Tsunami Flooding Assessment Using Forecast Tools

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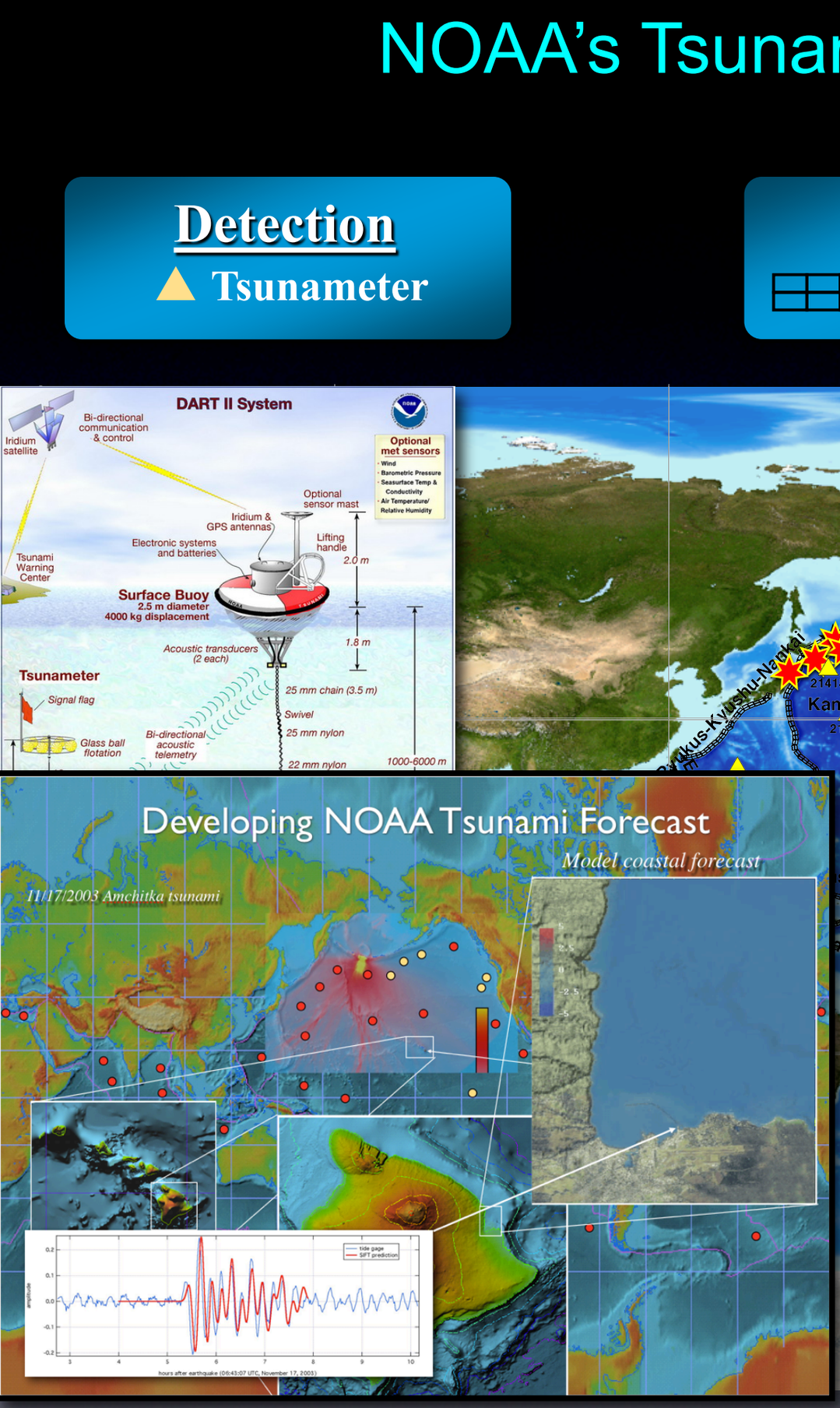
Workshop on probabilistic flood hazard assessment
January 29-31, Rockville, MD
Panel 5: Tsunami flooding

