

The Island Climate Update

May's climate

- The South Pacific Convergence Zone (SPCZ) was positioned southwest of normal.
- Suppressed convection near Western Kiribati and along the Equator extending east through Nauru and Eastern Kiribati.
- Mostly well above normal rainfall for New Caledonia and many parts of Fiji.

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

- ENSO neutral conditions exist in the tropical Pacific. Most climate models project ENSO neutral conditions for winter 2009. Some climate models suggest El Niño could develop early in Austral spring.
- Below normal rainfall is forecast for Tuvalu, Tokelau, the Marquesas and the Northern Cook Islands.
- Normal or above normal rainfall is expected for Papua New Guinea, the Solomon Islands, Western Kiribati, Vanuatu, Niue, Tonga, the Southern Cook Islands, and the Austral Islands.
- Above normal SSTs are forecast for Papua New Guinea. Normal or above normal SSTs are forecast for the western half of the southwest Pacific. Near normal SSTs are expected elsewhere.

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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World Meteorological
Organization

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New Zealand



Climate developments in May 2009

The South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position last month, but exhibited less coherent rainfall concentrations than in previous months. A region of enhanced rainfall, partly due to intensified convection, was observed over part of Vanuatu, New Caledonia, and Fiji during May. Suppressed convection existed northeast of the Solomon Islands during May, in a zone including Western Kiribati, Nauru, and to the north of Tuvalu. There was also suppressed convection along the equator including Eastern Kiribati, and from the Northern Cook Islands to the Austral Islands. The regional circulation in May was characterised by more frequent low pressure near Pitcairn Island and higher than normal pressure in the northwestern portion of the southwest Pacific.

High precipitation totals were concentrated in the western half of the southwest Pacific during May, and also the far east and south of French Polynesia. Drier than normal conditions occurred over much of the Society Islands and the Marquesas, which also experienced more frequent easterly winds than normal during the month. Nearby in the Southern Cook Islands, well below normal rainfall occurred at Rarotonga and Aitutaki (50 and 100mm, respectively). Most stations in Fiji received well above normal rainfall during May. The exceptions were Laucala Bay, Lakeba, and Vunisea, which received well below to below normal rainfall (25 – 75% of normal). In addition, much drier than normal conditions occurred in the North Tasman region this past month, with Norfolk, Raoul, and Lord Howe Islands recording 25 – 30% of normal rainfall.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Fiji	Nacocolevu	322	379	Record high
Vanuatu	Sola	680	183	Highest monthly total in the region
North Tasman	Raoul Island	37	30	Record low
North Tasman	Norfolk Island	37	26	Very low
North Tasman	Lord Howe Island	48	30	Very low

Soil moisture in May 2009

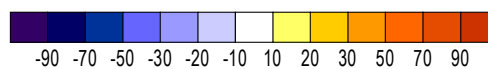
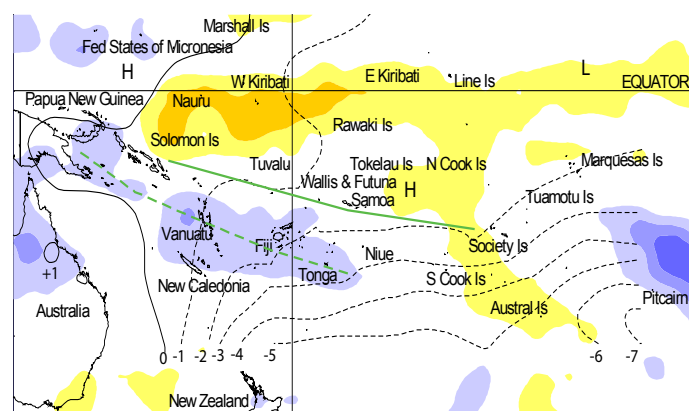
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but more stations will be included in the future.

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.

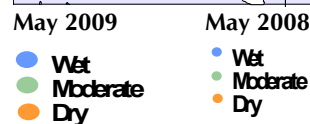
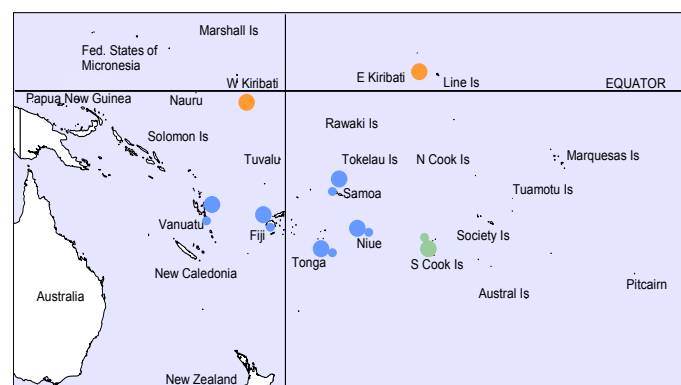
Hanan (Niue), Apia (Samoa), Port Vila (Vanuatu), Nadi (Fiji) and Fua'amotu (Tonga) project moist soil moisture conditions. Soil moisture is moderate at Rarotonga (Southern Cook Islands), and dry at Tarawa and Kiritimati (Kiribati).

