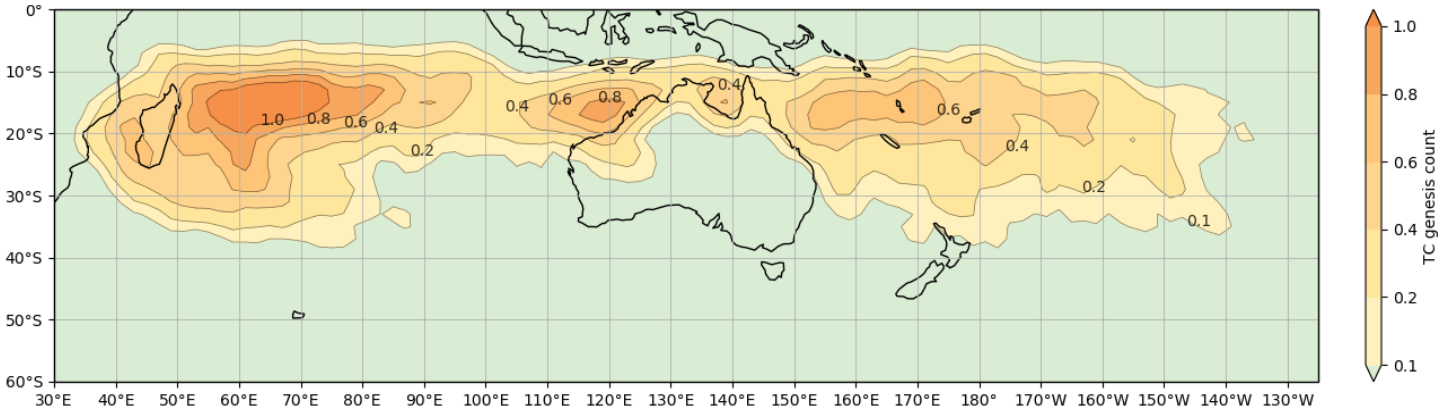
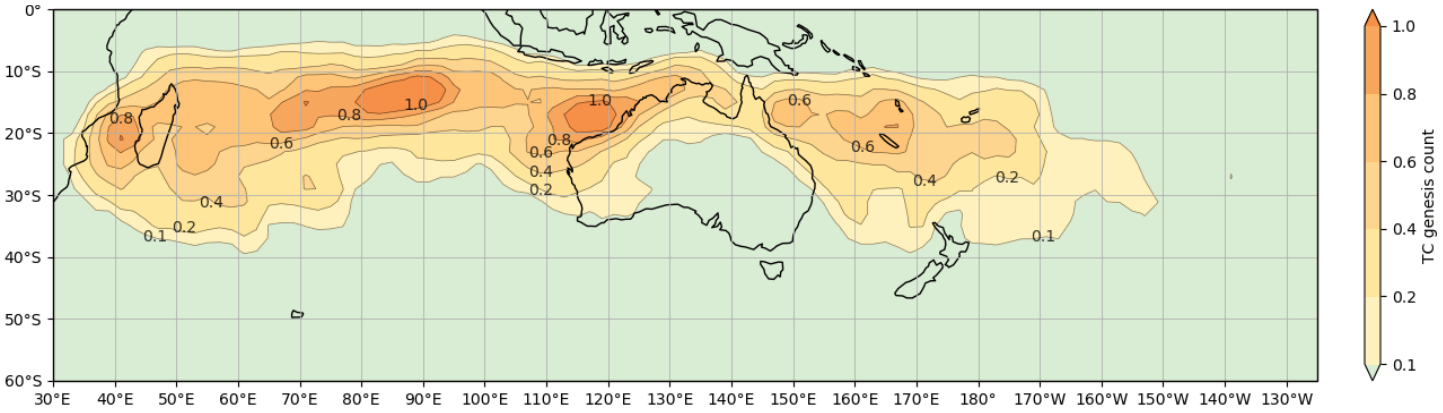
EL NIÑO'S IMPACT ON TROPICAL CYCLONES IN THE PACIFIC

During **El Niño** events, the risk and distribution of tropical cyclones across the Pacific region shift significantly, generally moving **eastward** away from the western Pacific and toward the central and eastern Pacific.

AVERAGE ANNUAL TROPICAL CYCLONES IN EL NIÑO YEARS



AVERAGE ANNUAL TROPICAL CYCLONES IN LA NIÑA YEARS



Source: Australian Government Bureau of Meteorology. Tropical cyclones are low pressure systems that form over warm tropical waters and have well defined wind circulations of at least gale force strength (sustained winds of 63 km/h or greater with gusts in excess of 90 km/h). These maps show the average number of tropical cyclones across Oceania in El Niño years, La Niña years, neutral years and using all years of data. The data are based on a 48 year period from the 1969/70 to 2017/18 tropical cyclone season.

