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Example NTWC SOP - India

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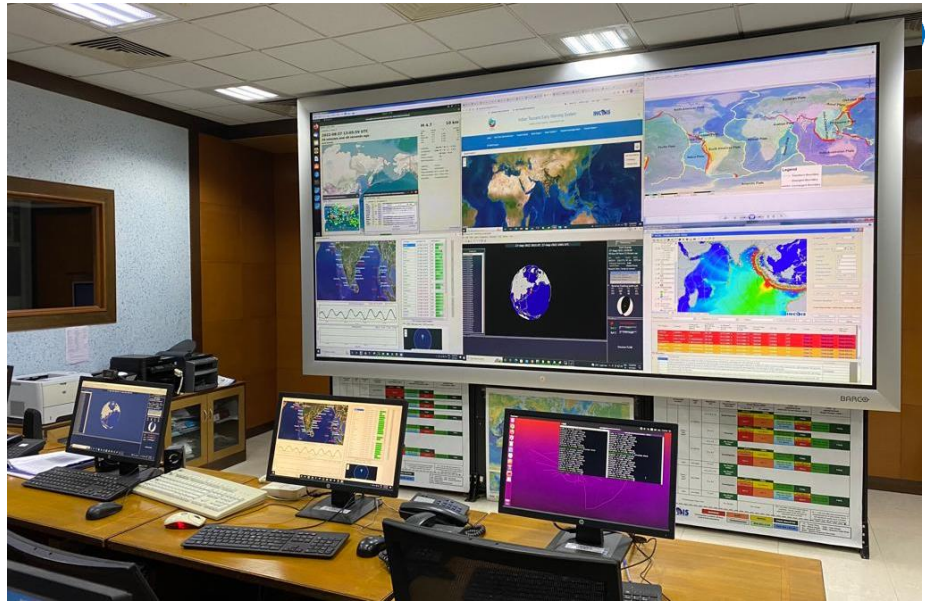
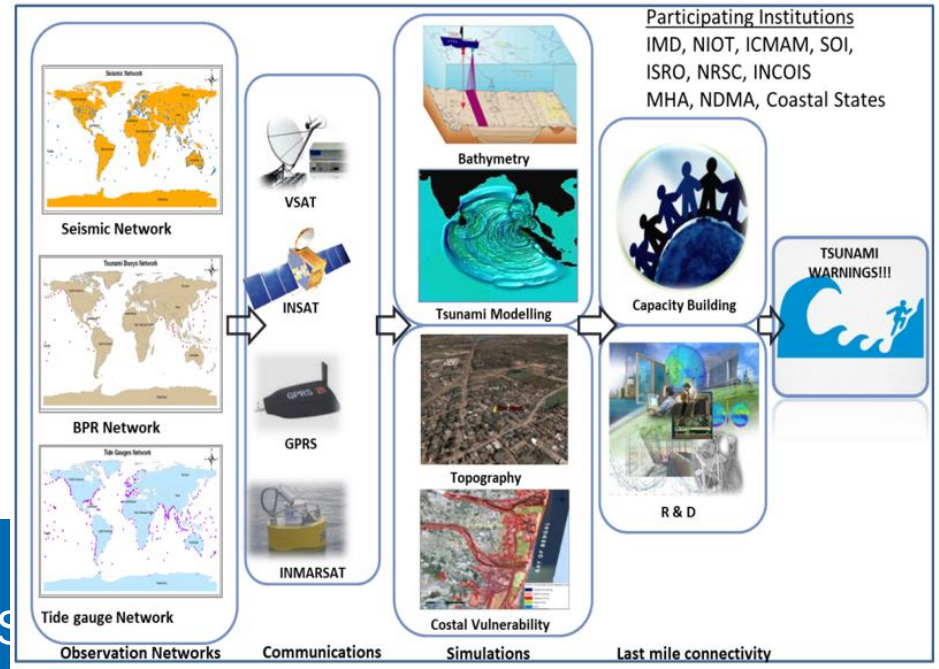
ICG Indian Ocean Tsunami Warning & Mitigation System SOP Workshops July 2023:
Standard Operating Procedures (SOPs) for
National Tsunami Warning Centres (NTWCs) and
Disaster Management Organisations (DMOs)

Indian Tsunami Early Warning Centre (ITEWC)



Indian Tsunami Early Warning Centre operated by INCOIS , is the nodal alert generating agency to provide the Tsunami advisories to India.

