

The Island Climate Update

November's climate

- The South Pacific Convergence Zone (SPCZ) was contracted towards Papua New Guinea and was displaced southwest of its normal position.
- Very suppressed convection near Western Kiribati and northern Vanuatu, and south of the Equator from Nauru southeast to the Society Islands.
- Above normal rainfall for many areas in the South Pacific, including a record high in 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

European Centre
for Medium Range
Weather Forecasts

UK Met Office

World Meteorological
Organization

MetService of
New Zealand

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

- Neutral ENSO conditions exist in the tropical Pacific Ocean, but La Niña-like conditions exist in the atmosphere. Many climate models project neutral ENSO conditions persisting into early 2009.
- Below normal rainfall is forecast for Western Kiribati, the Marquesas, Tuvalu, Tokelau, Samoa, the Northern Cook Islands, Pitcairn Island, and the Tuamotu archipelago.
- Above normal rainfall is expected for Papua New Guinea, New Caledonia, Vanuatu, the Solomon Islands, Niue, and Tonga for the coming three months.
- Normal to above normal SSTs are forecast for the southwestern half of the southwest Pacific region. Normal to below normal SSTs are forecast for the northeast half of the southwest Pacific. The Pacific Ocean surrounding Western Kiribati is projected to have near normal SSTs.



Climate developments in November 2008

The South Pacific Convergence Zone (SPCZ) activity was weaker in November relative to last month. A consolidated region of enhanced rainfall was observed in satellite data during November 2008 over southern Papua New Guinea as well as over southeast Australia and southern New Caledonia. A localised region of suppressed convection intensified during the month to the south of the Equator, which encompassed the southern Solomon Islands and Nauru and extended across the southwest Pacific to central French Polynesia. The regional circulation for the month was characterised by more frequent cyclones over eastern Australia, with ridges of high pressure to the east of northern New Zealand. Lower than normal pressure also developed to the north of the Marquesas Islands and east of Eastern Kiribati.

Rainfall was near normal or slightly above normal for many countries in the Southwest Pacific during November 2008. The exception occurred in a swath that extended from French Polynesia to Nauru and the eastern Solomon Islands including Tuvalu, Tokelau, and Vanuatu, that had normal or below normal rainfall. Lower than normal rainfall totals were recorded at Tahiti in the Society Islands, which received 27 mm of rainfall (21% of normal). Elsewhere in the eastern half of the Southwest Pacific, the stations in the Tuamotu archipelago and the Austral Islands all recorded 70–80% of normal rainfall, with the exception of 207 mm (159% of normal) falling at Tubuai.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Tonga	Lupepau'u	380	266	Record high
Solomon Islands	Taro	474	201	Highest monthly total in the region
New Caledonia	Poindimie	373	201	Very high
Society Islands	Tahiti	27	21	Very low
Eastern Kiribati	Kanton	1	2	Very low
Tuvalu	Nanumea	49	28	Very low

Soil moisture in November 2008

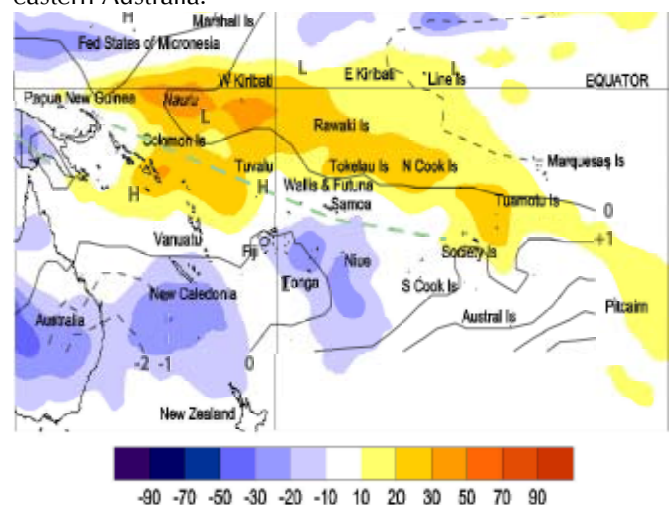
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but more stations will be included in the future.

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. 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.

