and are displayed using different colours; the product is updated every 15 minutes. A time lag of approximately one hour exists between the satellite and lightning observations, primarily due to the satellite scan strategy. The 10-, 20-, and 30-minute intervals shown in the imagery (Fig 1.11) correspond to the timing of the received lightning data.

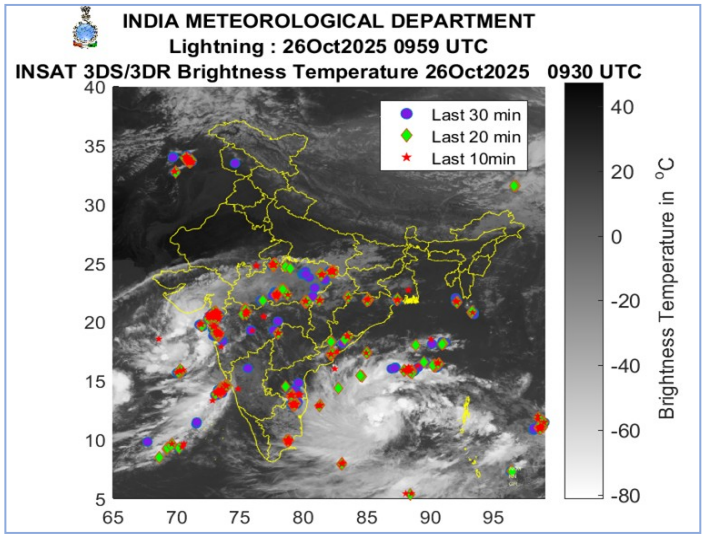


Fig 3.4: The points are lightning flashes/strikes (cloud-to-ground) which is being generated by the ground networks. These flashes/strikes are also superimposing on INSAT-3DR/DS cloud top temperature.

User can access this data through a dedicated link on IMD website: https://mausam.imd.gov.in/http://internal.imd.gov.in/section/satmet/lightning/

ANNEX III-B-2

Maldives

An integrated satellite receiving system generously donated by China Meteorological Agency was installed on 25 October 2012. This CMACAST system receives Satellite imageries from FY2G and FY4B series of Chinese geostationary satellites at an interval of 15 minutes, however, data latency is relatively high of the order 30-45 minutes. Another component of this CMACAST system is the application software MICAPS (meteorological data analyzing system) and SWAP (Satellite Weather Application Platform) which enables to display satellite pictures, surface & upper air data and NWP products and overlay different products and analysis of various weather phenomena. This SYSTEM is satisfactorily operational and recently upgraded to receive latest FY series of CMA satellites.
Other satellite products are used from IMD website, RSMC Website and Japanese (JAXA Realtime Rain Watch) etc.
Additionally, surface synoptic data, Automatic Weather Station (AWS) data, Upper air sounding data, along with locally run WRF model products, NWPs of ECMWF, UK Met Office, IMD, CMA global model etc. are utilized for TC monitoring and forecasting.

Myanmar

The Department of Meteorology and Hydrology in Myanmar is receiving satellite imageries from Himawari Cast, CMA Cast ground reception system and also from US polar-orbiting satellites (NOAA series of the USA) by using internet.

An integrated satellite receiving system of Himawari Cast donated by Japan Meteorological Agency was upgrated on November 2015. This Himawari Cast system receives 14 channels and Himawari-8-9, NWP (JMA-GSM), Observation (SYNOP, TEMP, and SHIP), Ocean Surface wind and MANAM.

An integrated satellite receiving system generously donated by China Meteorological Agency was installed on March 2012. This CMA Cast system receives Satellite imageries from FY2E and FY2D series of Chinese geostationary satellites at an interval of 30 minutes. Surface synoptic data, Upper air sounding data, NWPs of ECMWF, T213: NWPs of CMA global model, NWP accumulation precipitation from Germany model and Japan model. Another component of this system is the application software MICAPS (meteorological data analyzing system) which enables to display satellite pictures, surface & upper air data and NWP products and overlay different products and analysis of various weather phenomena.

ANNEX III-B-3

Oman (Sultanate of Oman)

The Meteorological Department has the following satellite ground receiving stations:

(i) METOSAT KU band at Muscat Airport and C band at Muscat Airport and Salalah Airport

. (ii) HRPT system at Muscat International Airport And Salalah Airport

All the above mentioned systems receive their data from the EUMETSAT Geostationary Satellite and NOAA Polar Orbiting Satellites.

Apart from generating cloud imagery, several products are derived from the satellite data. Some of these products are:

(i) Sounding based on TOVS [on experimental basis]
(ii) Sea surface temperature
(iii) Precipitation estimates
(iv) Cloud tops
(v) Fire detection [on experimental basis]
(vi) Pollution [on experimental basis]
(iv) Vegetation Index - NDVI [on experimental basis]

Pakistan

Satellite Ground Stations operated by PMD

1. HRPT at Islamabad and Quetta and
2. FY-2E/D (CMA cast-satellite receiving products, cloud imageries, winds and vorticity etc) at Islamabad and Karachi Airport.
3. Other satellite imageries available thru internet are accessed too.

Qatar

Qatar Meteorology Department receives Meteosat second generation satellite images on operational basis every 15 minutes which include visible, infrared, water vapor channels as well as HRV and various RGB satellite images.

Sri Lanka

Satellite imageries and products are received from HimawariCAST and CMACAST through the real time receiving systems.

METEOSAT-2SG/ INSAT imageries are accessed through Internet regularly

Thailand

The Meteorological Department in Thailand is receiving satellite imageries and products from Himawari 8, through HimawariCast receiving system, and FY-2 via internet.

UAE

Satellite cloud imagery monitoring facilities in NCM

Satellite	Position (Longitude)	Orbit	channels	period
Eumetsat Met-11	0°	Geostationary	12	15 minutes
Eumetsat Met-8	41.5° E	Geostationary	12	3 hours
Himawari-8 (Japan)	140.7° East	Geostationary	1	10 minutes
GOES-15 USA west	135° W	Geostationary	1	3 hours
GOES-16 USA east	075° W	Geostationary	1	15 minutes
FY2E (China)	86.5° E	Geostationary	5	1 hour
FY2G (China)	105° E	Geostationary	5	1 hour

C H A P T E R IV

TROPICAL CYCLONE FORECASTING

4.1 Forecasting development and movement of tropical cyclones

The final responsibility for analysis and forecasting of genesis, intensification and movement of tropical cyclones in the region will be with the National Meteorological Service of each of the Members. However, in addition to the exchange of observational data needed for analysis and forecasting, the following special arrangements for the exchange of processed products and advisories have been made.

(i) (a) Processed products will be provided by RSMC tropical cyclones, New Delhi. A list of output products broadcast from RSMC tropical cyclones, New Delhi for international purposes is given in Table IV1. A list of other products broadcast through facsimile from RSMC tropical cyclones, New Delhi for national purposes is given in Annex IV-A.

(b) RSMC tropical cyclones, New Delhi will issue a tropical weather outlook once daily throughout the year for the benefit of the Member countries. It is being transmitted on the GTS at 06 UTC. The outlook covering the Bay of Bengal and the Arabian Sea indicates possible development of tropical depressions over the sea. An additional outlook will be transmitted again over the GTS at 1700 UTC when a Depression is located and expected to intensify into a cyclonic storm.

