Tsunami Modeling Needs For Western North Pacific Tropical Islands

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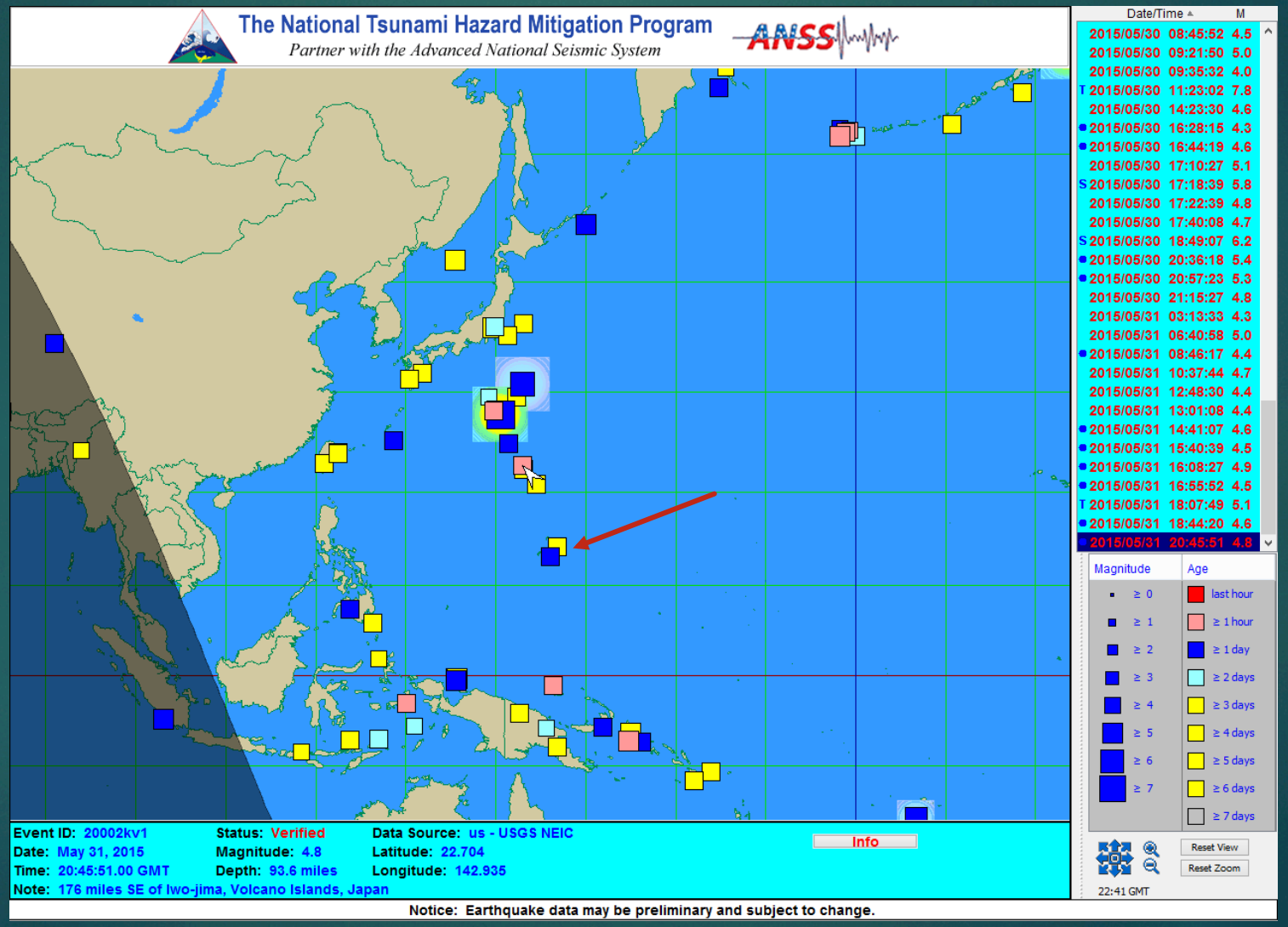
Guam's Location



Primary Source Regions and Travel Times for Guam

Marianas Trench	10-50 minutes
Papua New Guinea	2.5 hours
Mindanao Trench	3 hours
Nankai Trough	3 hours
Eastern Japan	3.5 hours
Kamchatka	5-6 hours
Aleutians	6-8 hours
Cascadia	9 hours

Potential USGS Support

- Potential Tsunami Generation from Above Sea Level Volcanic Eruptions in the Mariana Islands
- Potential Tsunami Generation from Below Sea Level Volcanic Eruptions in the Mariana Islands
- How will USGS information and modeling on subduction zones differ from the PMEL information and modeling?
- How can USGS assist in determining inland currents and wave dissipation rates?
- What are the parameters for which evacuation-in-place is a viable strategy for those in steel-reinforced single-story structures?

