

# The Island Climate Update

## March's climate

- The South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position and was very active.
- Very suppressed convection near Western Kiribati and south of the Equator from Nauru southeast to Tuvalu.
- Mostly well above normal rainfall for French Polynesia and New Caledonia.

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

- La Niña-like conditions exist in the tropical Pacific, but have weakened relative to previous months. 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 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.

### Collaborators

Pacific Islands National  
Meteorological Services

Australian Bureau of  
Meteorology

Meteo France

NOAA National  
Weather Service

NOAA Climate  
Prediction Centre  
(CPC)

International Research  
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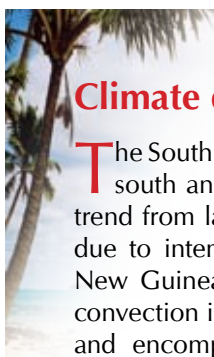
European Centre  
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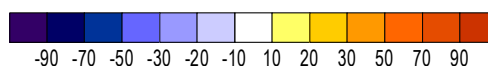
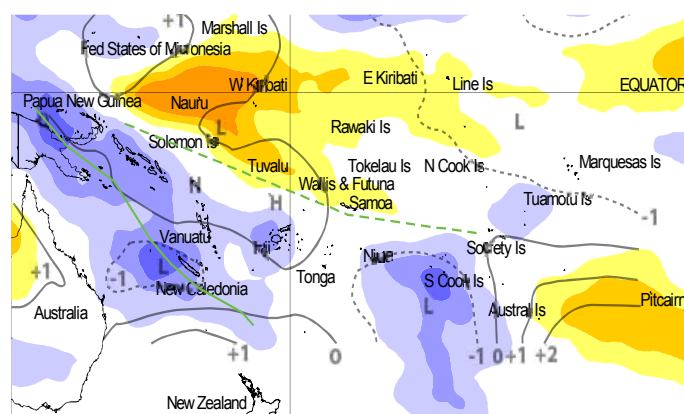
## Climate developments in March 2009

The South Pacific Convergence Zone (SPCZ) was displaced south and west of normal during March, continuing the trend from last month. A region of enhanced rainfall, partly due to intensified convection, was observed over Papua New Guinea and New Caledonia last month. Suppressed convection intensified during near the Equator during March and encompassed the region northeast of the Solomon Islands, including Western Kiribati, Nauru, and Tuvalu. Significant drought has developed for some of the southern islands in Western Kiribati group, particularly at Banaba. There was also suppressed convection localised near the Pitcairn Islands. The regional circulation was characterised by more frequent high pressure in the North Tasman Sea, and lower than normal pressures to the northeast of New Zealand, over the Southern Cook Islands, and near New Caledonia.

There were many high precipitation totals during March, particularly in French Polynesia where all stations recorded between 140–270% of normal rainfall. In New Caledonia, with the exception of Belep (22% of normal) all stations had well above normal rainfall, with record highs at Koumac and Poindimie. These high rainfall totals were due to the position of the SPCZ near New Caledonia, and also because of the passage of Tropical Cyclone Jasper close to the island on 24 March. There was also a record high rainfall total at Hanan Airport in Niue (see table below). In general, the Solomon Islands had near normal or above normal rainfall for the month, except at Lata.

In contrast to last month when Townsville, Australia received a new monthly high rainfall total of 989 mm (339 % of normal), only 18mm of rainfall (8% of normal) fell at that location. In general, normal or below normal rainfall occurred in the central, northwestern, and northeastern parts of the Southwest Pacific during March. Record low rainfall totals were recorded in Tonga and Tuvalu (see table below). Low monthly rainfall totals also occurred in the Northern Cook Islands, Eastern and Western Kiribati, Pitcairn Island, and the northern part of Fiji and Rotuma.

Northern New Zealand experienced a relatively dry month, with the northern part of the country recording normal to below normal rainfall (40–90% of normal). The North Tasman Region, including Raoul Island and Norfolk Island, was also relatively dry during March.



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 March 2009 position of the South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position, and exhibited coherent regions of low and high values similar to month. 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.

