The Island Climate Update

24

6 September 2002

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.

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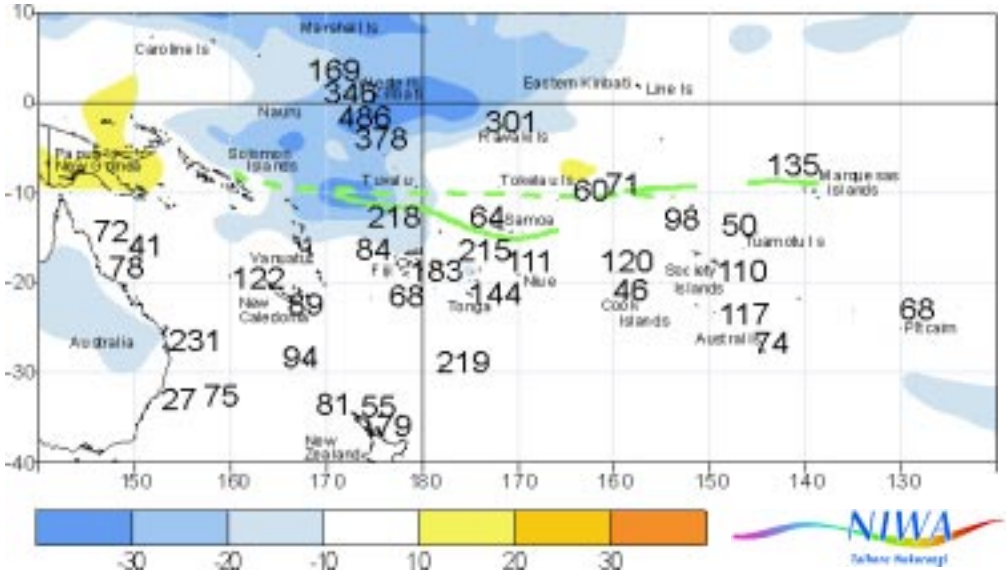
August's climate

A very extensive area of enhanced convection (larger than the continent of Australia) affected a wide area of the western-central tropical Pacific in August, enhancing rainfall from Micronesia across to Hawaii, Nauru, Kiribati and Tuvalu. Record high August rainfall occurred throughout much of Western Kiribati. The South Pacific Convergence Zone (SPCZ) continued to be weak east of the date line in the Southwest Pacific. In contrast, below average rainfall, affected much of Indonesia, Australia and Papua New Guinea. Willis Island, in the western Coral Sea, has now recorded 13 consecutive months with less than 75% of average rainfall. Below average rainfall persisted in 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 August 2002 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

Based on the current conditions in the Pacific, El Niño is likely to persist into early 2003. The Southern Oscillation Index remains negative and the equatorial Pacific Ocean continues to be warmer than average. *Details Page 2.*

The next three months (September to November 2002)

Above average rainfall is likely in both Western and Eastern Kiribati. Tuvalu, Wallis and Futuna, and Pitcairn Island are likely to experience average or above average rainfall. Average or below average rainfall is expected from Papua New Guinea across to Tonga and the Southern Cook Islands.

More on Page 3.

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Climate developments in August 2002

CLIMATE EXTREMES IN AUGUST 2002

Country	Location	Rainfall (mm)	% of normal	Comments
Western Kiribati	Tarawa	477	346	Very High
Western Kiribati	Beru	496	486	Record High
Western Kiribati	Arorae	492	378	Record High
Eastern Kiribati	Kanton Island	214	301	Record High
Fiji	Rotuma	421	218	Very High
New Zealand	Raoul Island	210	219	Well above average
Tonga	Mata'aho Airport	198	215	Well above average

Country	Location	Max Air Temp (°C)	Date	Comments
Fiji	Matei	22.2	11th	Record Low

Country	Location	Min Air Temp (°C)	Date	Comments
Fiji	Rotuma	26.8	18th	Record High
Fiji	Vunisea	11.7	18th	Record Low

An extensive region of enhanced convection in the western-central tropical Pacific

Enhanced convection affected a wide area of the western-central tropical Pacific in August. This covered much of the region between 20°N and 15°S and 160°E and 170°W, enhancing rainfall from Micronesia across to Hawaii, Nauru, Kiribati and Tuvalu. Extremely high August rainfall (300-500% of average) was recorded throughout much of Western Kiribati. Rainfall was at least 125% average in Tuvalu, parts of northern and central New Caledonia, northern and eastern Fiji, Tonga, and the Maequesas Islands of northern French Polynesia. The SPCZ extended east from the south of Tuvalu to the east of Samoa. It continued to be weak with little activity further east in the Southwest Pacific.

