Number 79, April 2007

The Island Climate Update

March's climate

- South Pacific Convergence Zone (SPCZ) near its normal location, with enhanced convection from the region south of the Solomon Islands east to central and southern French Polynesia.
- Extremely wet in Niue, and very high rainfall in the Southern Cook Islands and parts of Fiji and Tonga
- Suppressed convection affecting Nauru, the Northern Cook Islands and parts of Eastern Kiribati
- Much warmer than normal in parts of Tuvalu and central French Polynesia
- Six tropical cyclones this season

El Niño/Southern Oscillation (ENSO) and seasonal rainfall forecasts

- Tropical Pacific showing some signs of move towards a La Niña
- Tuamotu Islands are expected to experience above average rainfall
- Below average rainfall for Eastern Kiribati

Collaborators

Pacific Islands National Meteorological Services

Australian Bureau of Meteorology

Meteo France

NOAA National Weather Service

NOAA Climate Prediction Centre (CPC)

International Research Institute for Climate and Society

European Centre for Medium Range Weather Forecasts

UK Met Office

World Meteorological Organization

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NIWA Taihoro Nukurangi

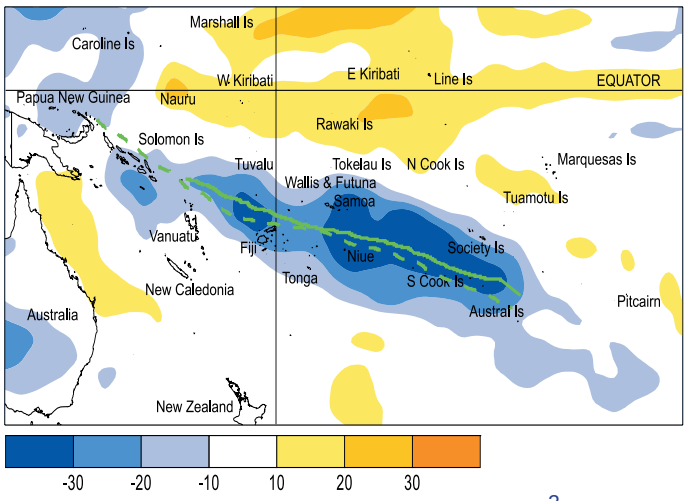
Climate developments in March 2007

The South Pacific Convergence Zone (SPCZ) was located near its normal location in March, with enhanced convection extending from the region south of the Solomon Islands east across Fiji and Samoa to central and southern French Polynesia, including Tonga, Niue, and the Southern Cook Islands. A double Inter-Tropical Convergence Zone (ITCZ) pattern existed in March, both north and south of the Equator. A region of suppressed convection and low rainfall existed north of the SPCZ, affecting Nauru, Eastern Kiribati, and the Northern Cook Islands.

Rainfall was extraordinary in Niue. The Liku March total of 1024 mm was the highest for any month in the Niue rainfall records which commenced in 1905. There were 23 rain-days at Liku, and 26 rain-days at Hannan Airport. Rainfall was at least 200% of normal in parts of Tonga, the Southern Cook Islands and Fiji, and at least 125% of normal in parts of Vanuatu, Western Kiribati, and in Northland, New Zealand (where severe flooding occurred). Nadi, Fiji recorded 29 days with rainfall during the month. Three lives were lost due to floods in parts of Fiji.

March mean air temperatures were 0.5 ºC or more above average throughout much of Vanuatu, Tuvalu, Tonga, and French Polynesia.

