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First Ocean Decade International Coastal Cities Conference, Qingdao, China 26-27 February 2025

Side Event - Coastal Cities Facing Sea level Rise and Tsunami Threats

Early Warning System for Tsunamis and Other Ocean related Hazards

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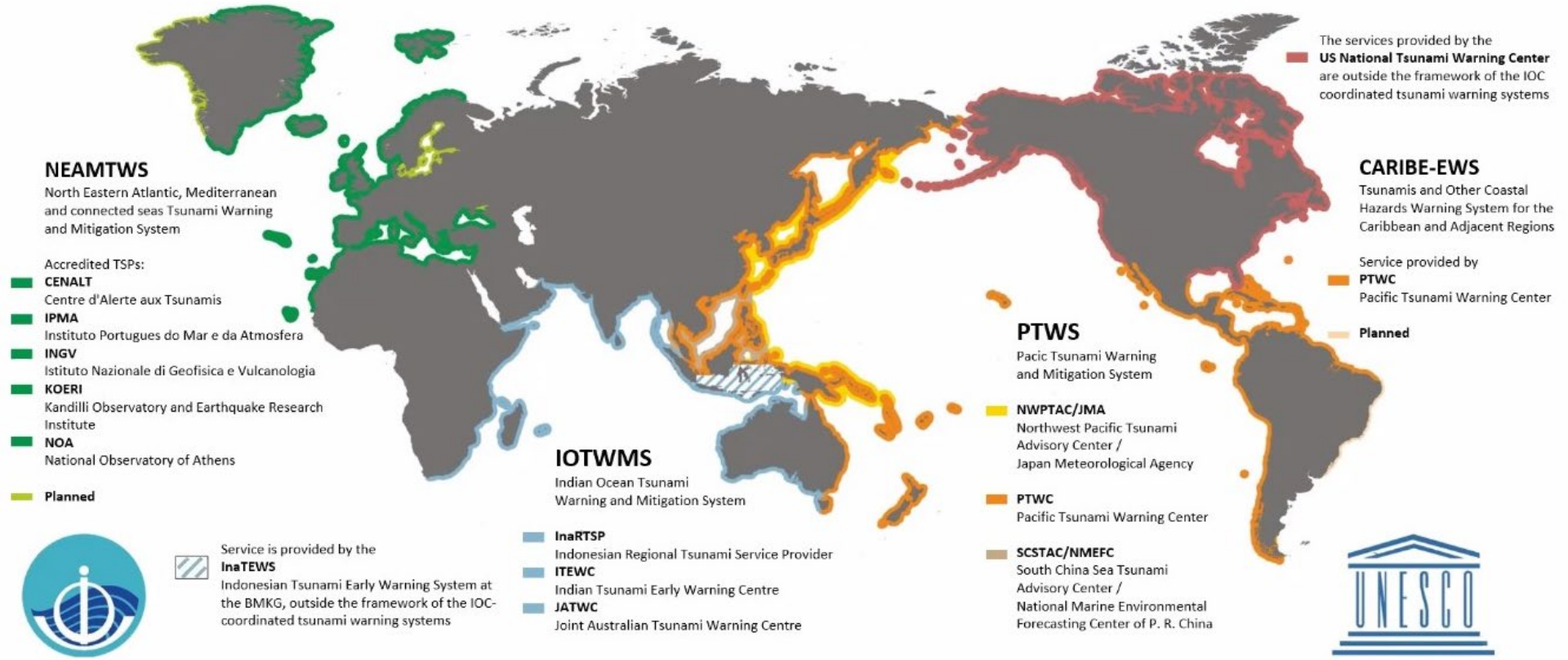
EXISTING SERVICES OF THE GLOBAL TSUNAMI WARNING SYSTEM

Intergovernmental Oceanographic Commission of UNESCO
2021 www.ioc-tsunami.org



System of Systems (UNESCO-IOC globally coordinates)

- Four Regional Systems (CARIBEEWS, IOTWMS, NEAMTWS, PTWS)
- Tsunami Service Providers (PTWC, JATWC, CENALT, SCSTAC etc)
- National Tsunami Warning Centres (via each member state)

