

# The Island Climate Update

## April's climate

- The South Pacific Convergence Zone (SPCZ) shifted in April, with only the eastern end positioned southwest of normal.
- Very suppressed convection near Western Kiribati and south of the Equator extending east through Nauru and Eastern Kiribati.
- Mostly well above normal rainfall for Tuvalu and Niue.

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

- La Niña-like conditions have existed in the tropical Pacific in previous months, but most climate models project ENSO neutral conditions for autumn and winter 2009.
- Below normal rainfall is forecast for Tuvalu, Tokelau, and the Northern Cook Islands.
- Above normal rainfall is expected for Vanuatu, Fiji, Niue, the Southern Cook Islands, and Papua New Guinea.
- SST anomalies are expected to weaken in the region. Normal or above normal SSTs are forecast for the southwestern half of the southwest Pacific region. Normal or below normal SSTs are forecast near the Tuamotu Archipelago.

### 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



## Climate developments in April 2009

The South Pacific Convergence Zone (SPCZ) shifted east during April, with the northwestern part of the convective spur moving northeast of normal. However the southeastern portion of the SPCZ remained displaced southwest of its normal position for the month, contributing to high rainfall in the Austral Islands. A region of enhanced rainfall, partly due to intensified convection, was also observed in the north Tasman Sea and near New Caledonia last month. Suppressed convection intensified near the Solomon Islands during April and persisted in a zone including Western Kiribati, Nauru, and Eastern Kiribati. There was also suppressed convection localised near the Pitcairn Islands and Society Islands. The regional circulation in April was characterised by more frequent low pressure in the North Tasman Sea and to the northeast of New Zealand, over the Austral Islands.

There were not many high precipitation totals concentrated in any particular island group in the southwest Pacific during April. In French Polynesia dry conditions occurred over Tuamotu, Gambier, and the Society Islands, which also experienced above normal pressures for the month. A record daily maximum temperature was also recorded at Rapa (30.3°C), located at the southeastern end of the Austral Islands. Nearby in the Southern Cook Islands, near normal rainfall occurred at Rarotonga. Most stations in Fiji were normal or below normal for rainfall during April, the exception being Ono-i-lau which received 403mm of rainfall (257% of normal). Western Kiribati continued to have dry conditions, and Butaritari, Tarawa, and Kanton all had below normal rainfall during April.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Wallis	Wallis Island	572	233	Record high
Futuna	Maopoopo	746	225	Highest monthly total in the region
Tonga	Lupepau'u	413	198	High
Tuvalu	Nui Island	478	199	High
North Tasman	Lord Howe Island	515	318	High
Austral Islands	Rapa	610	263	High

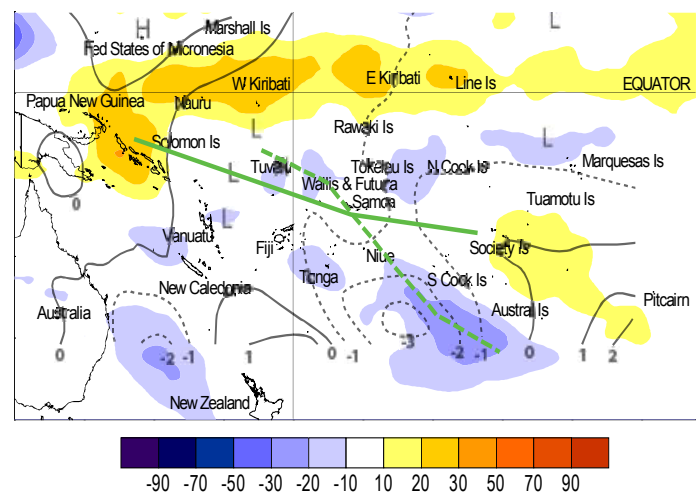
## Soil moisture in April 2009

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 more stations will be included in the future.

