Tsunami Warning Services for the Pacific Northwest

Paul Whitmore; Director – NOAA/West Coast and Alaska Tsunami Warning Center

October 11, 2007
A Tsunami Warning System:

- **Tsunami Warning Centers**
  - Data Acquisition
  - Data Analysis and Forecasting
  - Message Dissemination

- **Communications**
  - NOAA Weather Wire
  - Global Telecom System
  - National Warning System

- **Emergency Response Orgs.**
  - Carry out evacuations
  - Prepare Communities
Tsunami Warning Systems

Acronyms

NWS - National Weather Service
EOC - Emergency Operations Center
EMWIN - Emergency Managers
Weather Information Network
GTS - Global Telecommunications System
FOS - Family of Services
NOAA Tsunami Warning Centers

NOAA TSUNAMI WARNING SYSTEM AREAS OF RESPONSIBILITY

West Coast/Alaska Tsunami Warning Center (WC/ATWC)
and Pacific Tsunami Warning Center (PTWC)
Tsunami Warning Center
Seismic Data Acquisition

• 250+ Seismic Stations recorded at center
• USGS, University, Global, and NOAA networks
• Pacific NW network improved in late ’90s as part of NTHMP
Tsunami Warning Center
Sea Level Data Acquisition

- 400+ Sea Level Sites recorded at center
- Most NOAA or international
- Coastal and DART
- Network improved greatly post-2004 Tsunami
Tsunami Warning Center Response Time

- Dropped to < 5 minutes in FY ’07
- Decrease due to:
  - Observational Net Improvements
  - Enhanced processing
  - 24/7 staffing
Pacific Northwest Tsunami Threat

• Local – tens of minutes:
  • Cascadia
  • Landslide generation
  • Secondary faults

• Regional – about one hour
  • Cascadia segment

• Distant – several hours away
  • Alaska
  • NW Pacific
  • South America
Typical Event Timeline – 1
(Local Event)

- 0 sec  Earthquake
- 30 sec  Alarms
- 1 min  First location
- 3 min  Magnitude (large event)
- 4 min  Analyst review
- 5 min  Warning issued
Typical Event Timeline

• 0 sec  Earthquake
• 30 sec  Alarms
• 1 min  First location
• 3 min  Magnitude (large event)
• 4 min  Analyst review
• 5 min  Warning issued
Typical Event Timeline - 2

- 5-10 min  Verify receipt
- 10-30 min  Further Seismic Analysis
- 10+ min  Monitor Sea Level
- 30+ min  Forecast
- Every 30’  Update Message
# Tsunami Forecasting

**Kuril Islands Event**  
**Magnitude 8.2**  
**Origin Time 2024 PST January 12, 2007**

<table>
<thead>
<tr>
<th>Tide Gauge</th>
<th>Estimated Tsunami Arrival Time</th>
<th>Forecasted Amplitude * (above sea level)</th>
<th>Observed Amplitude (above sea level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midway Island</td>
<td>2320 AKST 1/12</td>
<td>-----</td>
<td>0.19 M</td>
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<tr>
<td>Kodiak AK</td>
<td>0111 AKST 1/13</td>
<td>0.04 M</td>
<td>not measurable (&lt;0.05 M)</td>
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<tr>
<td>Nawiliwili HI</td>
<td>0032 HST 1/13</td>
<td>0.07 M</td>
<td>0.10 M</td>
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<td>Seward AK</td>
<td>0136 AKST 1/13</td>
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<tr>
<td>Yakutat AK</td>
<td>0146 AKST 1/13</td>
<td>0.08 M</td>
<td>0.05 M</td>
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<tr>
<td>Sitka AK</td>
<td>0146 AKST 1/13</td>
<td>0.12 M</td>
<td>0.08 M</td>
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<td>Honolulu HI</td>
<td>0047 HST 1/13</td>
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<td>0.06 M</td>
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<td>Langara BC</td>
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<tr>
<td>Kahului HI</td>
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<td>Hilo HI</td>
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<td>0.11 M</td>
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<td>Juneau AK</td>
<td>0308 AKST 1/13</td>
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<td>not measurable (&lt;0.05 M)</td>
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<td>Neah Bay WA</td>
<td>0431 PST 1/13</td>
<td>0.02 M</td>
<td>0.03 M</td>
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<tr>
<td>La Push WA</td>
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<tr>
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<td>Port San Luis CA</td>
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<td>0.11 M</td>
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<td>0.09 M</td>
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<tr>
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<td>Santa Barbara</td>
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</tbody>
</table>
NOAA – SIFT Tsunami Forecast

Kuril Is Tsunami 7.9 Mw
2007.01.13 04:23:20 UTC
05h07m00s

Mw 8.4

Crescent City, CA

Kahului, HI

Hilo, HI

Mw 7.9 First inversion

Crescent City, CA

Kahului, HI

Hilo, HI

Mw 7.9 joint inversion

Crescent City, CA

Kahului, HI

Hilo, HI
Message Dissemination

- State Emergency Service Offices
- FEMA National Warning System (NAWAS)
- Tsunami Warning Center
- US Coast Guard
- NOAA Weather Wire
- NOAA-net
- EMWIN
- NOAA Weather Radio
- NWS Coastal Forecast Offices
- State Dept. Operations Center
- FAA Offices, Foreign contacts
- FAA NADIN2
- Internet – Email/RSS, AutoFAX
- Cell Phone Text Messaging
- Internet
- Public Web Site
- Local Emergency Mgmt./Public
- Local Emergency Mgmt., Media, Public
- State/Local Emergency Mgmt.
- Notify foreign countries as appropriate
- AWIPS
- USGS QDDS