

Linkage to the National Program

Frank González

**Pacific Marine Environmental Laboratory
Seattle, WA**

NOAA is about FORECASTS and WARNINGS

-Hurricanes

Sunspots

Tornadoes

Storm Surge

Flooding

...

Tsunamis

U.S. National Tsunami Hazard Mitigation Program

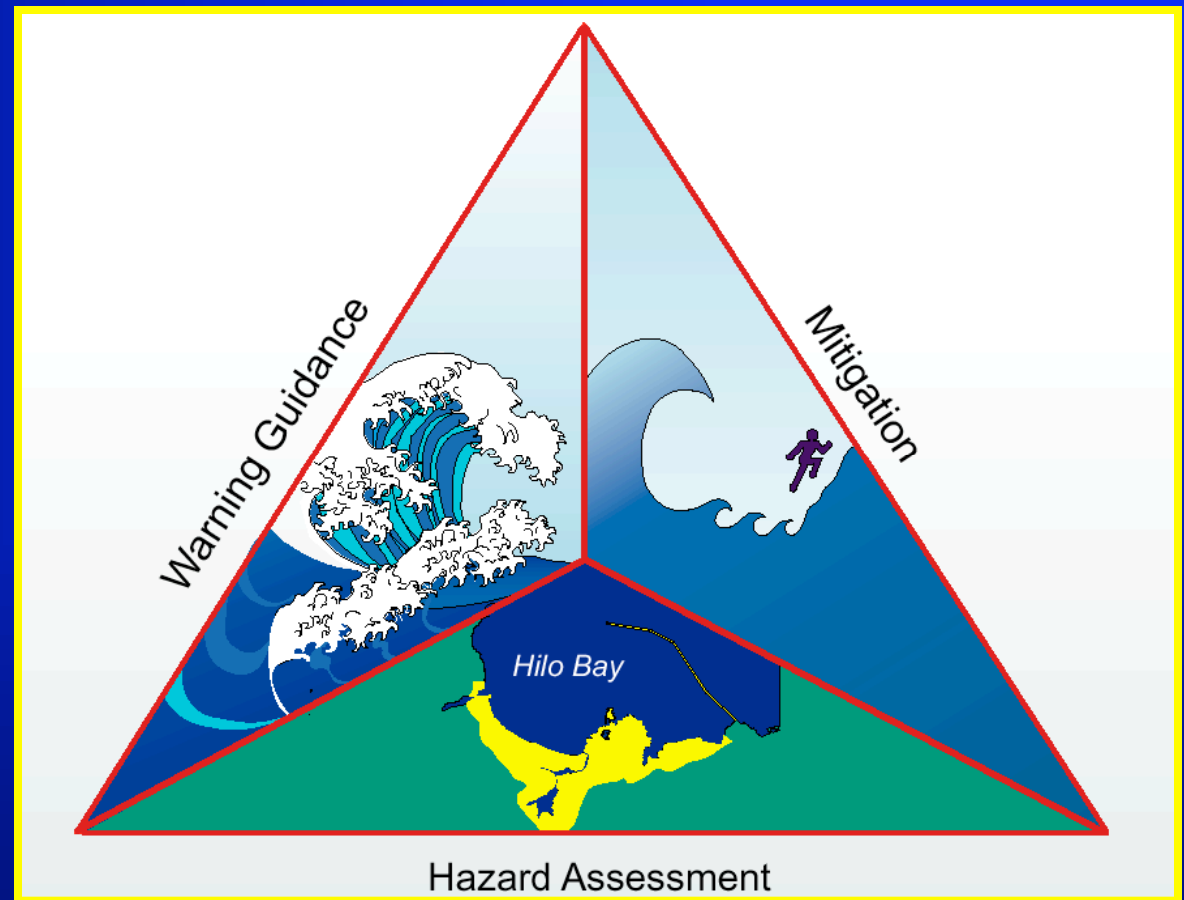
Reduce the Impact of Tsunamis on U.S. Coastal Communities

States

*Alaska California Hawaii
Oregon Washington*

Federal Agencies

- *National Oceanic and Atmospheric Admin.*
- *U.S. Geological Survey*
- *Federal Emergency Management Agency*



