Number 110, November 2009

The Island Climate Update

October's climate

- South Pacific Convergence Zone (SPCZ) is contracted toward Papua New Guinea, and shows northeastward movement to the east of the Date Line.
- Enhanced convection exists about the Equator from Western Kiribati to Eastern Kiribati.
- Below normal rainfall for several stations in Fiji, New Caledonia, Vanuatu, Niue, Tonga, and in parts of Australia occurred in October, but very high rainfall was recorded in the Solomon Islands and French Polynesia.

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

- El Niño conditions exist in the equatorial Pacific. Many dynamical climate models project the continuation of El Niño through 2009 and into 2010.
- Average or below average rainfall is very likely near New Caledonia, Papua New Guinea, Fiji, Niue, Tonga, the Southern Cook Islands, the Austral Islands, and the Marquesas. Below average rainfall is forecast for Samoa.
- Enhanced convection is likely to continue along the Equator, with above average rainfall for Eastern Kiribati and Western Kiribati. Near or above normal rainfall is expected for Tokelau and Tuvalu.
- Above normal SSTs are forecast for Eastern Kiribati and Western Kiribati. Average or below average SSTs are forecast for Fiji and Tonga.

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

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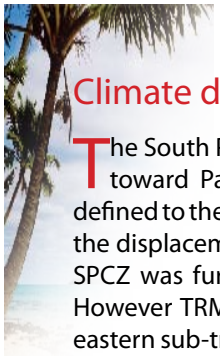


Climate developments in October 2009

The South Pacific Convergence Zone (SPCZ) was contracted toward Papua New Guinea this month, and was poorly defined to the northwest of Fiji and east of the dateline. Overall, the displacement of the northwestern, tropical portion of the SPCZ was further south and west than normal for October. However TRMM rainfall monitoring indicates the central and eastern sub-tropical components of the SPCZ are now shifting northeast. A small region of suppressed convection extended from near Samoa southeast to the Austral Islands. The regional circulation was characterised by lower than normal pressures over French Polynesia, and higher than normal pressures over Australia. This pattern is similar to what might normally be seen during El Niño in the Austral spring, and it brought southerly quadrant wind anomalies and negative temparture anomalies to many island countries last month.

Rainfall was well below average for many island nations in the southwest Pacific as a result of the atmospheric developments linked to El Niño. Most stations in New Caledonia received between 20–60% normal rainfall, and similar anomalies were observed nearby for the islands in the Tasman Sea. Many stations in Fiji reported dry conditions, with the exception of Rotuma in the far north which had very high monthly rainfall. A similar story was reported for Vanuatu, which had anomalies of 40–60% of normal in the southern and central part of the island group and well above normal rainfall in the north at Sola (516mm; 143% of normal). Wallis and Futuna, Tonga, and Niue also reported very dry conditions for the month.

Country	Location	Rainfall (mm)	% of avg	Comments
Fiji	Savusavu	16	9	Record low
New Caledonia	Ouloup	1	2	Record low
Kermadec Region	Raoul Island	33	41	Record low
Papua New Guinea	Madang	312	112	Record high
Fiji	Rotuma	618	182	Highest total in the region

Soil moisture in October 2009

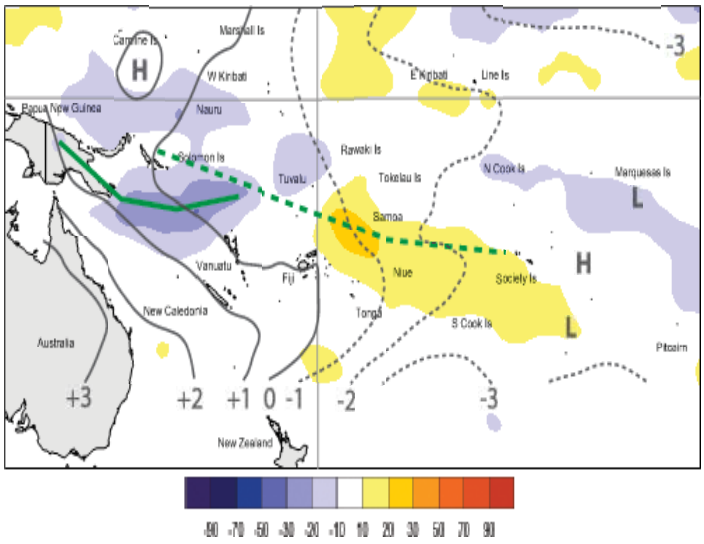
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but it is planned to include more stations in the future.

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.