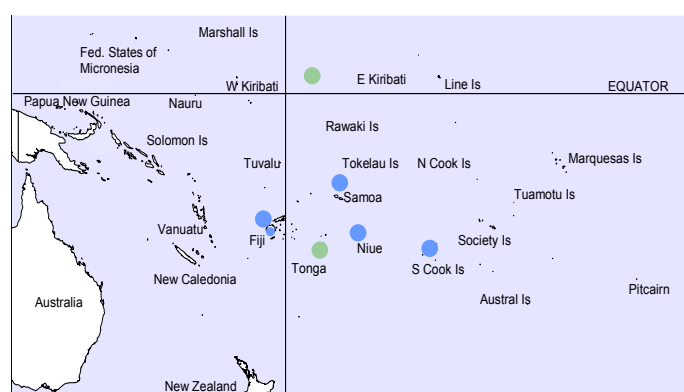
Island Group	Location	Rainfall (mm)	% of avg	Comments
New Caledonia	Koumac	397	263	Record high
New Caledonia	Poindimie	891	223	Record high; Highest monthly total in the region
Niue	Hanan	380	182	Record high
Tonga	Salote	52	23	Record low
Tuvalu	Niulakita	84	23	Record low

## Soil moisture in March 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.

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



March 2009

● Wet  
● Moderate  
● Dry

March 2008

● Wet  
● Moderate  
● Dry

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

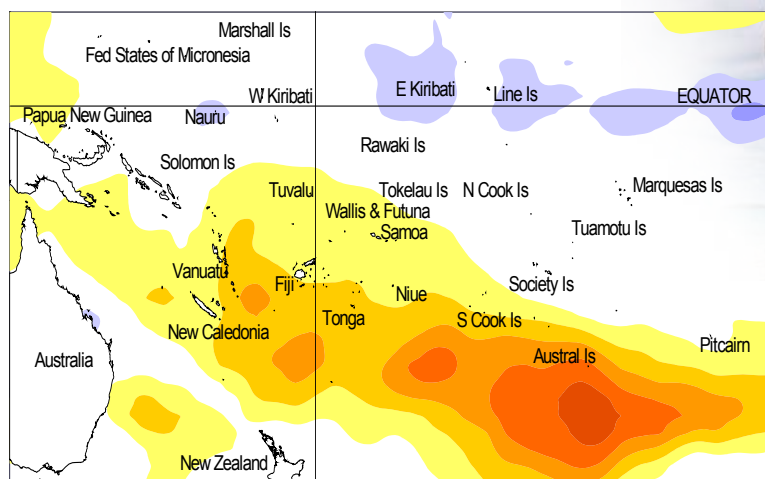


## El Niño/Southern Oscillation (ENSO)

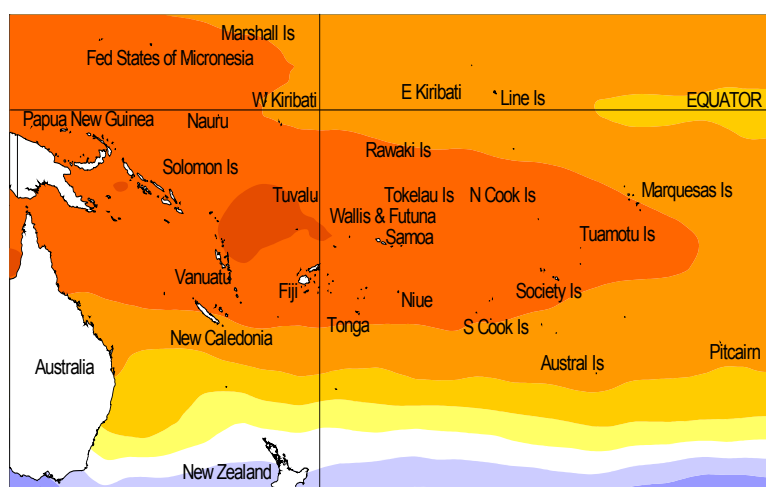
During March, previous La Niña conditions seen in the equatorial Pacific since December 2008 are now weakening towards the borderline of neutral. The SOI, which was +1.4 in February, dropped to +0.2 by the end of March (January–March mean +0.9). Easterly trade winds are now close to normal across much of the equatorial Pacific, although a westerly burst appeared late in March west of the Dateline.

SST anomalies across much of the equatorial Pacific have eased a little. NINO3 and NINO4 anomalies are  $-0.7^{\circ}\text{C}$  and  $-0.4^{\circ}\text{C}$  respectively (both around  $-0.7^{\circ}\text{C}$  in February). Sea surface height anomalies still show a clear La Niña pattern with positive heights west of the Dateline. Negative subsurface oceanic heat content anomalies (average temperatures in the upper 300m of the ocean), and temperature anomalies at thermocline depth continue to weaken slowly across the eastern half of the Pacific. Tropical Pacific convection and precipitation was suppressed near the Date Line just south of the Equator, about Indonesia and northern Australia, and was enhanced across the northern hemispheric tropics at the Australian longitudes during March. The TRMM ENSO precipitation index was  $-1.6$  as of 24 March. The MJO is presently weak and is expected to strengthen in early April, resulting in suppressed convection over the eastern Indian Ocean.