- The Indian Tsunami Early Warning System (ITEWS) was established in 2007.
- ITEWS comprises a real-time network of seismic stations, tide gauges, Tsunami Buoy Network, and a 24X7 operational tsunami warning center to detect tsunamigenic earthquakes, monitor tsunamis, and provide timely advisories to vulnerable communities.
- ITEWC issue advisories/bulletins to India (NTWC) and Indian Ocean rim countries (TSP-IOTWMS)



Tsunami Risk Assessment - INDIA

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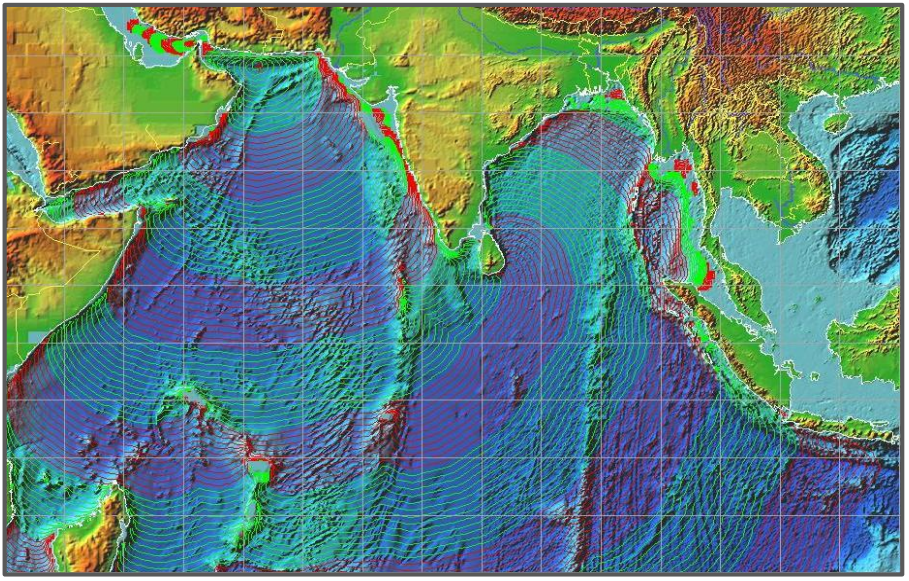
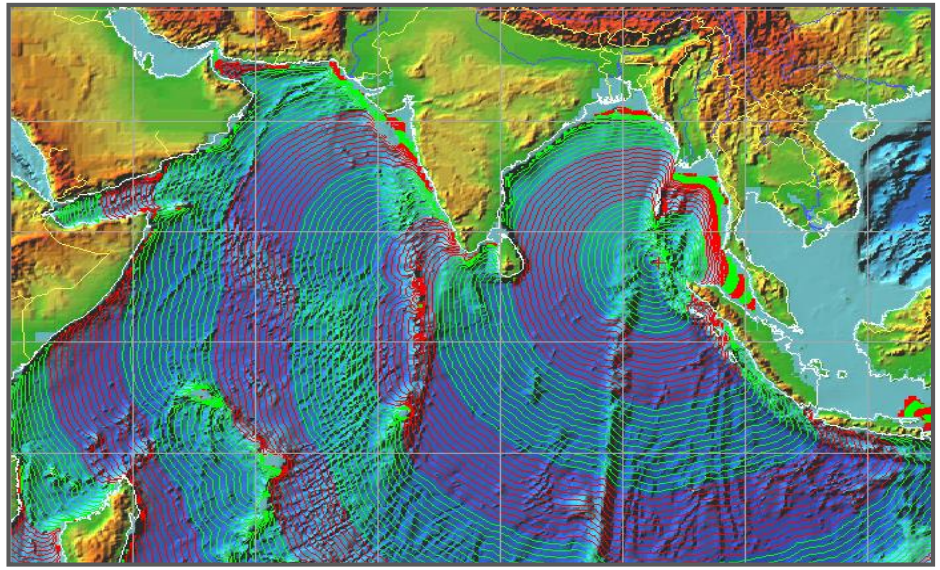
Makran Subduction Zone



