Number 97, October 2008

The Island Climate Update

September's climate

- The South Pacific Convergence Zone (SPCZ) was not as well-defined in September as in previous months.
- Very suppressed convection near Western Kiribati and south of the Equator from Nauru to Tuvalu and Tokelau.
- Below normal rainfall for many areas in the South Pacific, including Samoa and southwestern French Polynesia.

El Niño/Southern Oscillation (ENSO), seasonal rainfall, and sea surface temperature forecasts

- Neutral ENSO conditions exist in the tropical Pacific at present. Most climate models project neutral ENSO conditions persisting into early 2009.
- Average or below average rainfall is forecast for the Solomon Islands, Tuvalu and Tokelau, Pitcairn Island, and the northeastern half of French Polynesia.
- Above normal rainfall is expected to be centralised near Eastern Kiribati and Papua New Guinea, and also from Vanuatu to the Southern Cook Islands. Near–to–above average rainfall is forecast for Fiji, Niue, and New Caledonia for the coming three-month period.
- Normal to above normal SSTs are forecast to extend from near Papua New Guinea southeast to Tonga, including Fiji, Vanuatu, and New Caledonia. Normal to below normal SSTs are forecast for the Society Islands.

Collaborators

Pacific Islands National Meteorological Services

Australian Bureau of Meteorology

Meteo France

NOAA National Weather Service

NOAA Climate Prediction Centre (CPC)

International Research Institute for Climate and Society

European Centre for Medium Range Weather Forecasts

UK Met Office

World Meteorological Organization

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Climate developments in September 2008

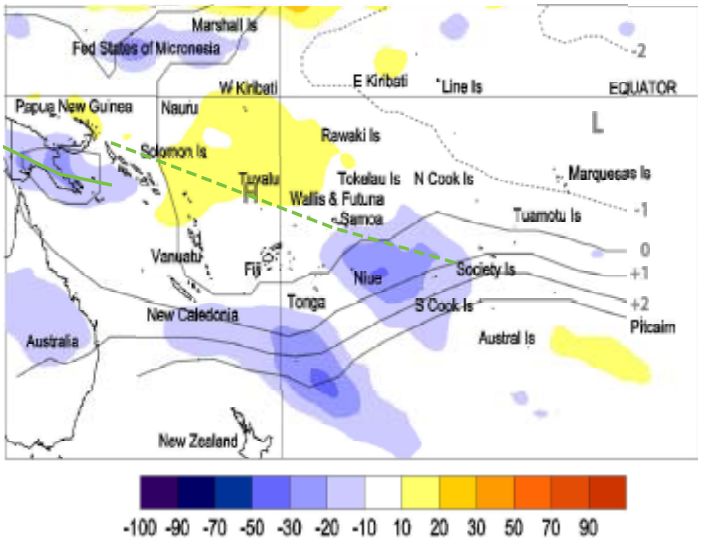
The South Pacific Convergence Zone (SPCZ) continued to weaken in September relative to previous months. Only a small region of enhanced rainfall was observed in satellite data during September 2008, centred over Indonesia and Papua New Guinea. A localised region of suppressed convection expanded south of the Equator, and extends from east of the Solomon Islands to Tokelau, and southeast to Tuvalu and Tokelau. The regional circulation was characterised by more frequent anticyclones to the east of New Zealand and lows to the north of the Marquesas Islands.

Rainfall was near average to below average for many countries in the South Pacific region during September 2008. However, there were a few monthly rainfall records, with 307.2 mm falling at Lakeba, Fiji (304 % of normal), and a 24 hour precipitation total of 147 mm at that site. 385.1 mm of rainfall also fell at Salote Pilolevu Airport, Tonga (347% of normal) and 275 mm was recorded at Raoul Island (250% of normal). Near normal to well above normal rainfall also occurred in the Solomon Islands, Tonga, and Vanuatu during September.

