

# The Island Climate Update

## 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

MetService of  
New Zealand

## October's climate

- South Pacific Convergence Zone (SPCZ) extends from Papua New Guinea to central French Polynesia; active and further southwest than normal
- Suppressed convection over Nauru, Western and Eastern Kiribati, and further east
- High rainfall in parts of Vanuatu, New Caledonia, Fiji, Samoa, Niue, and central French Polynesia
- Low rainfall over much of Kiribati, and the Northern Cook Islands; soil moisture deficit persists in the Southern Cook Islands
- Record October warmth in parts of Fiji, Tonga, and the Southern Cook Islands

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

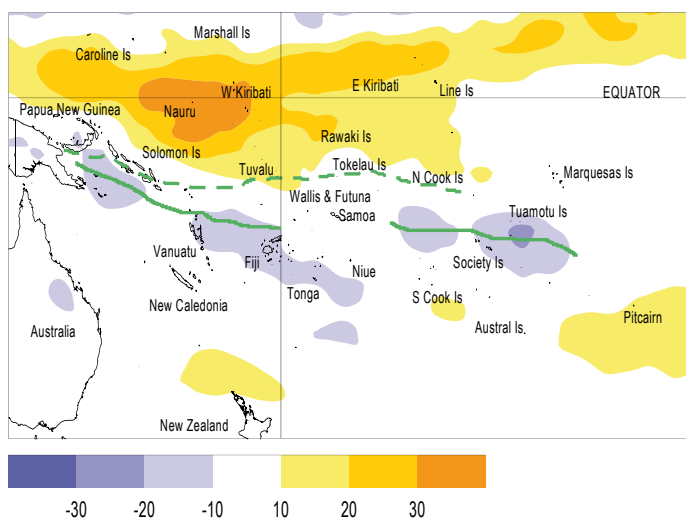
- La Niña is now well established in the central and eastern equatorial Pacific, persisting through to early 2008 then easing
- Suppressed convection and below average rainfall are expected along the equatorial Pacific from Western to Eastern Kiribati, including Tuvalu and the Northern Cooks
- Enhanced convection along a southwest displaced SPCZ with above average rainfall likely from Vanuatu to Tonga then to southern French Polynesia



## Climate developments in October 2007

The South Pacific Convergence Zone (SPCZ) was active, extending from Papua New Guinea toward Fiji and further east toward central French Polynesia. It also remained more southwest than normal for the time of year. An elongated region of suppressed convection continued to persist along the equator affecting Nauru, Western and Eastern Kiribati, and the region further east (north of the Equator) to the coast of South America. Suppressed convection also extended to Tuvalu.

Rainfall was extremely high in areas under the active SPCZ with over 200% or more of normal in parts of Vanuatu, Fiji, central French Polynesia, and also well above normal in parts of New Caledonia, Niue, and parts of Samoa. Rainfall totalling 150–200 mm occurred in parts of New Caledonia over 22–23 October. Heavy rainfall and flooding occurred in parts of Vanuatu at the end of the month, Aneityum recording 375



Outgoing Long-wave Radiation (OLR) anomalies, in  $Wm^{-2}$  are represented by hatched areas. 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 October 2007 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.

## Soil moisture in October 2007

Estimates of soil moisture shown in the map 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 the 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 were made at the end of the month, and for practical purposes, generalisations were made about the available water capacity of the soils at each site.

At the end of October 2007 soils were dry (for the 4th consecutive month) at Rarotonga (Southern Cook Islands). In contrast, soils continued to be moist (at field capacity) for the

mm over the 30–31 October. In contrast rainfall was 50% or less of normal over much of Kiribati and parts of the Cook Islands. Rainfall was near normal in most other regions.

October mean air temperatures were 1.5 °C or more above normal in parts of Tonga and the Southern Cook Islands, and 1.0 °C or more above normal in New Caledonia and parts of Fiji (the warmest October on record at Nadi, with records at several other sites), Fua'amotu, and Rarotonga. Temperatures were also above normal in Vanuatu and Samoa.