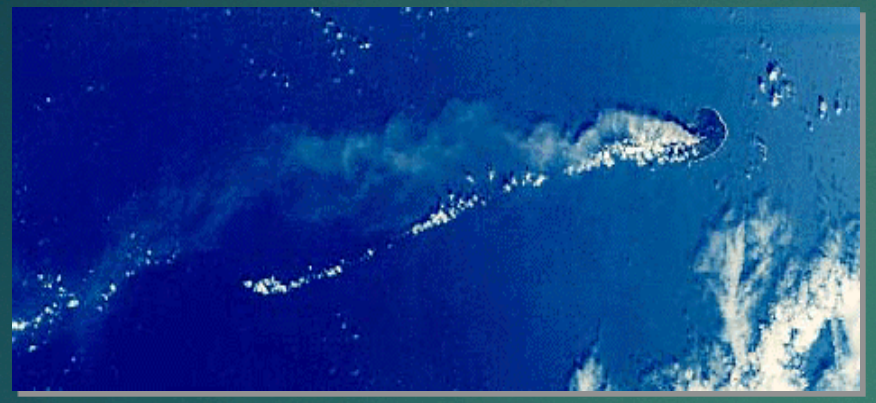
Volcano Hazards for the CNMI

Anatahan

Pagan

NOAA's National Weather Service

Volcanoes of the Marianas "On Fire"



Pagan Island from space, after 1981 eruption.

A pulse of activity seen by plane on June 16th, 2003, Anatahan.

May 2003, Anatahan's first eruption in recent history.

Above and Below Sea Level Volcanos

Sarigan

Sarigan Underwater

Key Challenge

Local tsunamis produce the greatest threat, BUT they provide the least amount of time for evacuation response.

Are there other evacuation strategies that can be employed in addition to vertical evacuation?

Do single-story steel-reinforced concrete buildings provide for such a strategy in tsunami zones?