Southern French Polynesia experienced low rainfall totals during September, with rainfall totals registering a deficit of 25% – 75% of normal for the month. However the northern portion of French Polynesia had 108 % of normal rainfal, recorded at Atuona. New Caledonia received above average rainfall on the east coast, but below normal rainfall for offshore islands during September. In Samoa, many locations also recorded well–below normal rainfall, with Apia and Faleolo receiving 40–60% of normal precipitation. The dry conditions also were severe enough to produce forest fires and drought warnings.

Western Kiribati also had high rainfall in places, including a one-day rainfall total of 58.8 mm recorded at Butaritari on 18 September. Islands. Eastern Kiribati recorded below normal rainfall for the month, with 15.1 mm and 10.6 mm falling at Christmas and Kanton Islands, respectively..

Country	Location	Rainfall (mm)	% of avg	Comments
Tonga	Salote	385	347	Record high
New Zealand	Raoul Island	275	250	Record high
Fiji	Lakeba	307	304	Record high
Australia	Townsville	1	5	Very low



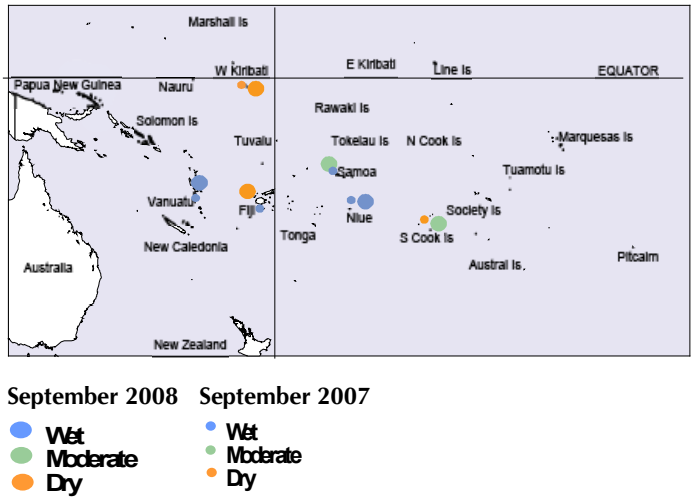
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^2 are represented by hatched areas. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically result in higher rainfall. The September 2008 position of the South Pacific Convergence Zone (SPCZ) is contracted toward Papua New Guinea and weaker relative to previous months. The average position of the SPCZ is identified by the dashed green line, which is based on mean January rainfall for the South Pacific (after Linacre and Geerts, 1998). Mean sea level (MSL) pressure anomalies (in hPa) are shown as grey solid (high pressure) and dashed (low pressure) lines (adapted from Bureau of Meteorology, Australia).

Soil moisture in September 2008

Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but it is planned to include more stations in the future.

The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to the available water already in the soil comes from rainfall, with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture level and its changes. Please note that these soil moisture calculations were made at the end of the month, and for practical purposes, generalisations were made about the available water capacity of the soils at each site.

Nadi (Fiji) and Tarawa (Western Kiribati) project dry soil moisture conditions. Soils continued to be moist (at field capacity) for the time of year at Port Vila (Vanuatu) and Hanan (Niue) while moderate soil moisture is projected for Apia (Samoa) and Rarotonga (Southern Cook Islands).



Estimated soil moisture conditions at the end of September 2008, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

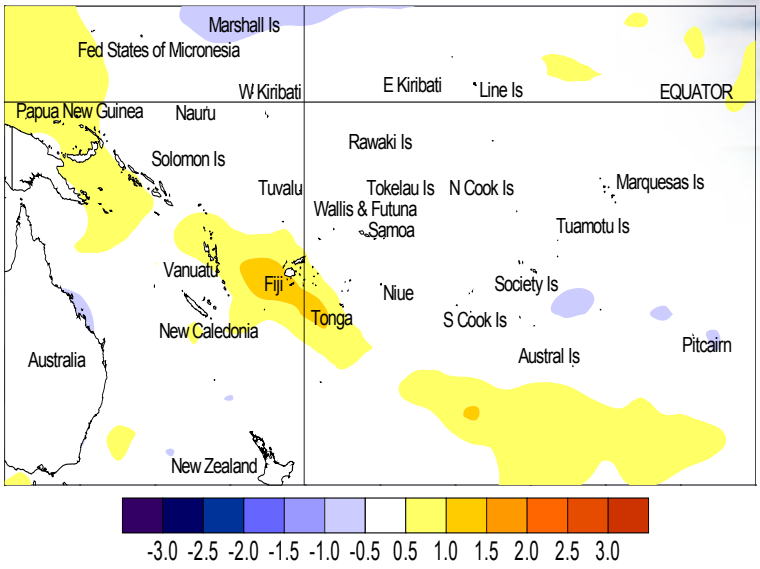
El Niño/Southern Oscillation (ENSO)