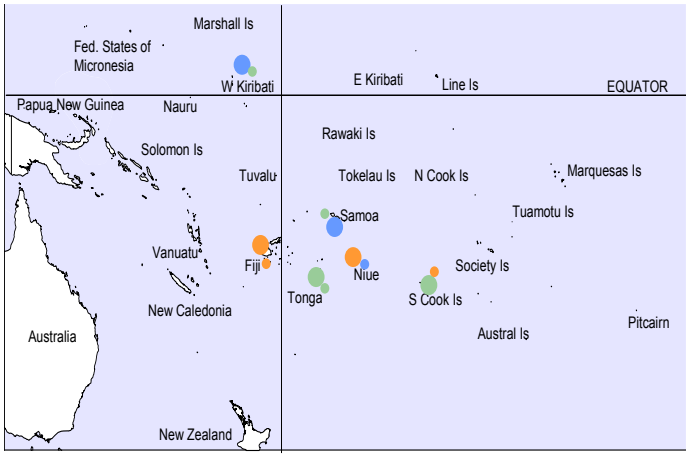
Fiji (Nadi) and Niue (Hanan) project significant soil moisture deficits. Soil continued to be moist at Tarawa, and was moderate at Rarotonga (Southern Cook Islands) and Apia (Samoa).

In contrast, conditions were very wet in both Eastern Kiribati and Western Kiribati. Tarawa and Kanton received 190% and 339% of normal rainfall, respectively. Rainfall was also near normal to well above normal in French Polynesia during October. In the Marquesas, 284% of normal rainfall (278mm) fell, and anomalies of more than 200% of normal were also recorded in Tuvalu. For the Solomon Islands, October saw near normal to well above normal rainfall, and 100%–230% or normal rainfall anomalies were reported at multiple sites.

The southerly circulation pattern resulted in lower than normal temperatures to the north of the Tasman Sea last month, and were particularly important for Fiji and New Caledonia. However in Australia, warmer than normal temperatures occurred in eastern Queensland.



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 October 2009 position of the South Pacific Convergence Zone (SPCZ), as identified from OLR , is indicated by the solid green line. Overall, the SPCZ was contracted toward Papua New Guinea, and the sub-tropical portion has now started to swing north. The SPCZ was poorly defined in the OLR anomalies east of Vanuatu this month. The average position of the SPCZ is identified by the dashed green line.



Estimated soil moisture conditions at the end of October 2009, using monthly rainfall data.

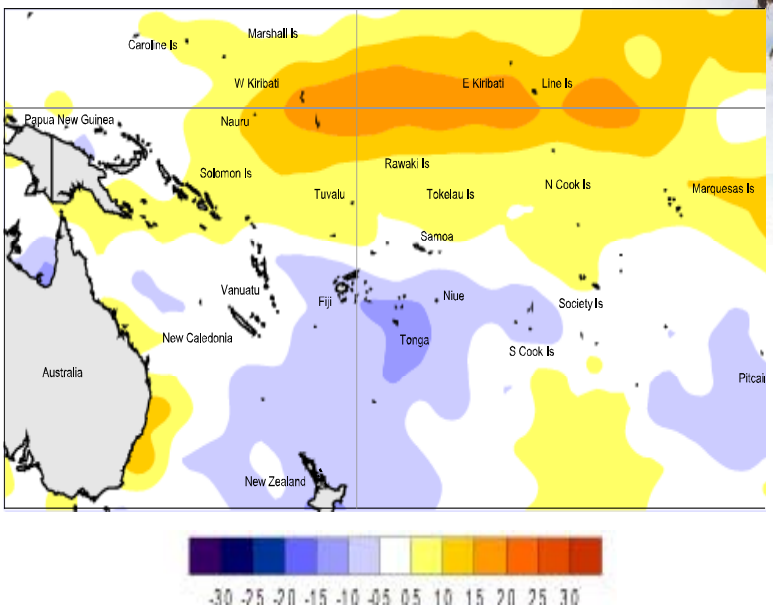
El Niño/Southern Oscillation (ENSO)

The equatorial Pacific Ocean remains in an El Niño state, and during October (especially in the last two weeks of the month) the atmosphere appeared to have started responding to the ocean. Equatorial sea surface temperature anomalies are positive across much of the Pacific, with the largest anomalies now in the central Pacific, in and near the NINO4 region. NINO 3 & 4 anomalies were +0.9 °C and +1.2 °C in October (3–month ASO means +1.1 °C and +1.0 °C). Subsurface oceanic heat content remains above average, with the largest anomalies in the central Pacific, where a significant positive subsurface temperature anomaly has developed during October (+3 °C for the month, +5 °C in the latest 5-day mean).

