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What Do Tsunami Warning Centers Provide to Emergency Response Agencies?

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Tsunami Warning Centers – Two Types

Tsunami Service Provider (TSP)

- A center like PTWC, NWPTAC (JMA), SCSTAC (China), CATAC (Nicaragua) with the capability to detect and assess tsunami threats over a large region, and that has been accepted by the ICG to disseminate their threat assessment to other Member States

Tsunami Warning Centers – Two Types

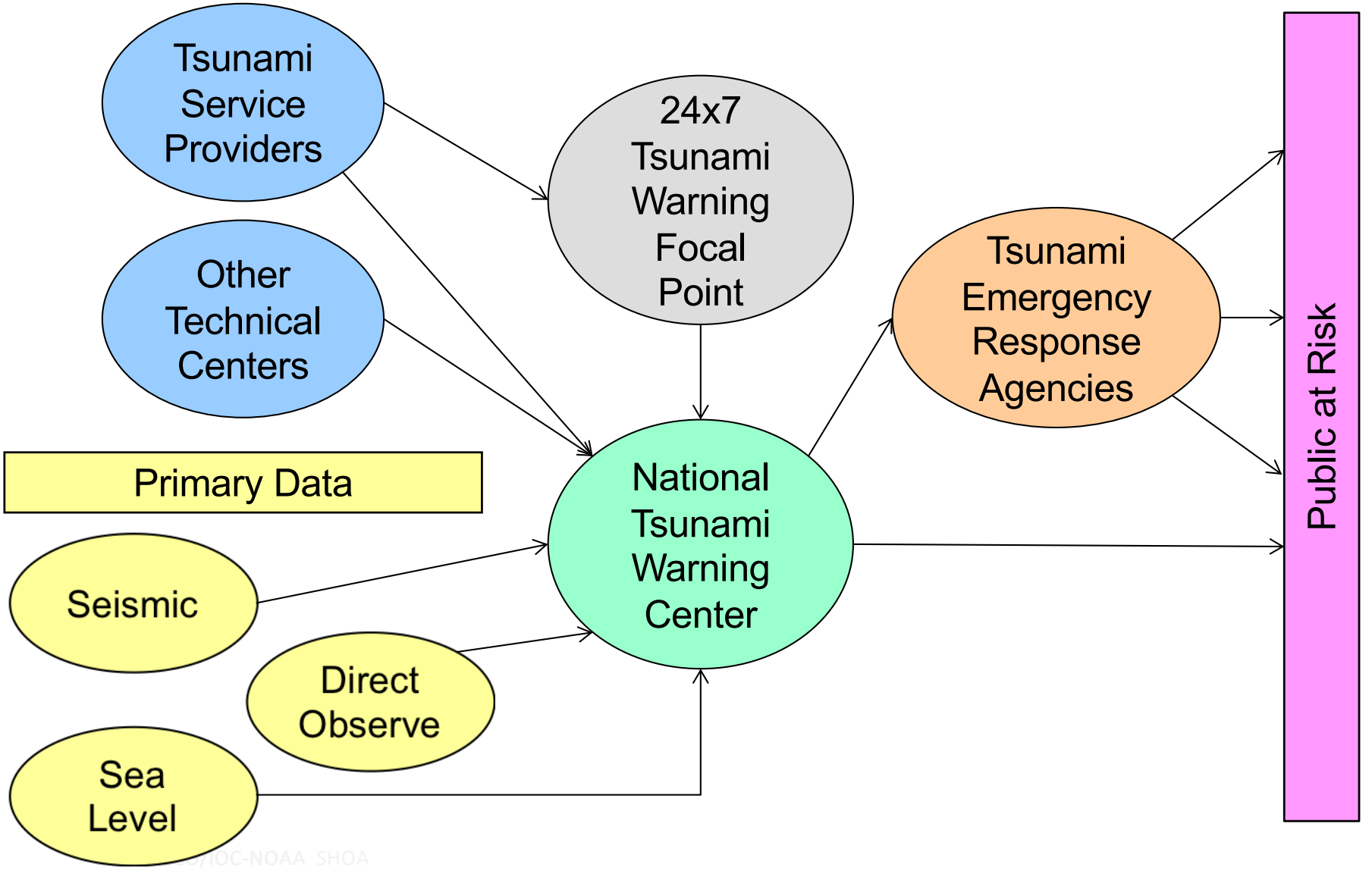
National Tsunami Warning Center (NTWC)

