

# The Island Climate Update

## January's climate

- The South Pacific Convergence Zone (SPCZ) was displaced northeast of normal.
- Suppressed convection in the central part of the Southwest Pacific near Vanuatu, Fiji, Niue and Tonga.
- Mostly well below normal rainfall for many parts of New Caledonia, Fiji and Vanuatu.

## 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  
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European Centre for  
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UK Met Office

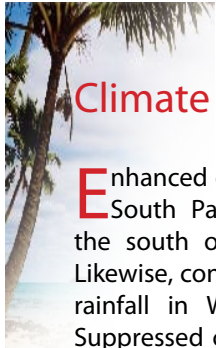
World Meteorological  
Organization

MetService of  
New Zealand

## El Niño/Southern Oscillation (ENSO), seasonal rainfall, and sea surface temperature forecasts

- El Niño conditions exist in the equatorial Pacific. Many dynamical climate models project the continuation of El Niño through early autumn 2010.
- Below normal rainfall is forecast for Fiji, Vanuatu, Niue, and Tonga.
- Above normal rainfall is expected for Western Kiribati, Eastern Kiribati, Tokelau, Tuvalu and the Society Islands.
- Above normal SSTs are forecast for Eastern Kiribati and Western Kiribati. Normal or above normal SSTs are forecast for the Northern Cook Islands, Tuvalu, Tokelau, and all of French Polynesia. SSTs are expected to be near or below normal around Fiji, Niue, Tonga and Pitcairn Island.





## Climate developments in January 2010

Enhanced convection along a partially northeast displaced South Pacific Convergence Zone (SPCZ) were seen to the south of the Tuamotu Archipelago this past month. Likewise, convection along the Equator generated significant rainfall in Western Kiribati, Eastern Kiribati, and Nauru. Suppressed convection existed in the central portion of the southwest Pacific, particularly around Vanuatu, Fiji, Tonga and in the Marquesas. The regional circulation in January was characterised by more frequent low pressure in the eastern sector of French Polynesia, and higher than normal pressure to the north and east of New Zealand and over eastern Australia. This pattern resulted in more frequent southeasterly anomalies across the much of southwest Pacific.

Very high rainfall was recorded at stations in French Polynesia, northern Australia, parts of Papua New Guinea, and Western Kiribati this past month, either due to convection associated with the Intertropical Convergence Zone (ITCZ), SPCZ, or monsoonal trough. In Eastern Kiribati, 781mm (724% of normal) of rain fell during January, a record high. It is the seventh month in a row with considerable rainfall at Tarawa (>190 % of normal). In Papua New Guinea, more than one meter of rainfall was recorded at Hoskings, due to monsoon trough activity, and infrastructure including roads and bridges were destroyed by flooding. High rainfall in French Polynesia was also contributed to movement of the SPCZ over the region during the month. TC Oli, which formed very late in January, and a northeast-displaced subtropical limb of the SPCZ contributed to high totals in Gambier and Bora Bora.

Island Group	Location	Rainfall (mm)	% of avg	Comments
French Polynesia	Bora Bora	733	297	New Record High
French Polynesia	Gambier, Rikitea	490	336	New Record High
Kiribati	Christmas Is	781	724	New Record High
Tonga	Lupepau'u	38	13	New Record Low
Papua New Guinea	Hoskings	1074	153	Highest total in the region

