

The Island Climate Update

Collaborators

Pacific Islands National
Meteorological Services

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Meteorology

Meteo France

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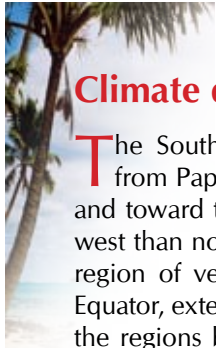
January's climate

- South Pacific Convergence Zone (SPCZ) extends from northeast of Papua New Guinea toward Wallis & Futuna, and from the Northern Cook Islands to east of Pitcairn Island
- Tropical cyclone Funa brings high rainfall and winds to parts of northern Fiji with flooding and >1.5m of standing water in places
- Suppressed convection exists from Western to Eastern Kiribati and about the Equator with low rainfall
- Above average temperatures in New Caledonia, Samoa, and Tonga; below average in eastern Australia

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

- A moderate–strong La Niña episode is continuing across the entire equatorial Pacific, and the event is expected to persist into the Southern Hemisphere autumn
- A large area of suppressed convection and average or below average rainfall is very likely along the equatorial Pacific from Western to Eastern Kiribati, including the Solomon Islands, Tuvalu, Tokelau, Northern Cook Islands, the Tuamotu Archipelago, and the Marquesas Islands
- Enhanced convection is likely to continue along a southwest displaced SPCZ with average or above average rainfall from Vanuatu to Pitcairn Island, including New Caledonia, Fiji, Tonga, Niue, and the Southern Cook Islands





Climate developments in January 2008

The South Pacific Convergence Zone (SPCZ) extended from Papua New Guinea, over the Solomon Islands, Fiji, and toward the Austral Islands, displaced further south and west than normal for the time of year in that region. A large region of very suppressed convection persisted along the Equator, extending from Western to Eastern Kiribati, affecting the regions both north and south of the Equator, including the Northern Cook Islands, Tuvalu, and the Marquesas.

Rainfall was well above average in parts of Vanuatu and Niue (Port Vila recording 649 mm) as a result of tropical cyclone Funa, and also in parts of the Solomon Islands and Fiji. Heavy rainfall, exceeding 200% of normal, occurred in central and western Fiji with the passage of Tropical cyclone Gene and was accompanied by flooding and >1.5 m of standing water in Nadi. Rainfall was also above average over much of Samoa as a result of cyclones this month, with extensive flooding in and around Apia.

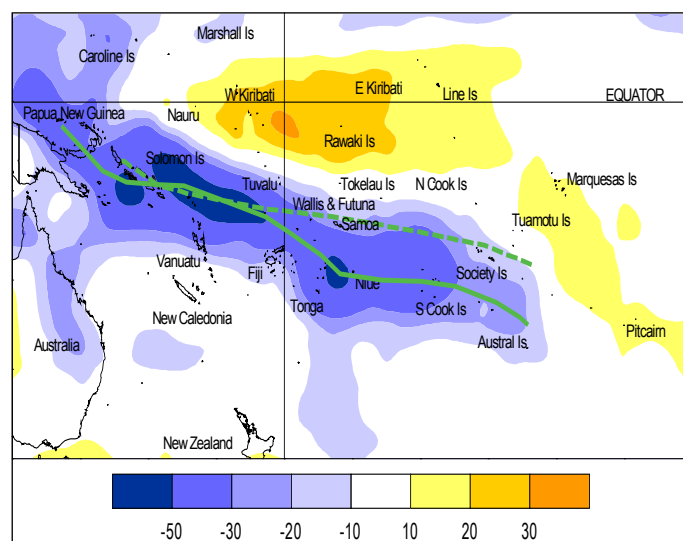
In contrast January rainfall was near or below normal over much of Kiribati, French Polynesia, and the parts of the Cook Islands, New Caledonia, the Marquesas, and Pitcairn Island. Rainfall has been below average for each of the past 8 months in Kiribati, and above average for each of the past 4 months in Fiji.

