The Island Climate Update

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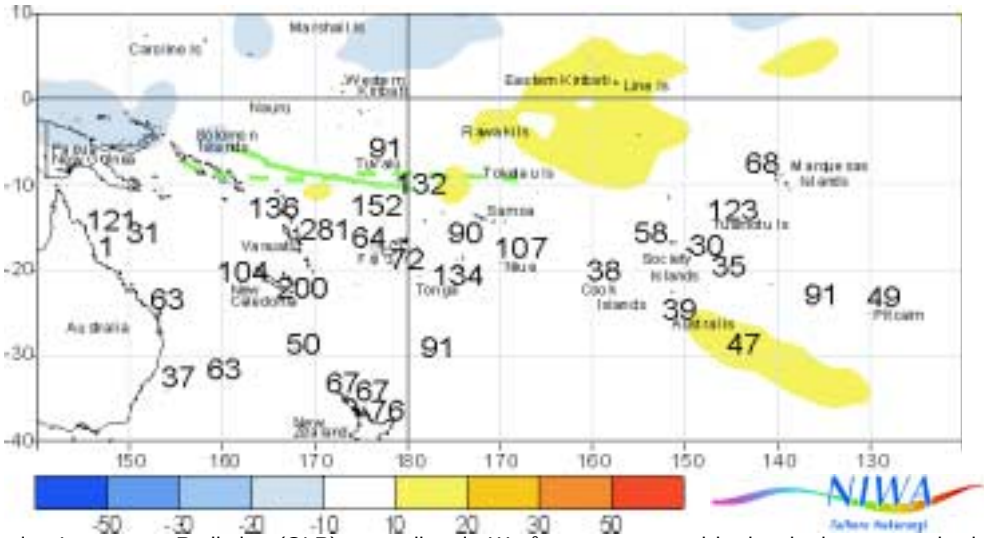
An overview of the present climate in the tropical South Pacific, with an outlook for the coming months, to assist in dissemination of climate information in the Pacific region

July's climate

The South Pacific Convergence Zone (SPCZ) was active west of the Date Line. However, there was little activity in the east. Rainfall was well above average over much of New Caledonia and Vanuatu. Some locations in New Caledonia recorded 500 mm for the month, after torrential rainfall totalling about 400 mm fell over a two-day period. Rainfall was also above average in parts of Tonga and areas of the Tuamotu Islands of French Polynesia. Well below average rainfall occurred along the equator from Eastern Kiribati eastwards to French Polynesia. Rainfall was also below average in parts of Fiji. Air temperatures were near average throughout much of the tropical Southwest Pacific. However, they were above average in Tuvalu and the Southern Cook Islands. ***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 July 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

The cooling of sea surface temperatures (SSTs) seen in May, has dissipated rapidly over last few months. The equatorial ocean and atmosphere are in a neutral state. The Southern Oscillation Index (SOI) rose to +0.3 during July. Neutral conditions are expected to prevail in the tropical Pacific until the end of 2003. ***Details Page 2***

The next three months August to October 2003

The SPCZ is expected to be near its normal position for the forecast period. Above average rainfall is expected in Tuvalu and Tokelau while Papua New Guinea, the Solomon Islands, Wallis and Futuna and Samoa are expected to experience average or above average rainfall. Average or below average rainfall is likely from Western Kiribati trending east-southeast to the Marquesas Islands. Another region of average or below average rainfall is expected from Vanuatu to the Society Islands including Fiji, Tonga, Niue, the Southern Cook Islands and the Marquesas Islands. Below average rainfall is expected in Eastern Kiribati. ***More on Page 3***

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Climate developments in July 2003

CLIMATE EXTREMES IN JULY 2003

Country	Location	Rainfall (mm)	% of average	Comments
New Caledonia	Ouloup/Ouvea	190	200	Well above average
New Caledonia	Ouanaham/Lifou	500	471	Extremely high
New Caldedonia	Poindimie	346	247	Well above average
New Caldeonia	La Roche/Mare	497	507	Extremely high
New Caledonia	La Tontouta/Paita	140	205	Well above average
New Caledonia	Noumea	170	200	Well above average
Vanuatu	Bauerfield	163	212	Well above average
Vanuatu	Port Villa	191	281	Well above average
Australia	Townsville Airport	<1	1	Extremely low
Fiji	Rarawai Mill/Ba	6	16	Well below average