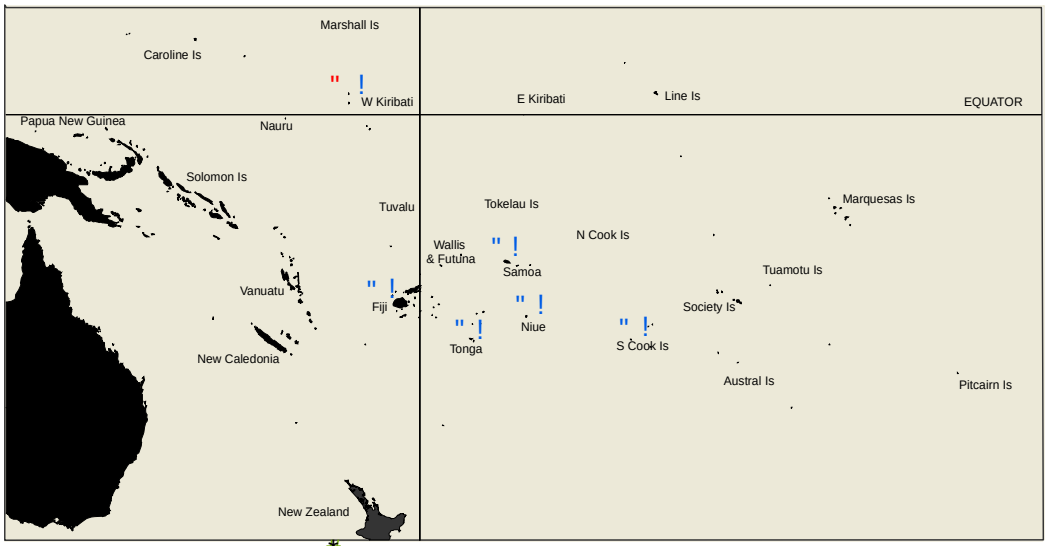
Tropical Southwest Pacific mean sea-level pressures were above average northeast of New Zealand, with high pressure extending toward the region south of Niue. Pressures were below average over Australia, and also in equatorial areas especially east of the Date Line. Equatorial surface easterlies occurred in 97% of observations at Tarawa, the highest frequency since April 2006.



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} (blue equals high rainfall and yellow equals low rainfall). The March 2007 position of the 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.

Country	Location	Rainfall (mm)	% of average	Comments
Niue	Hanan Airport	732	350	Highest for March
Niue	Liku	1024	449	Highest for any month
Tonga	Salote Airport	462	203	Well above average
Tonga	Lupepau'u	728	243	Extremely high
Cook Islands	Rarotonga EWS	436	256	Extremely high
Cook Islands	Rarotonga Airport	470	277	Well above average
New Zealand	Whangarei Airport	310	244	Extremely high

Soil moisture in March 2007



Estimated soil moisture conditions at the end of March 2007, using monthly rainfall data.

Estimates of soil moisture shown in the map (above) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model. It is planned to include more stations in the future.

The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to available water already in the soil comes from rainfall with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture level and its changes.

Please note that these soil moisture calculations are made at the end of the month. For practical purposes, generalisations were made about the available water capacity of the soils at each site.

At the end of March 2007, Tarawa, Apia, Nadi, Nuku'alofa, Hanan, and Rarotongan soils were at field capacity (full).

El Niño/Southern Oscillation (ENSO)

The tropical Pacific is showing some signs of a move towards La Niña, but signals are mixed, suggesting the usual level of uncertainty for the time of year.

SSTs remain above normal to the west of the Date Line, but there is some development of an enhanced "cold tongue" in SSTs off the South American coast: the NINO3 anomaly was near zero in March (January–March average around +0.5°C) while the NINO4 anomaly was +0.5°C in March (January–March mean around +0.6°C).

The Southern Oscillation Index (SOI) is still slightly negative, but in the neutral range.

There is a strong negative anomaly (below -3°C) in the equatorial Pacific Ocean subsurface temperature field centred near 120°W and 100m depth. It is uncertain whether the cold water will remain in place, move eastward, or advance westward.

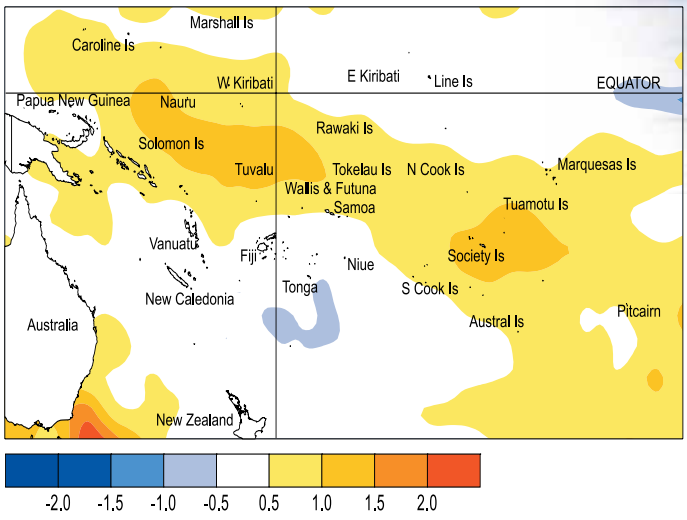
The easterly trade winds have been slightly stronger than normal during the month of March. OLR and tropical rainfall anomalies for March indicate enhanced convection in the SPCZ and an apparent double-ITCZ structure east of the Date Line. Convection has also been enhanced over Western Australia and Indonesia.

