NOAA TIME Center
Tsunami   r&D

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Pacific Marine Environmental Laboratory
Seattle, WA

2nd Tsunami Simulation Workshop
San Francisco, CA
29-30 October 2004

NOAA is about FORECASTS and WARNINGS

-**Hurricanes**

Sunspots

Tornadoes

Storm Surge

Flooding

…

Tsunamis

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

U.S. National Tsunami Hazard Mitigation Program
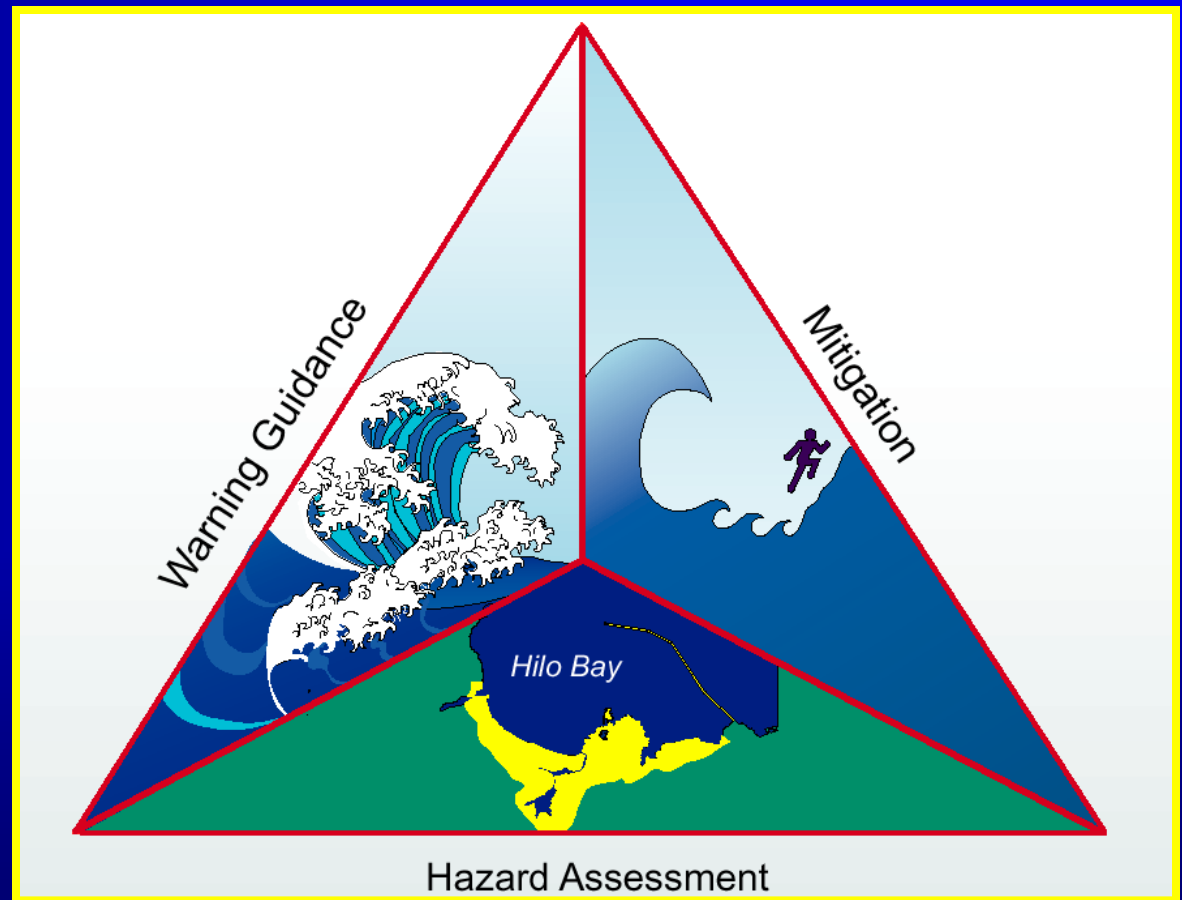
Reduce the Impact of Tsunamis on U.S. Coastal Communities

States

Alaska   California   Hawaii   Oregon   Washington

Federal Agencies

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

Warning Guidance

Mitigation

Hilo Bay

Hazard Assessment

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

NOAA Center for Tsunami Inundation Mapping Efforts

"**Track Research and Transfer Technology based on** Best Available Science **and** Implement Applications **to establish** Operational Capabilities"

