Summary: Climate Change in Kiribati 2022

Historical and Recent Variability, Extremes and Change

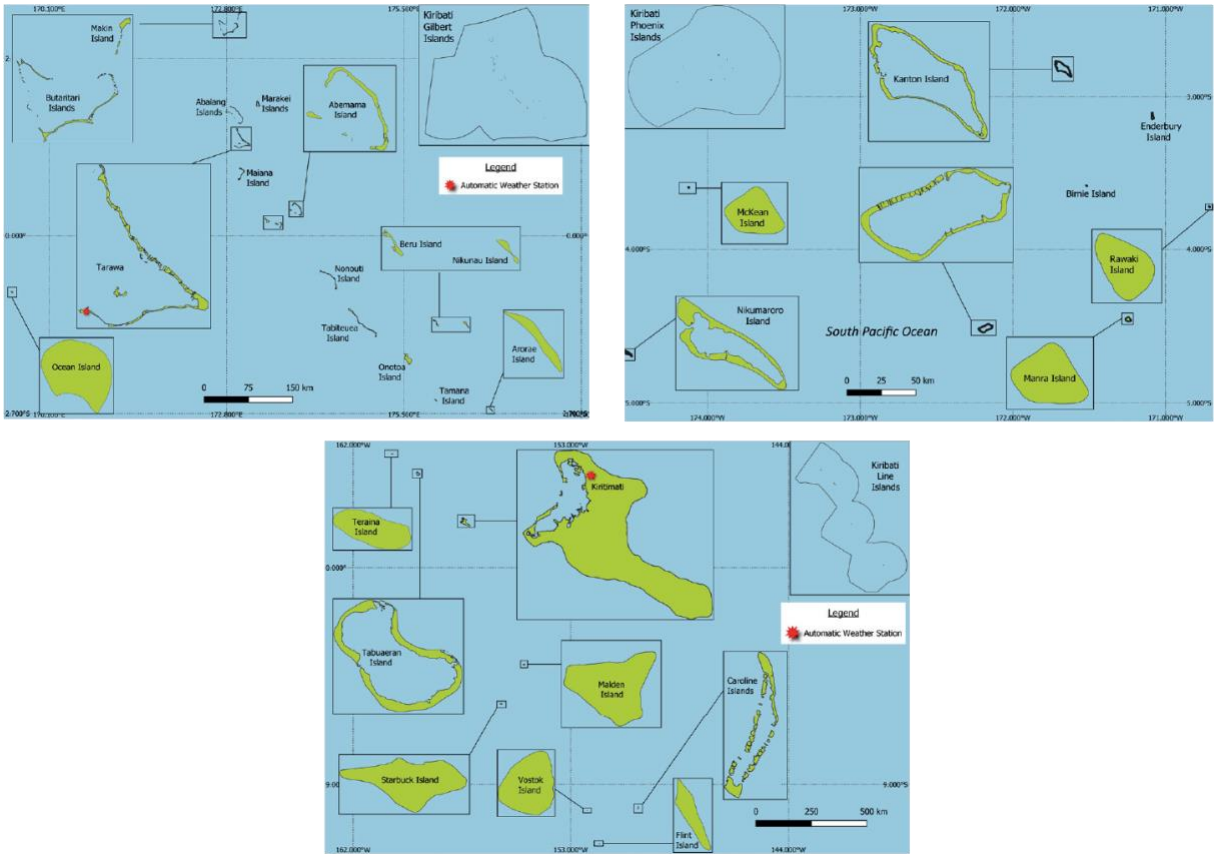
COSPPac
Climate and Oceans Support Program in the Pacific

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

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

Figure 1:

Kiribati Gilbert Islands (top left), Phoenix Islands (top right) and Line Islands (bottom left) and the locations of the climate stations used in this report.



Little change in annual and seasonal rainfall

There has been little change in annual and seasonal rainfall at Tarawa and Kiritimati since 1951.

El Niño–Southern Oscillation (ENSO) – a natural mode of climate variability – strongly influences rainfall variability from year to year at both Tarawa and Kiritimati. El Niño years generally experience much higher rainfall than La Niña years. Annual rainfall varies from approximately 500 to 4400 mm at Tarawa and 200 to 3700 mm at Kiritimati.

