The Island Climate Update

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

NIWA
Taihoro Nukurangi

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, IRICP

European Centre for Medium Range Weather Forecasts, ECMWF

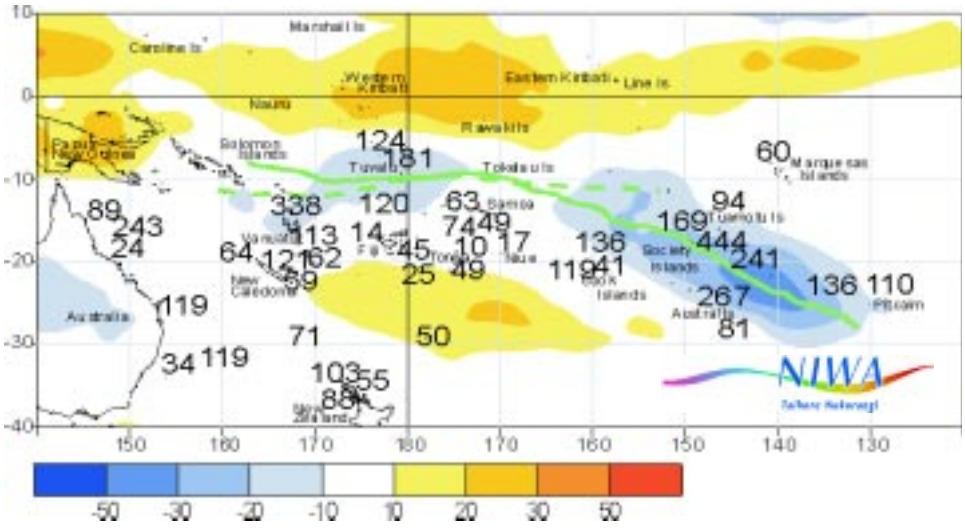
UK Met Office

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

June's climate

The South Pacific Convergence Zone (SPCZ) was displaced further south than average east of the Date Line. As a result enhanced convection and extremely high rainfall was recorded over parts of French Polynesia during the month. Rainfall totals were also above average in most areas from the Solomon Islands to Tuvalu and east to the Cook Islands, as well as Pitcairn Island and much of Vanuatu. Suppressed convection persisted along the equator extending from Indonesia across to Eastern Kiribati. Suppressed convection, with low rainfall, also affected Fiji, Tonga and Niue. Air temperatures continued above average throughout much of the tropical Southwest Pacific. Tropical cyclone 'Gina', the last of the season, was active between 4 and 8 June. The storm took a southwest track between the Solomon Islands and Fiji, and then moved southeast to pass over the sea area between Fiji and Vanuatu. ***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 June 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 rapid shift in the sea surface temperatures (SSTs) indicating a La Niña like pattern seen in May, did not continue during June. The Southern Oscillation Index (SOI) fell during June to -1.4. The majority of the global climate models indicate that neutral conditions will prevail in the tropical Pacific for the rest of the year. ***Details Page 2***

The next three months July to September 2003

Average or above average rainfall is expected from Papua New Guinea to Samoa, including Tuvalu, Wallis and Futuna, and Tokelau. Average or below average rainfall is likely for the equatorial region of Western and Eastern Kiribati. Near average rainfall is most likely elsewhere in the region. ***More on Page 3***

SOPAC

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

SPREP

Climate developments in June 2003

SPCZ active with extremely high rainfall over French Polynesia

Reduced convection persists along the equator

Record low rainfall in parts of Tonga and Niue

CLIMATE EXTREMES IN JUNE 2003

Country	Location	Rainfall (mm)	% of average	Comments
Australia	Willis Island	121	243	Well above average
French Polynesia	Tahiti-Faaa	271	444	Record high
French Polynesia	Tuamotu, Hereheretue	248	241	Well above average
French Polynesia	Tubuai	275	267	Record High
Vanuatu	Pekoa	532	338	Record high
Fiji	Labasa Airport	14	21	Well below average
Fiji	Savusavu Airport	25	21	Well below average
Fiji	Nadi	29	45	Well below average
Fiji	Penang Mill	19	19	Well below average
Niue	Hanan Airport	15	20	Well below average
Tonga	Lupepau'u	12	10	Record low
Tonga	Fua'amotu Airport	19	18	Extremely low

Country	Location	Min Air Temp (°C)	Date	Comments
Fiji	Savusavu	25.5	4th	New high

The SPCZ was displaced further south than average east of the Date Line. As a result enhanced convection occurred over much of French Polynesia and at least 200% of average rainfall throughout much of the Society and northern Austral Islands. Rainfall totals were also enhanced, being 125% or more than average in most areas from the Solomon Islands to Tuvalu and east to the Cook Islands, as well as Pitcairn Island and much of Vanuatu. The high rainfall recorded in northern Vanuatu was largely due to tropical cyclone Gina.