- **If Earthquake occurs at Makran Subduction zone, Travel Time to nearest Indian Coast (Gujarat) are 2 to 3 hrs**

Andaman-Sumatra Subduction Zone



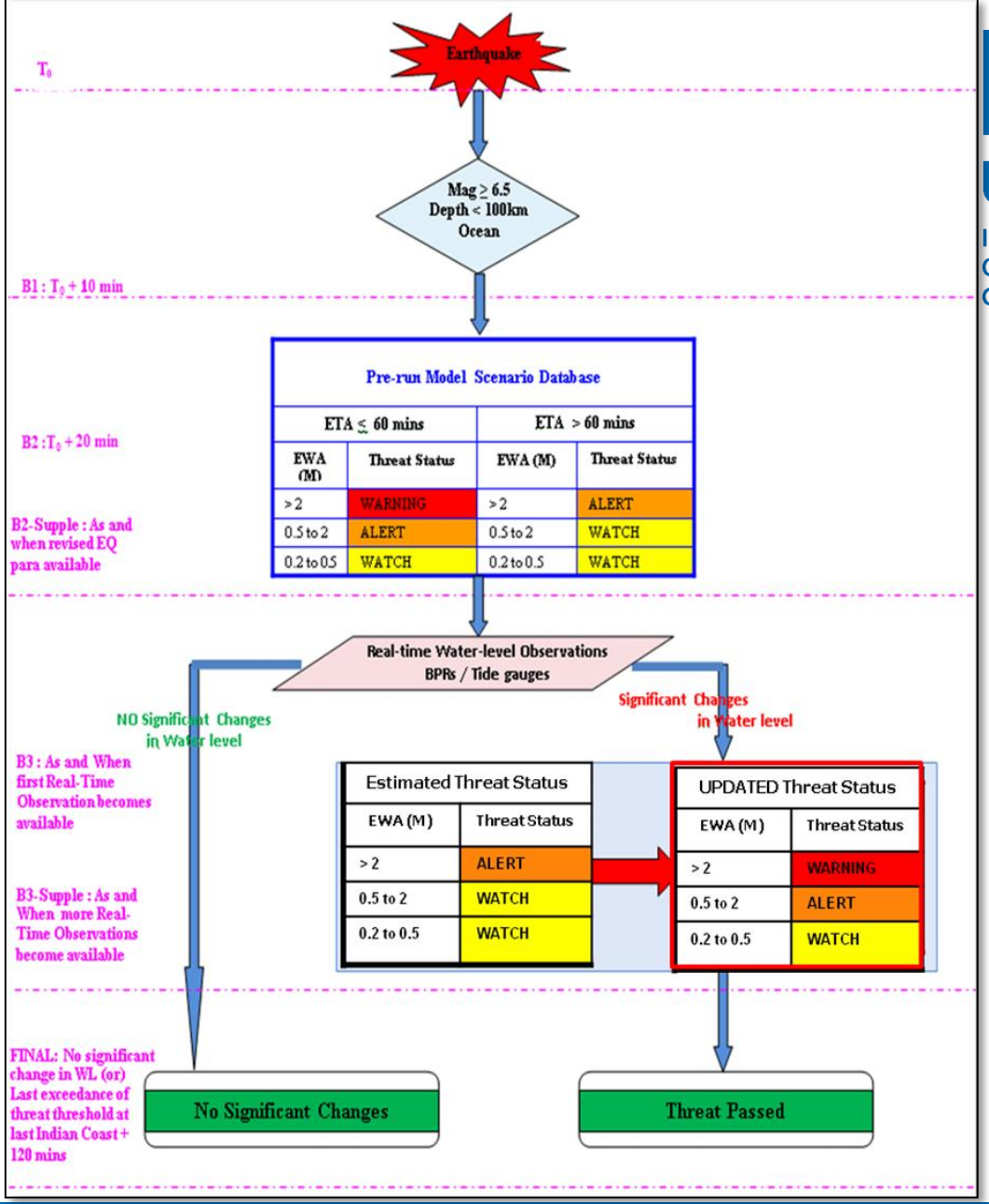
- **If Earthquake happens at Nicobar Islands , travel times to nearest coast (A&N Islands) are 20 to 30 min**
- **For Indian main land travel times are 2 to 3 hrs**

