The Island Climate Update

37

8 October 2003

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

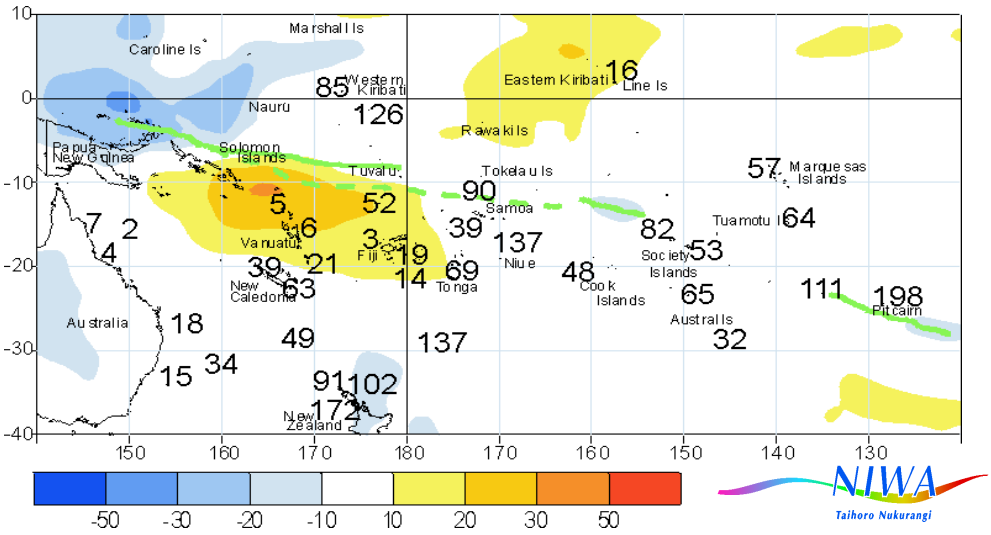
NIWA
Taihoro Nukurangi

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, IRI
European Centre for Medium Range Weather Forecasts, ECMWF
UK Met Office
World Meteorological Organisation, WMO

September's climate

September rainfall was extremely low, being less than 25% of average in a broad region from Queensland (Australia) eastward to Fiji, including Vanuatu and Eastern Kiribati. Many stations in this region recorded rainfall totalling less than 10 mm, and some long-term low rainfall records were broken. Rainfall was also below average over the northern half of New Caledonia, the northern islands of Tonga, and parts of the Southern Cook Islands. September was the seventh consecutive month with below average rainfall in parts of Eastern Kiribati. Air temperatures were above average in many tropical islands east of the Date Line. However, they were well below average in parts of New Caledonia. ***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 September 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 in a neutral state, with little change in the El Niño Southern Oscillation (ENSO) from August. The Southern Oscillation Index (SOI) was -0.3 for September. The global climate models indicate that the equatorial Pacific will remain in a neutral state until the end of southern hemisphere summer. ***Details Page 2***

The next three months October to December 2003

Suppressed convection is expected over the equatorial region resulting in below average rainfall in Western and Eastern Kiribati. Rainfall is also expected to be average or below average in Vanuatu, New Caledonia, and the Marquesas Islands. Average or above average rainfall is likely for Samoa. Rainfall is expected to be near average elsewhere in the region. ***More on Page 3***

SOPAC

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

SPREP

Climate developments in September 2003

CLIMATE EXTREMES IN SEPTEMBER 2003

Country	Location	Rainfall (mm)	% of average	Comments
Australia	Willis Island	<1	2	Record Low
Fiji	Nacocolevu	5	5	Record Low
Fiji	Viwa	1	2	Record Low
Fiji	Vatukoula	5	7	Record Low
Fiji	Vunisea	8	6	Record Low
Vanuatu	Lamap	8	11	Record Low
New Caledonia	Ile Art, Belep	10	15	Well below average
Eastern Kiribati	Christmas Island	9	16	Well below average
Pitcairn	Pitcairn Island	248	198	Well above average

Country	Location	Mean Air Temp (°C)	Dep. from Av	Comments
New Caledonia	Ouloup	21.1	-1.7	Well below average
New Caledonia	Ouanaham	19.4	-1.4	Well below average
New Caledonia	La Roche	18.2	-1.7	Well below average
Cook Islands	Rarotonga	23.7	+1.1	Well above average

Country	Location	Max Air Temp (°C)	Date	Comments
Fiji	Vatukoula	34.8	18 Sep	New record high

Country	Location	Min Air Temp (°C)	Date	Comments
Fiji	Penang Mill	12.4	3 Sep	New record low