## Soil moisture in January 2010

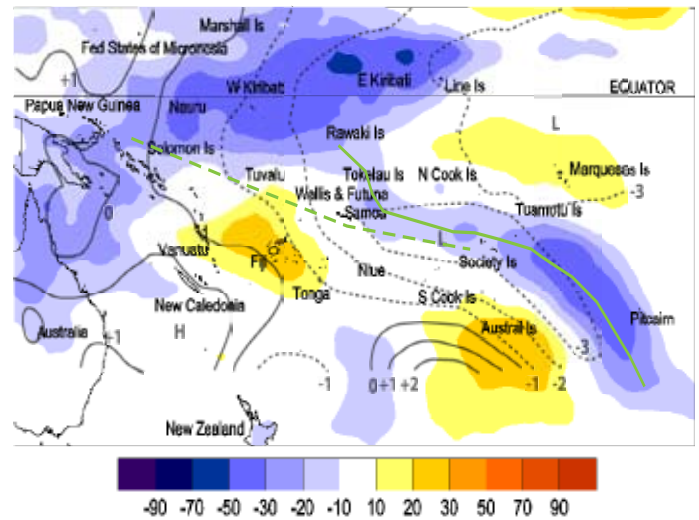
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but more stations will be included in the future.

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. 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.

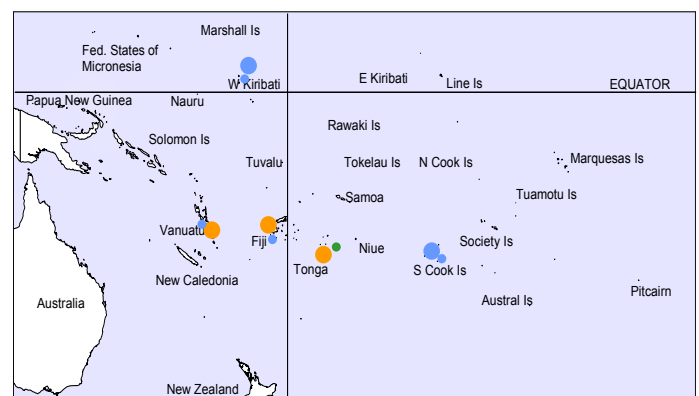
Rarotonga (Southern Cook Islands), and Tarawa (Western Kiribati) project moist soil moisture at this time. Port Vila (Vanuatu), Nadi (Fiji), and Nuku'alofa (Tonga) project moderate to dry conditions at this time.

Many regional rainfall developments were characterised by drier than normal conditions for island groups in the central part of the southwest Pacific due to the continuation of El Niño during January. Well below normal rainfall occurred over most of Vanuatu, New Caledonia, and especially Fiji last month. Particularly dry conditions were observed in the Austral Islands and Marquesas with as low as 15% of normal rainfall recorded in that area.

Warm conditions also affected all of French Polynesia during January, with anomalies of more than +1.5°C in Tahiti. Temperatures were also above average in southeastern Australia during January.



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 result in higher rainfall. The January 2010 position of the South Pacific Convergence Zone (SPCZ) was northeast of normal to and particularly active south of the Tuamotu Archipelago. The average SPCZ position is identified by the dashed green line, which is based on mean January rainfall for the South Pacific. Mean sea level (MSL) pressure anomalies (in hPa) are shown as solid and dashed black lines.



January 2010      January 2009

- Wet
- Moderate
- Dry

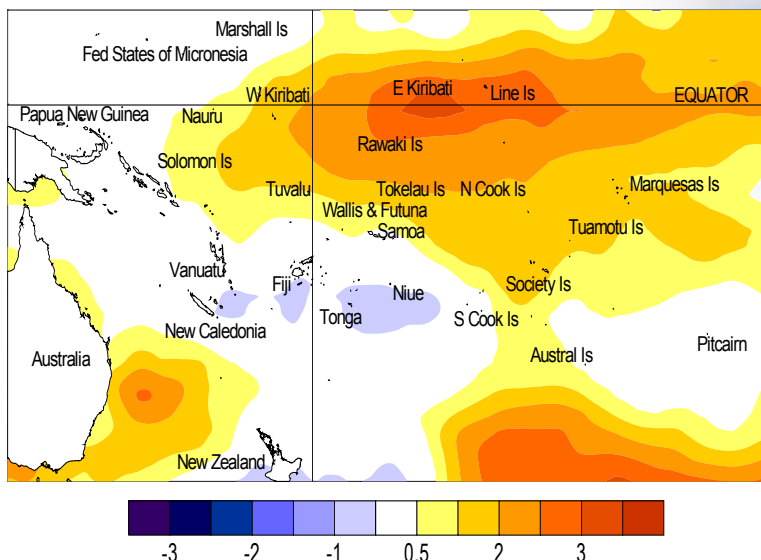
Estimated soil moisture conditions at the end of January 2010, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