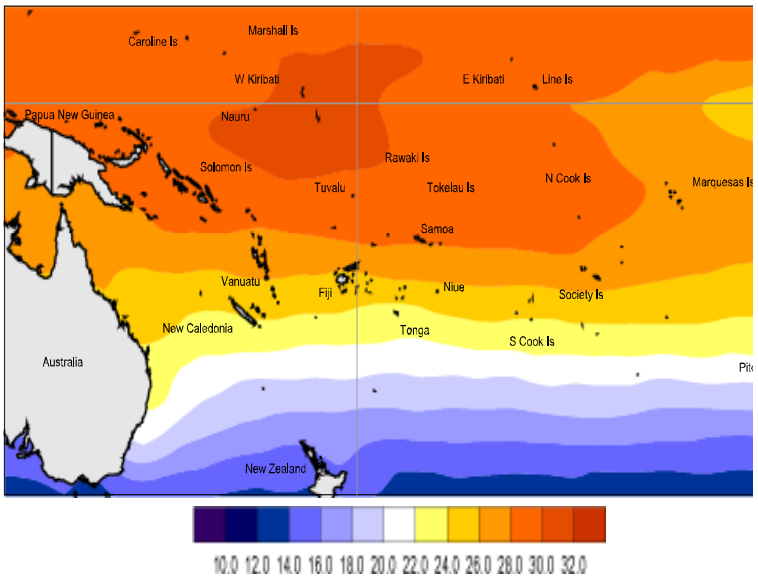
Overall, the regional diagnostics suggest the currernt situation is a Central-Pacific or Modoki El Niño. In the atmosphere, the SOI has been dropping rapidly since mid-October, with the October average around –1.4 (ASO mean –0.6). Westerly wind anomalies began to penetrate east of the Dateline during October, reaching 120°E by late in the month, while at the same time intensifying west of the Date Line. Convection over the Tropical Pacific was enhanced west of the Date Line in October, and suppressed over the Indian ocean and Indonesia.

Equatorial OLR anomalies remain weak east of the Date Line. The TRMM ENSO precipitation index is near-zero at +0.04. The MJO has been muted in October, but a convective pulse is predicted to develop and propagate over the Indian Ocean over the next two weeks, associated with suppressed convection over Indonesia and the western Pacific.

All dynamical models (and all but one statistical model) show warm conditions through to the end of January 2010, with a general easing to neutral conditions by mid-autumn. The NCEP ENSO discussion from 8 October suggests the El Niño peaking at moderate strength and persisting through southern summer. The IRI summary indicates a 90% probability for El Niño persisting through to the end of January, and at least an 80% probability of El Niño through March.



Sea surface temperature anomalies (°C) for October 2009



Mean sea surface temperatures (°C) for October 2009

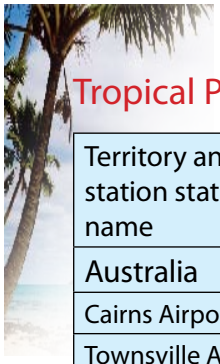
Tropical Cyclone guidance: November 2009 to April 2010

Tropical cyclone (TC) activity in the southwest Pacific is expected to be near normal for the 2009–10 season. On average, nine TCs occur in the region each year between November and April. Countries east of the date line, including Niue and Tonga, are at higher risk than normal because of the current weak El Niño. French Polynesia (Society and Austral Islands) and the southern Cook Islands can also be affected by TCs during El Niño, so these islands should also remain vigilant. More details about the 2009–10 TC outlook can be found at http://www.niwa.co.nz/news-and-publications/news/all/tropical-cyclone-outlook-normal

Forecast validation: August to October 2008

During August – October 2009, a region of suppressed convection was forecast for the southwest Pacific encompassing Tokelau, the Northern Cook Islands, and the Marquesas. Below average rainfall was expected for those areas. Near to below average rainfall was expected for Papua New Guinea and the Society Islands. Near normal rainfall was forecast for Niue, the Tuamotu Archipelago, New Caledonia, and Pitcairn Island. Enhanced convection was forecast along the Equator extending from Western to Eastern Kiribati, and in the area around the Southern Cook Islands and the Austral Islands. These regions were expected to receive near or above normal rainfall, with Western Kiribati forecast to receive above normal rainfall. No clear precipitation guidance was offered for Fiji, Vanuatu, Tuvalu, Tonga, Samoa, Wallis & Futuna, and the Solomon Islands.