(ii) In case there is a tropical cyclone in the Panel region, RSMC tropical cyclones, New Delhi will also issue the following:

(a) Tropical cyclone advisories, details of which have been given in earlier chapters.

(b) Tropical Cyclone Advisory Centre (TCAC) New Delhi will issue Tropical Cyclone Advisory bulletins for the international air navigation to Meteorological Watch Offices (MWOs) in area of responsibility at least for every six hours.

(ii) The satellite tropical disturbance summary issued from Washington will be exchanged through the GTS.

(iii) National Meteorological Services may like to use climatological charts of average vector motions for the track prediction. The track prediction based on climatological charts are usually most useful (minimum error) when tropical storms are to the south of subtropical anticyclones. Such charts for the region for each month and for each season are available in IMD and RSMC, New Delhi website in the form of cyclone Web Atlas**.**

4.2Prediction Models in operational use during the year 2026

4.2.1 Global Forecast System

(a) The Global Forecast System (GFS), adopted from National Centre for Environmental Prediction (NCEP) USA is operationally run at India Meteorological Department (IMD), New Delhi on Cray XC40 based High Power Computing Systems (HPCS). The IMD-GFS (T1534/L64) global model is run with ~12 km horizontal resolution and 64 hybrid sigma-pressure layers with Ensemble Kalman Filter (ENKF) based Grid Point Statistical Interpolation (GSI) scheme as the global data assimilation to generate 10 days forecast. The model is run four times in a day (00, 06, 12 and 18 UTC). The real-time outputs are made available to the national web site of IMD (https://mausam.imd.gov.in/ under Short to Medium Range Model Guidance).

IMD also makes use of NWP products prepared by some other operational NWP Centers like, European Center for Medium Range Weather Forecasting (ECMWF), GFS (NCEP) USA, Japan Meteorological Agency (JMA), UK Meteorological Office (UKMO) model etc.

(b) Bharat Forecast System (Bharat FS) global model of about 6 km horizontal resolution operationally started using by IMD in 2025 May. The model uses novel grid structure

Triangular cubical Octahedral grid (TCO) to achieve high resolution forecasts about size of cluster of Panchayats/villages. The Bharat Forecast system will significantly enhance predictive capabilities across a wide range of sectors, including public safety, energy, transportation and agriculture. Its high resolution forecast will support timely decision-making, improve preparedness, optimize resource allocation and in critical situations help save human lives.

4.2.2 Regional Forecast System

IMD operationally runs regional models Weather Research Forecast Advance Research for Weather Forecasting (WRFARW) (v3.9) with regional GSI based data assimilation, and Atmosphere-Ocean coupled Hurricane Weather Research and Forecast (HWRF) modelling system for short-range prediction during cyclone.

4.2.2.1. Mesoscale modeling system WRF-ARW with regional GSI based Data Assimilation system

The mesoscale Weather Research and Forecast WRF (version 3.9.1) with 3DVAR data assimilation is being operated daily twice to generate mesoscale analysis at 3 km horizontal resolution using IMD GFS-T1534L64 analysis as first guess and forecasts as boundary condition. Using analysis and updated boundary conditions from the WRFDA, the WRF (ARW) is run for the forecast up to 3 days with 3 km and 45 Eta levels in the vertical 4 times a day at 06 hourly interval.

The model domain covers the area between lat. 5ºS to 40ºN long 50ºE to 102ºE covering India and neighbouring south Asian countries. The model runs with its own regional data assimilation (Com GSI V3.7_EnKF1.3).

4.2.2.2 Hurricane WRF Model (HWRF)

Since 2011, time to time the HWRF modelling system is developed and customized atmospheric and ocean models with other associated pre-processing and post-processing components are implemented in IMD under the framework of MoU between Ministry of Earth Sciences (MoES) India and National Oceanic and Atmospheric Administration (NOAA) USA. The HWRF version H217 has been ported on the MHIR HPCS with horizontal resolution of 18 km for parent domain and 6km & 2 km for intermediate and innermost nested domains following the center of cyclonic storm. The model is running with 61 vertical levels with parent domain, intermediate and innermost domain covering area of 80^{o}x80^{o}, 24^{o}x24^{o} and 7^{o}x7^{o} respectively. The special feature modified for tropical cyclone forecasting includes vortex initialization and correction, GSI based regional data assimilation, coupler for two-way coupling between atmosphere and ocean components and fine-tuned physical parameterization schemes. This model is customized specifically to forecast the track, intensity and structure of tropical cyclones. The HWRF modelling system uses the dynamics and infrastructure from the Non-Hydrostatic Mesoscale Model (NMM) WRF modelling system. It uses physics that are proven to be better for the tropics. Also, at this time, it is an Ocean coupled model system with a Moving two-way interactive nest, and advanced data assimilation. IMD is operationally running ocean coupled HWRF models during Tropical Cyclone (TC) events with two ocean models viz. Princeton Ocean Model (POM-TC) and Hybrid Coordinate Ocean Model (HYCOM). HYCOM initial conditions are provided through Indian National Centre for Ocean Information Services (INCOIS) whereas POM-TC is initialized based on climatology.

It is run 4 times a day in cyclic mode with GSI based (hybrid-Ensemble Variation (EnVar)) assimilation (80 members) with 6 hourly cycles in cycling mode with full physics configuration. The Unified Post-Processor (UPP) coverts raw model outputs from all three domains into standard GRIB1/2 format. Moreover, Global Fluid Dynamics Laboratory (GFDL) tracker

generates track and intensity information in a standard Automated Tropical Cyclone Forecasting System (ATCF) format processing all GRIB files with a specified time interval (3 or 6 hours) as per requirement.

The modeling system was fully operational and predicted all cyclones during the years. Whenever any low-pressure system intensified and became depression over both sub-basins of North Indian Ocean, the cyclic run of the modelling system had been initiated. The model utilized ocean initial state from the INCOIS Tendral Ocean Prediction System – Indian Ocean Model (ITOPSI) during each cycle to initialize the HYCOM ocean component. All available observed data including conventional and satellite observations were assimilated into the regional GSI system to improve further the initial condition after the vortex initialization of the atmospheric first guess state of the model forecast from previous cycle (except first cycle).

The ocean model provides the SST field to the atmospheric component through coupler during the model integration to update the effect of mixing, cooling as well as advection effect on SST field, whereas the atmospheric component provides the heat fluxes, wind stress, precipitation and surface pressure fields to the ocean model through coupler. The coupled HWRF model uses GFDL vortex tracker and diagnostic software to provide the graphic and text information on track, intensity as well as structure of tropical cyclones for real time operational requirements. The HWRF physics scheme upgrades include updated Scale-Aware Simplified Arakawa-Schubert (SASAS) scheme, Ferrier-Aligo microphysics, GFS Hybrid-EDMF PBL, partial cloudiness for RRTMG scheme, and surface-exchange coefficients in the surface layer.

