

## Pacific Tsunami Services Tsunami Threat Advice

When a large earthquake occurs in the Pacific Ocean area, International (such as PTWC) and National Tsunami Warning Centers (NTWC) determine the earthquake's hypocenter, the initial rupture point of the earthquake, and its magnitude. If the hypocenter is under or near the ocean and not too deep within the earth, and if the magnitude is sufficiently large, then tsunami generation is possible. On the basis of this seismic evidence, the PTWC issues a tsunami threat to areas located near the epicenter. All remaining areas are issued general information. The initial bulletin tells customers that an earthquake has occurred, its location and origin time, and if a destructive tsunami is possible. Because tsunamis move through the water in accordance with known physical laws, estimated arrival times are computed and given for key Pacific locations. Additional bulletins are issued when tsunami wave forecasts are available, generally about 30 minutes after the earthquake. The issuance of new graphical forecast products for the Pacific commenced on 1 October 2014.

The first indication of a tsunami usually comes within a hour from the sea level stations located nearest the earthquake. Fortunately, most large earthquakes with tsunamigenic potential do not generate long-range destructive tsunamis. When there is confirmation of a tsunami, the PTWC alerts all system customers that dangerous waves have been reported, and continues to monitor the tsunami until the threat has passed.

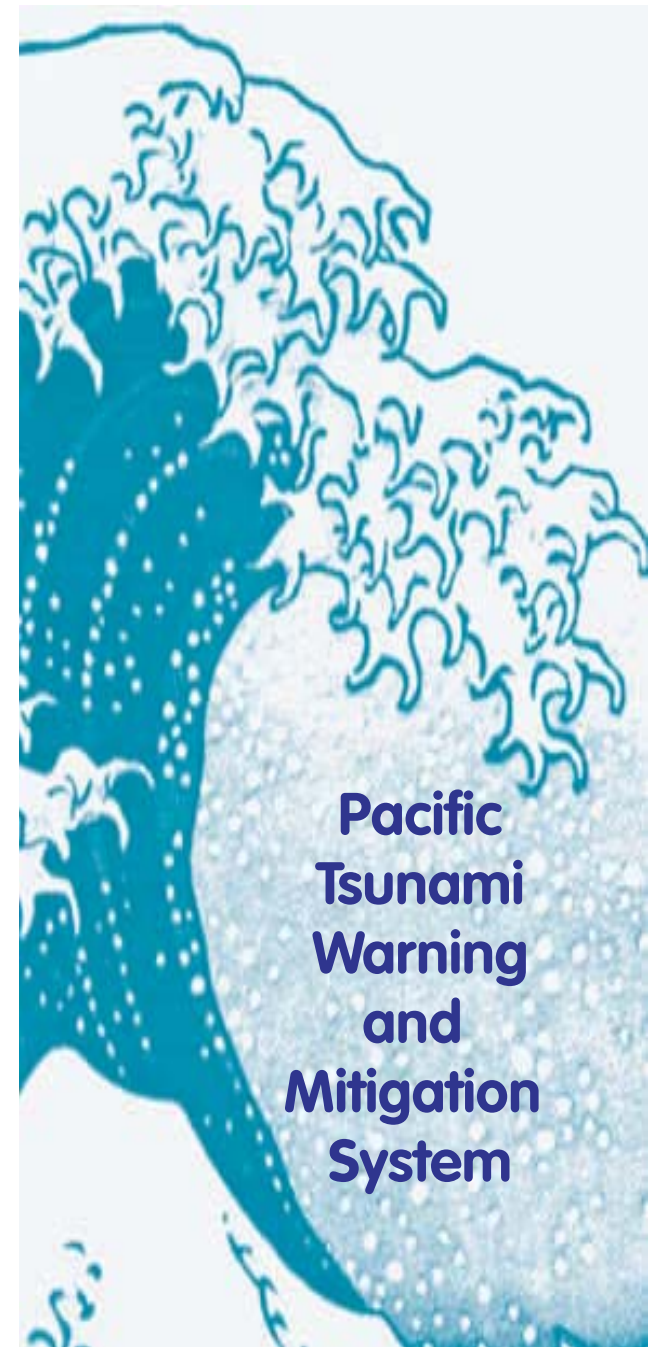
Text and graphical products are disseminated in accordance with procedures outlined in the Operational User's Guide for the Pacific Tsunami Warning and Mitigation System. National authorities are responsible for immediately interpreting the science-based alerts from PTWC or other international tsunami service providers, determining the tsunami threat to their country, and quickly disseminating official warnings and safety information to the public on what to do. They also have the ongoing responsibility for educating the public on the dangers of tsunamis and for developing safety measures to be taken to avoid the loss of life and reduce property damage.

### For further information, contact:

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## Tsunami Safety Rules

1. All large earthquakes do not cause tsunamis, but some do. When you know that an earthquake has occurred, stand by for a tsunami emergency message.
2. An earthquake in your area is one of nature's tsunami warning signals. Do not stay in low-lying coastal areas after strong or unusually long earthquake shaking has been felt.
3. Tsunamis are sometimes preceded by a noticeable fall in sea level as the ocean retreats seaward exposing the seafloor. A roar like an oncoming train may sometimes be heard as the tsunami wave rushes toward the shore. These are also nature's tsunami warning signals.
4. A tsunami is not a single wave, but a series of waves carrying a massive volume of water that can quickly flood and keep inundating the land for hours. The first wave may not be the largest. Strong currents are possible. Stay out of danger areas until an "all-clear" is issued by authorities.
5. A small tsunami at one point on the shore can be extremely large a few kilometers away, and can wrap around islands. Don't let the modest size of one make you lose respect for all.
6. All warnings to the public must be taken very seriously, even if some are for non-destructive events. The tsunami of May 1960 killed 61 people in Hilo, Hawaii, because some thought it was just another false alarm.
7. All tsunamis are potentially dangerous, even though they may not damage every coastline they strike.
8. Never go down to the shore to watch for a tsunami. When you can see the wave, you are too close to outrun it. Most tsunamis are like flash floods full of debris. Tsunami waves typically do not curl and break, so do not try to surf a tsunami.
9. Sooner or later, tsunamis visit every coastline in the Pacific and all oceans. If you live in any coastal area, be prepared and know nature's tsunami warning signs.
10. During a tsunami emergency, your local civil defense, police, and other emergency organizations will try to save your life. Give them your fullest cooperation.