There were some localised high rainfall totals in the southwest Pacific during May, particularly in the northern regions of New Caledonia and its eastern offshore islands. Koumang and La Roche received more than 275% normal rainfall, a contrast to the near normal totals for the southern part of New Caledonia, and below normal rainfall levels observed nearby in the North Tasman Sea.

In Tonga, normal or well below normal rainfall was recorded, with a low of 46mm at Lupepau'u (24% of normal). Monthly rainfall reports also indicated drier than normal conditions occurred in Tuvalu, which had 30 – 90% of normal rainfall in May. Northern New Zealand had a wetter than normal month, with 130 – 170% of normal rainfall recorded in the northern part of the country.



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 May 2009 position of the South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position, but weakly coherent compared to previous months. 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 solid and dashed black lines.



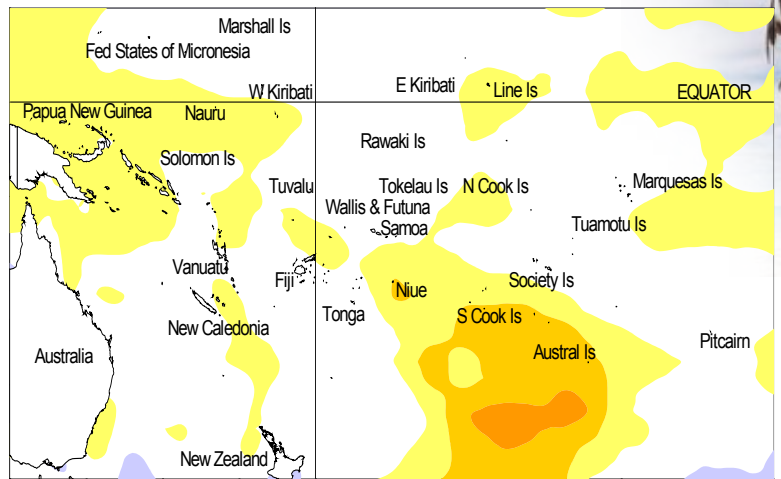
Estimated soil moisture conditions at the end of May 2009, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

El Niño/Southern Oscillation (ENSO)

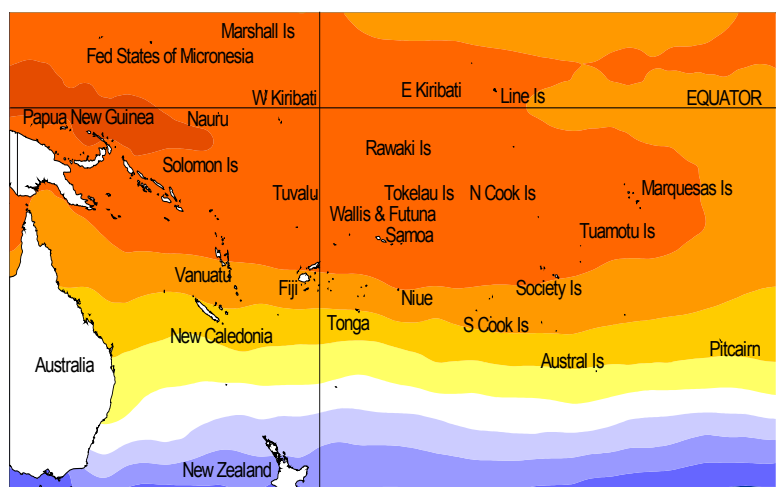
During May, the equatorial Pacific Ocean exhibited ENSO-neutral characteristics. Sea surface temperatures (SSTs) in that region have been rising steadily since February, and are now warmer than normal across the entire Pacific basin. NINO3 and NINO 4 SST anomalies are $+0.8^{\circ}\text{C}$ and $+0.3^{\circ}\text{C}$, respectively, for May (and $+0.1^{\circ}\text{C}$ and -0.0°C , respectively, for MAM). SSH anomalies still remain positive in the tropical Pacific west of the Date Line, but show a north-south banded structure in the east, with positive anomalies along the Equator east of the Date Line. Positive equatorial subsurface ocean temperature anomalies strengthened during May in the uppermost 100m near the South American coast, and now exceed $+3^{\circ}\text{C}$. The upper ocean heat content, averaged over the top 300m, is positive right across the equatorial Pacific.