In contrast, a large area of divergence, with sunny conditions, affected much of the Indonesia, Australia and Papua New Guinea region. Willis Island, in the western Coral Sea has recorded below average rainfall every month since August 2001. Rainfall continued less than 50% of average in the Southern Cook Islands.

Temperatures were generally below average in Fiji, and around average in Queensland, Australia. Fiji recorded two new minimum temperature records and one new maximum temperature record. Temperatures were 0.7°C above average for New Caledonia.

The Central Equatorial Pacific remains warmer than average

El Niño likely to persist into early 2003

During August, there has been some intensification in patterns of sea surface temperatures (SST) in the equatorial central Pacific, where some areas particularly around Kiribati are more than 1.5°C above average .

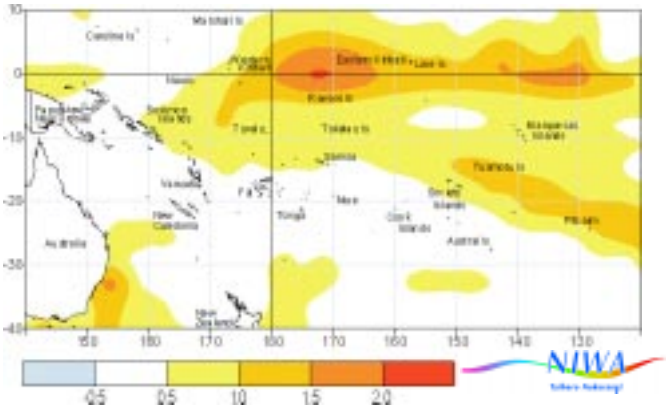
There has been cooling in the Coral Sea especially around the northern cost of Australia, while SSTs have warmed along the southern coast of Australia. The region of warm SSTs southeast of the Pitcairn Islands has expanded north to Tuamoto Island (1.0°C above average).

A slight development toward a horseshoe like SST anomaly pattern occurred in the WesternPacific SSTs surrounding the warm tongue during August.

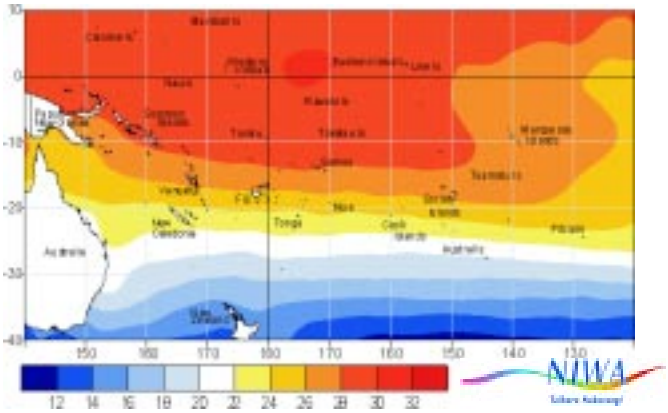
Equatorial SSTs persist above average (1.5°C - 2.0°C) in the NINO4 regions. The cool SST anomalies along the South American coast have further weakened during the last week of August.

Weaker than average tradewinds continued during August along most equatorial regions in the Western Pacific.

Based on current conditions and the model projections, this El Niño should persist into early 2003.