The Madden-Julian Oscillation is presently weak, with the main centre of action over the western Pacific.

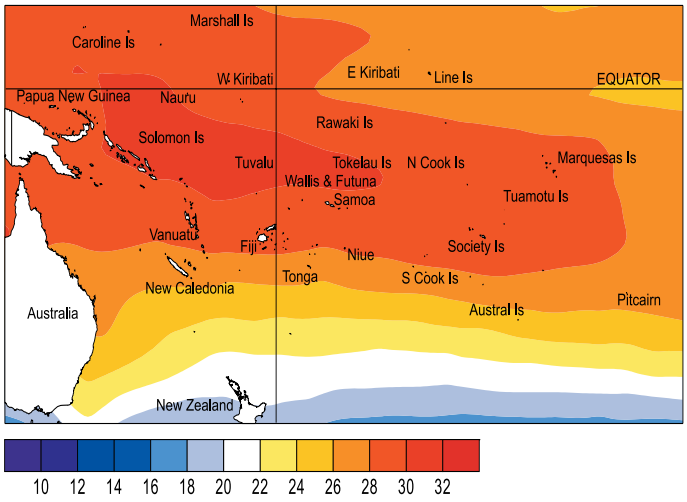
Most models show neutral ENSO states for the next 6-9 months, with one or two on the warm side and a few on the cold side.

The NCEP synopsis suggests a possible transition to La Niña conditions over the next 2-3 months, while the IRI synthesis gives a probability of 50% for a La Niña by mid-year. An El Niño is deemed unlikely.

A World Meteorological Organisation ENSO update on 30 March suggested a substantial possibility of La Niña a development within the next 6 months.



Sea surface temperature anomalies (°C) for March 2007.

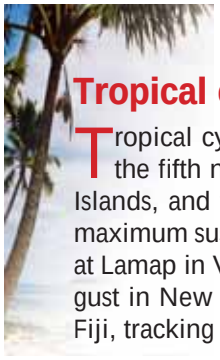


Mean sea surface temperatures (°C) for March 2007

Forecast validation: January to March 2007

A region of suppressed convection and below average rainfall was expected over Vanuatu and New Caledonia, with average or below average rainfall affecting Fiji and Tonga. A large region of enhanced convection and above average rainfall was expected over Western and Eastern Kiribati, the Solomon Islands, Tuvalu, and Tokelau, and near or above average rainfall over Wallis and Futuna east-southeastwards to Pitcairn Island, including the Northern and Southern Cook Islands, and French Polynesia. Near average rainfall was expected elsewhere.

A large region of enhanced convection occurred along the equator in the Western South Pacific. Enhanced convection also occurred, associated with the SPCZ, occurred over Fiji and Samoa, as well as the Southern Cook Islands, and central and southern French Polynesia. Suppressed convection occurred over Northern French Polynesia. Rainfall was higher than expected in Niue, and lower than expected in Tuvalu, Eastern Kiribati and northern French Polynesia. The 'hit' rate for the January - March 2007 rainfall outlook was about 60%.



Tropical cyclones

Tropical cyclone Becky occurred from 26-29 March, the first named tropical cyclone since Arthur (24-26 January), and the fifth named tropical cyclone this season. Tropical cyclone Becky developed in the Coral Sea south of the Solomon Islands, and tracked southeast toward Vanuatu, and later toward the region southeast of New Caledonia (with estimated maximum sustained wind speeds over the sea being 130 km/h with gusts to 160 km/h). Near-gale force winds were recorded at Lamap in Vanuatu on the 27th, however wind speeds eased on the cyclone's approach to New Caledonia, the maximum gust in New Caledonia being 90 km/h. Another tropical cyclone, name Cliff (and sixth this season), formed near northern Fiji, tracking southeast on 4 April.

There are still a couple of months left for the tropical cyclone season, however the risk is now beginning to decline. On average, about two tropical cyclones can normally be expected in the Southwest Pacific during the April-May period.