- A center operated by a Member State that has the authority by law or otherwise to issue tsunami warnings for the coasts of that Member State.
- Ideally, an NTWC should have some technical capability to aid in decisions.

Tonga

Peru

Information Flow



Functions of an NTWC

BASIC

- Monitor and Locate Earthquakes
- Monitor and Detect Tsunami Waves
- Assess the Tsunami Threat
- **Create and Disseminate Alerts**
- Monitor Tsunami Impacts

OTHER CRISIS ACTIVITIES

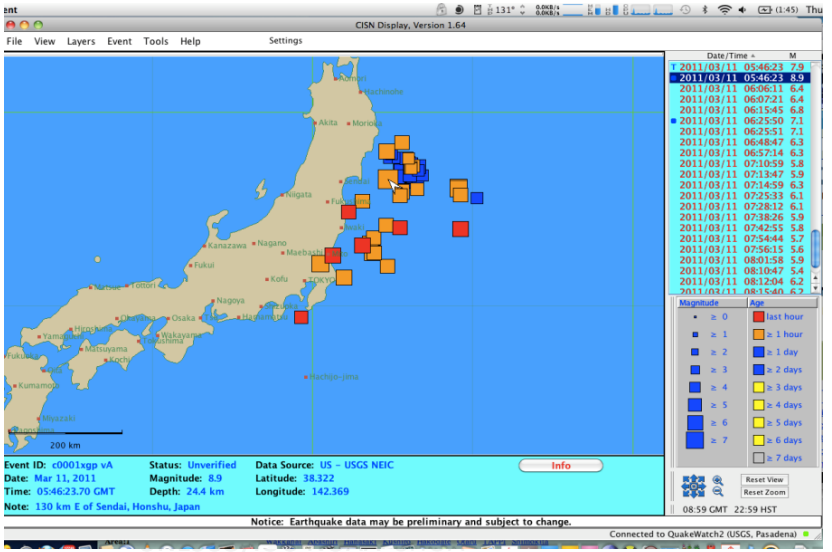
- Consult with NDMO During Events
- Brief the Media – Your Partner

