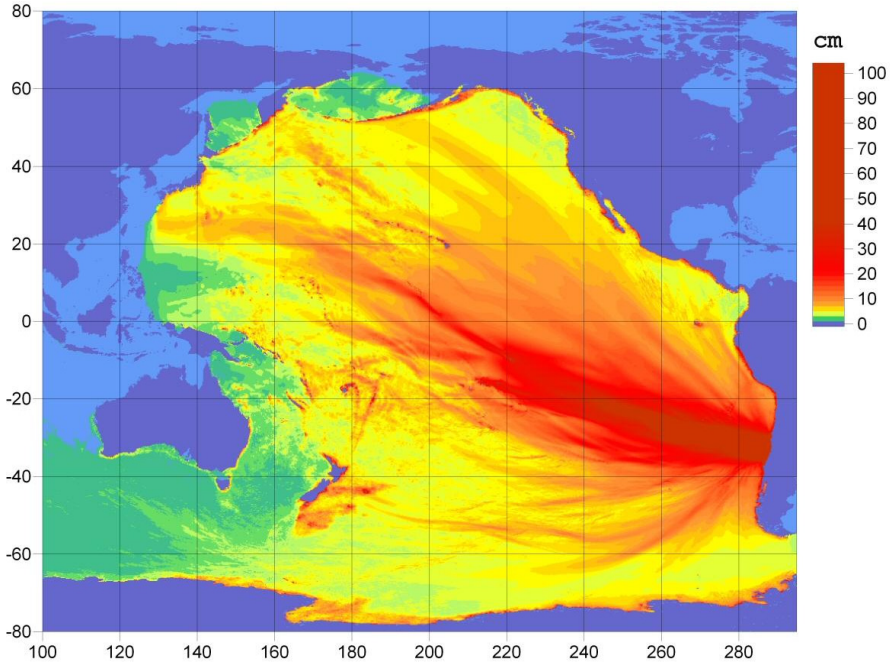
February 27-28, 2010 Chile Tsunami

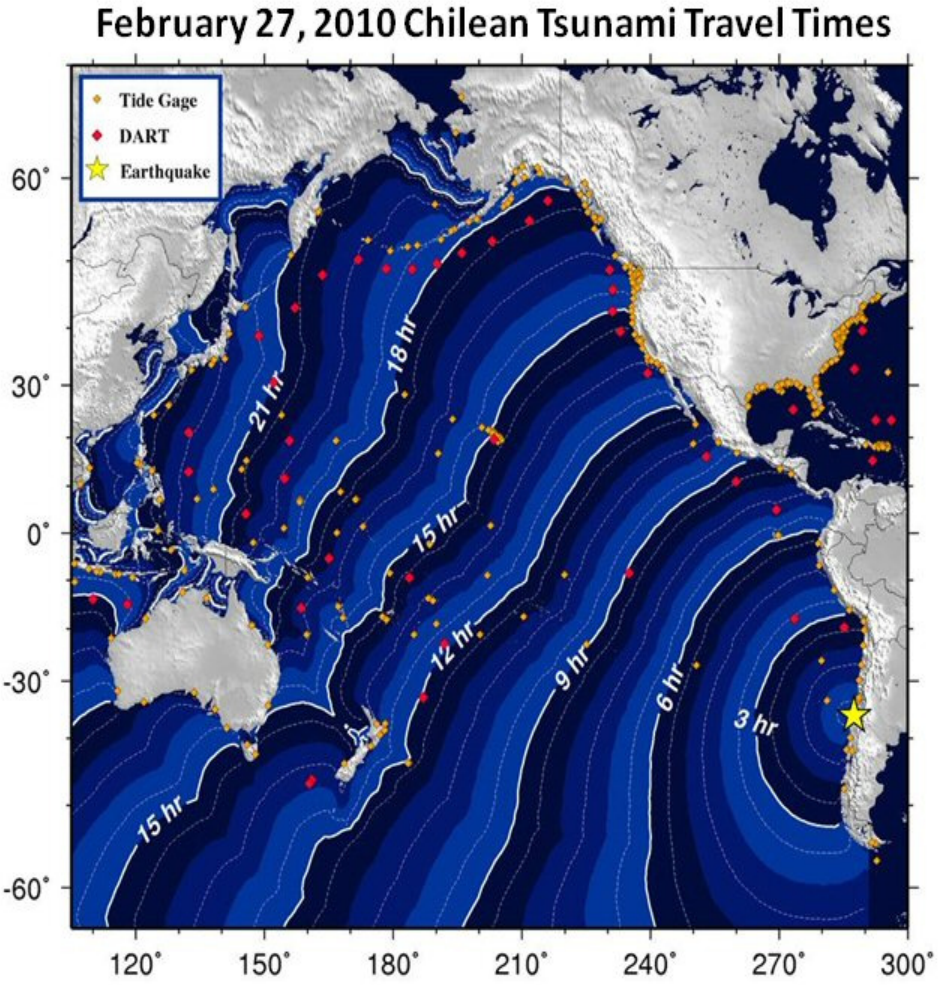


Alaska Tsunami Forecast Model Energy Map

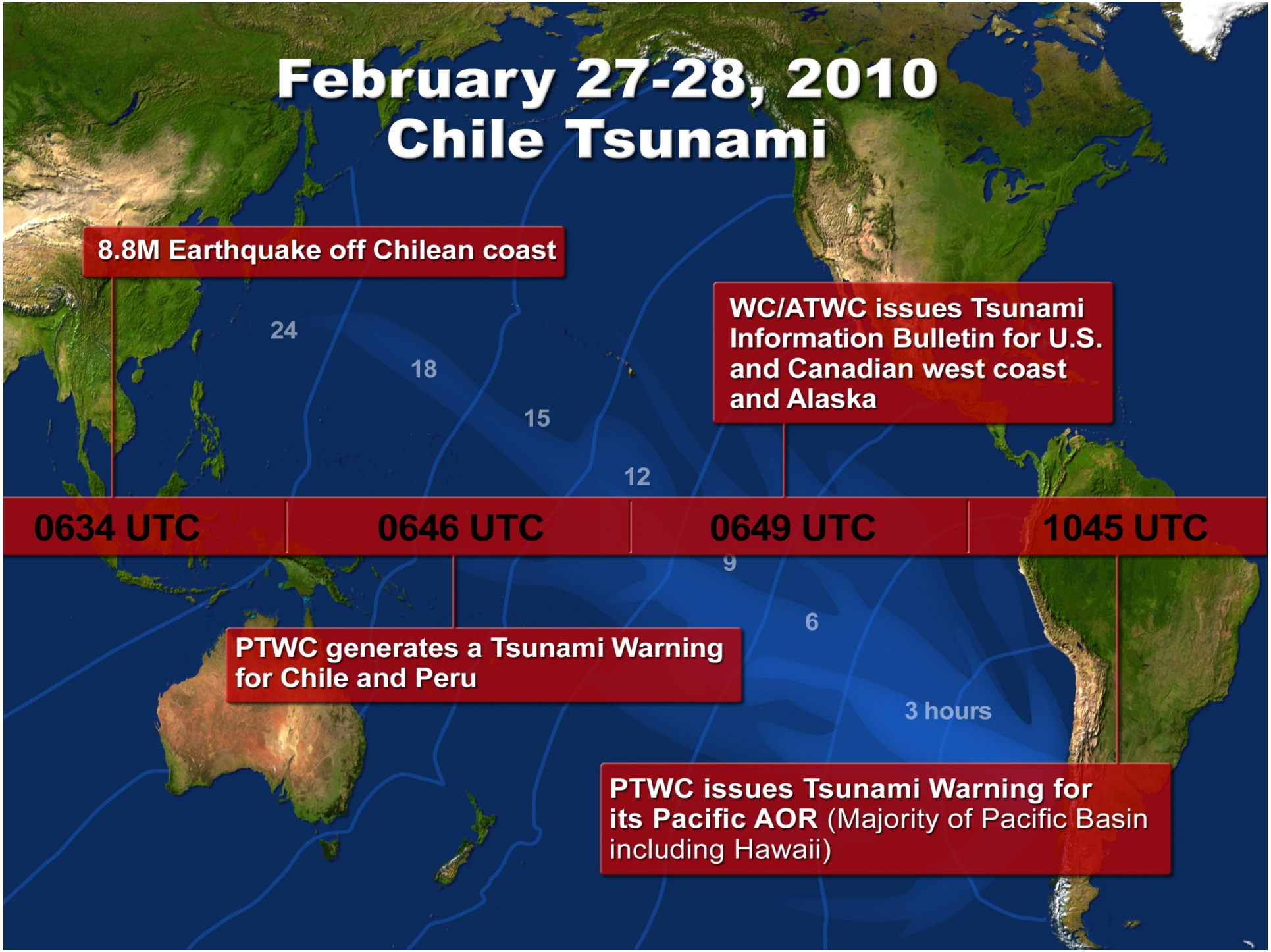
Jenifer Rhoades

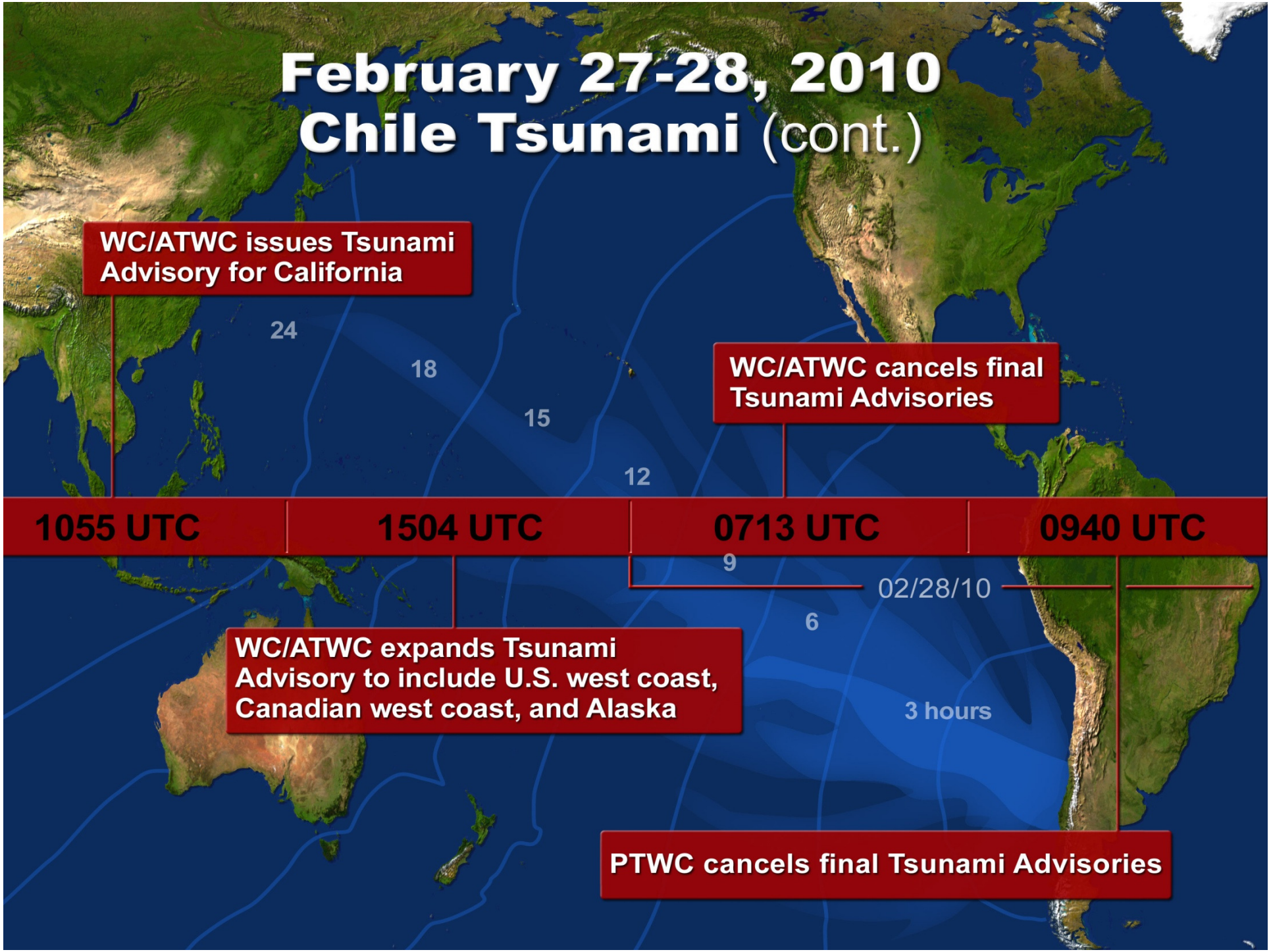
March 4, 2010

- 8.8M Earthquake 02/27/2010 0634 GMT