During September, ENSO conditions continued to remain near neutral in the equatorial Pacific. A warm water tongue off the coast of Ecuador that developed last month continues to be prominent. The SOI remains positive, having strengthened somewhat during September to +1.4 with the 3-month mean at +0.8.

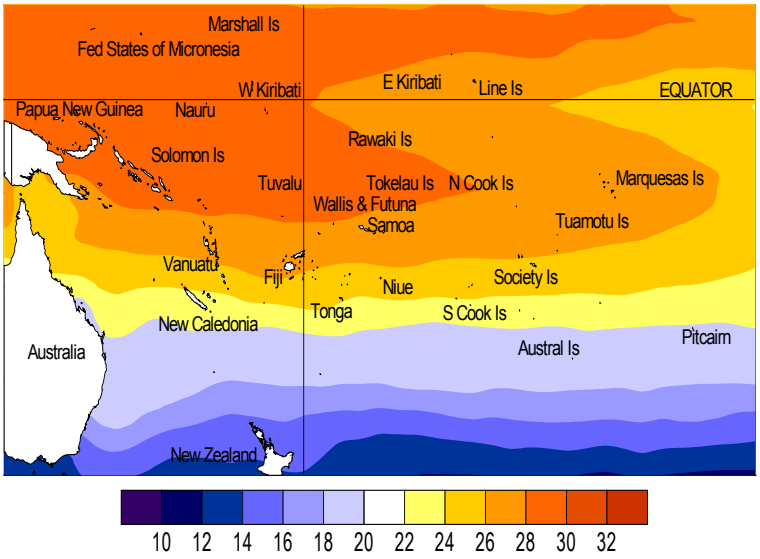
The positive SST anomalies in the eastern Pacific weakened during September (NINO3 fell to +0.6 °C, with 3-month mean of +0.8 °C), and the accompanying subsurface warm anomaly has also weakened. NINO4 remains close to normal at 0.2 °C in September (3-month mean around 0.2 °C). The strongest subsurface anomaly in the tropical Pacific now is a cold anomaly of about 3 °C below normal located just below 100m midway between the Date Line and the South American coast.

Low-level easterly anomalies remain stronger than normal in the western equatorial Pacific. The OLR anomaly field has lost the La Niña signature it displayed in past months and lacked coherence in the Pacific in September, though convection remains weakly suppressed near the Date Line and enhanced over Papua New Guinea. The TRMM ENSO precipitation index is –0.87 for September (down from the strong La Niña value of –1.25 in August). However, the upper-ocean heat anomaly in the equatorial Pacific, and the thermocline slope index, are both near zero, indicative of ENSO-neutral conditions. The MJO reappeared in late August, with active convection in the near-equatorial regions of Southeast Asia (east of Indonesia). The SPCZ was very inactive during September.

All models indicate neutral ENSO conditions continuing from late spring 2008 through to the late autumn 2009. The NCEP discussion of 11 September indicates ENSO-neutral conditions during September –November, and considers this is most likely to continue, although also indicates a small possibility of a return to weak La Niña conditions. The IRI summary of 18 September projects a 90% probability of ENSO-neutral conditions for September to November, and the probability of an El Niño or La Niña occurring at only 5%. The Australian weekly tropical summary of 26 August suggests ENSO-neutral conditions now exist, and will persist through the austral spring..