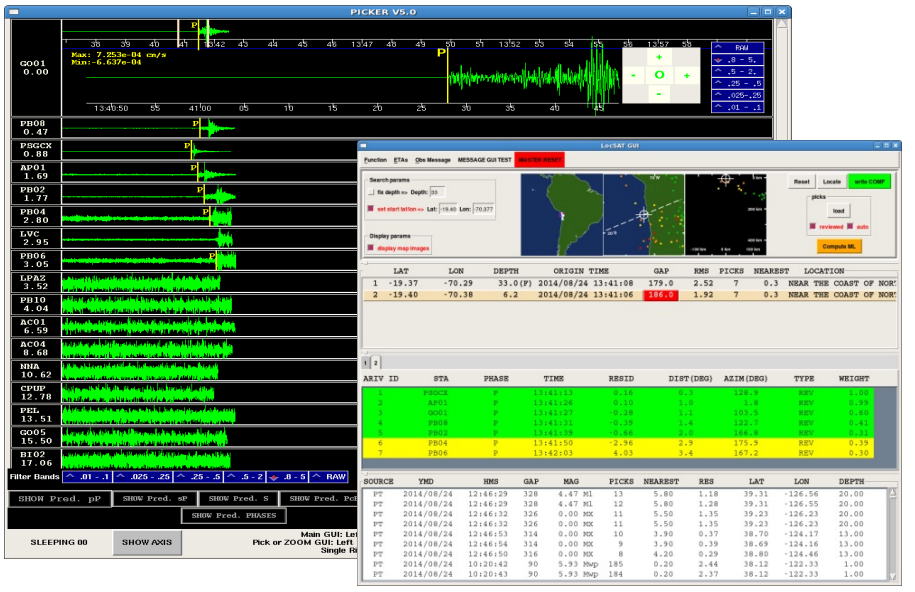
OTHER NON-CRISIS

- Outreach

Basic Functions of an NTWC

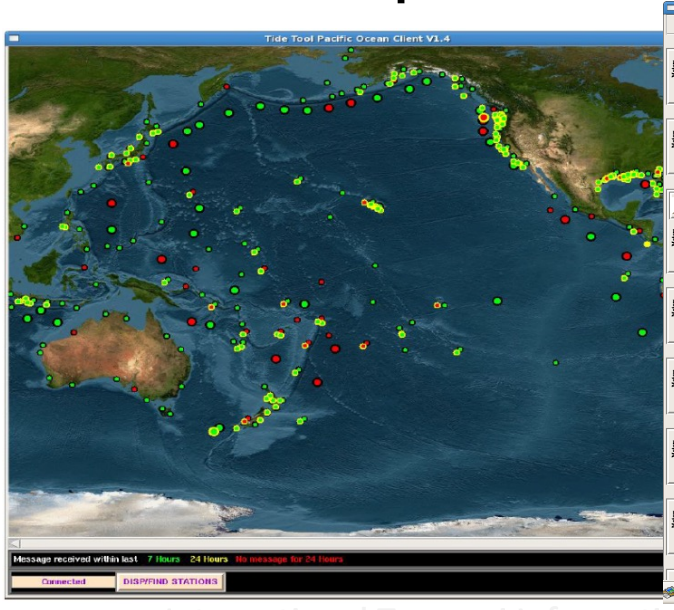
- **Monitor for Earthquakes**
  - **SIMPLE** - Monitor other observatories real-time reporting of earthquakes (e.g., CISN).
  - **COMPLEX** – Operate a seismic network and perform real-time analysis of seismic waveform data.

