Summary: Climate Change in Nauru 2022

Historical and Recent Variability, Extremes and Change

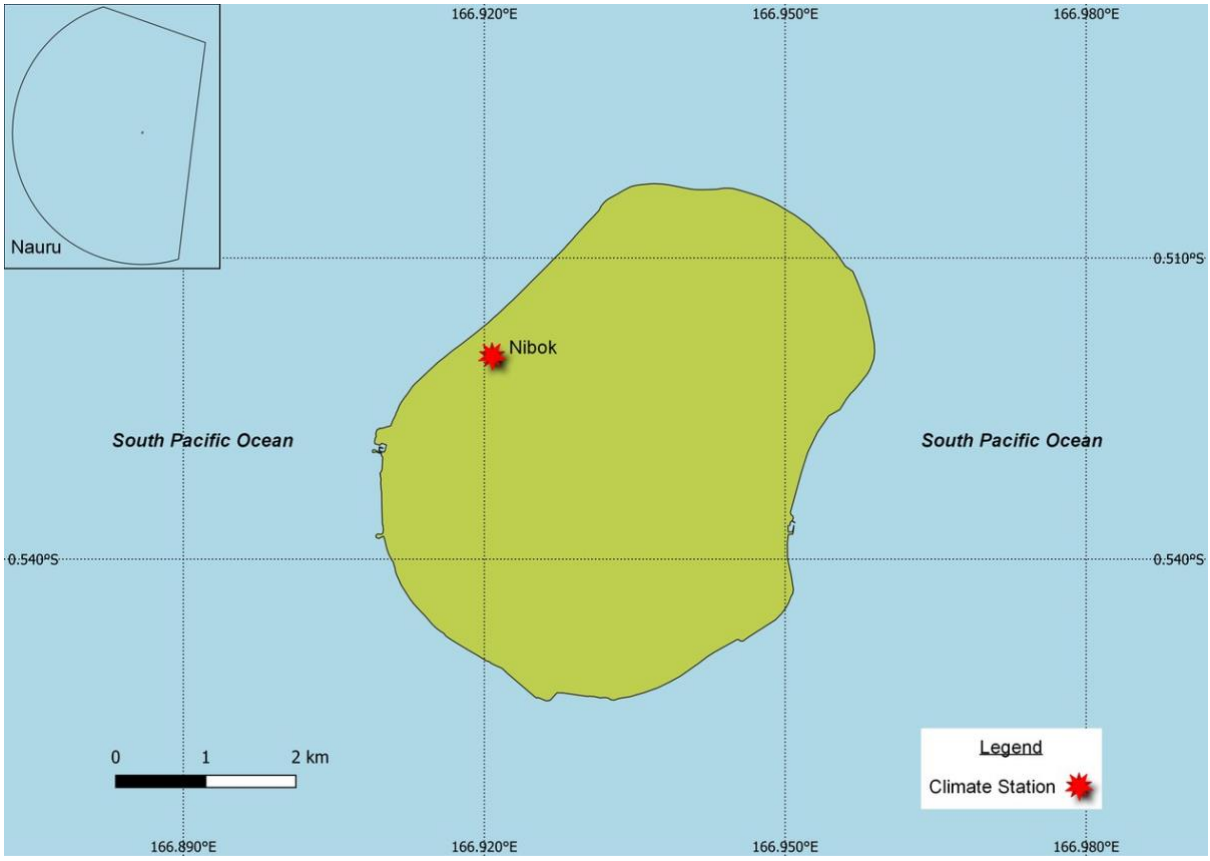
COSPPac
Climate and Oceans Support Program in the Pacific

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

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

Figure 1:

Nauru and the location of the climate station used in Climate Change in the Pacific 2022 report.



Annual and seasonal rainfall has not changed

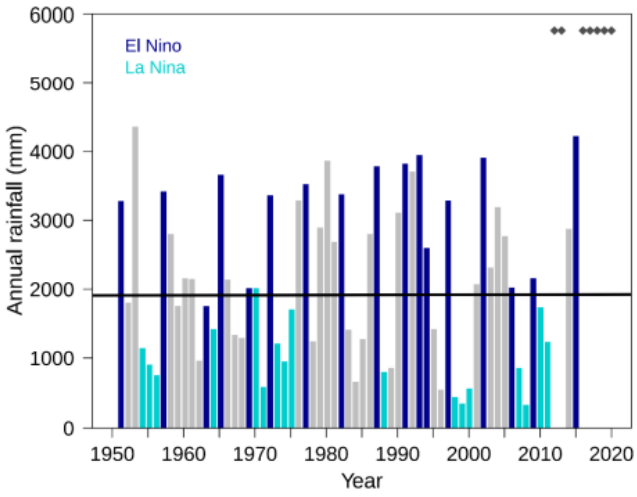
There has been little long-term change in annual and seasonal rainfall since 1951 at Nauru (Figure 2).