The rainfall outlook for the August– October 2009 period was similar to what was forecast, the 'hit' rate being 72%. Rainfall was lower than expected in the Southern Cook Islands and Niue.



Tropical Pacific rainfall – October 2009

Territory and station station name	October 2009 rainfall total (mm)	October 2009 percent of average
Australia		
Cairns Airport	31	76
Townsville Airport	1	4
Brisbane Airport	57	61
Sydney Airport	180	231
Cook Islands		
Penrhyn	82	47
Aitutaki	96	89
Rarotonga Airport	154	151
Fiji		
Rotuma Island	618	182
Udu Point	35	21
Nadi Airport	56	N/A
Nausori	39	19
French Polynesia		
Hiva Hoa, Atuona	278	284
Bora Bora	129	128
Tahiti - Fa'a	113	111
Tuamotu, Takaroa	148	128
Gambier, Rikitea	151	113
Tubuai	131	112
Rapa	218	131
Kiribati		
Tarawa	241	190
Kanton	112	339
New Zealand		
Kaitaia	103	103
Whangarei Airport	61	55
Auckland Airport	91	115
New Caledonia		
Ile Art, Belep	20	37
Koumac	N/A	N/A
Ouloup	1	2
Ouanaham	18	27
Poindimie	41	33
La Roche	45	54
La Tontouta	23	53
Noumea	23	47
Moue	48	60
Niue		
Hanan Airport	25	20
Liku	38	26

Territory and station station name	October 2009 rainfall total (mm)	October 2009 percent of average
North Tasman		
Lord Howe Island	44	33
Norfolk Island	31	34
Raoul Island	33	41
Samoa		
Faleolo Airport	191	82
Apia	128	57
Nafanua	139	N/A
Afiamalu	370	N/A
Alafua	N/A	N/A
Solomon Islands		
Taro	224	78
Munda	575	232
Auki	268	126
Honiara	175	113
Henderson	157	180
Kira Kira	519	216
Santa Cruz, Lata	349	99
Tonga		
Niuafo'ou	21	12
Mata'aho Airport	N/A	N/A
Lupepau'u	29	17
Salote Airport	9	10
Nuku'alofa	52	40
Fua'amotu Airport	48	47
Tuvalu		
Nanumea	346	205
Nui Island	444	229
Funafuti	261	98
Nuilakita	105	35
Vanuatu		
Sola	516	143
Pekoa	100	56
Lamap	62	54
Port Vila	N/A	N/A
Tanna/Whitegrass	20	N/A
Aneityum	48	51
Papua New Guinea		
Port Moresby	14	36
Wewak	173	70
Kavieng	241	90

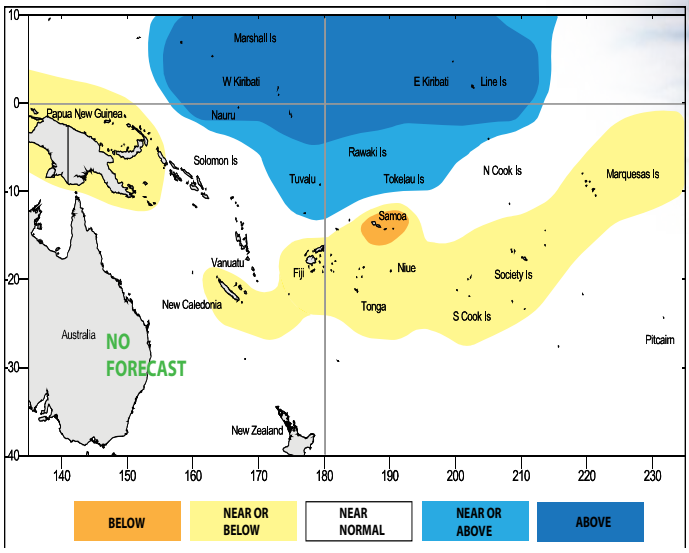
Rainfall totalling 200% or more is considered well above average. Totals of 40% or less are normally well below average. Highlighted values are new records. Data are published as received and may be subject to change after undergoing quality control checks. * denotes synoptic values.