NOAA Center for Tsunami Inundation Mapping Efforts

**Pacific Marine Environmental Laboratory
Seattle, WA**



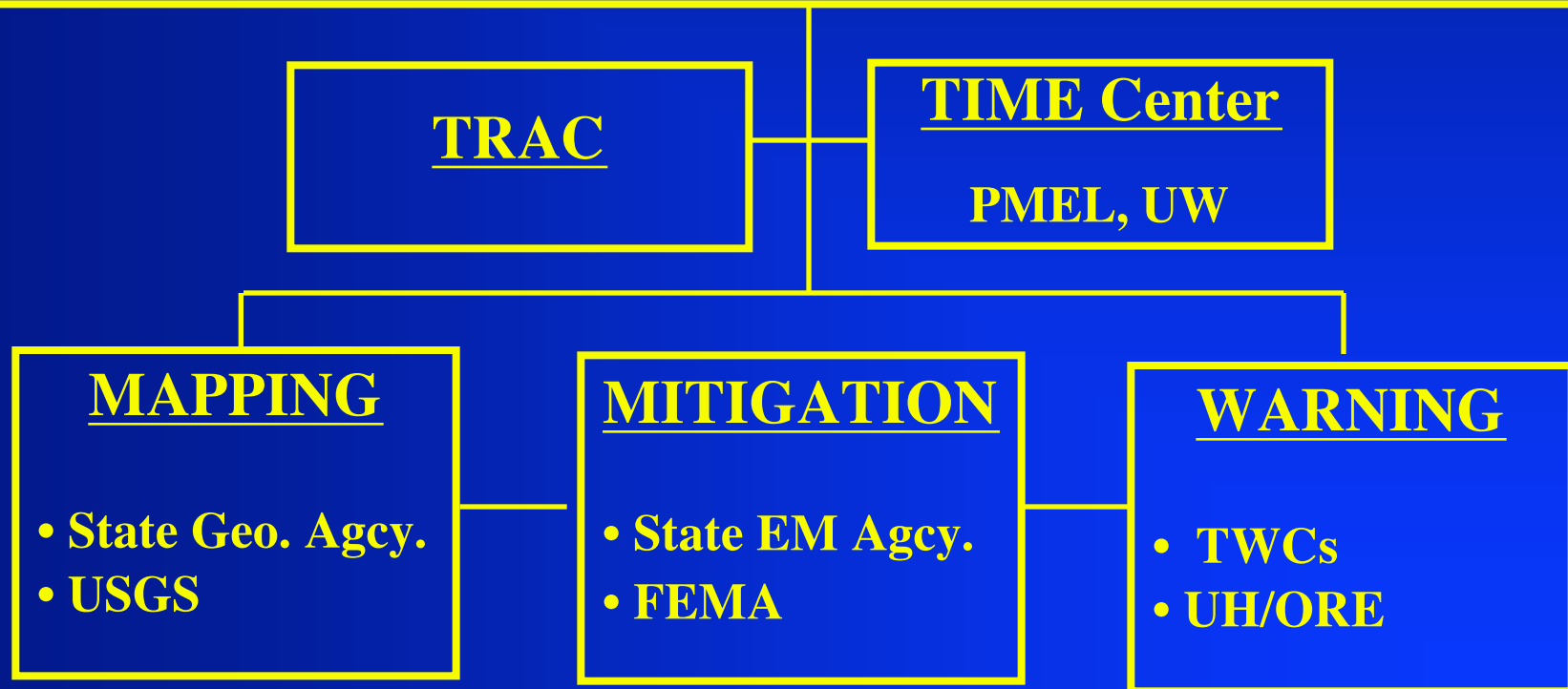
<http://www.pmel.noaa.gov/tsunami/time/>

Frank González, NOAA TIME Center, PMEL, Seattle, WA

NTHMP Structure

STEERING GROUP

- **10 State Reps: 5 EM Agencies, 5 Geoscience Agencies**
- **8 Fed Reps: 2 NOAA/PMEL, 2 NOAA/NWS, 2 USGS, 2 FEMA**

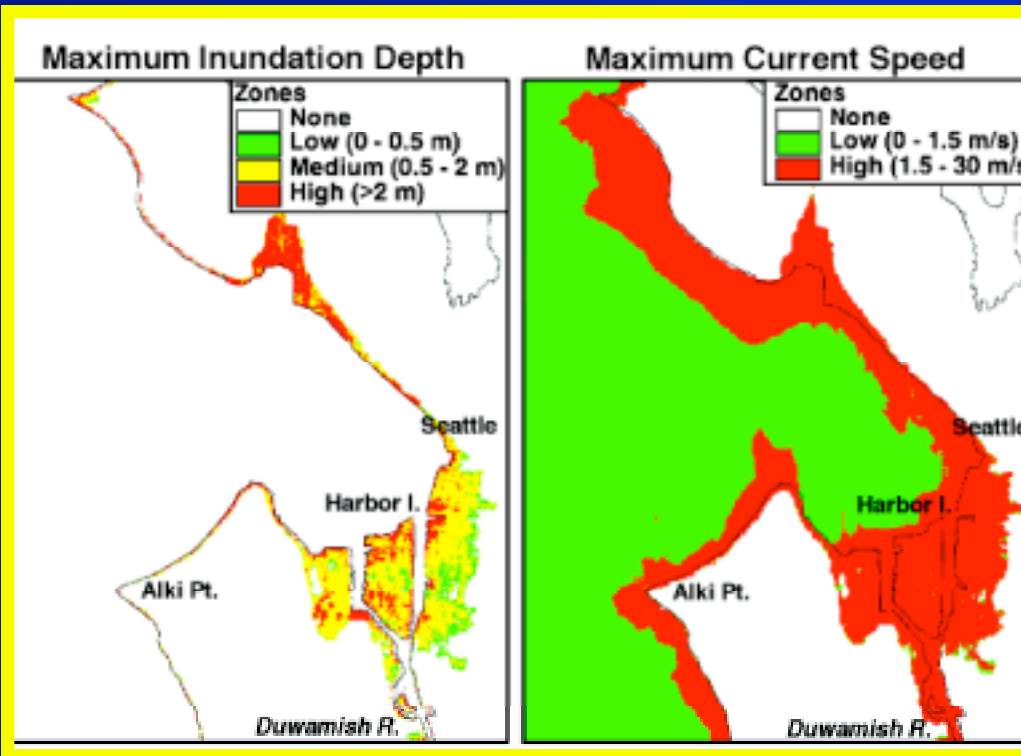
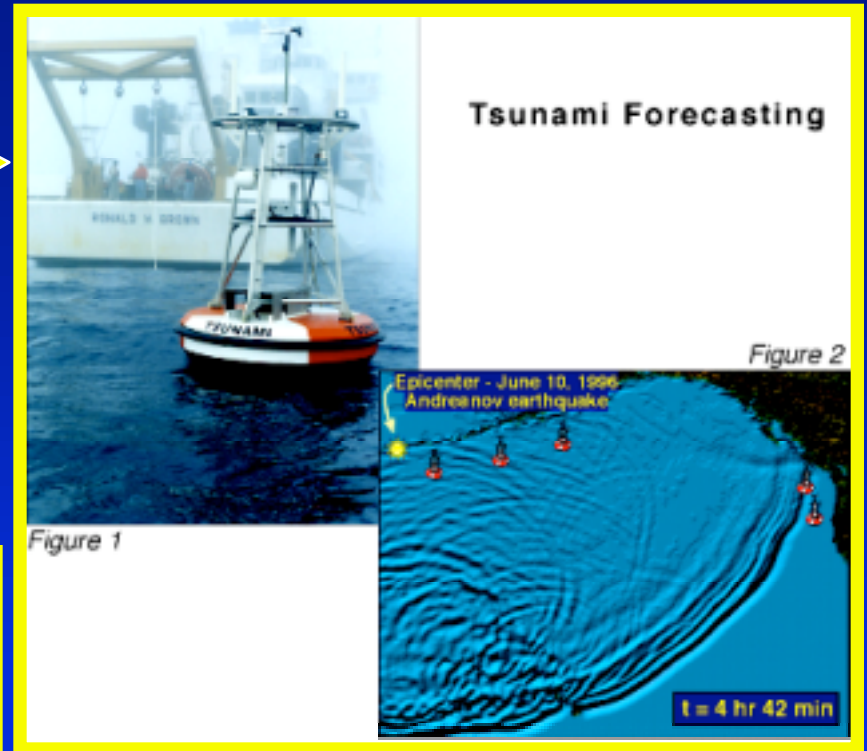