Country	Location	Rainfall (mm)	% of avg	Comments
Vanuatu	Port Vila	649.1	234	Record high
Kiribati	Christmas Island	6	5	Extremely low
New Zealand	Auckland Airport	15	22	Very low
Niue	Liku	473.6	191	Record high

December mean air temperatures were about 1.0 °C below normal in northeast Australia, and were 0.5 °C or more above normal in New Caledonia, Samoa, and Tonga.

Tropical Southwest Pacific mean sea-level pressures were below average over New Caledonia and a band of the southwest Pacific to the south and west of the SPCZ. Higher than normal pressures occurred across the South Island of New Zealand and extended toward the region southeast of the Cook Islands as well as over all of French Polynesia.

This pressure anomaly produced more frequent mid-latitude equatorial surface easterlies for New Zealand and eastern Australia.



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 results in higher rainfalls. The January 2008 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.

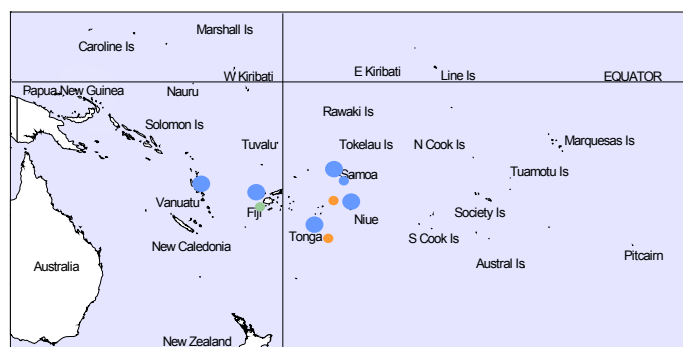
Soil moisture in January 2008

Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but 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.

Soils continued to be moist (at field capacity) for the time of year at Nadi (Fiji), Hanan Airport (Niue), Apia (Samoa), and in Tonga.



Estimated soil moisture conditions at the end of January 2008, using monthly rainfall data.

El Niño/Southern Oscillation (ENSO)

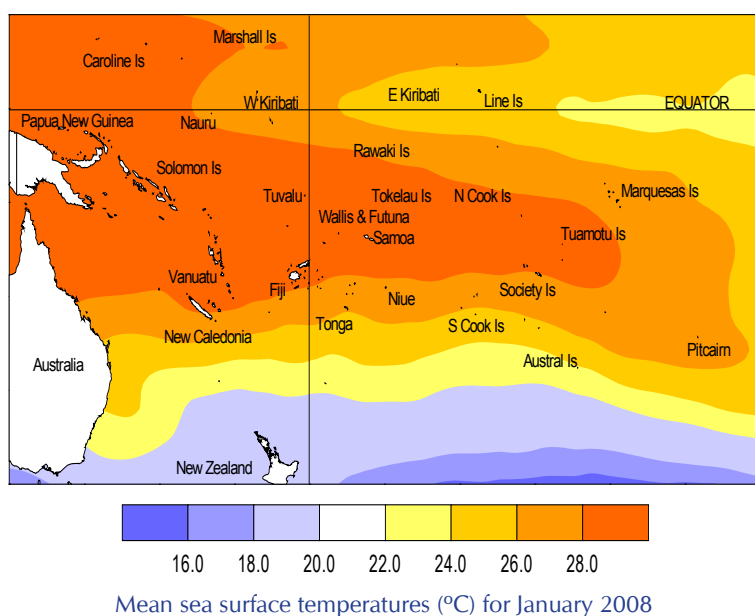
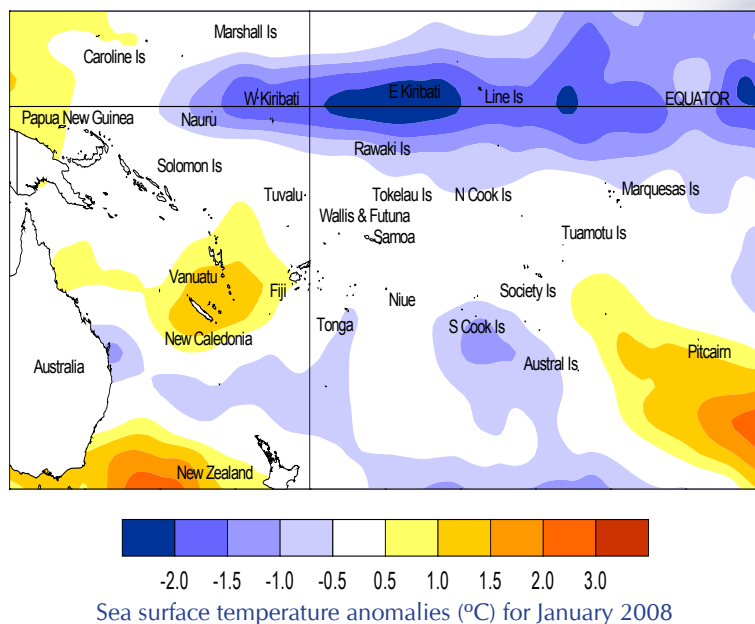
During January, a moderate–strong La Niña event persisted from the previous month, and conditions continued to spread into the western tropical Pacific. The Southern Oscillation Index (SOI) continued its strong movement upwards, indicating a further strengthening of the ocean-atmosphere coupling.

