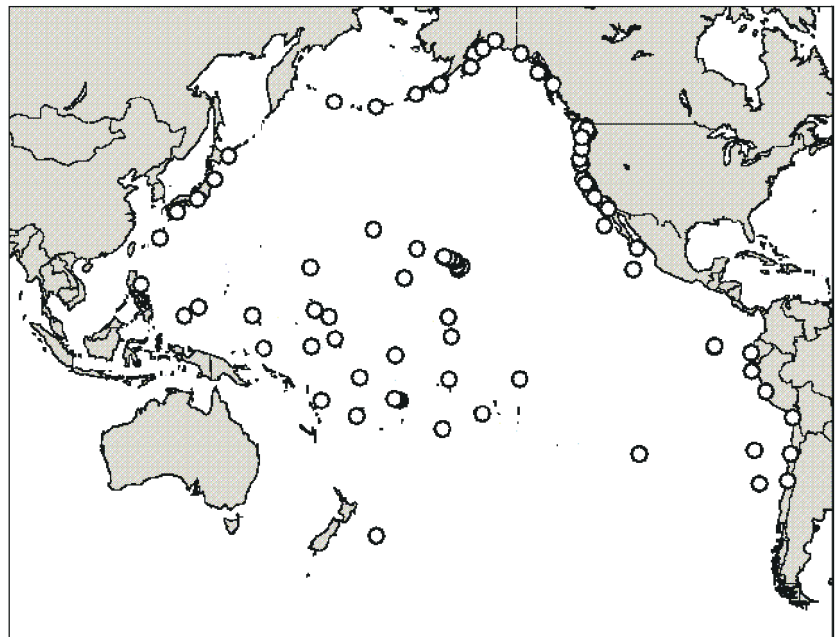


Water level gauges used by the Pacific Tsunami Warning Center to confirm and evaluate Pacific-wide tsunamis. Gauges are owned and operated by many organizations, and their data are shared for a variety of purposes. The configuration changes from time to time, and the most current information is found in the "Communications Plan for the Tsunami Warning System" and its updates.



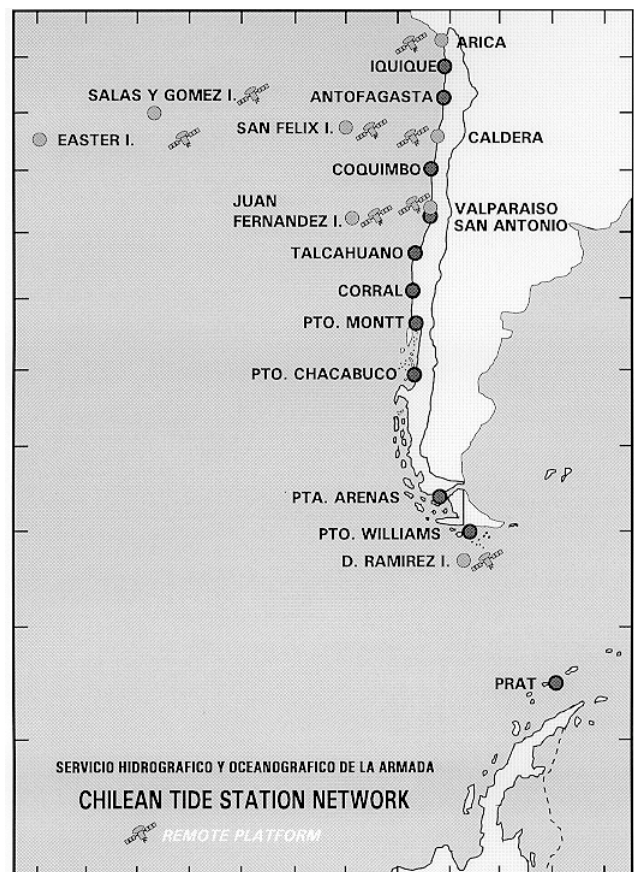
Water Level Data

Water-level gauges are an essential element of tsunami warning systems. When strategically located, they are used to quickly confirm the existence or non-existence of tsunami waves following an earthquake, to monitor the tsunami's progress, to help estimate the severity of the hazard, and to provide a basis for declaring the hazard over. Water level gauges may also be the only way to detect a tsunami in cases where seismic data are, or when the tsunami is not earthquake generated.

The majority of the water level gauges used for tsunami warning purposes were designed to measure tides. Tide gauges typically use a **stilling well** to eliminate the higher frequency wind wave signals. A stilling well is usually a long hollow vertical cylinder, sealed at the bottom except for a small opening, and mounted on the side of a pier so it extends into the ocean. Seawater inside the cylinder rises and falls with the slowly changing tides, but the small opening at the bottom restricts the flow so that much higher frequency wind-driven waves and swell have little effect on the level. Tsunami waves have frequencies in between the two extremes and can pass inside the stilling well, but often with reduced amplitude as well as a delay. Water level measurements inside the stilling well are usually made by mechanical or acoustical techniques.

Another type of tide gauge known as a **bubbler** has a wider frequency response, and uses a slow but constant flow of gas that escapes out the submerged end of a long narrow tube. As ocean levels rise and fall over the tube opening, the pressure needed to maintain that constant gas

flow increases and decreases accordingly. This backpressure can be measured and converted into a water level.



Gauges of the National Tsunami Warning System of Chile.