Extremely dry from Queensland east to Fiji

Areas of suppressed convection encompassed Vanuatu, Fiji, and the southern part of the Solomon Islands, as well as Eastern Kiribati. Rainfall was extremely low, being less than 25% of average in a broad region from Queensland (Australia) eastward to Fiji, including Vanuatu and Eastern Kiribati. Many stations in this region recorded rainfall totalling less than 10 mm. Rainfall was less than 50% of average in the north Tasman, over the northern half of New Caledonia, the northern islands of Tonga, and parts of the Southern Cook Islands. September was the seventh consecutive month with below average rainfall in parts of Eastern Kiribati, and the fourth consecutive month with below average rainfall in parts of Fiji.

The SPCZ extended from the monsoon region just north of Papua New Guinea, east to Tuvalu, being displaced to the north of its mean location about and west of the Date Line. There was also SPCZ activity over the Northern Cook Islands and the region around Pitcairn Island, with rainfall totals exceeding 200 mm. A large region of enhanced convection affected the northwest Pacific, extending over the Caroline Islands and Papua New Guinea.Air temperatures were at least 1.0ºC above average in the Southern Cook Islands, and 0.5-0.9ºC above average in Niue and much of French Polynesia. In contrast, they were well below average in parts of New Caledonia.

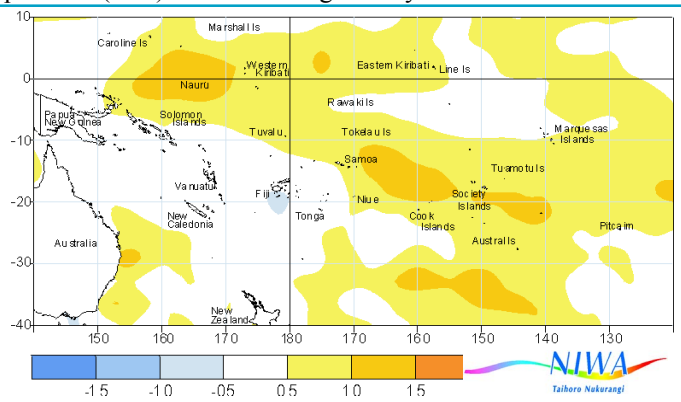
Positive SST anomalies in the western Equatorial Pacific

Neutral ENSO conditions till early 2004

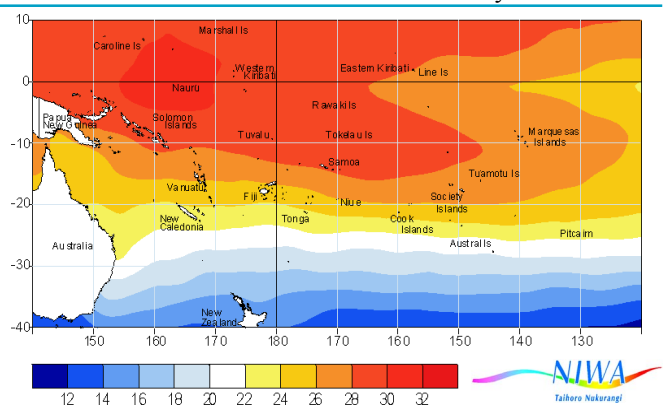
The Equatorial Pacific remains in a neutral state, with little change in ENSO indices from August. The equatorial sea surface temperature (SST) anomalies are generally positive in the western Pacific. The NINO3 SST anomaly was about +0.3°C in September (from +0.3°C in August). NINO4 remained unchanged at +0.7°C. The three month (July-September) means were +0.35°C and +0.7°C for NINO3 and NINO4, respectively. Slightly below average SSTs are confined to the far eastern Pacific.

Subsurface ocean temperature anomalies are weakly positive west from about 110°W westward. The tradewinds are slightly weaker than average west of the Date Line, but near average in strength in the east.

Almost all global climate models indicate neutral conditions until early 2004.



