Summary: Climate Change in Solomon Islands 2022

Historical and Recent Variability, Extremes and Change

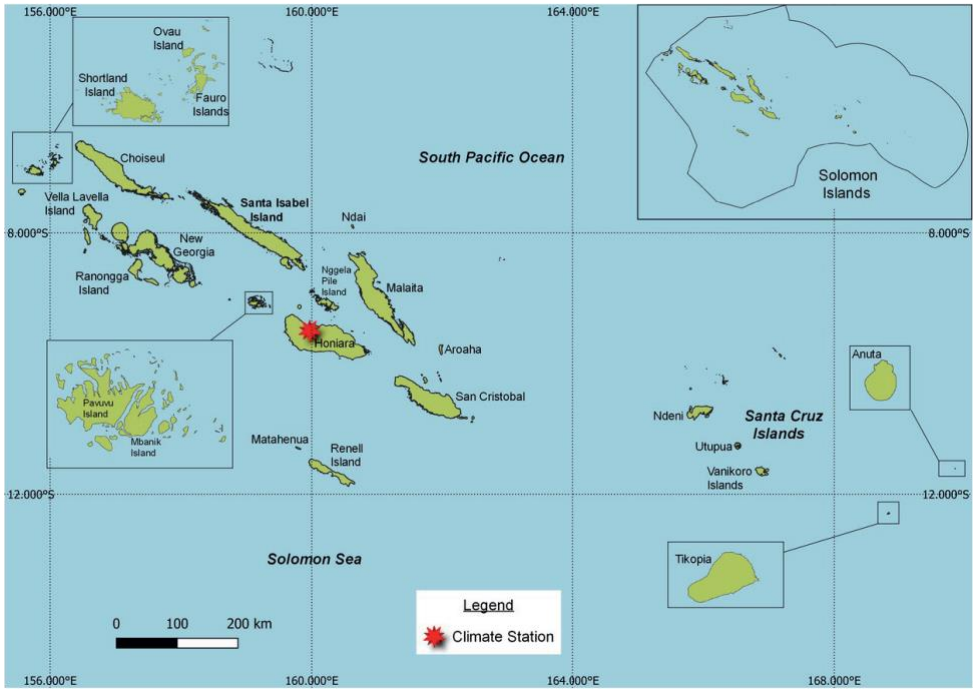
COSPPac
Climate and Oceans Support Program in the Pacific

This brochure provides a snapshot of key long-term changes in climate and ocean variables in the Solomon Islands. Long-term changes were determined by analysing trends in historical climate and ocean data. Trends provide information about climate change in the Solomon Islands 'to date'.

Climate variability strongly influences extreme events in the Solomon Islands. The brochure also provides up-to-date scientific information on climate variability and its influence on extreme events.

Figure 1:

The Solomon Islands and the location of the Honiara climate station used in Climate Change in the Pacific 2022 report.



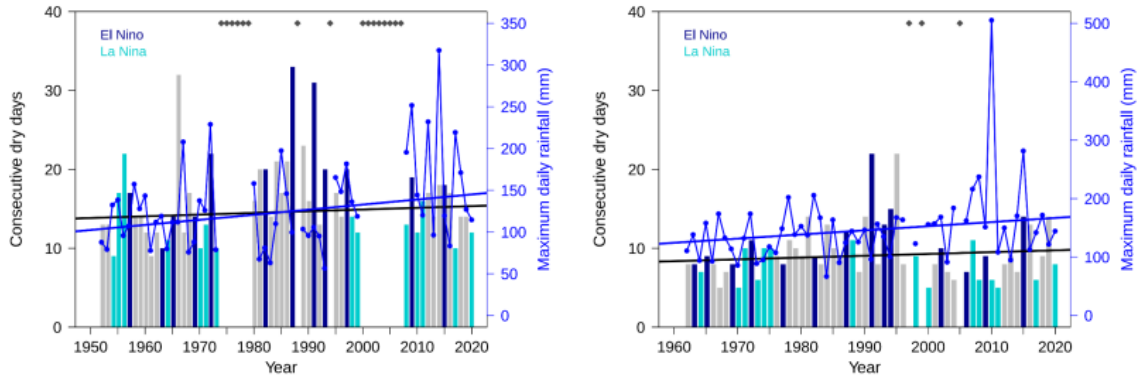
The maximum amount of rainfall received on a single day has increased

Annual rainfall varies from approximately 1300 to 3000 mm per year at Honiara and 2600 to 4400 mm at Munda. The band of high rainfall known as the South Pacific Convergence Zone (SPCZ) intensifies during the wet season (December to April) and contributes to the high rainfall at this time, with Munda receiving more rainfall than Honiara due to its location closer to the western Warm Pool and SPCZ. There has been little change in annual and seasonal rainfall since 1951 at both locations.

