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The Island Climate Update



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

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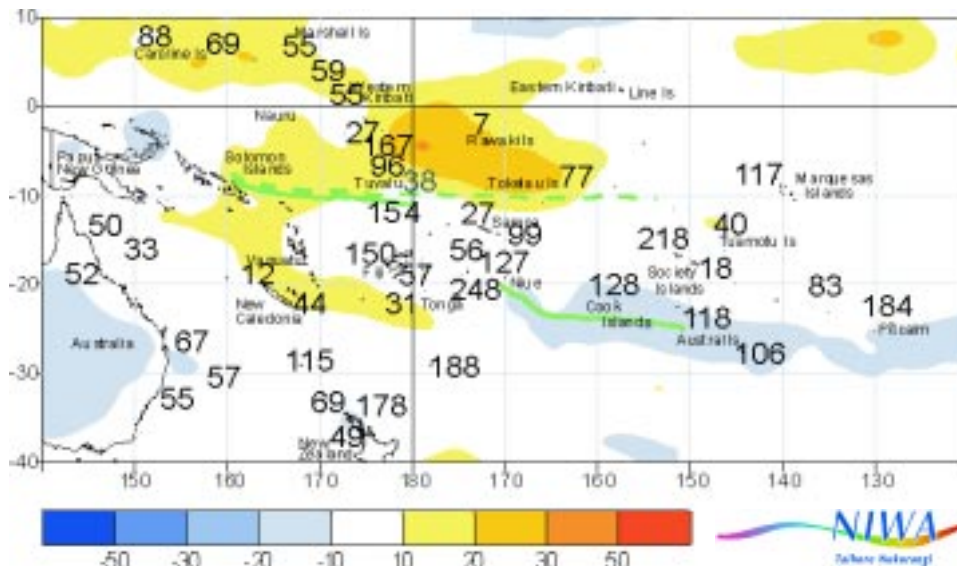
UK Met Office

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

August's climate

A large area of suppressed convection occurred from the Solomon Islands southward to include Vanuatu and New Caledonia, and eastward to encompass Western Kiribati, Rawaki, and Tokelau. Many sites in these areas recorded less than 25% of their normal August rainfall, especially Vanuatu and northern areas of New Caledonia where it was extremely dry and previous low rainfall records were broken. Enhanced convection and above normal rainfall occurred from southern Tonga to southern French Polynesia, and east to Pitcairn Island. Air temperatures were well below average in parts of Fiji and New Caledonia and well above average in the Society Islands of French Polynesia. **More on Page 2**



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} are represented by hatched areas, and rainfall percentage of normal, 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 August 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 equatorial Pacific remains essentially in a neutral state. The August Southern Oscillation Index (SOI) was about -0.4. Sea surface temperature anomalies were generally positive throughout the western equatorial Pacific. The trade winds were weaker than average over the western Pacific but near average strength in the east. **Details Page 2**

The next three months, September to November 2003

Enhanced convection is expected over Papua New-Guinea, as well as the Austral Islands, resulting in normal or above normal rainfall in those areas. Normal or below normal rainfall is more likely for Western and Eastern Kiribati, Tuvalu, Fiji, and the Tuamotu and Marquesas Islands. Near normal rainfall is expected elsewhere in the region. **More on Page 3**



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





Climate developments in August 2003

Extremely dry in New Caledonia and Vanuatu

A large area of suppressed convection occurred from the Solomon Islands southward to include Vanuatu and New Caledonia, and eastward to encompass Western Kiribati, Rawaki, and Tokelau. Many sites in these areas recorded less than 25% of their normal August rainfall, especially Vanuatu and northern areas of New Caledonia where it was extremely dry and some gauges recorded totals below 10 mm. Rainfall was also well below normal in Western Samoa, and below normal in the Caroline and Marshall Islands.

Although the South Pacific Convergence Zone (SPCZ) was near its average location west of the Date Line, it was less active than usual there. It was more active and much further south than usual in the east from southern Tonga to southern French

Neutral ENSO state in the tropical Pacific Ocean

Weaker tradewinds in western equatorial Pacific

The Equatorial Pacific atmosphere and ocean remains in a neutral state. The equatorial sea surface temperature (SST)

CLIMATE EXTREMES IN AUGUST 2003				
Country	Location	Rainfall (mm)	% of normal	Comments
New Caledonia	Koumac	5	12	Extremely low
Fiji	Labasa Airport	5	11	Extremely low
Fiji	Matei Airport	8	6	Extremely low
Eastern Kiribati	Kanton Island	6	7	Extremely low
French Polynesia	Tahiti-Faaa	8	18	Well below normal
Tonga	Nuku'alofa	265	248	Well above normal