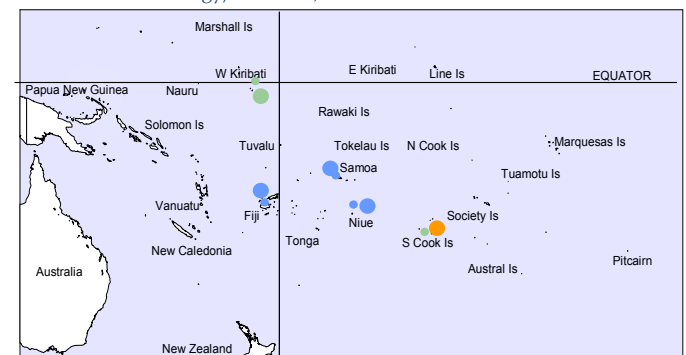
Nadi (Fiji), Hanan (Niue), and Apia (Samoa) project moist (at or near field capacity) soil moisture conditions. Soils are moderate for the time of year at Tarawa (Western Kiribati), while dry soil moisture is projected for Rarotonga (Southern Cook Islands).

Many stations in Fiji received above normal rainfall, with five sites exceeding 200% of normal rainfall for November. At Penang, 296 mm of rain fell in a 24 hour period on 28 November, breaking an 80-year-old record. Nearby in New Caledonia, most stations recorded above average rainfall particularly along the east coast, with a record monthly total recorded at Aoupinie (448 mm).

In Samoa, abundant rainfall finally fell in November, helping to ease drought conditions. In Niue, abundant rainfall was recorded, with a global station average of 150% of normal for the month. Even more rain fell in neighboring Tonga, which had many stations recording above 175% of normal, and a total at Lupepau'u of 380 mm (266% of normal) that broke a 13-year-old record. In the western Southwest Pacific, rainfall totals were near to above normal in the Solomon Islands and well above normal for portions of central 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 result in higher rainfall. The November 2008 position of the South Pacific Convergence Zone (SPCZ) was contracted toward Papua New Guinea and was displaced southwest of its normal position. The average position of the SPCZ is identified by the dashed green line, which is based on mean January rainfall for the South Pacific (after Linacre and Geerts, 1998). Mean sea level (MSL) pressure anomalies (in hPa) are shown as grey solid (high pressure) and dashed (low pressure) lines (adapted from Bureau of Meteorology, Australia).



November 2008 November 2007

● Wet
● Moderate
● Dry

Estimated soil moisture conditions at the end of November 2008, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

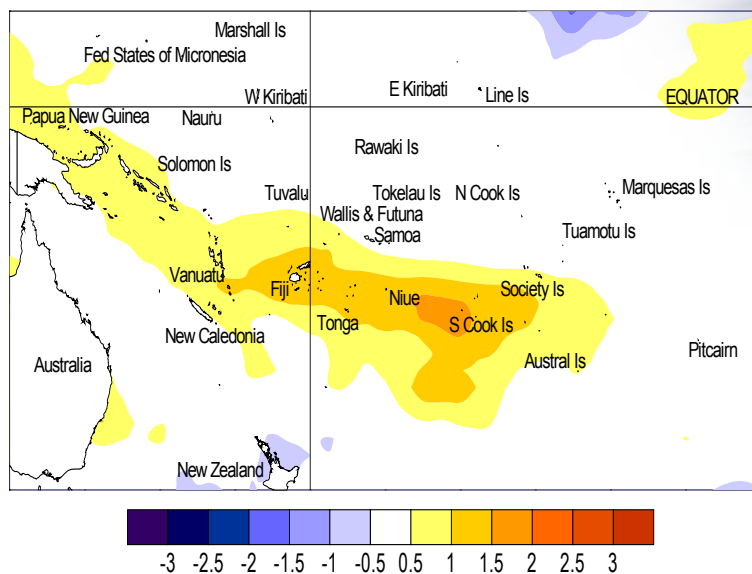
El Niño/Southern Oscillation (ENSO)

During October, ENSO-neutral conditions are well established in the equatorial Pacific Ocean, but the tropical Pacific atmosphere continued to exhibit La Niña-like characteristics. The SOI remains positive at around +1.7 (a September–November mean of +1.5), and easterly trade winds have strengthened during November about and west of the Date Line.