The maximum amount of rain that falls on a single day has increased significantly since 1951 at Honiara (6 mm/decade) and Munda (7 mm/decade) (Figure 2). At Honiara, the number of wet days per year has decreased by around 3 days per decade.

Figure 2:

Annual longest run of consecutive dry days (bar graph) and maximum daily rainfall (line graph) at Honiara (left) and Munda (right). Straight lines indicate linear trends for dry days (in black) and maximum daily rainfall (in blue). Diamonds indicate years with insufficient data for one or both variables.



There has been little long-term change in dry spells and drought over time, while there is little change in the longest run of days without rain over time, this rarely exceeds three weeks at Honiara and two weeks at Munda.

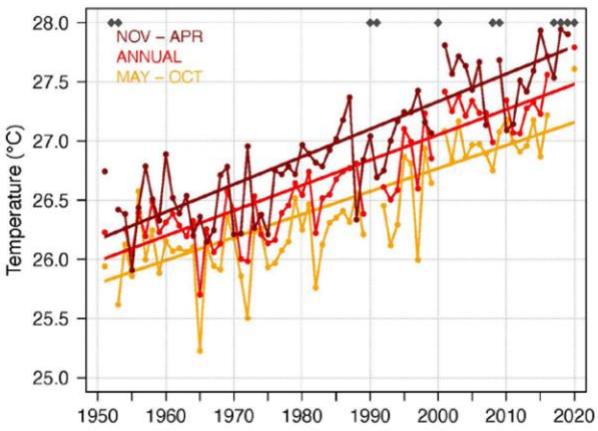
Air Temperature has increased

Average annual temperatures at Honiara have increased by 0.21 °C per decade since 1951. Average November–April temperatures are warming faster than May–October temperatures (Figure 3).

The number of cold nights at Honiara has decreased significantly, and available data suggest Honiara now experiences more than three times as many hot days compared to the 1950s.

Figure 3:

Average annual, November–April and May–October temperatures for Honiara. Straight line indicates linear trend. Diamonds indicate years with insufficient data for one or more variables



Long-term increases in both average temperature and temperature extremes in the Pacific are likely driven by human-associated climate change due to the rate of the observed changes and consistency with global trends that have been attributed to climate change (PCCM, 2021).

Tropical cyclone severity has decreased

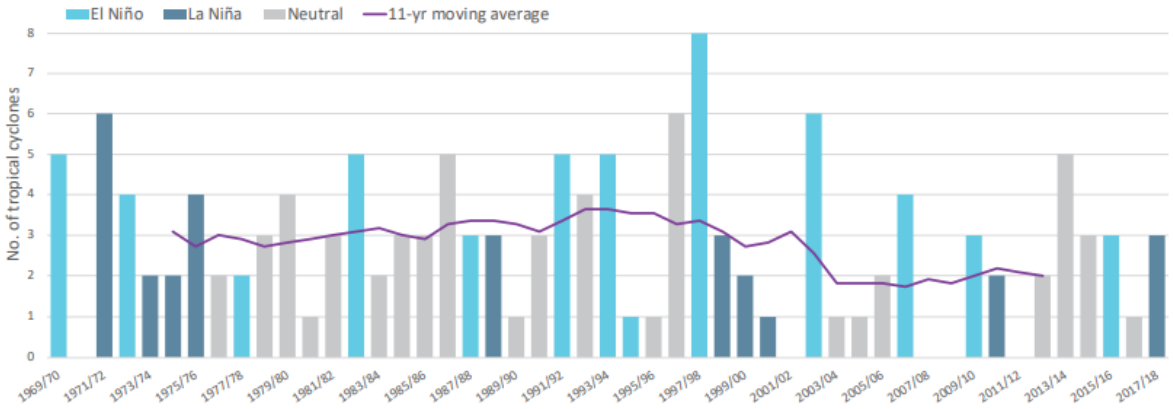
In the greater Southwest Pacific, the total number of **severe** tropical cyclones[1] has decreased over the last 40 seasons. There has been little change in the total number of tropical cyclones of any category in the southwest Pacific. The number of tropical cyclones that became severe events has marginally declined.