Clients:
- State EM & Geotech Agencies
- State Modelers
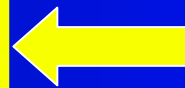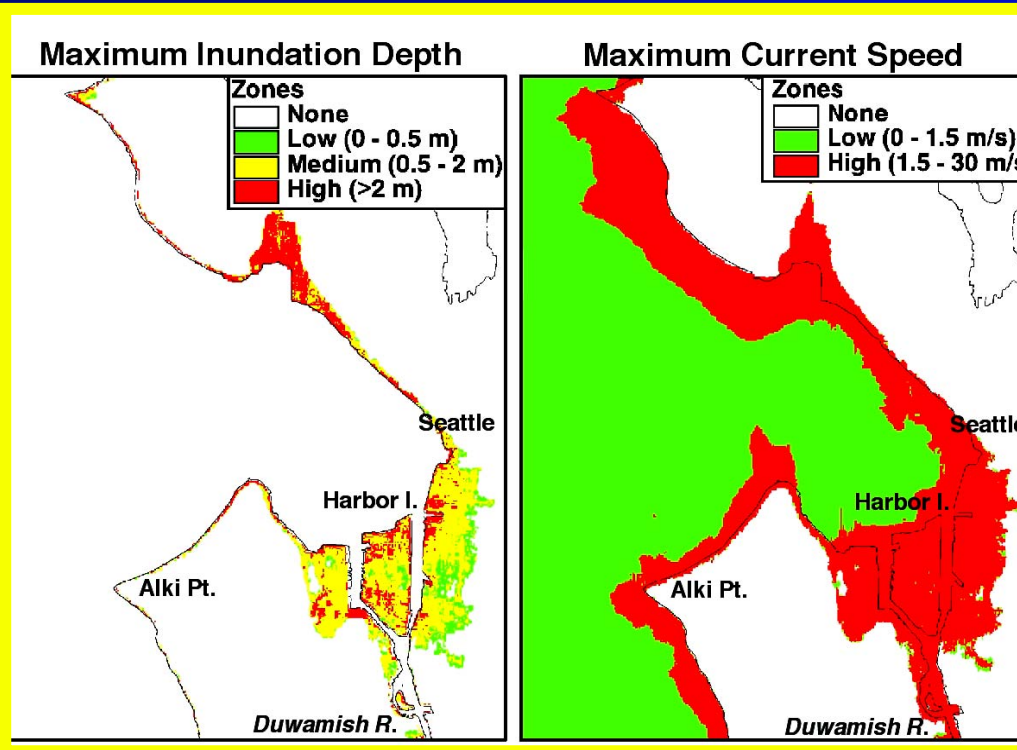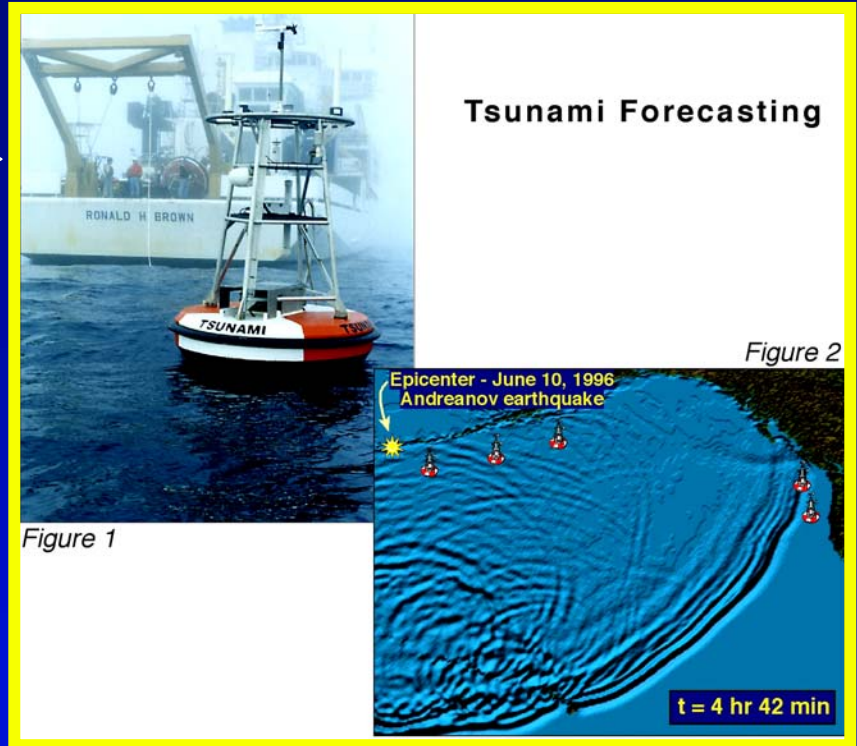- NOAA (Tsunami Warning Centers)

Collaborators:
- NOAA (NOS, PTWC, WCATWC, CSC, …)
- USGS
- Academia (UH, USC, AGI, …)
- International academics and agencies

TSUNAMI FORECASTING:

Short-Term
(Real-time …
during the event)

Tsunami Forecasting

RONALD H BROWN

TSUNAMI

Figure 2

Epicenter - June 10, 1996
Andreanov earthquake

Figure 1

t = 4 hr 42 min

Maximum Inundation Depth

Zones
None
Low (0 - 0.5 m)
Medium (0.5 - 2 m)
High (>2 m)

Seattle

Harbor I.

Alki Pt.

Duwamish R.

Maximum Current Speed

Zones
None
Low (0 - 1.5 m/s)
High (1.5 - 30 m/s)

Seattle

Harbor I.