Sea surface temperature anomalies (ºC) for September 2008



Mean sea surface temperatures (ºC) for September 2008

Forecast validation: July to September 2008

A large region of suppressed convection was forecast in the southwest Pacific, extending southward from the Northern Cook Islands to the Austral Islands and eastward to the Marquesas, encompassing the Tuamotu Archipelago and the Society Islands. Below average rainfall was forecast for these islands. Enhanced convection was forecast for Papua New Guinea and from Western Kiribati extending southward to Tonga, Niue, and the Southern Cook Islands, including Fiji, Tuvalu, Tokelau, and Vanuatu. Near-to-above or above average rainfall was expected in those countries for the July–September period. Normal rainfall was forecast for Samoa and New Caledonia. No clear precipitation guidance was offered for Eastern Kiribati, Pitcairn Island, the Solomon Islands, and Wallis & Futuna.

The rainfall outlook for the July–September 2008 period was mixed compared to what was forecast, the 'hit' rate being 51%, 13% lower than average. Rainfall totals were overestimated for the north-central part of the South Pacific, including Tuvalu and Tokelau, Western Kiribati, Niue, and for the northeastern fringe of French Polynesia. Many island groups also had prominent north-south or west-east rainfall anomaly splits during the past three month period.

Forecast statistics compiled over the last nine years indicate the multi-ensemble strike rate will improve with the shift into austral spring and summer.

Tropical Pacific rainfall – September 2008

Territory and station station name	September 2008 rainfall total (mm)	September 2008 percent of average
Australia		
Cairns Airport	40	111
Townsville Airport	1	5
Brisbane Airport	56	159
Sydney Airport	99	157
Cook Islands		
Penrhyn	120	81
Aitutaki	N/A	N/A
Rarotonga Airport	128	118
Fiji		
Rotuma Island	215	91
Udu Point	186	164
Nadi Airport	55	78
Nausori	98	59
French Polynesia		
Hiva Hoa, Atuona	154	208
Bora Bora	65	100
Tahiti – Faa'a	14	27
Tuamotu, Takaroa	63	77
Gambier, Rikitea	65	48
Tubuai	27	29
Rapa	62	38
Kiribati		
Tarawa	12	28
Kanton	11	12
New Zealand		
Kaitaia	100	75
Whangarei Airport	50	40
Auckland Airport	38	39
New Caledonia		
Ile Art, Belep	88	167
Koumac	32	84
Ouloup	59	92
Ouanaham	53	63
Poindimie	230	256
La Roche	61	82
La Tontouta	53	170
Noumea	76	186
Moue	173	293

Territory and station station name	September 2008 rainfall total (mm)	September 2008 percent of average
Niue		
Hanan Airport	137	118
Liku	172	175
North Tasman		
Lord Howe Island	115	82
Norfolk Island	87	96
Raoul Island	275	250
Samoa		
Faleolo Airport	55	53
Apia	85	56
Nafanua	97	63
Afiamalu	90	40
Maota	184	48
Solomon Islands		
Taro	283	99
Munda	417	171
Auki	295	133
Honiara	114	111
Henderson	102	100
Kira Kira	351	129
Santa Cruz, Lata	283	76
Tonga		
Niuafoo'o	N/A	N/A
Mata'aho Airport	131	97
Lupepau'u	311	255
Salote Airport	385	347
Nuku'alofa	149	122
Fua'motu Airport	285	242
Tuvalu		
Nanumea	66.6	38
Nui Island	130.1	71
Funafuti	220.2	107
Nuilakita	N/A	N/A
Vanuatu		
Sola	105.6	42
Pekoa	256.9	177
Lamap	93.1	124
Port Vila	133.2	167
Tanna/Whitegrass	148	N/A
Aneityum	74.4	93

Rainfall totalling 200% or more is considered well above average. Totals of 40% or less are normally well below average. Highlighted values are new records.

Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and * denotes synoptic values.