An elongated region of suppressed convection persisted along the equator extending from Indonesia across to Eastern Kiribati (with rainfall totals generally less than 50% of average there) and further east. Another region of suppressed convection, with rainfall generally less than 50% of average with low totals in places, affected Fiji, Tonga and Niue. June was Niue's third consecutive month with below average rainfall.

Air temperatures were above average over New Caledonia, Vanuatu, and the Marquesas Islands, average or below average over Fiji, and near average elsewhere.

Neutral conditions continue to prevail in the tropical Pacific

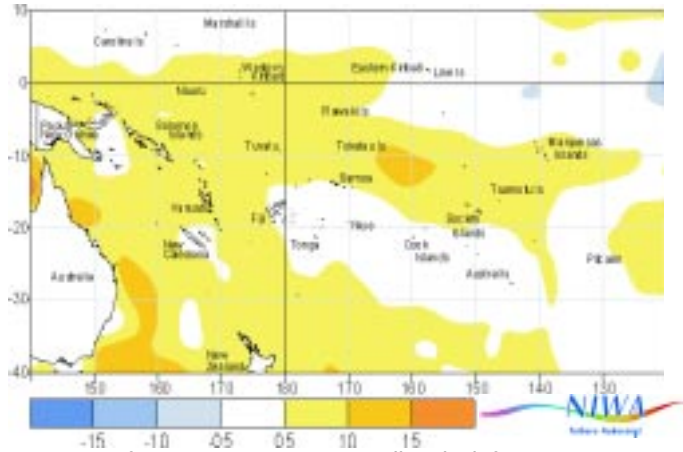
Continuing negative SST anomalies along the South American coast

During June, the tropical Pacific did not continue the trend towards La Niña conditions seen in May. Current ocean and atmospheric indicators are inconsistent with the phase of El Niño-Southern Oscillation (ENSO) being still unclear.

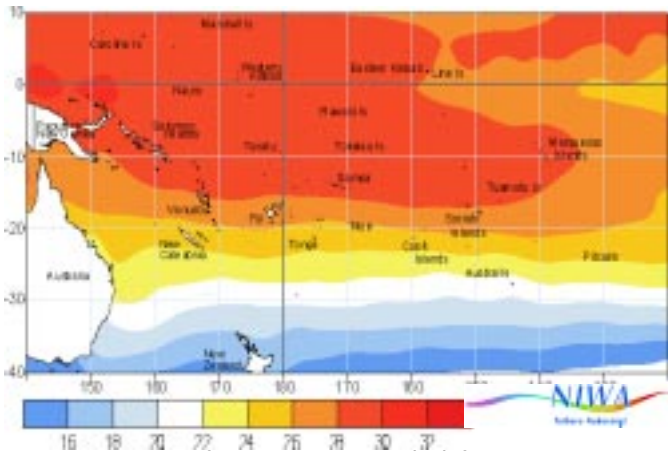
The NINO3 SST anomaly was -0.4°C in June. However NINO4 rose to +0.5°C. The three month (April - June) means were -0.4°C and +0.5°C for NINO3 and NINO4, respectively. The thermocline remains slightly elevated close to the South American coast, but is near or below its average position further west.

The area of suppressed convection in the eastern Pacific continued to expand along the equator during June.

Most of the ENSO global climate models indicate neutral conditions throughout the southern hemisphere winter and into early summer.



Sea surface temperature anomalies (°C) for June 2003



Mean sea surface temperatures (°C) for June 2003

Forecast validation

Forecast period: April to June 2003

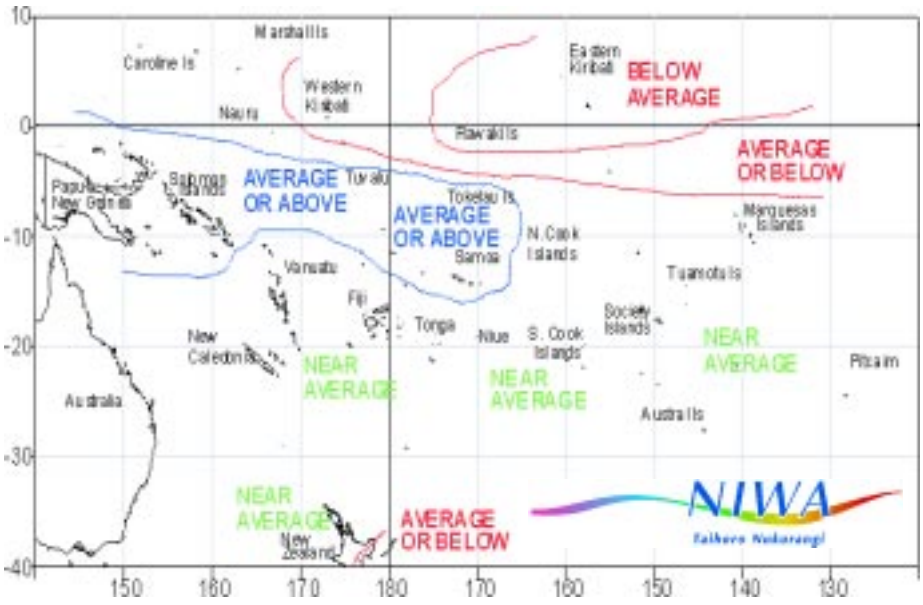
Enhanced convection was expected over Western and Eastern Kiribati, possibly extending south to include the Solomon Islands, Tokelau and Samoa. Below average rainfall was expected in the Marquesas Islands of northern French Polynesia, with average or below average rainfall in New Caledonia and Fiji. Near average rainfall was projected elsewhere.