Below normal sea surface temperature (SST) anomalies now extend from 160°E to the South American coast, while a warm horseshoe continues in the extratropics of both hemispheres. The NINO3 anomaly was -1.3 °C for January (NDJ average -1.4 °C), while NINO4 continued to strengthen and is now -1.4 °C (NDJ average -1.1 °C). The subsurface temperature anomalies have continued to strengthen: the largest cold anomalies near 100m depth around 120 °W during January were about -4 °C (-3 °C in December), while the warm pool of water in the western Pacific appears to have moved deeper into the ocean.

The easterly trade winds that were strong and persistent during December and the start of January over a wide longitude band have weakened in the western Pacific recent days, probably in response to Madden-Julian Oscillation (MJO) activity. The SOI stabilised during January and is around +1.5 (+1.4 in December), with the NDJ average of +1.3.

Tropical OLR anomalies show suppressed convection in the equatorial region from west of the International Date Line (160 °E) eastwards. The region of enhanced convection that was over Indonesia and parts of northern Australia in December has shifted eastwards into the western Pacific. The South Pacific Convergence Zone is still prominent between New Caledonia and Tonga, well south of its normal position. The TRMM-based ENSO precipitation index was -0.4 in January, has weakened from a value of -1.35 in December. The MJO has displayed a fairly regular periodicity of 40 to 50 days in recent months. A new active MJO in the western Indian Ocean is expected to move eastwards, bringing enhanced convection to Indonesia and northern Australia by mid February.

All models now clearly indicate existing La Niña conditions. Most models indicate La Niña conditions continuing through summer and autumn, before



easing to neutral conditions by the end of the austral winter 2008. The NCEP synopsis (of 10 January) indicates La Niña has reached a moderate strength (Niño3.4 index below -1.5 °C), and likely to continue into the austral autumn. The IRI synthesis gives moderately strong La Niña conditions, with a 96% probability of La Niña conditions through the next three months and a gradual weakening thereafter with the probability of neutral ENSO conditions rising to 50% by mid 2008.

Forecast validation: November 2007 to January 2008

A La Niña-like pattern, with a large region of enhanced convection was anticipated from Vanuatu and New Caledonia eastward across Fiji, Wallis & Futuna, Niue, the Southern Cook and Austral Islands to Pitcairn Island, with average or above average rainfall expected in this region. A swath of suppressed convection was anticipated from West Kiribati eastward across the Date Line to the Marquesas, encompassing Tuvalu, Tokelau, Northern Cook Islands, and the Tuamotu Archipelago.