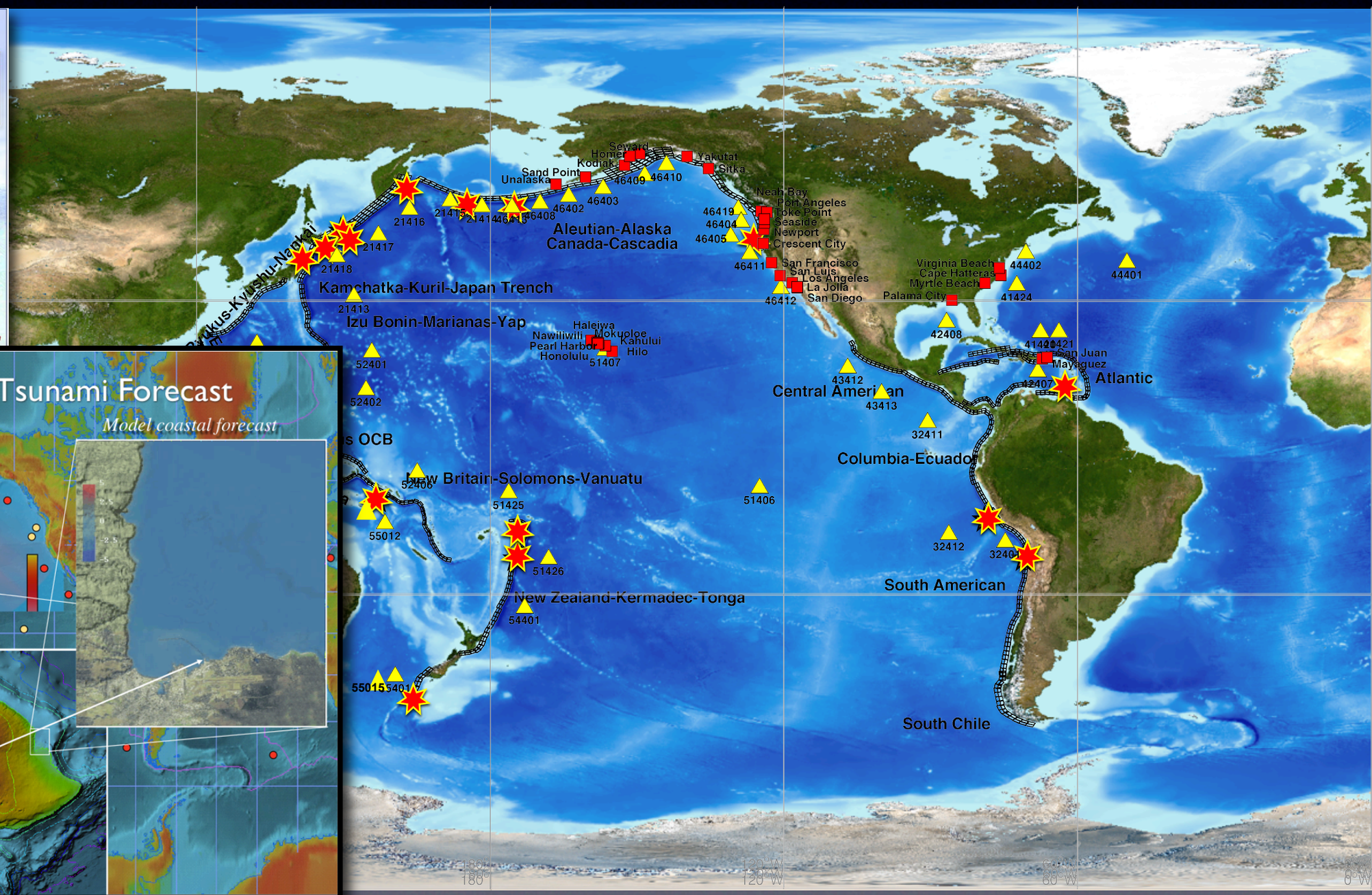
NOAA's Tsunami Forecast Methodology

Detection
▲ Tsunameter