Alki Pt.

Duwamish R.

Long-Term
(Community
inundation maps)

Scientific Product: MOST Model Output

Maximum Inundation Depth Zones
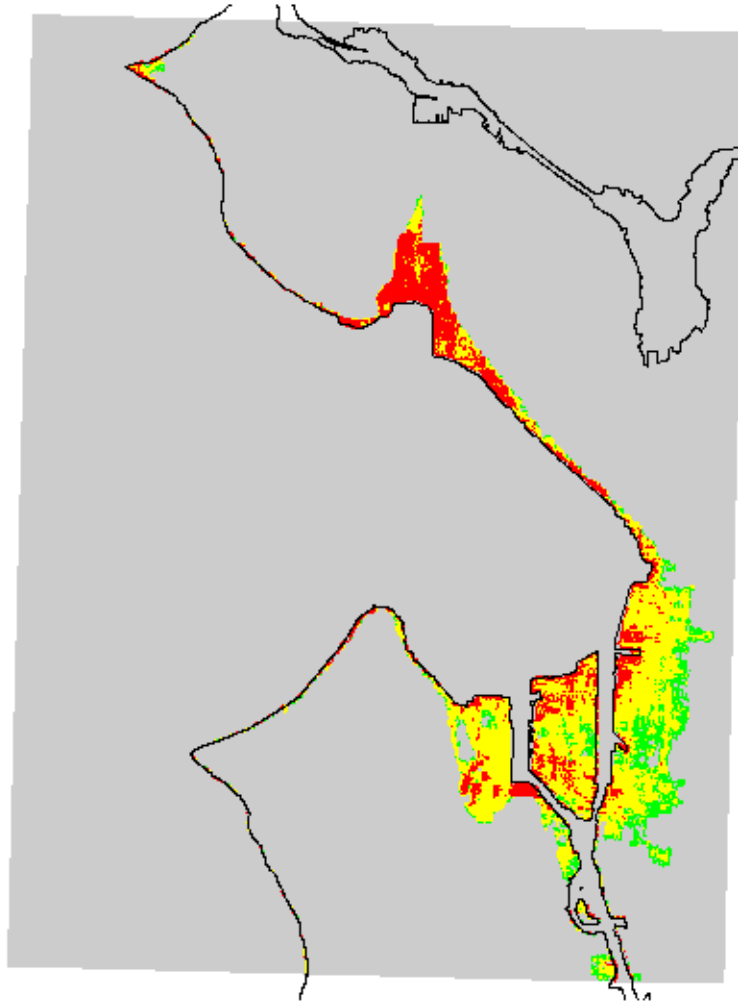
Zones
- None
- Low (0 - 0.5 m)
- Medium (0.5 - 2 m)
- High (>2 m)

Projection: State Plane Coordinate System
Zone: 5626 (Washington South)
XY Units: feet
Horizontal Datum: NAD27
Vertical Datum: Mean High Water