Rainfall was above average in Vanuatu and from Tuvalu to the Society and Tuamotu Islands of French Polynesia, including Samoa. Below average rainfall occurred in Western and Eastern Kiribati, and the Marquesas Islands, and also over parts of Fiji, Tonga, and Niue. Rainfall was higher than forecast over Vanuatu, Tuvalu, and much of central and southern French Polynesia, and lower than forecast over Western and Eastern Kiribati, Tonga, and Niue. The overall 'hit rate' for the April to June rainfall outlook was 55%, the lowest for the past 10 months.

Rainfall outlook: July to September 2003

Average or above average rainfall is expected from Papua New Guinea to the Solomon Islands

Average or below average rainfall in Western and Eastern Kiribati



Rainfall outlook map for July to September 2003

Recent oceanic and atmospheric changes in the equatorial region suggest that July to September rainfall is likely to be average or above average from Papua New Guinea to Samoa including Tuvalu, Wallis and Futuna and Tokelau.

The cooling of SSTs in the equatorial region just east of the Date Line is likely to result in average or below average rainfall in both Western and Eastern Kiribati over the coming three months.

Rainfall is expected to be near average for the rest of the South Pacific region.

The skill of most of the forecast models is reduced during this time of the year.

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

Climate Research

Is there a role for Indigenous knowledge in improving scientific understanding of future change in climate?

Penehuro F Lefale, NIWA

Long before the advent of complex numerical climate models, indigenous communities have used changes in their environments to predict changes in the climate and weather. Social and communal activities like feasting and fishing were planned in response to these changes (Table 1). Recent research by the National Institute of Water and Atmospheric Research (NIWA) aimed at documenting knowledge of climate and weather in Samoa revealed Samoans have their own unique seasonal calendar. Unlike the European calendar, which is based on astronomical events, the Samoan calendar is based on the observations of environmental changes, which are in turn largely influenced by the onset of extreme weather and climate events.

Fig 1 Damage from Tropical Cyclone Val, Samoa in 1991

Scientists tend to assume that scientific problem-solving abilities are superior to those of traditional knowledge. However, the issues facing scientists today are becoming extremely complicated, often calling for more creative forms of collaboration between scientists and a broader range of disciplines and skills. In research into climate change, some of the most important tools being employed are numerical climate models.

These models have evolved considerably over the years. The climate projections in the 2001 Intergovernment Panel on Climate Change Technical Assessment Report (IPCC TAR) draw on the output from climate models run for a range of plausible greenhouse gas scenarios. The best way to test a climate model is to run it for a period in the past using known greenhouse gas concentrations, and compare the output with past climate observations. This brings us to the importance of local observations, either in conventional data collection or in the documentation of indigenous knowledge.

Pacific Islands National Meteorological Services have been monitoring and collecting data from many parts of the South Pacific and continuing datasets that in some areas began over 100 years ago. Unfortunately, few parallel records have been kept of traditional perspectives on climate and weather. NIWA now recognises the important role of local climate and weather observations and knowledge. The project that resulted in documentation of the seasons from a Samoan perspective began in March 2001. Samoa, with its long history of climate data collection (1890) and local knowledge on predicting climate and weather events was the obvious place to start exploring these issues. NIWA hopes the project will be expanded to other Pacific Islands.

Table 1
Samoan methods of climate and weather observations and possible Western scientifc equivalent

Samoan Indicator/Phrase	English	Possible Scientific Tool Equivalent
Mogamoga	Cockroaches	Barometers
O le malio/kupa ma lona lua	The Hermit Crab	Anemometer
O le Atafa	Frigate Bird	Anemometer
Ua oso foi le gugu o le toeaina o le a sau le timu	The old man's gout is back, rain is on the way	Barometer
Tulisi'a foi moa ua lata mai le timu	Chickens are running scared, rain is on its way	Anemometer Solarimeter Thermometer

The Island Climate Update

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
Technical Services: **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

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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