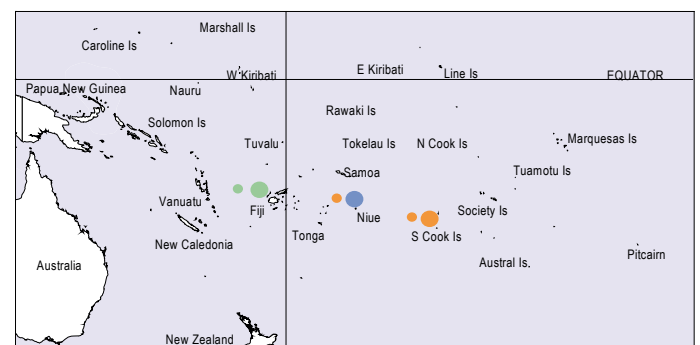
Tropical Southwest Pacific mean sea-level pressures were below average about and west of the Date Line, especially in the Vanuatu–Fiji region. Higher than normal pressures occurred over the north Tasman Sea, and southern French Polynesia in the east.

Equatorial surface easterlies have strengthened at Tarawa since September, occurring in almost 95% of observations.

Country	Location	Rainfall (mm)	% of avg.	Comments
Vanuatu	Lamap	319	280	Well above average
Vanuatu	Aneityum	444	467	Extremely high
New Caledonia	Ouanaham	226	343	Well above average
Fiji	Nausori Airport	467	228	Well above average
Fiji	Ono-I-Lau	226	262	Well above average
Niue	Hanan Airport	562	300	Extremely high
Niue	Liku	424	291	Extremely high
French Polynesia	Bora Bora	308	305	Extremely high
French Polynesia	Takarua	468	407	Well above average

Country	Location	Mean temp. (°C)	Dep. from avg.	Comments
Fiji	Nadi Airport	26.6	+1.2	Highest on record
Tonga	Fua'amotu Aero	24.9	+2.4	Highest on record
Cook Islands	Rarotonga Airport	25.0	+1.6	Highest on record

time of year at Hanan (Niue). Soil moisture was moderate at Nadi (Fiji).



October 2007  
 ● Wet  
 ● Moderate  
 ● Dry

October 2006  
 ● Wet  
 ● Moderate  
 ● Dry

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

## El Niño/Southern Oscillation (ENSO)

The La Niña event is now well established in the central and eastern Pacific, where moderate conditions are prevailing in the ocean. These are more consistent in the ocean than in the atmosphere.

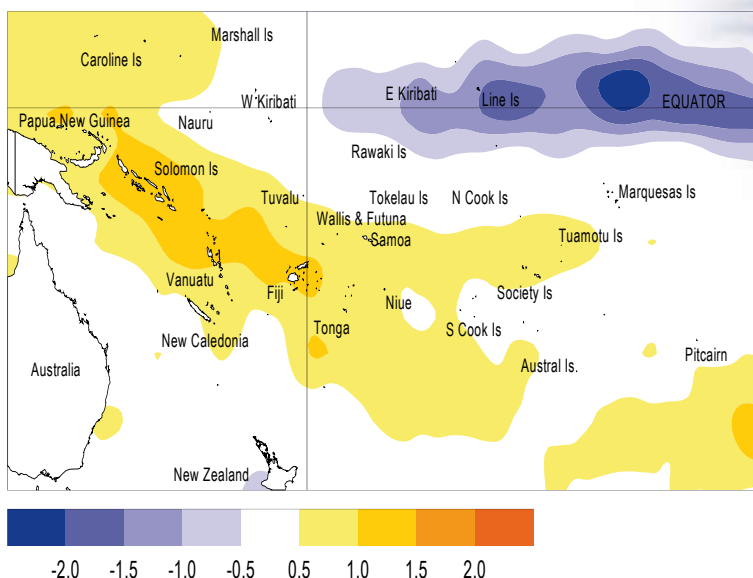
Sea surface temperatures (SSTs) in the tropical Pacific now exhibit a clear La Niña pattern, with a well-developed cold anomaly extending from the South American coast to the Date Line, (extending much further west than during September) whilst a warm 'horseshoe' extends from tropical to temperate latitudes in both hemispheres. This is also very evident in the sea surface height anomalies. The NINO3 anomaly was  $-1.3\text{ }^{\circ}\text{C}$  in October (ASO average  $-0.8$ ) and the NINO4 was  $-0.4\text{ }^{\circ}\text{C}$  for October (ASO  $-0.1\text{ }^{\circ}\text{C}$ ). Subsurface equatorial temperature anomalies show strong negative anomalies ( $-3\text{ }^{\circ}\text{C}$ ), reinforcing the surface cold tongue. Positive anomalies ( $+1\text{ }^{\circ}\text{C}$ ) in the same layer occurred in the western Pacific.

