

Tsunami Warning System Challenges

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Tsunami Warning Philosophy

- The PRIME directive:
 - Get the warning out prior to wave impact on the coast!!!
- But wait... the phenomena can't be observed prior to impact on the nearest coasts.
- OK... issue the warning based on associated phenomena (i.e., seismic recordings)
- The PROBLEM:
 - There is not a one-to-one correspondence between seismic recordings and tsunami generation
- The RESULT:
 - Tsunami warnings occasionally get issued with no resulting impact

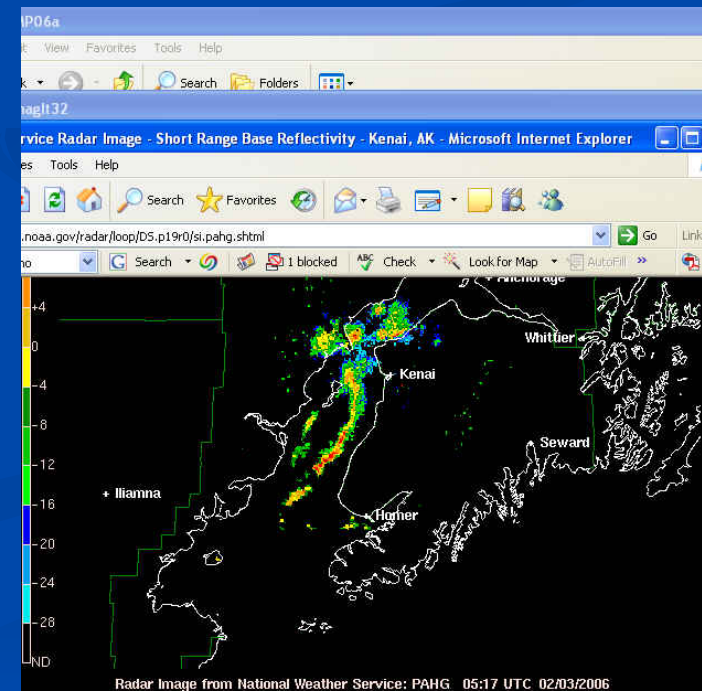
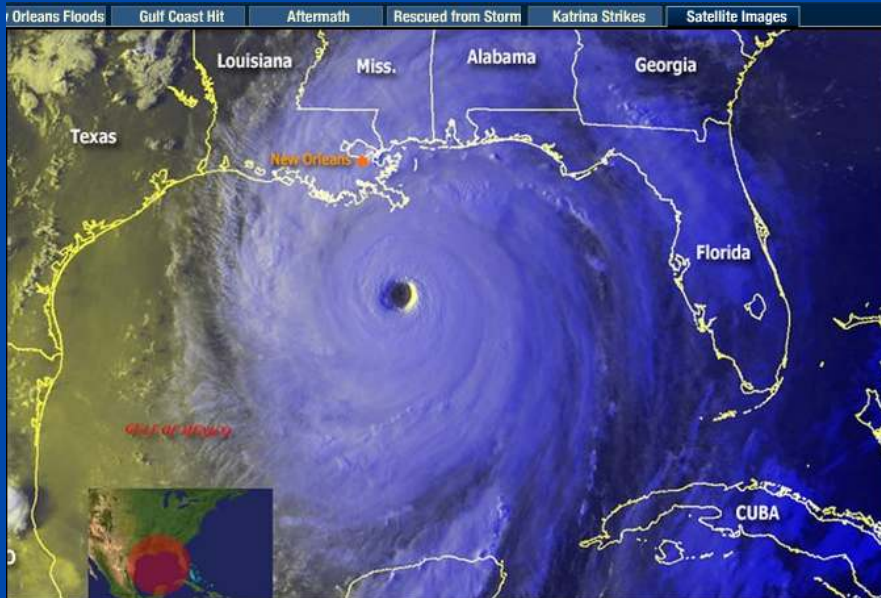
Tsunami Warning Philosophy

■ The HOPE:

- Be able to observe the phenomena directly prior to first impact

■ The REALITY:

- A denser DART network and forecasting tools will allow us to estimate danger prior to impact for distant tsunamis
- The DART network and an improved tide gage network will allow faster warning cancellations for regional events
- We are not able to verify the wave prior to impact near source and will not be able to in the near future.



