The Island Climate Update

44

6 May 2004

An overview of the present climate in the tropical South Pacific, with an outlook for the coming months

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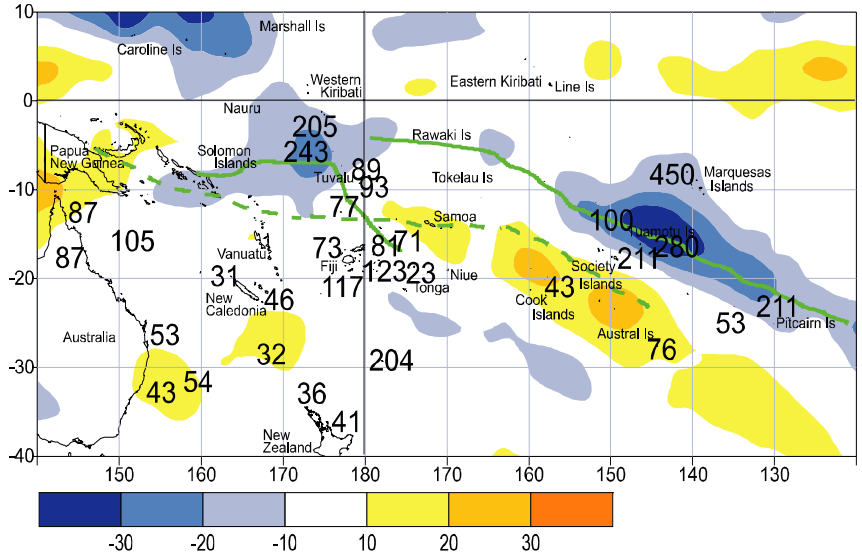
April's climate

- High rainfall, floods and loss of life in parts of Fiji
- Well above average rainfall in northern and central French Polynesia, Tuvalu and Pitcairn Island
- Drier over Samoa, the Southern Cook Islands, the Austral Islands of French Polynesia and parts of New Caledonia
- Warmest April on record in the Southern Cook Islands



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 April 2004 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 March Southern Oscillation Index (SOI) was -1.8. The equatorial Pacific continues in a neutral El Niño Southern Oscillation (ENSO) state
- Sea Surface Temperatures anomalies (SST) are near zero in the equatorial Pacific

The next three months May to July 2004

- Above average rainfall is forecast for the Solomon Islands
- Below average rainfall is expected in the Marquesas Islands

SOPAC

nzaid

New Zealand Agency for International Development

Nga Hoe Tuputupu-mai-tawhiti

SPREP

NIWA

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Climate developments in April 2004

CLIMATE EXTREMES IN APRIL 2004

Country	Location	Rainfall (mm)	% of average	Comments
Tuvalu	Nanumea	490	205	Well above average
Tuvalu	Nui Island	583	243	Record high
French Polynesia	Hiva Hoa, Atuona	414	450	Record high
French Polynesia	Tahiti-Faa	237	211	Well above average
French Polynesia	Takaroa	355	280	Well above average
Pitcairn Island	Pitcairn	217	211	Well above average
New Zealand	Raoul Island	208	204	Well above average
New Caledonia	Ile Art, Belep	42	24	Well below average
Tonga	Fua'amotu Airport	36	23	Well below average
New Caledonia	Moue	31	24	Extremely low
French Polynesia	Tubai	40	21	Well below average

Country	Location	Mean Temp (°C)	Dep. (°C)	Comments
Cook Islands	Rarotonga Airport	27.5	+1.9	Record high

Enhanced convection and above average rainfall occurred from the Solomon Islands across to Tuvalu, and from the Northern Cook Islands southeast over northern and central French Polynesia to Pitcairn Island. Rainfall was at least 400% of normal (over 400 mm) in the Marquesas Islands, and at least 200% of normal (over 200 mm) over much of the Society and Tuamotu Islands of French Polynesia, and Tuvlau. The SPCZ (South Pacific Convergence Zone) has moved little since March, generally being located further north and east than usual, extending over these islands. April rainfall exceeded 700 mm in northwestern parts of the Solomon Islands, with Munda recording 270 mm on the 4th and 184 mm on the 10th. Two tropical depressions and a slow moving trough of low pressure affected Fiji during the month, all three events producing high rainfall and floods, resulting in the death of at least 10 people with 10 others missing, and US$ 4 million in damages. Nausori Airport recorded more than 100 mm on both the 8th and 15th. There were 26 days with rainfall at Maopoopo in the Wallis and Futuna Islands.