Coastal Area Buildings

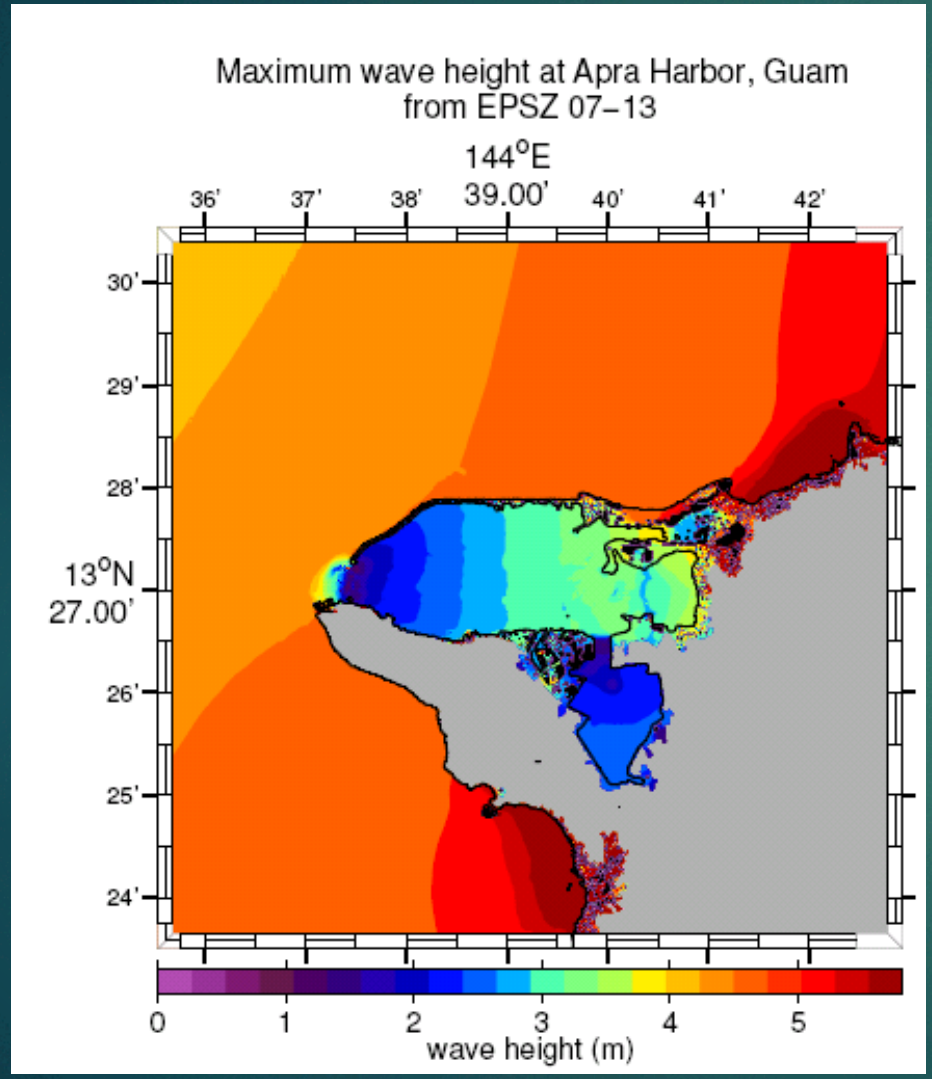
Coastal Area Buildings

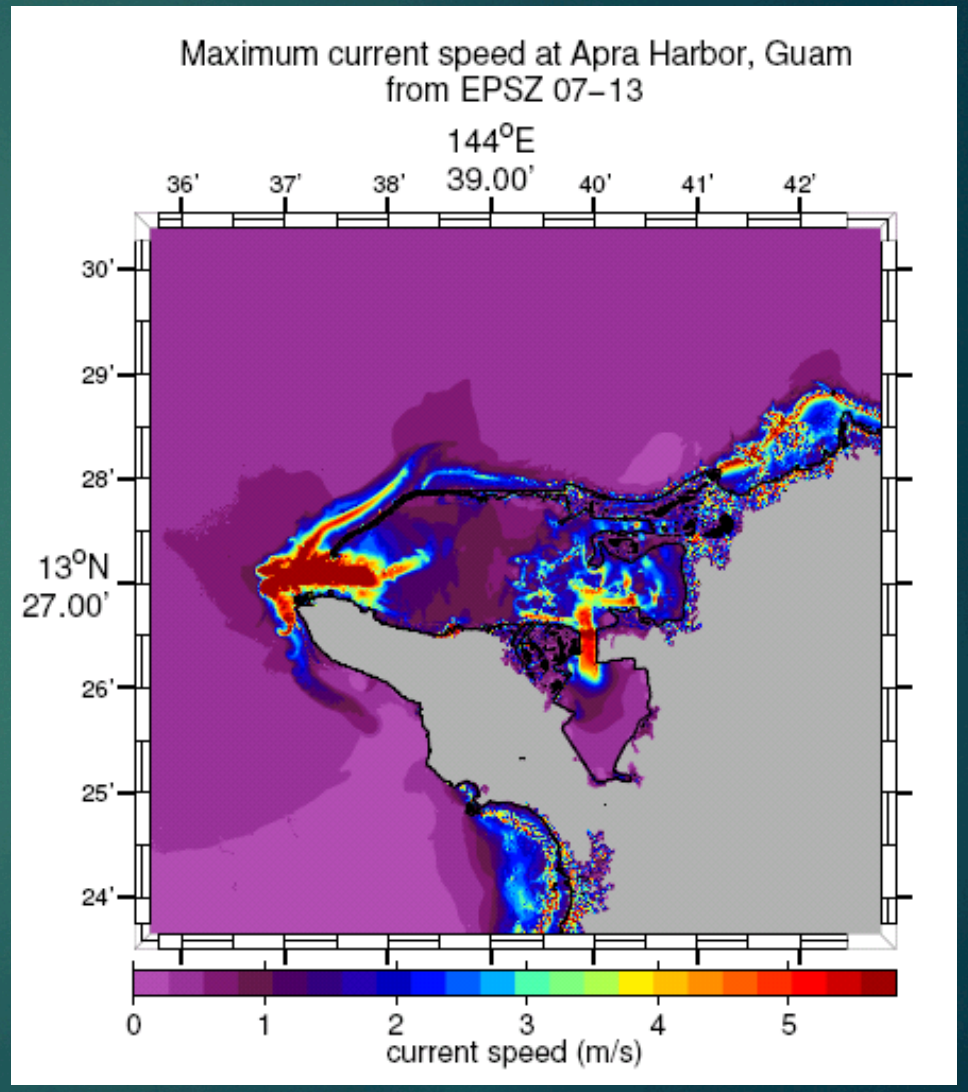
Western North Pacific Tropical Island Tsunami Needs

- We need to determine the extent of inland tsunami-induced currents and the dissipation rates for tsunami waves as they move inland? This effects the ability to "walk out of tsunami zones". CNMI has a couple of dozen schools in the tsunami zone.
- What are the parameters for which evacuation-in-place is a viable strategy for those in steel-reinforced single-story structures? Wave height? Distance from shore? Slope or rate of elevation rise?
- How do tsunamis behave with respect to barrier reefs? Movement around reefs and through channels in the reefs.
- Identify Potential Tsunami Generation from Above/Below Sea Level Volcanic Eruptions.
- How would other model outputs (e. g., USGS) for subduction zones differ from PMEL outputs? Can they help to better define the error bars associated with prediction.
- Better identification of strong tsunami-induced currents in narrow channels.
- Improving the application of Green's Law where high resolution bathymetry is not available.

Width of Reef Variations

Trapped Waves and Strong Currents





Strong Currents

Barrier Reef Characteristics

- Displaced from/not adjacent to the coast. Can be less than a mile to several miles from shore.
- Water is deeper than that across fringing reefs (i. e., 10s to 100s of feet versus a few feet).
- Lagoon area can be very large (i. e., 100s of square miles).
- Lagoon areas can be very small (e. g., less than 10 square miles).