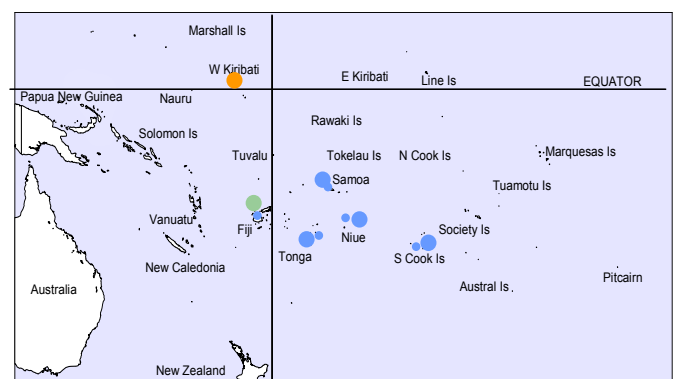
The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to the available water already in the soil comes from rainfall, with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture 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.

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

There were also some localised high rainfall totals in the central and southeastern parts of the southwest Pacific. Northern New Zealand experienced a relatively dry month, but the Far North of the country recorded well above normal rainfall (257% of normal). Wallis and Futuna also reported very high rainfall totals during April (see table below). Lord Howe Island was one exception for month, recording 515mm of rainfall (318% of normal) that was the result of a sub-tropical low. In Tonga, nearly 200% of normal rainfall fell at Lupepau'u. Monthly rainfall totals were also well above normal in Tuvalu, which had 140 – 190% of normal recorded at Nui and Funafuti, respectively. 610mm of rain (263% of normal) fell at Rapa in the Austral Islands, which was the second highest amount reported in the region last month. The high rainfall totals for these two island groups was the result of SPCZ activity during April.



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 April 2009 position of the South Pacific Convergence Zone (SPCZ) was partly displaced northeast and southwest of its normal position, and exhibited coherent regions of high values near the Austral Islands. The average position of the SPCZ 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 grey lines.



April 2009  
 ● Wet  
 ● Moderate  
 ● Dry

April 2008  
 ● Wet  
 ● Moderate  
 ● Dry

Estimated soil moisture conditions at the end of April 2009, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

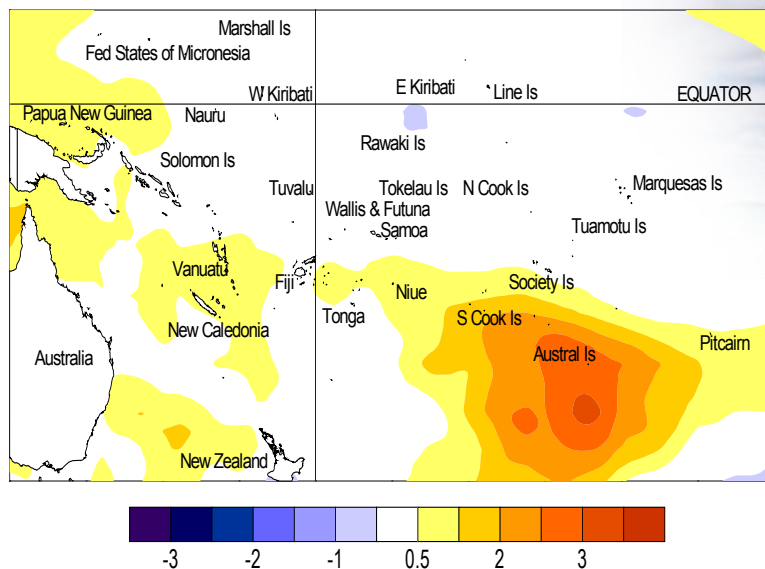
## El Niño/Southern Oscillation (ENSO)

During April, the equatorial Pacific Ocean returned to ENSO-neutral conditions, after exhibiting a La Niña state since December 2008. NINO3 and NINO4 SST anomalies are now close to zero:  $+0.1^{\circ}\text{C}$  and  $-0.1^{\circ}\text{C}$  respectively (February – April means both around  $-0.4^{\circ}\text{C}$ ). Sea surface height anomalies still remain positive in the western Pacific, but show a north–south banded structure in the east, with positive anomalies along the Equator east of the Date Line.

