Number 106, July 2009

The Island Climate Update

June's climate

- The South Pacific Convergence Zone (SPCZ) was positioned southwest of normal, and contracted toward Papua New Guinea.
- Suppressed convection north of the Equator and near the Solomon Islands.
- Mostly well above normal rainfall for many parts of Fiji.

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

- ENSO neutral conditions exist in the tropical Pacific. Many dynamical climate models project a transition to El Niño by early in Austral spring.
- Below normal rainfall is forecast for Tokelau, the Marquesas and the Northern Cook Islands.
- Normal or above normal rainfall is expected for Papua New Guinea, the Solomon Islands, Western Kiribati, Eastern Kiribati, the Southern Cook Islands, and the Austral Islands.
- Above normal SSTs are forecast for Eastern Kiribati. Normal or above normal SSTs are forecast for Papua New Guinea, the Solomon Islands, Western Kiribati, the Northern Cook Islands and the Austral Islands. Near normal SSTs are expected elsewhere in 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 Institute for Climate and Society

European Centre for Medium Range Weather Forecasts

UK Met Office

World Meteorological Organization

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Climate developments in June 2009

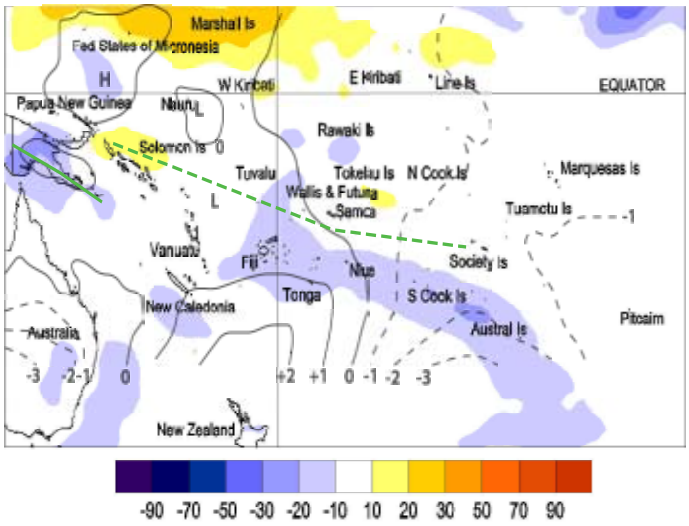
The South Pacific Convergence Zone (SPCZ) was displaced slightly southwest of its normal position last month, but was contracted toward the Equator. The SPCZ exhibited less coherent rainfall in the northeast portion of the Southwest Pacific than in previous months. A region of enhanced rainfall was observed over part of Fiji and the Austral Islands during June. Suppressed convection existed northeast of Western Kiribati last month. The regional circulation in June was characterised by more frequent low pressure over Australia and south of the Austral Islands, and higher than normal pressure in the northwestern portion of the Tasman Sea to the north of New Zealand.

Near normal to above normal rainfall occurred in Papua New Guinea and New Caledonia in June. High rainfall was also recorded in Samoa, the Southern Cook Islands, and the southern fringe of French Polynesia. Stations in those areas all received more than 120% of normal rainfall for the month. Niue also received high precipitation, with more than 190% of normal rainfall recorded at Liku and Hanan. Very high rainfall fell at Niulakita in Tuvalu (see table below), which was a contrast to near or below normal rainfall for three other stations that reported for June. In Kiribati, Tarawa received well above normal rainfall (230mm; 143% of normal) for the month. In Fiji, 80% of sites had average to above average rainfall, and three sites had greater than 200% of normal rainfall.

Drier than normal conditions occurred over much of northeast Australia, parts of Vanuatu, and much of the Solomon Islands during June. Low rainfall totals in the Solomon Islands occurred at Honiara and Henderson, which received 21% and 63% of normal rainfall, respectively. There were dry conditions in the Marquesas for the month of June, with about 75% of normal rainfall recorded in Gambier. Near normal rainfall was recorded for the Society Islands and the Tuamotu Archipelago.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Solomon Islands	Honiara	20	21	Record low
Tuvalu	Nuilakita	552	286	Highest monthly total in the region
Papua New Guinea	Daru	220	234	High
Niue	Hanan	200	222	Very high
Australia	Cairns	4	8	Very low

Warmer than normal conditions occurred as a whole across French Polynesia, with +0.4°C to +1.6°C above normal temperatures. Increased frequency of easterly wind were recorded in the Marquesas and the northern part of the Tuamotu Archipelego. Across the Southwest Pacific in Fiji, air temperatures were average to below average, with some nights dipping below 15°C due to strong southerly flow.