The trade winds remained enhanced both west and east of the Date Line. The SOI in October was still in the neutral range ( $+0.4$ ) with an ASO average of  $+0.2$ .

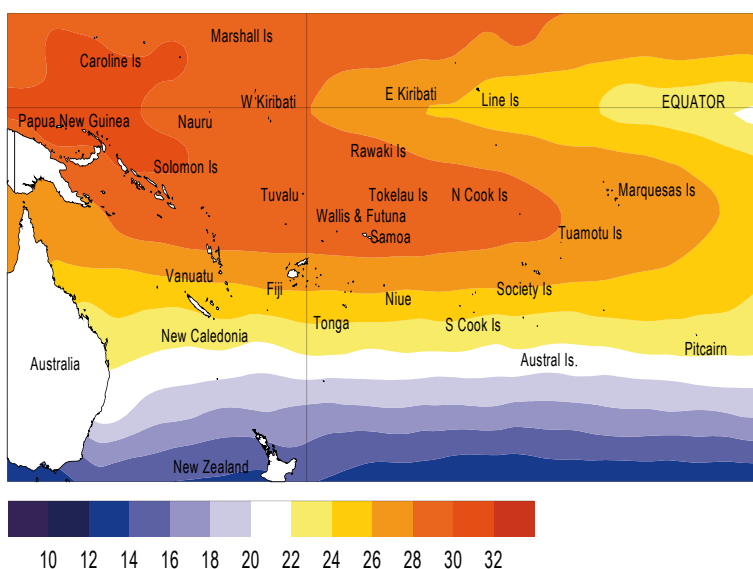
The tropical OLR anomalies continue to show suppressed convection in the equatorial region from  $150^{\circ}\text{E}$  eastwards, in the region of the Intertropical Convergence Zone. Farther west there is no clear region of enhanced convection. The TRMM-based ENSO precipitation index was  $0.8$  in October, in the weak La Niña range. The SPCZ was active and again displaced southwest of its normal position. The Madden Julian Oscillation continues to be weak.

Most models indicate weak–moderate La Niña conditions into early 2008, easing during March to May. The dynamical models give stronger projections of strengthening La Niña conditions, with the event dissipating at the normal time of year from March to May.

The NCEP synopsis suggests La Niña conditions will continue into early 2008. Based on the latest observations and forecasts, the IRI synthesis gives a probability of 90% maintaining La Niña conditions



Sea surface temperature anomalies ( $^{\circ}\text{C}$ ) for October 2007



Mean sea surface temperatures ( $^{\circ}\text{C}$ ) for October 2007

over the coming three months. The probability of El Niño conditions re-emerging during the forecast period remains at or below 10% until mid 2008, and the probability of returning to ENSO-neutral much below 50% until early 2008.

## Forecast validation: August to October 2007

Enhanced convection and above average rainfall were expected over Samoa, with a large area of near or above average rainfall forecast from Papua New Guinea southeast to southern French Polynesia, including the Solomon Islands, Vanuatu, New Caledonia, Fiji, Tonga, Wallis and Futuna, Niue, and the Cook Islands.

Suppressed convection with below average rainfall was expected over Western and Eastern Kiribati and Tuvalu, with near or below average rainfall on Pitcairn Island. Near average rainfall was expected elsewhere.

The rainfall outlook for the August–October 2007 period was very similar to what was forecast, the 'hit' rate of 90%, easily

the highest since the commencement of the Island Climate Update!

Suppressed convection and below average rainfall occurred as expected in the equatorial region about and east of the Date Line, including Western and Eastern Kiribati, and the Northern Cook Islands. Rainfall was above average as expected from Papua New Guinea to Vanuatu, including New Caledonia, Fiji, Niue, and central French Polynesia. Tuvalu rainfall was near average and higher than expected.