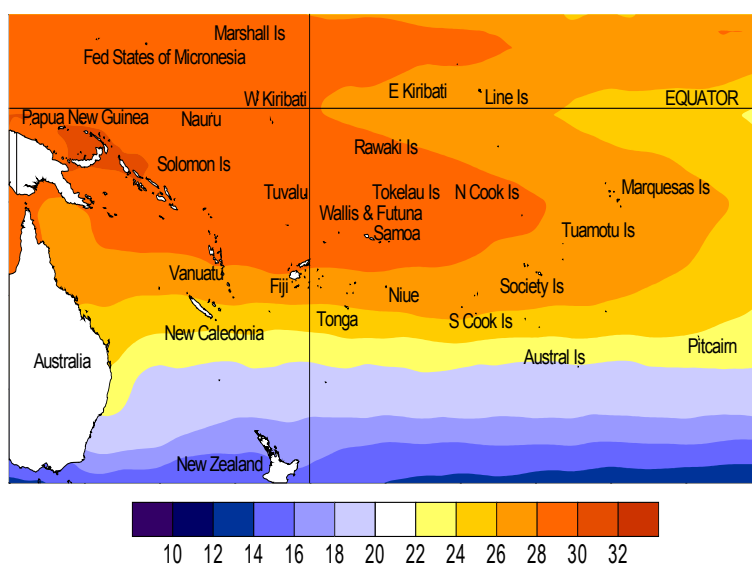
SST anomalies in November were close to neutral across the equatorial Pacific: The NINO3 anomaly for October was +0.0°C (3-month mean +0.3°C), and the NINO4 anomaly was -0.1°C (SON mean 0.1°C). Equatorial subsurface temperature anomalies are relatively weak, but a -2°C anomaly remains centred near 140°W below 100 m.

Tropical Pacific precipitation patterns continue to show a La Niña signal, with the TRMM ENSO precipitation index at -1.1 for November. Conversely, OLR anomalies show suppressed equatorial convection about and west of the Date Line for November as a whole. A convective pulse associated with the MJO was present over Indonesia during late November (probably associated with the strengthening easterlies between the Date Line and the convection), but this is predicted to dissipate by early December as the convective region approaches the Date Line. The development of a La Niña, which would be unusual but not unprecedented (e.g., Dec 1967) at this time of year cannot be ruled out.

Several climate models appear to be responding to the enhanced easterlies and have strengthened the cool SST anomaly: five models out of 14 assessed by NIWA indicate a return to La Niña conditions could occur over the coming summer season. However, the majority indicate neutral conditions continuing through to the end of autumn 2009. The IRI summary of 20 October projects a 85% probability of ENSO-neutral conditions in the November to January season, and the probability of El Niño 2% and La Niña only 13%. The Australian weekly tropical summary of 25 November likewise expects ENSO-neutral conditions to persist through into



Sea surface temperature anomalies (°C) for November 2008



Mean sea surface temperatures (°C) for November 2008

the austral autumn. The NCEP discussion of 11 December indicates ENSO-neutral or La Niña conditions are equally likely through 2009.

Forecast validation: September to November 2008

A large region of suppressed convection was forecast to encompass Western Kiribati and Tuvalu, and also Tokelau, the Northern Cook Islands, Tuamotu, the Society Islands, Pitcairn Island, and the northeastern half of French Polynesia from September to November 2008, with average-to-below or below average rainfall expected for those countries. Enhanced convection for the same period was projected to be centralised near Vanuatu and north of New Caledonia and east of the Solomon Islands with above normal rainfall. Near-to-above average rainfall was forecast for Fiji, Niue, Tonga, Papua New Guinea, the Solomon Islands, and New Caledonia. No clear precipitation guidance was offered for Eastern Kiribati, Tokelau, Samoa, the Southern Cook Islands, or the Austral Islands.

The rainfall outlook for the September–November 2008 period was very good compared to what was forecast, although this is calculated for only 10 island groups (six islands had a forecast of ‘Climatology’, which is unscorable). The global station ‘hit’ rate was 91%, 28% higher than average for forecasts made during September and 30% higher than the average for all months combined. Rainfall totals were slightly overestimated for parts of Niue, northern Vanuatu, and Honiara (Solomon Islands). This is the highest validation score for the ICU to date.

Forecast statistics compiled over the last nine years indicate the multi-model ensemble strike rate will continue to have good skill throughout the summer.

Tropical Pacific rainfall – November 2008

Territory and station name	November 2008 rainfall total (mm)	November 2008 percent of average
Australia		
Cairns Airport	58	60
Townsville Airport	112	184
Brisbane Airport	327	337
Sydney Airport	73	88
Cook Islands		
Penrhyn	135	60
Aitutaki	246	186
Rarotonga Airport	65	48
Fiji		
Rotuma Island	114	40
Udu Point	117	57
Nadi Airport	208	158
Nausori	239	98
French Polynesia		
Hiva Hoa, Atuona	78	82
Bora Bora	204	112
Tahiti – Faa'a	27	21
Tuamotu, Takaroa	160	76
Gambier, Rikitea	181	79
Tubuai	207	159
Rapa	127	73
Kiribati		
Tarawa	122	92
Kanton	1	2
New Zealand		
Kaitaia	143	140
Whangarei Airport	62	70
Auckland Airport	46	55
New Caledonia		
Ile Art, Belep	182	165
Koumac	61	115
Ouloup	270	281
Ouanaham	182	167
Poindimie	373	201
La Roche	138	120
La Tontouta	121	209
Noumea	72	122
Moue	122	121

