

Number 74, November 2006

The Island Climate Update

October's climate

- 'Xavier', an early tropical cyclone
- Moderate El Niño underway in the Southwest Pacific
- Enhanced convection about and west of the Date Line, and extremely wet in parts of Western Kiribati
- Cooler and drier than normal in New Caledonia, dry also in Niue

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

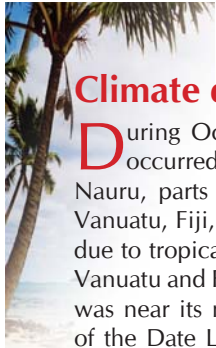
UK Met Office

World Meteorological
Organization

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

- The tropical Pacific ocean and atmosphere show a clear El Niño state
- Above average rainfall likely over Western and Eastern Kiribati, Tuvalu and Tokelau
- Below average rainfall expected over Papua New Guinea, New Caledonia and the Marquesas Islands





Climate developments in October 2006

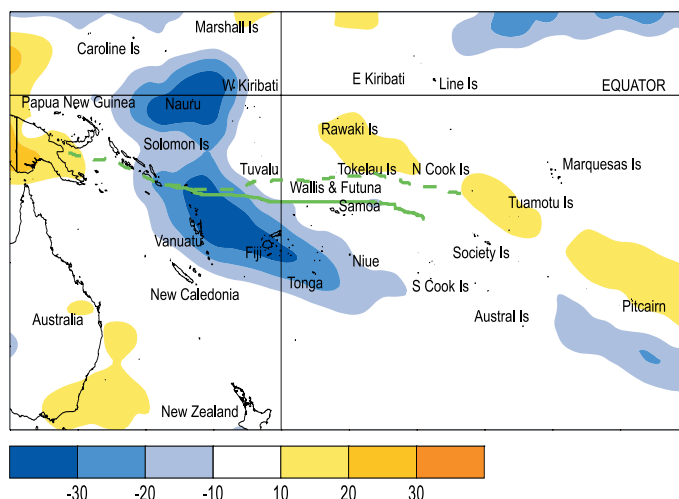
During October, a large region of enhanced convection occurred about and west of the Date Line, affecting Nauru, parts of Western Kiribati and the Solomon Islands, Vanuatu, Fiji, Tonga, and Niue. Some of this convection was due to tropical cyclone Xavier, which tracked south between Vanuatu and Fiji. The South Pacific Convergence Zone (SPCZ) was near its normal location, with some enhancement west of the Date Line. Convection was suppressed over much of Papua New Guinea, and was extremely suppressed further west over Indonesia.

Extremely high October rainfall occurred in parts of Western Kiribati (about 400% of normal at Tarawa). Rainfall was also above average (at least 125% of normal) over much of the Solomon Islands, Fiji, and Central French Polynesia. Rainfall was 50% or less than normal in the Southern Cook Islands and parts of Southern French Polynesia, and less than 25% of normal in parts of New Caledonia and Niue.

Mean air temperatures were 0.5 °C or more below average in parts of New Caledonia, but were 0.5 °C or more above average in parts of Central French Polynesia.

Tropical Southwest Pacific mean sea-level pressures were above average, over the south and east of Australia, with higher than normal pressures extending towards Papua New Guinea and to the south of Tonga. Pressures tended to be below average in equatorial areas east of the Date Line.