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Intergovernmental  
Oceanographic  
Commission



National Oceanic  
and Atmospheric  
Administration



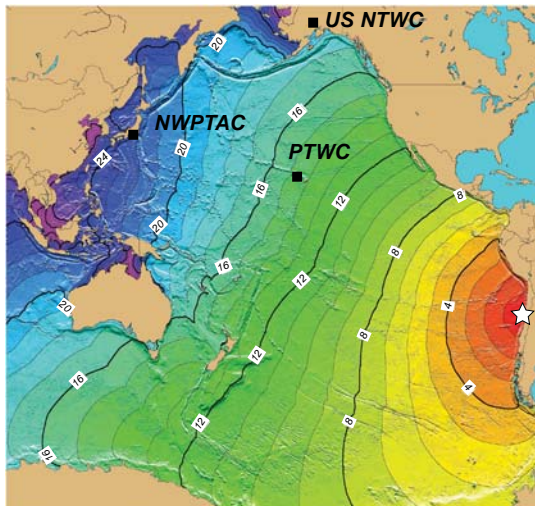
International  
Tsunami Information  
Center

Aleutian Islands tsunami attacking Hilo, Hawaii, 1 April 1946



## Tsunami

The phenomenon we call a "tsunami" is a series of travelling ocean waves of extremely long length and period, generated by disturbances associated primarily with shallow earthquakes occurring below or near the ocean floor. Underwater volcanic eruptions and landslides can also generate tsunamis, although these sources are significantly less frequent. As the tsunami crosses the deep ocean, sometimes at speeds exceeding 800 km/h (480 mph), its length from crest to crest may be 100 km or more (60 miles) and its period five minutes to an hour, but its height from trough to crest may only be a few tens of centimeters (a foot or so), even for a very destructive tsunami. It cannot be felt aboard ships in the open ocean. As the tsunami enters shallow water, its wave velocity decreases and its wave height increases. It is at coastlines that a tsunami becomes a threat to life and property for it can crest to heights of more than 20 m (30 feet), strike with devastating force, and quickly flood low-lying coastal areas. Dangerous waves come ashore for hours, and later waves may be larger.



**Tsunami Travel Times for 1960 Chile Tsunami**  
(1-hour contour interval)

## Pacific Tsunami Warning and Mitigation System

Under the auspices of the Intergovernmental Oceanographic Commission (IOC), the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System first convened in 1968 (ICG/PTWS, formerly known as ICG/ITSU for International Tsunami). An international cooperative effort involving Member States of the Pacific, the ICG/PTWS meets regularly to review progress and coordinate activities resulting in improvements of the service. The PTWS encompasses 46 countries of the Pacific Ocean and its marginal seas. Globally over history, 90% of the casualties have been caused by local or regional tsunamis where waves attack in minutes to hours. As such, emphasis has been on building community-level resiliency through timely warnings to a prepared and knowledgeable public that recognizes a tsunami and knows what to do and where to go to save their life.

The IOC and the U.S.A. maintain the International Tsunami Information Center (ITIC). Established in 1965 and staffed by the U.S.A. National Oceanic and Atmospheric Administration (NOAA) and Chilean Navy Hydrographic and Oceanographic Service (SHOA), the ITIC works closely with U.S.A. NOAA's Pacific Tsunami Warning Center (PTWC), and other international tsunami service providers such as Japan's Northwest Pacific Tsunami Advisory Center (NWPTAC) and NOAA's US Tsunami Warning Center (US NTWC).

ITIC's primary responsibilities include:

- monitoring the international tsunami warning activities in the Pacific and other oceans and recommending improvements in communications, data networks, acquisition and processing, tsunami forecasting methods, and information dissemination;
- bringing to Member and non-member States information on tsunami warning systems, on the affairs of IOC and ITIC, and on how to become participants in the global TWS;
- assisting Member States in the establishment of national and regional warning systems, and the reduction of tsunami risk through comprehensive mitigation programmes, and capacity building;
- acting as a clearinghouse for educational and preparedness materials, facilitating post-event tsunami surveys, collecting and archiving historical event data, and fostering research and its application to save lives and mitigate losses from tsunami.

The PTWC serves as the PTWS's main tsunami service provider. PTWC works closely with other international, sub-regional and national centres in monitoring seismic and sea level stations around the Pacific Ocean for large earthquakes and tsunami waves. The PTWC makes use of about 600 high-quality seismic stations around the world to locate and size potentially tsunamigenic earthquakes, and accesses about 600 coastal sea level and 60 deep-ocean pressure systems (DART, tsunameters) globally to verify the generation of and evaluate the severity of a tsunami. Tsunami threat information is disseminated to designated national authorities across the Pacific as guidance for country decision-making on tsunami warnings. Other tsunami service providers such as the US NTWC and NWPTAC provide regional alerts to the U.S. A. West Coast, Alaska and Canada, and the Northwest Pacific and South China Sea regions, respectively.

The Pacific Tsunami Warning and Mitigation System is one of the most successful international scientific programmes with the direct humanitarian aim of mitigating the effects of tsunami to save lives and property.