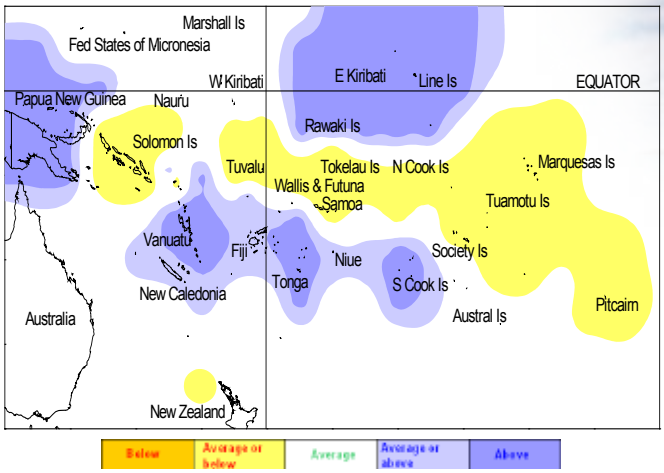
Tropical rainfall and SST outlook: October to December 2008

During the October–December 2008 forecast period, a region of suppressed convection is likely to encompass the Solomon Islands, and a region extending southeast from Tuvalu to Pitcairn Island, including Tokelau, Wallis & Futuna, Samoa, the Northern Cook Islands, and most of French Polynesia (except the Austral Islands). Average–to–below or below average rainfall is expected for those countries.

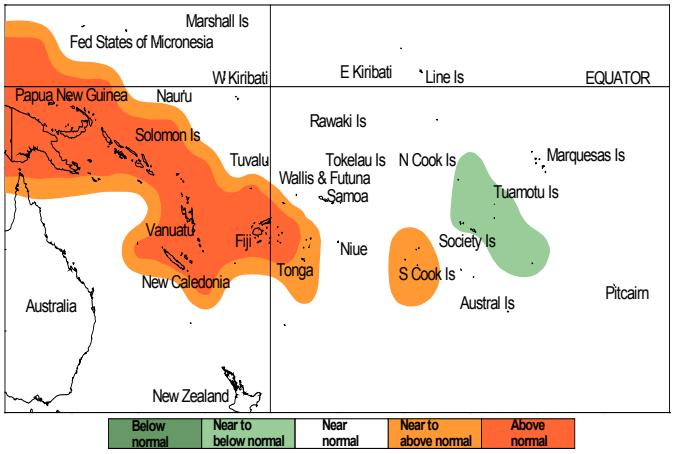
Enhanced convection is expected to be centralised near Papua New Guinea, and also near Vanuatu, Eastern Kiribati, Tonga, and the Southern Cook Islands, with above average rainfall. Near–to–above average rainfall is forecast for Fiji, Niue, New Caledonia, and the Solomon Islands for the next three-month period. There is no clear precipitation forecast for the Austral Islands and the Society Islands.

SSTs are expected to be above normal in a band extending from near Papua New Guinea, southeast to Fiji, including Vanuatu, New Caledonia, and the Solomon Islands. Near – above normal SSTs are forecast for Tonga and the Southern Cook Islands. Normal to below normal SSTs are forecast for the northeastern sector of French Polynesia, including the Tuamotu archipelago and the Society Islands.

The confidence in the forecast model skill for this seasonal rainfall outlook is moderately high for most Pacific Island countries. In the past, the average region-wide hit rate for forecasts issued in October is 64%, 4% higher than the long-term average for all months combined. The SST forecast confidence is moderately high to high.



Rainfall outlook map for October to December 2008



SST outlook map for October to December 2008

NOTE: Rainfall and sea surface termperature estimates for Pacific Islands for the next three months are given in the tables below. The tercile probabilities (e.g., 20:30:50) are derived from the averages of several global climate models. They correspond to the odds of the observed rainfall or sea surface temperatures being in the lowest one third of the distribution, the middle one third, or the highest one third of the distribution. For the long term average, it is equally likely (33% chance) that conditions in any of the three terciles will occur. *If conditions are climatology, we expect an equal chance of the rainfall being in any tercile.