The global climate model ensemble assessed by NIWA indicate neutral ENSO conditions for April–June, and all but two models indicate neutral conditions in July–September. The NCEP discussion of 5 March indicates La Niña conditions will gradually weaken with more than a 50% chance of ENSO–neutral conditions in the coming months. The IRI summary of 19 March indicates a 50 % of La Niña conditions persisting through to end of May reducing to 25–30 percent for May–July as near-neutral conditions become most likely.



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



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

## Tropical Cyclone Activity and Guidance

Four Tropical Cyclones (TC) affected the Southwest Pacific region during March. TC Hamish formed off the Australian coast in the Coral Sea on March 5. TC Joni followed, forming on March 11 near the Southern Cook Islands and attained a maximum intensity of 55 knots. Damage in the Southern Cooks, if any, was minimal. TC Ken then formed between Niue and the Southern Cook Islands on March 17 and attained a maximum intensity of 50 knots. TC Ken did not affect land areas. TC Jasper entered the RSMC Nadi region of responsibility from the Coral Sea on March 24 as a tropical cyclone with storm intensity and later passed through New Caledonia's waters, with no significant damage reported.

## Forecast validation: January to March 2009

A region of suppressed convection was forecast for January–March 2009 over the central and eastern Southwest Pacific, extending from Western Kiribati to Eastern Kiribati, including Tuvalu, Tokelau, the Northern Cook Islands, and the Tuamotu archipelago. Below normal rainfall was expected for those island groups. Near-to-below normal rainfall was expected for Samoa. Enhanced convection was expected to extend southeast from Vanuatu and New Caledonia, to the Austral Islands, including Tonga, Fiji, the Southern Cook Islands and Niue, with average to above or above average rainfall for those island groups. No

precipitation guidance was offered for Pitcairn Island, Papua New Guinea, the Solomon Islands, the Marquesas, or the Society Islands for January–March 2009.

The validation for the January – March 2009 forecast was calculated for 13 island groups (three countries did not report rainfall values; three were forecast as climatology and were unscorable). The global island group 'hit' rate was 64%, 7% higher than average for January and 3% higher than the average for all months combined. Rainfall was overprojected for the Southern Cook Islands and Austral Islands.

## Tropical Pacific rainfall – March 2009

Territory and station name	March 2009 rainfall total (mm)	March 2009 percent of average
<b>Australia</b>		
Cairns Airport	149	33
Townsville Airport	18	8
Brisbane Airport	47	34
Sydney Airport	61	47
<b>Cook Islands</b>		
Penrhyn	169	55
Aitutaki	59	30
Rarotonga Airport	268	158
<b>Fiji</b>		
Rotuma Island	206	56
Udu Point	150	47
Nadi Airport	321	94
Nausori	450	118
<b>French Polynesia</b>		
Hiva Hoa, Atuona	175	194
Bora Bora	247	179
Tahiti – Faa'a	125	179
Tuamotu, Takaroa	73	140
Gambier, Rikitea	53	169
Tubuai	212	168
Rapa	337	269
<b>Kiribati</b>		
Tarawa	134	67
Kanton	27	25
<b>New Zealand</b>		
Kaitia	46	61
Whangarei Airport	117	92
Auckland Airport	35	43
<b>New Caledonia</b>		
Ile Art, Belep	52	22
Koumac	397	263
Ouloup	665	333
Ouanaham	447	187
Poindimie	891	223
La Roche	361	153
La Tontouta	234	176
Noumea	255	171
Moue	337	153

Territory and station name	March 2009 rainfall total (mm)	March 2009 percent of average
<b>Niue</b>		
Hanan Airport	380	182
Liku	251	110
<b>North Tasman</b>		
Lord Howe Island	114	92
Norfolk Island	60	55
Raoul Island	96	59
<b>Samoa</b>		
Faleolo Airport	N/A	N/A
Apia	219	42
Nafanua	326	89
Afiamalu	460	87
Maota	261	90
<b>Solomon Islands</b>		
Taro	429	132
Munda	281	76
Auki	477	123
Honiara	439	126
Henderson	436	177
Kira Kira	435	119
Santa Cruz, Lata	480	107
<b>Tonga</b>		
Niuafo'ou	267	88
Mata'aho Airport	167	56
Lupepau'u	249	83
Salote Airport	52	23
Nuku'alofa	N/A	N/A
Fua'amotu Airport	77	41
<b>Tuvalu</b>		
Nanumea	143	42
Nui Island	276	77
Funafuti	165	44
Nuilakita	84	23
<b>Vanuatu</b>		
Sola	455	111
Pekoa	168	49
Lamap	136	49
Port Vila	N/A	N/A
Tanna/Whitegrass	380	N/A
Aneityum	422	125

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.