TIME = Tsunami Inundation Mapping Efforts
TRAC = Tsunami Research Advisory Committee

Frank González, NOAA TIME Center, PMEL, Seattle, WA

TSUNAMI FORECASTING:

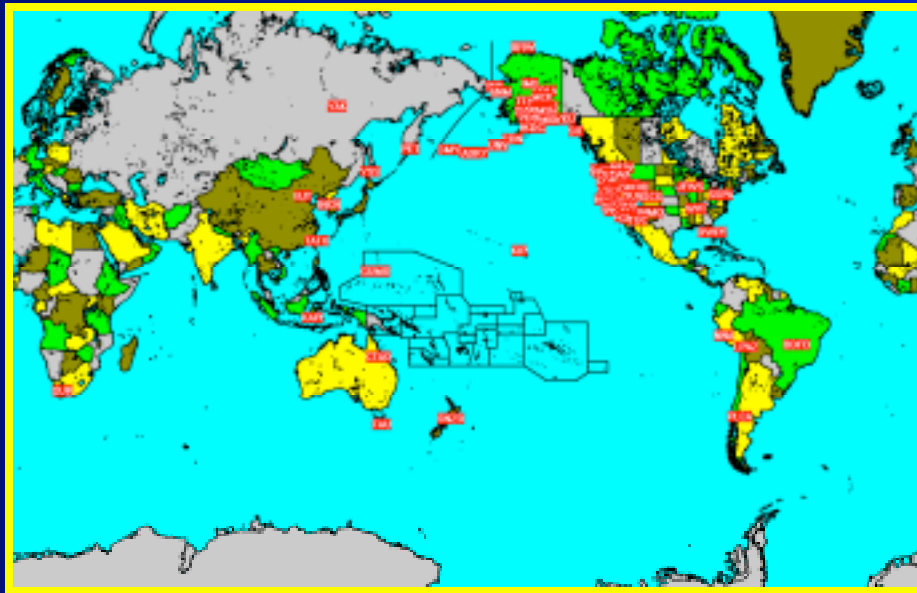
Short-Term →
(Real-time ...
during the event)



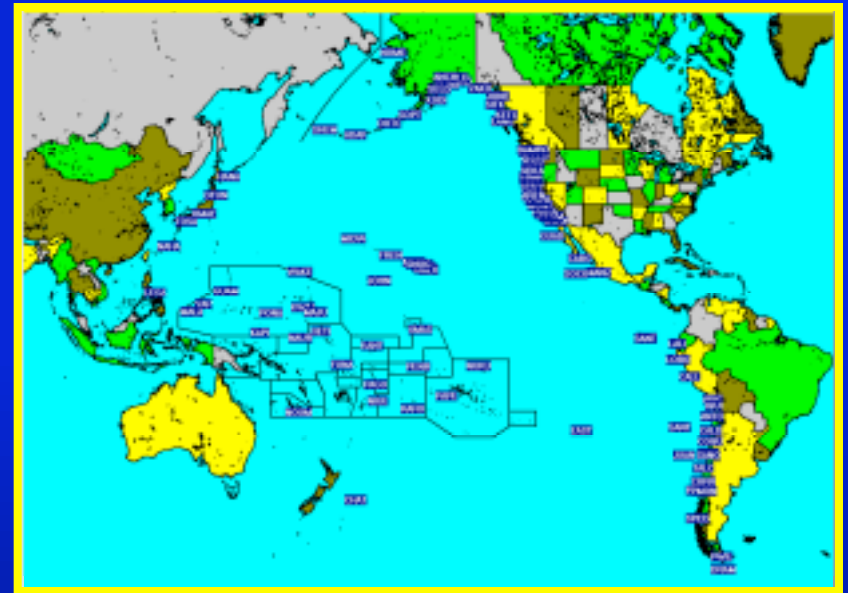
← **Long-Term**
(Community
inundation maps)