Three Pillars

- ❑ Risk Assessment and Reduction
- ❑ Detection Warning and Dissemination
- ❑ Preparedness and Response

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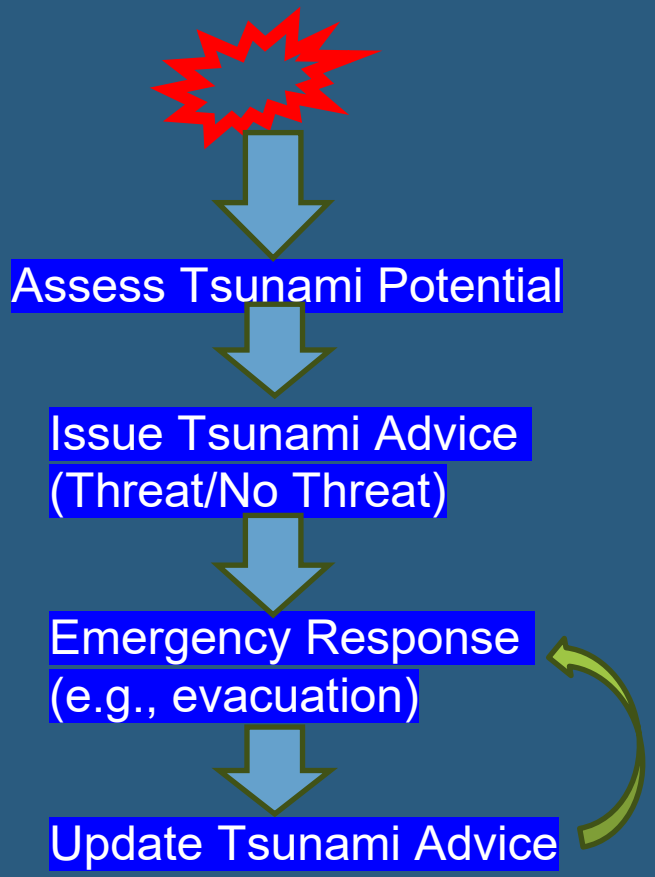
Timeline-driven decision making/messaging flow diagram in a typical tsunami warning system



Earthquake, non-seismic (volcanic eruption, landslide, meteotsunami, meteorite)

Scenario Database/Real-time tsunami modelling

Decision Tools (e.g., TOAST)

Sea Level Obs/updated source information

Challenges to a timely and effective tsunami warning system

Data/Tools Used

Earthquake, non-seismic (volcanic eruption, landslide, meteotsunami, meteorite)

Scenario Database/Real-time tsunami modelling

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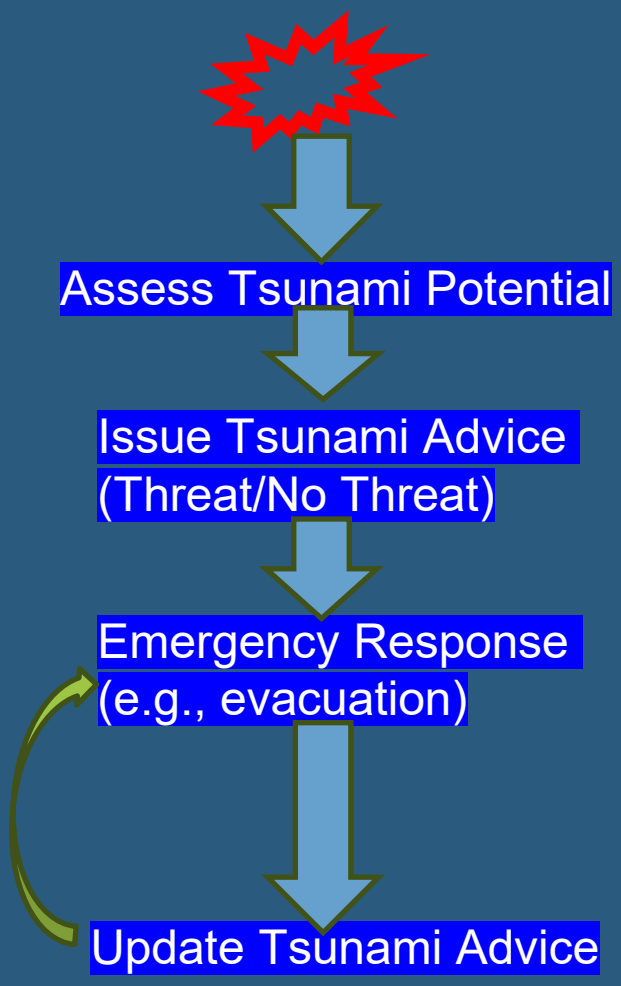


