U.S. Tsunami Warning System

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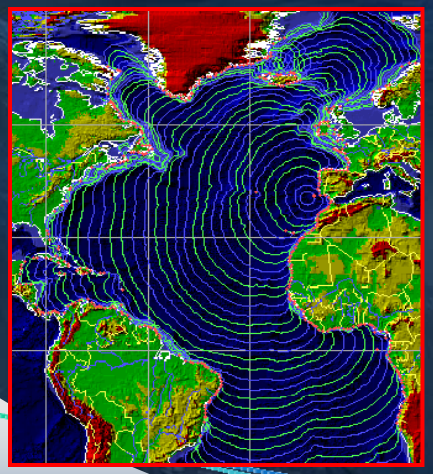
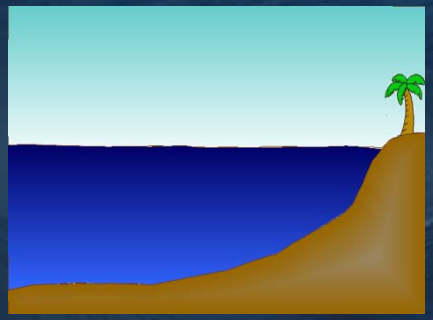
Overview

- What is a Tsunami?
- NOAA's Tsunami Program
- Japan Tsunami Time-Line

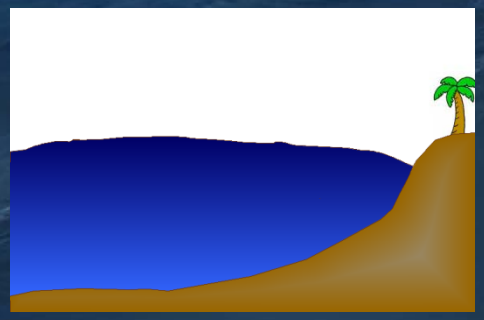
What Is A Tsunami?

- Series of ocean waves generated by earthquakes, landslides, or volcanic activity
- In deep ocean, a tsunami moves at up to 600 mph and may only be a few inches high
- At coasts, water and energy are focused into potentially powerful waves
- Tsunamis can travel large transoceanic distances

