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The Island Climate Update



Produced by the National Institute of Water and Atmospheric Research, New Zealand



Contributors

Australian Bureau of Meteorology

Meteo France

Fiji Met Service

NOAA National Weather Service

NOAA Climate Prediction Centre, CPC

International Research Institute for Climate Prediction, IRI

European Centre for Medium Range Weather Forecasts, ECMWF

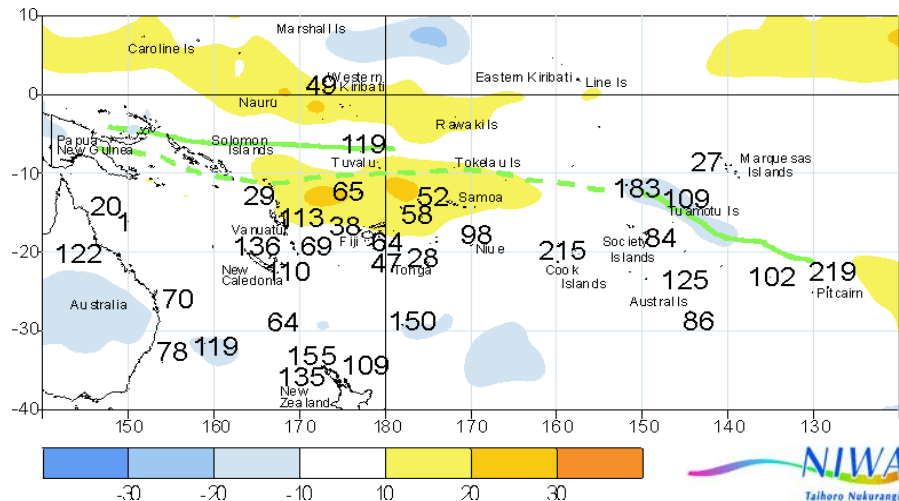
UK Met Office

World Meteorological Organisation, WMO

An overview of the present climate in the tropical South Pacific, with an outlook for the coming months, to assist in dissemination of climate information in the Pacific region

October's climate

Rainfall was below average over much of the Southwest Pacific from the Caroline Islands to Eastern Kiribati, and from the region east of Vanuatu to Samoa, including Fiji. The South Pacific Convergence Zone (SPCZ) extended from the north of Papua New Guinea, east to Tuvalu, and from the Tuamotu Islands of French Polynesia to the region around Pitcairn Island (where rainfall was above average). October's rainfall was also above average over parts of Vanuatu and New Caledonia, the Kermadec's, northern New Zealand, and the Southern Cook Islands. Air temperatures were above average in tropical Southwest Pacific Islands within a few degrees of the equator, as well as the Marquesas Islands of French Polynesia. It was extremely warm in Samoa. **More on Page 2**



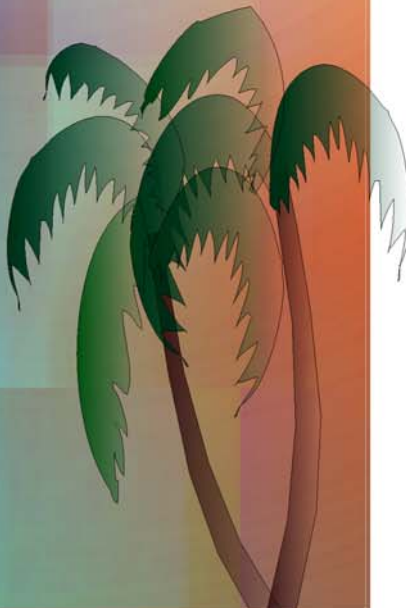
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} are represented by hatched areas, and rainfall percentage of average, shown by numbers. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically mean higher rainfalls. The October 2003 position of the South Pacific Convergence Zone (SPCZ), as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line.

ENSO and sea surface temperatures

Even though the equatorial Pacific sea surface temperatures (SST) are warmer than average, most of the El Niño Southern Oscillation (ENSO) indicators are showing a neutral state, which is likely to continue through to the end of the southern hemisphere summer. The chances of an El Niño occurring during this time of year is minimal. The Southern Oscillation Index (SOI) remained unchanged at -0.3 for October. The global climate models suggest that the equatorial Pacific will remain in a neutral state through the rest of this year and into early 2004. **Details Page 2**