Tsunami Warning System Monitoring Networks

Seismic Stations



Tide Gage Stations



Both are ESSENTIAL ... but:

- Seismometers don't measure tsunamis

- Tide gages not between source and communities

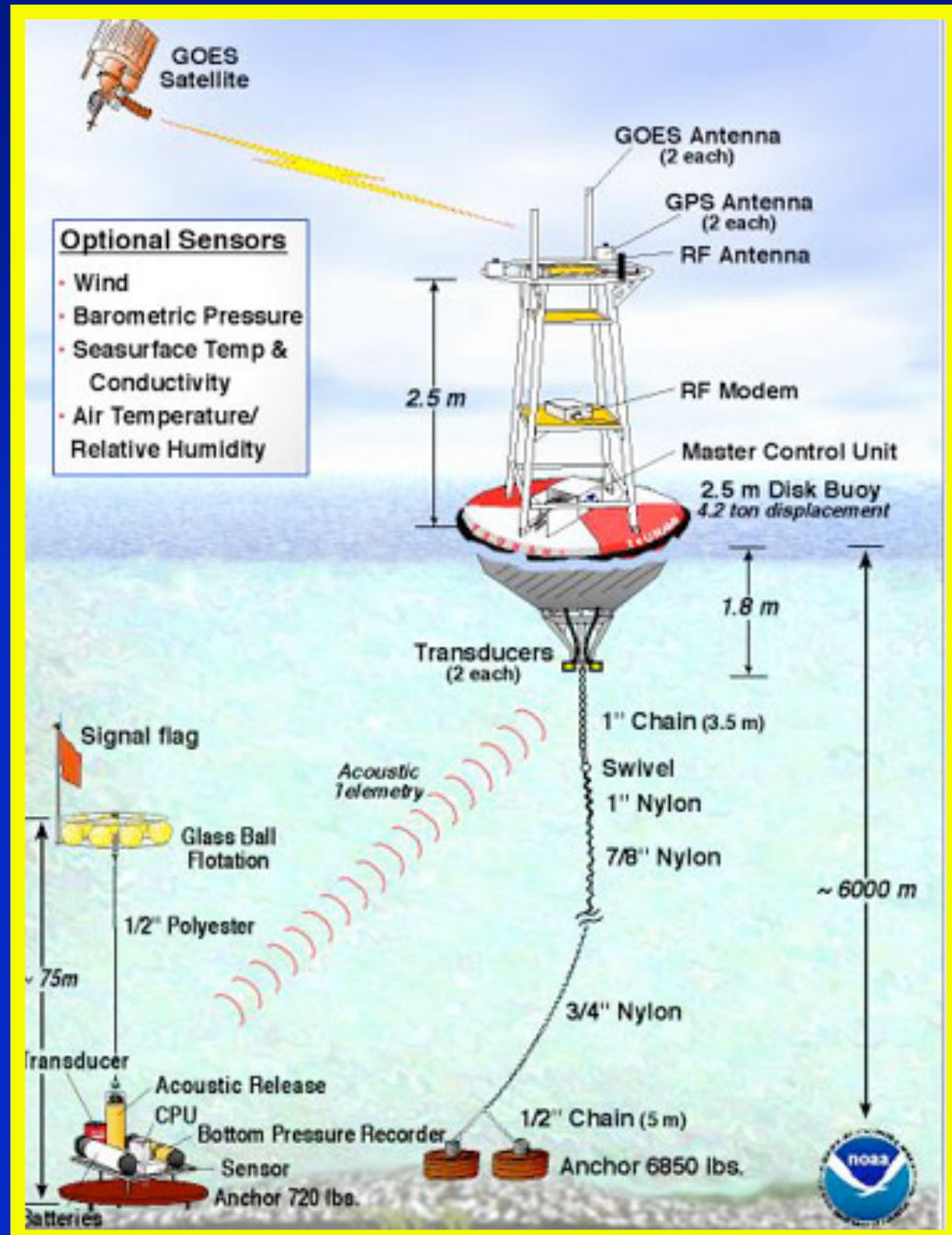
Tsunami Warning System

- **Based on seismic and coastal tide gauge data.**
- **Neither provide direct measurement of tsunami energy propagating to coastal communities**
- **Arrival time only - no wave height, current forecasts**
- **75% False Alarm rate since 1975, because of understandably conservative philosophy.**
- **False Alarms are serious:**
 - a. Injuries or deaths during evacuation**
 - b. Credibility loss can increase future deaths**
 - c. Cost: >\$30M for 7 May 1986 Hawaii evacuation**



DART System Mooring Design and Performance

- Deployment depth to 6 km
- 0.25 mm sensitivity
- 15-s sampling
- 1-yr Buoy Deployment
- 2-yr BPR Deployment
- Data return > 96% since '98
- Real-time data available at www.ndbc.noaa.gov/dart



Deep-ocean Assessment & Reporting of Tsunamis

National Data Buoy Center
Center of Excellence in Marine Technology

Home FAQ Links What's New? Contact Us Search Go

Station ID Search Go

Station List

Observations
Recent
Historical
Obs Search
NOAA Obs
APEX
CSI
DART

Station Status
Maintenance
Platform Status

Ship Observations
VOS Program
Ship Obs Report

About NDBC

Recent Data Historical Data Observations Search NOAA Marine Observations APEX NOAA Coastal Storms Initiative DART