## Tropical Pacific rainfall – October 2007

Territory and station name	October 2007 rainfall total (mm)	October 2007 percent of average
<b>Australia</b>		
Cairns Airport	30.4	74
Townsville Airport	13.6	52
Brisbane Airport	46.2	49
Sydney Airport	12.0	15
<b>Cook Islands</b>		
Penrhyn	99.2	57
Rarotonga Airport	44.0	43
Rarotonga EWS	31.2	31
<b>Fiji</b>		
Rotuma Island	356.0	105
Udu Point	347.7	211
Nadi Airport	86.0	84
Nausori	467.3	228
Ono-I-Lau	225.5	262
<b>French Polynesia</b>		
Hiva Hoa, Atuona	61.6	63
Bora Bora	307.6	305
Tahiti – Faa'a	221.6	217
Tuamotu, Takaroa	467.6	407
Gambier, Rikitea	127.2	95
Tubuai	111.8	96
Rapa	146.0	87
<b>Kiribati</b>		
Tarawa*	25.8	20
Kanton*	17.0	52
<b>Niue</b>		
Hanan Airport	561.8	300
Liku	424.2	291
<b>New Zealand</b>		
Kaitaia	78.2	78
Whangarei Airport	58.6	53
Auckland Airport	75.8	96

Territory and station name	October 2007 rainfall total (mm)	October 2007 percent of average
<b>New Caledonia</b>		
Ile Art, Belep	87.4	162
Koumac	7.6	27
Ouloup	65.2	102
Ouanaham	226.4	343
Poindimie	205.8	166
La Roche	190.8	227
La Tontouta	25.0	58
Noumea	48.8	100
Moue	90.9	114
<b>North Tasman</b>		
Lord Howe Island	91.2	68
Norfolk Island	25.6	28
Raoul Island	84.2	105
<b>Samoa</b>		
Apia	410.1	181
Faleolo Airport	213.8	92
Nafanua	319.7	-
Afimalu	481.5	-
Maota	214.1	-
<b>Tonga</b>		
Lupepau'u	307.7	175
Nuku'alofa	122.1	95
Fua'motu Airport	130.3	127
<b>Tuvalu</b>		
Nanumea	138.5	82
Nui Island	114.6	59
Funafuti	201.7	76
Nuilakita	505.0	169
<b>Vanuatu</b>		
Sola	275.9	76
Pekoa	271.2	151
Lamap	319.4	280
Port Vila	147.2	204
Tanna/Whitegrass	25.7	-
Aneityum	443.8	467

Rainfall totalling 200% or more is considered well above average. Totals of 40% 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: November 2007 to January 2008

A La Niña-like pattern continues, producing a large area of suppressed convection along the equator from Western Kiribati to Eastern Kiribati, including Tuvalu. Below average rainfall is also likely in Tokelau, the Northern Cook Islands, and the Marquesas.

Enhanced convection is likely along a SPCZ displaced southwest of its normal position, from Papua New Guinea to Tonga, then the Society and Austral Islands of French Polynesia. Included in the above average rainfall are New Caledonia, Vanuatu, Fiji, Tonga, Niue, Southern Cook Islands, and Pitcairn Island.