- 70 mi NNE of Concepcion, Chile
- Current death toll is 802 for earthquake and tsunami
  - Estimated 350 people died from tsunami
- Significant property damage from earthquake and tsunami in Chile
- Light to moderate property damage around the Pacific Basin

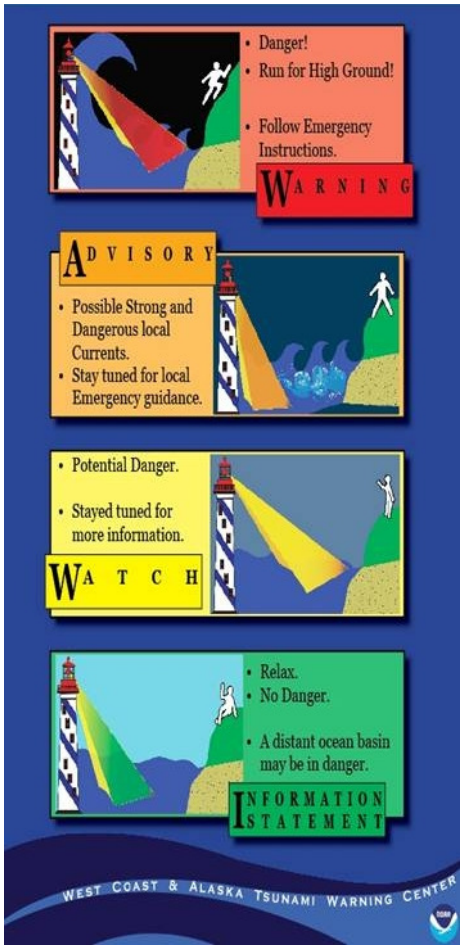


At 06:34:14 UTC, a M8.8 earthquake occurred offshore Maule, Chile, [35.846°S, 72.719°W], resulting in a Pacific-wide tsunami. Shown above are the tsunami travel time contours in hours, beginning from the O-time of the earthquake.


February 27-28, 2010
Chile Tsunami
8.8M Earthquake off Chilean coast
WC/ATWC issues Tsunami Information Bulletin for U.S. and Canadian west coast and Alaska
24
18
15
12
9
6
3 hours
0634 UTC
0646 UTC
0649 UTC
1045 UTC
PTWC generates a Tsunami Warning for Chile and Peru
PTWC issues Tsunami Warning for its Pacific AOR (Majority of Pacific Basin including Hawaii)