Island Group	Rainfall Outlook	Outlook confidence	Island Group	SST Outlook	Outlook confidence
Vanuatu	15:30:55 (Above)	Moderate-High	New Caledonia	20:30:50 (Above)	Moderate
Papua New Guinea	20:30:50 (Above)	Moderate-High	Fiji	20:35:45 (Above)	Moderate
Wallis & Futuna	20:30:50 (Above)	Moderate-High	Papua New Guinea	20:35:45 (Above)	Moderate
Tonga	25:30:45 (Above)	High	Vanuatu	20:35:45 (Above)	Moderate
Kiribati (Eastern)	25:30:45 (Above)	Moderate-High	Solomon Islands	20:35:45 (Above)	Moderate
Cook Islands (Southern)	30:30:40 (Above)	Moderate-High	Cook Islands (Southern)	25:35:40 (Near to Above)	Moderate-High
Fiji	20:40:40 (Near to Above)	Moderate-High	Tonga	25:35:40 (Near to Above)	Moderate-High
New Caledonia	25:35:40 (Near to Above)	Moderate-High	Austral Islands	30:35:35 (Near Normal)	Moderate-High
Niue	25:35:40 (Near to Above)	Moderate-High	Kiribati (Eastern)	30:35:35 (Near Normal)	Moderate-High
Austral Islands	30:35:35 (Climatology)	Moderate-High	Kiribati (Western)	30:35:35 (Near Normal)	Moderate
Kiribati (Western)	30:40:30 (Near normal)	Moderate	Niue	30:35:35 (Near Normal)	Moderate-High
Society Islands	35:35:30 (Climatology)	Moderate-High	Society Islands	30:35:35 (Near Normal)	Moderate
Samoa	30:40:25 (Near to Below)	Moderate-High	Cook Islands (Northern)	30:40:30 (Near Normal)	Moderate-High
Cook Islands (Northern)	40:35:25 (Near to Below)	High	Marquesas	30:40:30 (Near Normal)	Moderate-High
Solomon Islands	40:30:30 (Below)	Moderate-High	Pitcairn Island	30:40:30 (Near Normal)	Moderate-High
Marquesas	45:30:25 (Below)	Moderate	Samoa	30:40:30 (Near Normal)	Moderate-High
Pitcairn Island	45:30:25 (Below)	Moderate	Tokelau	30:40:30 (Near Normal)	Moderate-High
Tokelau	45:30:25 (Below)	High	Wallis & Futuna	30:40:30 (Near Normal)	Moderate-High
Tuamotu Islands	45:30:25 (Below)	Moderate-High	Tuvalu	35:35:30 (Near Normal)	Moderate
Tuvalu	50:30:20 (Below)	Moderate-High	Tuamotu Islands	35:40:25 (Near to Below)	Moderate-High

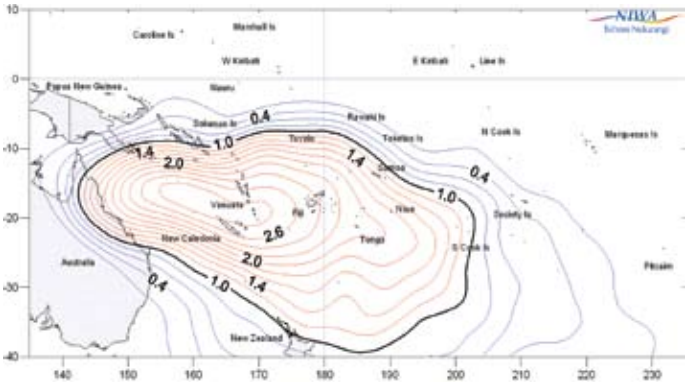
Tropical cyclone risk across the South Pacific, 2008–09

Jim Salinger and James Renwick, NIWA

Neutral El Niño/Southern Oscillation (ENSO) conditions are likely to produce average tropical cyclone activity for most tropical South Pacific countries over the coming months. Communities should remain alert and prepared.