Westerly anomalies are now evident in the trade winds west of the Date Line. The TRMM ENSO precipitation index remains negative at -1.0 , about the only indicator remaining of the recent La Niña. At the same time, the SOI fell rapidly to a value of -0.5 in May (but averaged $+0.1$ over MAM). Tropical Pacific convection (from OLR) was enhanced over Indonesia and north of Australia in late May, but was still suppressed along the Equator, east of 150°E . MJO activity was heightened at the end of May and convection was expected to propagate at least as far as the Date Line during the first week of June.

The global climate model ensemble assessed by NIWA show statistical models are signaling ENSO-neutral conditions into early 2010. However, seven of the 10 dynamical models that are monitored indicate reaching an El Niño threshold by the end of Austral winter. Thus, the ENSO discussion has shifted from whether La Niña will continue through winter to whether current neutral conditions will transition into El Niño before the end of the year. Most forecasts still expect Austral winter to be ENSO-neutral. The Australia Bureau of Meteorology has noted that signs indicating the possible development of El Niño have strengthened in early June. NOAA also



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



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

indicates conditions are ripe for El Niño development if the atmospheric response catches up to the ocean anomalies. The IRI indicates a 48% chance of neutral ENSO conditions for the coming season, and a 45% chance of an El Niño.

Tropical Cyclone Activity Summary

Eight tropical cyclones occurred in the Southwest Pacific during the 2008–09 season, which was one less than the long term average (1969/70–2007/08). This year was the most active TC season since 2005/06. ICU tropical cyclone guidance produced in October 2008 projected average TC activity (8–10 TC's) for the 2008/09 season. The first tropical cyclone formed on January 28, making this the latest start to the Southwest Pacific TC season since 2000/01. Four TC's developed west of the Date Line and five formed east of the Date Line. Peak activity occurred in March (four TC's), and December and February were unusually quiet, and only one TC reached hurricane intensity (sustained wind speeds of at least 118 km).

Forecast validation: March to May 2009

A region of suppressed convection was forecast for the central and eastern Southwest Pacific, extending from Tuvalu southeast to the Northern Cook Islands, including Tokelau, with an expectation of below normal rainfall. Near-to-below normal rainfall was expected for Samoa, Eastern Kiribati, and Western Kiribati. Enhanced convection was expected to extend southeast from Papua New Guinea, and include New Caledonia, Vanuatu, Tonga, the Southern Cook Islands and the Austral Islands, where above normal rainfall was forecast. Near or above normal rainfall was forecast for Fiji and Niue. Normal rainfall was anticipated for

the Marquesas, Pitcairn Island, and also the Society Islands. No clear precipitation guidance was offered for the Solomon Islands, Tuamotu, or Wallis & Futuna for the forecast period.

The March – May 2009 forecast validation was calculated for 13 island groups (four countries did not report rainfall values; three were forecast as climatology and were unscorable). The global island group 'hit' rate was 64%, 1% higher than average, and 3% higher than the average for all months combined. Rainfall was overprojected for Vanuatu, Tonga and Samoa.

Tropical Pacific rainfall – May 2009

Territory and station name	May 2009 rainfall total (mm)	May 2009 percent of average
Australia		
Cairns Airport	89	93
Townsville Airport	7	19
Brisbane Airport	241	243
Sydney Airport	126	130
Cook Islands		
Penrhyn	N/A	N/A
Aitutaki	100	51
Rarotonga Airport	50	30
Fiji		
Rotuma Island	279	94
Udu Point	241	144
Nadi Airport	163	183
Nausori	308	124
French Polynesia		
Hiva Hoa, Atuona	104	66
Bora Bora	99	89
Tahiti – Faa'a	34	33
Tuamotu, Takaroa	96	109
Gambier, Rikitea	237	172
Tubuai	126	75
Rapa	305	137
Kiribati		
Tarawa	166	86
Kanton	50	40
New Zealand		
Kaitaia	157	132
Whangarei Airport	139	129
Auckland Airport	151	164
New Caledonia		
Ile Art, Belep	275	133
Koumac	175	287
Ouloup	169	159
Ouanaham	237	174
Poindimie	237	117
La Roche	386	278
La Tontouta	83	148
Noumea	88	102
Moue	101	78

