



NWS Tsunami Program: Then and Now

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(contract support)

EMForum

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Tsunami Warning System U.S. History

- 1949 Honolulu Observatory established
 - Co-located with existing Magnetism Observatory
 - Used data sent via teletype from seismic observatories
 - Established in time for major tsunamis of the 50s/60s



Tsunami Warning System U.S. History

- 1967 Alaska Tsunami Warning System established
 - Followed tsunami destruction due to 1964 Great Alaska Earthquake
 - Originally 3 centers; later combined into 1



Tsunami Warning System U.S. History

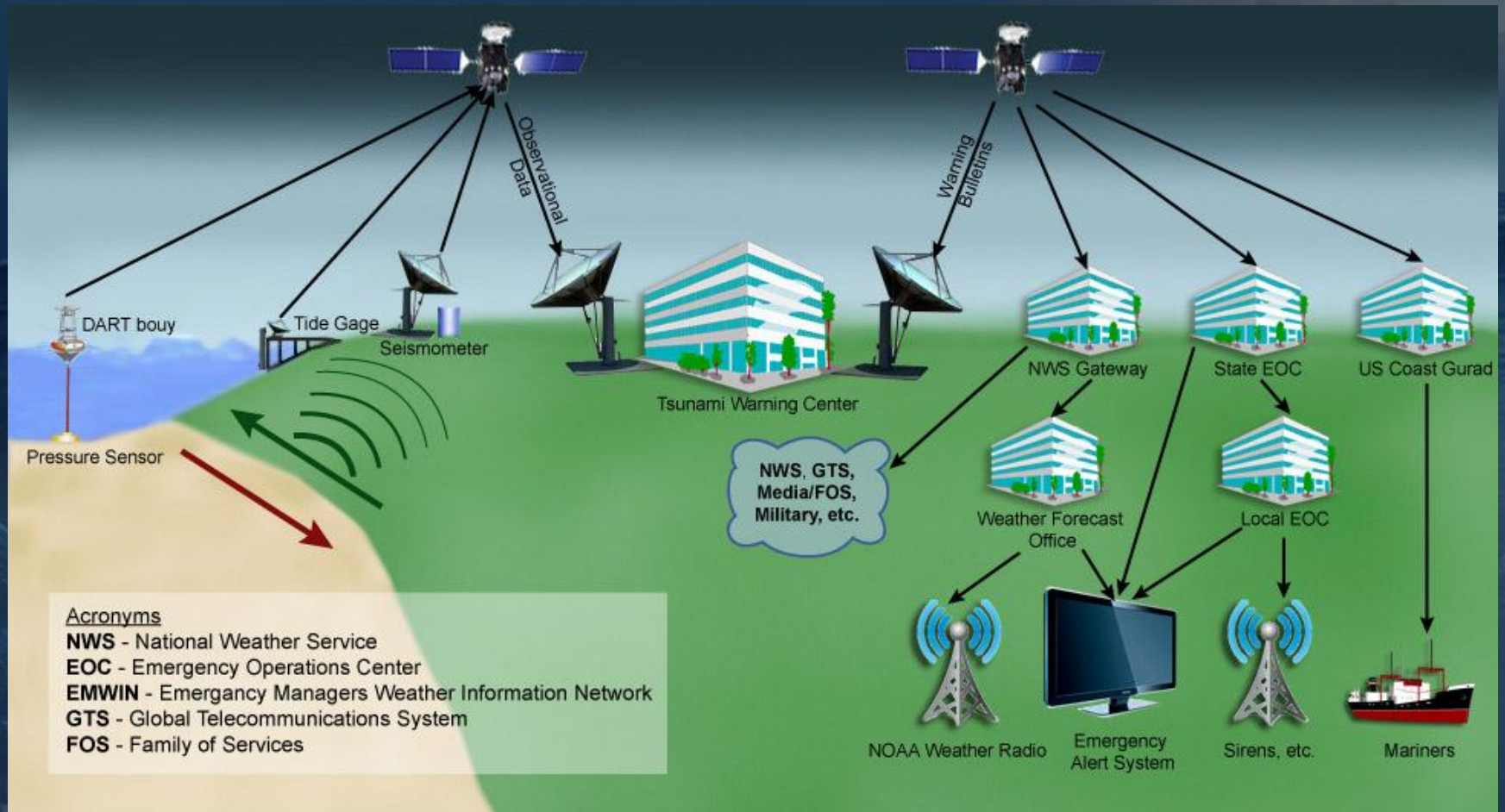
- 1968 Pacific Tsunami Warning Center established
 - Officially expanded scope of Honolulu Observatory to other nations