In the South Pacific, tropical cyclones usually develop in the wet season, from November through to April, but occasionally occur in October and May. Peak cyclone occurrence is usually from January to March. In seasons with similar climate backgrounds, several tropical cyclones usually occur in the region between Vanuatu, New Caledonia, Fiji, and Tonga, while a few affect other areas. In an average season about half of the tropical cyclones that develop reach hurricane force with mean wind speeds of at least 64 knots (118 km/h).

For the coming tropical cyclone season, from November 2008 – May 2009, we are likely to see a normal risk of occurrence over much of the South Pacific. A reduced risk of tropical cyclones is likely in parts of French Polynesia east of the Date Line. Climate forecasting organisations in the Pacific are in general agreement that neutral ENSO conditions are likely to persist from spring into summer in the Southern Hemisphere. As a result, the likelihood is for a normal risk of tropical cyclones. There is a good chance that the first tropical cyclone of the coming season in the South Pacific region may occur before the end of December, which is normal during neutral seasons. On average eight to ten tropical cyclones can be expected over the entire South Pacific region during a neutral ENSO season.



Average annual number of Tropical Cyclones, neutral-ENSO periods, from 1969–70 to 2007–08.

South Pacific tropical cyclones are grouped into classes ranging from 1 to 5, with 5 being the most dangerous. In an average season, four are likely to reach class 4 with mean wind speeds of at least 64 knots or 118 km/h, and one to two, class 5, with mean speeds in excess of 90 knots or 167 km/h.

Area	Average over all years	Average over neutral - weak La Niña seasons	Comment
Vanuatu	3.0	2.8	Average risk
New Caledonia	2.6	2.7	Average risk
Fiji	2.4	2.5	Average risk
Tonga	2.0	2.1	Average risk
Wallis & Futuna	1.9	1.8	Average risk
Niue	1.8	1.8	Average risk
Southern Cook Islands	1.5	1.3	Average risk
Tuvalu	1.2	1.1	Average risk
Northern New Zealand	0.9	1.0	Average risk
Tokelau	0.8	0.6	Average risk
Society Islands/ Tahiti	0.8	0.6	Average risk
Samoa	1.6	1.3	Risk is uncertain
Solomon Islands	1.4	1.0	Average risk
Austral Islands	0.8	0.5	Average risk
Northern Cook Islands	0.8	0.4	Reduced risk
Tuamotu Islands	0.4	0.1	Reduced risk
Tuvalu	1.2	0.8	Reduced risk
Pitcairn Island	0.3	0.1	Cyclones unlikely
Marquesas	0.1	0.0	Cyclones unlikely
Western Kiribati	0.0	0.0	Cyclones unlikely
Eastern Kiribati	0.0	0.0	Cyclones unlikely

The average number of tropical cyclones passing within 5° of the main South Pacific island groups between November and May.

In the Pacific islands – contact your local Meteorological Service for more information. This tropical cyclone information has been prepared as a collaborative effort between NIWA and Meteorological Services around the Pacific. It has been prepared based on contributions and climate information received from the Meteorological Services of Australia (Bureau of Meteorology), Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, Niue, Papua New Guinea, New Zealand (Meteorological Service of NZ), Samoa, Solomon Islands Tonga, Tuvalu, Vanuatu and in the United States National Oceanic and Atmospheric Administration (NOAA) and the International Research Institute for Climate and Society (IRI).

The Island Climate Update

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Sources of South Pacific rainfall data
This bulletin is a multi-national project, with important collaboration from the following Meteorological Services: **American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, New Zealand, Niue, Papua New Guinea, Pitcairn Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna.**

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This summary is prepared as soon as possible following the end of the month, once the data and information are received from the Pacific Island National Meteorological Services (NMHS). Delays in data collection and communication occasionally arise. While every effort is made to verify observational data, NIWA does not guarantee the accuracy and reliability of the analysis and forecast information presented, and accepts no liability for any losses incurred through the use of this bulletin and its content.

Requests for Pacific Island climate data should be directed to the Meteorological Services concerned.