The next three months November 2003 to January 2004

The three-month forecast period coincides with the start of the wet and tropical cyclone season in the southern hemisphere. Based on the global climate forecast models, enhanced convection is expected over Papua New Guinea, the Solomon Islands, Samoa, the Society Islands and Tuamotu Islands. Suppressed convection is likely in the equatorial region from Eastern Kiribati eastwards to the Marquesas Islands. Normal or below normal rainfall is expected from Vanuatu east to Niue, including Fiji and Tonga. Near normal rainfall is likely everywhere else in the region. **More on Page 3**



New Zealand Agency for International Development
Nga Hoe Tuputupu-mai-tawhiti





Climate developments in October 2003

Below average rainfall over much of the Southwest Pacific

Above average rainfall over parts of Vanuatu and New Caledonia

A region of suppressed convection and generally below average rainfall moved west during October to encompass the Caroline Islands, Nauru, and southern parts of Western Kiribati. Another region of reduced convection moved east, situated over Fiji and Samoa. It was very dry, with 50% or less of average rainfall in parts of Western Kiribati and Fiji. October was the 8th consecutive month with below average rainfall in parts of Eastern Kiribati, and the 4th consecutive month with below average rainfall in parts of Fiji.

Tropical Pacific in a neutral ENSO state

Equatorial SSTs warmed slightly

The tropical Pacific remains essentially in a neutral state with no change in the ENSO indices from last month. Equatorial SST anomalies have risen a little recently, and westerly zonal wind anomalies were evident across the western Equatorial Pacific.

CLIMATE EXTREMES IN OCTOBER 2003

Country	Location	Rainfall (mm)	% of average	Comments
Australia	Willis Island	<1	1	Extremely low
French Polynesia	Hiva Hoa, Atuona	17	21	Well below average
Tuvalu	Nanumea	327	194	Well above average
Pitcairn Island	Pitcairn Island	264	219	Well above average

Country	Location	Mean Air Temp (°C)	Dep. from Av	Comments
Samoa	Apia	28.3	+1.6	Extremely high
Samoa	Faleolo	28.4	+1.9	Extremely high
French Polynesia	Hiva Hoa, Atuona	27.3	+1.2	Well above average

The SPCZ extended from the monsoon region (which was relatively weak) to the north of Papua New Guinea, east to Tuvalu, being displaced to the north of its mean location west of the Date Line. There was also SPCZ activity from the Tuamotu Islands of French Polynesia to the region around Pitcairn Island (where rainfall totals exceeded 200 mm). A small region of enhanced convection affected the area north of the equator near the Date Line. The month's rainfall was at least 125% of average over parts of Vanuatu and New Caledonia, the Kermadec's, northern New Zealand, and close to or more than 200% of average in the

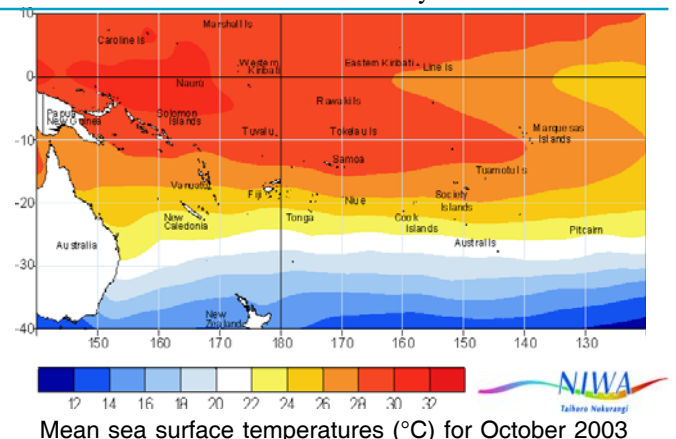
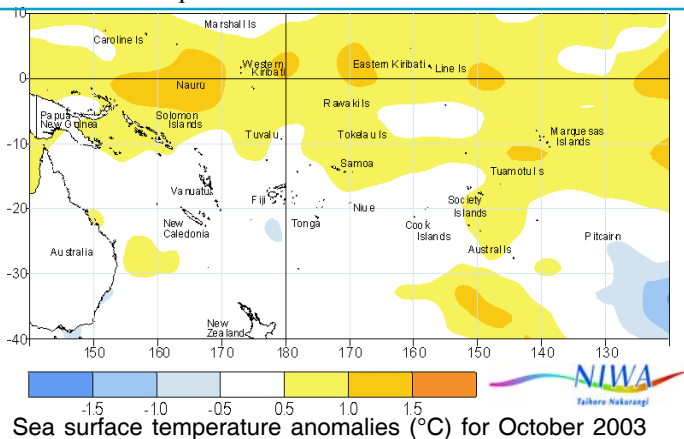
Southern Cook Islands, areas of the Tuamotu Islands, and Pitcairn Island. Rainfall totalling 161 mm was recorded at Rarotonga Airport on the 24th. It was very unsettled at Gambier, Rikitea (southern French Polynesia) with rainfall on at least 25 days during the month.