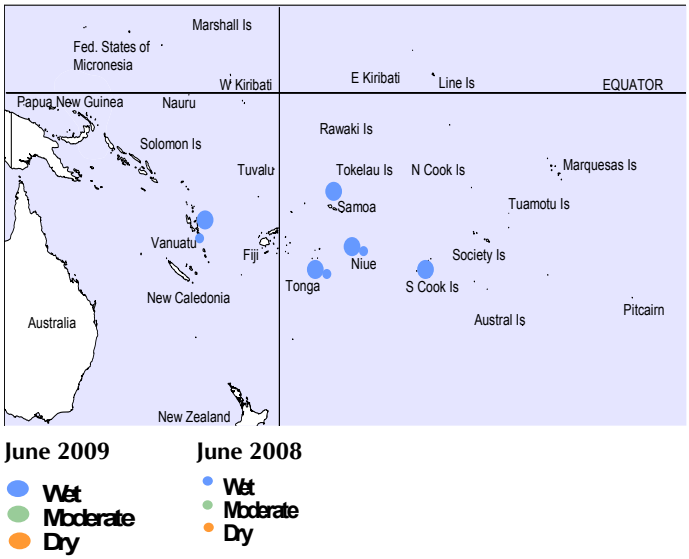
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^2 are represented by hatched areas. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically result in higher rainfall. The June 2009 position of the South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position, less extensive, and and 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.

Soil moisture in June 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.

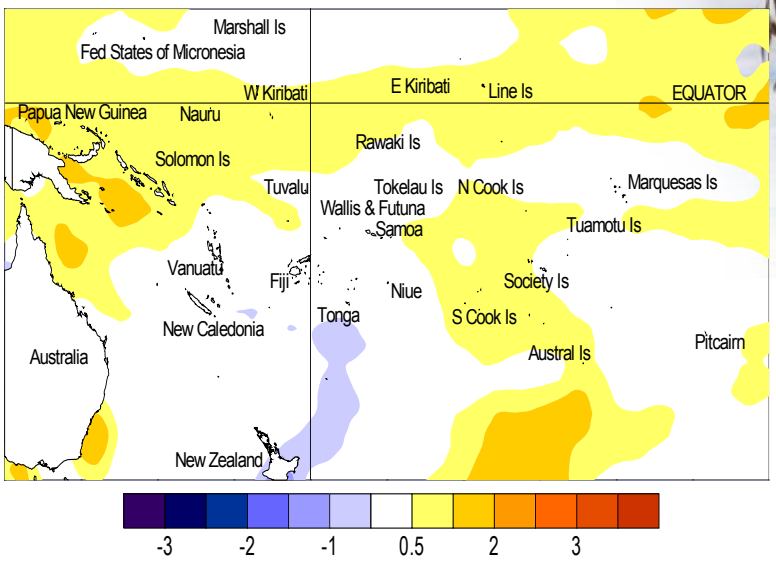
Hanan (Niue), Apia (Samoa), Port Vila (Vanuatu), Raratonga (Southern Cook Islands) and Fua'amotu (Tonga) project moist soil moisture conditions.



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

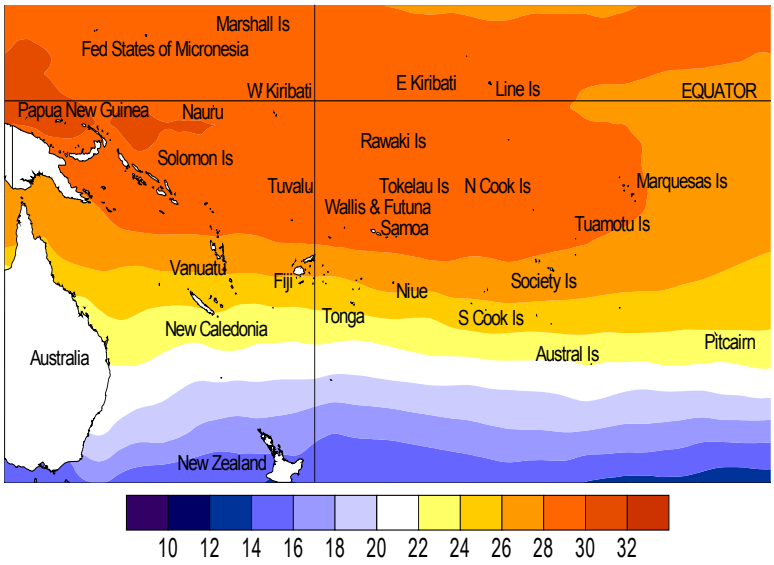
El Niño/Southern Oscillation (ENSO)