Sea surface temperature anomalies (°C) for September 2003



Mean sea surface temperatures (°C) for September 2003

Forecast validation

Forecast period: July to September 2003

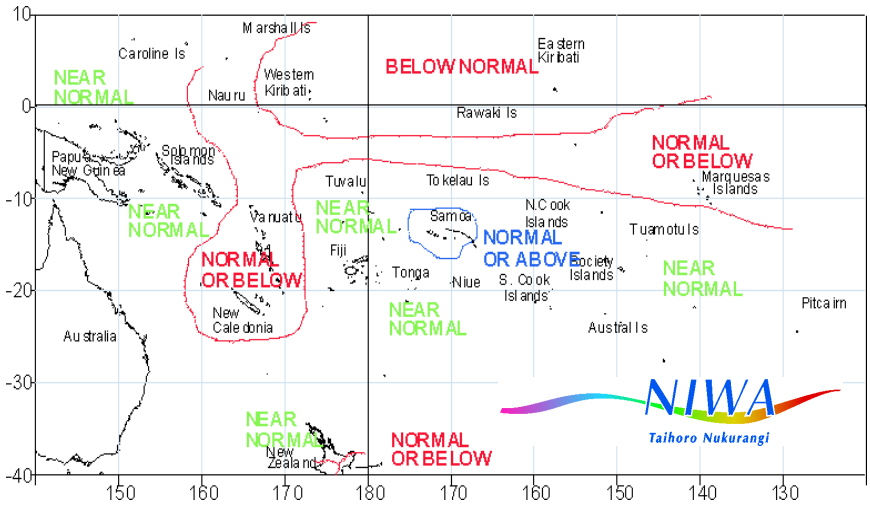
Average or above average rainfall was expected from Papua New Guinea to Samoa, including Tuvalu, Wallis and Futuna and Tokelau. Average or below average rainfall was forecast in the equatorial region east of Nauru, including the Marquesas Islands. Near average rainfall was expected elsewhere.

Rainfall was below average in an extensive region from the Coral Sea to Western Kiribati, and eastward along the equator to the region northeast of the Marquesas Islands, including, Vanuatu, the southeast region of the Solomon Islands and Tokelau. Rainfall was above average over much of Papua New Guinea and Pitcairn Island.

The region of below average rainfall extended much further south and west than predicted, with lower than forecast rainfall in the Solomon Islands, Tokelau, Vanuatu, Fiji, Wallis and Futuna, Samoa, and the Tuamotu and Austral Islands of French Polynesia. Rainfall was higher than forecast in Pitcairn Island. Mixed rainfall anomalies occurred over New Caledonia, Tonga, and the Society Islands.

Rainfall outlook: October to December 2003

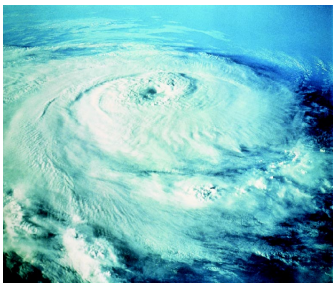
- **Suppressed convection in the equatorial region of Western and Eastern Kiribati**
- **Average or above average rainfall is expected in Samoa**
- **Average or below average rainfall in Vanuatu, New Caledonia, and the Marquesas Islands**



Rainfall outlook map for October to December 2003

Average or above average rainfall is expected in Samoa. However, a large area of suppressed convection in the equatorial region should extend south, to affect areas west of the Date Line, with below average rainfall likely in Western and Eastern Kiribati, and average or below average rainfall in New Caledonia, and Vanuatu, as well as the Marquesas Islands. Average rainfall is expected elsewhere in the region. The model skill is moderate to low for this time of the year.

Tropical Cyclones



Digital Imagery, copyright 2001 PhotoDisc, Inc.

The South Pacific tropical cyclone (TC) season coincides with the southern hemisphere wet season, usually from November through April. Peak cyclone occurrence is normally during January, February and March. On average, the highest numbers occur in the region around Vanuatu, New Caledonia, and the adjacent Coral Sea.

In the period 1939-2003, cyclones have been recorded only occasionally earlier than November. The earliest recorded was on 4 October 1997. Other early cyclones were 19 October 1972 and 31 October 1982, and all of these were during El Niño periods - 1982/83 (16 TCs) and 1997/98 (19 TCs) being the most active TC seasons on record.

However, this tropical cyclone season is expected to be neutral for ENSO. In 37% of the past 30 seasons, the first TC occurred before 1 December, increasing to 77% for at least one occurrence before 1 January. December normally has an average of one occurrence.

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 (OCTOBER - DECEMBER 2003)

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

THE CLIMATE OF NEW CALEDONIA

Luc Maitrepierre, Meteo-France, New Caledonia

New Caledonia is a tropical archipelago located between latitude 18°S and the tropic of Capricorn, and between longitudes 164° E and 168° E. The total land area is approximately 19,000 km² with 16,900 km² for the main island "Grande Terre". Grande Terre is dominated by an almost continuous mountain range from northwest to southeast. The average altitude of the range is 1000 m with two peaks above 1600 m: Mt Panié in the north and Mt Humbolt in the south. The interaction between the topography and east to southeasterly tradewinds impacts on the annual rainfall distribution. On the west coast the average annual amount is 800 mm to 1200 mm while on the east coast it is 1750 mm to 4000 mm. New Caledonia is often affected by climatic hazards such as tropical cyclones, floods and droughts.