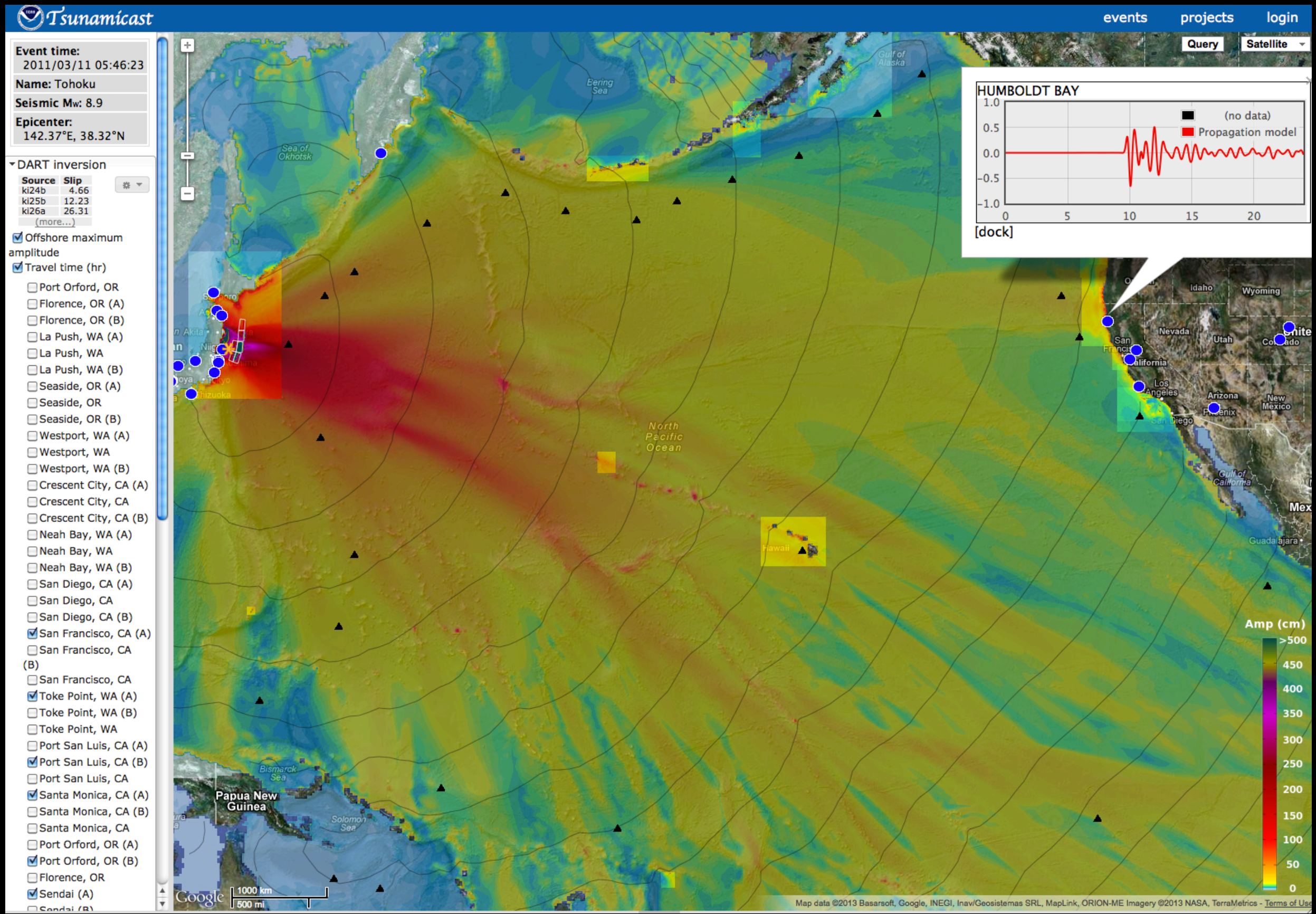
Inversion
▭ Prop. Database

Inun. forecast
■ Forecast Models

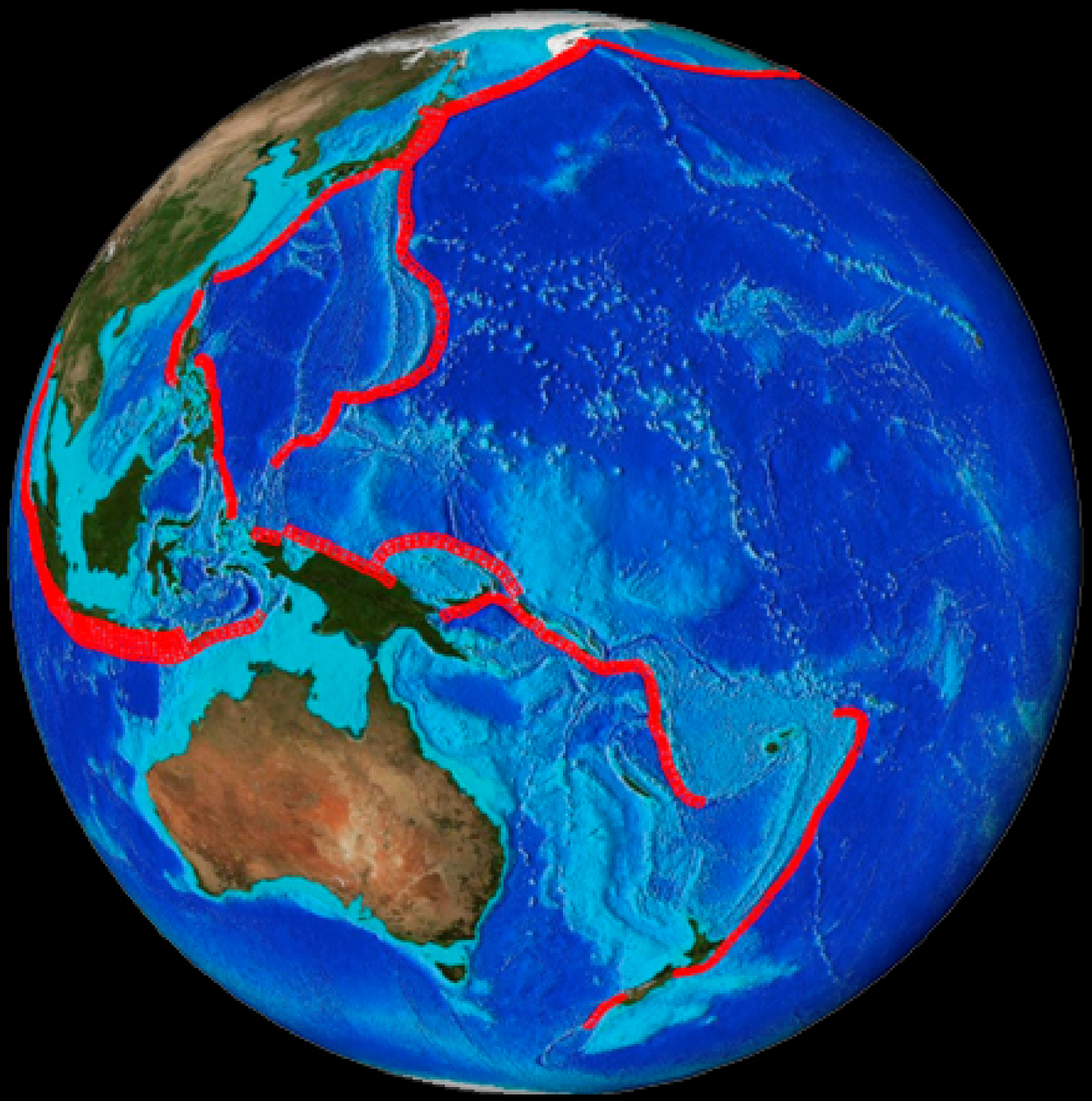