Air temperatures were at least 0.5°C above average in many tropical Southwest Pacific Islands within a few degrees of the equator, as well as the Marquesas Islands of French Polynesia. It was extremely warm in Samoa, with near average air temperatures on most other islands.

The NINO3 SST anomaly rose slightly to about +0.7°C in October (from +0.3°C in September). NINO4 rose to +0.9°C (from +0.7°C in September). The three month (August-October) means were +0.4°C and +0.8°C for NINO3 and NINO4, respectively. SST anomalies have fluctuated near the South American coast, but anomalies have risen slowly in the central Equatorial Pacific over the last 2 to 3 months.

Subsurface ocean temperature anomalies are weakly positive above 100 m depth, and are weakly negative in the 100 m below that. Surface westerlies at Tarawa, Western Kiribati occurred in 27% of observations, their highest frequency since January this year.

Most global climate models indicate neutral conditions until early 2004.



Forecast validation

Forecast period:
August to
October 2003

Average or above average rainfall was expected from Papua New Guinea east to Tokelau, including Samoa, with above average rainfall forecast for Tokelau and Tuvalu. Average or below average rainfall was expected from Western Kiribati east-southeast to the Marquesas Islands, with below average totals in Eastern Kiribati. Another large region of average or below average rainfall was expected from Vanuatu to the Society Islands, including the Southern Cook Islands, Fiji, Tonga and Niue. Near average rainfall was expected elsewhere.

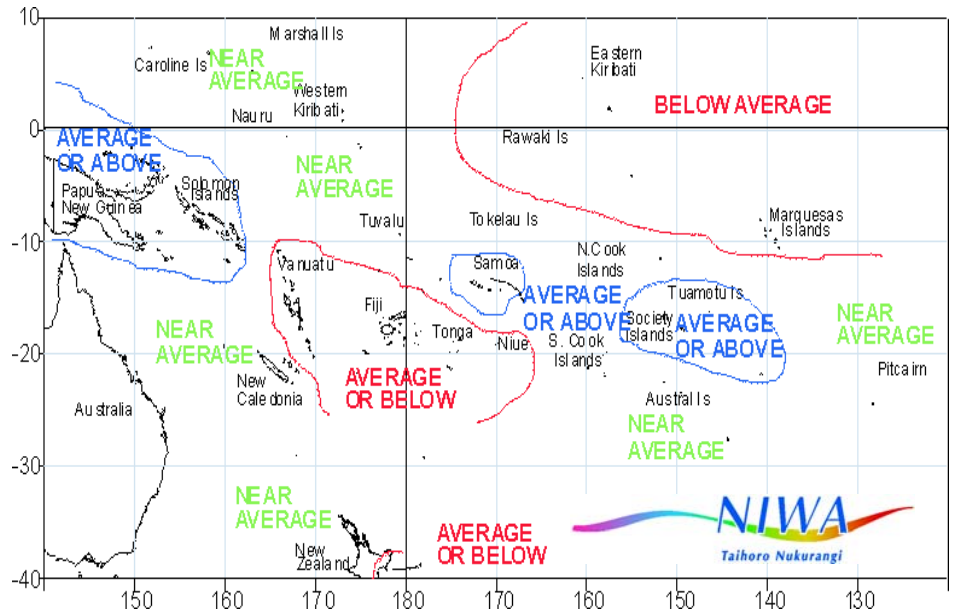
Rainfall was below average over much the Southwest Pacific and above average in the north of Papua New Guinea, Niue and on Pitcairn Island.

The SPCZ was weaker than average, allowing the region of below average rainfall to extend much further north than predicted, with lower than forecast rainfall in the Solomon Islands, Wallis and Futuna, Samoa, and Tokelau. Rainfall was also lower than expected in the Tuamotu Islands. Rainfall was higher than forecast in Niue and on Pitcairn Island.



Rainfall outlook: November 2003 to January 2004

- **Enhanced convection in Papua New Guinea, the Solomon Islands and Samoa**
- **Average or above average rainfall in parts of French Polynesia**
- **Average or below average rainfall about the Date Line from Vanuatu to Niue**
- **Below average rainfall in Eastern Kiribati and the Marquesas Islands**



Rainfall outlook map for November 2003 to January 2004

Enhanced convection in the equatorial western Pacific is likely to result in average or above average rainfall in areas from Papua New Guinea east to the Solomon Islands and Samoa. Another region of average or above average rainfall is expected over the Society Islands and Tuamotu Islands of French Polynesia.