Tropical rainfall outlook: November 2009–January 2010

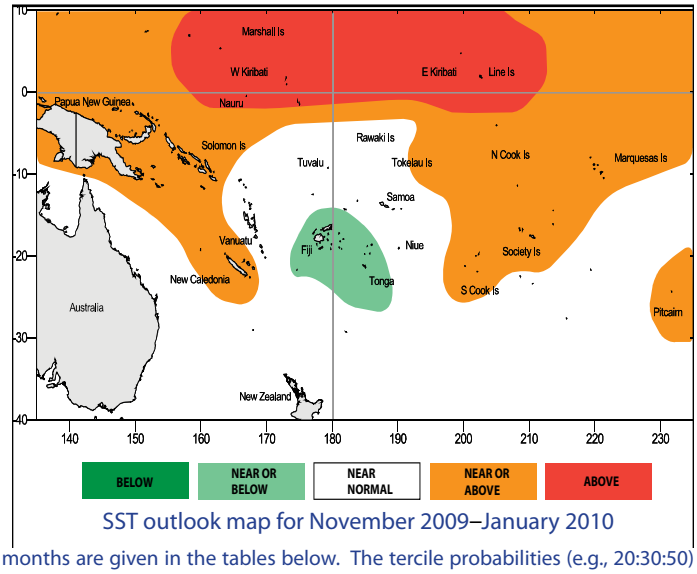
A region of suppressed convection is likely in the southwest Pacific encompassing Samoa, Niue, Tonga, Fiji, New Caledonia, the Southern Cook Islands, the Society Islands, the Austral Islands and Papua New Guinea. Near to below average rainfall is expected for all of those islands, except for Samoa, which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

The global models are continuing to show elevated temperatures in the near equatorial Pacific sea surface. Some anomalies a have strengthened from past months, and a diffuse warming is seen in many models for the eastern half of the southwest Pacific Ocean. 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 Papua New Guinea, New Caledonia, Tokelau, and the Solomon Islands, the Northern Cook Islands, the Southern Cook Islands, the Marquesas, the Austral Islands, and Pitcairn Island. Average or below average SSTs are forecast for Fiji and Tonga. Near normal SSTs are forecast for the remainder of the southwest Pacific.

The multi-model ensemble forecast skill confidence for this seasonal rainfall outlook is moderately high for most countries. In the past, the average region-wide hit rate for rainfall forecasts issued in November is 64%, 3% higher than the long–term average for all months combined. The SST forecast confidence is mostly high for this period.



Rainfall outlook map for November 2009–January 2010



SST outlook map for November 2009–January 2010

NOTE: Rainfall and SST anomaly 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 outputs of several global climate models. They correspond to the odds of the observed anomalies being in the lowest one third of the distribution, the middle one third, or the highest 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
Kiribati (Western)	20:30:50 (Above)	Moderate-High
Kiribati (Eastern)	20:35:45 (Near or Above)	Moderate-High
Tokelau	25:35:40 (Near or Above)	Moderate
Tuvalu	25:35:40 (Near or Above)	Moderate-High
Austral Islands	30:40:30 (Near normal)	Moderate-High
Cook Islands (Northern)	30:40:30 (Near normal)	Moderate-High
Pitcairn Island	30:40:30 (Near normal)	Moderate
Tuamotu Islands	30:40:30 (Near normal)	Moderate
Solomon Islands	30:35:35 (Climatology)	Moderate
Vanuatu	35:35:30 (Climatology)	Moderate
Wallis & Futuna	35:35:30 (Climatology)	Moderate
New Caledonia	40:35:25 (Near or Below)	Moderate
Cook Islands (Southern)	40:35:25 (Near or Below)	Moderate
Fiji	40:35:25 (Near or Below)	Moderate-High
Marquesas	40:35:25 (Near or Below)	Moderate
Niue	40:35:25 (Near or Below)	Moderate-High
Society Islands	40:35:25 (Near or Below)	Moderate
Tonga	40:35:25 (Near or Below)	Moderate-High
Papua New Guinea	40:35:25 (Near or Below)	Moderate-High
Samoa	45:35:20 (Below)	Moderate

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

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Your comments and ideas about The Island Climate Update are welcome. Please contact:
Dr Andrew Lorrey, NIWA,
41 Market Place, Auckland, New Zealand
E-mail: a.lorrey@niwa.co.nz

Forecasts:
Dr. Andrew Lorrey (South Pacific rainfall and SST forecasts) and the NIWA National Climate Centre (ENSO wrap)

ICU Editors:
Andrew Lorrey Email: a.lorrey@niwa.co.nz
James Renwick Email: j.renwick@niwa.co.nz
Harriet Palmer Email: h.palmer@niwa.co.nz

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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.

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.**

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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/

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

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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/

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http://www.met.gov.sb/

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http://www.met.gov.to/

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

The UK Met Office
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European Centre for Medium-term Weather Forecasts
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