There has also been little change in extreme rainfall at Tarawa. This includes little long-term change in meteorological drought. La Niña years experience much longer dry spells than El Niño years.

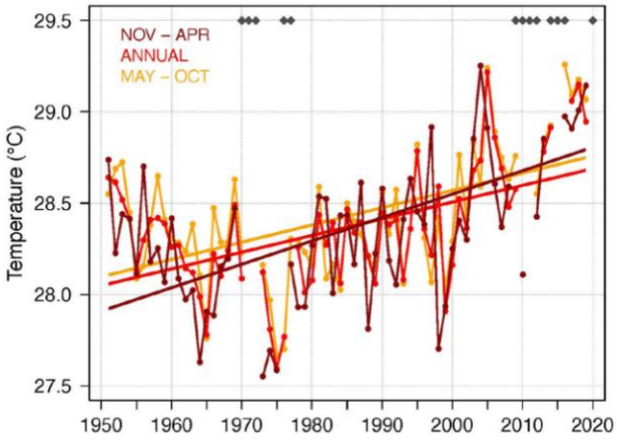
Air Temperature has increased

Average annual temperatures at Tarawa have increased by 0.09 °C per decade since 1951. Average November–April temperatures warmed slightly faster than May–October temperatures (Figure 2).

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).

Figure 2:

Average annual, November–April and May–October temperatures for Tarawa. Straight lines indicate linear trends. Diamonds indicate years with insufficient data for one or more variables.



Tropical cyclone severity has decreased in the Southwest Pacific

In the greater Southwest Pacific, the total number of **severe** tropical cyclones[1] have 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 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.

Tropical cyclones are rare in Kiribati since the country is located near the equator; however, Kiribati can be impacted by storm surges associated with a distant tropical cyclone.

Between the 1969/70 and 2017/18 seasons, five tropical cyclones passed within Kiribati's Exclusive Economic Zone (EEZ), all were during El Niño years. In addition, two tropical cyclones located in the western North Pacific basin passed near Tarawa in 1979 and 2015.

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.

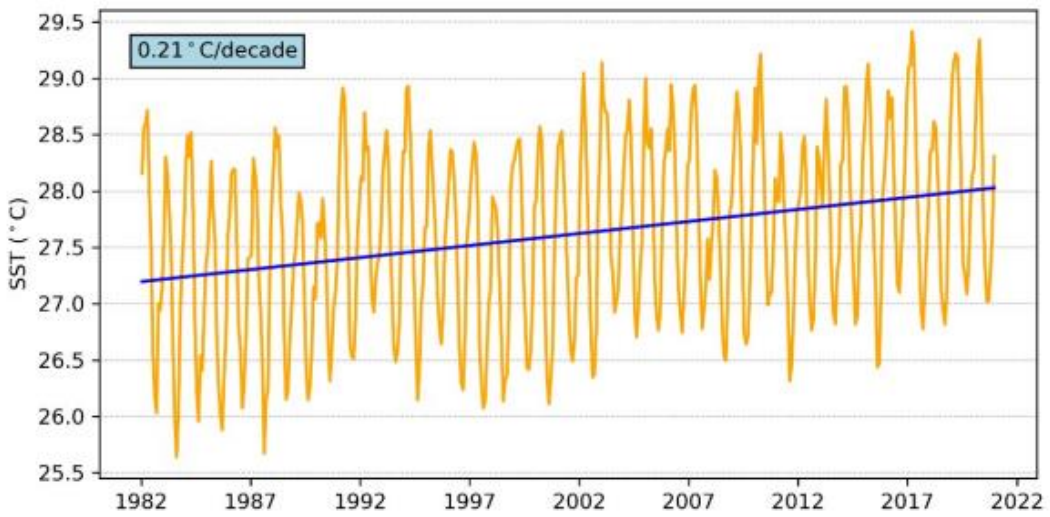
[1] A 'severe' tropical cyclone is defined as having a minimal central pressure of <970 hectopascals (hPa). Pressure is often used when comparing intensity of tropical cyclones.