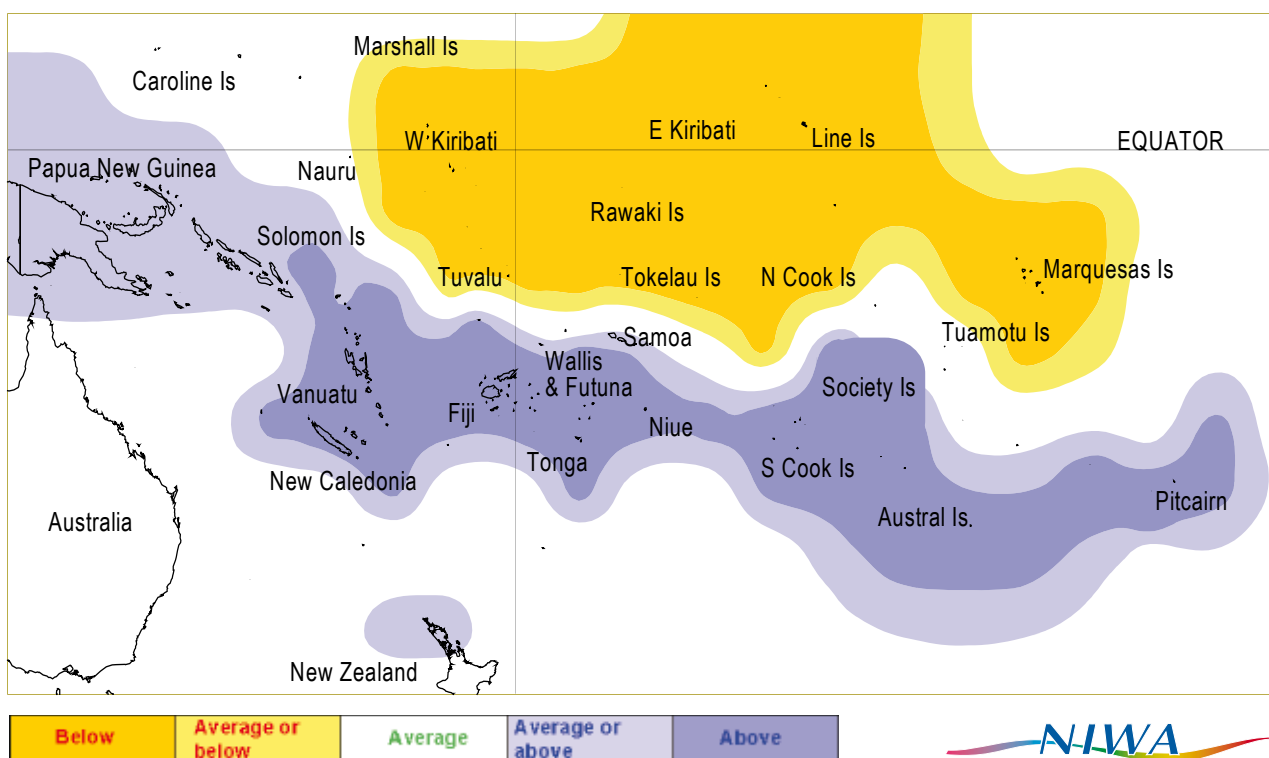
Near of above average rainfall is expected in Papua-New Guinea, the Solomon Islands and Samoa.

Near average rainfall is expected in the Tuamotu Islands.

The confidence in the forecast model skill for this seasonal outlook is moderate to high for most Pacific Island countries. In the past, the average region-wide hit rate for forecasts issued in November has been 64%, 4% higher than the long-term average for all months combined.

Island Group	Rainfall Outlook	Outlook confidence
Tonga	15:30:55 (Above)	High
Niue	20:30:50 (Above)	High
Fiji	20:35:45 (Above)	High
Vanuatu	25:30:45 (Above)	Moderate
New Caledonia	20:35:45 (Above)	Moderate-high
Wallis & Futuna	25:30:45 (Above)	Moderate
Southern Cook Islands	20:35:45 (Above)	Moderate
Austral Islands	20:35:45 (Above)	Moderate-high
Society Islands	20:35:45 (Above)	Mod
Pitcairn Islands	20:35:45 (Above)	Mod
Papua New Guinea	20:40:40 (Near or Above)	Moderate
Solomon Islands	20:40:40 (Near or Above)	Moderate
Samoa	20:40:40 (Near or Above)	Moderate
Tuamotu Islands	30:45:25 (Average)	Moderate
Tokelau	40:35:25 (Below)	Moderate
Marquesas	45:30:25 (Below)	Moderate
Northern Cook Islands	45:35:20 (Below)	Moderate
Tuvalu	50:30:20 (Below)	High
Western Kiribati	60:25:15 (Below)	High
Eastern Kiribati	50:30:20 (Below)	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 outputs 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.



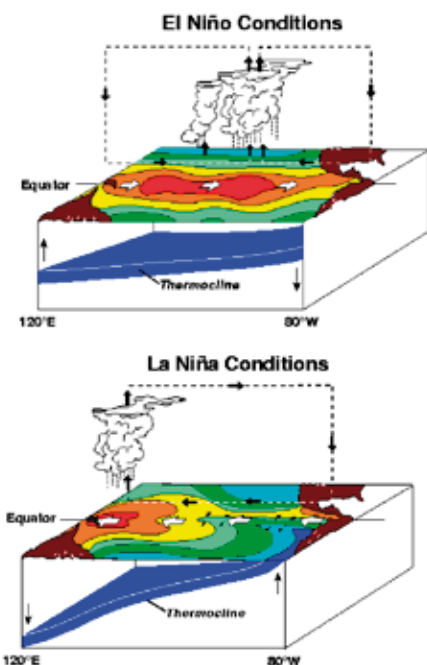
Rainfall outlook map for November 2007 to January 2008



