

# Summary: Climate Change in Vanuatu 2022

Historical and Recent Variability, Extremes and Change



**COSPPac**  
Climate and Oceans Support  
Program in the Pacific





## Tropical cyclone severity has decreased

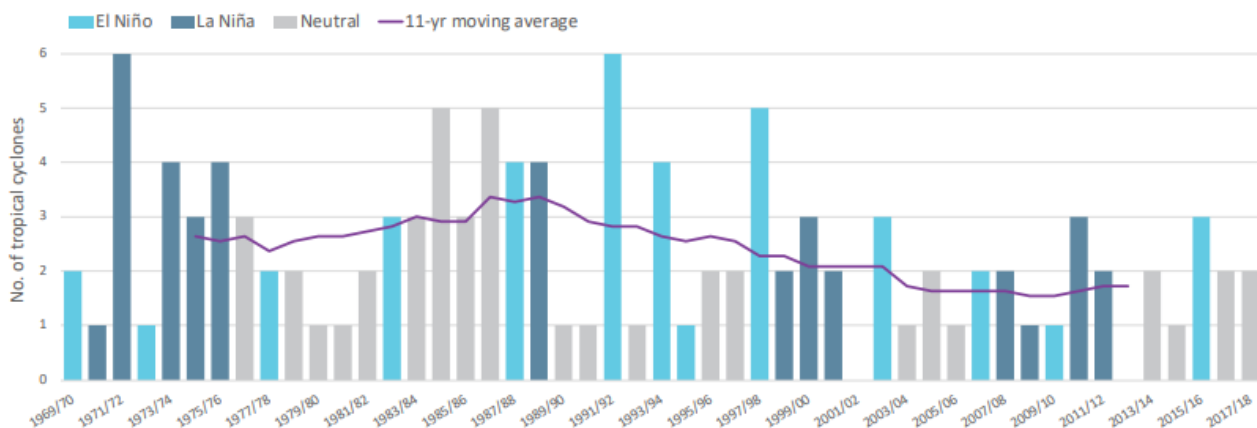
In the greater Southwest Pacific, the total number of **severe** tropical cyclones<sup>1</sup> has decreased over the last 40 seasons. There has been little change in the total number of tropical cyclones of any category in the southwest Pacific. The number of tropical cyclones that became severe events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

Tropical cyclones usually affect Vanuatu 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 Vanuatu's Exclusive Economic Zone (EEZ) varies considerably from one year to the next (Figure 3). Tropical cyclones were most frequent in El Niño years (28 cyclones per decade), followed by La Niña years (26 cyclones per decade) and least frequent in neutral years (20 cyclones per decade).

**Figure 3:**

Number of tropical cyclones passing within the Vanuatu 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.

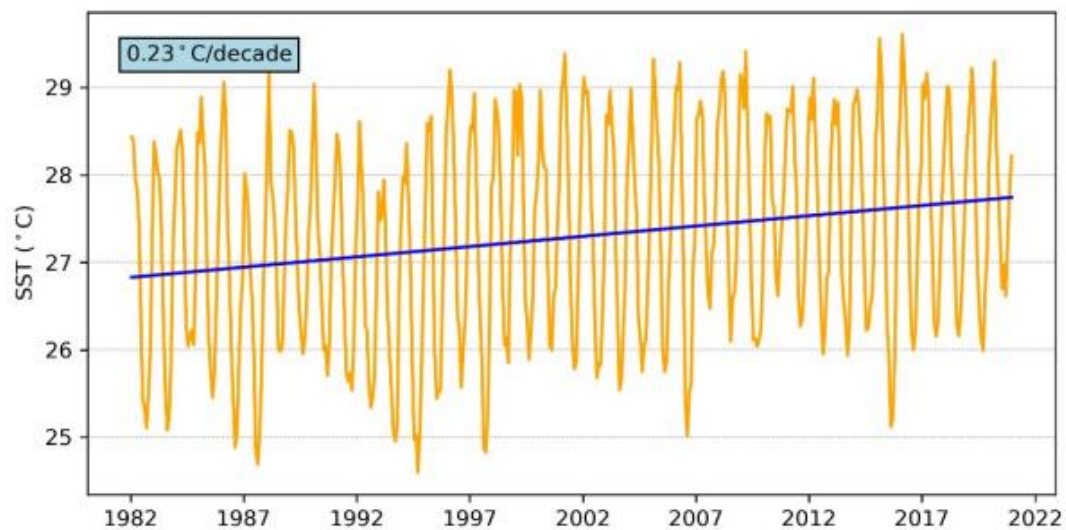
<sup>1</sup> A 'severe' tropical cyclone is defined as having a minimal central pressure of <970 hectopascals (hPa). Pressure is often used when comparing intensity of tropical cyclones.