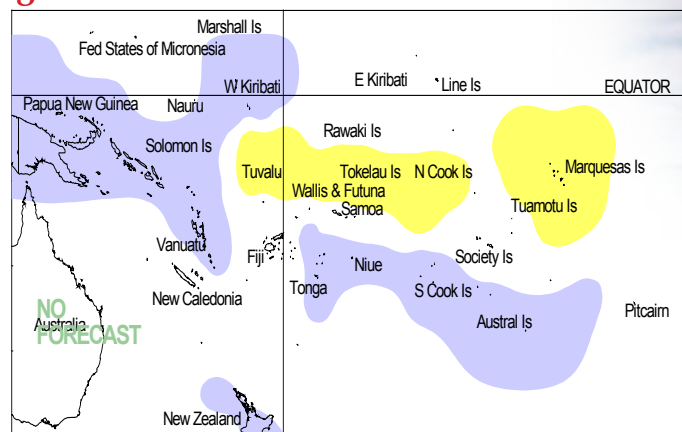
Territory and station name	May 2009 rainfall total (mm)	May 2009 percent of average
Niue		
Hanan Airport	160	110
Liku	164	98
North Tasman		
Lord Howe Island	48	30
Norfolk Island	37	26
Raoul Island	37	30
Samoa		
Faleolo Airport	258	163
Apia	173	99
Nafanua	198	N/A
Afiamalu	233	N/A
Maota	235	N/A
Solomon Islands		
Taro	306	113
Munda	362	150
Auki	171	86
Honiara	165	116
Henderson	111	84
Kira Kira	348	114
Santa Cruz, Lata	303	85
Tonga		
Niuafu'ou	325	196
Mata'aho Airport	130	78
Lupepau'u	46	24
Salote Airport	67	39
Nuku'alofa	102	92
Fua'amotu Airport	181	134
Tuvalu		
Nanumea	73	32
Nui Island	209	95
Funafuti	119	48
Nuilakita	202	86
Vanuatu		
Sola	680	183
Pekoa	388	181
Lamap	75	45
Port Vila	109	75
Tanna/Whitegrass	105	N/A
Aneityum	258	166

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.**

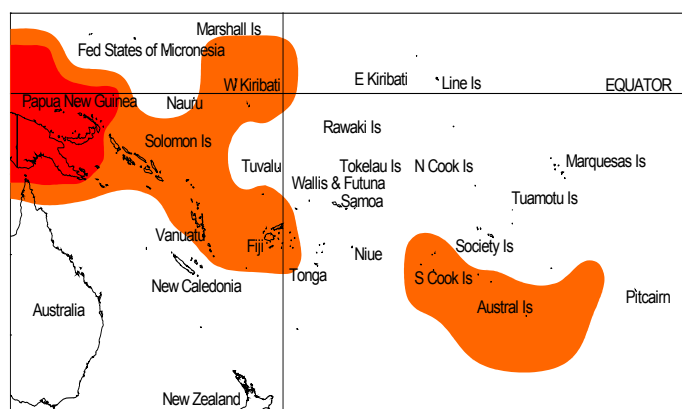
Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and * denotes synoptic values.

Tropical rainfall and SST outlook: June to August 2009

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



Rainfall outlook map for June to August 2009



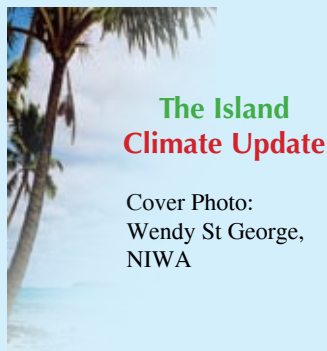
SST outlook map for June to August 2009

Prominent negative equatorial SST anomalies that existed in the region during the past months have eased. Global models indicate significant shifts to near-neutral SSTs during Austral winter, and a subsequent swing toward warm anomalies as early as Austral spring. Above average SSTs are expected for Papua New Guinea, while near or above average SSTs are forecast for Western Kiribati, the Solomon Islands, Vanuatu, Fiji, the Southern Cook Islands, and the Austral Islands. Near normal SSTs are forecast for Samoa, Tokelau, Tuvalu, the Northern Cook Islands, Wallis & Futuna, Tonga, the Marquesas, Eastern Kiribati, the Tuamotu Archipelago, Pitcairn Island, and the Society Islands. No clear SST guidance is provided for New Caledonia or Niue.

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 June is 60%, 1% lower 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.

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



The Island Climate Update

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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
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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/>