

OUR PACIFIC OCEAN, OUR STORIES

Tides and Extreme Tide Events



More and more, Pacific media are writing about climate change and telling Pacific stories of Pacific people being impacted. With all of our Pacific islands surrounded by oceans, some islands and atolls in particular with extremely small landmass, knowing about tides may help enhance media reports.

Samoa © Stuart Chape

As we face the stronger extreme weather events that are projected as an impact of climate change, knowing about tides can help provide the foundation for good stories. The more you are informed and share your knowledge in media reports, the more informed your audiences become.

The following is developed from the Tides and Extreme Tide Events factsheet produced by the Pacific Community (SPC) through the Climate and Oceans Support program in the Pacific (COSPPac).

All about tides

Tides are the daily rise and fall of sea levels, caused by the gravitational pull of the moon and the sun, and also by the Earth's rotation. There are many different types of tides that happen. In locations around the Pacific, we observe different types of tides and tidal events over the course of a day, month, or year.

Spring tides and neap tides

Spring tides and **neap tides** are part of the normal tidal cycle and occur regularly, usually twice per month.

Spring tides are very high tides and very low tides that occur during full and new moon phases, when the gravitational forces of the sun and moon combine to exert a stronger pull on the oceans.

During the moon's quarter phases each month, the sun and moon are at right angles, and the gravitational forces cancel each other out, resulting in lower high tides and higher low tides called neap tides.





King tides

The term **king tide** is commonly used to describe an especially high spring tide. King tides occur a few times every year, when the gravitational pull of the sun and moon upon the Earth is the strongest. This happens when the moon is closest to the Earth in its monthly orbit. When this coincides with a spring tide, it will produce an especially high tide, or king tide.

In the Pacific, the highest king tides often occur during the months of November to March, when the Earth is also closest to the sun in its annual orbit.

What you should know

King tides are a natural part of the tidal cycle and are predictable. A king tide can cause coastal flooding, even on a clear, sunny day. When king tides coincide with cyclones, floods or storms, water levels can rise significantly, potentially causing damage to property and the coastline. The actual height reached by a king tide will depend on the local weather and ocean conditions on the day. It is also important to note that king tides have always occurred and are not a result of sea level rise.



LOW TIDE

HIGH TIDE

Predicting tides

The time and approximate heights of tides are very predictable. They follow the laws of physics and can be calculated with mathematical formulas. By observing and recording tides at a single location over many years, we can gain a better understanding of tides and sea level changes over time.

The Pacific Sea Level and Geodetic Monitoring Project (PSLGM) has been recording sea level and weather statistics in 13 Pacific countries for more than 25 years. These observations tell a story about the sea levels at these locations: How high was the highest tide in Apia? What effect does El Niño have on sea levels in Kiribati? All of this information is also used to verify and improve tide predictions.

Tide levels can, however, vary from predicted levels for a number of reasons, including:

- **Geography:** The shape of bays and other coastal geography can magnify or otherwise influence water levels.
- **Weather:** Wind speed and direction, air temperature, barometric pressure and other weather conditions can greatly affect water levels.
- **Waves:** Both nearby and faraway events such as storms, landslides and earthquakes can create large waves that lead to coastal flooding.
- **Climate drivers:** El Niño or La Niña conditions in the Pacific can raise or lower sea level by as much as 50 cm.
- **Sea-level rise:** Through assessing observations and research, the Intergovernmental Panel on Climate Change (IPCC) concluded that global average sea levels have been rising at a rate of about 3 mm per year since 1993. Levels were 225 mm higher in 2012 compared to 1880. Sea-level rise can contribute to higher tides, but the rates are not the same at all locations.

More about the PSLGM

The PSLGM operates under the Climate and Oceans Support Program in the Pacific (COSPPac). It is a continuation of the 20-year South Pacific Sea Level and Climate Monitoring Project (SPSLCMP).

COSPPac is funded by the Australian Government and implemented by the Bureau of Meteorology. COSPPac partners with many other agencies to deliver the program including the Australian Government Department of Foreign Affairs and Trade, Geoscience Australia, the Pacific Community and the Secretariat of the Pacific Regional Environment Programme.

Telling our Pacific stories

What types of tides impact your Pacific communities? Linking these tides and sharing information about them by telling the stories that impact people helps raise awareness of tides and what we need to know to prepare for them.

Getting it right. Knowing about tides can help make sure your media reports are correct when and if you are linking the tides to impacts of climate change. Spend time with your national Met Services and other departments and agencies that can help tell you more about tides and the linkages between them and other issues such as climate change.