## El Niño/Southern Oscillation (ENSO)

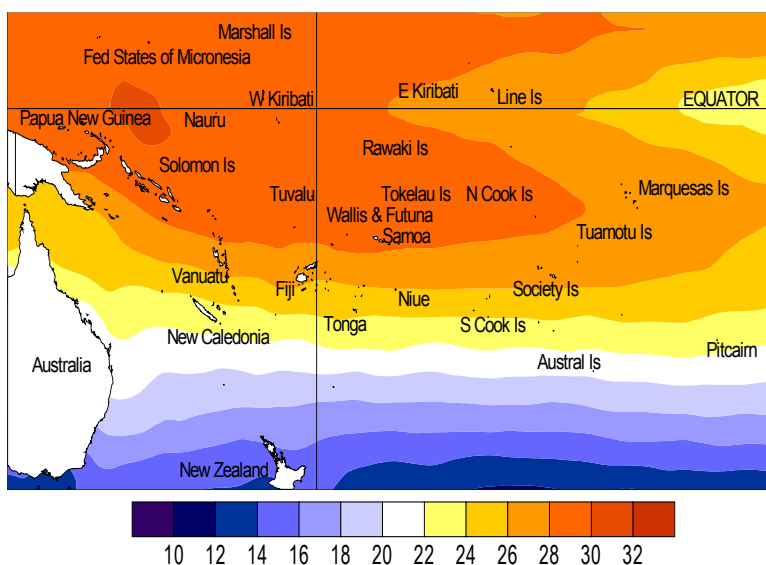
During January, El Niño conditions were well-established in the equatorial Pacific. Equatorial sea surface temperature anomalies weakened a little in the NINO3 region in response to weakened Equatorial westerly wind anomalies. In NINO4 SSTs changed only slightly where the westerly wind anomalies persisted. In January, the NINO3 SST anomaly was +1.4°C and the NINO4 anomalies was +1.6°C (3-month NDJ means were +1.5°C and +1.6°C respectively). Upper-ocean equatorial heat content anomalies were positive east of the Date Line, and showed signs of weakening as the easterly trades strengthened later in the month. The large positive subsurface temperature of above +4°C east of 130°W that existed in December has also weakened, and this indicates that El Niño has peaked and is beginning to weaken.

The SOI for January was -1.1 (NDJ mean -1.0). Tropical OLR anomalies in January showed strongly enhanced convection across the Equatorial Pacific from near the Date Line towards Papua, northern Australia and Indonesia. The extensive area of convection that was present during January was probably due to a combination of the classical El Niño convective pattern and an MJO event that passed across Indonesia and into the Pacific. The MJO event is expected to stall in the western Pacific during the first half of February, with suppressed convection spreading over the eastern Indian Ocean/western Indonesia regions. The MJO influence may account for a slow weakening in the SOI over the past two months. The TRMM ENSO precipitation index was -0.0 for the 30 days to 25 January.

The global climate model ensemble assessed by NIWA show dynamical models (and all but one statistical model) projecting warm conditions through to the end of April 2010, but all models show a weakening towards neutral conditions in autumn. The NCEP ENSO discussion from 7 January suggests a strong El Niño at present but it is expected to weaken and persist into the austral autumn. The IRI summary (21 January) indicates a 98%



Sea surface temperature anomalies (°C) for January 2010



Mean sea surface temperatures (°C) for January 2010

above 90% of continuing El Niño through February-April, before returning to climatological probabilities in July-September.