Tsunami Warning System

- Three basic components:
 - The Warning Center
 - Acquires observational data
 - Processes the data
 - Makes decisions based on observations and protocols
 - Disseminates warnings
 - Communication systems which carry warnings to emergency management officials and the public
 - NOAA Weather Wire
 - NOAA Weather Radio/Emergency Alert System
 - Etc.
 - Emergency Management Infrastructure
 - Prepares itself and local populations for events
 - Transmits warnings to public
 - Conducts evacuations

Tsunami Warning System

- Two associated components:
 - Research
 - Enhances the capabilities of the warning system
 - Provides emergency management best estimation of the tsunami hazard zone
 - Public Education
 - Alert coastal populations and visitors of their hazard and proper response to both official warnings and nature's warnings

WC/ATWC Area-of-Responsibility

- WC/ATWC AOR
 - Western:
 - California
 - Oregon
 - Washington
 - British Columbia
 - Alaska
 - Eastern
 - U.S. Gulf of Mexico coast
 - U.S. Atlantic coast
 - Eastern Canada
- PTWC AOR:
 - Hawaii
 - Pacific outside WCATWC AOR
 - Interim Puerto Rico/VI/Caribbean
 - Interim Indian O.



WC/ATWC Staff

- 15 staff
 - Director
 - TWSO
 - 5 Sr. Watchstanders
 - 4 Watchstanders
 - Oceanography
 - Geophysics
 - Physical Science
 - 1 ITO
 - 1 Senior ET
 - 1 ET
 - Secretary
- Center staffed 24x7 with 2 staff.

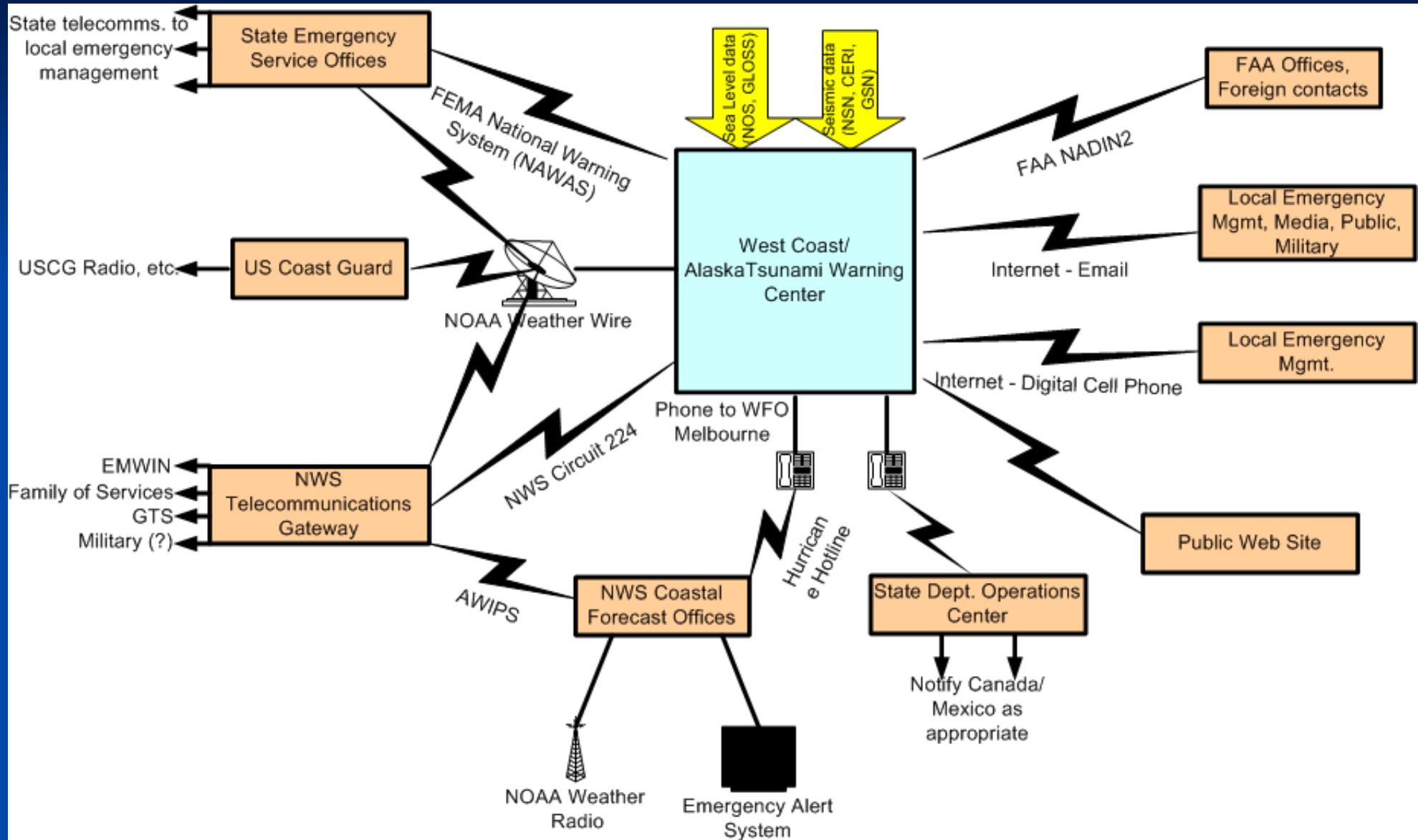


Tsunami Warning Center Core Functions

- Acquire raw data:
 - Seismic data
 - Sea level data
- Process and analyze data:
 - Initial processing on seismic data
 - Decision's based on processed data and protocols
 - Post-processing seismic data
 - Display sea level data
 - Analyze sea level data in conjunction with pre-event modeling and historical information
- Disseminate Information