3000   0   3000   6000   9000 Meters

2002 Seattle Tsunami Inundation Modeling Project

NOAA TIME Center
Pacific Marine Environmental Laboratory
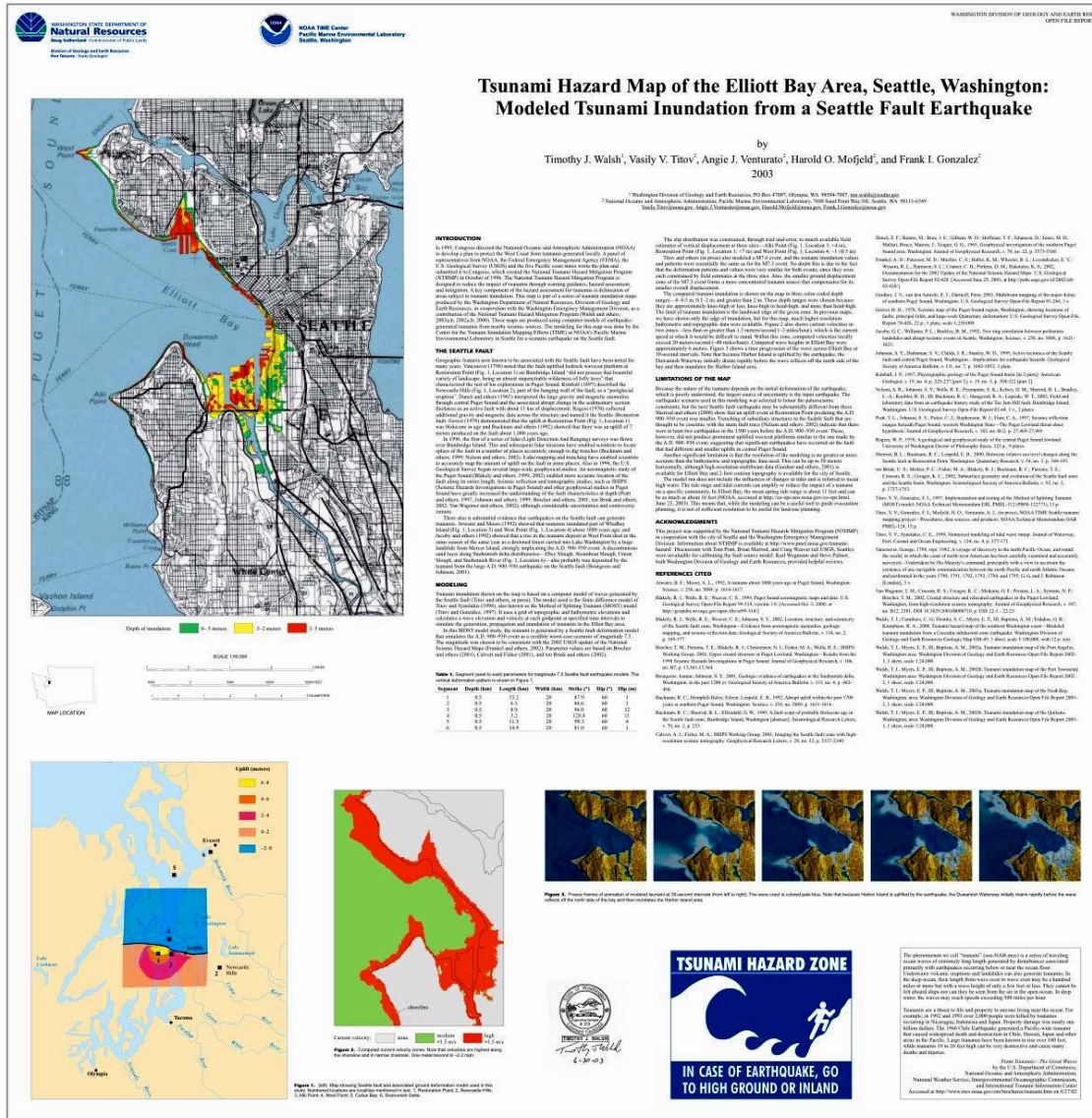Seattle, Washington   13

Scientific Products
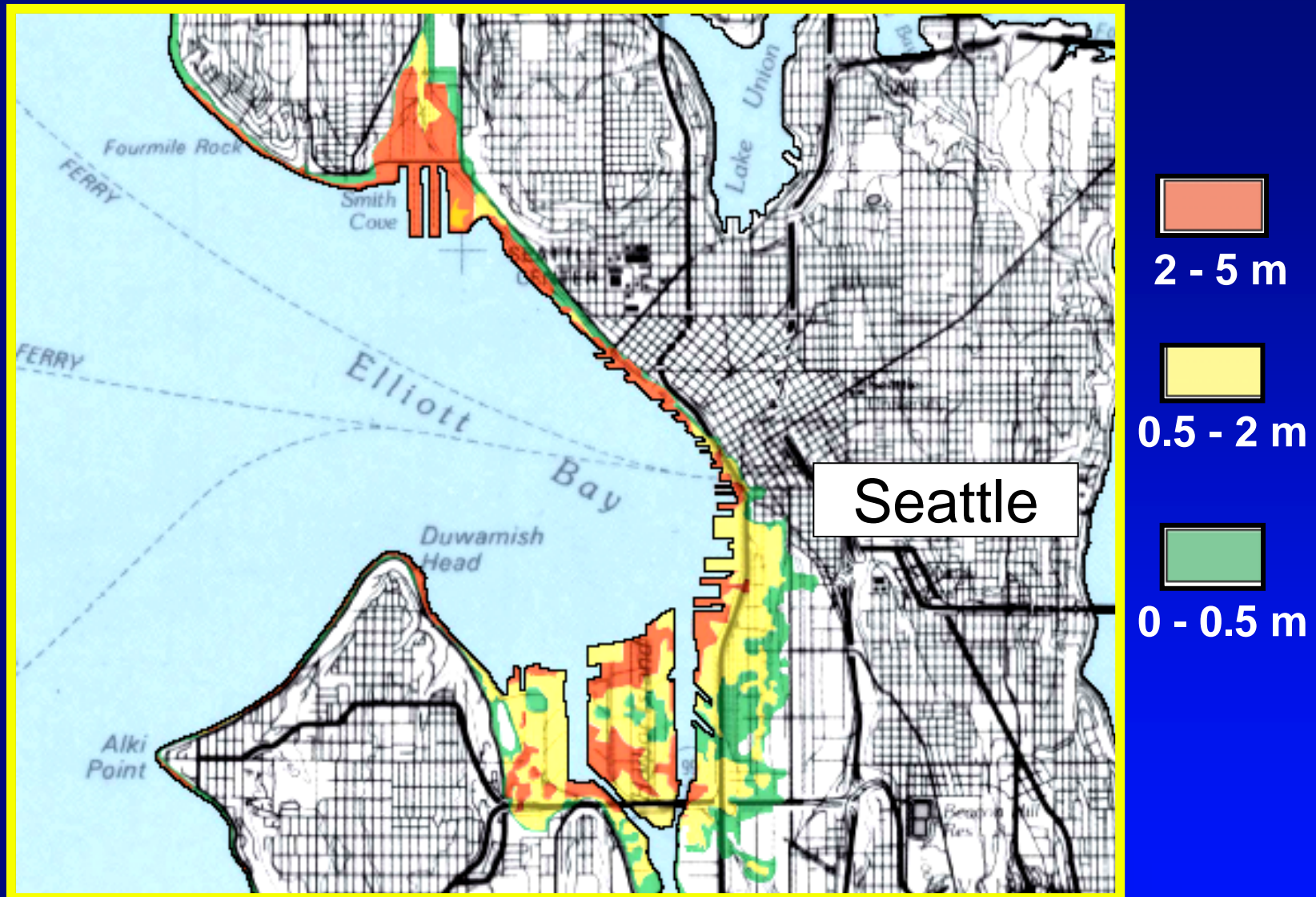# NOAA TIME Center Delivers to WA EMD