Within coupled framework of HWRF modeling system, the POM is initialized based on the climatological data whereas the HYCOM is initialized based on the ocean fields from Real-Time Ocean Forecast System (RTOF) of INCOIS, Hyderabad. The atmospheric component of HWRF is initialized based on the analysis and forecast from IMD-GFS (T1534L64) and associated GDAS analysis. The HWRF model uses 3D-EnVAR-GSI as its data assimilation component. The coupled HWRF model is run every 6 hours on real time basis in cyclic mode based on 00, 06, 12, 18 UTC initial conditions to provide track and intensity forecast along with surface wind, rain swaths and other diagnostic products for up to 126 hours.

The coupled HWRF system with both ocean models viz, POM-TC and HYCOM was operational simultaneously and model guidance products were provided from both the configurations. The coupled HWRF model uses TC Vital parameters generated by RSMC, New Delhi every six hour from Deep depression state till landfall of TC

4.2.2.3. High Resolution Rapid Refresh Modeling System (HRRR)

The High Resolution Rapid Refresh (HRRR) system based on Weather Research and Forecast (WRF-ARW) model with WRFDA (3DVAR-FGAT) data assimilation is operationalized in IMD in collaboration with Space Application Center (ISRO) from beginning of 2021. The HRRR is hourly updated atmospheric model with horizontal resolution of 2km. The model uses forecast of IMD-GFS (T1534L64) model as first guess and forecast as boundary during cold start and is then cycled providing hourly updates based on Radar Data assimilation. Using analysis and updated boundary conditions from the WRFDA, the HRRR is run to produce forecasts up to 12 hours and forecasts are made available after every two hours on NWP website of IMD.

The model is run in three different domains covering Indian mainland. The three domains are North-West domain, East & North-East domain and South-Peninsular domain. HRRR with hourly updates provide frequent and updated precipitation and reflectivity forecasts with respect to the TCs which could be very useful in planning effective and immediate disaster mitigation strategies in very short range.

4.2.3. Dynamical statistical models

The method comprises of five forecast components, namely (a) Cyclone Genesis Potential Parameter (GPP), (b) Multi-Model Ensemble (MME) technique for cyclone track prediction, (c) Cyclone intensity prediction, (d) Rapid intensification and (e) Predicting decaying intensity after the landfall.

a) Genesis Potential Parameter (GPP)

A cyclone genesis parameter, termed the genesis potential parameter (GPP), for the North Indian Sea is developed (Kotal et al, 2009). The parameter is defined as the product of four variables, namely relative vorticity at 850 hPa, middle tropospheric relative humidity, middle tropospheric instability, and the inverse of vertical wind shear. The parameter is operationally used for distinction between non-developing and developing systems at their early development stages. The composite GPP value is found to be around three to five times greater for developing systems (T 3.0) than for non-developing systems. The analysis of the parameter at early development stage of a cyclonic storm found to provide a useful predictive signal for intensification of the system.

The grid point analysis and forecast of the genesis parameter up to seven days is also generated on real time. Higher value of the GPP over a region indicates higher potential of genesis over the region. Region with GPP value equal or greater than 30 is found to be high potential zone for cyclogenesis. The analysis of the parameter and its effectiveness during cyclonic disturbances in 2025 affirm its usefulness as a predictive signal (4-5 days in advance) for cyclogenesis over the North Indian Ocean.

b) Multi-model ensemble (MME) technique

The multi model ensemble (MME) technique (Kotal and Roy Bhowmik, 2011) is based on a statistical linear regression approach. The predictors selected for the ensemble technique are forecasts latitude and longitude positions at 12-hour interval up to 120-hour of five operational NWP models. In the MME method, forecast latitude and longitude position of the member models are linearly regressed against the observed (track) latitude and longitude position for each forecast time at 12-hours intervals for the forecast up to 120-hour. The 12 hourly predicted cyclone tracks are then determined from the respective mean sea level pressure fields using a cyclone tracking software. Multiple linear regression technique is used to generate weights (regression coefficients) for each model for each forecast hour (12hr, 24hr, 36 hr, 48hr, 60hr, 72hr, 84hr, 96hr, 108hr and 120 hrs) based on the past data. These coefficients are then used as weights for the ensemble forecasts. 12-hourly forecast latitude (LATf) and longitude (LONf) positions are defined by multiple linear regression technique. A collective bias correction is applied in the MME by applying multiple linear regression based minimization principle for the member models GFS (IMD), GFS (NCEP), ECMWF, UKMO and JMA. ECMWF data are available at 24h intervals. Therefore, 12h, 36h, 60h, 84h, 108h forecast positions of ECMWF are computed based on linear interpolation. All these NWP products are routinely made available in real time on the IMD web site: www.rsmcnewdelhi.imd.gov.in.

New MME based on TC tracker: Since 2021, IMD has also implemented IFS TC Tracker (available from ECMWF) for all available TIGGE models (9 in numbers). These 9 models are from Bureau of Meteorology, Australia (BoM), Environment and Climate Change Canada (ECCC), European Centre for Medium-Range Weather Forecasts (ECMWF), India Meteorological Department (IMD), Japan Meteorological Agency (JMA), Korea Meteorological Administration (KMA), Met Office - UK (UKMO), and National Centers for Environmental Prediction, USA (NCEP), and National Centre for Medium Range Weather Forecasting (NCMRWF) are nine International Institutes model outputs (contributing to the TIGGE) are chosen based on availability at the ECMWF-TIGGE web data portal https://apps.ecmwf.int/datasets/data/tigge/levtype=sfc/type=cf/ as on December 2021

c) Statistical Dynamical model for Cyclone Intensity Prediction (SCIP)

A statistical-dynamical model (SCIP) (Kotal et al, 2008) has been implemented for real time forecasting of 12 hourly intensity up to 120 hours. The model parameters are derived based on model analysis fields of past cyclones. The parameters selected as predictors are: Initial storm intensity, Intensity changes during past 12 hours, Storm motion speed, Initial storm latitude position, Vertical wind shear averaged along the storm track, Vorticity at 850 hPa, Divergence at 200 hPa and Sea Surface Temperature (SST). For the real-time forecasting, model parameters are derived based on the forecast fields of IMD-GFS model. The method is found to be provided useful guidance for the operational cyclone forecasting.

The MME based all available NWP models on EPS is also developed by IMD since 2021 for intensity prediction.

d) Rapid Intensification (RI) Index

A rapid intensification index (RII) is developed for tropical cyclones over the Bay of Bengal (Kotal and Roy Bhowmik, 2013). The RII uses large-scale characteristics of tropical cyclones to estimate the probability of rapid intensification (RI) over the subsequent 24-h. The RI is defined as an increase of intensity 30 kt (15.4 ms-1) during 24-h. The RII technique is developed by combining threshold (index) values of the eight variables for which statistically significant differences are found between the RI and non-RI cases. The variables are: Storm latitude position, previous 12-h intensity change, initial storm intensity, vorticity at 850 hPa, divergence at 200 hPa, vertical wind shear, lower tropospheric relative humidity, and storm motion speed. The probability of RI is found to be increases from 0% to 100% when the total number of indices satisfied increases from zero to eight. The forecasts are made available in real time from 2013.

e) Decay of Intensity after the landfall

Tropical cyclones (TCs) are well known for their destructive potential and impact on human activities. The Super cyclone Odisha (1999) illustrated the need for the accurate prediction of inland effects of tropical cyclones. The super cyclone of Odisha maintained the intensity of cyclonic storm for about 30 hours after landfall. Because a dense population resides at or near the Indian coasts, the decay forecast has direct relevance to daily activities over a coastal zone (such as transportation, tourism, fishing, etc.) apart from disaster management. In view of this, the decay model (Roy Bhowmik et al. 2005) has been used for real time forecasting of decaying intensity (after landfall) of TCs.