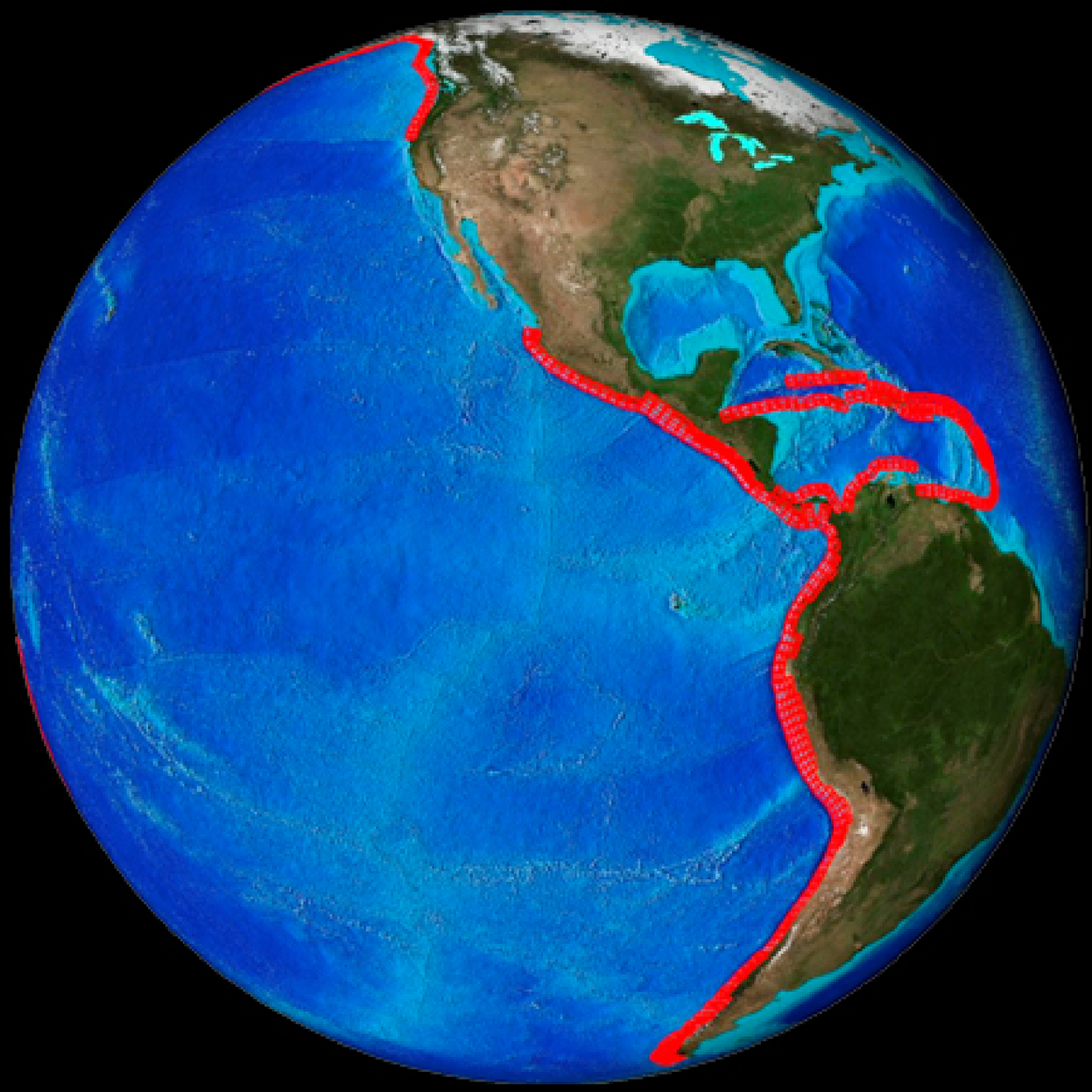
Tsunamicast – a forecast tool developed for NRC



