## 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


### Mission

- Round the clock watch over the area of responsibility north of equator & west of 98.5$^0$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

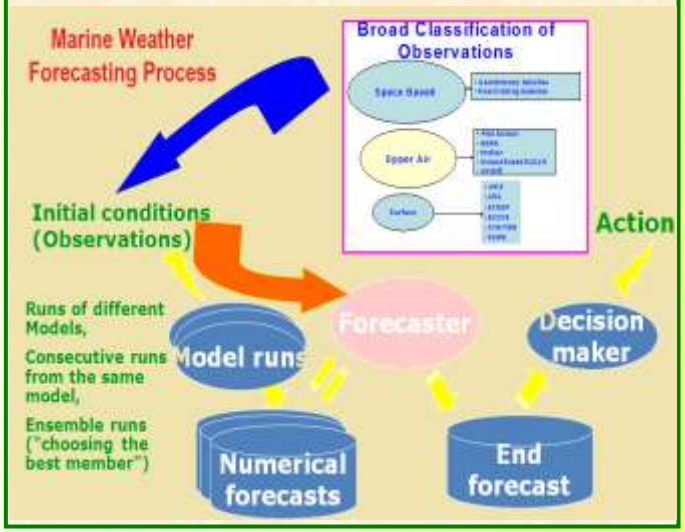
(a) Wind speed and direction
(b) Atmos. Pressure, tendency & characteristics
(c) Weather-present and past
(d) Clouds (amount, type and height of base)
(e) Visibility
(f) Air temperature
(g) Humidity
(h) Precipitation
(i) Sea-surface temperature
(j) Ocean sea-wave/swell-height, period/direction
(k) Sea ice and/or ice accretion on board ship, when appropriate
(l) 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

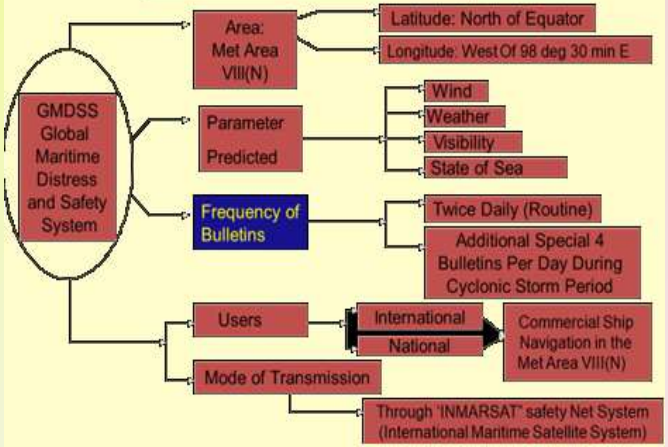



## Global Maritime Distress Safety System

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

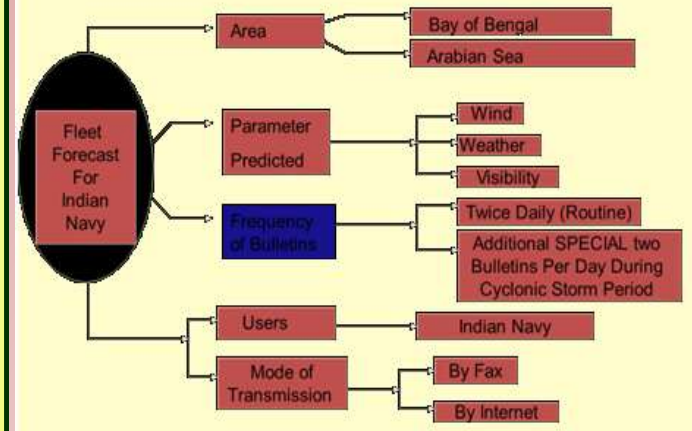

Time of Issue
0900 UTC and
1800 UTC
4 additional bulletins during cyclones

### GMDSS Bulletin




### FLEET Forecast for Indian Navy

Sea Area Forecast to Indian Navy (Fleet Forecast)



## Sea Area Bulletin

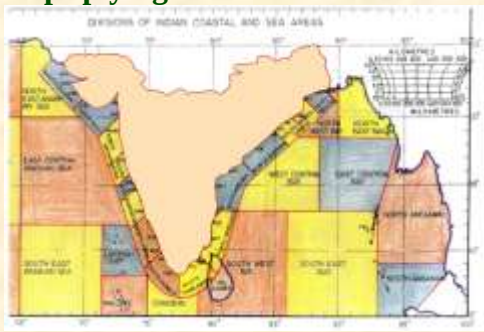

### Area of Responsibility for Sea Area Bulletin

| 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: 1st 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

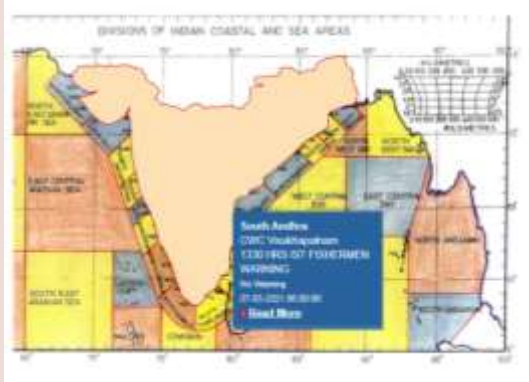
### Port Warning Signals used in India

| Signal/Flag No. | | NAME | Symbols: Day | Symbols: Night | Description |
|---|---|---|---|---|---|
| 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 bad weather 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