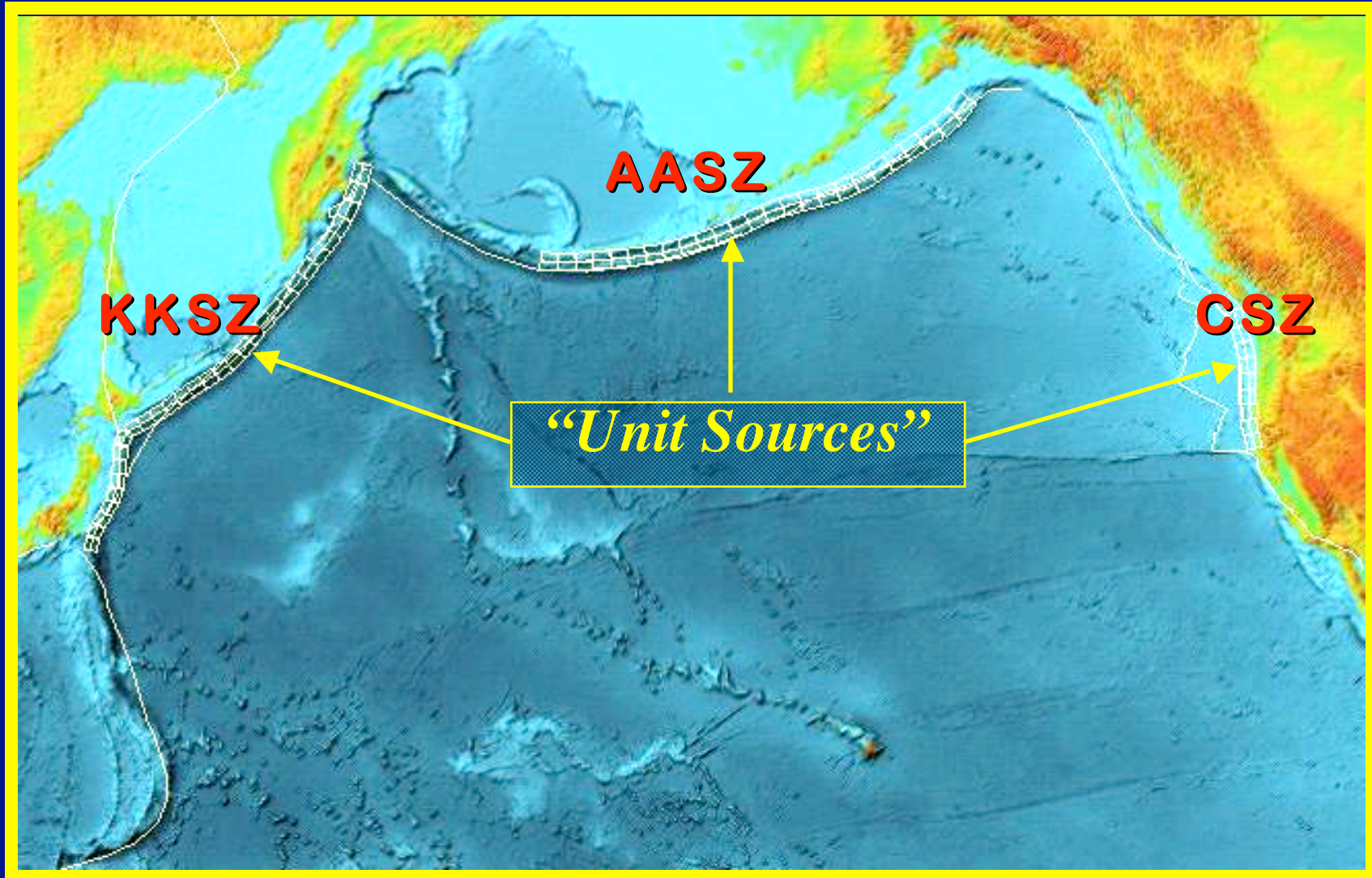
Place pointer on station at left to display corresponding plot below or click on station at left to view station page

Water Column Height at 46401

Time (GMT)	Water Column Height (meters)
07/01 00	5526.8
07/01 06	5527.4
07/01 12	5526.1
07/01 18	5526.9
07/02 00	5527.4
07/02 06	5526.1
07/02 12	5527.3
07/02 18	5526.8
07/03 00	5527.3
07/03 06	5526.1
07/03 12	5527.2
07/03 18	5526.9
07/04 00	5527.2
07/04 06	5526.2
07/04 12	5527.1
07/04 18	5526.9
07/05 00	5527.1
07/05 06	5526.2
07/05 12	5527.1
07/05 18	5526.9
07/06 00	5526.4

