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10 June 2003

The Island Climate Update



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

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

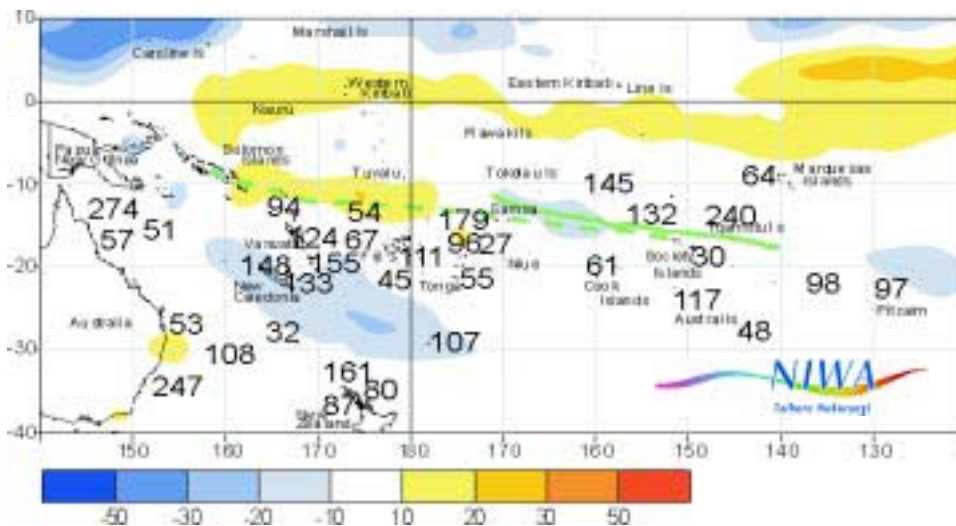


Contributors

- Australian Bureau of Meteorology
- Meteo France
- Fiji Met Service
- European Centre for Medium Range Weather Forecasts, ECMWF
- NOAA Climate Prediction Centre, CPC
- UK Met Office
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May's climate

The South Pacific Convergence Zone (SPCZ) was displaced further east than average, with enhanced convection and above average rainfall over Samoa and the Northern Cook Islands, and the Tuamotu Islands of French Polynesia. Rainfall totals were also above average in parts of Vanuatu and New Caledonia. A region of suppressed convection and below average rainfall persisted along the equator from Nauru east across Kiribati, and to the north of the Marquesas Islands. Air temperatures were above average throughout much of the tropical Southwest Pacific. Although the tropical cyclone season has officially ended, two tropical cyclones 'EPI' and 'GINA' formed in the western south Pacific at the beginning of June. *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 May 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

Sea surface temperature conditions in the equatorial Pacific indicate a rapid shift towards a La Niña like pattern. However, the Southern Oscillation Index (SOI) has been fluctuating, the May mean being -0.8. Most of the global climate models indicate a short period of moderate La Niña conditions, followed by a return to neutral conditions during the later part of 2003. Next month's ICU will provide a detailed summary on winter outlook in regards to La Niña. *Details Page 2*

The next three months June to August 2003

Rainfall is expected to be average or above average from Papua New Guinea to the Solomon Islands, and also from Wallis and Futuna across to the Northern Cook Islands and Society Island (including Samoa and Tokelau). Average or below average rainfall is forecast for the Marquesas Islands. Near average rainfall is most likely elsewhere. *More on Page 3*



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





Climate developments in May 2003

SPCZ further east, from Samoa to the Tuamotu Islands

Reduced convection along the equator

The SPCZ was displaced further east than average, with enhanced convection over Samoa and the Northern Cook Islands, and the Tuamotu Islands of French Polynesia. May rainfall was at least 125% of average (totalling 200-300 mm at most locations) throughout much of this region.

Transition to La Niña like conditions in the equatorial Pacific

Negative SST anomalies (-2°C) along the South American coast

Sea surface temperature (SST) conditions in the equatorial Pacific indicate a rapid shift towards a La Niña like pattern. These conditions are likely to last through the southern hemisphere winter.