## Tropical Cyclone guidance and activity: November 2009 to April 2010

There were two tropical cyclones (TCs) that occurred in the southwest Pacific during January. "Nisha" was the second TC to form in the region, and developed on 27 January to the northeast of Fiji. The system gradually strengthened into a Category 1 TC, reaching winds of 75km/h. The third TC to form during the season was "Oli", which developed on 29 January and was upgraded to a tropical depression on 30 January. Eventually in February, Oli would be categorised as the first severe TC (with winds up to 185km/h) to form in the southwest Pacific during the 2009/10 TC season. Updated TC guidance indicates increased risk of the Solomon Islands, and to the east of the Date Line for Tonga, Niue, and the Southern Cook Islands for the remainder of the TC season. More details about the 2009-10 TC outlook can be found at <http://www.niwa.co.nz/>

## Forecast validation: November 2009 to January 2010

A region of suppressed convection was forecast for the southwest Pacific extending southeast from Vanuatu to Pitcairn Island. Below average rainfall was expected for New Caledonia, Vanuatu, Niue and Tonga, while near or below average rainfall was forecast for Wallis & Futuna, Fiji, the Southern Cook Islands, Pitcairn Island and the Marquesas. Near normal rainfall was forecast for the Austral Islands, the Tuamotu Archipelago, Samoa, and Papua New Guinea. Enhanced convection was projected along the Equator extending from Western to Eastern Kiribati, and also near Tokelau. These regions were expected to receive above

normal rainfall. The Solomon Islands, Tuvalu, the Northern Cook Islands and the Society Islands were expected to receive near or above normal rainfall.

The November 2009-January 2010 forecast validation was calculated for 10 island groups (ten Pacific Islands were forecast as climatology and were unscorable). The global island group 'hit' rate was 72%, 8% higher than average for November forecasts, and 11% higher than the average for all months combined. Rainfall was underprojected for the Society Islands and for Gambier (Southern Tuamotu).

## Tropical Pacific rainfall – January 2010

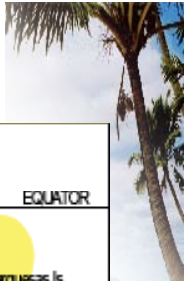
Territory and station name	January 2010 rainfall total (mm)	January 2010 percent of average
<b>Australia</b>		
Cairns Airport	705	179
Townsville Airport	545	201
Brisbane Airport	40	25
Sydney Airport	36	36
<b>Cook Islands</b>		
Penrhyn	120	46
Aitutaki	N/A	N/A
Rarotonga Airport	189	83
<b>Fiji</b>		
Rotuma Island	214	60
Udu Point	34	11
Nadi Airport	66	19
Nausori	40	11
<b>French Polynesia</b>		
Hiva Hoa, Atuona	23	15
Bora Bora	<b>733</b>	<b>297</b>
Tahiti - Fa'a	387	142
Tuamotu, Takarua	N/A	N/A
Gambier, Rikitea	<b>490</b>	<b>336</b>
Tubuaiti	126	62
Rapa	84	35
<b>Kiribati</b>		
Tarawa	486	195
Kanton	220	180
<b>New Zealand</b>		
Kaitiaki	31	38
Whangarei Airport	17	20
Auckland Airport	36	53
<b>New Caledonia</b>		
Ile Art, Belep	301	126
Koumac	221	124
Ouloup	N/A	N/A
Ouanaham	128	65
Poindimie	322	86
La Roche	50	29
La Tontouta	42	35
Noumea	136	117
Moue	21	11
<b>Niue</b>		
Hanan Airport	208	81
Liku	N/A	N/A