The rainfall outlook for the November 2007– January 2008 period was very similar to what was forecast, the 'hit' rate being 66%. Rainfall was lower than expected in New Caledonia.

Tropical Pacific rainfall – January 2008

Territory and station name	January 2008 rainfall total (mm)	January 2008 percent of average
Australia		
Cairns Airport	410	104
Townsville Airport	479.6	177
Brisbane Airport	135	85
Sydney Airport	60.6	61
Cook Islands		
Penrhyn	94.6	36
Aitutaki		
Rarotonga Airport		
Rarotonga EWS		
Fiji		
Rotuma Island	448.8	126
Udu Point	707	226
Nadi Airport	549.2	160
Nausori	605	166
French Polynesia		
Hiva Hoa, Atuona	71.2	45
Bora Bora	270.8	110
Tahiti – Faa'a	137.4	50
Tuamotu, Takaroa	110.8	58
Gambier, Rikitea	66.6	46
Tubuai	155.4	77
Rapa	447	187
Kiribati		
Tarawa		
Kanton		
New Zealand		
Kaitia	46	56
Whangarei Airport	82.2	98
Auckland Airport	15	22
New Caledonia		
Ile Art, Belep	191.2	80
Koumac	224.4	126
Ouloup	230	130
Ouanaham	89.8	46
Poindimie	502	134
La Roche		
La Tontouta	180.8	151
Noumea		
Moue		

Territory and station name	January 2008 rainfall total (mm)	January 2008 percent of average
Niue		
Hanan Airport	405.1	119
Liku	473.6	191
North Tasman		
Lord Howe Island	197.4	64
Norfolk Island	228.2	213
Raoul Island	179.4	138
Samoa		
Apia	700.9	152
Faleolo Airport	607.1	156
Nafanua	971.1	
Afimalu	1453.7	
Maota		
Tonga		
Niuafu'o		
Mata'aho Airport	296	107
Lupepau'u	547.7	190
Salote Airport	363.2	221
Nuku'alofa	129.8	75
Fua'motu Airport	303.6	151
Tuvalu		
Nanumea	169.7	48
Nui Island	303.9	72
Funafuti	643.5	167
Nuilakita*	697.1	185
Vanuatu		
Sola	475.4	120
Pekoa	250.0	77
Lamap	250.7	99
Port Vila	649.1	234
Tanna/Whitegrass	169.7	
Bauerfield	192.1	119
Aneityum	168.9	61

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: February to April 2008

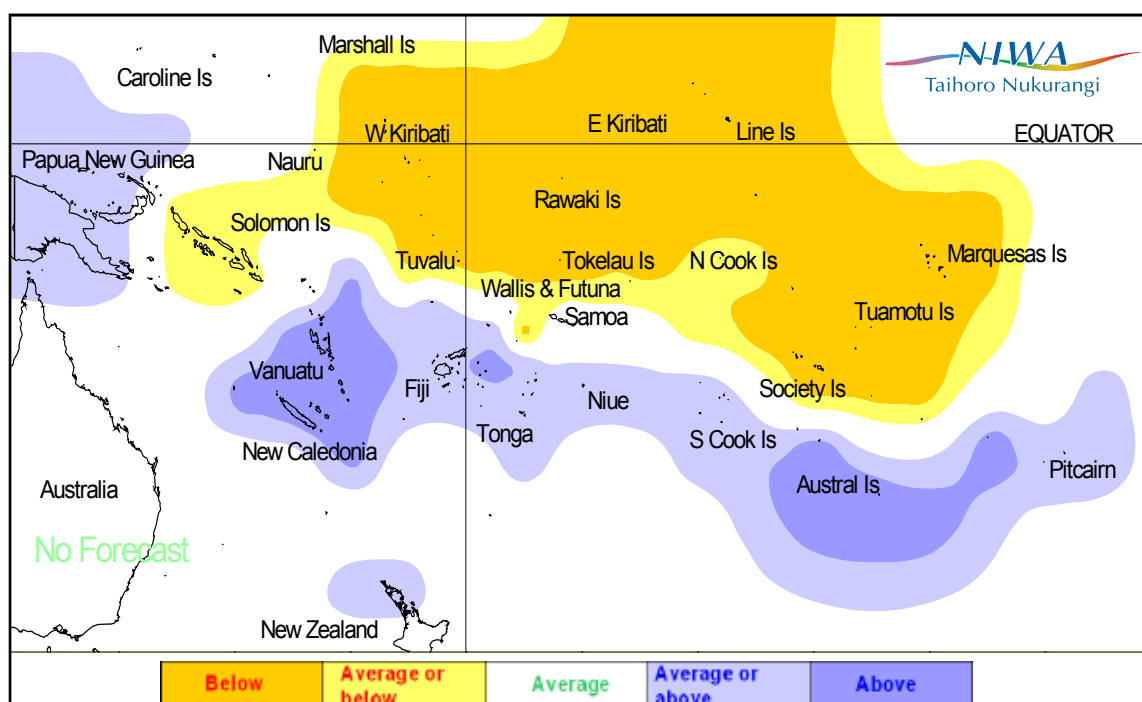
La Niña conditions are still very likely to influence rainfall patterns during this period, with a large area of suppressed convection very likely along the equatorial Pacific from Western Kiribati to Eastern Kiribati, including Tuvalu, the Society Islands, the Marquesas, Wallis & Futuna, and the Tuamotu Islands. Near or below average rainfall is likely for the Northern Cook Islands and the Solomon Islands, while average rainfall is likely for Samoa.

