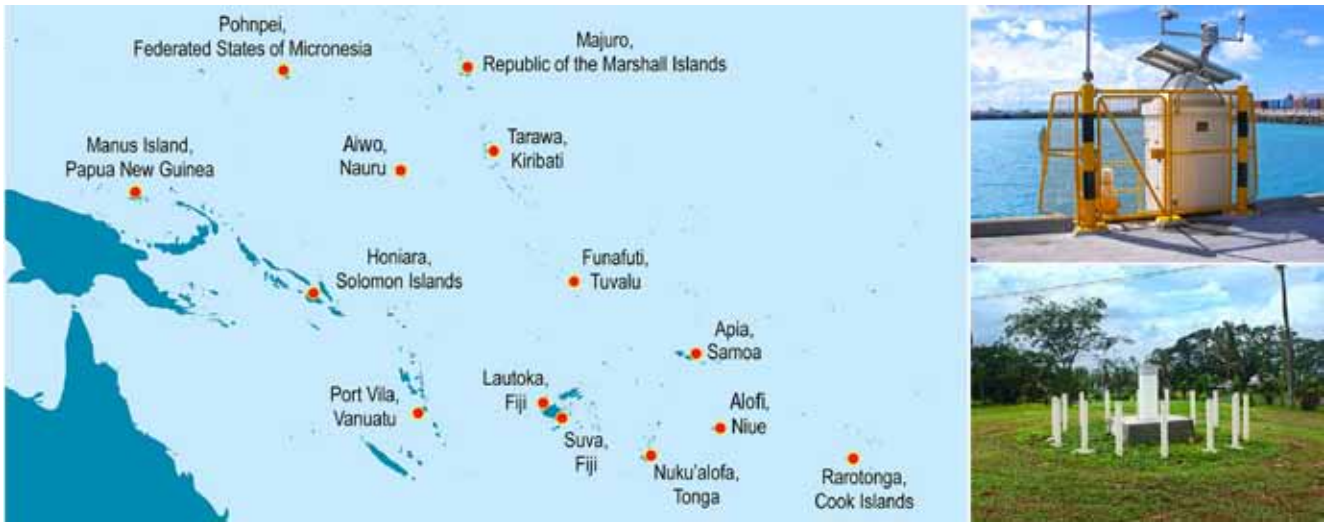
Pacific Sea Level and Geodetic Monitoring Project

Providing continuous, high-quality sea level, climate, and geodetic data for the Pacific Islands since 1991

In the early 1990s, the Australian Government established a network of tide gauges to collect sea level and weather data in thirteen Pacific locations. This was in response to concerns voiced by Pacific Forum leaders about the potential impact of changing climate and sea levels. This network, now called the **Pacific Sea Level and Geodetic Monitoring Project**, is a continuation of the South Pacific Sea Level and Climate Monitoring Project that began in 1991. From 2010 to 2015, the tide gauges have been progressively refurbished and upgraded, and their number has grown to fourteen.



Sea-level monitoring tide gauges and geodetic earth-monitoring stations are located in thirteen Pacific countries. Sea-level monitoring station in Kiribati (top right) and geodetic earth-monitoring station in Fiji (bottom right).

Niue was added to the network in 2015 and the new tide gauges in Tuvalu and Tonga are now the most technologically advanced addition to the network. These sea-level monitoring stations form the backbone of one of the world's most important ocean-monitoring networks. They provide an indispensable record for meteorological agencies, emergency services, shipping operators, and a huge range of industries across the Pacific Ocean.

How do the sensors monitor sea level?

The monitoring stations employ a sophisticated set of acoustic, water pressure and radar sensors to record changes in sea level to an accuracy of within one millimetre, together with an array of sensors to measure wind speed and direction, air and water temperatures, and the atmospheric pressure.

Data are captured each minute and sent via satellite to the Australian Bureau of Meteorology, where it can be analysed by tidal experts and relayed to meteorological services across the Pacific. The quality controlled data are also accessible to the public.

Each sea-level monitoring station also has a partnering geodetic earth-monitoring station on land. These use a satellite navigation system to continually track the motion and deformation of the land, as during earthquakes for example.

Together with regular land surveying work, these land-monitoring stations enable vertical land movements to be recorded for later analysis alongside sea level changes. This makes the assessment of sea-level rise a more precise science.

