



## IMD in the service of Nation since 1875

### Marine Weather Services

India Meteorological Department is the nodal agency to provide Marine Meteorological Services since 1966. Marine Services Division, New Delhi and Climate Research Services, Pune coordinate marine weather services in the country

#### Vision

Optimum Marine weather services to ensure:

- ❖ Safety of life and protection of property
- ❖ Promotion of international commerce through improved efficiency of marine operations
- ❖ Mitigation of environmental impacts and Enhancement of quality of life at Sea



### Marine Weather Forecast -Users

#### Mission

- ❖ Round the clock watch over the area of responsibility **north of equator & west of 98.5°E**
- ❖ Routine weather forecasts for Indian Navy, shipping, fishermen, off-shore oil exploration
- ❖ Weather forecast under Global Maritime and Distress Safety System (GMDSS) for Indian Ocean area to the north of equator.
- ❖ Forecast for recreational activities/ tourism
- ❖ Special weather warnings for severe weather like tropical cyclones over north Indian Ocean
- ❖ Marine Climatological Summary (MCS) under WMO's MCS Scheme (1971)
- ❖ Meteorological Support during major Marine pollution emergency incident on high seas under Met Area VIII(N)

### Marine Meteorological Parameters

- Wind speed and direction
- Atmos. Pressure, tendency & characteristics
- Weather-present and past
- Clouds (amount, type and height of base)
- Visibility
- Air temperature
- Humidity
- Precipitation
- Sea-surface temperature
- Ocean sea-wave/swell-height, period/direction
- Sea ice and/or ice accretion on board ship, when appropriate

### (I) Course and speed of ship

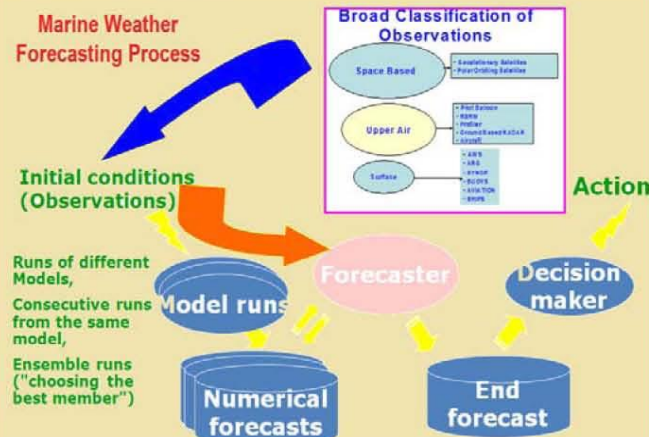
#### Marine Meteorological forecast products

- ✦ Sea wave height
- ✦ Wave period
- ✦ Wind
- ✦ Weather and Visibility

#### Numerical Models utilized

- ✦ Atmospheric Global Models (IMD GFS, GEFS, NCEP GFS, ECMWF, UKMO, JMA Model)
- ✦ Atmospheric Regional Models (WRF, NCUM)
- ✦ AdCirc Storm Surge Model
- ✦ Ocean models :
- ✦ MOM, POM, HYCOM, ROMS
- ✦ ECMWF wave model
- ✦ Coupled model: HWRF

### Marine Weather Forecasting Process



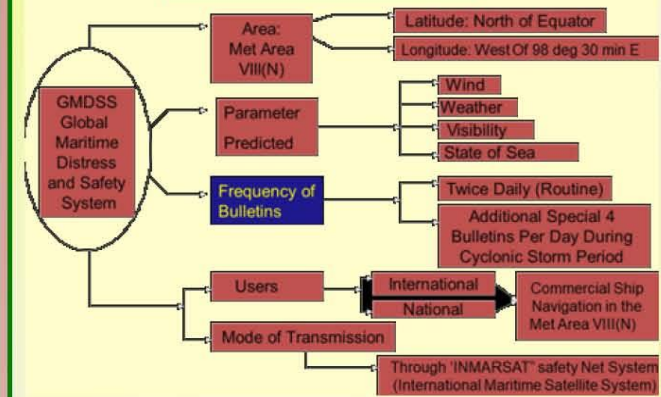
### Global Maritime Distress Safety System

IMD is one of 16 National Meteorological Services designated for issuing Sea Area Bulletin for Met Area VIII (N).



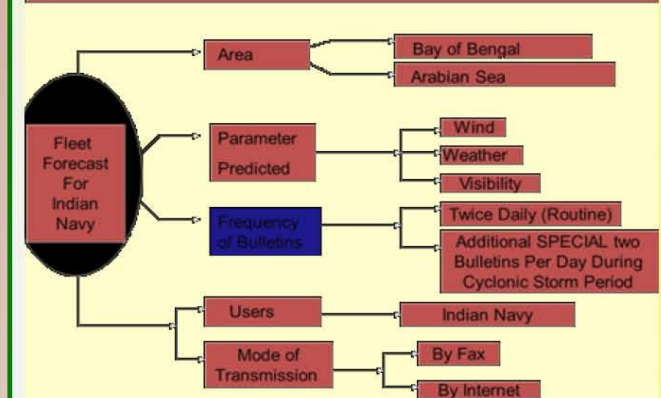
**Time of Issue**  
0900 UTC and 1800 UTC  
**4 additional bulletins during cyclones**