Tropical Pacific rainfall – March 2007

Territory and station name	March 2007 rainfall total (mm)	March 2007 percent of average
Australia		
Cairns Airport	218.8	49
Townsville Airport	78.2	37
Brisbane Airport	25.2	18
Sydney Airport	70.4	55
Cook Islands		
Penrhyn	84.0	27
Rarotonga Airport	470.1	277
Rarotonga EWS	435.6	256
Fiji		
Rotuma	523.2	142
Udu Point	292.1	91
Nadi	670.3	197
Nausori	570.3	149
Ono-I-Lau	188.1	74
French Polynesia		
Hiva Hoa, Atuona	136.2	70
Tahiti - Faa'a	193.8	108
Tuamotu, Takaroa	89.6	64
Gambier, Rikitea	117.6	70
Tubuai	262.6	156
Rapa	245.4	91
Kiribati*		
Tarawa	255.3	128
Niue		
Hanan	731.8	350
Liku	1024.3	449
Tonga		
Nuku'alofa	261.2	127
Lupepau'u	727.6	243
Salote Airport	461.9	203
Fua'amotu Airport	180.3	97

Territory and station name	March 2007 rainfall total (mm)	March 2007 percent of average
New Zealand		
Kaitaia	108.5	143
Whangarei Airport	310.2	244
Auckland Airport	132.6	162
New Caledonia		
Ile Art, Belep	204.0	87
Koumac	73.0	48
Ouloup	182.6	91
Ouanaham	249.8	105
Poindimie	463.0	116
La Roche	415.4	176
La Tontouta	140.4	106
Noumea	235.4	158
Moue	137.4	62
North Tasman		
Lord Howe Island	114.8	93
Norfolk Island	96.8	88
Raoul Island	42.0	26
Tuvalu		
Nui Is	132.7	37
Funafuti	415.6	111
Vanuatu		
Sola	458.7	112
Pekoa	293.0	86
Lamap	384.3	138
Bauerfield	330.3	105
Port Vila	406.5	125
Aneityum	446.0	132

Rainfall totalling 200 percent or more is considered well above average. Totals of 40 percent or less are normally well below average. Highlighted values are new records.

Data are published as received and may be subject to change after undergoing quality control checks. * denotes synoptic values.

Tropical rainfall outlook: April to June 2007

Enhanced convection is expected over Tuamotu Islands, where rainfall is forecast to be above average.

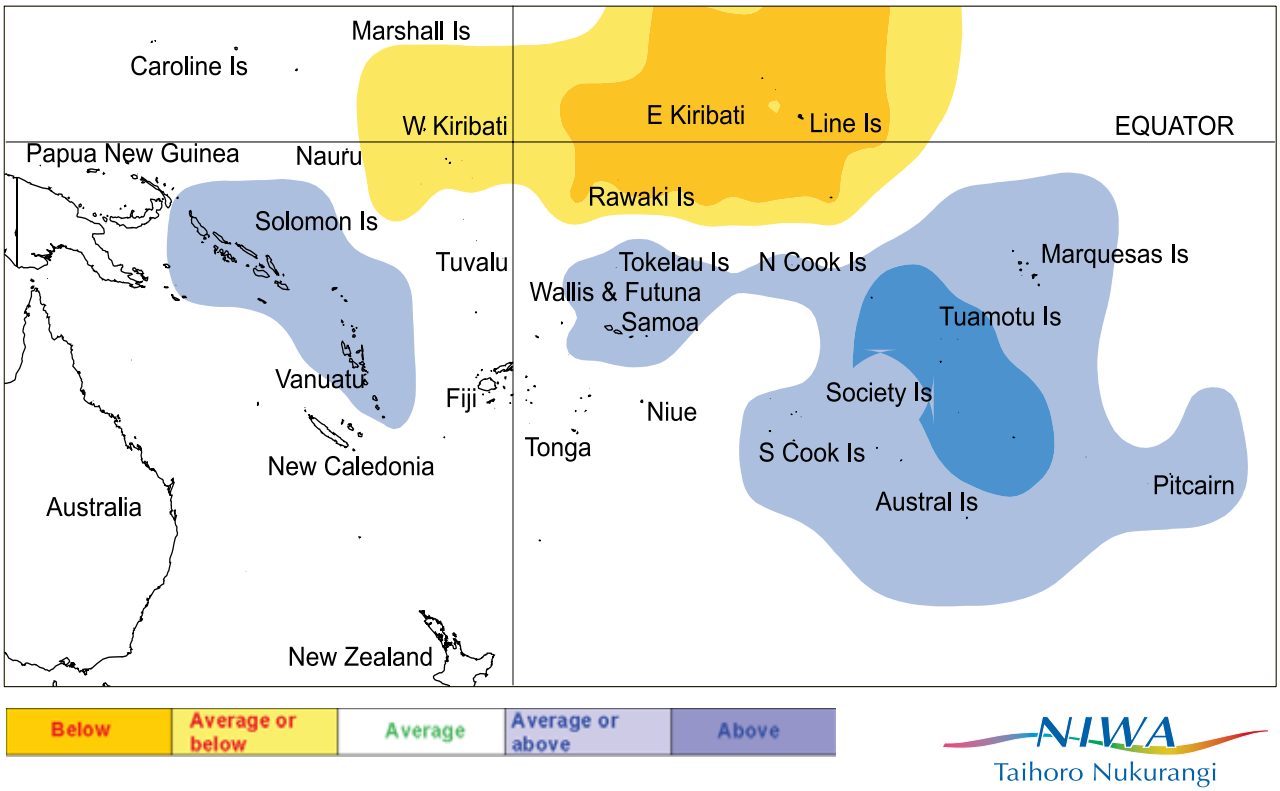
Another large region of convection is expected from the Solomon Islands southeastwards to Pitcairn Island including Vanuatu, Wallis and Futuna, Tokelau, Samoa, the Northern and Southern Cook Islands, and the French Polynesia where rainfall is likely to be near or above average.