Tropical cyclones usually affect the Solomon Islands during the southern hemisphere tropical cyclone season, which is from November to April, but also occasionally occur outside the tropical cyclone season.

The number of tropical cyclones occurring in the Solomon Islands' Exclusive Economic Zone (EEZ) varies considerably from one year to the next (Figure 4). Tropical cyclones were most frequent in El Niño years (42 cyclones per decade), followed by neutral years (25 cyclones per decade) and least frequent in La Niña years (20 cyclones per decade).

Figure 4:

Number of tropical cyclones passing within the Solomon Islands EEZ per season. Each season is defined by the ENSO status, with light blue being an El Niño year, dark blue a La Niña year and grey showing a neutral ENSO year. The 11-year moving average is presented as a purple line and considers all years.



Due to this high interannual variability and the relatively small number of tropical cyclones passing through any country's EEZ since reliable records began, individual country analysis of long-term trends in frequency and intensity is not possible.

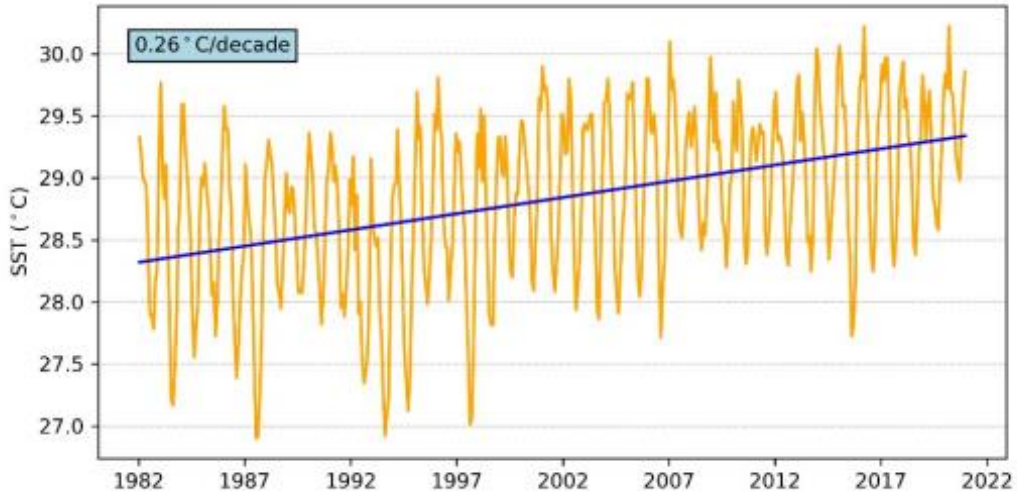
[1] A 'severe' tropical cyclone is defined as having a minimal central pressure of <970 hectopascals (hPa). Pressure is often used when comparing intensity of tropical cyclones.

Sea surface temperature has increased

Sea surface temperatures averaged across the Solomon Islands' EEZ increased by 0.26 °C per decade since 1982 (Figure 5).

Figure 5:

Sea surface temperature from satellite observations averaged across the Solomon Islands EEZ, shown as the orange line. The blue line shows the linear regression trend.



Globally, sea surface temperature is one of the most widely used indicators used to monitor human-associated climate change. Modes of climate variability influence sea surface temperatures on an interannual and decadal/multi-decadal basis; however, climate change is a driver of the long-term positive trend (PCCM, 2021).

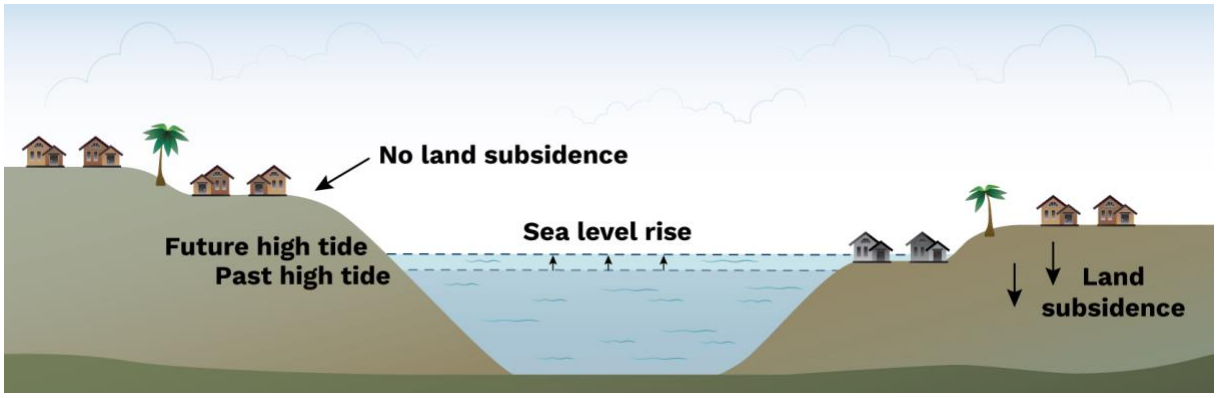
Sea surface temperatures at the Honiara tide gauge tend to be warmest in December/January and in April, reaching, on average, a maximum of 30 °C. Sea surface temperatures are coolest in August. Hourly temperatures can be up to 2 °C higher or lower than these monthly averages at Honiara and may differ at other locations in the Solomon Islands.