Table B1: Product summary.

Item	Name	Filename	Type	Image	Metadata	Resolution (m)
0	(a) Model Output	seattle.qt	Quick-Time			
	(b) Animation					
	(c) Documentation					
1	Shoreline	shore_orig	vector	shore_orig.gif	shore_orig_meta	various
2	Pierless Shoreline	shoreline	vector	shoreline.gif	shoreline_meta	various
3	DEM (30 m res.)	seattle30	raster	seattle30.gif	seattle30_meta	30
4	DEM (90 m res.)	seattle90	raster	seattle90.gif	seattle90_meta	90
5	DEM with Source Deformation (30 m res.)	def30	raster	def30.gif	def30_meta	30
6	DEM with Source Deformation (90 m res.)	def90	raster	def90.gif	def90_meta	90
7	Source Deformation (30 m res.)	src30	raster	src30.gif	src30_meta	30
8	Source Deformation (90 m res.)	src90	raster	src90.gif	src90_meta	90
9	Maximum Wave Heights	maxh	raster	maxh.gif	maxh_meta	30
10	Maximum Inundation Depths	maxd	raster	maxd.gif	maxd_meta	30
11	Maximum Current Speeds	maxv	raster	maxv.gif	maxv_meta	30
12	Maximum Inundation Depth Lines	inundation	vector	inundation.gif	inundation_meta	30
13	Maximum Inundation Depth Zones	maxd	raster	maxd_zones.gif	maxd_meta	30
14	Maximum Current Speed Zones	maxv	raster	maxh_zones.gif	maxv_meta	30

Titov, V.V., F.I. González, H.O. Mofjeld, and A.J. Venturato (2003): NOAA TIME Seattle Tsunami Mapping Project: Procedures, data sources, and products. NOAA Tech. Memo. OAR PMEL [In review].

State Products & Publications

Tsunami Hazard Map of the Elliott Bay Area, Seattle, Washington: Modeled Tsunami Inundation from a Seattle Fault Earthquake

State Products & Publications

Legend:
- 2 - 5 m
- 0.5 - 2 m
- 0 - 0.5 m

Seattle

Walsh, T.J., V.V. Titov, A.J. Venturato, H.O. Mofjeld, and F.I. González (2003): Tsunami hazard map of the Elliott Bay area, Seattle, Washington—Modeled tsunami inundation from a Seattle fault earthquake, by 1 plate, scale 1:50,000.
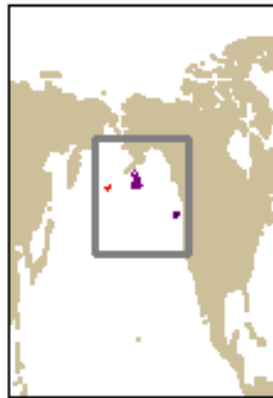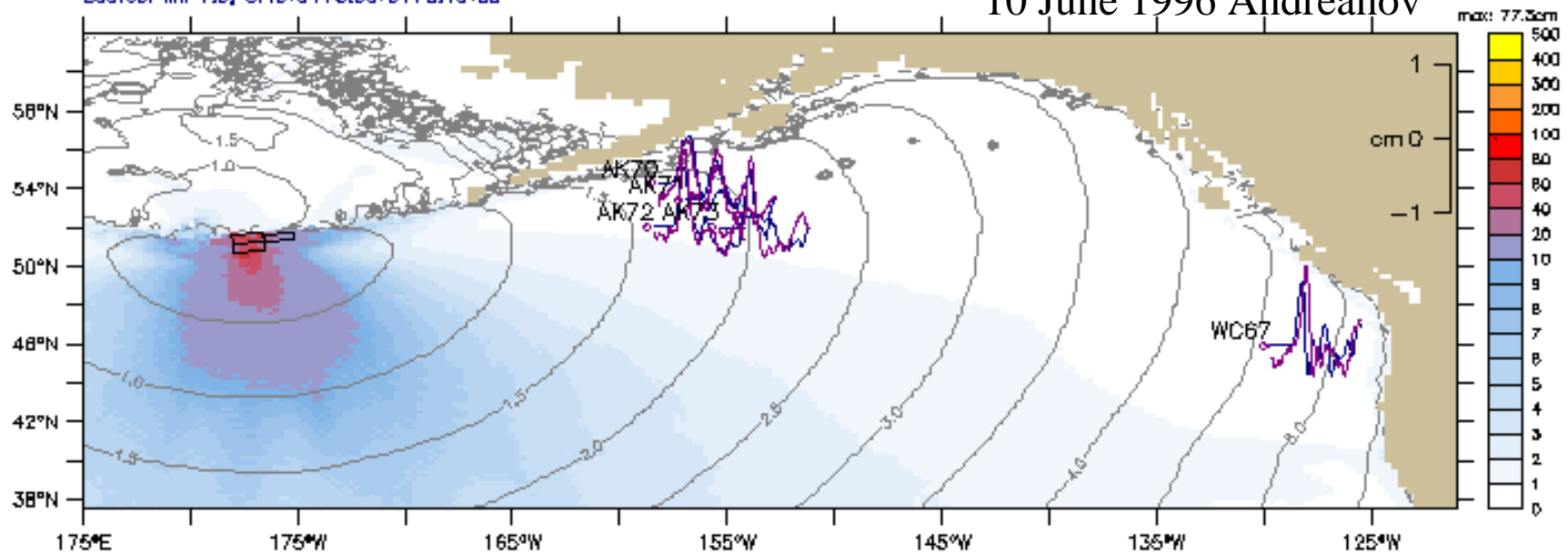
Willapa Bay, WA Evacuation Map