Enhanced convection with above average rainfall is likely from Vanuatu through to the Austral Islands, including New Caledonia, while near or above average rainfall is likely in Fiji, Pitcairn Island, Tonga, Niue, and the Southern Cook 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 February has been 56%, 5% lower than the long term average for all months combined.

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.

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



Rainfall outlook map for February to April 2008

Tropical cyclones

Three tropical cyclones (TC) affected the South Pacific region in January. TC Elisa formed on January 10th southwest of Nukualofa, Tonga and reached maximum sustained winds of 45 knots on 11 January before dissipating. TC Funa, formed on 16 January and had a much greater impact on the islands. Funa intensified quickly while approaching Fiji, and achieved sustained winds of 105 knots on the 18th, and then subsequently tracked southeast toward Tonga and began weakening on 19 January. TC Gene formed

on the 27 January northeast of Fiji and tracked southwest toward New Caledonia, reaching Category 3 strength with maximum sustained winds of 100 knots late on 31 January before swinging to the southeast. TC Gene has continued to deteriorate along a southeast exit path into the extra-tropics. February and March are normally active months for tropical cyclones, and the moderate La Niña conditions at present will continue to influence tropical cyclones in several parts of the South Pacific region.

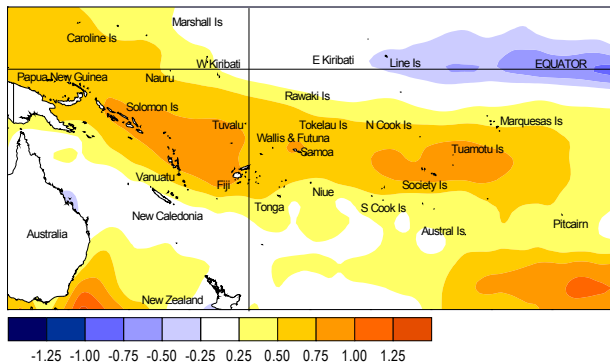
A review of Southwest Pacific climate in 2007

Dr. Jim Salinger, National Institute of Water and Atmospheric Research, New Zealand