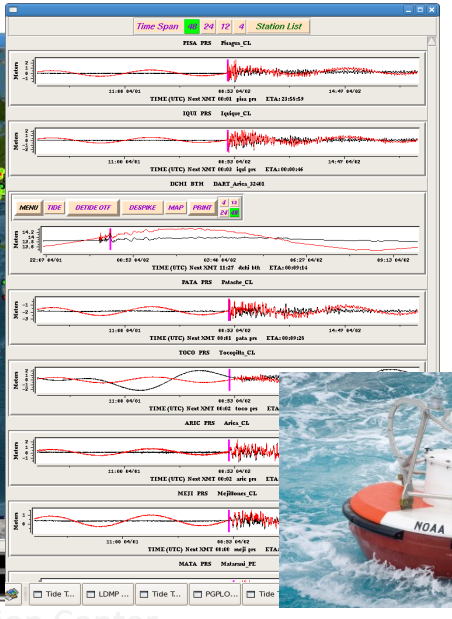


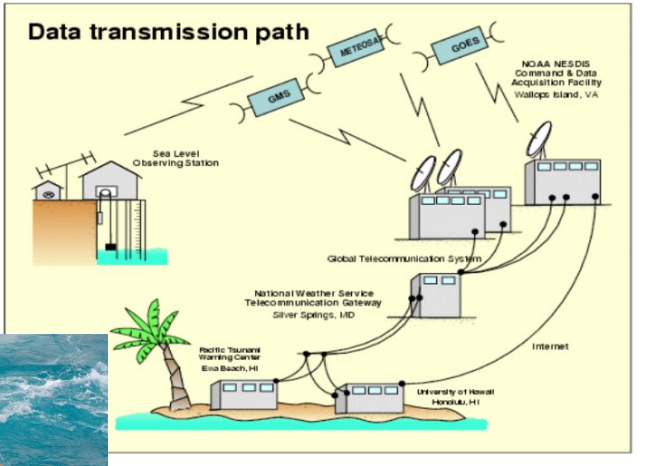


Basic Functions of an NTWC

- **Monitor for Tsunami Waves**
  - **SIMPLE** – Run software to display data from existing global network of sea-level gauges (e.g., TideTool software or IOC website)
  - **COMPLEX** – Operate network of coastal and deep-ocean sea level stations.







Basic Functions of an NTWC

- **Assess the Tsunami Threat**
  - **SIMPLE** – Base the tsunami threat on PTWC messages.
  - **COMPLEX** – Independently determine the tsunami threat based on sea-level readings, historical data and/or forecast models.
- **Create and Disseminate Alerts**
  - **SIMPLE** – Issue warning / no warning to NDMO for all coasts based on maximum threat anywhere (NDMO alerts public)
  - **COMPLEX** – Issue area-specific alerts of different levels to NDMO and public by numerous communication methods.

Basic Functions of an NTWC

- **Monitor Tsunami Impacts**
  - Monitor network of real-time reporting sea level gauges along coasts.
  - Monitor local television and radio for reports of tsunami impacts.
  - Get reports from EMs, police, fire department, other spotters, especially for vulnerable coasts.
  - Determine if/when alert levels should be raised, lowered, or cancelled.
  - Wait sufficient time to ensure threat has passed before cancelling.

Other Crisis Functions of an NTWC

- **Consult with NDMO During Events**
  - **Consider other factors that may play into decision-making:**
    - Time of Day – Day, Night, Traffic
    - Season of Year – Temperature, Weather
    - Weekday, Weekend, Holiday, Special Events
  - **Advise about NTWC**
    - What Readings are Coming Next
    - Confidence in Forecast
    - Expected Level of Impacts
    - Places Expected to Have Biggest Impacts
    - When to Expect Cancellation

Other Crisis Functions of an NTWC

- **Brief the Media – Your Partner**
  - **Stay on Point – What is In Official Message**
    - Big Earthquake Occurred
    - Potential (Watch) or Confirmed (Warning) Tsunami Threat
    - Take Warnings Seriously
    - Follow Instructions from NDMO
  - **Don't Over-Speculate or Over-Discuss**
    - Public Won't Take Action if Mixed Message
    - Media Will Want Your Opinions / Details
    - Give Official Message Only

Non-Crisis Functions of an NTWC

- **Outreach**
  - **Advise NDMO, Media, Public on Tsunamis and Potential Tsunami Threats**
    - Tsunami Characteristics
    - Not If, But When
    - Potential Sources – Local, Distant
    - Potential Impacts – Lead Times,
  - **Advise NDMO, Media, Public on Limitations**
    - Many Unknowns: Exact Source, Coastal Effects
    - Limited Data: A Few Readings
    - You Act Conservatively
    - There will be Over-Warning

What should Tsunami Emergency Response Agencies Expect from an NTWC

- **Rapid Notification of a Potential Tsunami Threat**
- **Conservative Evaluation of a Tsunami Threat**
- **Reasonably Rapid Stand-Down if No Tsunami Threat**
- **NTWC Underlying Principles**
  - Will Provide Forecast as Accurately as Possible but still Conservatively
  - Saving Lives is Highest Priority
  - Protecting Property only When Possible