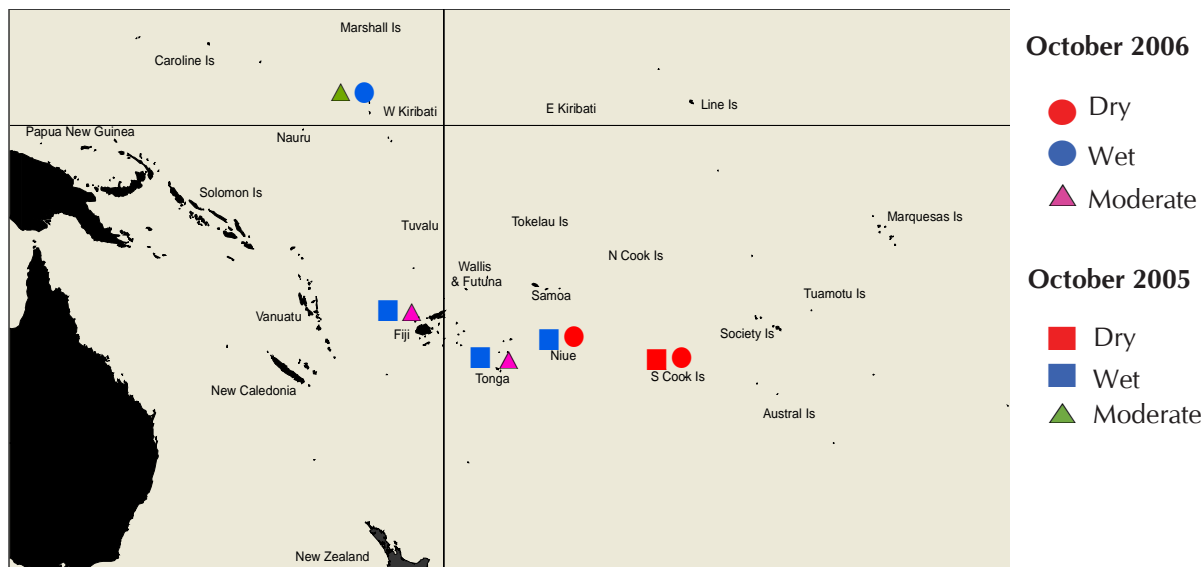
Equatorial surface westerlies occurred in about 45% of observations at Tarawa, the highest frequency since 59% during October 2002.



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} (blue equals high rainfall and yellow equals low rainfall). The October 2006 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
Fiji	Monasavu	794	241	New record
Kiribati	Tarawa	506	398	New record
New Caledonia	Koumac	4	13	Extremely low
New Caledonia	La Tontouta	5	11	Extremely low
New Caledonia	Noumea	9	18	Well below normal
New Caledonia	Moue	14	18	Well below normal

Soil moisture in October 2006



Estimated soil moisture conditions at the end of September 2006, 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 October 2006, Tarawa was at field capacity (full) while Nadi and Nukualofa soils were at a moderate soil moisture level. Hanan and Rarotonga soil moisture levels were dry.

El Niño/Southern Oscillation (ENSO)

The tropical Pacific Ocean and atmosphere have developed into a clear El Niño state. Sea surface temperature anomalies have risen in the eastern Equatorial Pacific while negative anomalies have strengthened in the western Pacific and have begun to develop an extratropical “horse shoe” pattern in the subtropics.

The NINO3 anomaly rose slightly to $+1.3^{\circ}\text{C}$ in October, with NINO4 at $+1.1^{\circ}\text{C}$ (3-month means both just above $+1^{\circ}\text{C}$). Accompanying this, positive zonal wind anomalies have intensified over the western Pacific and extended east of the Date Line for much of October.

Continued Kelvin wave propagation is evident along the Equatorial thermocline, with the latest 5-day average showing a strong thermocline depression in the central Pacific associated with a $+4^{\circ}\text{C}$ temperature anomaly at 150m depth.

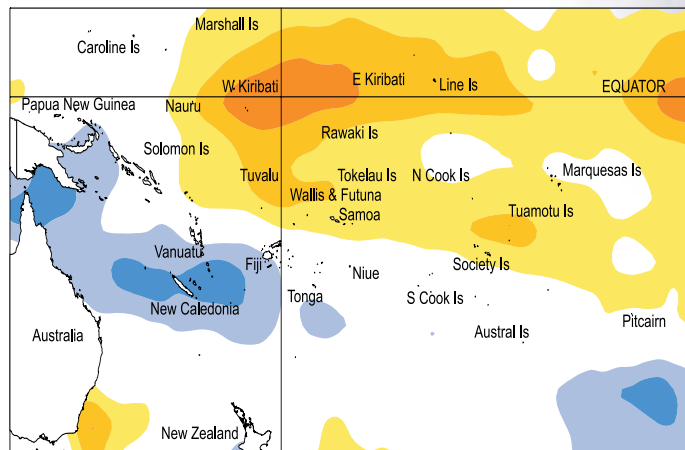
The subsurface temperature average for October shows positive anomalies in the upper 100m everywhere east of 160°E . After a weak period in September, the Southern Oscillation Index (SOI) strengthened steadily in October, averaging -1.7 for the month.