Current Challenges

EQ characteristics uncertainties

Little/non info if non-seismic sources

Scenario not real event

Real-time modelling not timely

Sparse networks led to delay in tsunami confirmation

Take time to gain better EQ characterization

Ocean Decade initiative to overcome Challenges

Assess Tsunami Potential

Source characterisation challenges

Issue Tsunami Advice (Threat/No Threat)

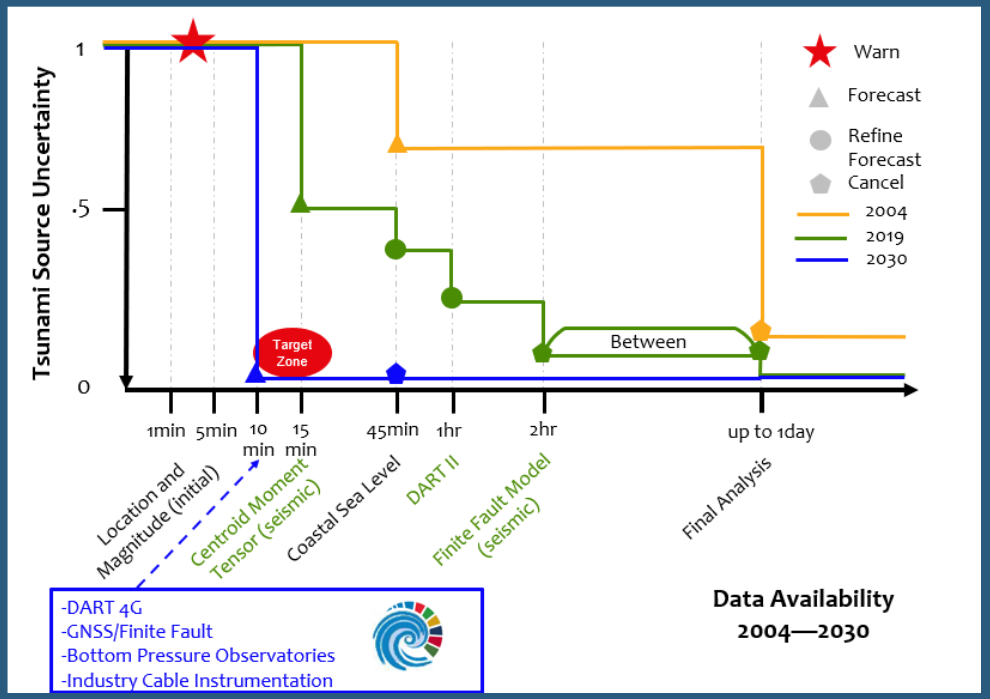
Modelling/forecasting challenges

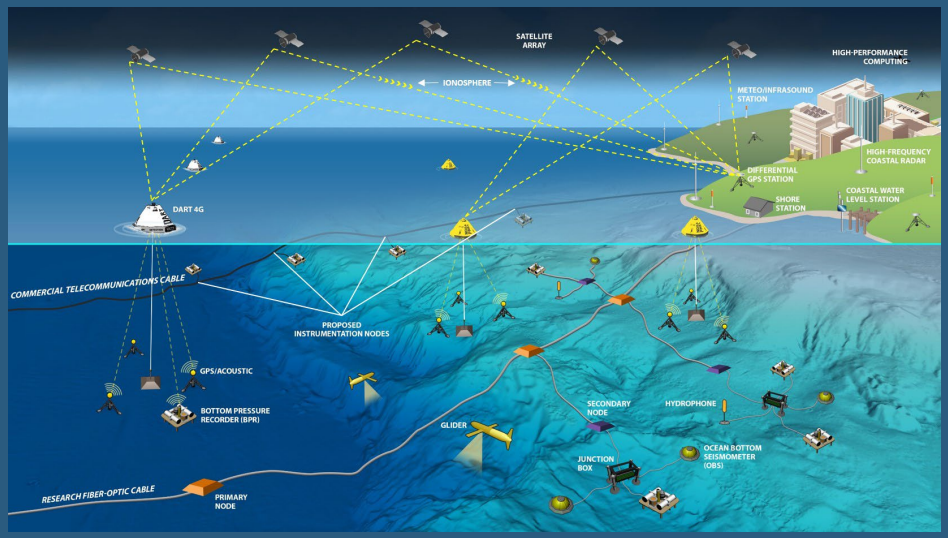
Emergency Response

Warning challenges

Update Tsunami Advice

Observation network challenges





Handling Non-seismic Sources

- Conduct risk assessment & develop scenario database
- Build alliance (volcanolists, geophysists, meteorologists, operators, academia etc)
- Situation awareness – regional live info sharing via social media, HF Radio etc
- Develop fit-for-purpose operating procedures (JATWC, PTWC for example)

Tsunami and other coastal multi-hazard early warning system

An Australian example

Multi-hazard early warning system to respond to cascading and concurrent coastal hazards of

- Tsunami
- Storm surge
- Damaging waves
- Riverine flooding to coast

They cause danger in marine environment, coastal erosion, land inundation

- Single agency, National approach, 24/7 continuous operation -> seamless info sharing and coordination, optimal and efficient resource utilisation, coherent messaging