Suppressed convection around the Date Line in the tropical Pacific is expected to result in average or below average rainfall from Vanuatu southeastwards to Niue, including Fiji and Tonga. Below average rainfall is the most likely outcome for Eastern Kiribati and the Marquesas Islands.

The forecast model skill confidence ranges from low to moderate for this seasonal forecast period as it coincides with the commencement of the wet and tropical cyclone season for the southern hemisphere.

Probabilities of rainfall departures from average

Broad-scale rainfall patterns and anomalies in the southern tropical Pacific area are estimated from the state of large-scale regional climate factors, such as La Niña or El Niño, their effect on the South Pacific and Tropical Convergence Zones, surface and sub-surface sea temperatures, and computer models of the global climate.

Rainfall estimates for the next three months for Pacific Islands are given in the adjacent table. The tercile probabilities (e.g. 20:30:50) are derived from the interpretation of several global climate models. They correspond to the odds of the observed rainfall being in the lowest (driest) one third of the rainfall distribution, the middle one third, or the highest (wettest) one third of the distribution. On the long-term average, rainfall is equally likely (33% chance) in any tercile.

The probabilities shown express the expected shift in the distribution from the long-term average, based on predictions of oceanic and atmospheric conditions. The amount of inter-model forecast consistency is indicated by the levels of confidence expressed in the table.

TROPICAL PACIFIC RAINFALL OUTLOOK (NOVEMBER 2003 - JANUARY 2004)

Island Group	Rainfall Outlook	Confidence in the Outlook
Papua New Guinea	15:45:40 (Average or above average)	Moderate
Solomon Islands	20:40:40 (Average or above average)	Moderate
Samoa	15:45:40 (Average or above average)	Moderate
Society Islands	20:40:40 (Average or above average)	Moderate
Tuamotu Islands	20:40:40 (Average or above average)	Moderate
Western Kiribati	25:50:25 (Near average)	Low
Wallis and Futuna	25:50:25 (Near average)	Moderate - Low
Tuvalu	10:60:30 (Near average)	Low
Tokelau	20:50:30 (Near average)	Low
New Caledonia	35:40:25 (Near average)	Moderate
Northern Cook Islands	15:50:35 (Near average)	Moderate - Low
Southern Cook Islands	30:50:20 (Near average)	Moderate
Austral Islands	30:40:30 (Near average)	Moderate - Low
Tuamotu Islands	25:50:25 (Near average)	Low
Pitcairn Island	20:50:30 (Near average)	Moderate - Low
Vanuatu	45:40:15 (Average or below average)	Moderate - Low
Fiji	40:40:20 (Average or below average)	Moderate
Tonga	50:40:10 (Average or below average)	Moderate - Low
Niue	40:40:20 (Average or below average)	Moderate - Low
Eastern Kiribati	50:20:30 (Below average)	Moderate - Low
Marquesas Islands	55:35:10 (Below average)	Moderate

Slightly Higher Risk of Tropical Cyclones for South Pacific Countries near the Date Line

Dr Jim Salinger, Dr Jim Renwick and Stuart Burgess

For some South Pacific countries near the Date Line the chances of tropical cyclone activity are slightly higher than normal for the November 2003 – April 2004 season.

The last few tropical cyclone seasons were relatively ‘quiet’ except last year, with only six occurrences during 2000/01, five in 2001/02, but increasing to ten last season (near the long-term average). Taken over the whole of the South Pacific, on average nine tropical cyclones can occur during the November to April season, but this can range from as few as four in 1994/95, to as many as seventeen in 1997/98, during the last very strong El Niño.

This season, ENSO conditions are expected to remain neutral (no El Niño or La Niña) and total cyclone numbers are expected to be near normal. However, some Pacific Island countries near the Date Line may experience a slightly higher risk of tropical cyclone occurrence than usual, based on analysis of previous ENSO neutral cyclone seasons. Countries with increased risk for the 2003/2004 cyclone season (see Table 1 and Figure 1) are Fiji and Tonga.

In the South Pacific tropical cyclones develop in the South Pacific over the wet season, usually from November through April. Peak cyclone occurrence is usually during January, February and March. In seasons similar to the present the highest numbers occur in the region between Vanuatu and Fiji in the South Pacific. Those countries with the highest risk include Vanuatu, New Caledonia, Fiji, Tonga and Niue.

