

TSUNAMIS



Tsunami Quick Information:

- ◆ Tsunami is Japanese for harbor (tsu) wave (nami).
- ◆ Tsunamis are often the result of marine earthquakes, though landslides, volcanic eruptions, and other events can also be the cause.
- ◆ Not every submarine earthquake will create a tsunami.
- ◆ A tsunami is not the same as a tidal wave.
- ◆ Wave height is the distance between the highest point (crest) and lowest point (trough), and wave length is the distance between two crests.
- ◆ A normal wave travels 5-60 mph and is 300-600 ft long. A tsunami travels 500-600 mph and is 60-300 mi long.

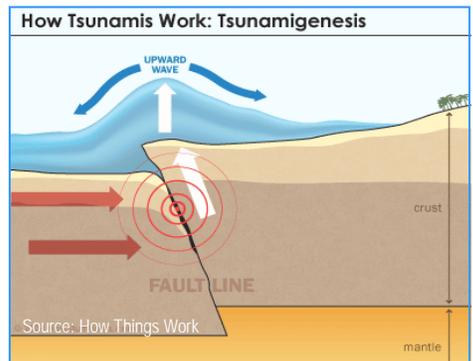
How Does A Tsunami Form?

A tsunami is generated when a large volume of water is rapidly displaced, usually as a result of a submarine or coastal earthquake—though marine landslides, volcanic eruptions, nuclear weapons testing, and asteroid impacts can all potentially create tsunamis. All coastal states have a tsunami risk, but the most powerful tsunamis are created in the Pacific leaving those coastal states, including Hawaii, most at risk.

The rapid movement of the seafloor during an earthquake requires a large amount of energy. That energy is transferred to the water, giving a tsunami its incredible size and speed.

The water is first forced upwards, then gravity begins pulling it back down creating a wave that propagates outwards. Think of the ripple effect from throwing a pebble into a pond.

A tsunami moves faster in deep water and slower in shallow water. Unlike a normal wave, a tsunami moves through the water instead of along the surface. Therefore, it is barely noticeable out at sea until it starts to slow down close to shore. The continued momentum causes the tsunami to grow hundreds of feet tall. As it nears the beach, the tsunami sucks all the water back before inundating the coast with a flood of water and debris.



Some Historic Tsunamis (1950-2008):

- ◆ **December 26, 2004:** A 9.0 earthquake off Sumatra generates tsunami waves in 10 countries, killing more than 280,000 people.
- ◆ **July 17, 1998:** An earthquake off Papua New Guinea may have caused a submarine landslide which created the tsunami that destroyed two villages 11 minutes later.
- ◆ **August 16, 1976:** A 7.9 earthquake hits the Moro Gulf region of the Philippines and created a tsunami that killed 5,000 people.
- ◆ **March 28, 1964:** The 9.2 Good Friday Earthquake off Alaska created a tsunami that enveloped the coastline and also hits Oregon and California killing 132 people.
- ◆ **May 22, 1960:** The 9.5 Great Chilean Earthquake generated a tsunami that hit Hawaii and Japan, killing 203 people.
- ◆ **July 9, 1958:** An 8.3 earthquake in Lituya Bay, AK caused part of a mountain to fall into the ocean forming a tsunami with the tallest wave (1742 ft) in recorded history.

Tsunami Hazard Mitigation

What to do ahead of time:

- ◆ Make disaster plans beforehand.
- ◆ Assemble a disaster supply kit.
- ◆ Contact local emergency officials to find out which areas are the most vulnerable and which are the safest (including the best evacuation route).
- ◆ Take a first aid class.

If you feel a strong, long-lasting earthquake while near the coast:

- ◆ Protect yourself during the earthquake.
- ◆ **Move to higher ground, or inland, immediately after!** A tsunami may come in minutes.
- ◆ Do not wait for an official warning.
- ◆ Do not go near the coast, waves may continue to arrive for hours.
- ◆ Listen to the radio for an “all-clear” signal.

If you are on a beach and the water suddenly recedes:

- ◆ **Run immediately inland, or to higher ground, and stay there!**
- ◆ An approaching tsunami will suck all the water towards it as it reaches the coast.
- ◆ Do not go out to see the wave, it moves faster than you can run.
- ◆ Expect multiple waves over the next couple of hours.
- ◆ The waves are not “surfable”, they often arrive as rapidly-rising turbulent surges of debris-laden water.

*Adapted from “How To Survive Earthquakes and Tsunamis on the North Coast” by the Humboldt Earthquake Education Center.
(<http://www.humboldt.edu/~geology/earthquakes/shaky2.html>)*

Tsunami Detection & Monitoring Systems:

As part of the U.S. National Tsunami Hazard Mitigation Program (NTHMP), deep-ocean tsunameters were developed by Project DART® (Deep-ocean Assessment and Reporting of Tsunamis) at NOAA's Pacific Marine Environmental Laboratory (PMEL). These systems have been deployed near regions with a history of tsunami generation to measure waves as they approach threatened U.S. coastal communities, and to acquire data critical for forecasting.

The first information available about the source of the tsunami is only based on the available seismic information for the earthquake event. As the tsunami wave propagates past the DART® systems, the systems report back information that is used to produce a new and more refined estimate of the tsunami source by the Tsunami Warning Centers, which provide more accurate tsunami forecasts that can be used to issue warnings.

The tsunami forecasting techniques developed at PMEL integrate real-time measurements and modeling technologies, an approach used in most hazard forecast systems. Both methods are needed to provide reliable tsunami forecasts since observational stations are sparse and numerical models are inherently limited by uncertainties in the data.



Tsunami Information Resources:

NOAA: Tsunamis
<http://www.tsunami.noaa.gov/>

NOAA: National Center for Tsunami Research
<http://nctr.pmel.noaa.gov/>

National Tsunami Hazard Mitigation Program
<http://nthmp.tsunami.gov/>

USGS: Surviving a Tsunami
<http://pubs.usgs.gov/circ/c1187/>

How Stuff Works: How Tsunamis Work
<http://science.howstuffworks.com/tsunami.htm>

The **Congressional Hazards Caucus** is co-chaired by Senators Mary Landrieu (LA), Ben Nelson (NE), and Lisa Murkowski (AK) and Representatives Dennis Moore (KS), Jo Bonner (AL) and Zoe Lofgren (CA). The Caucus helps individuals, businesses, and communities better prepare for and mitigate the costs of disasters. The Caucus seeks to foster dialogue on steps that government and citizens can take to lessen the severity of these disasters. To learn more about the Caucus, visit www.hazardscaucus.org.