Territory and station name	January 2010 rainfall total (mm)	January 2010 percent of average
<b>North Tasman</b>		
Lord Howe Island	119	104
Norfolk Island	14	15
Raoul Island	52	40
<b>Samoa</b>		
Faleolo Airport	356	145
Apia	365	75
Nafanua	450	N/A
Afiomalua	732	N/A
Alafua	365	N/A
<b>Solomon Islands</b>		
Taro	241	100
Munda	897	234
Auki	397	110
Honiara	254	93
Henderson	169	71
Kira Kira	470	137
Santa Cruz, Lata	441	105
<b>Tonga</b>		
Niuafo'ou	120	39
Mata'aho Airport	N/A	N/A
Lupepau'u	<b>38</b>	<b>13</b>
Salote Airport	65	39
Nuku'alofa	96	55
Fua'amotu Airport	163	81
<b>Tuvalu</b>		
Nanumea	464	130
Nui Island	241	57
Funafuti	361	94
Nuilakita	222	59
<b>Vanuatu</b>		
Sola	247	63
Pekoa	98	30
Lamap	29	12
Port Vila	N/A	N/A
Tanna/Whitegrass	36	N/A
Aneityum	94	34
<b>Papua New Guinea</b>		
Port Moresby	241	113
Wewak	94	86
Kavieng	231	76

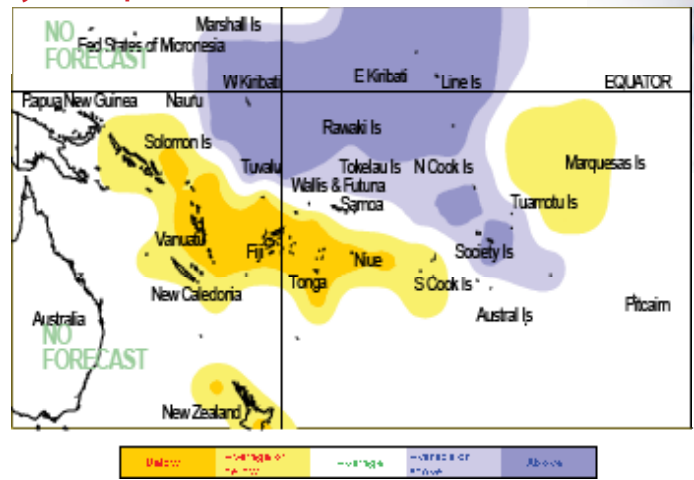
Rainfall totalling 200% or more is considered well above average. Totals of 40% or less are normally well below average. **Highlighted values are new records.**

Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and \* denotes synoptic values.

# Tropical rainfall and SST outlook: February to April 2010

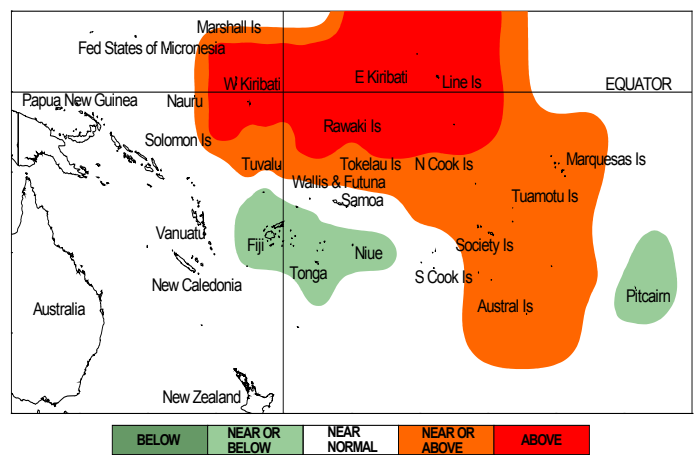


During February – April 2010, a region of suppressed convection is likely in the southwest Pacific encompassing Niue, Fiji, Tonga and Vanuatu. Below average rainfall is expected for all of those island groups. Near or below normal rainfall is expected for Wallis & Futuna, New Caledonia, the Southern Cook Islands, the Marquesas, and the Solomon Islands. Enhanced convection is likely along the Equator extending from Western to Eastern Kiribati, and also near Tuvalu and the Society Islands, with an expectation of above average rainfall for those islands. Near or above average rainfall is forecast for the Northern Cook Islands, the Tuamotu Archipelago and Tokelau. Near normal rainfall is forecast for Pitcairn Island and the Austral Islands. No clear precipitation guidance is offered for Papua New Guinea or Samoa.