Suppressed convection is expected over Eastern Kiribati with below average rainfall, while near or below average rainfall is forecast for Western Kiribati.

The rainfall forecast model skills are low to moderate for this time of the year.

Island group	Rainfall outlook	Outlook confidence
Tuamotu Islands	20:35:45 (Above average)	Moderate
Solomon Islands	20:40:40 (Near or above average)	Moderate
Vanuatu	20:40:40 (Near or above average)	Moderate
Wallis and Futuna	20:40:40 (Near or above average)	Moderate
Tokelau	20:40:40 (Near or above average)	Moderate
Samoa	20:40:40 (Near or above average)	Low – moderate
Northern Cook Islands	20:40:40 (Near or above average)	Moderate
Southern Cook Islands	20:40:40 (Near or above average)	Moderate
Society Islands	20:40:40 (Near or above average)	Moderate
Austral Islands	20:40:40 (Near or above average)	Moderate
Marquesas Islands	20:40:40 (Near or above average)	Moderate
Pitcairn Island	20:40:40 (Near or above average)	Moderate
Papua New Guinea	25:45:30 (Near average)	Moderate
New Caledonia	30:40:30 (Near average)	Moderate
Tuvalu	30:40:30 (Near average)	Moderate
Fiji	30:40:30 (Near average)	Low – moderate
Tonga	30:45:25 (Near average)	Low – moderate
Niue	30:45:25 (Near average)	Low - moderate
Western Kiribati	40:40:20 (Near or below average)	Moderate
Eastern Kiribati	50:30:20 (Below average)	Moderate

NOTE: Rainfall estimates for Pacific Islands for the next three months are given in the 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.