Tsunami Travel Times & Response time

- ❑ Depending upon the Earthquake location (Makran/Andaman-Sumatra Subduction Zone) the response time for evacuation of coastal population could range between 10 min to few hours.
- ❑ As Andaman & Nicobar Islands situated right on subduction zone the available response time is very short

NTWC SOP & Timelines

- The Indian Tsunami Early Warning Centre (ITEWC) services for an event commence whenever an earthquake is recorded with M ≥ 6.5 within the Indian Ocean and M ≥ 8.0 outside of the Indian Ocean
- Uniquely designed SOP for generation of timely and accurate tsunami bulletins to handle both **near-source** and **far-source** coastal regions
- Based on proximity of a coastal zone to the tsunamigenic earthquake source regions and Expected Wave Heights from Models



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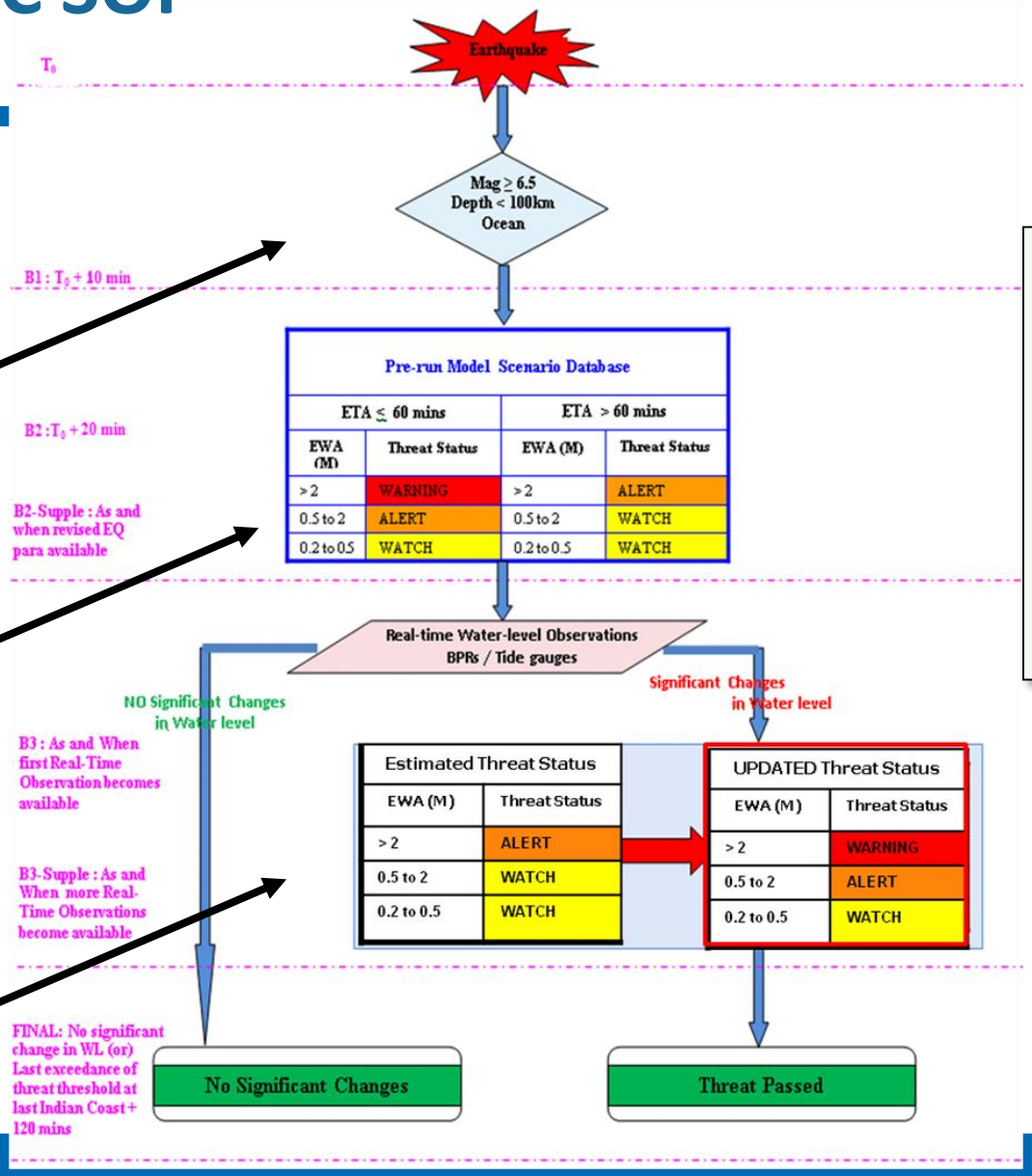
INDIA-NTWC SOP