Country	Location	Mean Air Temp (°C)	Dep. from Av	Comments
Cook Islands	Rarotonga Airport	23.6	+1.4	Well above average

Extremely high rainfall over parts of New Caledonia and Vanuatu

Below average rainfall in many islands from Kiribati to French Polynesia

The SPCZ was active west of the Date Line, extending from east of the Solomon Islands toward southern Tuvalu. However, there was little activity in the east. Enhanced convection occurred over Papua New Guinea. Rainfall was at least 200% of average over much of New Caledonia (some locations recording as much as 500 mm) and parts of Vanuatu. Rainfall was also above average in parts of Tonga and areas of the Tuamotu Islands of French Polynesia. The anomalous rainfall in parts of New Caledonia was result of torrential rainfall over the 15th and 16th of July. Tadine recorded 495 mm over that period, with 422 mm on the 15th, a new 1-day record and 285 mm in 6 hours. Rainfall over Vanuatu was more evenly spread throughout the month.

Areas of suppressed convection and below average rainfall persisted along the equator from Eastern Kiribati to the west coast of South America and also in much of the region from Kiribati to French Polynesia, with many sites recording less than 50% of average rainfall. Rainfall was also below average in parts of Fiji, the Tasman Sea, and over much of New Zealand. Parts of Fiji have now had 4 to 6 consecutive months with below average rainfall.

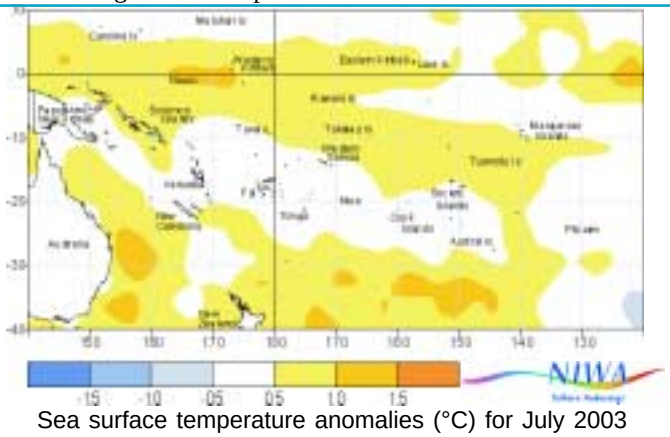
Air temperatures were near average throughout much of the tropical Southwest Pacific, consistent with most sea surface temperature anomalies. However, they were at least 0.5 ºC above average in Tuvalu and more than 1.0ºC above average in the Southern Cook Islands.

Neutral state in the tropical Pacific Ocean continues

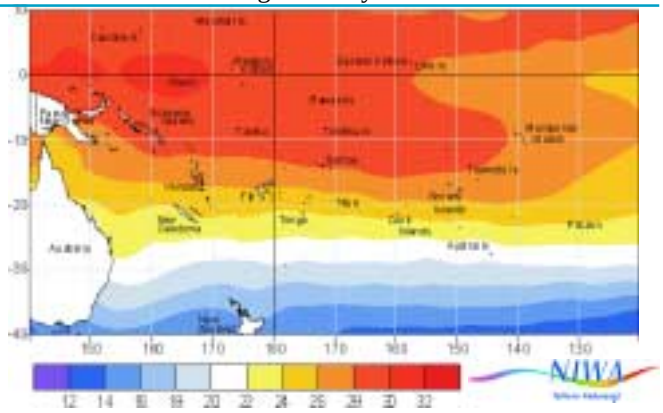
Negative SST anomalies in the equatorial region near the South American coast

The Equatorial Pacific atmosphere and ocean have been in a neutral state for the last few months. The short-lived sea surface cooling that developed in the east during May has completely dissipated. The equatorial sea surface temperature (SST) anomalies are weak (but generally positive) right across the Pacific. The NINO3 SST anomaly has risen to +0.4°C in July (from -0.4°C in June). NINO4 rose to +0.7°C. The three month (May - July) means were -0.2°C and +0.5°C for NINO3 and NINO4, respectively. The trade winds and OLR patterns show small anomalies across the tropical Pacific. The equatorial thermocline was depressed in the east, where a positive sea temperature anomaly has developed in recent weeks.