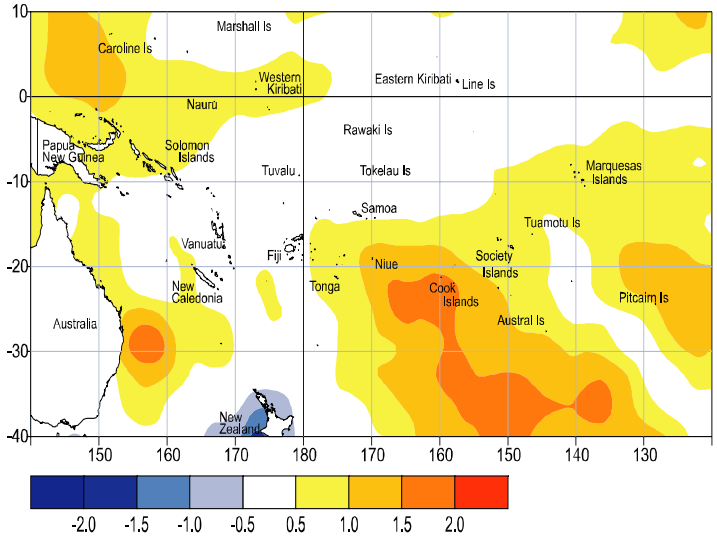
Suppressed convection with below average rainfall occurred in American Samoa, the Southern Cook Islands, and the Austral Islands of French Polynesia. Rainfall was also below average in parts of New Caledonia.

Mean air temperatures were extremely high in the Southern Cook Islands (almost 2ºC above average). They were about 0.5ºC above average in French Polynesia, and about 0.2ºC below average in New Caledonia.

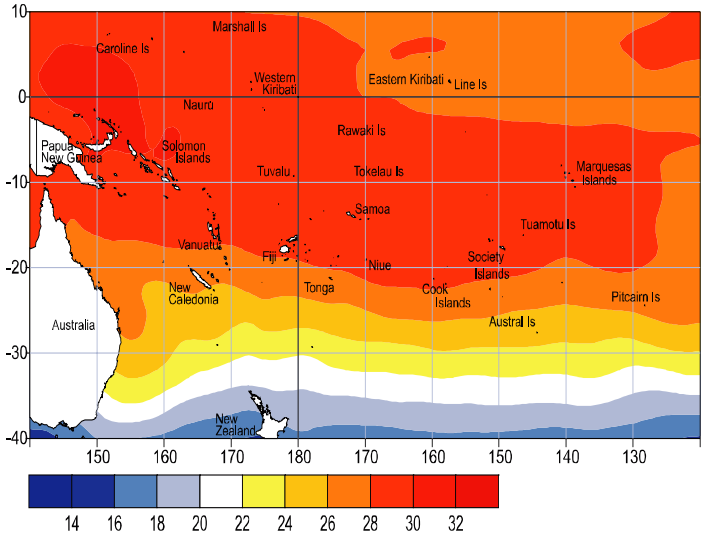
Mean sea-level pressures were generally above average west of the Date Line, and below average in the east, especially over the Southern Cook Islands, resulting in windier than normal conditions in New Caledonia.

SOI strongly negative
Equatorial SST anomalies near zero

The equatorial Pacific remains in a neutral state. Equatorial SST anomalies are near zero, and have changed little from March. The monthly SOI was strongly negative, largely as a result of Madden-Julian Oscillation (MJO) activity in early April. The three month SOI (February-April) continues in the neutral range. For April and for February to April, the NINO3 SST anomaly was about +0.2°C, and NINO4 was about +0.4°C. Subsurface temperatures show negative anomalies near the surface in the eastern Equatorial Pacific, with positive anomalies in the farther west, both of which appear to be propagating east. Most of the global models indicate that neutral conditions are the most likely outcome for the rest of the year, though the chance of an El Niño developing is slightly higher than average.