### GMDSS Bulletin



### FLEET Forecast for Indian Navy

#### Sea Area Forecast to Indian Navy (Fleet Forecast)





## Sea Area Bulletin



### Area of Responsibility for Sea Area Bulletin

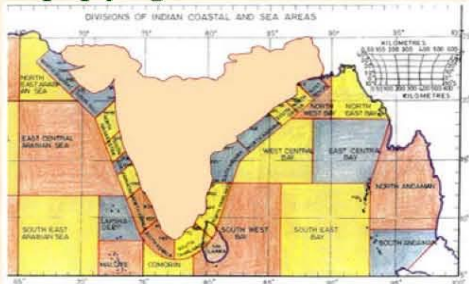
Basin	Issued By
Bay of Bengal	ACWC Kolkata
Arabian Sea	ACWC Mumbai

### Prefix Code to Sea Area Bulletin

Code word	Type of bulletin	Base time (UTC)
ELECTRON	Storm-One	0000
AURORA	Daily-One	0300
FORMULA	Storm-Two	0900
BALLOON	Daily-Two	1200
GASBAG	Storm-Three	1500
DEW DROP	Extra	1800
HEXAGON	Special	0600/2100 UTC

## Coastal Weather Bulletin

(for ships plying within 75 km off shore line)



### Area of Responsibility

Coastal area of	ISSUED BY
West Bengal A & N Island	ACWC Kolkata
Odisha	CWC Bhubaneswar
Andhra Pradesh	CWC, Visakhapatnam
Tamil Nadu and Puducherry	ACWC, Chennai
Kerala, Karnataka, Lakshadweep	CWC, Thiruvananthapuram
Maharashtra and Goa	ACWC, Mumbai
Gujarat, Daman, Diu	CWC, Ahmedabad

## Port Warnings

1865: 1<sup>st</sup> storm warning system at Kolkata Port.

1880: Storm warning system extended for west coast ports (Mumbai, Karachi, Ratnagiri, Vengurla, Karwar and Kumta)

1882: System extended to Ports at Sagar Islands, Mud Port and Diamond Harbour

1886: System of early warnings against cyclones extended to cover all Indian ports.

1898: Uniform storm warning signal in country

### Area of responsibility

Area Cyclone Warning Centre (ACWC) Kolkata: West Bengal Coast, Andaman and Nicobar Islands

ACWC Chennai: Tamil Nadu coast

ACWC Mumbai: Maharashtra coast and Goa coast

Cyclone Warning Centre (CWC) Bhubaneswar: Odisha Coast

CWC Visakhapatnam: Andhra Pradesh Coast

CWC Thiruvananthapuram: Kerala & Karnataka Coasts and Lakshadweep Islands

CWC Ahmedabad: Gujarat Coast

### Port Warning Signals used in India

Signal/Flag No.	NAME	Symbols		Description
		Day	Night	
1	DISTANT BAD WEATHER	DC1	☐ ○	Depression far at sea. Port NOT affected.
2		DW2	☐ ●	Cyclone far at sea. Warning for vessels leaving port.
3	LOCAL BAD WEATHER	LC3	☐ ●	Port Threatened by local weather bad like squally winds.
4		LW4	☐ ●	Cyclone at sea. Likely to affect the port later.
5	DANGER	D5	☐ ●	Cyclone likely to cross coast keeping port to its left.
6		D6	☐ ●	Cyclone likely to cross coast keeping port to its right.
7		D7	☐ ●	Cyclone likely to cross coast over/near to the port.
8	GREAT DANGER	GD8	☐ ●	Severe cyclone to cross coast keeping port to its left.
9		GD9	☐ ●	Severe cyclone to cross coast keeping port to its right.
10		GD10	☐ ●	Severe cyclone to cross coast over or very near to the port.
11	XI	☐ ●	Communication failed with cyclone warning office.	

## Fishermen Warnings

### Area of responsibility

(i) ACWC Kolkata: West Bengal Coast, North & South Andaman Sea

(ii) CWC Bhubaneswar: North & South Odisha coast.

(iii) CWC Visakhapatnam: North & South AP coast

(iv) ACWC Chennai: North & South Tamil Nadu coast.

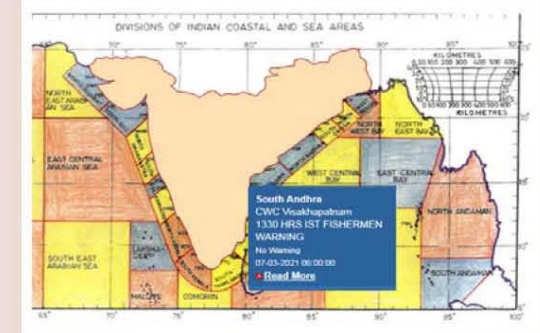
(v) CWC Thiruvananthapuram: Kerala Coast, Karnataka Coast, Lakshadweep area.

(vi) ACWC Mumbai: North & South Maharashtra Coast, Goa coast

(vii) CWC Ahmedabad: North and South Gujarat Coast, Daman and Diu coasts

In addition ACWCs/CWCs Kolkata, Chennai, Bhubaneswar and Visakhapatnam will issue warning for different parts of Bay of Bengal as and when required for deep sea fishing.

Similarly ACWC/CWC Mumbai, Ahmedabad and Thiruvananthapuram will issue warning for different parts of Arabian Sea as and when required for deep sea fishing.



### Graphical Fishermen Warning