Tsunami Warning Centers

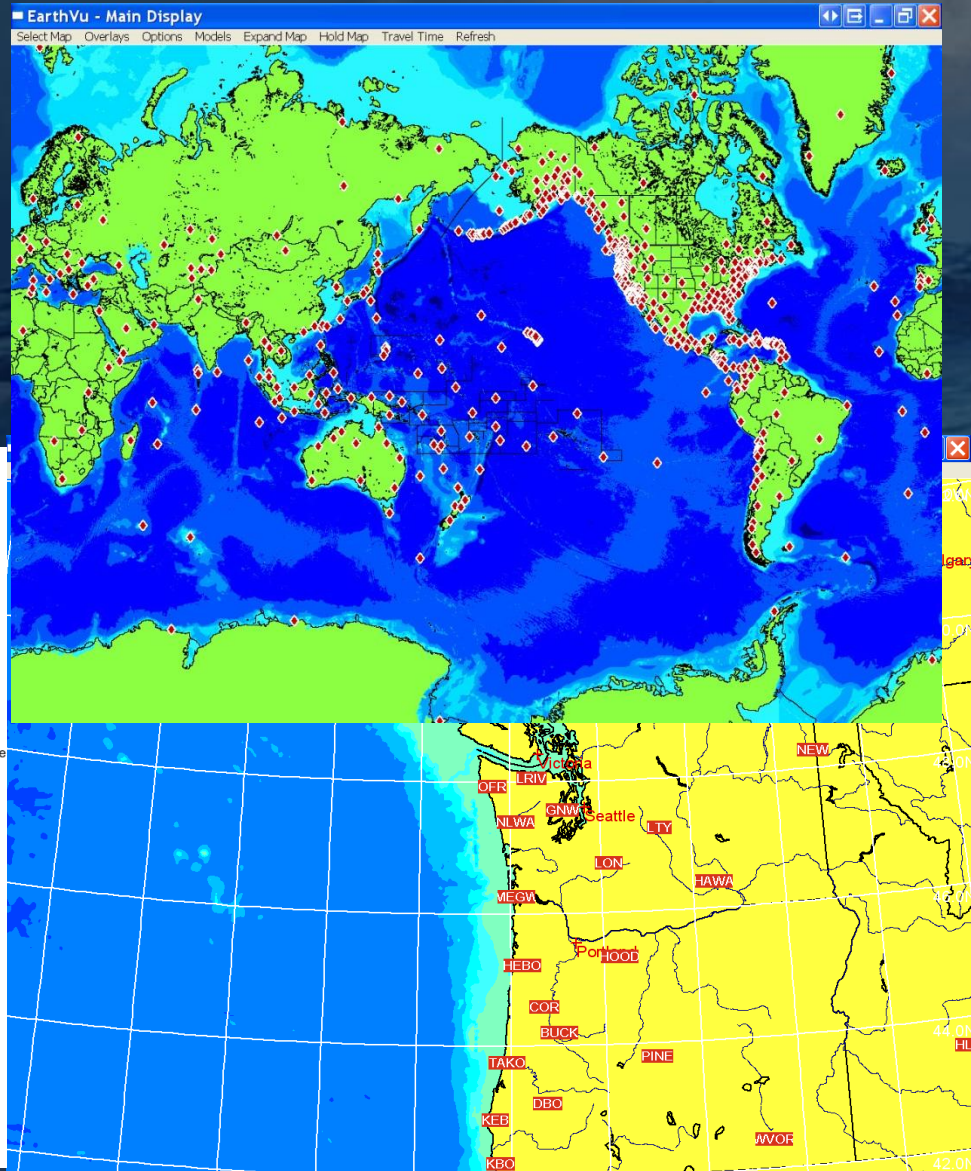
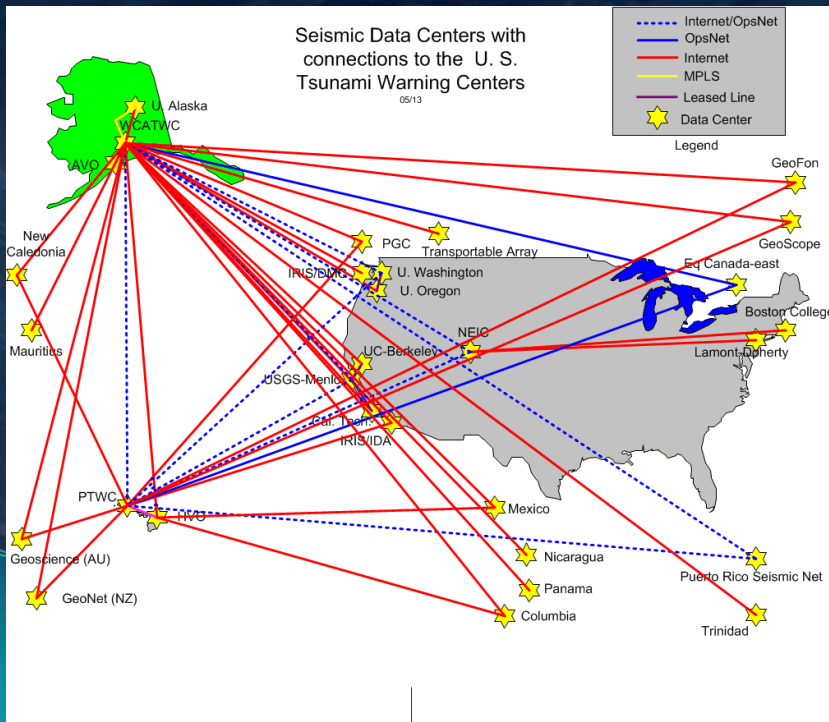