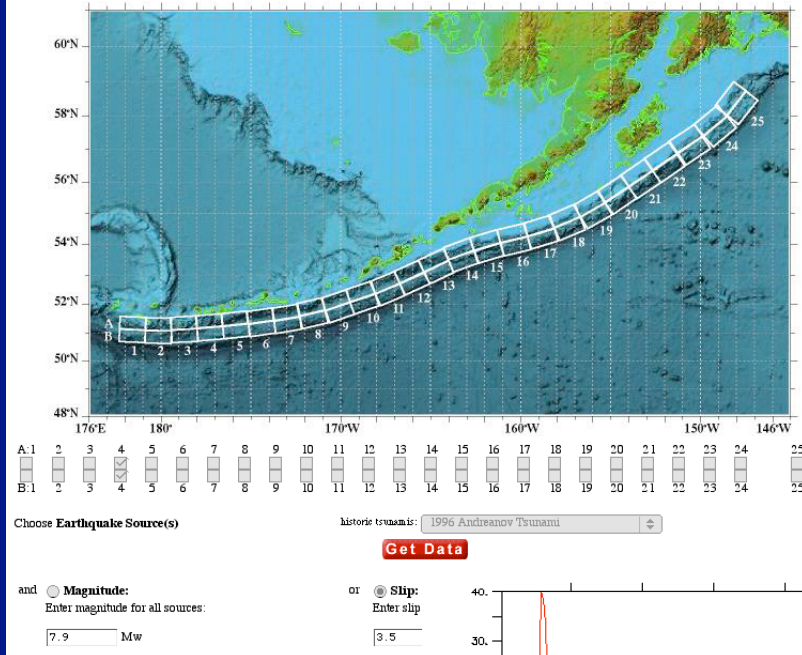
<http://www.ndbc.noaa.gov/dart>

Pre-computed Database of Linear Propagation Solutions



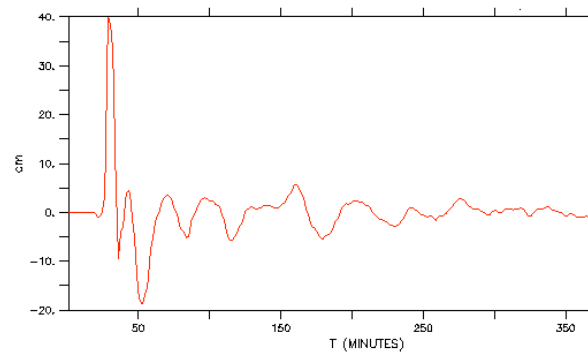
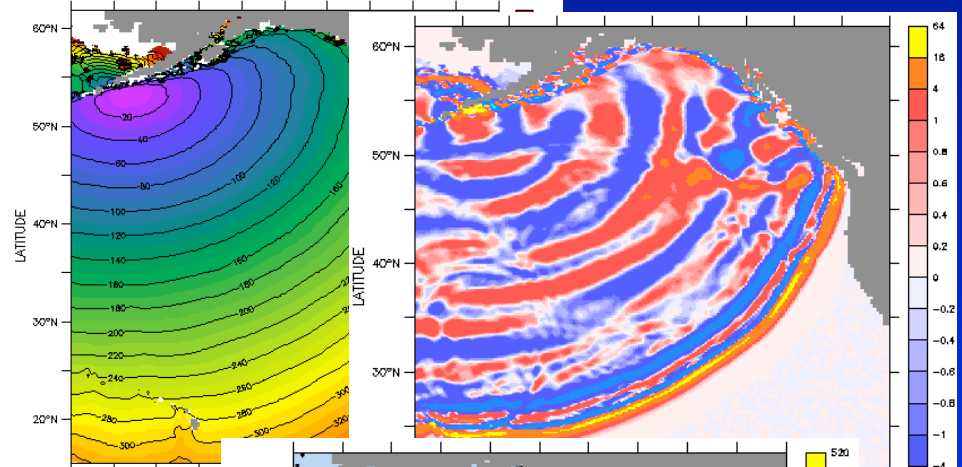
User Interface - Tools and Products

Alaska-Aleutian Subduction Zone Source Parameters

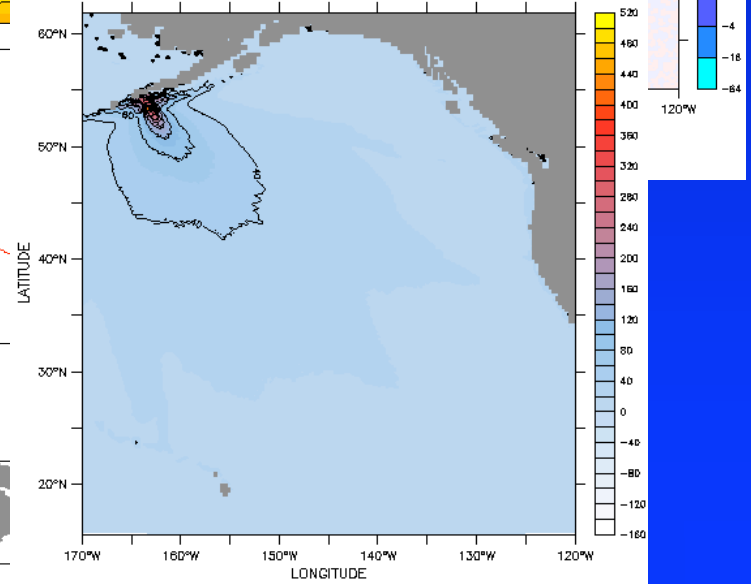
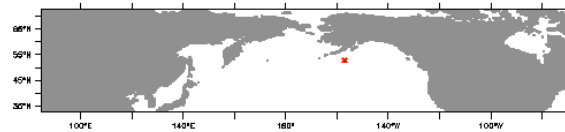


NOAA/PMEL TMAP FERRET Ver 5.22

T (SECONDS) : 30 to 25230
 Vastly propagation model runs
 source list = a14:5 b14:5