Bulletin 1 without warning levels (+10 min)

Time-dependent warning levels (+20 min)

Observation-dependent warning levels



- Near Coastal Areas (< 60 min travel time of waves).
  - Warning: > 2 M Expected Run-up - FLASH - MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
  - Alert: 0.5 - 2M Expected Run-up - Emergency - MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
  - Watch: < 0.5 M Expected Run-up - Ops - MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC
- Far Coastal Areas (> 60 min travel time of waves).
  - Alert: > 2M Expected Run-up - Emergency - MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC
  - Watch: 0.5 - 2 M Expected Run-up - Ops - MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC

Types of Bulletins & Timelines

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Bulletin	Information	Time of issue (Earthquake Origin time as T_0) minutes
Type-1 **(Tsunami genesis)**	Preliminary EQ Parameters and **LAND / NO THREAT** Information based on **EQ Location, Magnitude & Depth**.	**T_0 + 10**
	Preliminary EQ Parameters and **Qualitative Tsunamigenic potential** based on EQ Location, Magnitude & Depth	
Type-2 **(Potential Threat)**	Preliminary EQ Parameters and NO THREAT Information from Model Scenarios	**T_0 + 20**
	Preliminary EQ Parameters and **Quantitative Tsunami Threat** (**WARNING / ALERT / WATCH**) Information from Model Scenarios	
Type-2- Updates	Revised EQ Parameters and Quantitative Tsunami Threat (WARNING / ALERT / WATCH) Information from Model Scenarios - **If revised EQ Parameters are available much before the real-time water level observations are reported.**	as and when revised earthquake parameters are available or after Earthquake Elapsed Time + 60 mins
Type-3 **(Confirmed Threat)**	Revised EQ Parameters and **Quantitative Tsunami Threat** (WARNING / ALERT / WATCH) Information from Model Scenarios and **Real-time water level observations** indicating Tsunami Generation.	**as and when the first real-time water level observation is available**
Type-3 Supplementary – xx	Revised EQ Parameters and Quantitative Tsunami Threat (WARNING / ALERT / WATCH) Information from Model Scenarios and Real-time water level observations indicating Tsunami Generation Threat PASSED information for individual Zones	**Hourly update / as and when the subsequent real-time water level observations are available**
Type-4 **(Final)**	Issued when water levels from multiple gauges confirm that no significant tsunami was generated.	
	120 minutes after a significant tsunami passes the last Indian threat zone; **Final bulletin** and **no further bulletins will be issued** unless additional information becomes available	**Issued 2 hours after last arrival time in the Indian coast of a wave over 0.5m**

SOP – Public Response and Threat Levels in Bulletins

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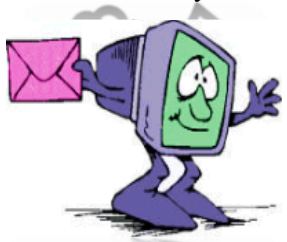
- 4 Threat Levels corresponding to different public responses and mapped to NDMA guidelines

Threat Status	Action to be taken	Dissemination to
WARNING	Public should be advised to move inland towards higher grounds. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
ALERT	Public should be advised to avoid beaches and low-lying coastal areas. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
WATCH	No immediate action is required	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Media
THREAT PASSED	All clear determination to be made by the local authorities	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media