Sea surface temperature anomalies (°C) for August 2002



Mean sea surface temperatures (°C) for August 2002

Forecast validation

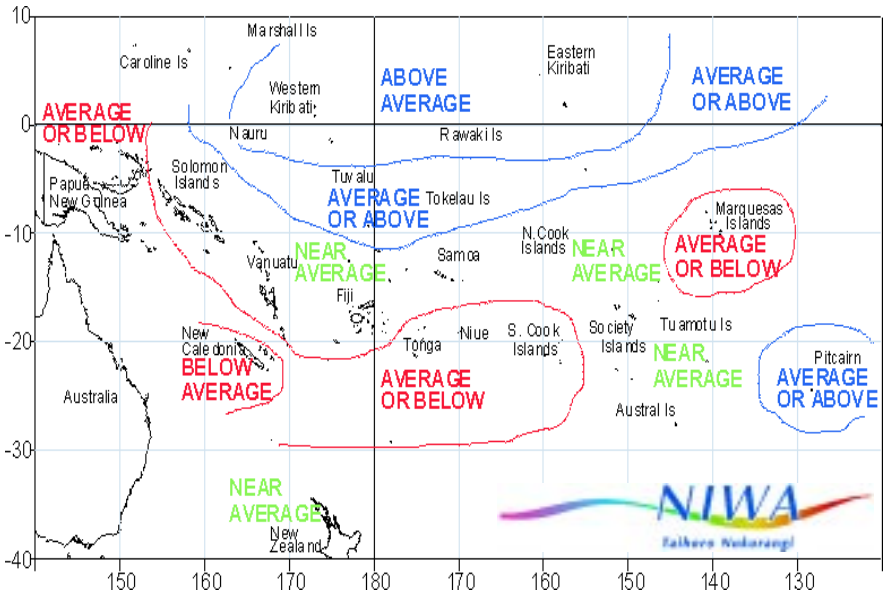
Forecast period: June to August 2002

Rainfall was projected to trend towards above average in Western and Eastern Kiribati and trend towards below average in Papua New Guinea, from New Caledonia northeast to Samoa, and in the Marquesas and Austral Islands of French Polynesia. Average rainfall was forecast for other areas.

The rainfall outlook was correct for countries near the equator, where rainfall is well correlated to the SOI. However, rainfall was higher than expected in the Southern Cook Islands and Pitcairn. Vanuatu rainfalls were expected to be average, but ended up being very mixed. The overall 'hit rate' for the June to August rainfall outlook was 45%.

Rainfall outlook: September to November 2002

- Above average or average rainfall in equatorial latitudes from west to east and Pitcairn Island
- Below average or near average rainfall from Papua New Guinea to New Caledonia across to the Southern Cook Islands
- Mainly average rainfall in other areas



Rainfall outlook map for September to November 2002

The SPCZ extended east from the south of Tuvalu to the east of Samoa in August, but it continued to be weak with little activity further east in the Southwest Pacific.

Rainfall is projected to be above average in Western and Eastern Kiribati, while Tuvalu, Tokelau, Wallis & Futuna and Pitcairn Island are likely to receive above average or average rainfall for September to November period. Confidence is high throughout Kiribati as above average rainfall is usually well correlated to negative SOI indices at this time of year and almost all global climate models are predicting above average rainfall there.

Below average or average rainfall is expected in a broad region from Papua New Guinea southeast to New Caledonia, across to Tonga and the Southern Cook Islands. Average rainfall is expected elsewhere.

Confidence levels are lower for model skills at most stations south of 10°S as the dry to wet season transition takes place.

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
(SEPTEMBER - NOVEMBER 2002)

Island Group	Rainfall Outlook	Confidence in the Outlook
Western Kiribati	15:25:60 (Above)	High
Eastern Kiribati	15:25:60 (Above)	High
Wallis & Futuna	15:35:50 (Average or above average)	Moderate - High
Tuvalu	10:40:50 (Average or above average)	Moderate - High
Tokelau	10:40:50 (Average or above average)	Moderate
Pitcairn Island	20:35:45 (Average or above average)	Moderate
Solomon Islands	30:45:25 (Near average)	Moderate
Vanuatu	25:50:25 (Near average)	Moderate
Fiji	30:40:30 (Near average)	Moderate
Samoa	30:50:20 (Near average)	Moderate
Northern Cook Islands	20:50:30 (Near average)	Moderate
Society Islands	30:55:15 (Near average)	Moderate
Austral Island	35:50:15 (Near average)	Moderate
Papua New Guinea	40:35:25 (Average or below average)	Moderate
New Caledonia	50:40:10 (Average or below average)	Moderate
Tonga	40:40:20 (Average or below average)	Moderate
Niue	40:45:15 (Average or below average)	Moderate
Southern Cook Islands	40:50:10 (Average or below average)	Moderate
Marquesas Islands	45:40:15 (Average or below average)	Low

ENSO Update

Current El Niño Situation

An El Niño event is under way in the tropical Pacific and there is a strong consensus that it will continue into the Southern Hemisphere wet season, although it is likely to be much weaker than the 1997/98 event. Anomalously warm waters persist in equatorial areas especially in the NINO3 and NINO4 regions, and the Southern Oscillation Index (SOI) fell to –1.8 for the month of August with a 3-monthly average of –1.1, the lowest since the previous (1997/98) El Niño event. There is considerable enhanced convection along the equatorial region around Kiribati and continued dry conditions over much of Australia.

Present Situation and Outlook

There has been further development in some El Niño indicators. The Southern Oscillation Index (SOI) dropped to –1.8 (Fig. 1) in August, with a 3-month mean value of –1.1, the lowest since April 1998.