## Sea surface temperature has increased

Sea surface temperatures averaged across Vanuatu's EEZ increased by 0.23 °C per decade since 1982 (Figure 4).

**Figure 4:**

Sea surface temperature from satellite observations averaged across the Vanuatu 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 Port Vila tend to be warmest in February/March, reaching, on average, a maximum of 29 °C and coolest in August, reaching, on average, a minimum of 25.5 °C. Hourly temperatures can be up to 2 °C higher or lower than these monthly averages at Port Vila and may differ at other locations in Vanuatu.



## Sea level has increased

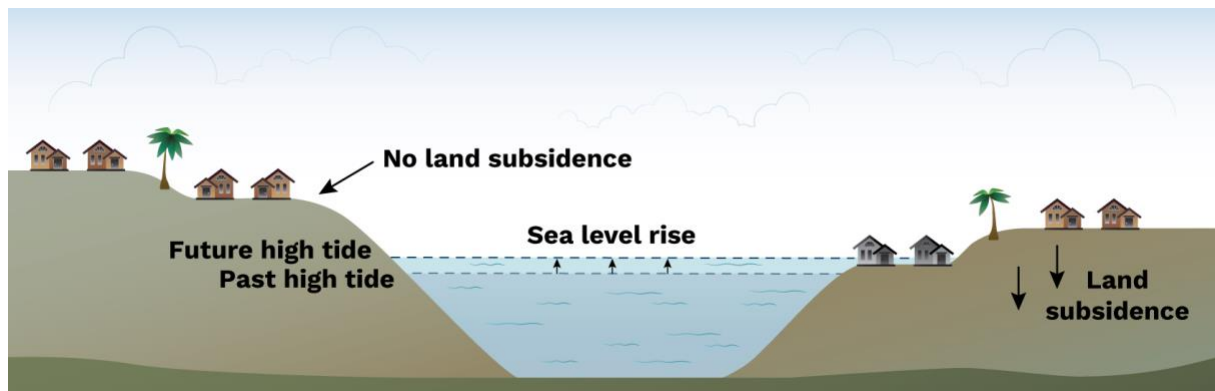
A combination of sea level rise and land subsidence has increased relative sea level at the Port Vila tide gauge by 0.3 mm per year since 1993, much less than the amount estimated by satellite altimetry (Figure 4).

The long-term trend in sea level from satellite altimetry across Vanuatu's EEZ is 3.5–5 mm per year since 1993, a rate higher than the global average trend. Vanuatu is one of the few places in the Southwest Pacific that has islands with rising land, which offsets some of the effects of sea level rise. The combined effect of rising land and sea level rise is measured by the Port Vila tide gauge, which is why the trend at Port Vila is so low.

Peak sea levels typically occur between October to March.

**Figure 5:**

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



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).

**Tanna, Vanuatu**



## Waves

Waves at Port Vila come from the south to the southwest. On average, Port Vila experiences approximately three extreme wave events – defined as reaching or exceeding wave height of 1.83 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.

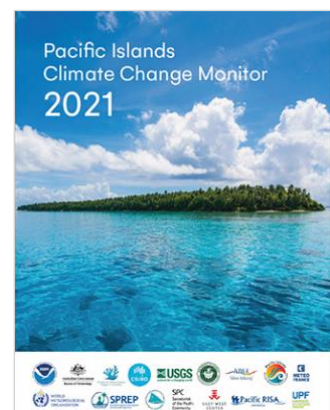
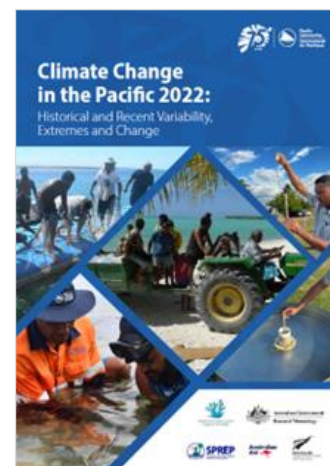
## Further reading

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](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](http://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>





### Mele Bay, Efate

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 Vanuatu 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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