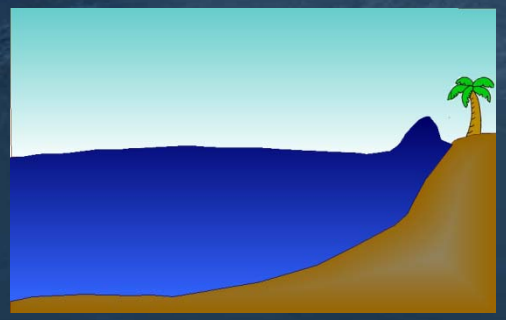




Quiet

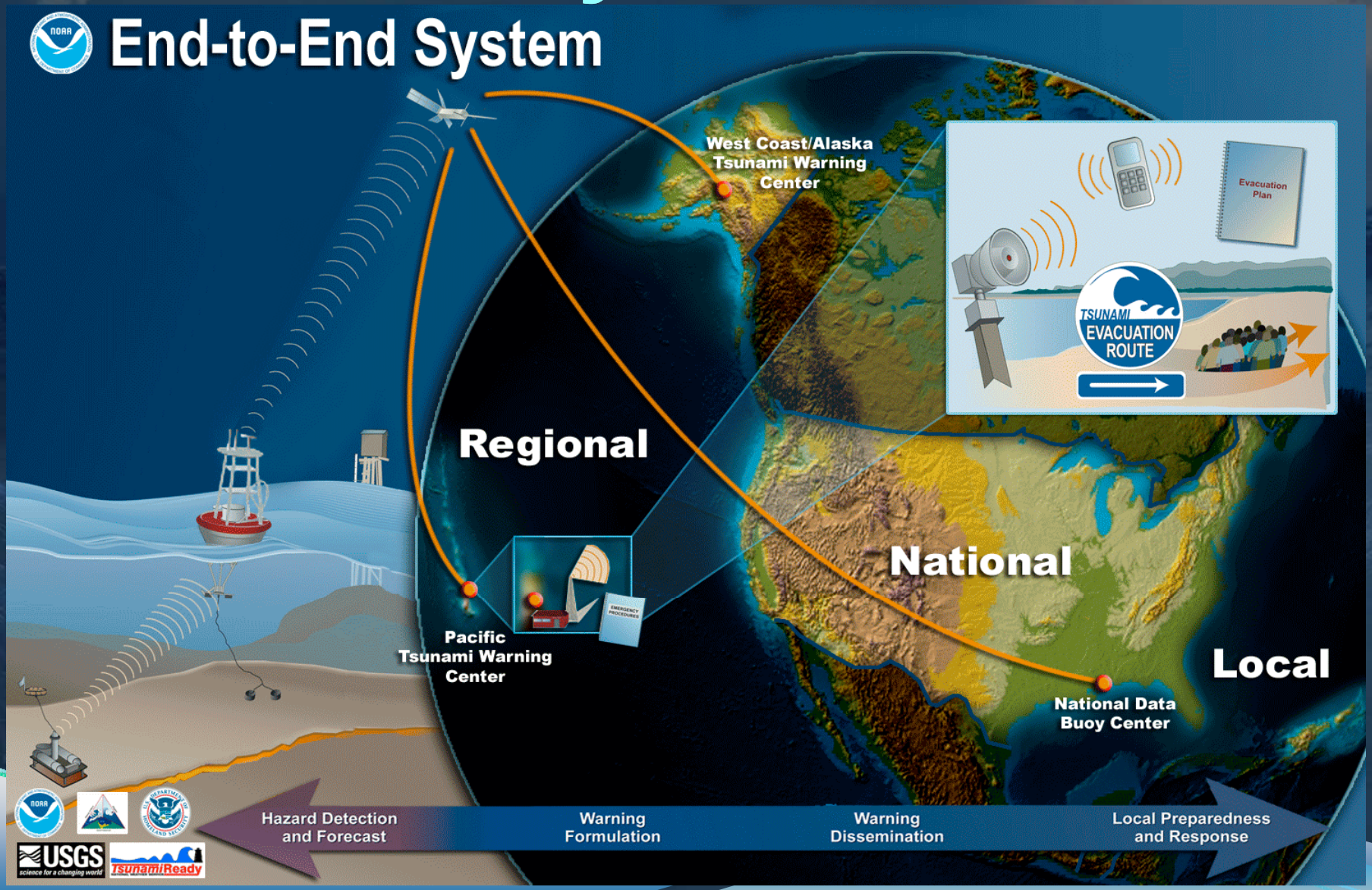


Tsunami at Sea



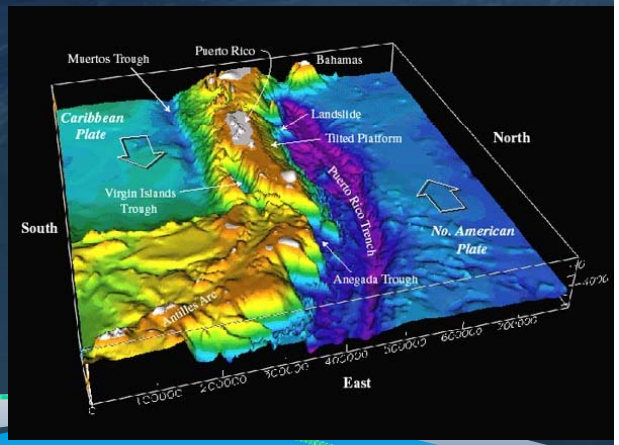
Tsunami Approaching Shoreline

U.S. Tsunami Warning System



NOAA's Warning System

- **24/7 Tsunami Warning Centers**
- **Detection and Evaluation of Earthquakes**
  - *Seismic Networks*
- **Detection and Evaluation of Tsunami Waves**
  - *39 DART Stations (Atlantic, Caribbean, & Pacific)*
  - *164 Water-level Stations*
- **Forecasting the Tsunami Threat**
  - *Modeling*
- **Product Generation and Dissemination**
  - *Warnings, Watches, Advisories and Bulletins*