Limitations to be Prepared For

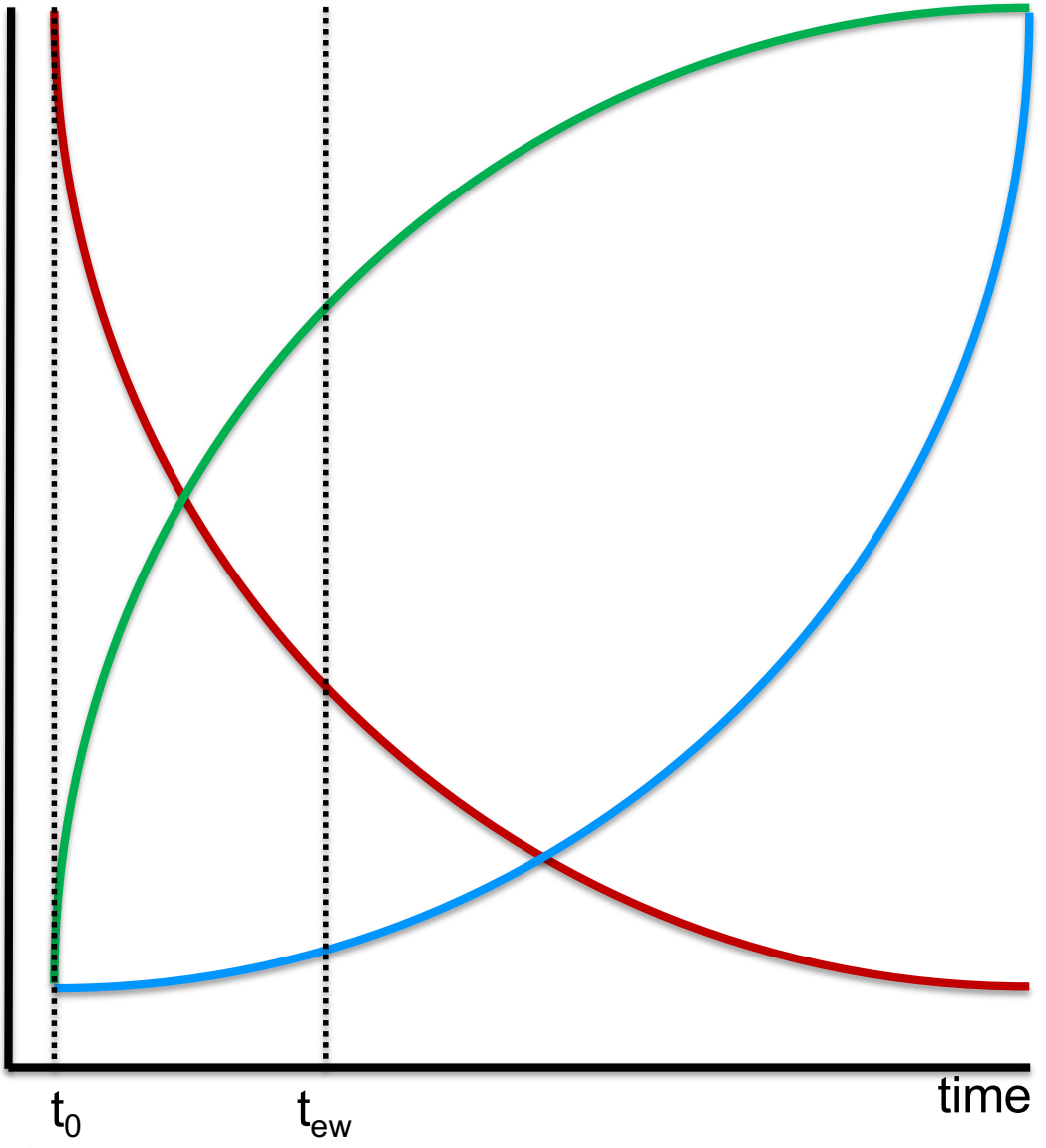
- Over-Warning due to Conservative Criteria
- General Forecast of Threat with Few Specifics
- Potential for Error in ETAs
- Uncertainty About How Long Impacts will Last

In a Nutshell…

phenomenological uncertainty
tsunami impact time
population at risk

'It is better to be roughly right than precisely wrong.'
John Maynard Keynes

Tsunami Early Warning Paradigm



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Thank You

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