Networks and Example Scenario

Product Delivery Methods

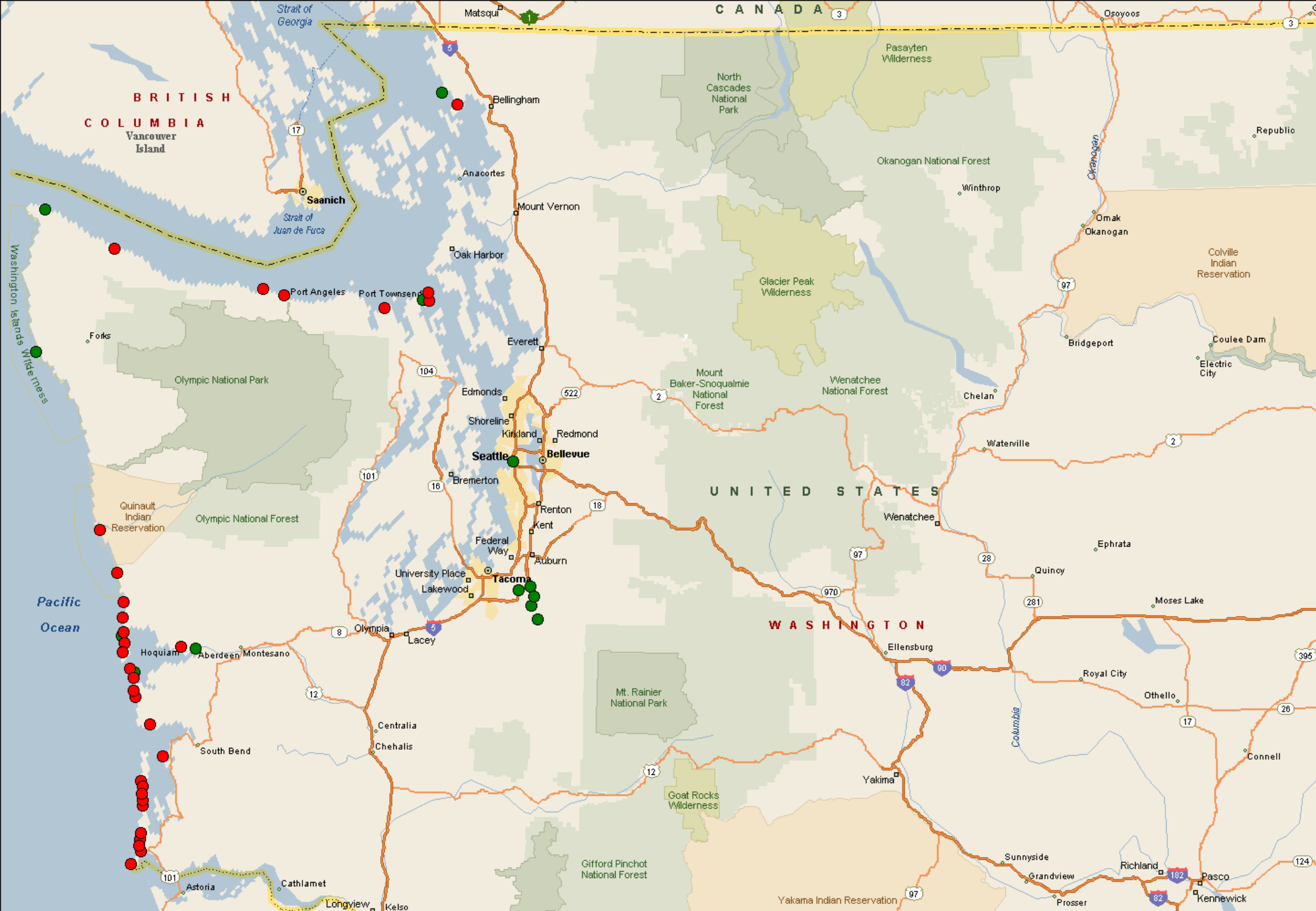


Tsunami Strengthening Program: TWC Enhancements

- Enhanced DART network (NDBC)
- Enhanced tide gage network (NOS)
- Upgrade PTWC seismic network
- Modernized forecast software (PMEL)
- TsunamiReady support (NWS)
- Global seismic network upgrade (USGS)
- Tsunami Archives (NGDC)
- 24x7 warning centers (TWCs)

Warning System Challenges

- Need direct wave observations PRIOR to impact on nearest coast
- Hazard definition in areas with little historic data
- Warning dissemination to those at risk
- Infrequency of events and associated complacency
- Poorly tsunami-educated public



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