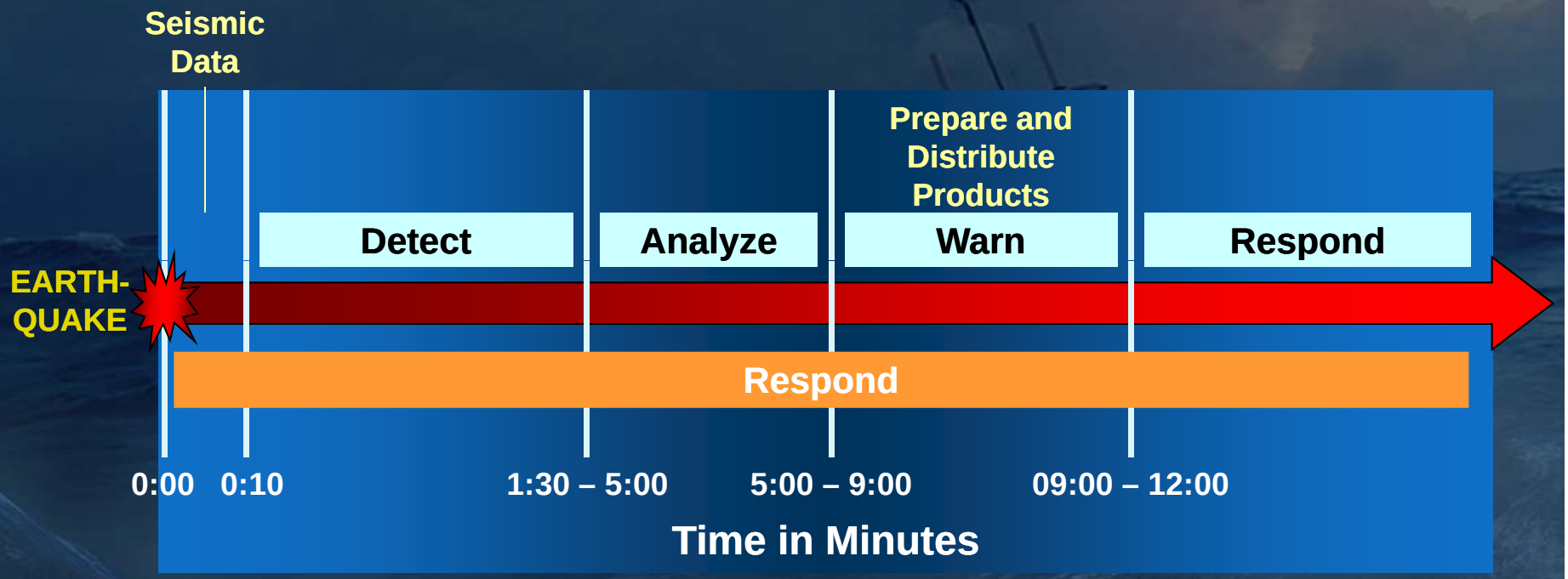


NOAA's Tsunami Outreach and Education

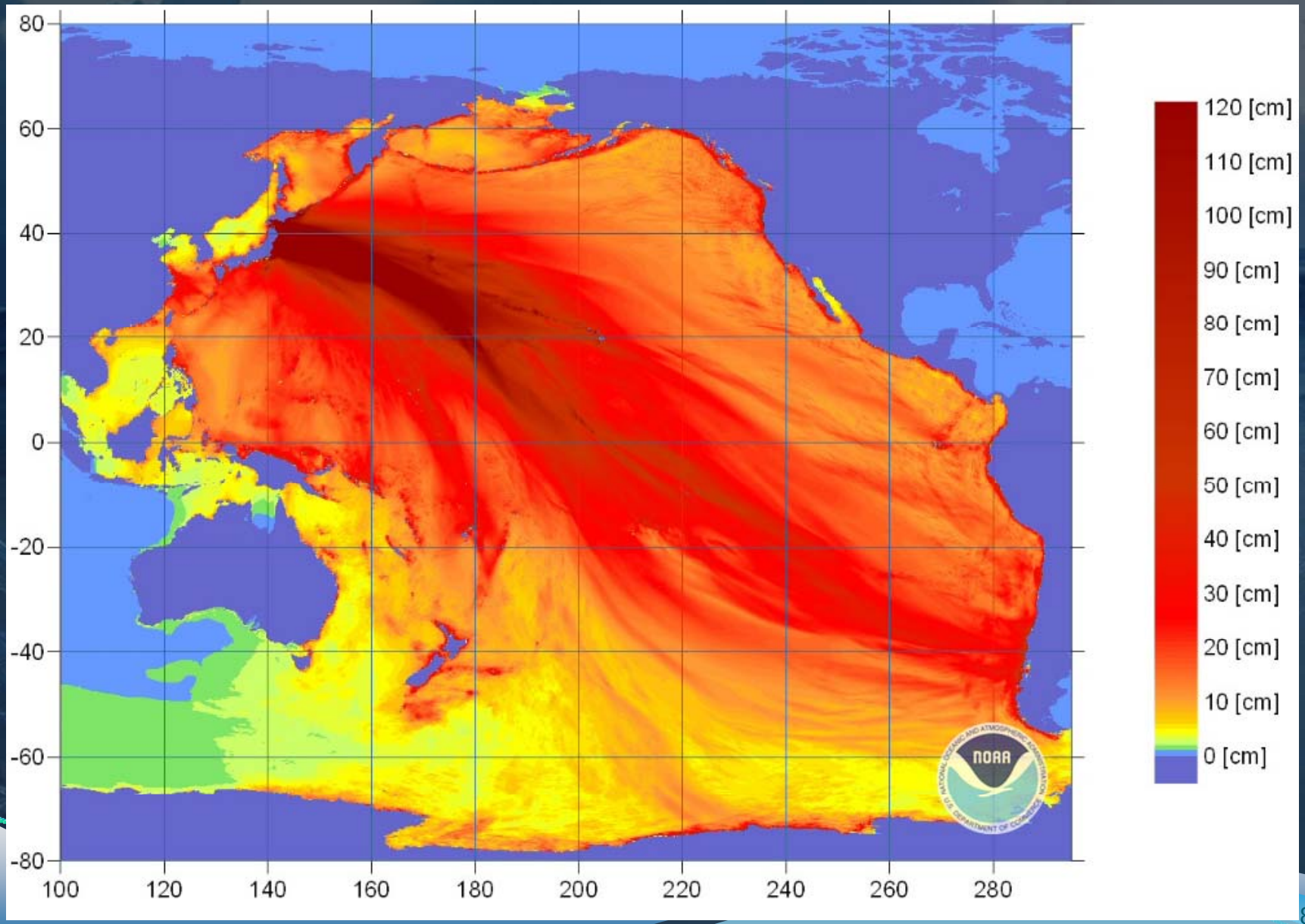
- **TsunamiReady Program**
  - *Improves community awareness, preparation, and education*
  - *Strengthens local Emergency Operations*
  - *83 local communities in U.S.*
- **National Tsunami Hazard Mitigation Program**
  - *Partnership among Federal and State Agencies*
  - *Enhance National Tsunami Outreach and Education Efforts*
  - *Promotes a Culture of Tsunami Preparedness and Response*
- **Outreach activities for public and partners**
  - *Through the media*
  - *Community Presentations*
  - *Brochures and Websites*