Tsunami Warning System – What is it?



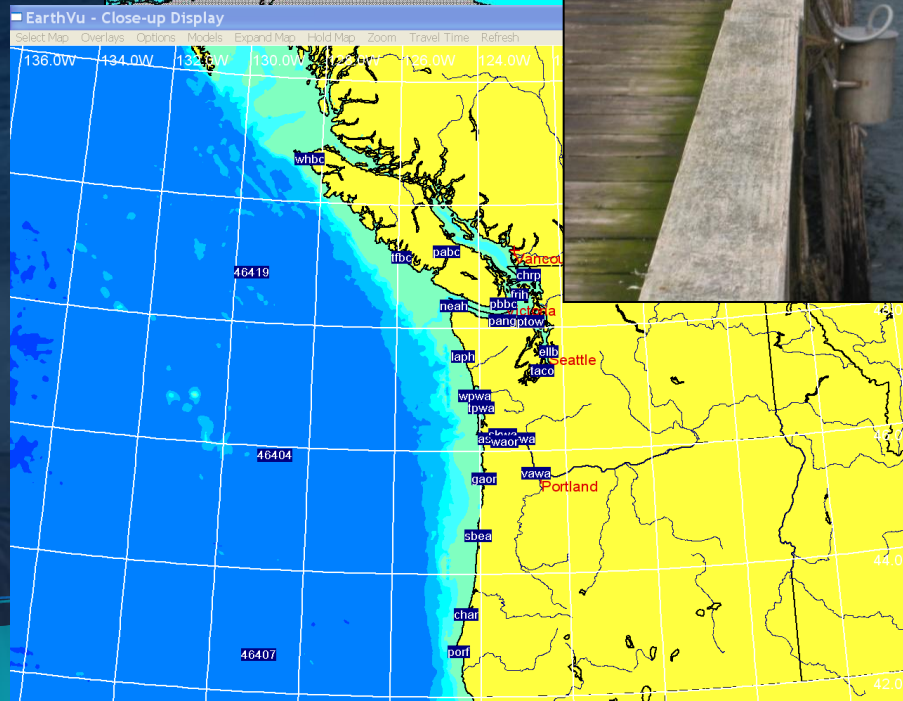
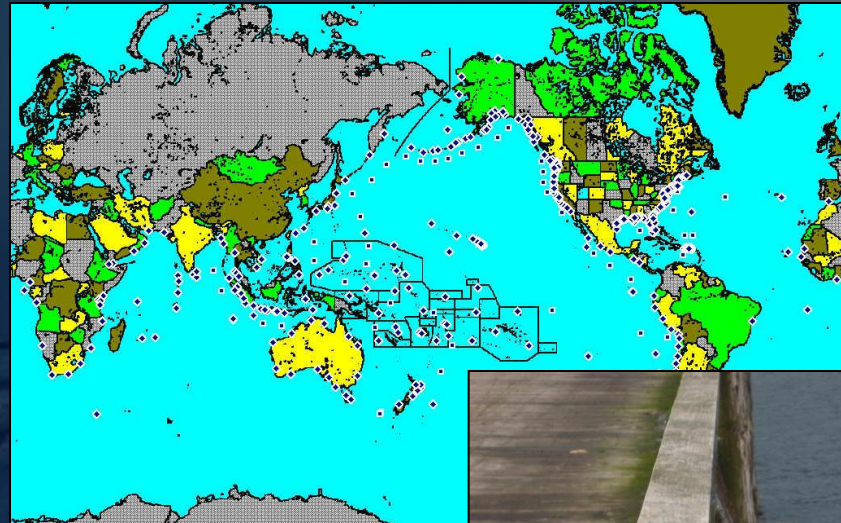
Tsunami Seismic Data