Rainfall outlook map for January to March 2010

The global models are continuing to show elevated temperatures in the near equatorial Pacific and the northeast part of the Southwest Pacific. A warm pattern is seen in many models for French Polynesia while cold anomalies are projected around Fiji. Above average sea surface temperatures are forecast for Eastern and Western Kiribati. A region of near or above average sea surface temperatures is forecast around Tokelau, Tuvalu, the Northern Cook Islands, and all of French Polynesia. Average or below average SSTs are forecast for Fiji, Niue, Tonga, and Pitcairn Island. Near normal SSTs are forecast for the remainder of the southwest Pacific.

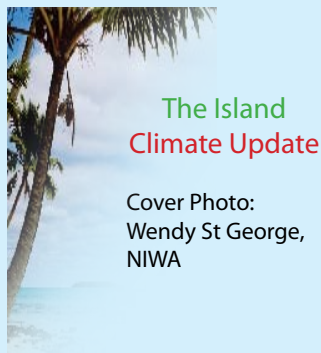


SST outlook map for February to April 2010

The confidence in the multi-model ensemble forecast skill for this seasonal rainfall outlook is moderate to moderately high. In the past, the average region-wide hit rate for rainfall forecasts issued in February is 63%, 2% higher than the long-term average for all months combined. The SST forecast confidence is mostly high, but the greatest uncertainty is localised around the Marquesas..

NOTE: Rainfall and sea surface temperature estimates for Pacific Islands for the next three months are given in the tables below. The tercile probabilities (e.g., 20:30:50) are derived from the averages of several global climate models. They correspond to the odds of the observed rainfall or sea surface temperatures being in the lowest one third of the distribution, the middle one third, or the highest one third of the distribution. For the long term average, it is equally likely (33% chance) that conditions in any of the three terciles will occur. \*If conditions are climatology, we expect an equal chance of the rainfall being in any tercile.

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



## The Island Climate Update

Cover Photo:  
Wendy St George,  
NIWA

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Your comments and ideas about The Island Climate

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

### 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.**

### Web links to ICU partners:

#### South Pacific Meteorological Services:

Cook Islands  
<http://www.cookislands.pacificweather.org/>

Fiji  
<http://www.met.gov.fj>

Kiribati  
<http://pi-gcos.org/index.php> (follow link to PI Met Services then Kiribati Met Service)

New Zealand  
<http://www.metservice.co.nz/>

Niue  
<http://pi-gcos.org/index.php> (follow link to to PI Met Services then Niue Met Service)

Papua New Guinea  
<http://pi-gcos.org/index.php> (follow link to to PI Met Services then Papua New Guinea Met Service)

Samoa  
<http://www.mnre.gov.ws/meteorology/>

Solomon Islands  
<http://www.met.gov.sb/>

Tonga  
<http://www.met.gov.to/>

Tuvalu  
<http://tuvalu.pacificweather.org/>

Vanuatu  
<http://www.meteo.gov.vu/>

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French Polynesia: <http://www.meteo.pf/>

Bureau of Meteorology (Australia)  
<http://www.bom.gov.au/>

National Oceanographic and Atmospheric Administration (USA)  
National Weather Service: <http://www.nws.noaa.gov/>  
Climate Prediction Center: <http://www.cpc.noaa.gov/>

The International Research Institute for Climate and Society (USA):  
<http://portal.iri.columbia.edu/portal/server.pt>

The UK Met Office  
<http://www.metoffice.gov.uk/>

European Centre for Medium-term Weather Forecasts  
<http://www.ecmwf.int/>