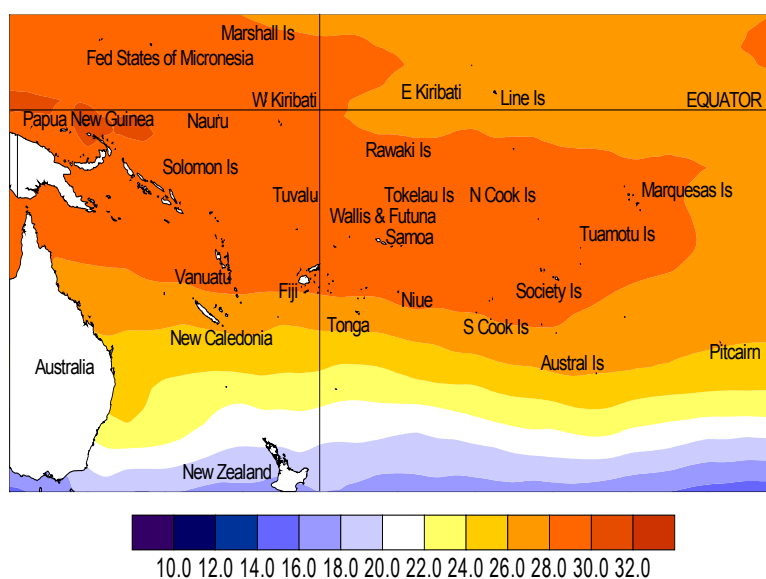
Equatorial subsurface ocean temperature anomalies are now positive in the uppermost 100m near the South American coast, as well as in the uppermost 200m west of the Date Line. The easterly trade winds strengthened in April, west of the Date Line, but eased late in the month, with westerly anomalies evident at the end of April. Consistent with this, the TRMM ENSO precipitation index strengthened to  $-1.8$  in April. However, tropical Pacific convection/OLR does not exhibit a clear La Niña pattern, though convection is suppressed near the Equator, east of the  $150^{\circ}\text{E}$ .

The MJO was active in April, with an event propagating steadily across the Maritime Continent and the western Pacific in the last two weeks of the month. This presumably contributed to the strengthening of the SOI, which rose again in April to  $+1.0$ , after falling to  $-0.2$  in March (February – April mean was  $+0.7$ ). The MJO is expected to weaken over the coming weeks.

The global climate model ensemble assessed by NIWA indicate neutral conditions on average will prevail during May – July. Almost all models show warming over the next few months, with three suggesting El Niño conditions later in 2009. The NCEP discussion of 9 April suggests a transition to neutral conditions during May, with La Niña-like impacts lingering through June. The IRI summary



Sea surface temperature anomalies ( $^{\circ}\text{C}$ ) for April 2009



Mean sea surface temperatures ( $^{\circ}\text{C}$ ) for April 2009

of 15 April indicates a 75% chance of neutral conditions persisting through to June and remaining the most likely ENSO state for the rest of 2009.

## Tropical Cyclone Activity and Guidance

Only one Tropical Cyclone (TC) formed in the Southwest Pacific region during April. TC Lin formed on 4 April east of Fiji and moved towards Tonga, passing over Tongatapu on 5 April. Sustained winds for TC Lin were estimated to be 55 knots with gusts up to 80 knots close to the storm centre. One significant tropical depression also occurred near Lord Howe Island, and was active from 16–25 April. This system reached a Category One status on 19 April as it passed over the island, with maximum wind gusts of  $149\text{km/h}$  recorded at that time. A one day rainfall total of 230mm from this storm was recorded on 20 April.