Most global climate models predict a neutral El Niño Southern Oscillation (ENSO) state lasting into early 2004.



Sea surface temperature anomalies (°C) for July 2003



Mean sea surface temperatures (°C) for July 2003

Forecast validation

Forecast period:
May to July 2003

Enhanced convection with average or above average rainfall was expected from the Solomon Islands across to Eastern Kiribati, including Tuvalu, Tokelau, and Samoa. Average or above average rainfall was also expected over the Society Islands. Average or below average rainfall was projected from Fiji across to Niue, as well as over the Tuamotu Islands. Below average rainfall was forecast for the Marquesas Islands of northern French Polynesia. Near average rainfall was projected elsewhere.

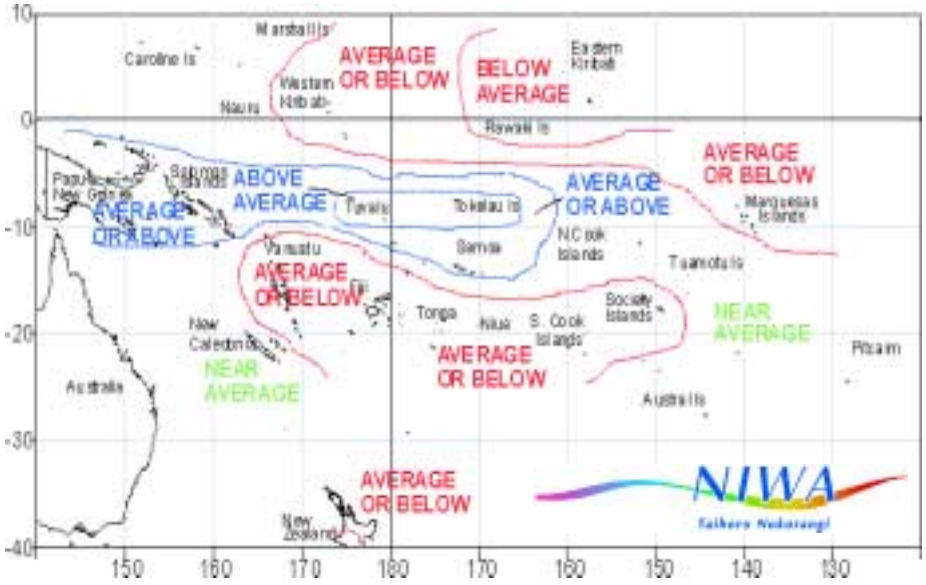
Rainfall was below average in an extensive region along the equator from Nauru east over Kiribati and the region north of the Marquesas Islands, and also from Fiji southeast to the Austral Islands, including Tonga and Niue. Rainfall was above average over much of New Caledonia, Vanuatu, and Tuvalu, and also from Samoa southeast across the Society and Tuamotu Islands of French Polynesia. Rainfall was higher than forecast over New Caledonia, Vanuatu, Samoa, and the Tuamotu Islands of French Polynesia, and lower than forecast over Western and Eastern Kiribati.

The overall 'hit rate' for the May to July rainfall outlook was 61%.

Rainfall outlook: August to October 2003

Average or above average rainfall is expected from Papua New Guinea to Samoa

Average or below average rainfall from Western Kiribati trending east-southeast to the Marquesas Islands



Rainfall outlook map for August to October 2003

The SPCZ is expected to be near its normal position, with some enhancement about and west of the Date Line. Above average rainfall is expected from Tuvalu to Tokelau, while Papua New Guniea, the Solomon Islands, the Wallis and Futuna islands and Samoa are expected to experience average or above average rainfall. Rainfall is likely to be average or below average from Western Kiribati trending east-southeast to the Marquesas Islands, with below average totals in Eastern Kiribati. Another region of average or below average rainfall is expected from Vanuatu to the Society Islands, including Fiji, Tonga, Niue, the Southern Cook Islands and the Marquesas Islands. Near average rainfall is expected elsewhere in the region. The skill of most of the forecast models is moderate to low for this time of the year as the forecast crosses into a transition period from the dry to the wet season.