Willapa Bay Evacuation Map
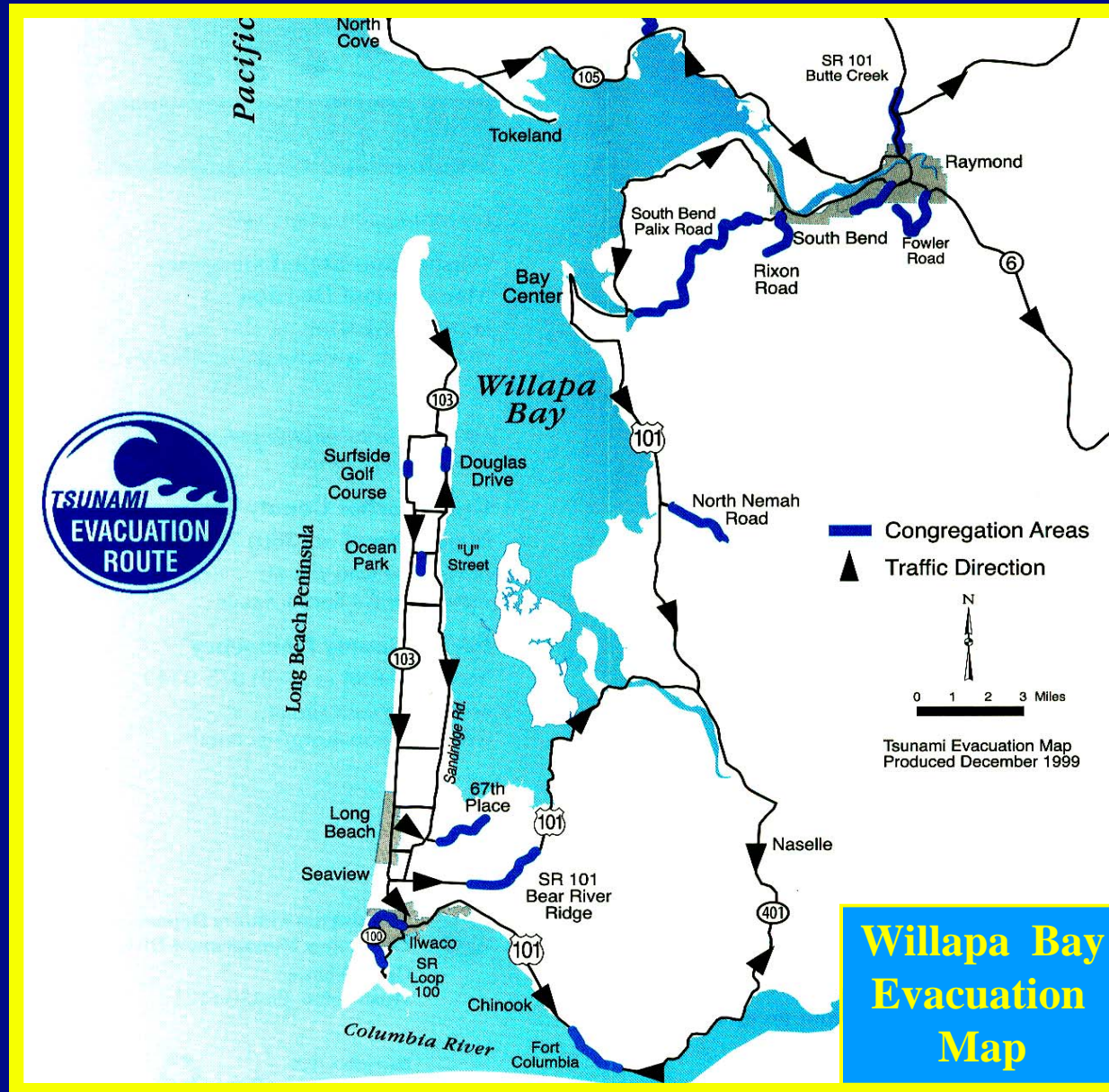
Inversion: **Force the Model to Match the Data**