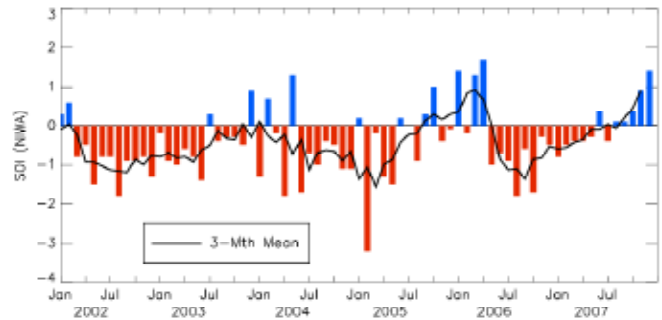
Climate diagnostics for the South Pacific early in 2007 showed a change from an El Niño to a La Niña climate pattern (right). The first quarter of the year was influenced by decaying El Niño characteristics, followed by a neutral period. La Niña conditions in the tropical Pacific developed by September, and matured in December. ENSO-related influences on the location of the South Pacific Convergence Zone (SPCZ) caused it to be north of its normal location in the first part of the year, and further south than usual from July through December.

Sea surface temperatures (SSTs)

For 2007, above average SSTs occurred throughout much of the tropical Southwest Pacific to the south and west of the International Date Line, and were at least +1.5 °C above average around the Solomon Islands, Vanuatu, Fiji, Samoa and Central French Polynesia. Below average SSTs existed in the equatorial region about and east of the Line Islands. Southwest Pacific island surface air temperature anomalies were generally consistent with the SST anomalies throughout the region. It was an extremely warm year in Fiji and Tonga where mean temperatures were about 1.0 °C above historical averages. Above average equatorial SSTs occurred in January around Western and Eastern Kiribati (+1 °C anomalies), however, the warm anomalies moved away from the Equator to affect regions in higher latitudes further south until October, dissipating after that. Negative SST anomalies (-0.5 °C) became apparent east of the Date Line in July, gradually spreading west to reach the Date Line in October. SSTs cooled by -1.0 to 1.5 °C below average in the seas around Eastern Kiribati for the rest of the year.



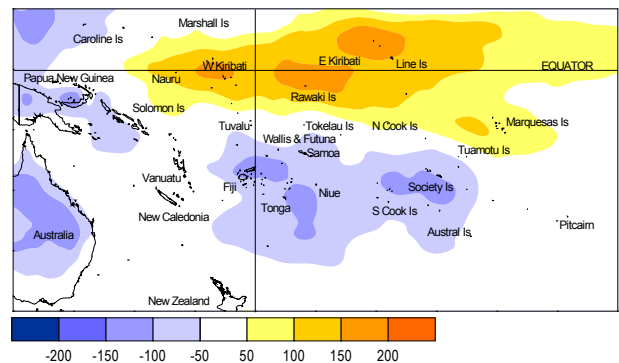
Sea surface temperature anomalies in the Southwest Pacific for 2007.



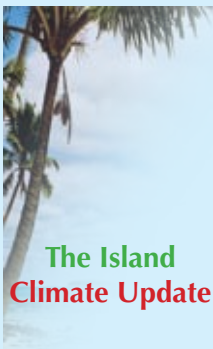
The Southern Oscillation Index (SOI): Jan 2002 - Dec 2007.

Outgoing Longwave Radiation (OLR)

January's OLR anomalies showed enhanced convection over Kiribati southeast to the Northern Cook Islands, with suppressed convection further south, typical of an El Niño event. However, from June onwards a reversal to convection patterns associated with La Niña development occurred. Mean sea-level pressures were above average in the subtropics west of the Date Line until April. Negative anomalies developed in the tropical western Pacific between Papua New Guinea (PNG) and Fiji from June onwards. OLR anomalies showed a region of enhanced convection over PNG, Fiji, and Central French Polynesia. Suppressed convection persisted over Kiribati, extending to Northern French Polynesia. 2007 rainfall anomalies were similar to the OLR pattern, with above average rainfall between Fiji and Central French Polynesia, including Tonga, and below average rainfall in Kiribati, extending to Northern French Polynesia.



Outgoing longwave radiation anomalies in the Southwest Pacific for 2007.



The Island Climate Update

Cover Photo:
Wendy St George,
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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 Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna**

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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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