Sea surface temperature has increased

Sea surface temperatures averaged across Kiribati's EEZ increased by 0.21 °C per decade since 1981 (Figure 3).

Figure 3:

Sea surface temperature from satellite observations averaged across Kiribati 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, human-associated climate change is a driver of the long-term positive trend (PCCM, 2021).

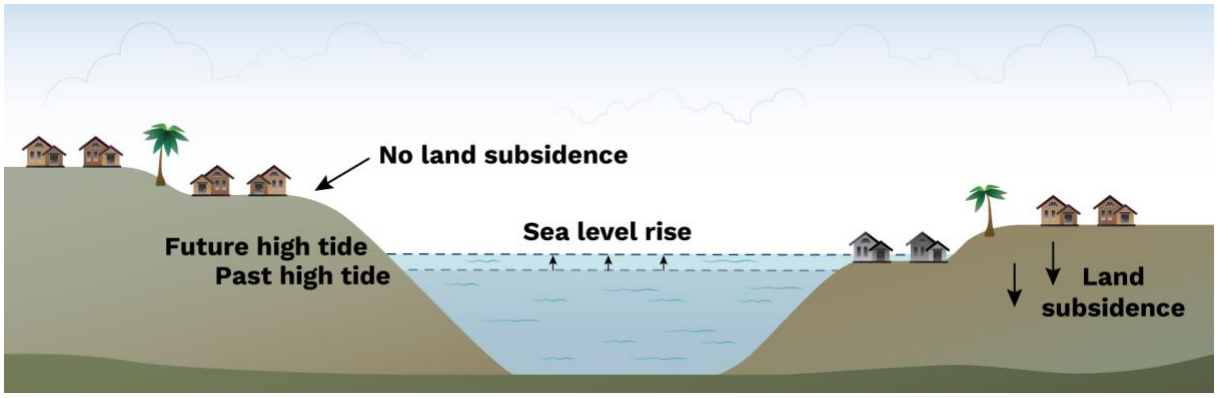
Sea surface temperatures at Tarawa tend to be warmest from June to October reaching, on average, a maximum of 30 °C and coolest in February reaching, on average, a minimum of 2 °C . Hourly temperatures can be up to 2.5 °C higher or lower than these monthly averages at Tarawa and may differ at other locations in Kiribati.

Sea level has increased

A combination of sea level rise and land subsidence has increased relative sea level by 4.4 mm per year at Tarawa since 1993 (Figure 4). The number of hours per month that sea level has exceeded the 99th percentile of the historical maximum sea level has increased since 2009. Peak sea levels typically occur around August/September and between December and February.

Figure 4:

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



The long-term trend in sea level across Kiribati's EEZ is 4–4.5 mm per year since 1993. This trend is higher than the global average trend (3.1 ±0.4 mm per year).

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).

Near Parliament Building at Ambo, Tarawa, Kiribati

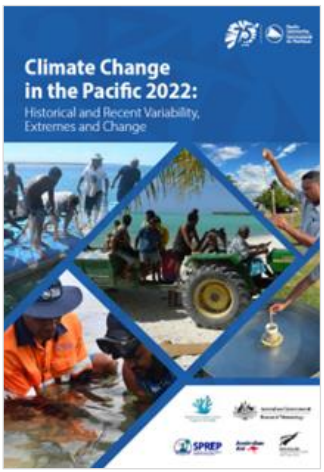
Waves

Waves at Betio come from the southeast to the southwest. On average, Betio experiences 3.9 extreme wave events – defined as reaching or exceeding wave height of 1.41 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.

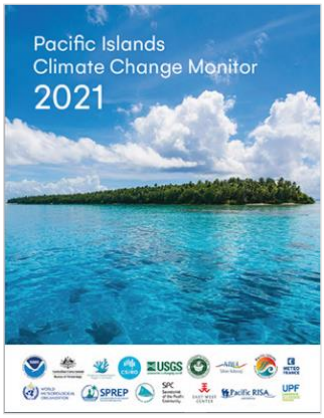
Further reading

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

Tarawa Atoll, Kiribati

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.

Australian Aid

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For more detailed information on the climate of Kiribati 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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