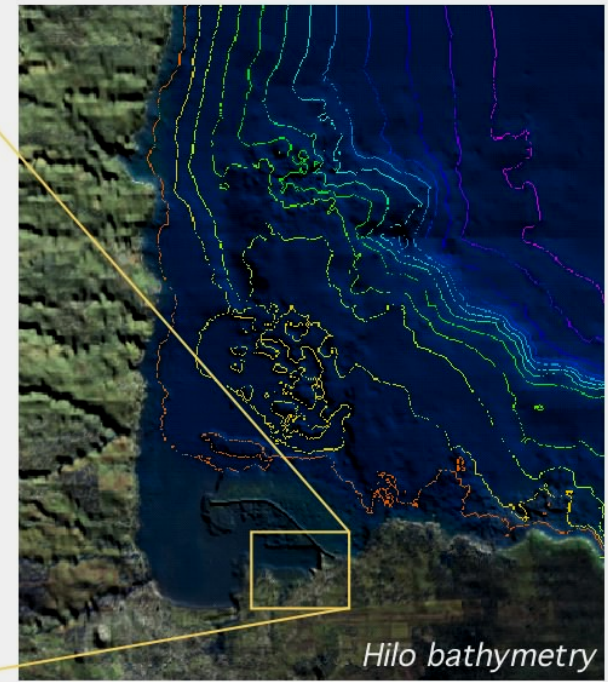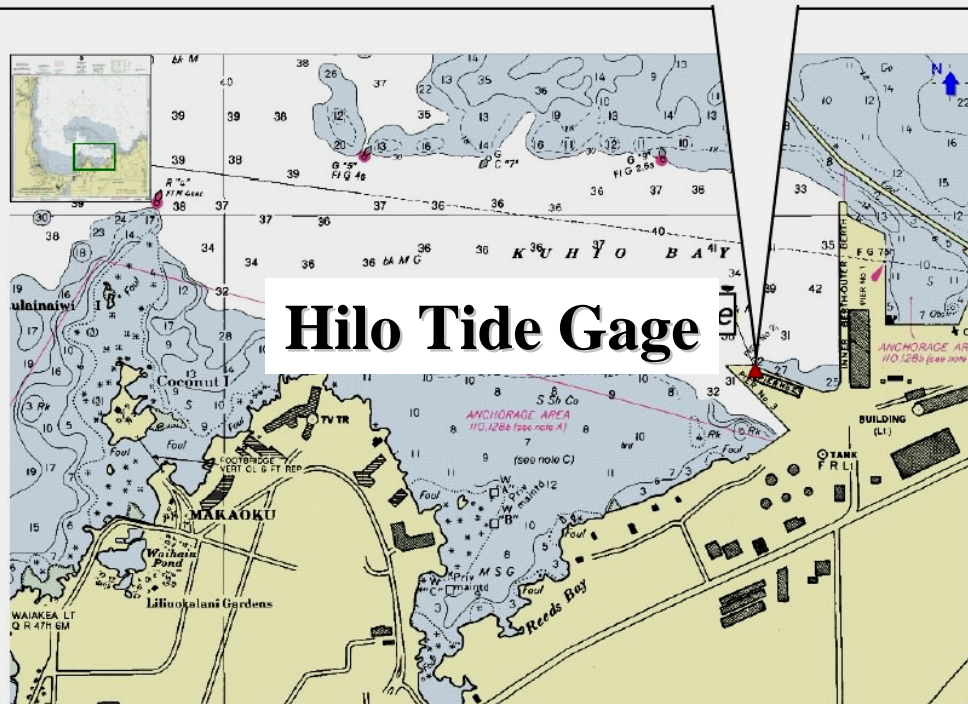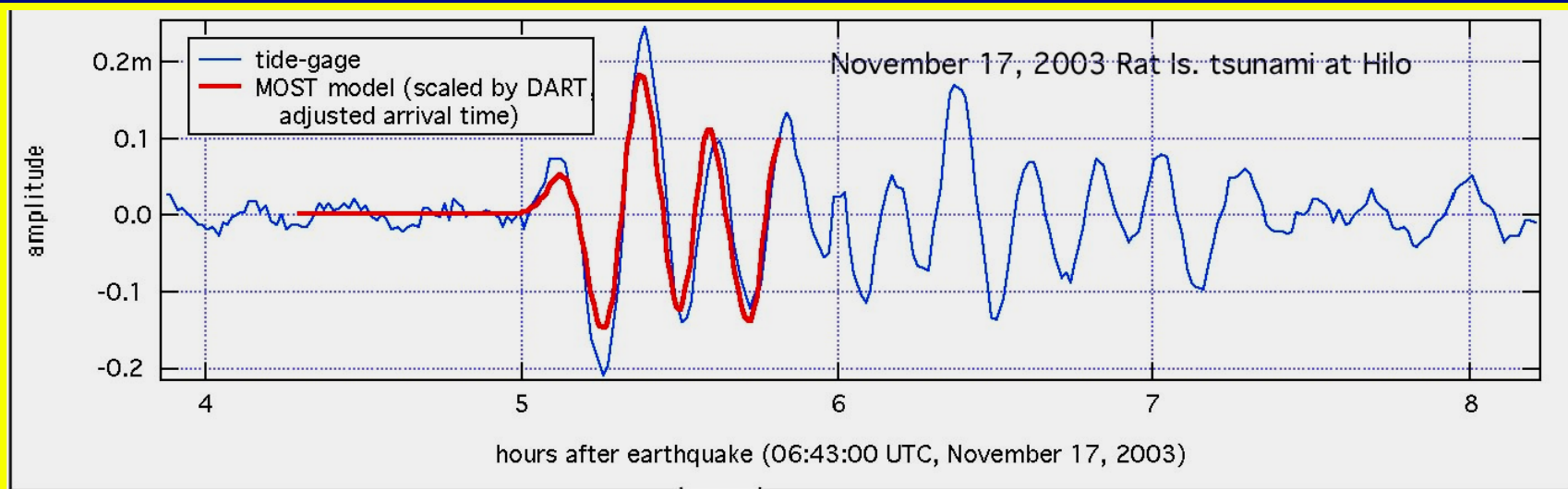Facility for the Analysis and Comparison of Tsunami Simulations (FACTS): DART Interpretive Aid