4.2.4. Tropical Cyclone Ensemble Forecast based on Global Models Ensemble (TIGGE) Data

The THORPEX Interactive Grand Global Ensemble (TIGGE, Philippe Bougeault et al. 2010) is an implementation of ensemble forecasting for global weather forecasting and is part of THORPEX, an international research programme established in 2003 by the World Meteorological Organization (WMO) to accelerate improvements in the utility and accuracy of weather forecasts up to two weeks ahead. As part of WMO Program to provide a guidance of tropical cyclone (TC) forecasts in near real-time for the ESCAP/WMO Member Countries based on the TIGGE Cyclone XML (CXML) data, IMD implemented JMA supported software for real-time TC forecast over North Indian Ocean (NIO) in 2011. The Ensemble and deterministic forecast products from ECMWF (50+1 Members), NCEP (20+1 Members), UKMO (23+1 Members) and MSC (20+1 Members) are available near real-time for NIO region for named TCs. These Products includes: Deterministic and Ensemble TC track forecasts, Strike Probability Maps, Strike probability of cities within the range of 120 kms 4 days in advance. The JMA provided software to prepare Web page to provide guidance of tropical cyclone

forecasts in near real-time for the ESCAP/WMO committee Members. The forecast products are made available in real time.

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4.2.10. Global Ensemble Forecast System

The Ministry of Earth Sciences (MoES) has commissioned two very high resolution (12 km grid scale) state-of-the-art global Ensemble Prediction Systems (EPS) for generating operational 10-days probabilistic forecasts of weather since 2018. The EPS involves the generation of multiple forecasts using slightly varying initial conditions. The forecast products from these two prediction systems are available at the following links (http://nwp.imd.gov.in/gefspro.php) and http://www.ncmrwf.gov.in/ product main.php). The frameworks of the new EPSs are among the best weather prediction systems in the world at present. Very few forecasting centres in the world use this high resolution for short-medium range probabilistic weather forecasts.

4.2.10.1. The Ensemble Mean and Spread

The ensemble spread is a measure of the difference between the members and is represented by the standard deviation (SD) with respect to the ensemble mean (EM). On average, small (high) spread indicates a high (low) forecast accuracy.

- The ensemble spread is flow-dependent and varies for different parameters.
- It usually increases with the forecast range, but there can be cases when the spread is larger at shorter forecast ranges than at longer ranges. This might happen when the initial days are characterized by strong synoptic systems with complex structures but are followed by large-scale "fair weather" high pressure systems.

4.2.10.2. Models run at NCMRWF

(a) Mithuna Forecast System (Mithuna-FS)

NCMRWF has recently upgraded its operational global forecasting system, moving from the atmosphere–land model NCUM-G to a fully coupled Earth system model known as Mithuna-FS. This model is India's first fully coupled numerical weather prediction system operational for routine short to medium-range forecasting, developed under the MOMENTUM, India-UK partnership. The new system incorporates dynamic exchange processes of heat, momentum, and moisture across the atmosphere, ocean, sea-ice, land components. Solar and terrestrial radiation govern the system's overall energy balance, while hydrological processes further intensify the coupling pathways between the atmosphere and the land surface. Mithuna-FS is operationalized since November, 2025 and routine short- to medium-range forecasts are now being delivered to IMD and other Government agencies, which will further strengthening national forecasting services. The Mithuna-FS suite encompasses modules for pre-processing, observation handling and monitoring, weakly coupled data assimilation, the coupled model components systems. Arunika, petascale high-performance computing (HPC) platform hosts an advanced software ecosystem built to support this modelling system.

(b) Weakly Coupled Data Assimilation (WCDA)

In a weakly coupled data assimilation (WCDA) system, Atmospheric, oceanic, land, and sea-ice components assimilate their respective observations independently using separate data assimilation systems. The updated component states are then combined within a coupled forecast model, where interactions among atmosphere, ocean, land, and sea ice occur only during the model integration step. No cross-component error covariances are used during the assimilation. The atmospheric deterministic DA system employs a hybrid 4D-Var scheme that blends static and flow-dependent background-error covariances. The ensemble DA system uses a hybrid En-4DEnVar method, in which ensemble-derived covariances are incorporated

directly within a four-dimensional variational framework. Ocean and sea-ice analyses are performed using NEMO v4, configured with the SI^3 sea-ice model. The system uses 75 vertical levels, a 20-minute time step, and 1/4° horizontal resolution on the ORCA025 tripolar grid. A 3D-Var FGAT scheme assimilates SST, SSH, T/S profiles, and Sea Ice Concentration, ensuring balanced updates of both oceanic and cryospheric states. The land surface and atmosphere are weakly coupled in the DA cycle: each system computes analysis increments independently but remains linked through the coupled model forecast. The JULES land-surface model, together with a simplified EnKF (sEnKF), enhances soil-moisture analyses and improves the representation of land–atmosphere energy and moisture exchanges.

(c) Mithuna FS: Deterministic

Mithuna-FS is based on the GC5 global coupled configuration (Xavier et al., 2025) comprising Global Atmospheric and Land system (GAL9) , Global Ocean and Sea (GOSI9) with the field exchanges passed through OASIS3 coupler. GOSI9 contains the NEMO 4.0 where Sea Ice-modelling Integrated Initiative (SI3) uses the same grid as the oceanic mesh where the transfer process is more robust and steady. The atmospheric and land component is using UM version 12.1 and the JULES version 7.1 respectively, and is set up with a horizontal resolution of 12 km and 70 vertical levels that span about 80 km. Major science advancement in the UM part is the modification in the mid-level convection to represent both surface-driven deep convection and elevated convection; bimodal cloud scheme and dust based heterogeneous ice nucleation thresholds. Whereas in the JULES, change in the tuning of the surface tile albedo values, and the changes in the soil water retention parameterization. The conductive coupling approach is replacing the default standard bulk formulation used in the NEMO.

(d) Mithuna FS: Ensemble

In the Mithuna-FS, forecast uncertainty is represented through ensemble-based methodologies, with the overall framework derived from the Met Office Global and Regional Ensemble Prediction System–Global. Recent system developments have transformed this framework into a fully coupled atmosphere–ocean ensemble configuration that employs weakly coupled data assimilation and stochastic physics perturbations. A hybrid ensemble–variational approach (En-4DEnVar) provides flow-dependent background-error covariances, leading to improved analysis accuracy.