Country	Location	Mean Air Temp (°C)	Dep. from Av	Comments
New Caledonia	La Roche	17.4	-1.0	Well below average
New Caledonia	Ouanaham	17.9	-1.6	Extremely low
Fiji	Nacocolevu	21.6	-1.1	Extremely low
Fiji	Nadi	22.4	-1.3	Extremely low
Fiji	Nausori	21.8	-1.1	Extremely low
Fiji	Penang Mill	22.4	-1.7	Extremely low
French Polynesia	Rapa Island	19.3	+1.3	Extremely high
French Polynesia	Tahiti-Faaa	25.9	+1.1	Extremely high

Polynesia, with enhanced convection and rainfall at least 100% of normal over that region, including Niue and the southern Cook Islands. Rainfall was at least 200% of normal in parts of southern Tonga. Rainfall was also well above normal in Pitcairn, and isolated areas in Fiji's Western Division. So far, the 2003 dry season (April-August) has been particularly dry over much of Kiribati, where rainfall has been 50% or less of normal.

Frequent southerly airflow kept air

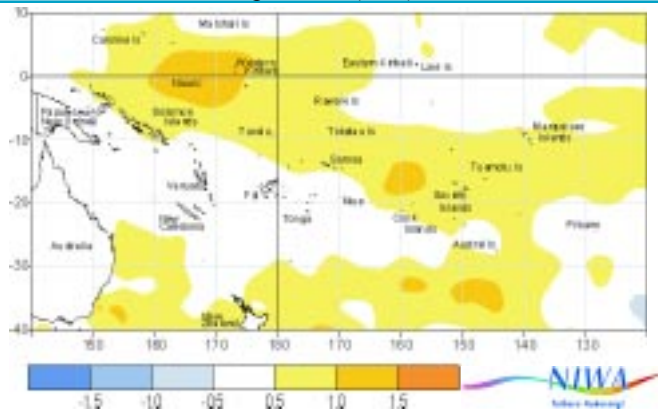
temperatures well below average in parts of Fiji and New Caledonia. In contrast, well above average mean air temperatures occurred in the Society Islands of French Polynesia.

Tarawa, Western Kiribati recorded its lowest frequency of easterlies (64% of observations) since January this year, and highest frequency of calms (30%) since May 2002.

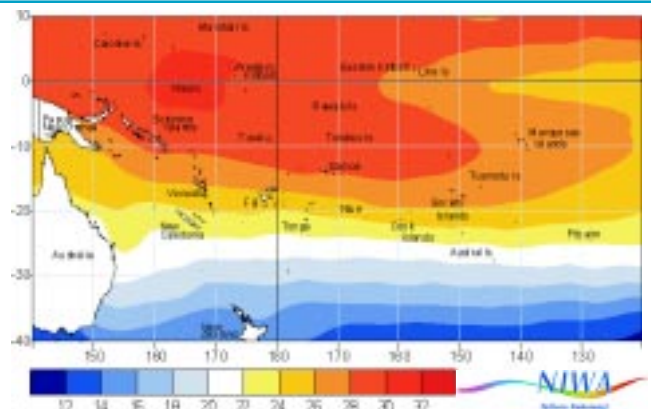
anomalies are generally positive across the Pacific. The NINO3 SST anomaly weakened slightly to +0.3°C in August (from +0.4°C in July), and NINO4 is about +0.7°C. The three month (June - August) means were +0.1°C and +0.6°C for NINO3 and NINO4, respectively. The trade winds are weaker than average over the western Pacific but

near average in the east. The equatorial thermocline remains depressed in the east but subsurface ocean temperature anomalies are relatively small.

Most global climate models predict a neutral El Niño Southern Oscillation (ENSO) state through to February 2004.



Sea surface temperature anomalies (°C) for August 2003



Mean sea surface temperatures (°C) for August 2003



Forecast validation

Forecast period: June to August 2003

Normal or above normal rainfall was expected from Papua New-Guinea east-southeast to the Society Islands of French Polynesia. Average or below normal rainfall was forecast for the Marquesas Islands. Near normal rainfall was expected elsewhere.

Rainfall was below normal in an extensive region along the equator from west of the Caroline Islands to the region northeast of the Marquesas Islands, and also from the Coral Sea southeast to the region south of

Tonga. Rainfall was above normal over much of the Cook Islands east to Pitcairn Island, including the Society Islands of French Polynesia.