Maximum Wave Crest Height(cm) & Travel Time(hrs)

10 June 1996 Andreanov
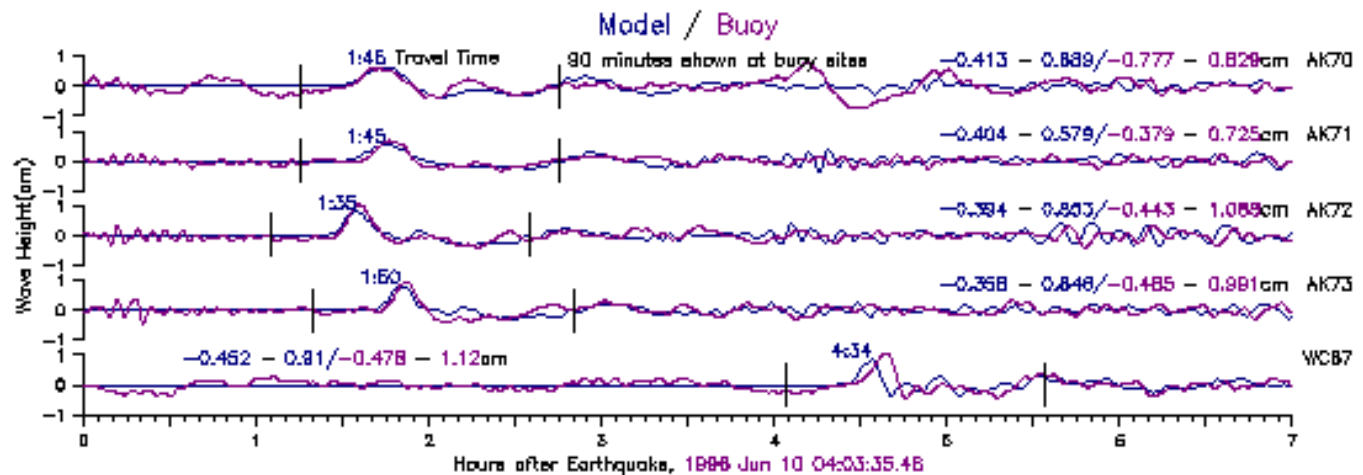
17 Nov 2003: Titov's Quasi-operational Forecast

Hilo Tide Gage

Hilo bathymetry

Short-term Inundation Forecasting for Tsunamis
Standing Inundation Models (SIMs)

- **Real-time, Site-specific Inundation Forecasts**

- **SIFT Prototype (Web-based, Quasi-operational)**
    - Hilo, HI
    - Kodiak, AK
    - Newport, OR
    - Crescent City, CA
    - Willapa Bay, WA
    - North Shore, HI
    - Neah Bay, WA

Summary

- **NEES and U.S. NTHMP R&D**
  Interests/Needs are
  Complementary/Parallel

- **Needed -- Tech Transfer Linkages**
  - **U.S. NTHMP Tech Transfer**
    TIME Center
  - **NEES Tech Transfer**
    Formal, recognized activity
    highly desirable