Territory and station name	November 2008 rainfall total (mm)	November 2008 percent of average
Niue		
Hanan Airport	273	157
Liku	246	161
North Tasman		
Lord Howe Island	227	194
Norfolk Island	156	226
Raoul Island	130	134
Samoa		
Faleolo Airport	151	65
Apia	273	104
Nafanua	287	N/A
Afiamalu	250	N/A
Maota	N/A	N/A
Solomon Islands		
Taro	474	201
Munda	209	89
Auki	301	145
Honiara	124	87
Henderson	168	95
Kira Kira	N/A	N/A
Santa Cruz, Lata	316	91
Tonga		
Niuafu'ou	N/A	N/A
Mata'aho Airport	165	89
Lupepau'u	380	266
Salote Airport	197	173
Nuku'alofa	181	162
Fua'amotu Airport	284	284
Tuvalu		
Nanumea	49	28
Nui Island	163	61
Funafuti	197	83
Nuilakita	249	90
Vanuatu		
Sola	137	43
Pekoa	123	63
Lamap	85	66
Port Vila	72	47
Tanna/Whitegrass	149	N/A
Aneityum	133	89

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: December 2008 to February 2009

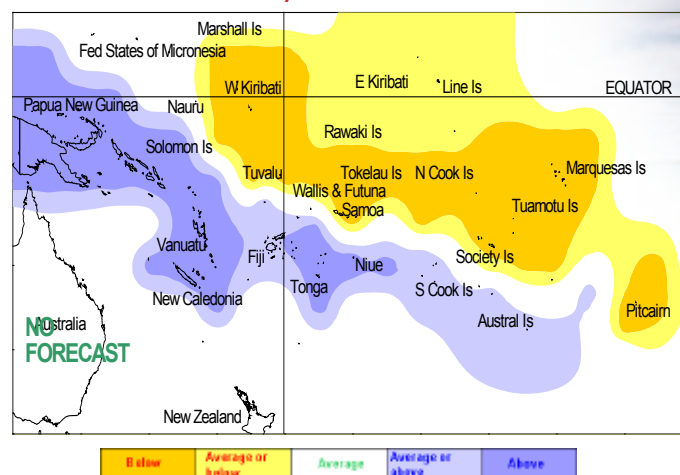
During the December 2008–February 2009 forecast period, a region of suppressed convection is likely to encompass the central and eastern Southwest Pacific, in a region extending from Western Kiribati to the Marquesas Islands, including Tuvalu, Tokelau, Wallis & Futuna, Samoa, the Northern Cook Islands, and the Tuamotu archipelago. Below normal rainfall is expected for those countries. Near-to-below normal rainfall is expected for the Society Islands, Pitcairn Island, and Eastern Kiribati.

Enhanced convection is expected to extend southeast from Papua New Guinea, encompassing the Solomon Islands, Vanuatu, New Caledonia, Tonga, and Niue with above average rainfall. Near-to-above average rainfall is forecast for Fiji, Wallis & Futuna, the Southern Cook Islands, and the Austral Islands for the next three-month period.

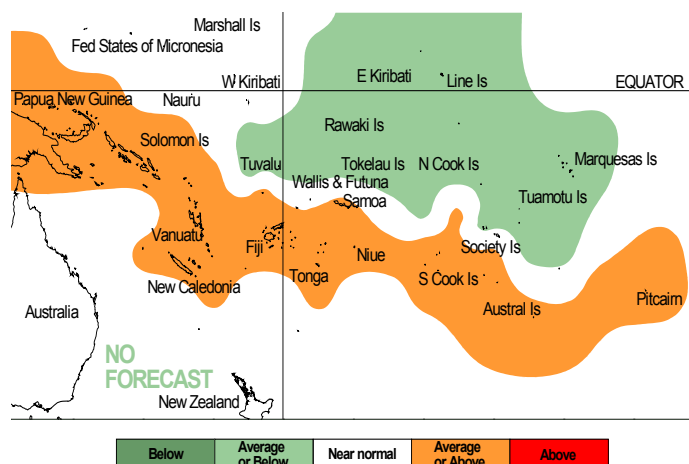
SSTs are expected to be near-to-above normal in a band extending from near Papua New Guinea, southeast to Fiji, including Vanuatu, New Caledonia, the Solomon Islands, Niue, the Southern Cook Islands, the Austral Islands, and Pitcairn Island. Normal to below normal SSTs are forecast for the northeastern sector of French Polynesia, including the Tuamotu archipelago and the Society Islands, Tuvalu, Tokelau, and Eastern Kiribati. Western Kiribati is projected for normal SSTs during this time.

