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

Frank González, NOAA TIME Center, PMEL, Seattle, WA
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)
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
Moorings 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](http://www.ndbc.noaa.gov/dart)
Deep-ocean Assessment & Reporting of Tsunamis

National Data Buoy Center
Center of Excellence in Marine Technology

Station ID Search
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
Dial A Buoy

http://www.ndbc.noaa.gov/dart
Pre-computed Database of Linear Propagation Solutions

"Unit Sources"
User Interface - Tools and Products
Project SIFT
(Short-term Inundation Forecasting for Tsunamis)

Recommended Features: Next-Generation Forecast Tools

SEISMIC
DART
TIDE G.

PROPAG.

SIFT V 0.5

INUND.

SIFT V 1.0

D&D

SIFT V 2.0

JAN 2004
Quasi-operational at TWCs

2005

?
### NSF-NTHMP R&D Partnership

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**ASSESSMENT**

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**INTERMEDIATE SIMULATIONS**
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
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

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

Inundation vs. Evacuation

Inundation Modeling
(Modelers - Scientific Product)

Applications
(State - EM Products)
LEVELS OF LINKAGE

Conceptual Level

RESEARCH ↔ TECH TRANSFER ↔ OPERATIONS

Organizational Level

NEES ↔ NEES and NOAA ↔ NOAA

Scientific/Technical Level

PEOPLE ↔ PEOPLE ↔ PEOPLE

Cross 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