CLIMATE EXTREMES IN MAY 2003

Country	Location	Rainfall (mm)	% of average	Comments
Vanuatu	Lamap	346	208	Well above average
French Polynesia	Tuamotu, Takaroa	204	240	Well above average
Tonga	Lupepau'u	45	23	Well below average
Niue	Hanan Airport	23	30	Well below average
French Polynesia	Tahiti - Faaa	30	30	Well below average

Country	Location	Max Air Temp (°C)	Date	Comments
Fiji	Rotuma	33.2	1st	New high record

Country	Location	Min Air Temp (°C)	Date	Comments
Fiji	Nabouwalu	26.5	15th	New high record

Rainfall totals were also 125% or more of average in parts of Vanuatu and New Caledonia. Rainfall was average to below average over Fiji.

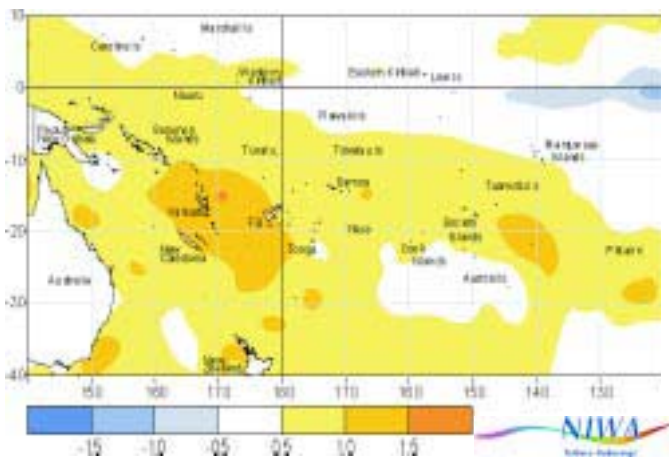
An elongated region of suppressed convection (associated with rainfall totals generally less than 50% of average) extended along the equator from Nauru east across Kiribati, and to the north of the Marquesas Islands.

Air temperatures were at least 0.5°C above average throughout much of the tropical Southwest Pacific, as far east as Pitcairn Island, and about 1.0°C above average between New Caledonia, and Vanuatu, as well as parts of central French Polynesia, consistent with the warmer than average seas. New maximum and minimum May temperature records were set at two sites in Fiji.

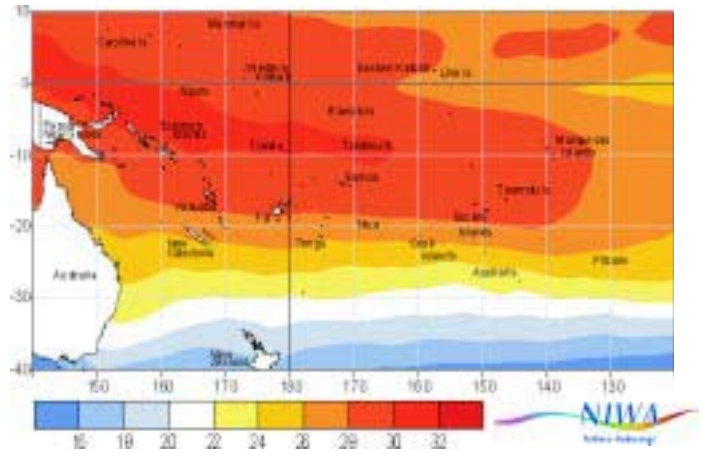
The NINO3 SST anomaly was -0.4°C in May, and NINO4 has eased back to +0.3°C. The three month (March - May) means are about -0.1°C and +0.6°C for NINO3 and NINO4, respectively. The thermocline is elevated near the South American coast, with a -2.0°C anomaly in subsurface temperatures sloping towards the surface in the eastern equatorial Pacific. Suppressed convection is evident across the eastern equatorial Pacific and the trade winds are near normal strength east of the Dateline.

Recent significant Madden-Julian Oscillation (MJO) activity has occurred in the west (across the Maritime Continent), with zonal westerly wind anomalies west of the Dateline. The May SOI was -0.8, as a result of a recent strong pressure rise at Darwin.

A number of models indicate a short period of moderate La Niña conditions, followed by a return to neutral by the end of 2003.