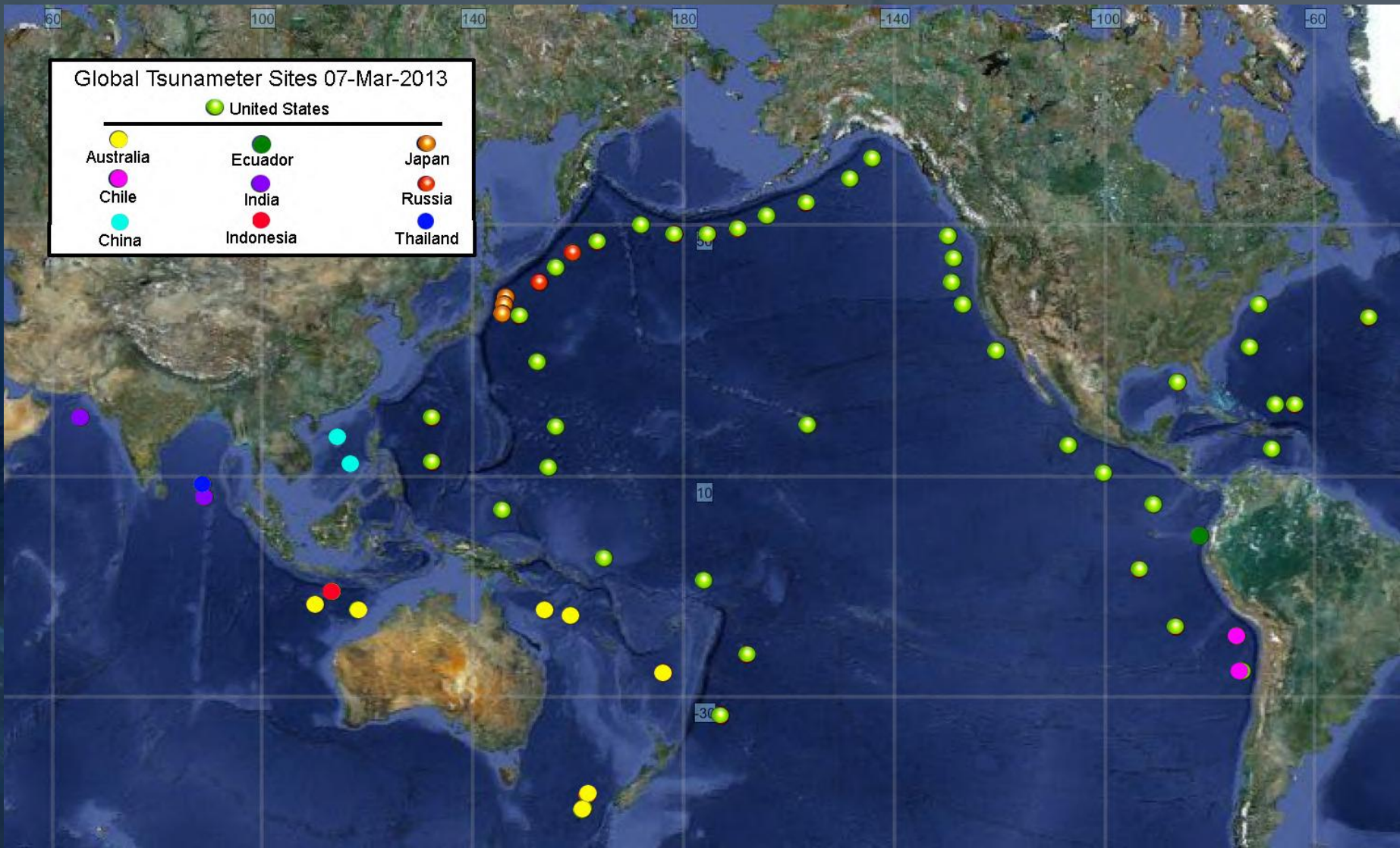
- Seismic Data
 - Virtual network
 - Multiple data paths
 - Redundancy