OLR and tropical rainfall anomalies also reflect a more El Niño-like pattern, though there is still a considerable Madden-Julian Oscillation (MJO) component over the western Pacific, and the east-west dipole pattern usually associated with ENSO events is still displaced to the west, with strongly suppressed convection northwest of Australia and enhanced convection mostly between 150°E and the Date Line. An active MJO event passed through the Pacific and across the western hemisphere during October, but the MJO is now weak.

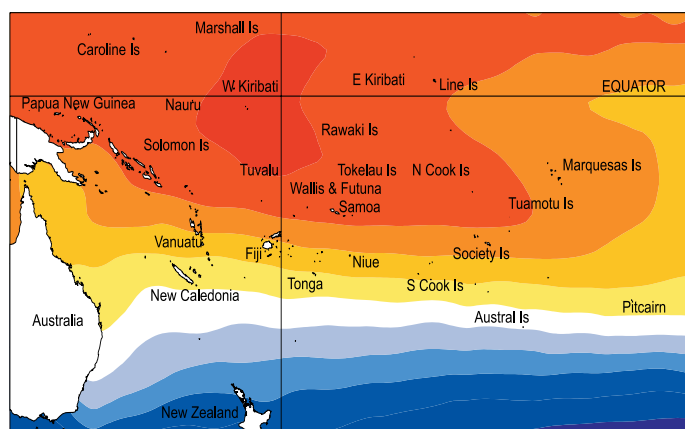
Most models show an El Niño state through to at least January, consistent with last month’s predictions. About half of the model predictions retain the El Niño into the southern hemisphere autumn 2007, but several predict an easing to neutral by April 2007.

Forecast validation: August to October 2006

Enhanced convection with above average rainfall was expected over the Solomon Islands, with near or above average rainfall in Vanuatu. Average or above average rainfall was also expected from Wallis and Futuna to Pitcairn Island, including, Tonga, Niue, the Southern Cook Islands, the Society Islands, and the Austral Islands. Suppressed convection with below average rainfall was forecast for Tuvalu and Tokelau, with near or below average rainfall expected in the Tuamotu and Marquesas Islands. Near average rainfall was expected elsewhere.



Sea surface temperature anomalies ($^{\circ}\text{C}$) for October 2006.



Mean sea surface temperatures ($^{\circ}\text{C}$) for October 2006.

The US International Research Institute (IRI) give an 80% chance of El Niño conditions continuing through the rest of the year, but note that some of their criteria for an El Niño event have not yet been met.

National Center for Environmental Prediction (NCEP) predict El Niño conditions persisting through early 2007.

Tropical cyclones

Xavier, the first tropical cyclone of the season occurred on 22 October east of the Solomon Islands, and then tracked southeast to dissipate over the seas between Vanuatu and Fiji after 25 October. Estimated maximum sustained wind speeds reached 213 km/h, which is category 4 on the Saffir-Simpson scale. This was the earliest start to the season since 1997. An early start to the tropical cyclone season was signalled this year, due to the El Niño conditions.

The chances of tropical cyclone activity, for the November through May period, remains higher than normal for several South Pacific Islands near and east of the Date Line, while Islands west of the Date Line are still likely to experience normal rates of occurrence. Future issues of the ICU will provide updates on information relating to further occurrences of tropical cyclones in the region.