The El Niño Southern Oscillation (ENSO) – a natural mode of climate variability – influences rainfall variability significantly from year to year over Nauru. El Niño years receive significantly more rainfall than La Niña years (Figure 2).

The year-to-year variability of annual rainfall is very large in Nauru, since 1951 this has varied from approximately 300 to 4400 mm. Limited daily totals are available so no trends in rainfall extremes have been calculated.

Figure 2:

Annual rainfall at Nauru. The straight line indicates the linear trend for annual rainfall (in black). The magnitude of this trend is presented in Table 7.1. Diamonds indicate years with insufficient data.



Air Temperature has increased

Air temperature trends were calculated using ERA5 reanalysis data. Average annual temperatures have increased by 0.16 °C per decade since 1979. Average wet season (November–April) and dry season (May–October) temperatures also increased. The increases in daytime (maximum) and nighttime (minimum) air temperatures were similar.

The number of hot days and warm nights has increased, and the number of cool days and cold nights has decreased over Nauru. The number of hot days has increased by 22 days per decade since 1979. Hot days have a maximum temperature above 28.2–29 °C degrees, depending on the time of year.

The number of days where air conditioning is required to cool a building down to 25 °C has increased by 55 days per decade, indicating that energy demand for cooling has increased since 1979.

Long-term increases in both average and extreme temperature 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 decreased in the Southwest Pacific

Due to Nauru's location near the equator, no tropical cyclones passed within Nauru's Exclusive Economic Zone (EEZ) between the 1969/70 and 2017/18 seasons.

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.

In the western North Pacific, there has been little change in the total number of tropical cyclones or the number of **severe** tropical cyclones over the last 41 seasons.

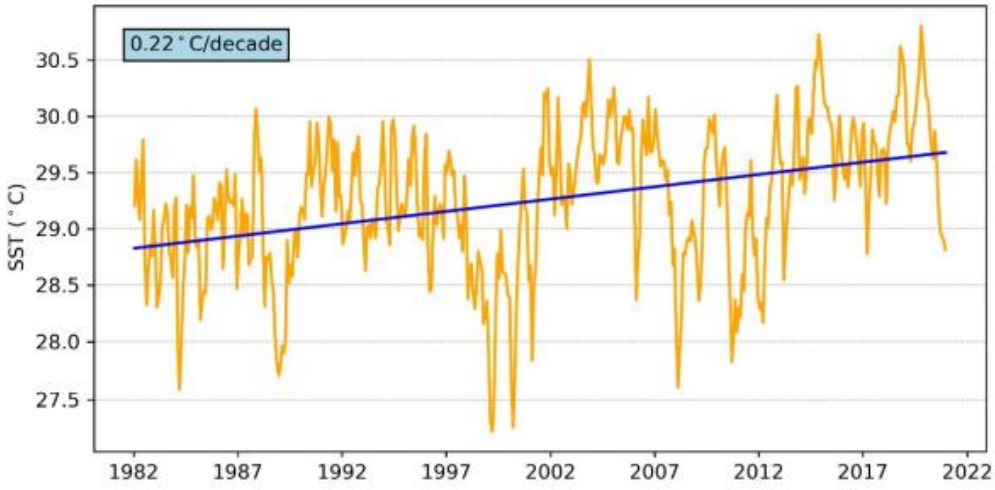
[1] A 'severe' tropical cyclone is defined as having a minimal central pressure of <970 hectopascals (hPa). Pressure is often used when comparing intensity of tropical cyclones.

Sea surface temperature has increased

Sea surface temperatures averaged across Nauru's EEZ increased by 0.22 °C per decade since 1981 (Figure 3).

Figure 3:

Sea surface temperature from satellite observations averaged across Nauru's 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 anthropogenic climate change. Modes of climate variability influence sea surface temperatures on an interannual and decadal/multi-decadal basis, however, anthropogenic climate change is a driver of the long-term positive trend (PCCM, 2021).