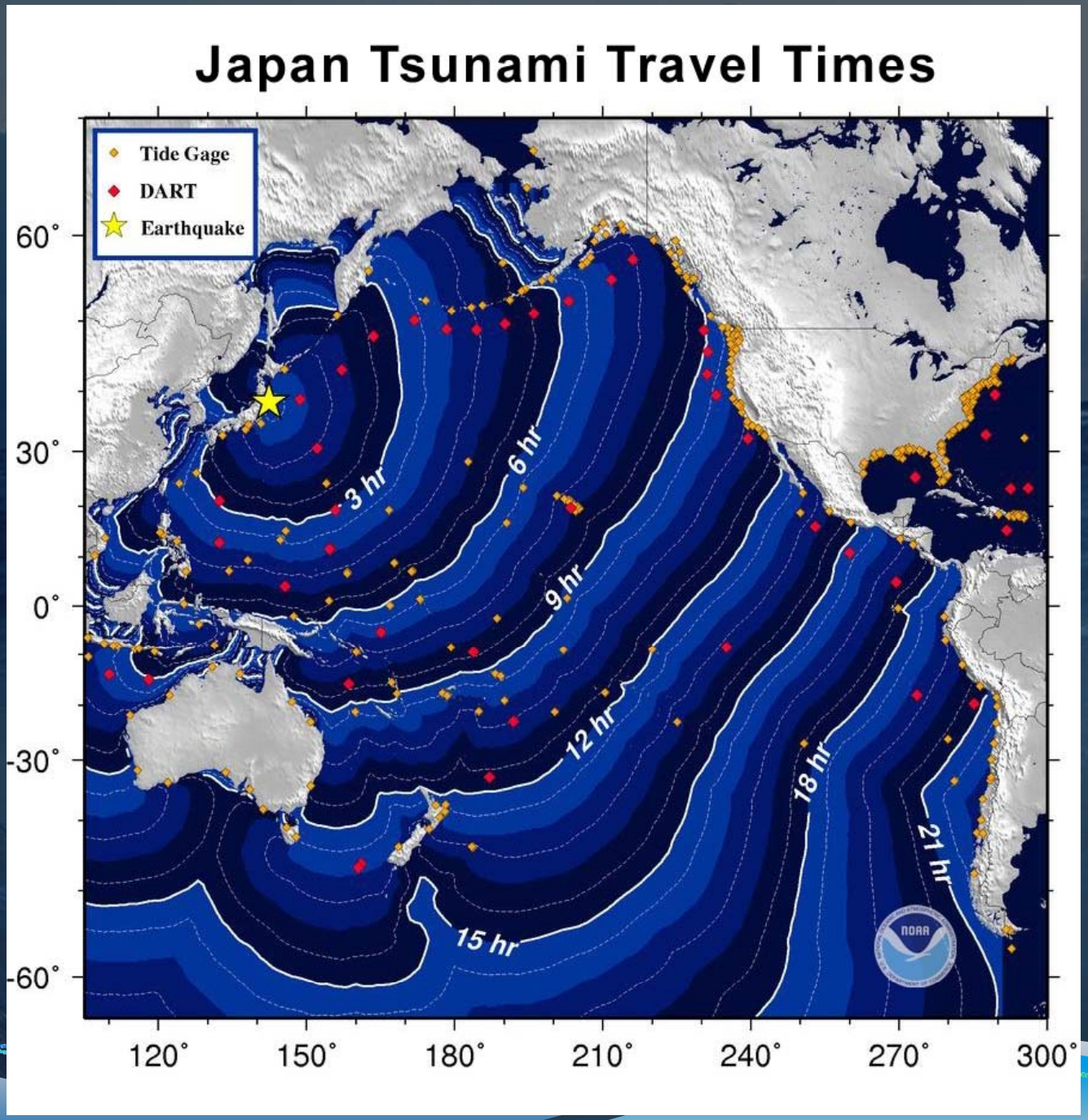
Outreach and **Education** of tsunami threat are key for residents to safely respond to Tsunami Events