Sea surface temperature anomalies (°C) for April 2004



Mean sea surface temperatures (°C) for April 2004

Forecast validation

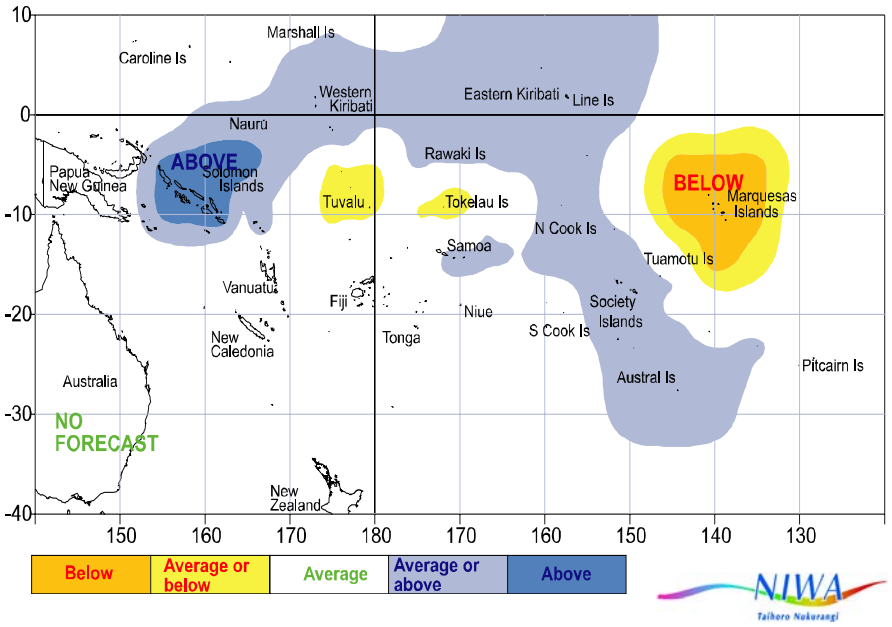
Forecast period: February to April 2004

Enhanced convection with above average or average rainfall was expected over the Solomon Islands and Western Kiribati, with a tendency toward below average rainfall predicted for the Marquesas Islands. The rest of the region was expected to experience near average rainfall.

Rainfall was above average over the Solomon Islands as expected and average or below average in Eastern Kiribati. However, totals were higher than expected in northern and central French Polynesia and Pitcairn Island, and lower than expected in much of the region from the Southern Cook Islands southeast to the Austral Islands of French Polynesia. The overall 'hit rate' for the February to April 2004 rainfall outlook was about 40%.

Rainfall outlook: May to July 2004

- **Enhanced convection over the Solomon Islands**
- **Suppressed convection over the Marquesas Islands**



Rainfall outlook map for May to July 2004

Enhanced convection is expected just west of the Date Line over the region of the Solomon Islands where rainfall is forecast to be above average. Average or above rainfall is likely over Western and Eastern Kiribati, Samoa, the Northern Cook Islands, the Society Islands and the Austral Islands.

Average or below average rainfall is expected over Tuvalu and the Tokelau Islands. Suppressed convection over the Marquesas Islands is likely to result in below average rainfall there.

Near average rainfall is expected elsewhere in the region. The forecast model skills are generally moderate to low 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 (MAY - JULY 2004)

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

Fiji's April Weather Bombs

Fiji Meteorological Service

April usually heralds the end of the South Pacific Tropical Cyclone and wet season. Being a transition month there is a slight chance of a Tropical Cyclone or extreme rainfall event. The 'Weather Bombs' of April 2004 came as a surprise to the people of Fiji especially after a very quiet cyclone season, with various parts of the Pacific Island experiencing extensive flooding, landslides and loss of life and property, due to three marked tropical weather systems in just over a fortnight.

On the 6th April, a tropical depression formed just northwest of northern island of Vanua Levu. The system made landfall and early on the 7th was accompanied by strong winds and heavy rain which caused flooding in the western and northern parts of Vanua Levu. On the same day, a second tropical depression formed just west of Viti Levu. This tropical depression brought torrential rain and wind gusts to Yasawa Islands and the main island of Viti Levu. The tropical depression was reported to have maximum (10-minute) average winds of about 60 km/h and momentary gusts of 95 to possibly 130 km/h at its peak intensity.

Torrential rain caused the Wainibuka and smaller rivers in the northeastern Viti Levu region to overflow severely. To date, ten people are confirmed to have drowned and ten are still regarded as missing and presumed dead. The media focused largely on an incident where a public bus was caught in a landslide and swept into a flooded river. Fortunately most of the passengers had got off the bus leaving only six people inside, including the driver. Flooding resulted in the loss of a considerable amount of food crops amounting to several thousands of dollars. A number of homes and bridges were destroyed as well.

During the 9th to 14th April, a trough of low pressure which had been lying over Fiji for a few days moved slowly northeastwards and was located northeast of Vanua Levu on the 11th. Another tropical depression developed along this trough to the northwest of Fiji, and became stationary between Vanua Levu and Rotuma till the 12th. However 12 hours later the trough retreated back over Fiji. It was located over the Group for the next two and a half days before moving to the southwest of Viti Levu on the 15th. With the ground being saturated from considerable rainfall in the past week, more rainfall in southeastern Viti Levu on the 14-15th led to considerable runoff from the highlands of southern Viti Levu setting off extensive flooding in the Waimanu and Waidina Rivers that feed into the Rewa River. The Navua catchment received continuous rainfall as well. The Navua River burst its banks on the 15th and low-lying areas were severely flooded. The National Disaster Management Centre reports "great damage" to root crops and housing in the Navua-Deuba corridor especially in Navua town, which is located on the banks of the Navua River. Navua hospital lost almost all its equipment, records and supplies. A total of 2374 people were moved to evacuation centres.

Preliminary estimates of damage for both events are in excess of $FJ6 Million with recovery costs estimated to be ~$FJ9 Million. The overall damage figure is likely to be more than double this as the above estimates are mainly for governmental infrastructure.

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 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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