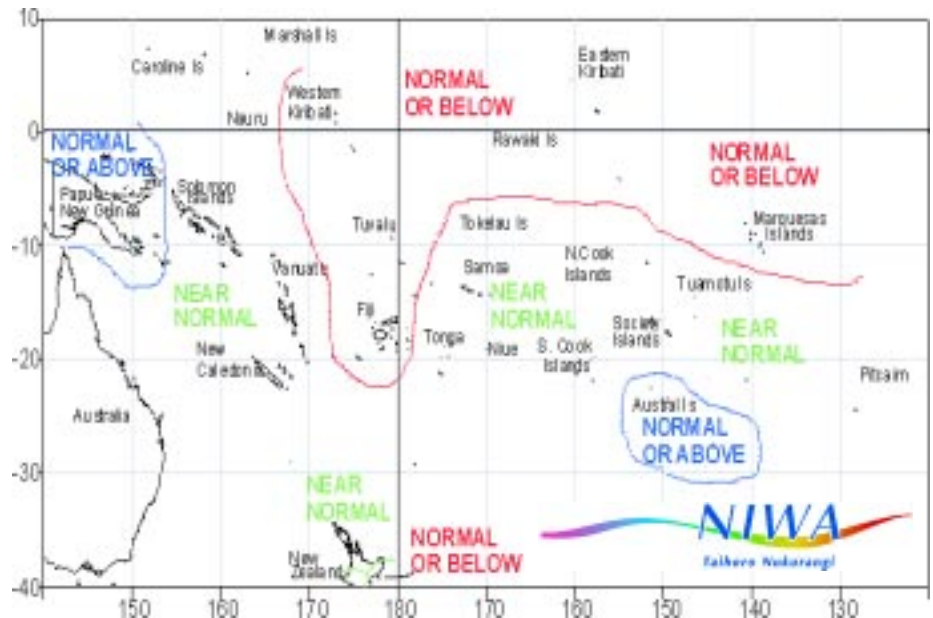
Rainfall was lower than forecast in Western and Eastern Kiribati, Tokelau, Wallis and Futuna, Samoa and Fiji, and higher than forecast in Pitcairn Island, with mixed anomalies over Tonga and the Austral Islands. The overall 'hit rate' for the June to August rainfall outlook was just over 50%.



**Rainfall outlook:
September to
November 2003**

Normal or above normal rainfall is expected in Papua New Guinea and the Austral Islands

Normal or below normal rainfall in the equatorial region and Tuvalu, Fiji, and the Tuamotu and Marquesas Islands



Rainfall outlook map for September to November 2003

Neutral ENSO conditions suggest a near normal rainfall pattern over many countries in the region. However, enhanced convection is likely over Papua New-Guinea and in the Austral Islands where rainfall is expected to be normal or above normal for the three month forecast period.

Suppressed convection is expected to continue in the equatorial region of Western and Eastern Kiribati resulting in normal or below normal rainfall. Rainfall is also expected to be normal or below normal in Tuvalu, Fiji, and the Tuamotu and Marquesas Islands.

Near normal rainfall is likely elsewhere in the region.

The skill of most of the forecast models is moderate to low for this time of the year as the region transits from the dry to the wet season.

Probabilities of rainfall departures from normal

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, rainfall is equally likely (33% chance) in any tercile.

The probabilities shown express the expected shift in the distribution from normal, 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
(SEPTEMBER-NOVEMBER 2003)**

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

Information on Drought

Stuart Burgess and Ashmita Gosai, NIWA Climate Applications and Research Group

The issue of drought can be a major concern in some Southwest Pacific countries. Drought occurs during a sustained period of low rainfall, which has persisted long enough to produce serious hydrological imbalances. These may result in shortages or restrictions on water supplies, crop failure and loss of productive land, damage to horticulture and lack of feed and consequences for agriculture, as well as increased potential for wild fire, and other extreme events.

There are many ways of measuring or defining drought. *Agricultural* drought is based on modelled estimates of soil moisture balance, where drought is said to occur when there is insufficient soil moisture to sustain plant growth. Crops become stressed as the readily available water capacity of the pasture root-zone becomes depleted and incipient wilting occurs. On tropical Southwest Pacific islands it can take as little as two or three weeks with insufficient rainfall to meet this criterion, even in the wet season. The drought ends when rainfall finally restores the soil moisture levels.

Hydrological drought occurs when rainfall is well below expected levels in any large catchment area for an extended period of time. Hydrological drought is usually associated with dry spells, which are temporally variable in regards to long-term averages.

Another useful *climatological or meteorological* definition of drought assumes that water shortages may often affect an area for short periods, in which case provisions are usually made or are already in place to cope with those events. Hazard conditions might be said to occur when at least the seasonal (3-month) rainfall in the area affected falls below the ten-percentile value, and a severe event falls below the five-percentile value, i.e. an event that occurs on average less than once in twenty years.

Droughts tend to be prolonged events in comparison to other extreme events which may cause a similar magnitude of havoc yet be over within a few hours or days. Droughts tend to break when there is substantial rainfall to recharge the moisture levels in the rivers, lakes and in some cases even soils.

Regular reporting and monitoring of rainfall and its relationships to ENSO characteristics play an important role towards improving drought prediction for Southwest Pacific Island countries, and also towards mitigating potential hazards caused by drought, by assisting people and organisations to become better prepared for drought and its consequences.

The Governments of the Pacific Island countries have established National Disaster Management Units under the umbrella of South Pacific Geosciences Commission (SOPAC) which not only deals with tropical cyclones, floods, earthquakes, and tsunamis, but also provides advice and national warnings during droughts.



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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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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