The Mithuna-FS incorporates these advances by allowing each ensemble member to assimilate nearly all observations used in the deterministic system. Improvements in ensemble spread–skill relationships, particularly in the tropics, are achieved through advanced ensemble data assimilation techniques, including the use of multiple inflation schemes, spatial localisation, and perturbation of observations, which together enhance the representation of initial-condition uncertainty. Additional gains in ensemble spread and reliability are obtained through the application of stochastic physics and parameter- or tendency-perturbation schemes.

The current operational ensemble is integrated at N640L70 resolution, corresponding to an approximately 20-km horizontal grid spacing with 70 vertical levels extending up to a model top of about 80 km. Collectively, these developments enable the Mithuna-FS to generate dynamically consistent, weakly coupled initial states and to deliver robust probabilistic forecasts of high-impact monsoon weather. The system operates with a 44-member ensemble in each assimilation cycle, starting from background states at T–6 h. A mean update is first performed, after which ensemble perturbations are applied to represent initial-condition uncertainty. Each perturbed member undergoes analysis by assimilating atmospheric observations together with soil analysis and perturbations, as well as sea surface temperature (SST) analysis and SST perturbations. The resulting ensemble analyses are used to initialise the EPS forecasts, which consist of a combination of short-cycle members and long-cycle members, thereby enhancing ensemble spread and improving the reliability of probabilistic forecasts.

4.2.10.3. Models run at IITM Pune

Since 2018, Global Ensemble Forecast System (GEFS) T1534 (~12 km) is used for operational short-range probabilistic weather forecast system including cyclone prediction at IITM. It is based on Global Forecast System (GFS v14.1) which is a part of the 'Operational Model' developed at NCEP, USA in 2018. This is a spectral model with semi lagrangian dynamics and semi implicit time scheme. It has a horizontal resolution of 12.5 km. The total number of 21 Ensembles (20 perturbed forecasts + 1 control forecast) constitutes the ensemble system. These 20 ensembles analysis are generated by Ensemble Kalman Filter (EnKF) method from the forecast perturbation of the previous cycles four times a day (00, 06, 12 and 18 UTC) at all 64 model vertical levels. These analysis perturbations are added to the reconfigured analysis obtained from the hybrid four-dimensional Ensemble variational data assimilation system (GDAS-Hybrid4DEnsVar) as part of the suite. The 243 hour forecast of GEFS is routinely generated based on 00UTC and 12UTC initial conditions which include a control forecast starting from GDAS assimilation and 20 (20 perturbations) ensemble members with each perturbed initial conditions.

4.2.10.4. Probabilistic forecasts of quantitative precipitation

- In these charts, the probability that 24-hour precipitation amounts over a 2.5x2.5 lat-long grid box will exceed certain threshold values is given. The forecast probability is estimated directly from the 20-member global ensemble.
- At each grid point the number of ensemble members having a 24-hour precipitation amount within a specified range (e.g. 1-2cm, 2-5cm etc) is counted (M) and the probability is expressed as 100*(M/20).

4.3 Storm surge forecasting

Storm surge forecasting is the responsibility of the National Meteorological Services. However, storm surge guidance is issued and incorporated in the Tropical Cyclone Advisory bulletin by RSMC- New Delhi based on IIT, Delhi Storm Surge prediction model and INCOIS Advanced Circulation model (AdCirc).

4.4Coastal inundation forecasting

The coastal inundation forecast by RSMC, New Delhi commenced from 2013 experimentally with cyclone Phailin. This forecast is provided to disaster managers. It is mainly based on coastal inundation model run by Indian National Centre for Ocean Information Services (INCOIS) Hyderabad. This is ADCIRC model is adapted from USA. This forecast guidance is also provided all member countries.

Processed products updated and uploaded on IMD's website (www.internal.imd.gov.in) on real time basis by RSMC –Tropical Cyclones New Delhi for national/international purposes.

(A) WEATHER CHARTS

Model	**Products**
GFS (T1534)	Analysis and forecast up to 240 hrs
WRF-VAR (ARW) Analysis 9 km	Analysis and forecast up to 72 hrs
WRF-VAR (ARW) Analysis 3 km	Analysis and forecast up to 72 hrs

Extended Range Forecast four weeks	Temperature anomaly and mean rainfall forecast up to
Other products	Weekly Upper Level Mean Winds Weekly Upper Level Wind Anomalies Monthly Upper Level Mean Winds Monthly Upper Level Wind Anomalies
HWRF	Analyses and forecasts upto five days
EPS	Forecast Track and strike probability upto five days
GEFS (T1534)	Analysis and forecast up to 192 hrs
NCMRWF: GEFS five days.	EPS products, forecast track and strike probability upto
NCUM	Analysis and forecast up to 240 hrs.
NCUM-EPS	Analysis and forecast up to 240 hrs.

(B) DOPPLER RADAR PRODUCTS

- MAX(Z) Product (MAX_Z)
- Plan Position Indicator (PPI_Z)
- Volume Velocity processing (VVP_2)
- Plan Position Indicator (PPI_V)
- Surface Rainfall Intensity (SRI_150)
- Precipitation Accumulation (PAC) 24 hrs at 0300 UTC (HOURS_24)

(C) INSAT 3D(R) IMAGES & PRODUCTS

(b) ASIA SECTOR

- Visible Channel
- Infra-red (IR) Channel
- Short wave IR Channel
- Mid IR Channel
- Water vapour Channel
- IR-1 and IR-2 Channel
- Enhanced Visible Channel

(c) NORTH WEST SECTOR

- Visible Channel
- Infra-red Channel
- Colour Composite
- Water Vapour Channel

(d) NORTH EAST SECTOR

- Visible Channel
- Infra-red Channel
- Colour Composite
- Water Vapour Channel

(e) CYCLONE SPECIFIC IMAGES

- Enhanced grey scale imag
- Enhanced colour image

(ii) PRODUCTS

- Daily Average WVBT image from INSAT-3D
- Daily Average IR1BT image from INSAT-3D
- Cloud Motion Vectors (CMV)
- Water Vapour Winds (WVW)

- Visible/Mid-Infrared Winds (VISW/ MIRW)
- Cloud Top Temperature Image
- Cloud Top Temperature Image(Below -40^{o}C)
- G.P.S. Precipitable Water Data
- Upper Tropospheric Humidity (UTH)
- Map of Daily UTH
- Map of Weekly UTH
- Sea Surface Temperature (SST)
- Map of Weekly SST
- Map of Daily SST
- Outgoing Long wave Radiation (OLR)
- Map of Daily Mean OLR
- Map of Weekly Mean OLR
- Map of Monthly Mean OLR
- Quantitative Precipitation Estimate (QPE), HE & IMSRA
- Map of Daily QPE, HE & IMSRA
- Map of Weekly QPE, HE & IMSRA
- Map of Monthly QPE, HE & IMSRA

❖ **OCEANSAT-3 Imageries and Products**
❖ **MeteoSat Imageries**

C H A P T E R V

COMMUNICATIONS

5.1 General

The basic communication network for the exchange of data, forecast, warnings and observations will be the Global Telecommunication System (GTS). Tropical cyclone advisories and warnings (SIGMETs) for aviation shall be transmitted by means of the Aeronautical Fixed Service (AFS), according to the provision of ICAO Annex 3/ WMO No. 49, Technical Regulations [C.3.1], and ICAO ASIA/PAC and MID ANP FASIDs.