Tsunami Sea Level Data

- Sea Level
 - Virtual network
 - Satellite data transmission
 - Many formats
 - Many instrument types
 - Coastal tide gages and DART



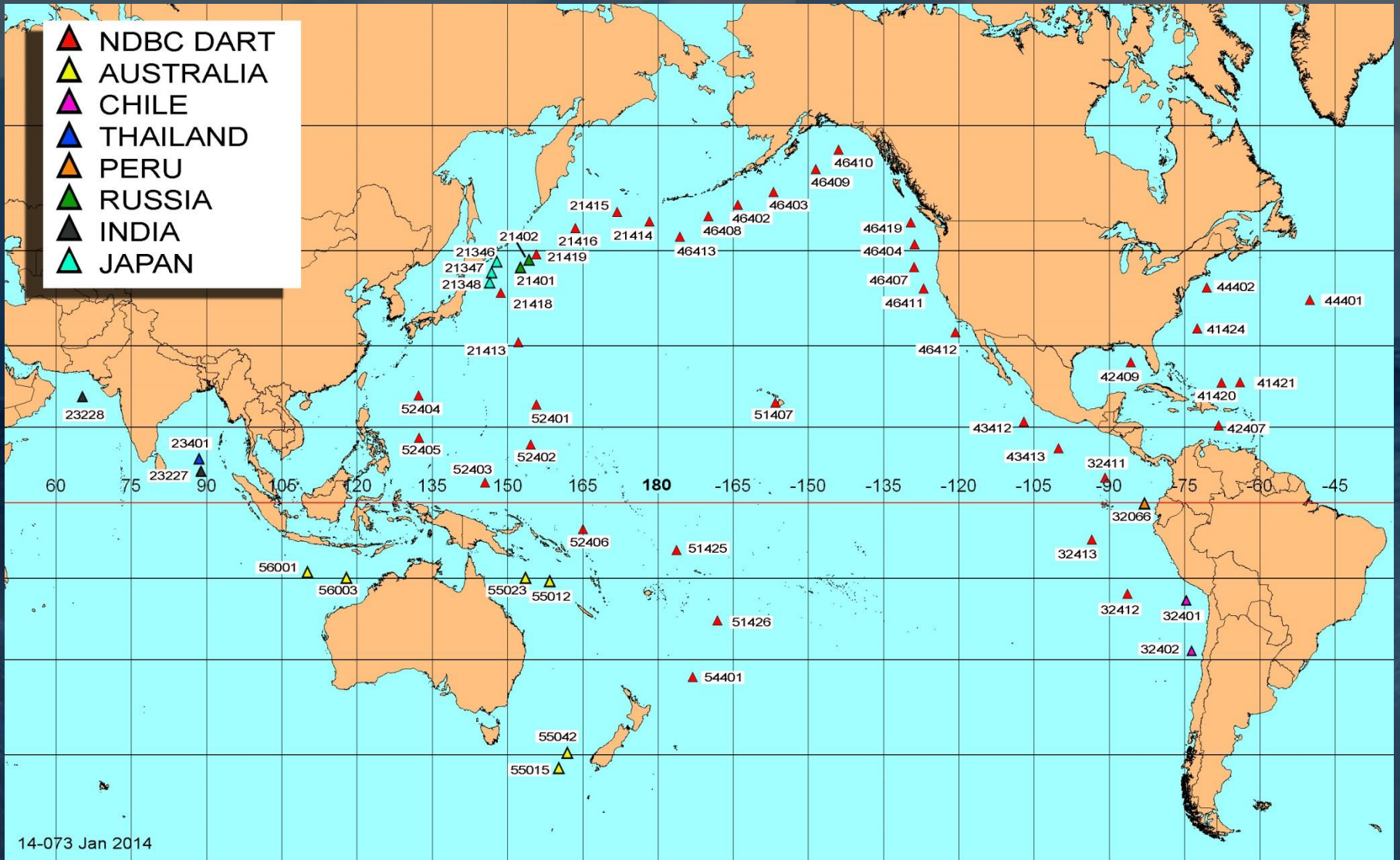


Global Tsunamimeter Sites

Video link: <http://youtu.be/Lo5uH1UJF4A>

DART – Deep-Ocean Assessment and Reporting of Tsunamis – Buoy Network





Video link: <http://youtu.be/4AoEUlcfdoY>

NWS Tsunami Program

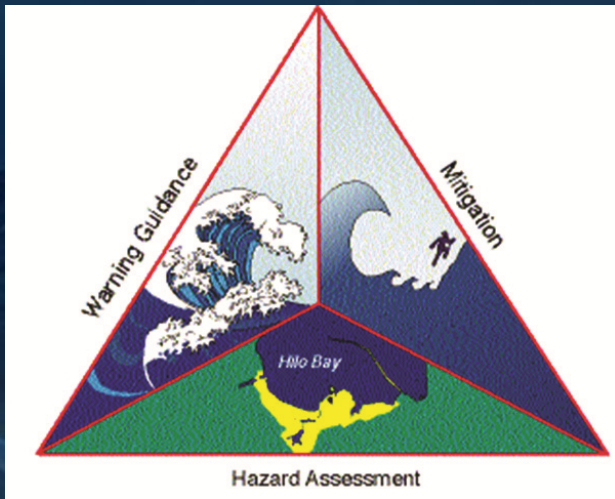
Forecast and Warning

- Pacific Tsunami Warning Center (PTWC)
 - National Tsunami Warning Center (NTWC)
 - DART Buoys—National Data Buoy Center (NDBC)
 - Tide gauges—Center for Operational Oceanographic Products and Services (CO-OPS)
 - Seismic Networks (AK, HI, Caribbean)
 - Pacific Marine Environmental Laboratory (PMEL)—Models/Sensors
 - National Geodetic Data Center (NGDC)—Digital Elevation Maps/archive
- TWCs**
- Observations**
- Research**

Information and Mitigation

- International Tsunami Information Center (ITIC)
 - Caribbean Tsunami Warning Program (CTWP)
 - NWS International Activities (Coordination)
 - National Tsunami Hazard Mitigation Program (NTHMP)
 - NWS Regions/WCMs/TsunamiReady Program
- International**
- Domestic**

National Tsunami Hazard Mitigation Program



- Formed in 1995
- Strengthened in 2006
- NOAA, FEMA, USGS
- 29 States, Territories, and commonwealths

Mapping & Modeling, Mitigation & Education, Warning Coordination



Recognition program to reduce consequences of tsunamis in coastal sites



As of 19 March 2014: 164 sites

- Includes tsunami annex to response plans
- 24/7 notification coverage
- Outreach and education
- Planning and preparedness