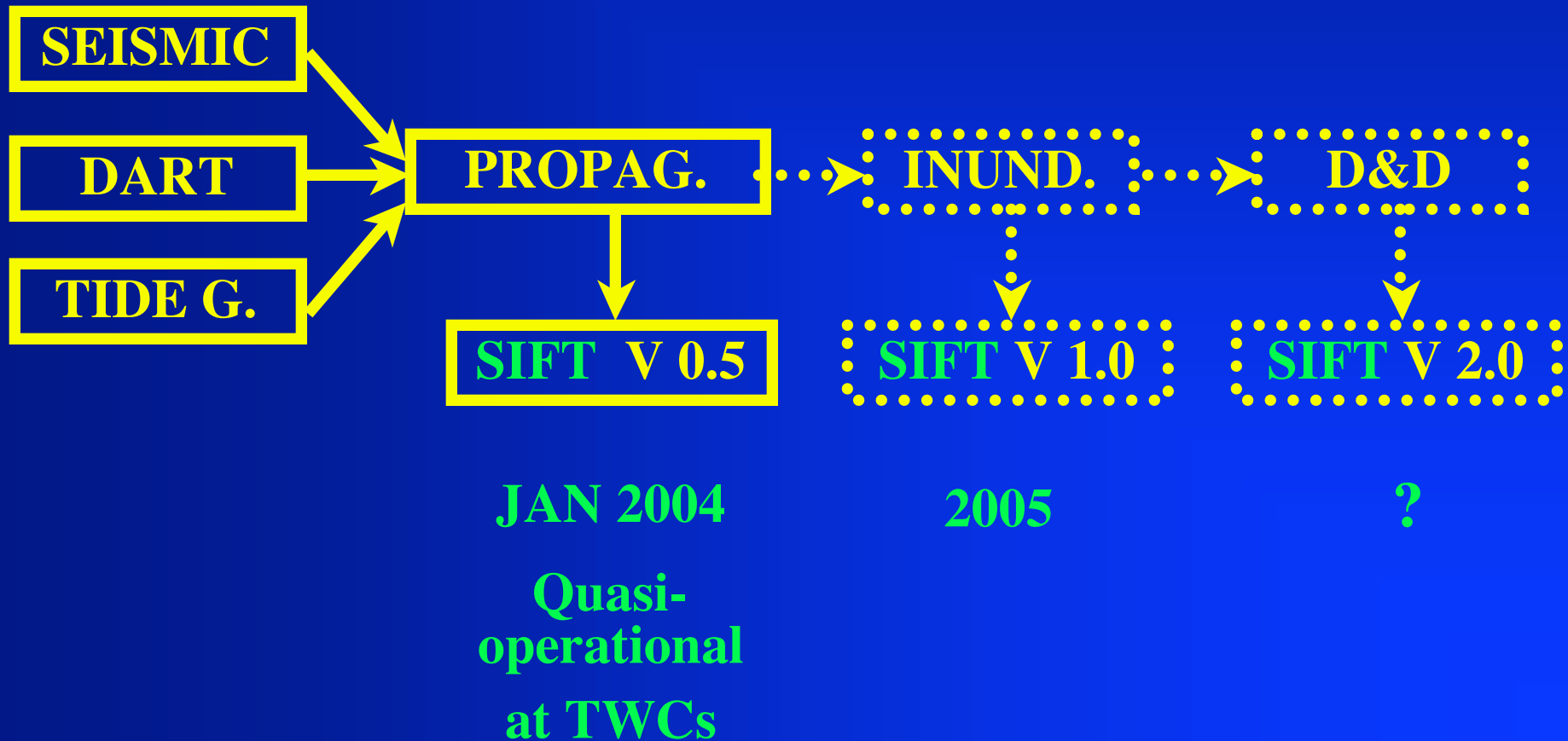
Tsunami Wave Height (cm)



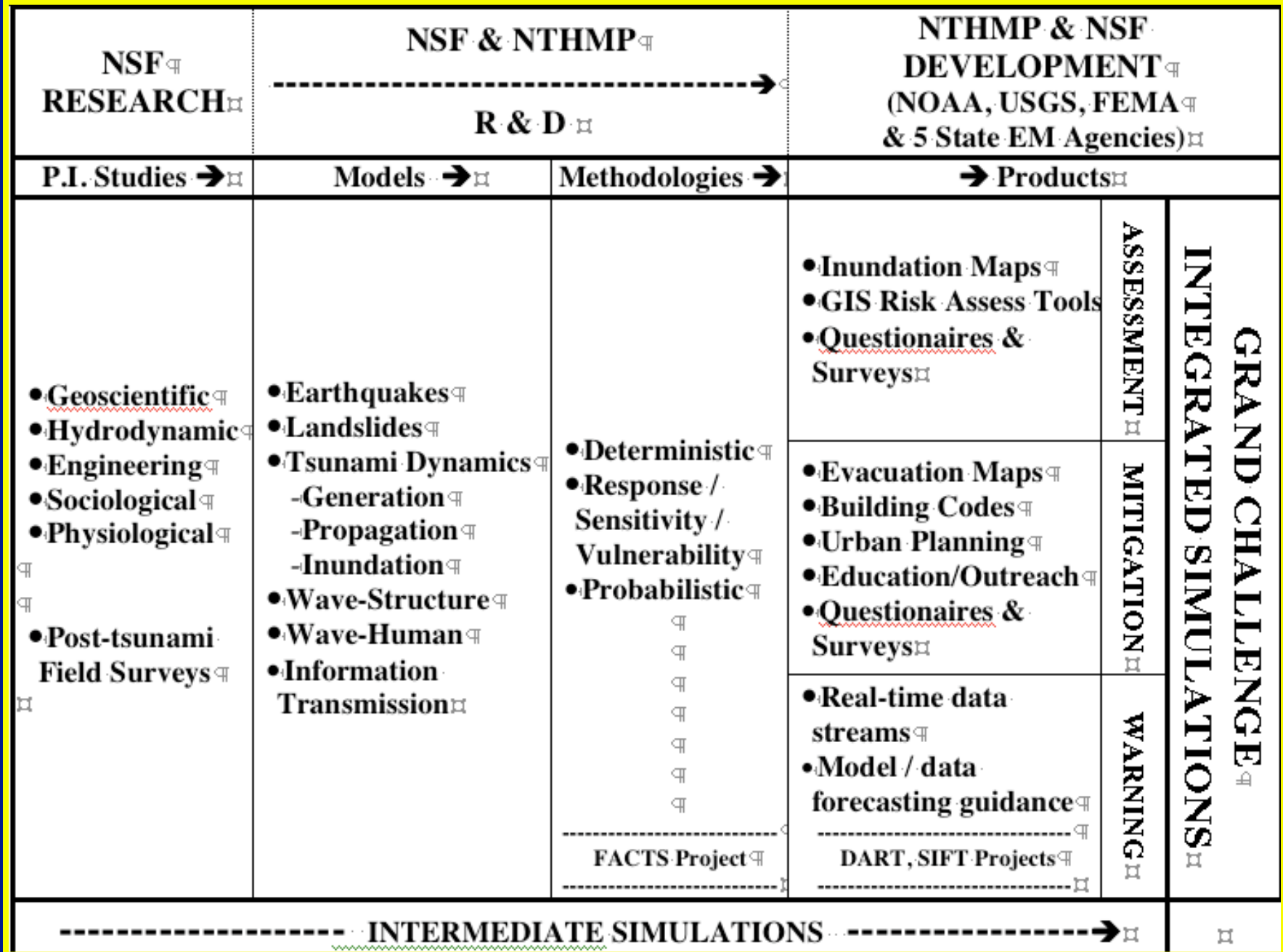
Tsunami Wave Height (cm)