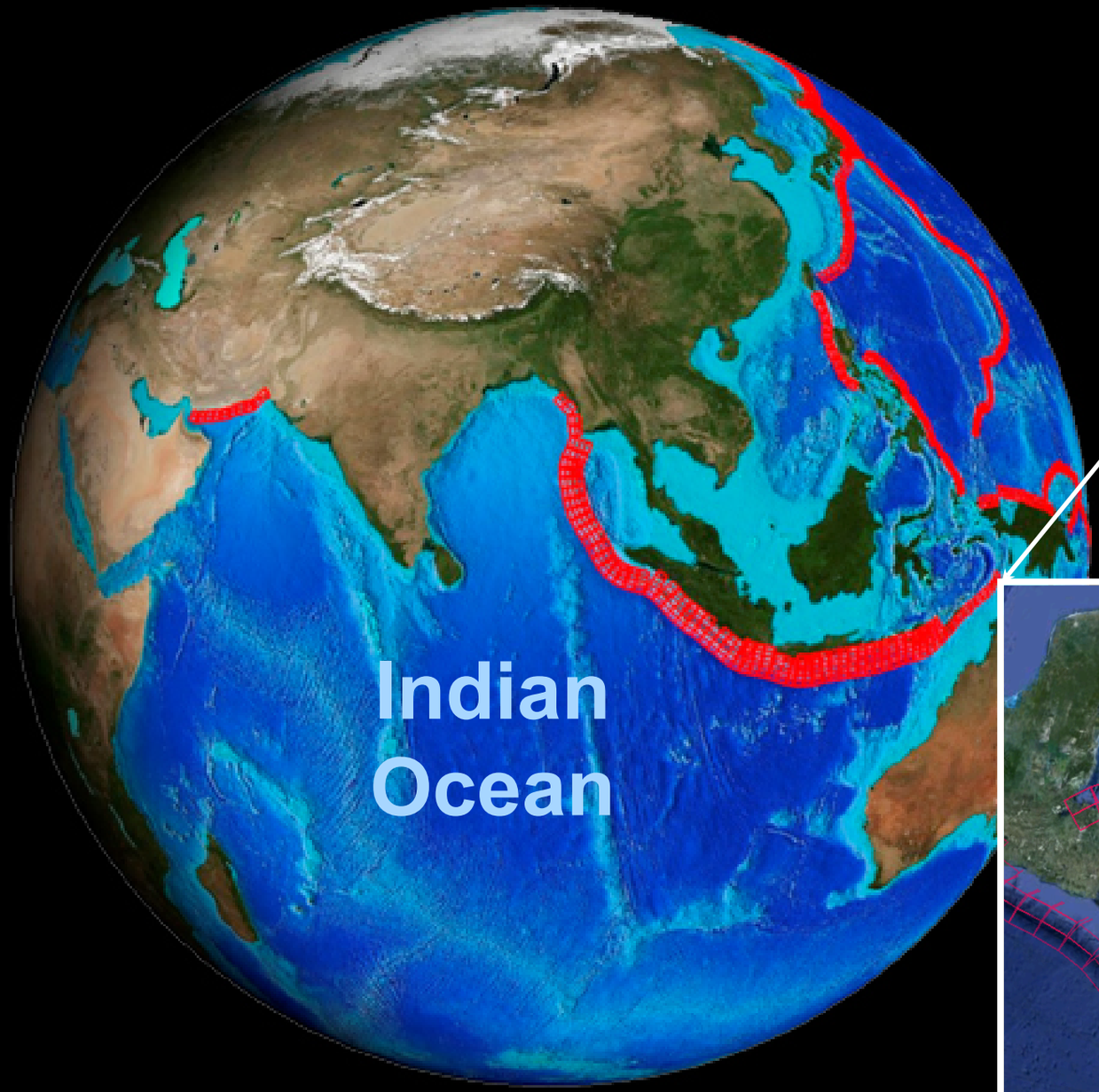
Tsunami Propagation Database:
1725 unit sources for pre-computed tsunami events.

