

Tonga's future climate

This is a summary of climate projections for Tonga. For further information, refer to Volume 2 of Climate Change in the Pacific: Scientific Assessment and New Research, and the web-based climate projections tool – Pacific Climate Futures ([available at www.pacificclimatefutures.net](http://www.pacificclimatefutures.net)).

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Temperature will continue to increase	Projections for all emissions scenarios indicate that the annual average air temperature and sea surface temperature will increase in the future in Tonga (Table 1). By 2030, under a high emissions scenario, this increase in temperature is projected to be in the range of 0.3-1.1°C
More very hot days	Increases in average temperatures will also result in a rise in the number of hot days and warm nights and a decline in cooler weather.

Table1: Projected annual average air temperature changes for Tonga for three emissions scenarios and three time periods. Values are represented 90% of the range of the models and changes are relative to the average of the period 1980-1999.

	Projected annual average air temperature changes		
	2030 (°C)	2055 (°C)	2090 (°C)
Low emissions scenario	0.2-1.0	0.5-1.5	0.8-2.0
Medium Emissions scenario	0.2-1.2	0.7-1.9	1.3-2.9
High Emissions scenario	0.3-1.1	1.0-1.8	1.9-3.3

Changing rainfall pattern	There is certainty around rainfall projections for Tonga as model results are not consistent. However, projections generally suggest a decrease in dry season rainfall over the course of the 21 st century. Wet season increase is consistent with the expected intensification of the South Pacific Convergence Zone. Drought projections are inconsistent across Tonga.
More extreme rainfall days	Model projections show extreme rainfall days are likely to occur more often.

Less frequent but more intense tropical cyclones

On a global scale, the projections indicate there is likely to be a decrease in the number of tropical cyclones by the end of the 21st century. But there is likely to be an increase in the average maximum wind speed of cyclones by between 2% and 11% and an increase in rainfall intensity of about 20% within 100km of the cyclone center.

In Tonga region, projections tend to show a decrease in the frequency of tropical cyclones by the late 21st century and an increase in the proportion of the more intense storms.

Sea level will continue to rise

Sea level is expected to continue to rise in Tonga (Table 2). By 2030, under a high emissions scenario, this rise in sea level is projected to be in the range of 3-17 cm. The sea-level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding.

Table2: Sea-level rise projections for Tonga for three emissions scenarios and three time periods. Values are represented 90% of the range of the models and changes are relative to the average of the period 1980-1999.

	Sea-level rise projections		
	2030 (mm)	2055 (mm)	2090 (mm)
Low emissions scenario	5-16	10-27	16-47
Medium Emissions scenario	4-16	10-31	20-59
High Emissions scenario	3-17	9-13	21-62

Ocean acidification will continue

Under three emissions scenarios (low, medium, and high) the acidity level of sea waters in the Tonga region will continue to increase over the 21st century, with the greatest change under the high emissions scenario. The impact of increased acidification on the health of reef ecosystems is likely to be compounded by other stressors including coral bleaching, storm damage and fishing pressure.