Tropical Pacific rainfall – October 2006

Territory and station name	October 2006 rainfall total (mm)	October 2006 percent of average
Australia		
Cairns Airport	68.8	168
Townsville Airport	6.0	23
Brisbane Airport	9.0	10
Sydney Airport	16.2	21
Cook Islands		
Penrhyn	191.0	110
Rarotonga Airport	30.7	30
Fiji		
Rotuma	486	143
Udu Point	151	92
Nadi	119	117
Nausori	279	136
Ono-I-Lau	118	137
French Polynesia		
Hiva Hoa, Atuona	61.4	63
Bora Bora Motu	130.2	129
Tahiti - Faa'a	135.4	133
Tuamotu, Takaroa	140.4	122
Gambier, Rikitea	164.8	123
Tubuai	44.4	38
Rapa	86.2	52
Kiribati		
Tarawa	505.7	398
New Zealand		
Kaitia	97.3	97
Whangarei Airport	83.0	75
Auckland Airport	157.8	200

Territory and station name	October 2006 rainfall total (mm)	October 2006 percent of average
Niue		
Hanan Airport	32.4	17
Liku	16.3	
New Caledonia		
Ile Art, Belep	48.6	90
Koumac	3.6	13
Ouloup	17.4	27
Ouanaham	37.4	57
Poindimie	52.8	43
La Roche	35.8	43
La Tontouta	4.6	11
Noumea	9.0	18
Moue	14.0	18
North Tasman		
Lord Howe Island	53.6	40
Norfolk Island	25.6	28
Raoul Island	69.4	87
Tonga		
Niutoputapu	149.1	81
Lupepau'u	146.8	83
Salote Pilolevu	85.4	91
Nuku'alofa	75.3	59
Fua'amotu	99.0	96
Tuvalu		
Nanumea	188.4	111
Niu Island	51.6	27
Funafuti	281.0	106
Nuilakita	306.1	103

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.

Tropical rainfall outlook: November 2006 to January 2007

Enhanced convection is likely in the equatorial region where rainfall is expected to be above average over Western and Eastern Kiribati, Tuvalu and Tokelau.

Near or above average rainfall is forecast for Samoa, the Northern Cook Islands, Wallis and Futuna, and Pitcairn Island.

Suppressed convection with below average rainfall is likely over Papua New Guinea, New Caledonia and the Marquesas Islands.

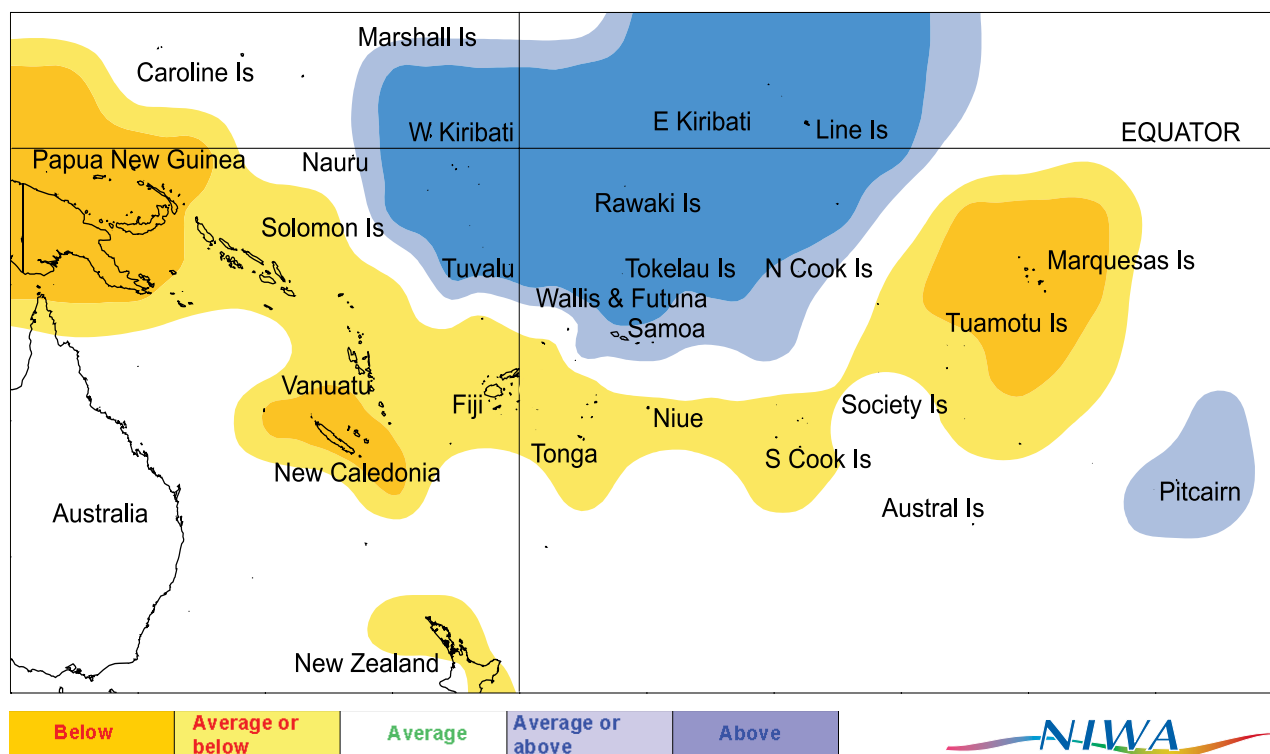
A large region of near or below average rainfall is likely from the Solomon Islands eastwards to Tuamotu Islands including, Vanuatu, Fiji, Tonga, Niue, and the Southern Cook Islands.