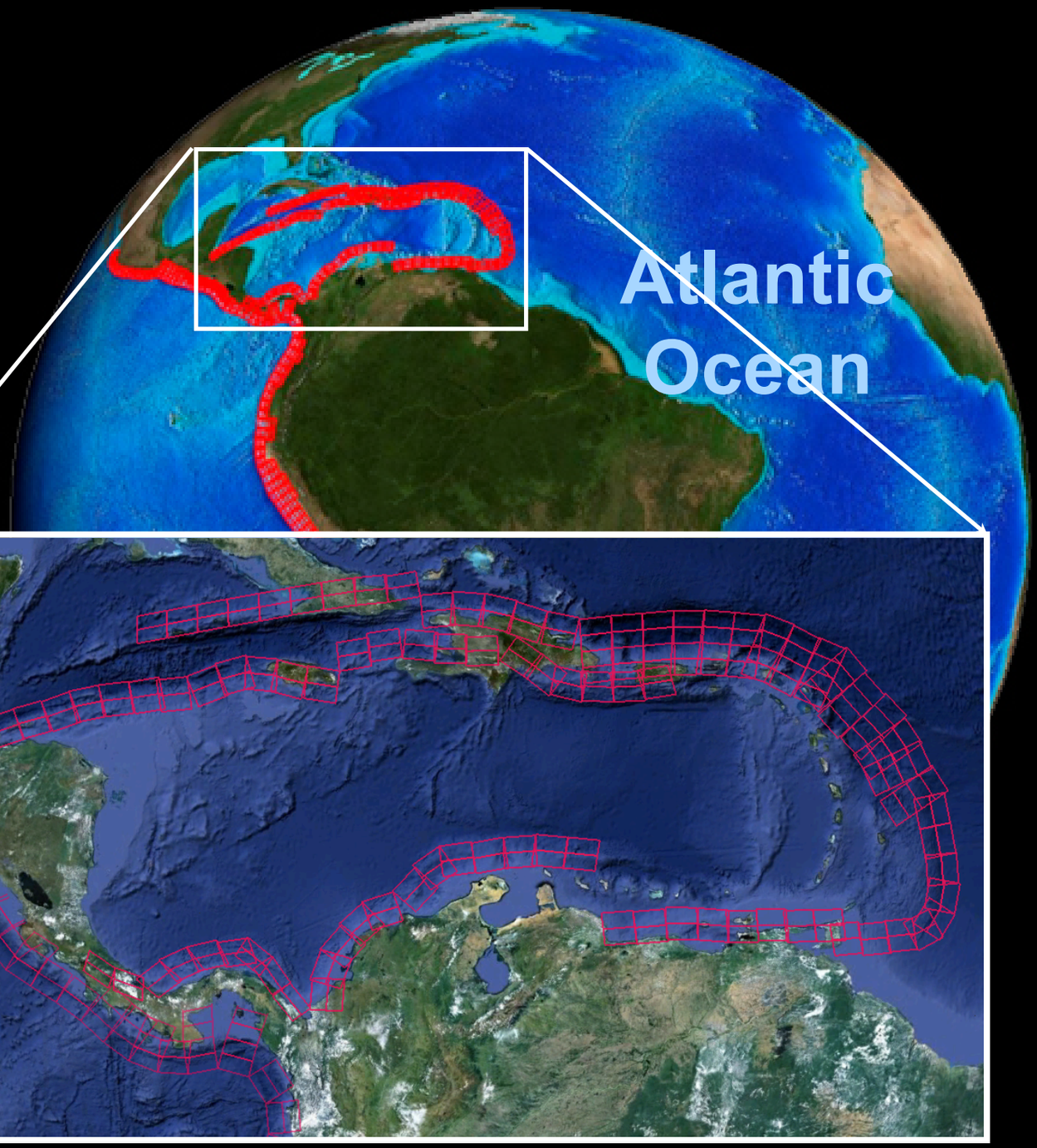


West Pacific



East Pacific





PMEL Tsunami Unit Sour

- 100 km × 50 km
- Placed along subduction zones and known tsunamigenic faults
- Aligned to fit known fault geometries
- Computed using linear shallow-water equations
- Can be linearly combined for source magnitude > 7.5