Product Formats & Dissemination

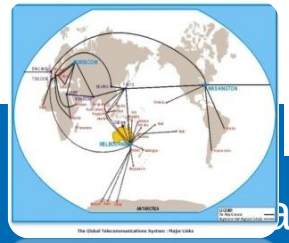
Fax



Email

SMS

Web



GTS

- **Notification Messages** are issued in **text** format
- **Bulletins** are generated in both text and **HTML formats** on the websites
- **Graphics** are generated in jpg or png format on the websites
- **Spatial** data is also available in dbf format on the websites

National Level

MHA, NDMA, MoES, NDRF Head quarters, IMD & CWC

State Level

Principal Secretaries (Revenue) of Andaman & Nicobar Islands, Andhra Pradesh, Gujarat, Goa, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu, West Bengal, Lakshadweep and Puducherry

District Level

DROs of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasham, and S.P.S Nellore

Institutional

1-10 NDRF Battalions, ALL control rooms of A&N Islands, HQWNC, HQENC, HQANC, HQSNC, NOIC Tamilnadu, Gujarat, West Bengal, NPCIL, Mumbai, Madras Atomic Power Station, Tarapur Atomic Power Station (1&2, 3&4), Kudankulam Atomic Power Unit, SHAR, MRCC, Coast Guards, Port Officers, Coastal Industries (Reliance) Media & Public subscriptions

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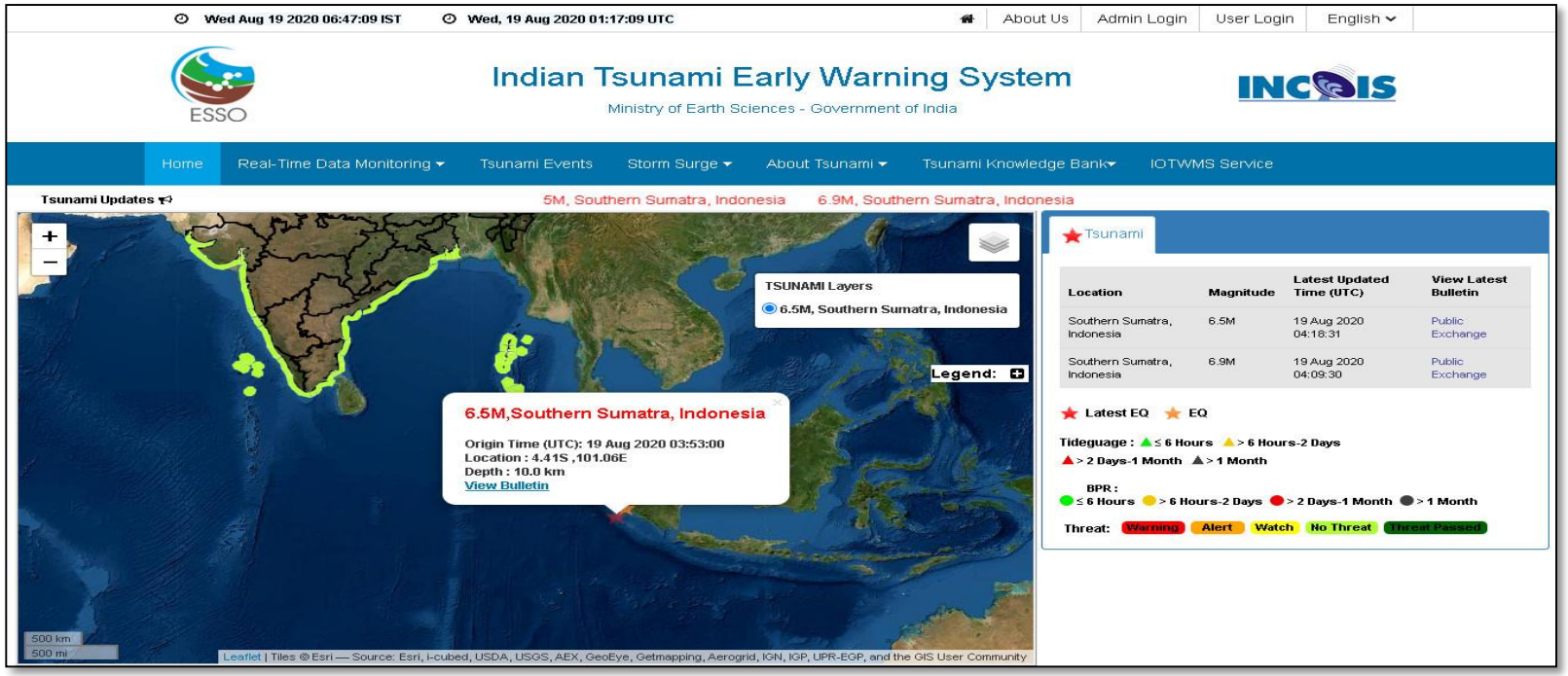
ITEWC Website and Products