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 (AUGUST-OCTOBER 2003)

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

ENSO Update

The current atmospheric and oceanic observations show a near neutral El Niño Southern Oscillation (ENSO) state in the tropical Pacific region

In March 2003, the equatorial Pacific (NINO3 and NINO4) seas surface temperature (SST) started cooling, which also coincided with the weakening of easterly trade winds, four months prior to change in the Southern Oscillation Index (SOI).

During May 2003, there was rapid cooling in the equatorial SSTs, which suggested development of of a cool La Niña event. However, this outcome has now become unlikely, as the cooling has broken down, and models predict continuation of neutral conditions for coming months.

During July 2003, the SOI trended positive for the first time after being negative for the past 16 consecutive months (Fig 1). The El Niño event which developed in mid 2002, reached its peak in late 2002 and began to decay in early 2003 to a neutral state over past the few months.

Over the past 12 months, the climate of the southwest Pacific responded as expected to the El Niño. The equatorial region experienced enhanced convection especially over Western and Eastern Kiribati and Tuvalu with suppressed conditions in the far western and eastern equatorial Pacific (Fig 2).

The persisting negative SOI over the last few months (Fig 1) may increase the risk of suppressed convection affecting the rainfall between Fiji and the Southern Cook Islands in the next few months because of the lag relationship between SOI and rainfall. This is likely to last until the ocean and atmosphere become more organised and coherent.

The El Niño event has ended and conditions have returned to normal in the equatorial region. Most of the global climate models show a consensus for a neutral state until early 2004.

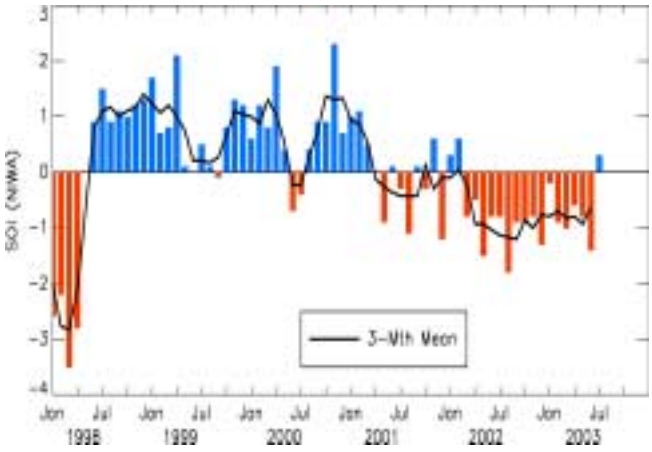


Figure 1 Southern Oscillation Index

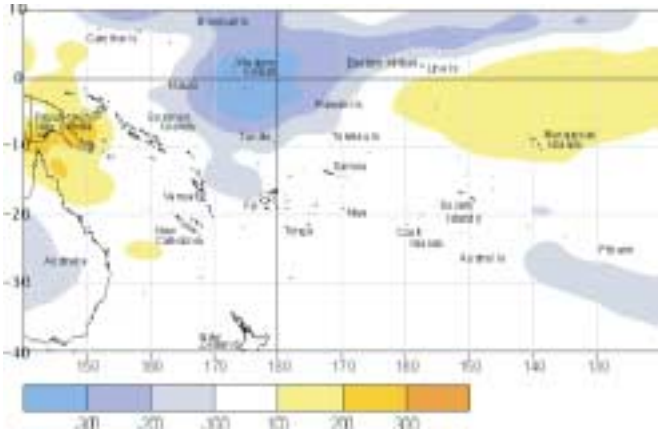


Figure 2 El Niño associated convective pattern (August 2002 through to July 2003) Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} are represented in hatched areas. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically mean higher rainfall.

Acknowledgements

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The Island Climate Update

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