February 27-28, 2010
Chile Tsunami (cont.)
WC/ATWC issues Tsunami Advisory for California
WC/ATWC cancels final Tsunami Advisories
24
18
15
12
9
6
3 hours
1055 UTC
1504 UTC
0713 UTC
0940 UTC
02/28/10
WC/ATWC expands Tsunami Advisory to include U.S. west coast, Canadian west coast, and Alaska
PTWC cancels final Tsunami Advisories

Levels of Tsunami Alert



- Warning: A potential tsunami with significant widespread inundation is imminent or expected. Widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave.
- Advisory: A potential tsunami which may produce local strong currents or waves. Significant widespread inundation is not expected.
- Watch: A potentially dangerous distant seismic event has occurred which may later impact the watch area with a tsunami. Be ready to take action if a warning is later issued.
- Information Statement: An earthquake has occurred or a tsunami warning, watch, or advisory has been issued for another section of the ocean. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami in your area.

February 27-28, 2010 Chile Major Points on Event

- Issued limited area Warning 12 minutes after detection of the earthquake (PTWC).
- Issued expanded Warning to majority of the Pacific Basin four hours later (PTWC).
  - Arrival of waves in Hawaii 15 hours after earthquake
  - Arrival of waves in Japan 22 hours after earthquake

February 27-28, 2010 Chile Major Points on Event

- Issued Tsunami Advisory to California 4 hrs 21mins after earthquake
- Expanded Tsunami Advisory to the U.S. west coast, British Columbia, and Alaska 7.5 hours after earthquake
  - Tsunami advisories indicate a lower level of threat than a warning.
  - Wave arrival time on west coast 13 hours 45 minutes after earthquake (La Jolla, CA)

February 27-28, 2010 Chile Major Points on Event

- During the event, tsunamis were recorded around the Pacific Basin including:

Location	Forecasted Wave Height (ft)	Highest Measured Wave Height (ft.)
Talcahauno, Chile	N/A	7.7
Acapulco, Mexico	N/A	2.0
Hanasaki, Hakkaido	N/A	2.7
Pago Pago, American Samoa	N/A	2.3
Kahalui, HI	3.0	3.2
Santa Barbara, CA	2.5	3.0
Santa Monica, CA	3.9	2.1

- The Hawaiian Islands experienced a tsunami within approximately ten minutes of forecasted time.
  - Tsunami reached Hawaii approximately 15 hours after event.

February 27-28, 2010 Chile Major Points on Event

- NOAA sea-level stations provided critical data that refined the accuracy and resolution of NOAA tsunami forecast models. The combination of data and forecasts eliminated unnecessary evacuations along the west coast.

- Timely seismic data from USGS, IRIS, etc. enabled Tsunami Warning Centers to analyze and assess earthquake magnitude and location for initial warning.

- NOAA's education and outreach with local emergency managers, state and local governments , and the media minimized the potential for loss of life and economic impact.
  - Hawaii citizens and visitors heading to higher ground when warnings issued.

February 27-28, 2010 Chile Major Points on Event

- Strong currents and minor damage were observed along the U.S. and Canadian west coast, Hawaii and Alaska.

- Minor damage was reported along the U.S. west coast.
  - Ventura Harbor - damaged navigational buoys and boats
  - Santa Cruz - boats unmoored and damaged
  - San Diego - damaged docks
  - Other reports coming in

- The use of the Tsunami Advisory product for the U.S. west coast provided the proper level of alert and response for the threat. Full evacuations were not required due to the use of the advisory product.

February 27-28, 2010 Chile Major Points on Event

- The tsunami was not as destructive as it could have been.
- NOAA's timely and accurate tsunami warnings and advisories provided emergency management partners and the public the time to respond.

February 27-28, 2010 Chile Major Points on Event

- NOAA's longstanding relationship and experience with local officials and outreach efforts on the ground was evident.
  - The emergency systems worked.
  - People heeded warnings and sought higher ground.
  - People were off the beach and out of the water, where tsunami-induced currents were prevalent.

BACKGROUND SLIDES

DART® Deployed Network
March 2, 2010 status
Non-operational Stations indicated with red dots