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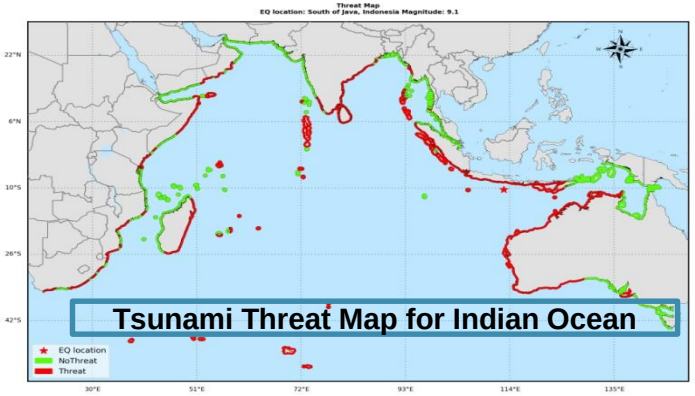
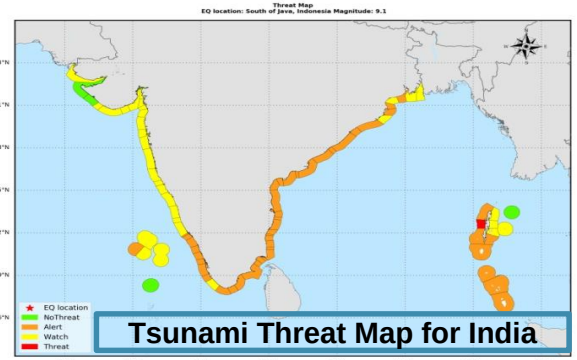
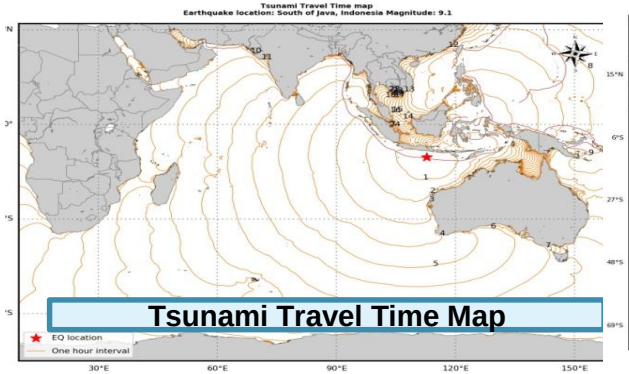
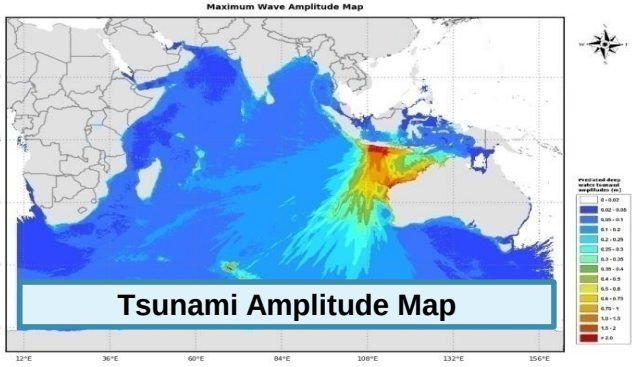
Tsunami Advisories and bulletins are made available on a dedicated website.
https://tsunami.incois.gov.in









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THANK YOU