WHY EL NIÑO AFFECTS TROPICAL CYCLONES

The primary reasons for this shift are the changes in ocean temperature and atmospheric circulation patterns:

Eastward Shift of Warm Water:

During El Niño, the pool of warm surface water that usually sits in the western Pacific moves toward the central and eastern Pacific. Since warm ocean water provides the necessary heat and moisture (energy) for cyclone formation, the "genesis" region for these storms shifts east with the water.

Convergence Zone Movement:

Tropical cyclones often form within the major convergence zones of the region. During El Niño, the South Pacific Convergence Zone (SPCZ) tends to shift toward the north-east, and the Intertropical Convergence Zone (ITCZ) moves closer to the equator, altering where storms are likely to develop.

Atmospheric Stability:

El Niño is characterised by ascending (rising) air over a large area covering the central and eastern Pacific, which creates a more favourable environment for cyclone development in those areas.

SPREP Secretariat of the Pacific Regional Environment Programme

WMO

PACIFIC REGIONAL CLIMATE CENTRE NETWORK

IMPACT BY COUNTRY

The following table details how El Niño influences the frequency and intensity of tropical cyclones for various Partner Countries based on historical averages:

Country	El Niño Impact	Specific Details / Historical Data
Cook Is.	Increased Risk	Frequency rises to 15 cyclones per decade during El Niño, compared to only 6 during La Niña.
Niue	Increased Risk	Experiences an average of 19 cyclones per decade in El Niño years, versus 9 in La Niña years.
Fiji	Increased Risk	Activity increases to 19 cyclones per decade (vs. 15 in La Niña). Storms may also occur "out of season" in October or May.
Samoa	Increased Risk	Frequency increases to 16 cyclones per decade during El Niño years, compared to 10 in La Niña.
Solomon Is.	Increased Risk	Risk rises to 13 cyclones per decade, roughly double the 6 per decade seen during La Niña.
Marshall Is.	Increased Intensity	While cyclones are often weak here, warmer sea-surface temperatures to the east during El Niño favor more intense storms.
Vanuatu	Relatively Stable	Frequency is fairly consistent across phases, with 23 cyclones per decade in El Niño vs. 25 in La Niña.
PNG	Decreased Risk	In south-eastern coastal regions, frequency drops to 4 per decade in El Niño, compared to 8 in neutral years.
FSM	Decreased Risk	Above-average numbers of tropical storms typically occur during La Niña rather than El Niño.
East Timor	Decreased Risk	Impact is generally weak; frequency is slightly lower at 6 per decade in El Niño vs. 8 in La Niña.
Palau	Rare / Indirect	Located south of the main zone, but can experience heavy swells from storms passing between Guam and Yap during shifted patterns.
Nauru	No Impact	Does not experience tropical cyclones due to its position very close to the equator.

Pacific island nations located further to the east and south-east generally face a higher risk during El Niño years as the storm-generating environment moves into their vicinity.

WHY IS THIS INFORMATION IMPORTANT?

Information regarding El Niño's impact on tropical cyclones is critical for the Pacific region because it serves as a vital early warning system to protect human life, national economies, and essential infrastructure from devastating extreme events.

THE IMPORTANCE OF PREPAREDNESS

Knowledge of these shifts acts as a vital early warning system.

- **Economic Protection:** Damage from a single tropical cyclone can exceed a nation's entire annual GDP.
- **Compounding Risks:** During El Niño, sea levels are already elevated in the central and eastern Pacific. A tropical cyclone's storm surge added to these higher background levels creates a much greater risk of devastating coastal flooding.
- **Resource Management:** Advance warning allows for the protection of critical rain-fed crops like taro and the management of fragile groundwater supplies.

STAY INFORMED! YOUR NATIONAL CONTACT POINTS

For the most accurate, up-to-date local forecasts and emergency warnings, always contact your National Meteorological Service (NMS).

SOURCES:

PCCSP_CCIP_Volume-1_Ch2-Climate-of-the-Western-Tropical-Pacific-and-East-Timor.pdf:
This source details the climate features of the Western Tropical Pacific and East Timor, including atmospheric and ocean data, seasonal cycles, and the Walker and Hadley Circulations.

PCCSP_CCIP_Volume-1_Ch3-Observed-Climate-Variability-and-Trends.pdf:
This source summarizes studies on climate variability and change in the region, focusing on patterns like the El Niño-Southern Oscillation (ENSO), the South Pacific Convergence Zone (SPCZ), and sea-level trends.

PCCSP_CCIP_Volume-2-country-reports-complete.pdf:
This comprehensive document contains detailed climate reports for 15 individual Partner Countries, covering their seasonal cycles, climate variability, observed trends, and future projections for rainfall, temperature, and sea levels.