Rainfall outlook map for April to June 2007

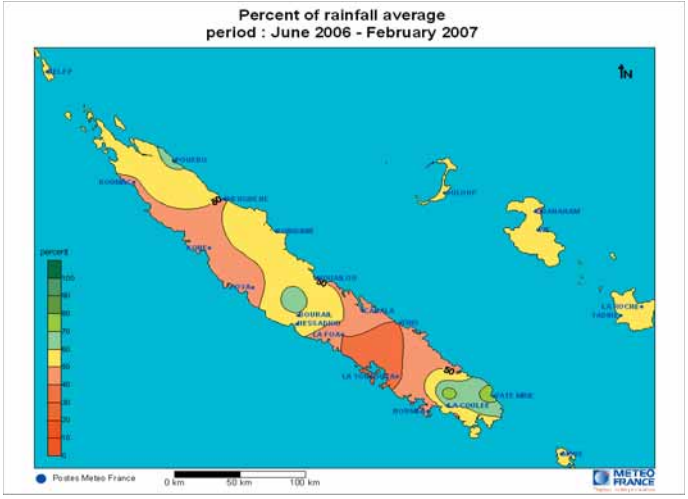
Drought in New Caledonia

Luc Maitrepierre, Meteo-France, Noumea, New Caledonia

Rainfall Assessment in New Caledonia from June 2006 to February 2007

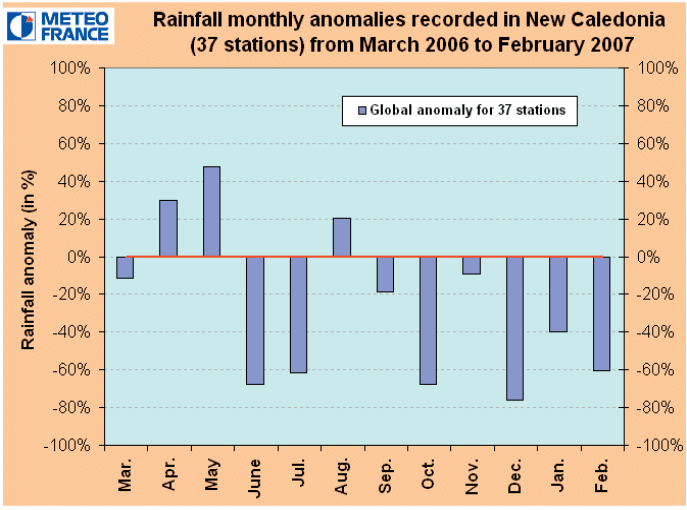
A very low amount of rainfall was recorded in New Caledonia from June 2006 to February 2007, linked with the El Niño event that ended by February 2007. The average rainfall anomaly over this period and for 37 stations from Météo-France's network was very significant being only 52 percent of the average rainfall. In summary, only half of the usual rainfall amount was recorded for this period of 9 months.

The lack of rainfall affected all the country but it was even worse in the middle of the southern half of the Main Island where the rainfall anomalies were up to 37 percent of average in Boulouparis. The drought was felt more dramatically on the West Coast which is usually the driest part of the archipelago. In this region, the recorded rainfall amounts are very low: 247 mm in Boulouparis, 255 mm in La Tontouta Airport, 311 mm in Nouméa.



Moreover this El Niño event deeply affected the rainy season. January and February are usually two of the wettest months of the year, but this year the rainfall deficit was very high particularly in February being below average by 61 percent For example, there was only 53 mm of rainfall recorded in La Tontouta in January and February compared to the average amount of 257 mm. The fear is now that the wet season will not bring enough water to recover from this very dry period.

The drought really started in June and July 2006 with anomalies below average of 68 and 62 percent respectively. For the June 2006 to February period, August was the only month with above average rainfall (+20%). Five months out of the 9 month period recorded very low rainfall anomalies of over -60% (June, July, October, December and February) with a maximum of -78% in December.



The impacts were mostly observed on livestock farming. Alerted by a press conference in early September and Meteo-France monthly seasonal forecast, the local government services were very quick to react. They provide substantial financial aid to farmers to help them buy hay or other cattle food to save the livestock. The Civil Security reinforced their fire warning and fighting system with a great success as the bush fires have been quickly contained.

Finally, this "moderate" El Niño event had a very important impact on rainfall in New Caledonia. The effects of this drought have been efficiently managed by the local authorities who were correctly informed of the situation and forecasted evolution by Meteo-France.

The Island Climate Update

Cover Photo: Wendy St George, NIWA

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Your comments and ideas about The Island Climate Update are welcome. Please contact:
Project Director: Dr Jim Salinger, NIWA, Private Bag 109 695, Newmarket, Auckland, New Zealand. E-mail: j.salinger@niwa.co.nz

Editors:
Ashmita Gosai Email: a.gosai@niwa.co.nz
Stuart Burgess Email: s.burgess@niwa.co.nz

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, Wallis and Futuna

Acknowledgements

This bulletin is produced by NIWA and made possible with financial support from the New Zealand Agency for International Development (NZAID), with additional support from the Pacific Islands Applied Geosciences Commission (SOPAC) and the Secretariat for the Pacific Regional Environmental Programme (SPREP).

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 National Meteorological Services (NMHS). 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 content.