Tropical cyclone warnings for shipping (WWMIWS) shall be transmitted by agreed means of the GMDSS, according to the provision of the Manual on Marine Meteorological Services (WMO No. 558). The METAREA Coordinator is responsible for ensuring warnings are disseminated on the appropriate GMDSS communication channel. The list of METAREA Coordinators is available from WMO No.9, Volume D, Information for Shipping. http://www.wmo.int/pages/prog/www/ois/Operational_Information/VolumeD/GMDSS/Focal_Points/GMDSS/fp.pdf

Processed products of RSMC tropical cyclones, New Delhi are distributed in chart form through Satellite broadcast as well as through ftp server on Internet.

In the GTS a regional arrangement exists for the exchange of raw and processed data, forecasts, warnings and addressed messages. Normally message-switching computers in GTS transmit the data on a first in-first out basis. However, priority can be assigned to certain messages on the basis of abbreviated headings. Such messages are given preference over other messages in transmission on the circuits.

The messages for which high priorities are to be assigned are:

(i) all radar observations in cyclonic storm situations;
(ii) composite ships' surface and upper-air observations from the tropical cyclone field:
(iii) tropical cyclone warnings;
(iv) tropical weather outlook;
(v) tropical cyclone advisories; and
(vi) satellite bulletins from RSMC tropical cyclones, New Delhi.

To exchange these messages on priority basis among the Panel countries the abbreviated headings as decided in consultation with RTH New Delhi will be used.

5.2 Procedures to be followed

WMO headings.

Station location indicators.

International block and station index numbers will be used to send surface and upper-air observations.

5.2.1 Tropical cyclone warning headings

The headings used for the exchange of tropical cyclone warnings by the Panel countries are given in Table V1. Member countries will request RTH New Delhi to assign priority to these headings if not already provided.

5.2.2 Telecommunication headings for the exchange of radar observations

The telecommunication headings used for the exchange of radar observations are listed in Table V2.

5.2.3 Telecommunication headings for the exchange of other messages

The telecommunication headings (which will be the priority headings) for the exchange of tropical weather outlook, tropical storm advisories and satellite bulletins as decided in consultation with the RTH New Delhi are listed in Table V3.

5.2.4 Telecommunication headings for the exchange of tropical cyclone advisories and warnings for aviation

The telecommunication headings for the exchange of tropical cyclone advisories and warnings for aviation are given in Table V4.

5.3 Existing GTS circuits among the Panel countries

S. No.	Communication Link	Connectivity / Circuit Details
1	New Delhi – Bangkok	450 Mbps IPVPN TCP/IP WMO FTP circuit over Internet
2	New Delhi – Colombo (Sri Lanka)	450 Mbps TCP/IP WMO Socket circuit over Internet
3	New Delhi – Dhaka (Bangladesh)	450 Mbps IPVPN TCP/IP WMO FTP circuit over Internet
4	New Delhi – Karachi (Pakistan)	450 Mbps IPVPN TCP/IP WMO FTP and Socket circuit over Internet
5	New Delhi – Malé (Maldives)	450 Mbps TCP/IP WMO Socket circuit over Internet
6	New Delhi – Myanmar	450 Mbps IPVPN TCP/IP WMO FTP circuit over Internet
7	New Delhi – Muscat	450 Mbps TCP/IP WMO Socket circuit over Internet
8	New Delhi – Jeddah	450 Mbps TCP/IP WMO FTP circuit over Internet
9	New Delhi – Yemen	No direct connectivity
10	Bangkok – Nay Pyi Taw (Myanmar)	20 Mbps IPVPN TCP/IP WMO FTP circuit over Internet
11	Bangkok – Jeddah	1 Mbps MPLS TCP/IP WMO FTP Circuit and 20 Mbps TCP/IP WMO FTP circuit over Internet

5.4 List of important telephone numbers and addresses connected with tropical cyclone warnings in the Panel countries

A list containing addresses of the tropical cyclone warning centres of the Panel countries, together with their telephone numbers, is given in Annex V-A.

India Meteorological Department is hosting its own website www.internal.imd.gov.in and www.rsmcnewdelhi.imd.gov.in which also provides information pertaining to WX Charts, Forecasts, Warnings, Satellite Imageries, Hydrological and Seismological and other weather related topics are updated on regular basis.

Regional Meteorological Centre
s located at Delhi, Chennai, Nagpur, Kolkata, Guwahati and Mumbai are hosting their own websites.

TABLE V-1
ABBREVIATED HEADINGS FOR EXCHANGE OF
TROPICAL CYCLONE WARNINGS FOR THE HIGH SEAS

	Country	GTS Abbreviated Headings	Priority
1.	Bangladesh	WTBW20 VGDC	Highest
2.	India	WTIN20 DEMS	Highest
3.	Iran		
4.	Maldives	WTMV20 VRMM	Highest
5.	Myanmar	WTBM20 and WOBM20 VBRR	Highest
6.	Oman	WTOM20 and WSOM20 OOMS	Highest
7.	Pakistan	WWPK20 OPKC	Highest
8	Qatar	FQQT20(with Pakistan Met Service)	Highest
9.	Saudi Arabia		
10.	Sri Lanka	WTSB40 VCCC	Highest
~~11.~~	~~Thailand~~	~~WTTH20 VTBB~~	~~Highest~~
12.	United Arab Emirates		
13.	Yemen	WTYE20 OYSN	Highest

TABLE V-2
Communication headings for the exchange of radar observations

	Country	Abbreviated heading
1.	Bangladesh	SDBW20 VGDC
2.	India	Since conventional radar has been replaced by DWR, there is no message communication on GTS.
3.	Iran	.
4.	Maldives	SDMV20 VRMM
5.	Myanmar	SDBM20 VBRR
6.	Oman	
7.	Pakistan	SDPK20 OPKC SDPK40 OPKC
8.	Qatar	
9.	Saudi Arabia	
10.	Sri Lanka	SDSB20 VCCC
~~11.~~	~~Thailand~~	~~SDTH20 VTBB~~

12. United Arab Emirates
13. Yemen

TABLE V-3

GTS headings for the exchange of tropical weather outlook, tropical storm advisory and satellite bulletin

Country	Abbreviated heading	
	Tropical weather outlook	Tropical storm advisory
Bangladesh	WWBW20 VGDC, VBRR	BMAA01 VGDC BMAA01
India	WTIN20 DEMS	BMAA01 OPKC
Pakistan	WWPK20 OPKC	BMAA01 VCCC BMAA01 VTBB BMAA01 VRMM BMAA01 OOMS BMAA01 OYSN BMAA01 OIII BMAA01 OTBD BMAA01 OEJD BMAA01 OMAA

Satellite bulletins generated by RTH, New Delhi

TCIN20 DEMS (Sat bulletins based on INSAT pictures) - For International
TCIN50 DEMS (Sat bulletins based on INSAT pictures
TCIN51 DEMS (Intense precipitation advisory bulletins For National
ATIN50 DEMS (For all CDRs during cyclone period)