Tsunami Preparedness Week

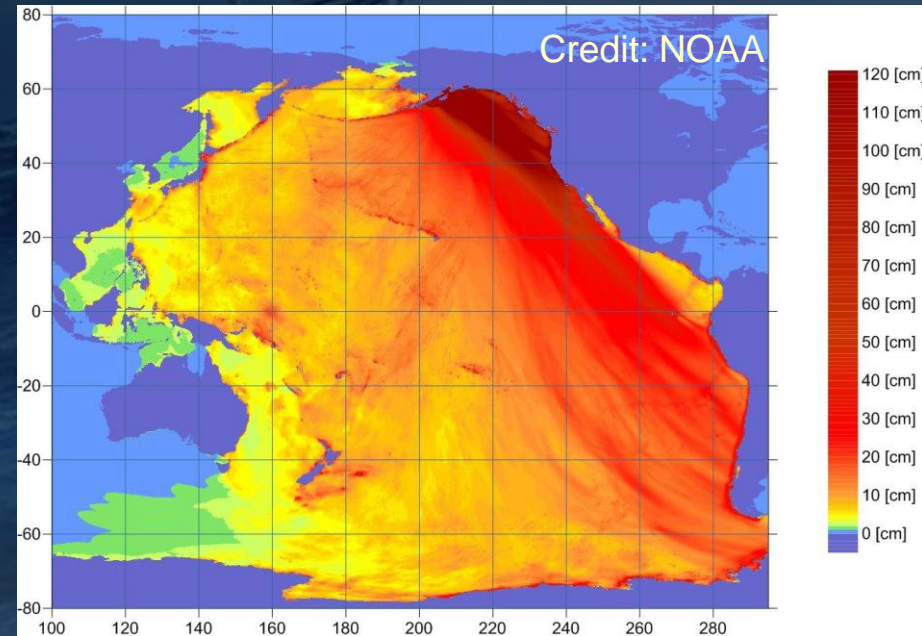
Tsunami Preparedness Week

March 23–29, 2014



1964 Great Alaska Earthquake and Tsunamis

- March 27, 1964, 5:36 pm
- Prince William Sound
- Magnitude 9.2
- Largest earthquake ever recorded in U.S., 2nd largest in world
- Shaking lasted 4+ minutes
- Multiple tsunamis generated by earthquake and associated landslides



Video link: http://youtu.be/m_-PWrx-cSo

1964 Great Alaska Earthquake and Tsunamis (cont'd)


- Valdez, Anchorage, many villages along Alaska coast = significantly damaged or destroyed
- 130+ lives lost (Alaska, Oregon and California)
- Additional damage along west coasts of U.S. and Canada and in Hawaii
- Damage from tsunamis alone = almost \$1 billion (2013 dollars)



Credit: NOAA

Tsunami Preparedness Week

- March 23-29, 2014
- Coordinated with National Tsunami Hazard Mitigation Program Partners
- Tsunami Preparedness Week Planning Team
- Tsunami Preparedness Week Website



The screenshot shows the website for the National Tsunami Hazard Mitigation Program. At the top left is the seal of the U.S. Department of the Interior. The main header reads "National Tsunami Hazard Mitigation Program" with navigation links for Home, About the Program, Partners, Resources, and About Tsunamis. The central banner features the text "Tsunami Preparedness Week March 23-29, 2014" above an illustration of a house on a hill with waves in the foreground. Below the banner are four green buttons with links: "View Ocean Today's Tsunami Awareness Video", "Read/Download Tsunami Awareness and Safety Factsheet", "Listen to/Download Tsunami Public Service Announcements", and "Download Tsunami Zone Brochure". A note states "This is a living site. It will be updated as new information becomes available." Below this, a paragraph mentions the 50th anniversary of the 1964 Great Alaska Earthquake and Tsunamis. The page is organized into sections: "Tsunami Preparedness Week Media" with links to NWS Aware, Tsunami Alerts, and a 1964 Media Webinar; "National Oceanic and Atmospheric Administration"; "National Tsunami Warning Center Activities" with dates for open houses and exercises; and "Caribbean Tsunami Warning Program Activities" with a link to register for a regional exercise.

National Tsunami Hazard Mitigation Program

– Home – About the Program – Partners – Resources – About Tsunamis

Tsunami Preparedness Week
March 23–29, 2014

[View Ocean Today's Tsunami Awareness Video](#)

[Read/Download Tsunami Awareness and Safety Factsheet](#)

[Listen to/Download Tsunami Public Service Announcements](#)

[Download Tsunami Zone Brochure](#)

This is a living site. It will be updated as new information becomes available.