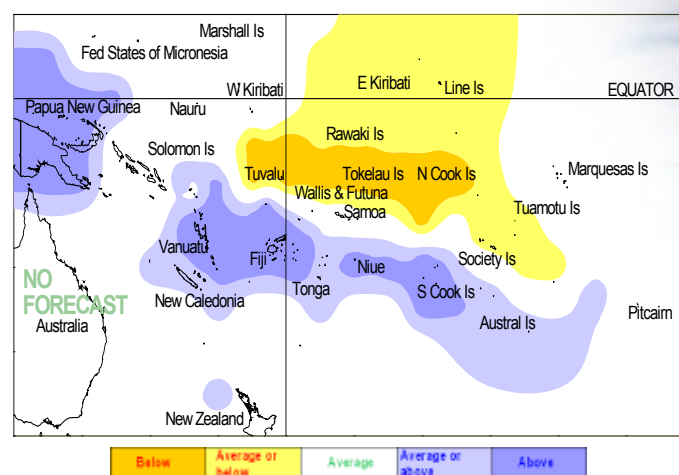
## Tropical rainfall and SST outlook: April to June 2009

During the March–May 2009 forecast period, 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 Tuamotu Archipelago.

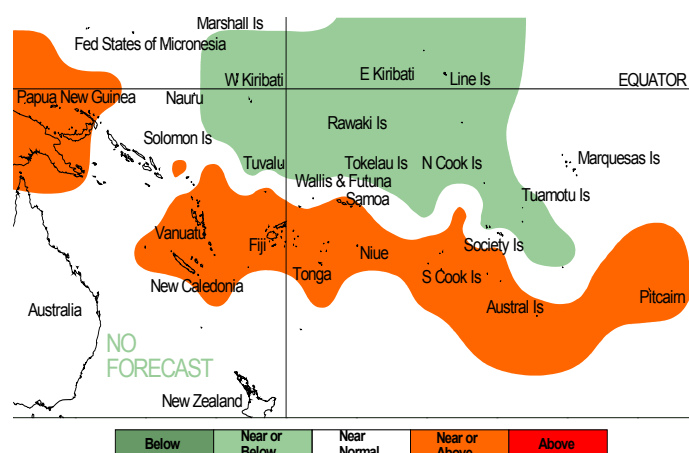
Enhanced convection is likely in the area around Papua New Guinea and Vanuatu, Fiji, Niue, and the Southern Cook Islands, with above average rainfall anticipated for the coming three month period. New Caledonia, the Austral Islands and Tonga are expected to receive near or above average rainfall. No clear precipitation guidance is offered for the Pitcairn, Samoa, Western Kiribati, Marquesas, the Society Islands, the Solomon Islands & Wallis and Futuna

The prominent SST anomalies in the region that existed during the past few months are easing. Near or above average sea surface temperatures are forecast for eastern Papua New Guinea extending into the southwest Pacific, encompassing Vanuatu, Fiji, and New Caledonia, Wallis and Futuna, Tonga, Samoa, Niue, the Southern Cook Islands, the Society Islands, the Austral Islands, and Pitcairn Island. Near normal SSTs are forecast for the Marquesas and the Solomon Islands. Average or below average SSTs are expected for Eastern Kiribati, Tuvalu, Western Kiribati, Tokelau, the Northern Cook Islands, and the Tuamotu Archipelago.

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 rainfall forecasts issued in April is 55%, 6% lower than the long-term average for all months combined. The SST forecast confidence is moderate–to–high for this period.



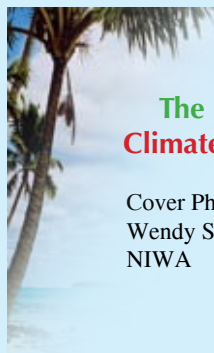
Rainfall outlook map for April to June 2009



SST outlook map for April to June 2009

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



## The Island Climate Update

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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:

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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  
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<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/>