Near average rainfall is likely over the Society and Austral Islands.

The forecast model skill is moderate to high for this time of the year.

Island group	Rainfall outlook	Outlook confidence
Western Kiribati	15:30:45 (Above)	Moderate – high
Eastern Kiribati	15:30:45 (Above)	Moderate – high
Tuvalu	15:30:45 (Above)	Moderate – high
Tokelau	15:30:45 (Above)	Moderate
Samoa	20:40:40 (Near average or above)	Moderate
Northern Cook Islands	20:40:40 (Near average or above)	Moderate
Wallis & Futuna	20:40:40 (Near average or above)	Moderate
Pitcairn Island	20:40:40 (Near average or above)	Moderate
Society Islands	30:40:30 (Near average)	Moderate
Austral Islands	25:45:30 (Near average)	Moderate – high
Solomon Islands	40:40:20 (Near average or below)	Moderate – high
Vanuatu	45:40:15 (Near average or below)	Moderate – high
Fiji	40:40:20 (Near average or below)	Moderate – high
Tonga	40:40:20 (Near average or below)	Moderate – high
Niue	40:40:20 (Near average or below)	Moderate
Southern Cook Islands	40:40:20 (Near average or below)	Moderate
Tuamotu Islands	40:40:20 (Near average or below)	Moderate
Papua New Guinea	50:30:20 (Below)	Moderate – high
New Caledonia	50:35:15 (Below)	Moderate – high
Marquesas Islands	45:30:25 (Below)	Moderate – high

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 November 2006 to January 2007.

The Pacific Hydrological Cycle Observing System

David Scott and Komal Raman, SOPAC

The announcement in June of the agreement between the European Union (EU) and the South Pacific Applied Geosciences Commission (SOPAC) regarding funding of the Pacific-HYCOS project represents the culmination of a long period of planning and advocacy for strengthening of the human and technical capacity of National Hydrological Services (NHSs) in Pacific Island Countries. The Pacific-HYCOS project was developed under the framework of the World Meteorological Organisation's (WMO) World Hydrological Cycle Observing System (WHYCOS). The WHYCOS programme, which has the ultimate objective to "promote and facilitate the collection, exchange, dissemination and use of water-related information, using modern information technologies", is being implemented in the form of regional HYCOS projects as shown in Figure 1.