March 27, 2014, marks the 50th anniversary of the [1964 Great Alaska Earthquake and Tsunamis](#).

Tsunami Preparedness Week Media

- NWS Aware - [Tsunami Preparedness Week, March 23-29](#)
- Tsunami Alert - [Multiple Articles](#)
- Remembering 1964: Media Webinar - [Recording](#), [Slides](#)

National Oceanic and Atmospheric Administration

National Tsunami Warning Center Activities

- March 22: Host an [open house](#)
- Lead the [2014 Tsunami Exercises](#): Caribbean/Northwestern Atlantic (CARIBE WAVE/LANTEX14), Gulf of Mexico (LANTEX14), Pacific (PACIFEX14)
- Take part in the 2014 Alaska Shield Earthquake/Tsunami Exercise
- Kick-off the Alaska and Northern California end-to-end communications tests

Caribbean Tsunami Warning Program Activities

- March 28: Help coordinate participation of the Caribbean and adjacent regions in the [regional tsunami exercise](#) (CARIBE WAVE/LANTEX14). Click [here](#) to register.

Tsunami Preparedness Week (cont'd)

The background of the slide features a photograph of a research vessel on the ocean. The vessel is equipped with a large, complex sensor tower or mast structure, likely used for oceanographic or tsunami-related research. The water is dark blue with visible waves, and the sky is overcast. The overall tone is professional and scientific.

- Tsunami Warning Tests
 - Live Code
 - Monthly Tests
- Tsunami Exercises
 - Alaska Shield/Capstone 2014
 - SAFRR - Science Application for Risk Reduction (USGS)
- Tsunami Walks
- Tsunami Preparedness Events
- 1964 Great Alaska Earthquake and Tsunamis Commemorations

Tsunami Preparedness Week (cont'd)

THE NEXT WAVE

Tsunami Walk

Know the Tsunami, Empower Yourself!

2014

Maine Tsunami Awareness

Are you prepared for when disaster hits?

maineprepares.com

50th Anniversary Tsunami Safe Historical Guided Walking Tour
Saturday, March 22nd

Free to the Public - Good for All Ages!

Start Out At the Cultural Center, 1001 Front Street, at 9:00am
Interactive Tsunami Displays • Vendors • Tsunami Safe Handouts
Tsunami Safe Quiz For Fabulous Prizes!

Sign Up For A Guided Downtown 8-Point Tsunami Walking Tour
Convenient Times Throughout the Day: 10:00 • 10:15 • 10:30* & 10:45
Break for Crescent City Harbor Ribbon Cutting Ceremony at 1pm
More Times In Afternoon: 2:00 • 2:15 • 2:30* • 2:45

*ADA accessible riding tour available - sign up at the Cultural Center
Make sure to wear comfortable walking shoes!

Light Rain Contingency: It's Del Norte! We have rain ponchos for you to wear.

Heavy Rain Contingency: We'll stay inside the Cultural Center and give you a 50-minute virtual tour with slideshow at 10:00, 11:00, 12:00, 2:00 & 3:00.

50th Anniversary Crescent City Tsunami Commemorative * 1/14-2014

Tsunami Preparedness

WARNING



- Danger!
- Run for high ground
- Follow emergency instructions

ADVISORY



- Possible dangerous currents
- Move off the beach & stay out of the water

WATCH



- Potential danger
- Stay tuned for more information

INFORMATION STATEMENT



- Relax
- No local danger
- A distant ocean basin may be in danger

Tsunami Preparedness (cont'd)



NOAA Tsunami Links

- Tsunami Warnings: <http://tsunami.gov>
- Tsunami information: <http://tsunami.noaa.gov>
- TsunamiReady:
<http://www.tsunamiready.noaa.gov/>
- Tsunami Preparedness Week:
<http://nthmp.tsunami.gov/tpw/tsunami-preparedness-week.html>
- National Tsunami Hazard Mitigation Program:
<http://nthmp.tsunami.gov/>

Thank You

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