Sea level has increased

A combination of sea level rise and land subsidence has increased relative sea level at the Honiara tide gauge by 3.7 mm per year since 1993 (Figure 4). Peak sea levels typically occur between November and January and also between March and April.

Figure 6:

The effect of sea level rise and land subsidence on local sea level.



The long-term trend in sea level from satellite altimetry across the Solomon Islands' EEZ is 3.5–5.5 mm per year since 1993. This trend is higher than the global average trend.

Coastline, Solomon Islands

The rise in Pacific mean sea level since 1993 is primarily attributable to global warming. Naturally-occurring modes of climate variability in the Pacific region - for example, the El Niño–Southern Oscillation (ENSO) on interannual time scales, and the IPO (Interdecadal Pacific Oscillation)/PDO (Pacific Decadal Oscillation) on decadal to multi-decadal time scales - influence sea level and can amplify or dampen the underlying trends arising from global warming (PCCM, 2021).

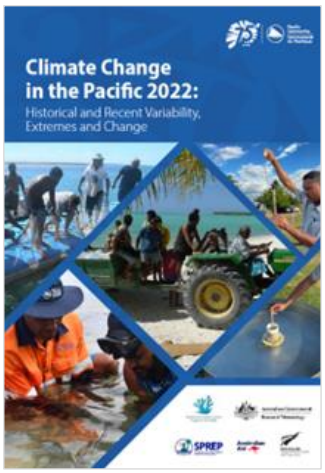
Waves

Waves at Honiara come from the northwest to the northeast. On average, Honiara experiences approximately two extreme wave events – defined as reaching or exceeding a wave height of 1 m per year.

There has been no long-term change in average annual wave height since 1979. Wave height, wave period (the time interval between two waves) and wave direction changes from month to month with the seasons and, to a lesser degree, year to year with climate variability modes. The highest waves usually occur between November and March, and the longest wave periods also occur over these months.

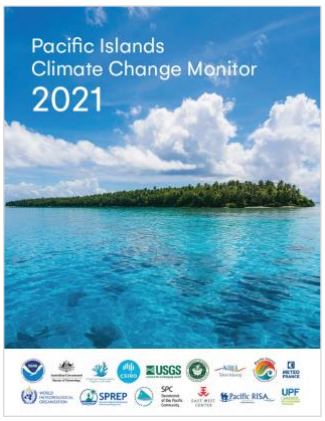
Further reading

For more information, refer to Climate Change in the Pacific 2022: Historical and Recent Variability, Extremes and Change. Climate and Oceans Support Program in the Pacific. Fifteen country chapters are available at https://purl.org/spc/digilib/doc/kskiv



For more information on Pacific-wide observed and future trends in climate indicators, see the Pacific Islands Climate Change Monitor 2021, available at https://www.pacificmet.net/sites/default/files/inline-files/documents/PICC%20Monitor_2021_FINALpp_0.pdf

Historical climate trends and basic climate information from observation sites across the Pacific Islands are available through the web-based Pacific Climate Change Data Portal at www.bom.gov.au/climate/pccsp



Information about future climate change can be found in the 'NextGen' Projections for the Western Tropical Pacific country reports https://www.csiro.au/en/research/environmental-impacts/climate-change/pacific-climate-change-info

Honiara, Guadalcanal Island, Solomon Islands

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Australian Aid

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For more detailed information on the climate of the Solomon Islands and the Pacific, see:
McGree, S., G. Smith, E. Chandler, N. Herold, Z. Begg, Y. Kuleshov, P. Malsale and M. Ritman. 2022. Climate Change in the Pacific 2022: Historical and Recent Variability, Extremes and Change. Climate and Oceans Support Program in the Pacific. Pacific Community, Suva, Fiji.

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