Project SIFT

(Short-term Inundation Forecasting for Tsunamis) Recommended Features: Next-Generation Forecast Tools



NSF-NTHMP R&D Partnership



Summary - Tsunami Forecasting

Current

- N. Pacific Coastal Forecast Tool
- User Interface

Near Future (Jan 04 ?)

- Pacific-wide Coastal Forecast Tool
- Quasi-operational implementation at TWCs

Future (2004 +)

- Community-specific Inundation Forecasts
- Quasi-operational implementation at TWCs

Future (by 2008)

- Expand DART Network from 6 to 10 Stations

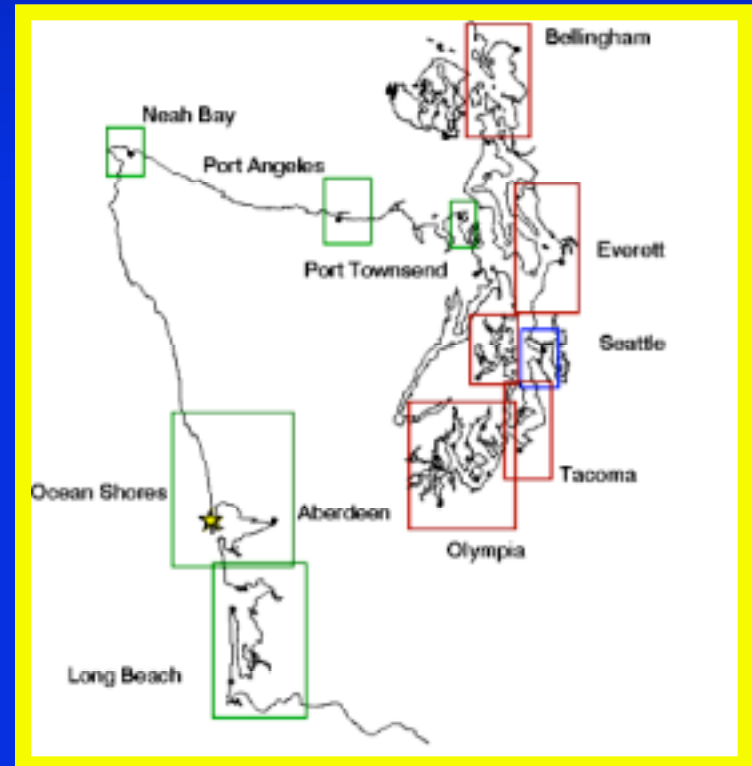
Inundation vs. Evacuation

Inundation Modeling (Modelers - Scientific Product)

- 1) Identify priority communities
- 2) Develop computational grid
 - Finite difference
 - Finite element
- 3) Develop “Credible worst case” scenarios
 - Earthquakes
 - Landslides
 - “Design waves”
- 4) Run model, create quality control products
 - Maps (max height, current, ETA, ...)
 - Animations, time series, ...
- 5) Interpret, analyze, apply QC
 - Reasonableness
 - Past inundation data
- 6) Publish Report and Map

Applications (State - EM Products)

- 7) Develop mitigation tools
 - Evacuation maps
 - Brochures
- 8) Certify Tsunami-Ready Communities



LEVELS OF LINKAGE

Conceptual Level



Organizational Level



Scientific/Technical Level



Crass Financial Level



Summary

- **NEES and U.S. NTHMP R&D**
Interests/Needs are
Complementary/Parallel
- **Needed -- Tech Transfer Linkages**
 - **U.S. NTHMP Tech Transfer**
TIME Center
TRAC
 - **NEES Tech Transfer**
Formal, recognized activity
highly desirable