Tsunami Response for 11 March 2011 Japan Tsunami

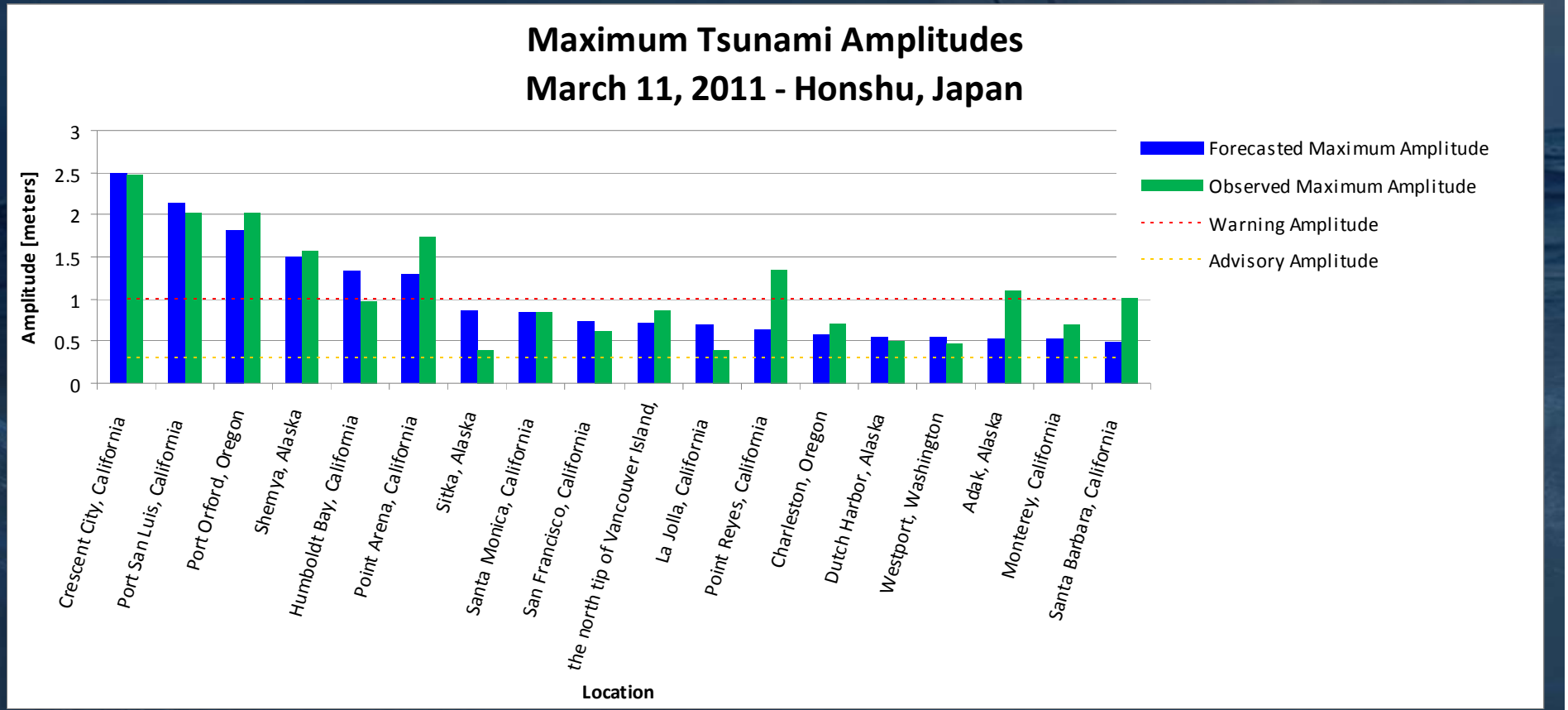


Japan Tsunami




Japan Tsunami Travel Times
Tide Gage
DART
Earthquake
3 hr
6 hr
9 hr
12 hr
15 hr
18 hr
21 hr
60°
30°
0°
-30°
-60°
120°
150°
180°
210°
240°
270°
300°
NOAA