## Forecast validation: February to April 2009

A region of suppressed convection was forecast to encompass the central and eastern Southwest Pacific, extending to the southeast from Western Kiribati and including Tuvalu, Tokelau, the Northern Cook Islands, and the Society Islands, where below normal rainfall is expected. Near-to-below normal rainfall was expected for Samoa, Eastern Kiribati, the Tuamotu archipelago, and the Marquesas Islands. Enhanced convection was expected to extend southeast from, Papua New Guinea, and include New Caledonia, Tonga and Niue, where above normal rainfall was expected. Near or above normal rainfall was forecast

for the Austral Islands, Fiji, the Southern Cook Islands, and Pitcairn Island. No clear precipitation guidance was offered for the Solomon Islands or Wallis & Futuna for the three-month forecast period.

The February – April 2009 forecast validation was calculated for 15 island groups (three countries did not report rainfall values; two were forecast as climatology and were unscorable). The global island group ‘hit’ rate was 85%, 22% higher than average, and 24% higher than the average for all months combined. Rainfall was overprojected for Tonga.

## Tropical Pacific rainfall – April 2009

Territory and station name	April 2009 rainfall total (mm)	April 2009 percent of average
<b>Australia</b>		
Cairns Airport	134	71
Townsville Airport	51	82
Brisbane Airport	60	67
Sydney Airport	153	156
<b>Cook Islands</b>		
Penrhyn	N/A	N/A
Aitutaki	N/A	N/A
Rarotonga Airport	199	94
<b>Fiji</b>		
Rotuma Island	277	94
Udu Point	216	78
Nadi Airport	73	46
Nausori	157	44
<b>French Polynesia</b>		
Hiva Hoa, Atuona	211	121
Bora Bora	99	54
Tahiti – Faa'a	31	27
Tuamotu, Takaroa	81	68
Gambier, Rikitea	72	48
Tubuai	187	103
Rapa	610	263
<b>Kiribati</b>		
Tarawa	29	15
Kanton	3	2
<b>New Zealand</b>		
Kaitaia	244	257
Whangarei Airport	87	74
Auckland Airport	41	43
<b>New Caledonia</b>		
Ile Art, Belep	N/A	N/A
Koumac	106	163
Ouloup	54	56
Ouanaham	95	74
Poindimie	237	98
La Roche	69	51
La Tontouta	55	90
Noumea	85	83
Moue	200	163

Territory and station name	April 2009 rainfall total (mm)	April 2009 percent of average
<b>Niue</b>		
Hanan Airport	439	195
Liku	219	116
<b>North Tasman</b>		
Lord Howe Island	515	318
Norfolk Island	86	61
Raoul Island	111	109
<b>Samoa</b>		
Faleolo Airport	191	N/A
Apia	311	N/A
Nafanua	351	N/A
Afiamalu	477	N/A
Maota	N/A	N/A
<b>Solomon Islands</b>		
Taro	304	90
Munda	108	38
Auki	270	106
Honiara	183	81
Henderson	179	112
Kira Kira	120	36
Santa Cruz, Lata	309	97
<b>Tonga</b>		
Niuafu'ou	320	127
Mata'aho Airport	238	92
Lupepau'u	413	198
Salote Airport	N/A	N/A
Nuku'alofa	128	78
Fua'amotu Airport	249	157
<b>Tuvalu</b>		
Nanumea	139	58
Nui Island	478	199
Funafuti	377	140
Nuilakita	250	104
<b>Vanuatu</b>		
Sola	219	47
Pekoa	358	119
Lamap	223	113
Port Vila	N/A	N/A
Tanna/Whitegrass	55	N/A
Aneityum	156	81