TABLE V-4

WMO headings for the exchange of Tropical Cyclone Advisories for aviation and SIGMETS

I. TC Advisories

	Country	Abbreviated heading	Area
1.	India	FKIN21 VIDP	Bay of Bengal
		FKIN20 VIDP	Arabian Sea

II. SIGMETs for tropical cyclones

	Country	Abbrevaited heading	Originating center
1.	Bangladesh	WCBWxx VGHS	Dhaka
2.	India	WCIN31 VIDP	Delhi
		WCIN31 VECC	Kolkata
		WCIN31 VOMM	Chennai

		WCIN31 VABB	Mumbai
3.	Iran	WSIR31	Tehran
4.	Maldives	WCMV31 VRMM	Malé
5.	Myanmar	WCBM31 VYYY	Yangon
6.	Oman (Sultanate of Oman) Muscat		WCOMxx OOMS
7.	Pakistan	WCPKxx OPKC	Karachi
8.	Sri Lanka	WCSB31 VCCC	Colombo
9.	Thailand	WCTH31 VTBB	Bangkok
10.	Yemen	WCYE31OYSN	SANAA
10.	Iran	WSIR31	Tehran

1. *TCAC New Delhi shall send the TC advisories to the MWOs through AFTN. In addition to the MWOs listed above, the advisories sent to all MWOs in the area of responsibility of TCAC New Delhi according to ICAO ASIA/PAC and MID Regions FASIDs.*
2. *TCAC New Delhi send the TC advisories to Singapore OPMET Data Bank – AFTN address WSSSYMYX.*
3. *The MWOs listed above sends their SIGMETs for tropical cyclones through AFTN to the MWOs responsible for the adjacent FIRs and to Singapore OPMET Data Bank – AFTN address WSSSYMYX.*

ANNEX V-A-1

LIST OF IMPORTANT ADDRESSES AND TELEPHONE NUMBERS CONNECTED WITH TROPICAL CYCLONE WARNINGS IN THE PANEL COUNTRIES

Country Name	Name of contact person	Contact details
Bangladesh	Dr. Md. Shadekul Alam Director, BMD Bangladesh Meteorological Department Meteorological, E-24 Agargaon, Dhaka-1207 Dhaka-1207	Phone: Off:(880) 2-41025705, (880) 2-41025726 Res: (880) 2-58152019 E- mail:info@bmd.gov.bd, shadekul@gmail.com FAX: 88 02 41025726, 41025873 Home page: http://www.bmd.gov.bd
India	Dr. Mrutyunjay Mohapatra Director General of Meteorology India Meteorological Department (IMD) Mausam Bhavan, Lodi Road, New Delhi-11003	Phone: Off: (91) 11-24611842 Res: (91) 11-24122236 Mob: (91) 8826354400 Fax (91) 11-24611792 F- mail: mohapatraimd@gmail.com Home page: http://www.imd.gov.in
Iran	Dr. Sahar Tajbakhsh Mosalman Deputy Minister of Roads and Urban Development President of the I.R. of Iran Meteorological Organisation and PR of Islamic Republic of Iran with WMO	Tel: +9821 660 700 38 Email: affairs.intl@gmail.com sahartajbakhsh@gmail.com FAX: +9821 660 700005
Maldives	Mr. Abdulla Wahid, Director General Meteorology, and acting PR of Maldives with WMO.	abdulla.wahid@met.gov.mv Phone: Off: (960) 303 7200
	Mr. Ahmed Rasheed, Director Meteorology. Maldives Meteorological Service, Hulhule' 22000, Maldives.	ahmed.rasheed@met.gov.mv Mobile (960) 776 8565 Office (960) 303 7205 Phone, Office Duty: (960) 332 3084

Myanmar	Dr. Kyaw Moe Oo Director-General Department of Meteorology and Hydrology, Building No. 5, Ministry of Transport and Communications, Nay Pyi Taw	Phone: Off: (95) 67 3411031 (95) 67 3411525 (95) 67 3411422 (95) 67 3411446 (95) 67 3411527 Res: (95) 67 3403404 Fax: (95) 67 3411449 (95) 67 3411254 (95) 67 3411250 (95) 67 3411526 Mobile: (95) 9 250954636 Email: dg.dmh1@gmail.com dg.dmh@mptmail.net.mm Web page: www.moezala.gov.mm www.dmh.gov.mm Whatsapp number: (95) 925094636
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C H A P T E R VI

MONITORING AND QUALITY CONTROL OF DATA

6.1 Monitoring of data

It will be the responsibility of the National Meteorological Services to monitor the data, advisories and forecasts received by them in accordance with the specified arrangements. Each tropical cyclone warning centre will review from time to time the inflow of data to the centre and also the transmission to neighbouring services of the messages they are responsible for sending out.

To be sure of reception of important data in the case of cyclonic storm situations, cyclone warning centres of the Member countries will transmit addressed messages to RSMC tropical cyclones, New Delhi four times a day which will include important surface, upper-air and ships' observations.

The National Meteorological Services will inform RSMC tropical cyclones, New Delhi of any shortcomings in the flow of data (raw and processed) and also indicate any requirements over and above those already agreed upon for tropical cyclone warning purposes.

6.2 Quality control

National Meteorological Services will make extra efforts to make sure that all observational data passed on GTS, particularly during disturbed weather, have been checked for errors and that corrections are made if needed. They will impress upon their observing stations the need for accuracy of data, particularly in tropical cyclone situations and the difficulties that may be caused in the decision process by an incorrectly recorded or transmitted observation.

In case of doubt as to the correctness of any observation or part thereof, an addressed message will be sent to the national service and to RSMC tropical cyclones, New Delhi requesting confirmation.

C H A P T E R VII

ARCHIVAL OF DATA

7.1 Necessity for data archival

In view of the development of computer facilities in the region, it is expected that the research efforts on tropical cyclones will substantially increase. In addition to dynamic modeling of tropical cyclones on the new generation computer being acquired by national authorities, it is expected that the synoptic oriented investigations and research as well as verification programmes will be undertaken in the region.

It is, therefore, necessary to create data sets as detailed and as complete as possible for all the future cyclones.

7.2 Tropical cyclone data on landfall

There is a dearth of information on actual conditions of tropical cyclones and an endeavor is therefore required to be made to utilize whatever information is obtained to the maximum extent possible. In particular, the Panel countries are interested in verifying forecast and estimated conditions against the actual. Panel countries will take appropriate steps to ensure that after a tropical cyclone makes a landfall all the available data pertaining to that tropical cyclone are collected and archived. Data on the actual condition of winds, storm surge, surface pressure and rainfall from stations near the point of landfall will be sent to RSMC tropical cyclones, New Delhi. If the landfall is in a country other than India, its meteorological service will send a brief summary of information to RSMC tropical cyclones, New Delhi for inclusion in the RSMC New Delhi tropical cyclone report. In the case of a tropical cyclone making a landfall on the coast of a country, which is not a member of the Panel, RSMC Tropical Cyclones, New Delhi will collect the information for inclusion in the RSMC, New Delhi tropical cyclones report.