Japan Tsunami Forecast and Observed Wave Heights



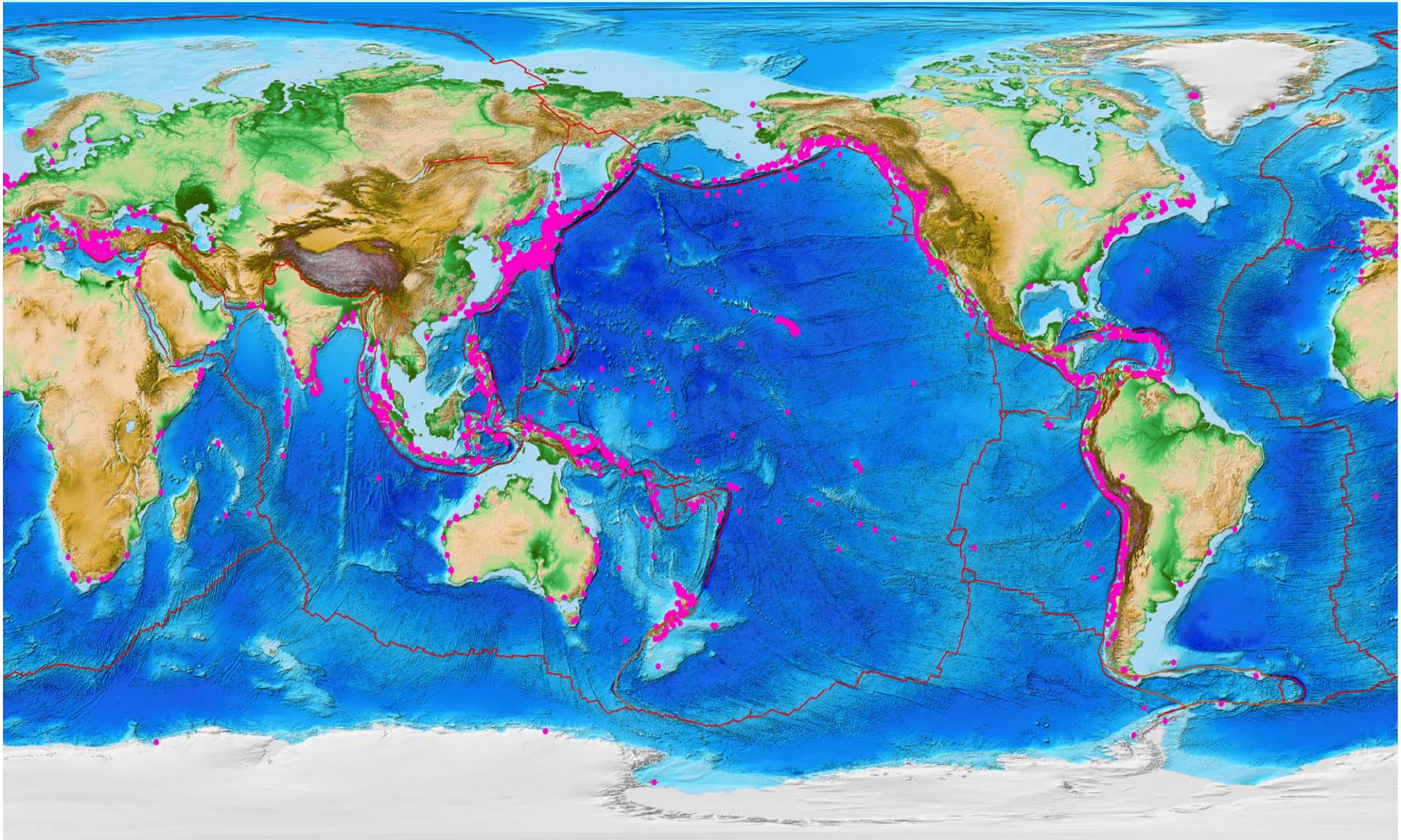

THANK YOU!

Japan Tsunami Time Line

TIME (Eastern)	**Japan Earthquake and Tsunami**
12:46am 03/11/2011	9.0 Magnitude Earthquake just off the coast of Japan
12:55 am	NOAA Pacific Tsunami Warning Center (PTWC) issues Tsunami Warning for Japan, Russia Marcus Island, and Northern Marianas Islands and a Tsunami Watch for Hawaii, Guam, Wake Island, Midway Island, the Marshall Islands, Taiwan, the Philippines, and other countries in the far western Pacific Ocean north of Australia.
12:58am	NOAA West Coast/Alaska Tsunami Warning Center (WC/ATWC) issues Tsunami Information Statement (assessing potential tsunami threat) for Alaska, British Columbia, Washington, Oregon and California.
1:46 am	NOAA WC/ATWC issues Tsunami Advisory issues for Aleutian Islands and a Tsunami Watch for the rest of Alaska, British Columbia, Washington, Oregon and California.
2:30 am	NOAA PTWC expands the Tsunami Warning to include Hawaii and most other Pacific Nations.
4:18 am	NOAA WC/ATWC Tsunami Watch to a Warning for California north of Pt. Concepcion, and the Western Aleutian Islands. The rest of Alaska, Washington, Alaska and BC were placed in an Advisory.
8:14 am	First wave arrives in Honolulu, HI
10:37 am	First wave arrives in Crescent City, CA
11:10 am 03/12/2011	Final Advisory was canceled.

Global Tsunami Threat

NOAA Focus Areas: Alaska, Hawaii, U.S. West Coast and the Caribbean



The most common causes of tsunamis are underwater landslides and earthquakes. Here's how an underwater earthquake can cause a tsunami:

1. An underwater earthquake occurs when a plate shifts abruptly and pushes water upward with tremendous force.
2. Low and fast waves are generated in all directions across the ocean, some speeding as fast as 600 m.p.h.
3. As waves enter shallower water, they are compressed, their speed slows, and they build in height.
4. The wave height increases and associated currents intensify becoming a threat to life and property.