Sea surface temperature anomalies (°C) for May 2003



Mean sea surface temperatures (°C) for May 2003



Forecast validation

Forecast period:
March to
May 2003

Enhanced convection was expected over Western and Eastern Kiribati, possibly extending south to include Tuvalu. Below average rainfall was expected in the Marquesas Islands of northern French Polynesia, with average or below average rainfall in most areas from New Caledonia to the Austral Islands, including Fiji, Tonga, Samoa and Niue. Near average rainfall was projected elsewhere.

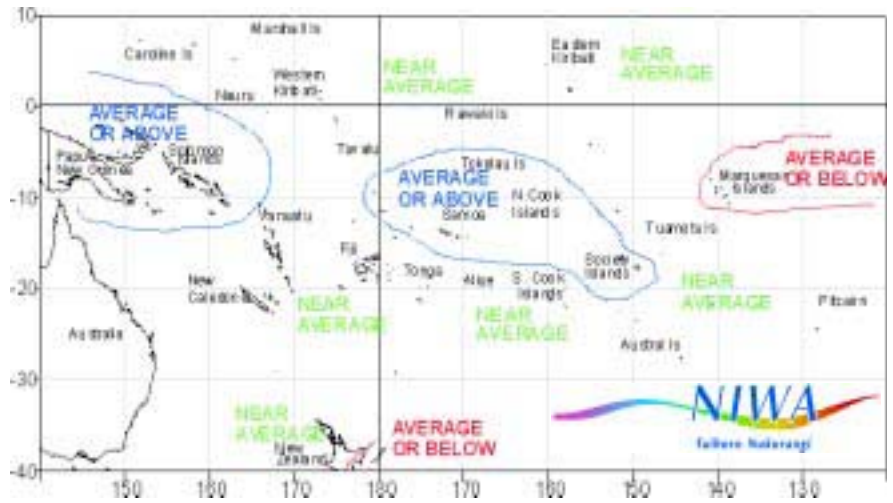
The region of above average rainfall was generally further south than expected, reaching Samoa and the Tuamotu Islands, leaving Kiribati with mixed rainfalls, rather than above average. Rainfall was higher than forecast over parts of New Caledonia, and lower than expected over Pitcairn Island. The overall 'hit rate' for the March to May rainfall outlook was 57%, the lowest for the past 8 months.



Rainfall outlook: June to August 2003

Average or above average rainfall is expected from Papua New Guinea to the Solomon Islands, also from Wallis and Futuna to the Society Islands

Average or below average rainfall in the Marquesas Islands



Rainfall outlook map for June to August 2003

Based on the recent climatic transitions in the equatorial Pacific, rainfall is expected to be average or above average from Papua New Guinea to the Solomon Islands, and also from Wallis and Futuna across to the Northern Cook Islands and Society Islands, including Samoa and Tokelau.

Average or below average rainfall is likely in the Marquesas Islands.

Near average rainfall is expected elsewhere in the Pacific over the upcoming three months.

Coupled with the sudden change in oceanic conditions in the equatorial Pacific and SOI, the rainfall forecast model skills are generally moderate to low for all countries in the region.



Tropical Cyclones

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'GINA', the 10th tropical cyclone this season was active at the time of writing. Gina originated at 10°S 170°E east of the Solomon Islands, taking a southwest track, with sustained maximum wind speeds of 100 km/h, gusts to 130 km/h at 13°S 168°E, and a central pressure of 985 hPa. It is unusual to have a tropical cyclone occurrence in June.

Tropical Cyclone 'EPI' formed east of Fiji, but decayed to a depression quickly.

At the time of publication of this newsletter not much information was available about the movement and intensity of these tropical cyclones.

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 (JUNE - AUGUST 2003)

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

Update on Pacific Island Rainfall Outlooks

Stuart Burgess NIWA

More than 30 rainfall outlooks for the Southwest Pacific have been issued through the ICU, so we now have enough information to accurately assess how the forecasts have been faring over the past few years. Figure 1 indicates how often the forecasts have been correct, in a categorical sense. Taking the forecast category (below, average or below, average, average or above, or above average) to be that assigned the highest probability, the contours and numbers show the percentage frequency of correct forecasts (or the “hit” rate). The overall hit rate is equivalent to the percentage frequency of correct forecasts. While this is a simple (and probably optimistic) measure of skill for probability forecasts, it provides a reasonable indication of our skill for the available sample.