The confidence in the forecast model skill for this seasonal rainfall outlook is moderately high for most Pacific Island countries. In the past, the average region-wide hit rate for forecasts issued in December is 67%, 6% higher than the long-term average for all months combined. The SST forecast confidence is moderate-to-high for this period.

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.



Rainfall outlook map for December 2008 to February 2009



SST outlook map for December 2008 to February 2009

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



Access to Pacific Islands Meteorological Data in the New Zealand National Climate Database

Errol Lewthwaite and Jim Salinger (NIWA)

The National Climate Database is an archive of climate data from New Zealand, the Pacific Islands and Antarctica administered by NIWA. The database contains about 400 million data rows from about 6500 climate stations with some (New Zealand) data going back to the 1850's. The database is classed as a "National" database by the NZ Government for recording long term measurements of climate data and is funded by the New Zealand Government's Foundation for Research, Science and Technology. CliFlo <<http://cliflo.niwa.co.nz/>> (see box) provides free web access to the database .

Data from about 200 climate stations are loaded into the database every day and data from about 50 New Zealand stations are loaded every hour. The two main daily updated data sources are NIWA EWS (Electronic Weather Stations) and Meteorological Service of NZ (MetService) AWS (Automatic Weather Stations). NIWA EWS climate stations also record data every ten minutes. There are many manual climate stations (some rainfall only) with data received at the end of the month. Most Pacific Island data come in through MetService as "synop" data. Quality control processes identify and flag possible bad data. This is important as quality controlled observations are essential for many applications including the measurement of climate change.

Most climate parameters are recorded in the database such as temperature, rainfall, wind, solar radiation, sunshine, pressure, soil moisture, earth temperature and upper air data. Over 80 different types of monthly statistics are calculated from the base data at the end of each month.

Every climate station has a set of descriptive data recorded about it in the database. This includes basic information such as the station name, position, height, observing organisation, start and end dates, instrument types, station history (changes and problems). This information can be very important when comparing data from different climate stations. There are many gaps in this descriptive data especially for Pacific Island stations. NIWA has an ongoing project funded by SOPAC to update these descriptive data records from paper records and to digitise daily data.

The climate database contains data from over 700 Pacific Island stations including Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, Niue, Samoa, Solomon Islands, Tokelau Islands, Tonga, Tuvalu and Vanuatu. About 65 of these stations have recent data at the end of November 2008 mostly from synops. Pacific Island countries are welcome to place more of their data into this database.

One of the oldest Pacific Island climate stations is "Samoa, Apia" (J76200). This climate station was opened in 1890 by German meteorologists at Sogi (exact location unknown) then in 1902 the Apia Geophysical Observatory was established at Mulinu'u Point by the Royal Society of Sciences, Gottingen, Germany. Measurements of total monthly rainfall, monthly mean maximum and minimum temperatures are 95% complete over this period. Interested readers can view a summarized history of this station at <http://cliflo.niwa.co.nz/pls/niwp/wstn.sensor_his?cagent=6044>.

CliFlo <<http://cliflo.niwa.co.nz/>> provides free web access to the Climate Database however with some data restrictions. Users are required to subscribe on-line using the "Subscribe On-line" link on the CliFlo home page. Subscribing includes choosing a username, entering subscription details (such as name and address), describing a "Purpose" for using the data (for our statistics) and agreeing to NIWA's Terms and Conditions of use. CliFlo users then have access to non-restricted New Zealand data. The descriptive data for each station (with some restrictions for privacy reasons) are available through CliFlo.

All Pacific Island data in the database are restricted and are grouped by country. Before a user can be granted access to Pacific Island data the user needs to obtain permission from the Pacific Island Meteorological Service who has responsibility for the those climate stations.

CliFlo and the Climate Database is a free service available to everyone and Pacific Island users are encouraged to use it.



The Island Climate Update

Cover Photo:
Wendy St George,
NIWA

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

Forecasts:

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

ICU Editors:

Andrew Lorrey Email: a.lorrey@niwa.co.nz

Jim Salinger Email: j.salinger@niwa.co.nz

Harriet Palmer Email: h.palmer@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.