7.3 Role of RSMC-tropical cyclones, New Delhi in data archival

For each tropical cyclone occurrence in the area, initially RSMC tropical cyclones New Delhi will compile the following data sets:

(i) Daily synoptic charts covering the area 45^0 N to 30^0 S and 30^0 E to 120^0 E for the surface and upper-air charts for the levels 700, 500 and 200 hPa for 00 UTC and 12 UTC.

(ii) All upper-air data from stations within 15 degrees of the tropical cyclone field.

(iii) The tracks of tropical cyclones for the Panel regions prepared by the India Meteorological Department.

(i) An e-Atlas on Cyclones and Depressions (C&D's) having many salient features as generation of Tracks, several types of C&D's statistics have been developed and also circulated to Panel Member countries for their use.

(ii) The online version of e-Atlas is available at IMD Website at Cyclone Page under the URL: www.rmcchennaieatlas.tn.nic.in.

(iii) All the annual reports on cyclonic disturbances are available for the period of 1990 onwards in the RSMC, New Delhi website.

(iv) Bulletins of cyclonic storms since 2011 are available on RSMC website

For the purpose of making these archives the National Meteorological Services will supply New Delhi with relevant information requested by RSMC tropical cyclones, New Delhi. On request by a Panel country, the RSMC tropical cyclones, New Delhi will make arrangements to supply these data sets to the Panel Member concerned on a copying cost basis. In accordance with the directive of the WMO Executive Council (ECXLV), Geneva, July 1993) an international format for the archiving of tropical cyclone data is to be used by all RSMCs with activity specialization in tropical cyclones. The Tropical Cyclone Programme (TCP) office of the WMO Secretariat has the responsibility for the maintenance of the format, including assignment of the source codes to appropriate organizations, and authorizing additions and changes.

In the international format given below, the Dvorak T number (Position 3536) and Dvorak CI number (position 3738) will be the ones determined at the centre submitting the data, in the case of the Panel on Tropical Cyclones, by RSMC New Delhi. Complete historic data in the format given in Annex VII-A will be made available for research applications. RSMC New Delhi will provide such data, to the Director of the National Climatic Data Centre (NCDC), USA in this format through WMO.

ANNEX VII-A-1

GLOBAL TROPICAL CYCLONE TRACK AND INTENSITY DATA SET REPORT FORMAT

Position Content

1-9

Cyclone identification code composed by 2 digit numbers in order within the cyclone season, area code and year code. 01 SWI2000 shows the 1st system observed in Southwest Indian Ocean basin during the 2000/2001 season. Area codes are as follows:

ARB = Arabian Sea
ATL = Atlantic Ocean
AUB = Australian Region (Brisbane)
AUD = Australian Region (Darwin)
AUP = Australian Region (Perth)
BOB = Bay of Bengal
CNP = Central North Pacific Ocean
ENP = Eastern North Pacific Ocean
ZEA = New Zealand Region
SWI = Southwest Indian Ocean
SWP = Southwest Pacific Ocean
WNP = Western North Pacific Ocean and South China Sea

10-19 Storm Name
20-23 Year
24-25 Month (0112)
26-27 Day (0131)
28-29 Hour-universal times (at least every 6 hourly position 00Z, 06Z, 12Z and 18Z)
30 Latitude indicator:
1 =North latitude;
2=South latitude
31-33 Latitude (degrees and tenths)
34-35 Check sum (sum of all digits in the latitude)
36 Longitude indicator:
1 =West longitude;
2=East longitude
37-40 Longitude (degrees and tenths)
41-42 Check sum (sum of all digits in the longitude)
43 position confidence*
1 = good (<30nm; <55km)
2 = fair (3060nm; 55-110km)
3 = poor (>60nm; >110km)
9 = unknown

Note* Confidence in the center position: Degree of confidence in the center position of a tropical cyclone expressed as the radius of the smallest circle within which the center may be located by the analysis. "position good" implies a radius of less than 30 nm, 55 km; "position fair", a radius of 30 to 60 nm, 55 to 110km; and "position poor", radius of greater than 60 nm, 110km.

44-45 Dvorak T number (99 for no report)
46-47 Dvorak CI number (99 for no report)
48-50 Maximum average wind speed (whole values) (999 for no report).
51 Units 1 =kt, 2=m/s, 3=km per hour.
52-53 Time interval for averaging wind speed (minutes for measured or derived wind speed, 99 if unknown or estimated).
54-56 Maximum Wind Gust (999 for no report)
57 Gust Period (seconds, 9 for unknown)
58 Quality code for wind reports:
1 =Aircraft or Dropsonde observation
2=Over water observation (e.g. buoy)

3=Over land observation
4=Dvorak estimate
5=Other

59-62 Central pressure (nearest hectoPascal) (9999 if unknown or unavailable)
63 Quality code for pressure report (same code as for winds)
64 Units of length: 1 =nm, 2=km
65-67 Radius of maximum winds (999 for no report)
68 Quality code for RMW:
1 =Aircraft observation
2=Radar with well defined eye
3=Satellite with well defined eye
4=Radar or satellite, poorly defined eye
5=Other estimate
69-71 Threshold value for wind speed (gale force preferred, 999 for no report)
72-75 Radius in Sector 1: 315 45
76-79 Radius in Sector 2: 45 135
80-83 Radius in Sector 3: 135 225
84-87 Radius in Sector 4: 225 315
88 Quality code for wind threshold
1=Aircraft observations
2=Surface observations
3=Estimate from outer closed isobar
4=Other estimate
89-91 Second threshold value for wind speed (999 for no report)
92-95 Radius in Sector 1: 315 45
96-99 Radius in Sector 2: 45 135
100-103 Radius in Sector 3: 135 225
104-107 Radius in Sector 4: 225 315
108 Quality code for wind threshold (code as for row 88)
109-10 Cyclone type:
01 = tropics; disturbance (no closed isobars)
02= <34 knot winds, <17m/s winds and at least one closed isobar
03= 34-63 knots, 17 32m/s
04= >63 knots, >32m/s
05= extra tropical
06= dissipating
07= subtropical cyclone (non frontal, low pressure system that comprises I initially baroclinic circulation developing over subtropical water)
08= overland
09= unknown

111-112 Source code (2digit code to represent the country or organization that provided the data to NCDC USA.

WMO Secretariat is authorized to assign number to additional participating centers, organizations)

01 RSMC Miami Hurricane Center
02 RSMC Tokyo Typhoon Center
03 RSMC Tropical Cyclones New Delhi
04 RSMC La Reunion Tropical Cyclone Centre
05 Australian Bureau of Meteorology
06 Meteorological Service of New Zealand Ltd.
07 RSMC Nandi Tropical Cyclone Centre
08** Joint Typhoon Warning Center, Honolulu
09** Madagascar Meteorological Service
10 ** Mauritius Meteorological Service
11 ** Meteorological Service, New Caledonia
12 Central Pacific Hurricane Center, Honolulu

Note**: no longer used

Headings 1-19 Cyclone identification code and name;
20-29 Date time group;
30-43 Best track positions;
44-110 Intensity, Size and Type;
111-112 Source code.