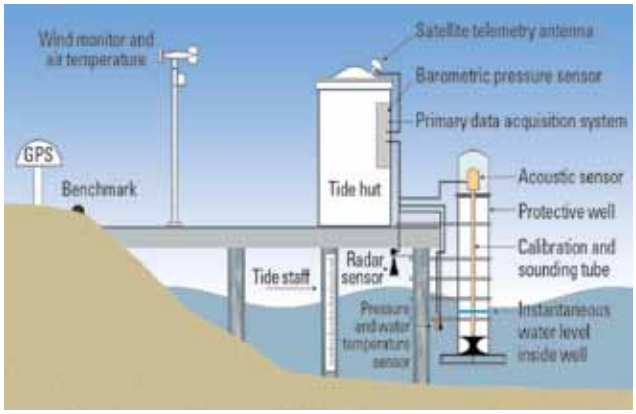


Diagram of a typical sea-level monitoring station.

Australian AID

Climate and Oceans Support program in the Pacific

Pacific Community
Communauté du Pacifique

How is this information used?

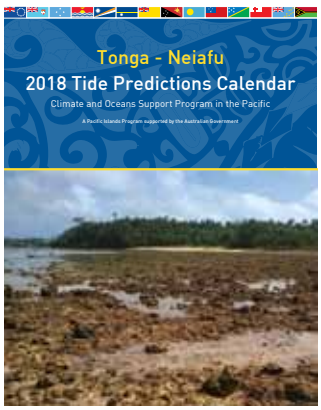
Information from the tide gauges and land-monitoring stations serve a multitude of vital roles, including:

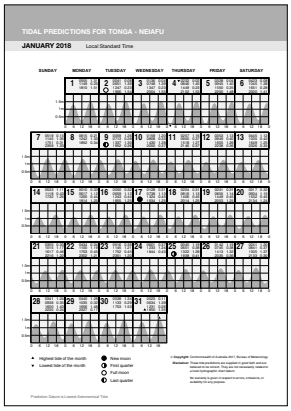
1. **Tidal Predictions:** the project produces monthly and annual tide calendars, available in print and online for 17 different locations in the region.
2. **Long Term Climate Trends:** with records of sea level extending back nearly 30 years and land-monitoring information for over 15 years, the project today provides a continuous record of enormous value to those working to assess the impact of changing Pacific climate and sea levels.
3. **King Tide Warnings:** Pacific governments routinely use the tide calendars to predict extreme high tide events, or 'king tides', which are announced on the radio and through community pamphlets.
4. **Tsunami Warning:** the project provides real-time data for the tsunami warning systems operated by the Joint Australian Tsunami Warning Centre and the Pacific Tsunami Warning Center in Hawaii.
5. **Spatial Information Management:** Geodetic infrastructure supports many global economic activities and is important for the development of the Pacific region. The earth-monitoring stations provide the most reliable geospatial information that underpins aspects of land ownership, engineering and construction, topographic mapping and hydrographic charting, as well as the delimitation of maritime zones and boundaries.
6. **Disaster Risk Reduction:** the sea level record is critical for research modelling of coastal inundation and storm surges, allowing countries to prepare for future events and build their resilience to natural hazards.
7. **Coastal Zone Management:** major coastal infrastructure developments require information on average sea levels, and the lowest and highest tides in that area.

King tide inundation in Tuvalu. Image credit: UNFCCC.

Where can I access this information?

Tidal prediction calendars are available in print and on the Pacific Sea Level Monitoring Project website.





2018 Tide Prediction Calendar for Neiafu, Tonga.

Real-time information from individual sea-level monitoring stations are available to the public through the Pacific webpages offered by the Australian Bureau of Meteorology on http://www.bom.gov.au/pacific

A dashboard view of real-time sea level and weather information from the Samoa tide gauge in Apia.

In addition, data from the geodetic stations can also be accessed online on the Geoscience Australia website: http://www.ga.gov.au

For more information

The Pacific Sea Level Monitoring Project is funded by the Australian Aid program of the Australian Government Department of Foreign Affairs and Trade, and supported by Geoscience Australia, Pacific Island country governments, and the Pacific Community.

To access tide calendars, weather maps, and climate data for your location visit: www.bom.gov.au/pacific