The El Niño Southern Oscillation (ENSO) also plays an important role on rainfall and cyclone activity. For the geographical domain around the archipelago (18°S to 24°S and 162°E to 170°E), research shows that there is usually increased cyclonic activity (+32%) during La Niña events whereas there are usually the normal frequencies of tropical cyclones during the El Niño events. El Niño episodes tend to reduce rainfall, which sometimes causes severe droughts especially on the west coast. Above average rainfall is usually experienced during La Niña events, which impact on agriculture and mining (Figure 1).

There are two main seasons, the wet season (December to March) and the dry season (mid July to November) (Figure 2). During the wet season, rainfall tends to be higher in the northern part of the main island. For example, at Nouméa, the monthly rainfall is lower than that recorded at Koumac for January and February but higher from April to August for a very similar annual amount. There are also large differences in rainfall amounts between the two coasts such as between Poindimié located on the east coast of the main island and stations located on the west coast (Koumac and Nouméa).The average temperature is about 23°C with an annual variation of 6°C to 8°C between the warm and cool season. Minimum temperatures can sometimes be very low in some places: overnight temperatures below 10°C are not unusual inland and the extreme minimum is 2.3°C. The extreme maximum temperature ever recorded is 38.8°C at Poya. The diurnal temperature range is very dependent on the location: areas closer to the sea have a smaller diurnal temperature range.

Over the last 40 years, temperatures in New Caledonia have increased by about 0.8 °C, the increase being particularly noticeable over the last 25 years. Furthermore, there is a very strong correlation between temperature anomalies in New Caledonia and the ENSO phenomenon. During El Niño events, temperatures are cooler than normal, whereas they are warmer than normal in La Niña phases with a maximum range of +0.8°C.

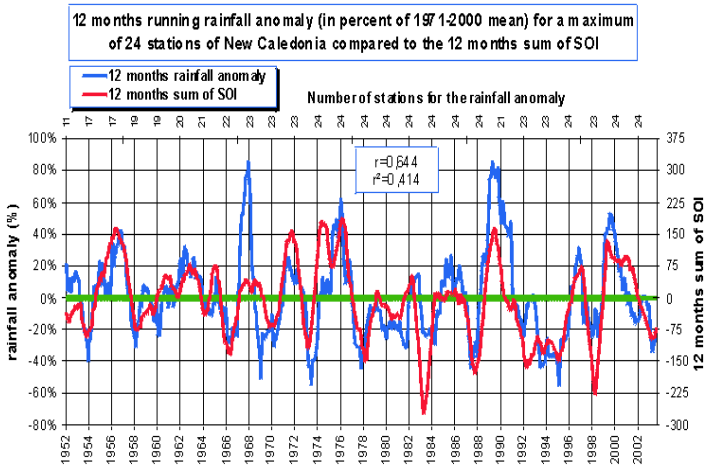


Figure 1 Relationship between ENSO and Annual Rainfall

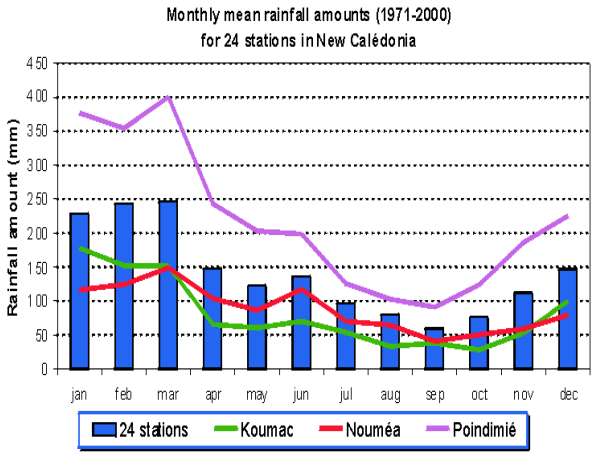


Figure 2 Average Monthly Rainfall

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
Climatologist: **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 Island Samoa Solomon Islands Tokelau Tonga Tuvalu Vanuatu

Requests for Pacific island climate data should be directed to the Meteorological Services concerned.

Acknowledgements

This bulletin is made possible with financial support from the New Zealand Agency for International Development (NZAID), Wellington, New Zealand, with additional support from the South Pacific Applied Geosciences Commission (SOPAC).