NOAA Tsunami Forecast Models

Completed

In Development

Shemya

Adak

Atka

Nikolski

Unalaska

Chignik

Homer

King Cove

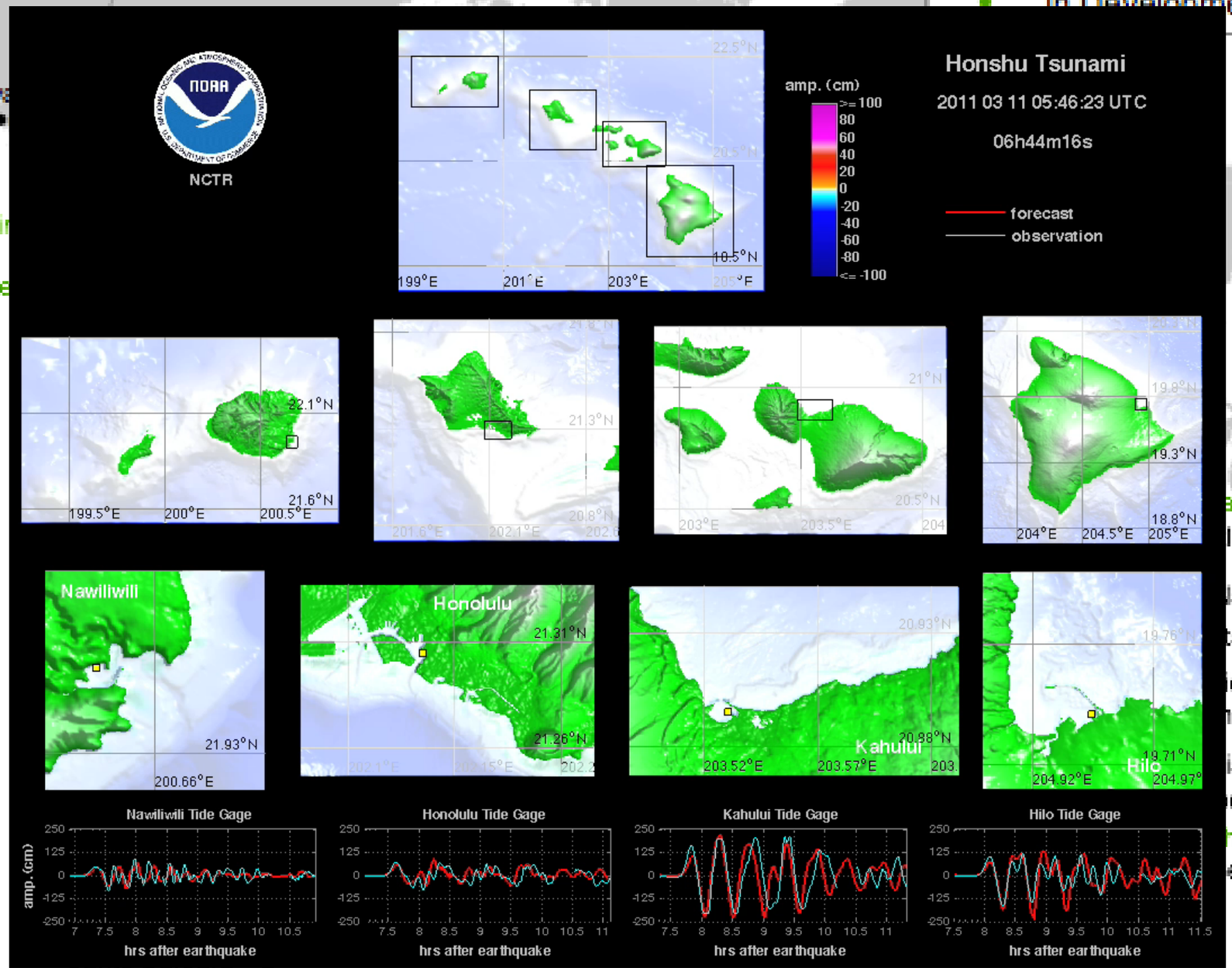
Sand Point

Kodiak

Sewa

Elfi

Port Ale



Hanalei

Nawiliwili

Haleiwa

Pearl Harbor

Honolulu

Lahaina

Kahului

Kihei

Kawaihae

Kailua-Kona

Hilo

Keauhou

Hawaii

Midway Island

Wake Island

Guam

Pago Pago

Pacific

Los Angeles

San Diego

Arecibo

San Juan

Fajardo

Mayagüez

Ponce

Charlotte Amalie

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Daytona Beach

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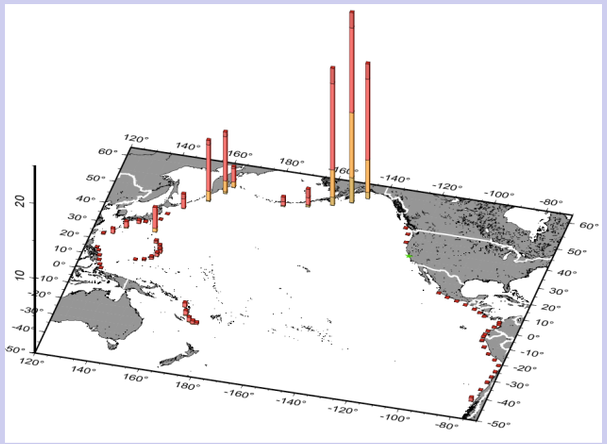
12/2011 NOAA Center for Tsunami Research