Tropical cyclones require huge amounts of energy to survive, and will form only over specific regions of the globe’s tropical oceans, where conditions are right for their formation and development. The La Niña and El Niño phenomena alter the patterns of climate, altering the risk of a cyclone in different parts of the South Pacific.

Major tropical cyclones bring extremes of wind, rainfall and sea surges, resulting in river and coastal flooding, landslides, and extensive damage to crops, trees, houses, power lines, ports and roads. Many lives can be lost. For a small South Pacific island country, the whole economy can be severely affected. Individual tropical cyclones are, however, rather unpredictable; so most South Pacific islands are exposed to some degree of risk every year and must be always prepared. In addition, whether it is an active year or a quiet year for tropical cyclones, it only takes one major tropical cyclone striking an island to cause widespread devastation. Therefore island countries must always be prepared.

Country	Average over all years	Average over Neutral ENSO	Probability Occurrences
Fiji	2.4	2.7	Slightly increased risk
Tonga	2.0	2.4	Slightly increased risk
Niue	1.7	2.0	Slightly increased risk
Papua New Guinea	0.6	0.5	Average risk
Vanuatu	3.2	2.9	Average risk
New Caledonia	2.9	2.7	Average risk
Wallis and Futuna	1.7	1.8	Average risk
Samoa	1.4	1.3	Average risk
Tokelau	0.7	0.5	Average risk
Southern Cook Islands	1.5	1.4	Average risk
Tuvalu	1.2	1.0	Average risk
Society Islands	0.7	0.5	Average risk
Northern Cook Islands	0.8	0.3	Average risk
Austral Islands	0.8	0.5	Average risk
Northern NZ	1.0	0.7	Average risk
Tuamotu Islands	0.5	0.2	Average risk
Pitcairn Island	0.3	0.1	Average risk
Solomon Islands	1.4	0.9	Reduced risk, but cyclones still likely
Marquesas Islands	0.1	Less than 0.1	Cyclones unlikely

(Based on 32 years of data, and for tropical cyclones having mean wind speeds over 34 knots*)

Table 1. Average number of tropical cyclones occurring within 100 km square for the main island groups of the South Pacific for October – June.

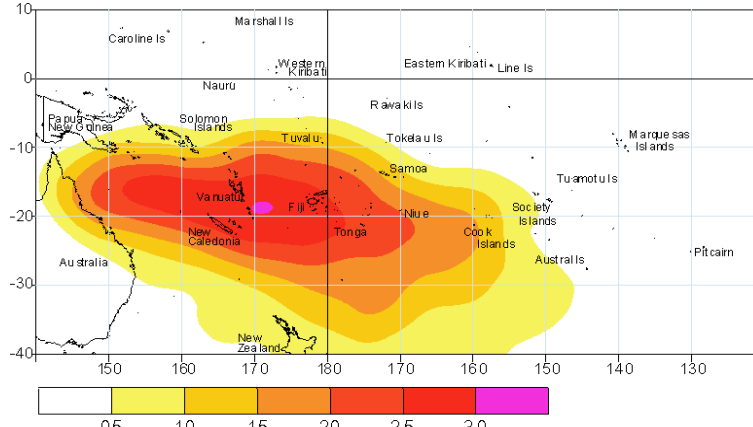


Figure 1 Tropical cyclone occurrence, neutral ENSO periods October - June, 1970/71 - 2001/02

*For the southwest Pacific, “tropical cyclone” is a tropical low-pressure system with an organised wind circulation intense enough to produce sustained gale force winds (at least 34 knots or 63 km/h) near its centre. A “severe tropical cyclone” produces sustained hurricane force winds (at least 64 knots or 118 km/h), and corresponds to the hurricanes or typhoons of other parts of the world.

Visit The Island Climate Update website at: www.niwa.co.nz/NCC/ICU/.

Your comments and ideas about The Island Climate Update are welcome. Please contact:

The Editor: **Dr Jim Salinger**, NIWA, Private Bag 109 695, Newmarket, Auckland, New Zealand.

E-mail: j.salinger@niwa.co.nz Telephone: int + 64 9 375 2053 Facsimile: int +64 9 375 2051

Assistant Editor: **Ashmita Gosai**, NIWA, Private Bag 109 695, Newmarket, Auckland, New Zealand

E-mail: a.gosai@niwa.co.nz Telephone: int + 64 9 375 4506 Facsimile: int + 64 9 375 2051

Climatologist: **Stuart Burgess**, NIWA, PO Box 14-901, Wellington, New Zealand.

E-mail: s.burgess@niwa.co.nz Telephone: int + 64 4 386 0300 Facsimile: int +64 4 386 0341

The Island Climate Update



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**

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

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