Since our earlier analysis (see ICU Issue No. 11), we have maintained a hit rate above 50% over much of our forecast area. The hit rate has been highest (>70%) in the 0-10°S latitudes west of about 155°W, in the region from Western Kiribati to the Northern Cook Islands, including Tokelau, and especially over Tuvalu (81%). However, scores have been much lower in areas around and to the south and east of Samoa.

Looking through time (see Figure 2), the average hit rate for the whole of the forecast region has ranged between about 45 and 80% throughout the period. If the forecasts were random guesses, we’d expect to get one of the single categories (below, average, or above average) correct one third of the time, and one of the composite categories (average or below, etc.) correct two thirds of the time. Hence, because we forecast overlapping and composite outcomes, a

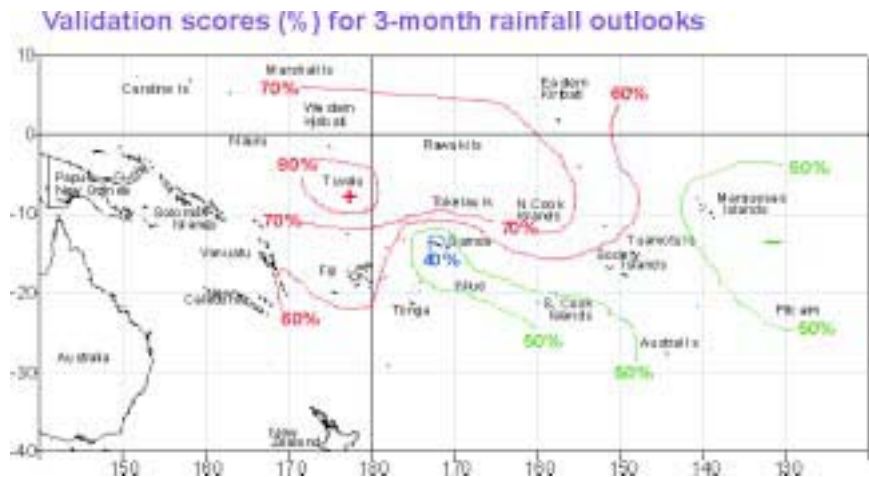


Figure 1. Frequency of correct 3-month rainfall outlooks. A score of 100 would mean that all were correct.

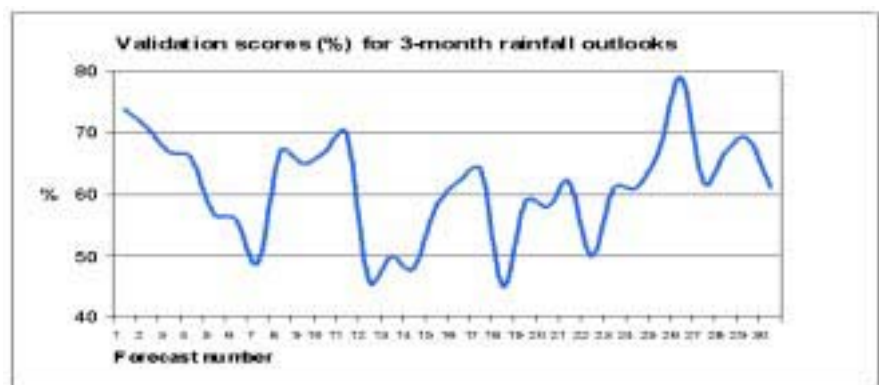


Figure 2. Validation score for 30 (3-month) rainfall outlooks. This chart shows the % of correct forecasts. Scores of 60% or more indicate significantly better outcomes than chance.

series of random forecasts would be correct half the time on average. Analysis of the statistics from the 30 rainfall outlooks overall shows that hit rates have exceeded 50% for the majority of our forecasts, indicating more skill than “chance” or climatology.

The distribution of forecast success may reflect to some extent the influence of ENSO

events and the location of the SPCZ. The area near Samoa is constantly in the transition zone for SPCZ-related rainfall, making it a difficult region to predict. At this stage there is a slight indication that forecast confidence reaches a peak during the South Pacific summer, and falls to a minimum during the South Pacific autumn, but further statistics are required.



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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DISCLAIMER: 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 meteorological services. 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 contents.

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