Related reference: PMEL tsunami forecast series on model development http://nctr.pmel.noaa.gov/most-pubs.html

Tsunami Flooding Assessment Using Forecast Tools

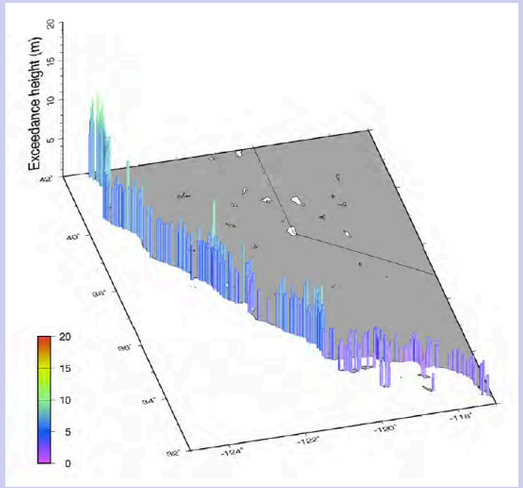
PTHA tsunami hazard maps

- Source disaggregation and selection



Courtesy of Thio et al. (2010)

- Offshore tsunami height for an ARP level



Courtesy of Thio et al. (2010)

PMEL tsunami forecast tools

Reconstruct disaggregated scenarios using a combination of PMEL "unit tsunami sources":

- source location
- magnitude
- rupture area
- slip

Tsunami inundation modeling for reconstructed sources

Tuning for PTHA tsunami height using unit tsunami sources

Derive probabilistic flooding hazard maps using an envelop of inundation lines obtained from above steps