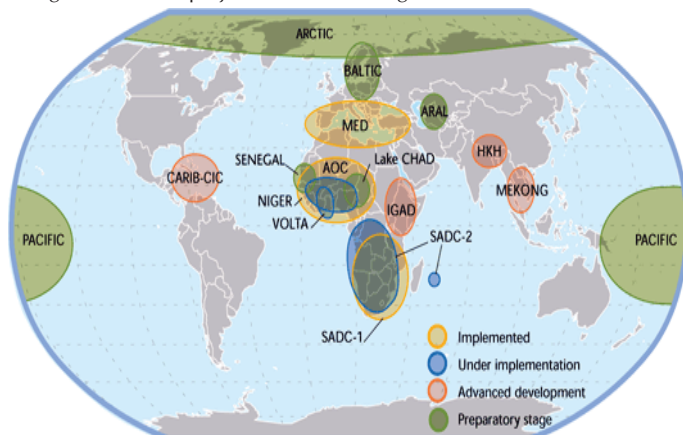


Figure 1: The regional HYCOS projects comprising the WHYCOS programme.
Source: www.whycos.org

The design of the Pacific-HYCOS project, which emerged from detailed needs analysis of Pacific Island Countries completed in 2000, recognises the need for a regional approach to improve management and protection of freshwater resources in island nations of the South Pacific. The goal of the project is to enable more informed decision making on integrated catchment management and the sustainable development of freshwater resources particularly during increasingly frequent climatic extremes.

The Pacific HYCOS project will ensure that the data collected is of improved quality and easily accessible to all users, primarily via the Internet. To achieve this, the project is expected to reinforce the hydrological observing networks using various remote-sensing technologies, facilitate the development of national and regional databases, promote regional cooperation and organize training programmes.

The Pacific-HYCOS project involves 14 participating Pacific Island countries: Cook Islands, Federated States of Micronesia, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. The Project will be implemented by SOPAC with supervision and facilitation by WMO and with linkages to the Fiji Meteorological Service and UNESCO.

The project focuses on the following 6 technical components:

- Flood forecasting capability
- Water resources assessment in major rivers
- Water resources databases
- Drought forecasting
- Groundwater monitoring and assessment
- Water quality monitoring and assessment

A Project Regional Centre (PRC) will be established at SOPAC and the Coordinator and Advisor positions are currently being filled. A Project Steering Committee comprising of Hydrologists from participating countries will be the highest executive body of the Project. Its role will be to ensure Project coherence and to oversee Project policy, strategy, and implementation. The PRC will provide technical support and training to augment and strengthen the national capacity in the participating countries. Priority activities in the first year of the project will be:

- identification of priority monitoring sites for each country (critical catchments or aquifers)
- selection, installation and implementation of field equipment and data transfer technology
- consideration of the primary technical activity (or activities) for each country.

The Regional scope and scale of the Pacific-HYCOS project should provide some exciting challenges and opportunities for those working in NHSs and for enhanced collaboration with their colleagues in National Meteorological Services. Some of the technical components will be particularly relevant for only some of the participating countries (e.g. flood forecasting capability is likely to be of most interest in Papua New Guinea and Fiji Islands whereas groundwater monitoring and assessment may be the priority for atoll countries). Other components of the project are likely to be relevant to all countries and for some, such as the water resources database activity, a regional approach is arguably a priority.

Programmes such as the Island Climate Update (ICU) have the potential to contribute to the Pacific-HYCOS project activities. The goal of "making forecasts better" which was promoted by the Dialogue on Water and Climate presents a real challenge to those working in the water and climate fields. The technology for flood forecasting is well developed and methods for drought forecasting are emerging. The capacity to benefit from these forecasting capabilities, however, depends on close collaboration and cooperation amongst technical workers and the development of a social capacity to respond to warnings. One of the aims of the Pacific-HYCOS project is to "improve the capacity to mitigate and plan for climate change and land-use impacts on freshwater resources at the catchment and national level." Achievement of that aim will require the involvement of those on either side of the Water and Climate divide.

More information and guidelines about the WHYCOS programme can be found at www.whycos.org or for the Pacific HYCOS project, contact Marc Overmars at marc@sopac.org or Komal Raman at komalr@sopac.org.

The Island Climate Update

Visit The Island Climate Update at:
www.niwascience.co.nz/ncc/icu

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

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Wendy St George,
NIWA

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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.

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