- Agile and responsive operating model (routine operation + expert team surge support + customer decision support)
- Multi-skilled competency-trained operators
- Not yet one integrated system with standalone tsunami warning system, separate for storm surge and damaging waves, separate riverine flooding.
- All warnings share consistent look and feel, using Common Alerting Protocol, XML, via website, Mobile App, X (Twitter), and phone service

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Ocean Decade Tsunami Program Research and Development Plan

- Expansion of existing detection and monitoring systems, including seismometers, coastal tide gauges, and deep ocean tsunameters, to fill identified gaps, and deploy new technologies e.g., GNSS and SMART Cable, to address observational gaps that cannot be covered by existing networks.
- Ensure all National Tsunami Warning Centres have access to data, tools and communication platforms, protocols and training to timely and effectively warn coastal and maritime communities threatened by tsunamis and other coastal hazards that are integrated into a multi-hazard framework
- Emphasize the importance of building tsunami resilient communities through the UNESCO IOC Tsunami Ready Recognition Programme, which is achieved through involvement of stakeholders at all levels.

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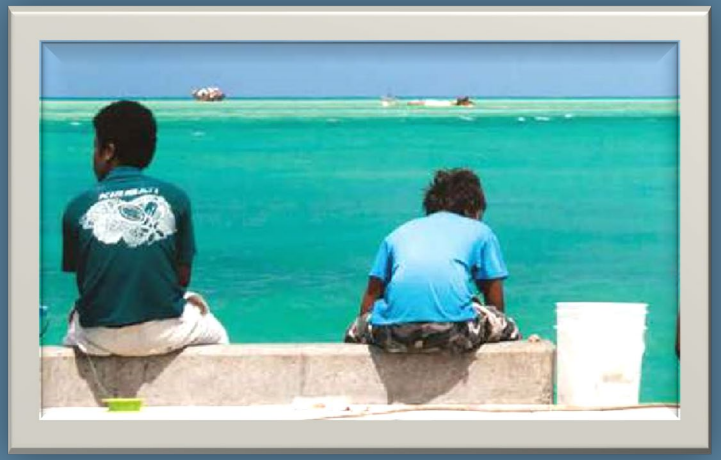

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