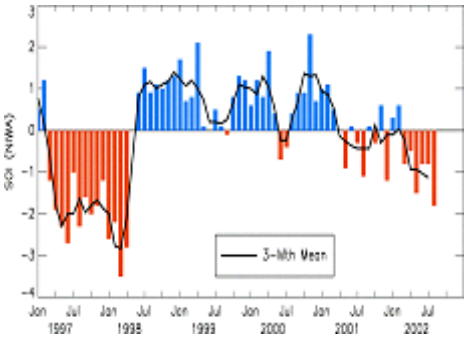


Fig 1 Southern Oscillation Index (up to August 2002)

In August, surface westerlies occurred in 68% of synoptic observations at Tarawa (Western Kiribati), the highest frequency since October 1997. Overall, low level easterly trade winds remained weaker than average over the Southwest Pacific. Equatorial sea surface temperatures (SSTs) in the Central Pacific remain more than 1°C above average, and now exceed 1.5°C just east of the date line, and a slight appearance of a horseshoe like pattern of cooler than normal water on both sides of the warmer equatorial waters is now apparent (Fig. 2). However, there has been some cooling in waters along the west coast of South America, which is not a typical characteristic during a developing El Niño event.

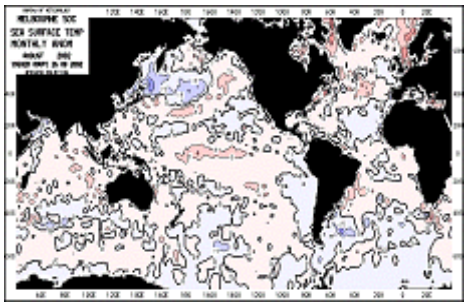


Fig 2 Sea Surface Temperature Anomalies for August 2002 (Australian Bureau of Meteorology). Red indicates above average, blue indicates below average.

The August sub-surface temperature profile for the equatorial Pacific (Fig. 3) shows a significant expansion of positive anomalies (red) in the Eastern Pacific, especially at about 100 metres depth The weakening of trades winds across the Pacific in recent months contributed to this warming in the Eastern Pacific. The trade winds remained weak over much of the Pacific, (apart from the fareast) in the 5-days to 4 September 2002 (Figure 4).

The majority of the global climate models continue to develop the warm El Niño event into the southern hemisphere summer (December - February). A recent World Meteorological Organisation (WMO) statement indicates that the present El Niño will be much weaker than that of 1997/1998.

Although it is likely that this event may be relatively short-lived, conditions in the tropical Pacific are expected to be sufficiently anomalous to create significant consequences in some areas of the region.

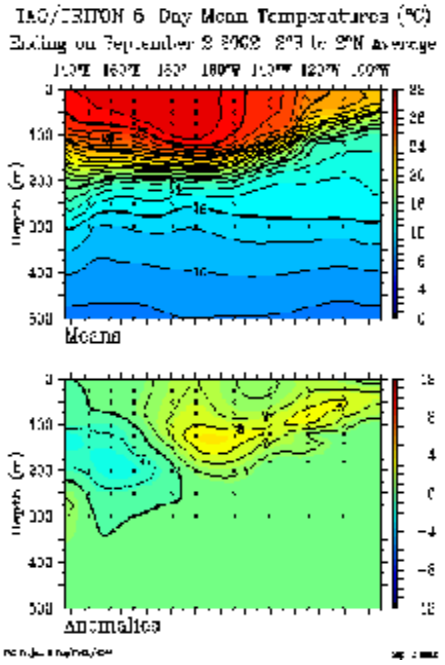


Fig 3 Sub-surface temperature along the equator for August 2002. Orange - red shading indicates warm, blue - green indicates cool.

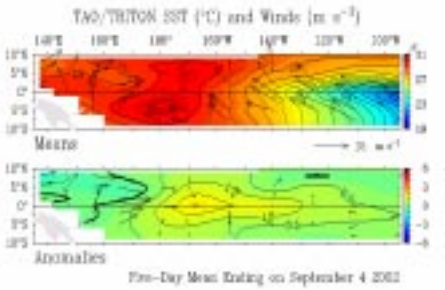


Fig 4 TAO/TRITON 5-Day Equatorial SST (°C) and winds (m s^{-1}). Orange-red indicates warm, blue-green indicates cool.

The Island Climate Update

Visit The Island Climate Update website at: www.niwa.cri.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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