# World Meteorological Organisation Expert Team meeting on 'El Niño and La Niña', Calverton, USA, August 13–15 2007

Luc Maitrepierre, New Caledonia

This WMO's Expert Team (ET) was formed in November 2005 during the fourteenth session of the Commission of Climatology (CCI), with Luc Maitrepierre as its leader. The first ET meeting was held in Calverton, USA, August 13-15 2007.



This followed the report of the previous ET. El Niño was first referred to as the seasonal appearance of a current of warmer than usual water off the Peruvian coast. El Niño sea surface warming is typically followed by either near-average sea surface temperatures (SST) or colder than average SSTs (La Niña).

El Niño and La Niña events have now been clearly identified as perturbations of the ocean-atmosphere system. There are

typically changes in convection and the strength and direction of the trade winds across the equatorial Pacific basin. These changes are represented by the Southern Oscillation Index (SOI), which is defined as the normalised difference in surface pressure between Tahiti, French Polynesia, and Darwin, Australia.

As a result of such atmospheric perturbations associated with ENSO events, various impacts are felt at different locations around the globe, and these regional impacts are dependent on the location, degree, and timing of the onset of the anomalous SSTs, and the intensity of the atmospheric response. Because of the potential confusion associated with the differing definitions in existence, CCI is addressing the issue of El Niño and La Niña definitions.

The aims of the meeting were to initiate the work of the ET on two main actions from the Terms of Reference given by CCI:

1. To produce a first version of an atlas of regional ENSO impacts.
2. To work on common language about ENSO.

The main issues about the atlas of regional ENSO impacts are:

- ET decided not to use one unique definition for El Niño or La Niña: ENSO variability should be seen as a continuum, and for practical reasons it was suggested that the ENSO cycle should be categorised by quintiles (0–20%, 21–40%, etc) of the chosen ENSO index, where it is based on sea surface temperature anomalies (NINO3.4), the Multivariate ENSO Index, Southern Oscillation Index or another.
- Impacts on climate should be compared to normal and expressed in probabilities. The seasonal variability should be highlighted.
- The final atlas will be available on the web but the ET recommended that a hard copy should also be developed.

The ET decided that a workshop on communicating about ENSO ('Toward Developing a Common Understanding') will be held in Hawaii from 8–10 April 2008. The goals of this workshop will be to:

- come to a common understanding of terminology used in describing the state of ENSO and its impacts, and
- develop best practices for communicating information on ENSO and its impacts to a wide range of users.

The agenda and the list of participants (about 50 people) are currently under consideration by the ET and will be available by the end of 2007.

Source: [http://www.pmel.noaa.gov/tao/elnino/nino\\_normal.html](http://www.pmel.noaa.gov/tao/elnino/nino_normal.html)  
The ET's terms of reference and the Catalogue of Indices and Definitions of El Niño and La Niña in Operational Use can be found at: [http://www.wmo.int/pages/prog/wcp/ccl/opags/opag3/et3.3/et3.3\\_members\\_tors.htm](http://www.wmo.int/pages/prog/wcp/ccl/opags/opag3/et3.3/et3.3_members_tors.htm)

Visit The Island Climate Update at:  
[www.niwascience.co.nz/ncc/icu](http://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](mailto:j.salinger@niwa.co.nz)

#### Editors:

Jim Salinger Email: [j.salinger@niwa.co.nz](mailto:j.salinger@niwa.co.nz)  
Stuart Burgess Email: [s.burgess@niwa.co.nz](mailto: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**

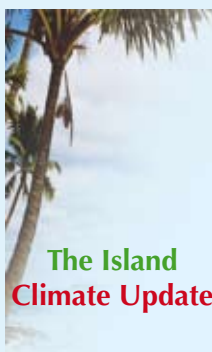
#### Acknowledgements

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.

The contents of The Island Climate Update may be freely disseminated, provided the source is acknowledged.

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



Cover Photo:  
Wendy St George,  
NIWA

**The Island  
Climate Update**