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: May to July 2009

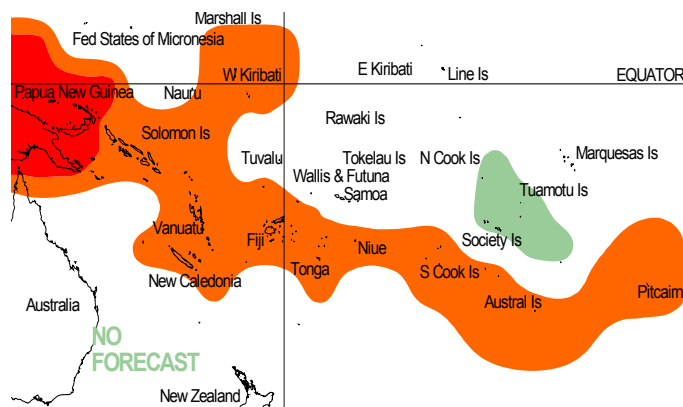
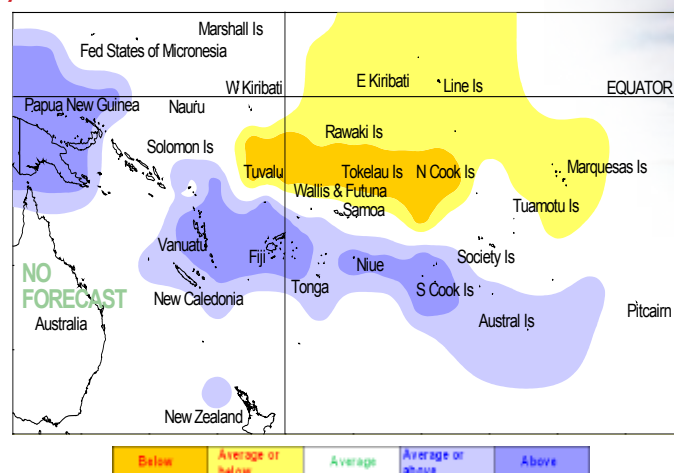
During May–July 2009, a region of suppressed convection is likely in the southwest Pacific encompassing Tokelau, Tuvalu, and the Northern Cook Islands, with below average rainfall expected for those areas. Near to below average rainfall is expected for Eastern Kiribati and the Marquesas. Near normal rainfall is forecast for Pitcairn Island and Samoa. Enhanced convection is likely in the area around Papua New Guinea and Vanuatu, Fiji, Niue, and the Southern Cook Islands, with above average rainfall anticipated for the coming three month period. New Caledonia, Tonga, Wallis & Futuna, and the Austral Islands are expected to receive near or above average rainfall. No clear precipitation guidance is offered for the Western Kiribati, the Solomon Islands, the Tuamotu Archipelago and the Society Islands

Prominent SST anomalies that existed in the region during that past months are now easing. Global models indicate significant shifts to near-neutral SSTs during Austral winter, but lingering anomalies related to the past La Nina event may exist. Above average SSTs are expected for Papua New Guinea, and near or above average SSTs are forecast for Western Kiribati, the Solomon Islands, Vanuatu, Fiji, Niue, New Caledonia, Tonga, Samoa, Niue, the Southern Cook Islands, the Austral Islands, and Pitcairn Island. Near normal SSTs are forecast for Samoa, Tokelau, Tuvalu, the Northern Cook Islands, Wallis and Futuna, and the Society Islands. Average to below average SSTs are expected for the Tuamotu Archipelago. No clear SST guidance is provided for the Marquesas or Eastern Kiribati.

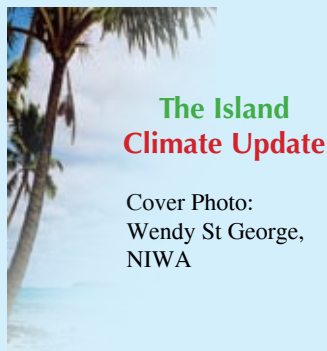
The confidence in the multi-model ensemble forecast skill for this seasonal rainfall outlook is moderately high for most Pacific Island countries. In the past, the average region-wide hit rate for rainfall forecasts issued in May is 53%, 8% lower than the long-term average for all months combined.

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



The SST forecast confidence is moderate-to-high for this period.



## 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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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/>