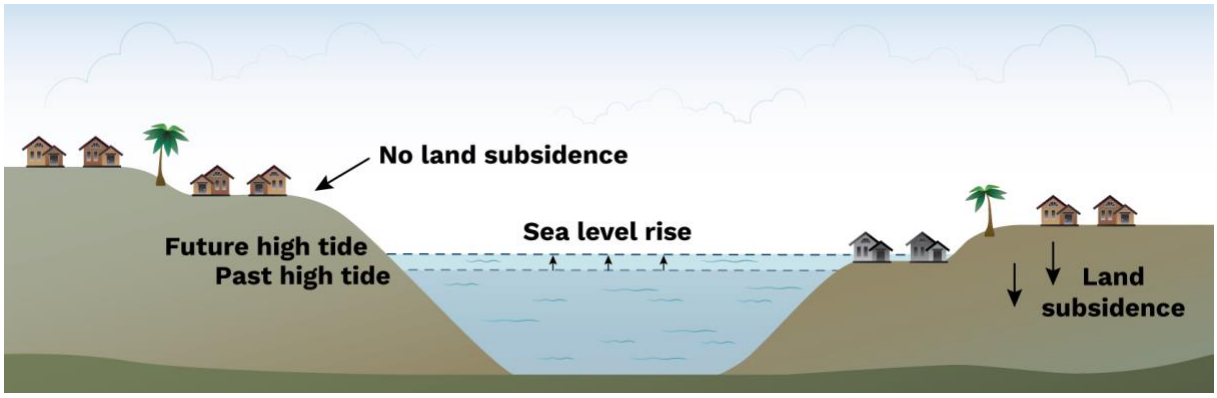
Sea surface temperatures around Nauru tend to be warmest in July reaching, on average, a maximum of 28.6 °C and coolest in February/March reaching, on average, a minimum of 27.7 °C. Hourly temperatures can be up to 3 °C higher or 4 °C lower than these monthly averages in Nauru.

Sea level has increased

A combination of sea level rise and land subsidence has increased relative sea level by 5.5 mm per year in Nauru since 1993 (Figure 4). Peak sea levels typically occur from October to March.

Figure 4:

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



The long-term trend in sea level across Nauru's EEZ is 3.5–4.5 mm per since 1993. This increasing trend is lower than that reported by the Nauru tide gauge (5.5 mm per year). Both trends are higher than the global average trend (3.1 ± 0.4 mm per year).

Nauru coastline

Thr rise in global 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).

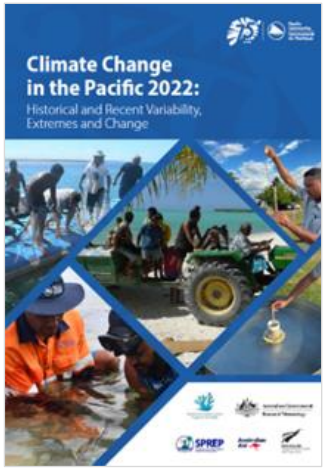
Waves

Waves at Nauru come from the northeast to the southeast. On average, Nauru experiences 3.4 extreme wave events - defined as reaching or exceeding wave height of 2.1 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 (peaking November to March) and, to a lesser degree, year to year with climate variability modes.

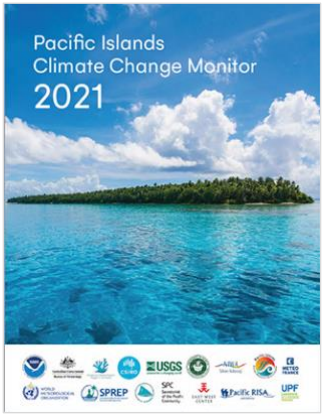
Further reading

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

Sunset in Nauru

The content of this brochure is an outcome of the high degree of cooperation and collaboration that exists between the implementing partners of the Australian Aid funded Climate and Oceans Support Program in the Pacific (COSPPac), specifically the Bureau of Meteorology (the Bureau), the Pacific Community (SPC) and Pacific Regional Environmental Programme (SPREP), together with the valuable ongoing support from the national meteorological services in the 15 partner countries and territories. Publication support has been provided through New Zealand Aid Programme.

For more detailed information on the climate of Nauru 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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