During June, the equatorial Pacific Ocean exhibited ENSO–neutral characteristics. Sea surface temperatures (SSTs) in that region have been rising steadily since February, and are now almost +1°C warmer than normal across the equatorial Pacific. NINO3 and NINO 4 SST anomalies are +0.5°C and +1.0°C, respectively, for June (and +0.6°C and +0.3°C, respectively, for AMJ). Sea surface height anomalies along the Equator were mostly positive and the large anomalies in recent months west of the Dateline in the Southern Hemisphere show signs of weakening. Positive equatorial sub–surface ocean temperatures in the uppermost 100m near South America, which strengthened in May, continued to intensify with a +4°C anomaly appearing by the end of June. The upper ocean heat content (averaged over the top 300m) is positive across the equatorial Pacific and intensified a little from last month.



Sea surface temperature anomalies (ºC) for June 2009

Westerly anomalies persisted in the trade winds west of the Dateline during June, and peaked for a time in the middle of the month. The TRMM ENSO precipitation index weakened (–1.0 in May) and was around –0.65 at the end of June. ENSO–neutral conditions in the atmosphere continued in June with an SOI value of –0.4 (+0.0 for AMJ). Tropical Pacific convection (gauged from OLR diagnostics) was suppressed over Indonesia, but was enhanced over southern Papua New Guinea and the adjacent equatorial Pacific. Convection is still suppressed along the equator east of the Dateline, and a weakly identifiable SPCZ lies between New Caledonia and Samoa in the western South Pacific. MJO activity weakened in June. The MJO is expected to remain weak during early July with suppressed convection likely to continue over Indonesia and the Maritime continent.



Mean sea surface temperatures (ºC) for June 2009

The global climate model ensemble assessed by NIWA show statistical models signaling ENSO–neutral conditions continuing through to March 2010. However, seven out of the 10 dynamical models suggest the recent warming trends seen in NINO3.4 will continue. Four out of seven dynamical models indicate a transition into moderate El Niño by the end of the JAS season. The ENSO discussion from NCEP suggests El Niño conditions are likely in the next two to three months given the current state of favourable oceanic conditions for El Niño development. The IRI summary estimates the probability of El Niño in the JAS season at 62%, and a 37% chance of a continuation of ENSO–neutral conditions. A WMO advisory suggests the likelihood of an El Niño event in the second half of 2009 is more than 50%.

Forecast validation: April to June 2009

A region of suppressed convection was forecast in the southwest Pacific encompassing Tokelau, Tuvalu, and the Northern Cook Islands, with below average rainfall expected for those areas during April – June 2009. Near to below average rainfall was expected for Eastern Kiribati and the Tuamotu Archipelago. Enhanced convection was expected in the area around Papua New Guinea and Vanuatu, Fiji, Niue, and the Southern Cook Islands, with above average rainfall anticipated. New Caledonia, the Austral Islands and Tonga were expected to receive near or above average rainfall. No clear precipitation guidance was offered for the Pitcairn, Samoa, Western Kiribati, Marquesas, the Society Islands, the Solomon Islands & Wallis and Futuna

The April – June 2009 forecast validation was calculated for 11 island groups (one country did not report rainfall values; seven were forecast as climatology and were unscorable). The global island group 'hit' rate was 72%, 17% higher than average, and 11% higher than the average for all months combined. Rainfall was overprojected for Papua New Guinea, the Southern Cook Islands, and Vanuatu, while it was underprojected for Tuvalu.

Tropical Pacific rainfall – June 2009

Territory and station station name	June 2009 rainfall total (mm)	June 2009 percent of average
Australia		
Cairns Airport	4	8
Townsville Airport	0	0
Brisbane Airport	88	124
Sydney Airport	130	103
Cook Islands		
Penrhyn	N/A	N/A
Aitutaki	144	155
Rarotonga Airport	205	183
Fiji		
Rotuma Island	350	152
Udu Point	85	73
Nadi Airport	113	173
Nausori	152	101
French Polynesia		
Hiva Hoa, Atuona	134	78
Bora Bora	84	91
Tahiti – Faa'a	66	103
Tuamotu, Takaroa	83	92
Gambier, Rikitea	126	78
Tubuai	156	134
Rapa	257	128
Kiribati		
Tarawa	230	143
Kanton	53	54
New Zealand		
Kaitaia	196	132
Whangarei Airport	127	77
Auckland Airport	89	77
New Caledonia		
Ile Art, Belep	153	128
Koumac	60	86
Ouloup	106	80
Ouanaham	229	151
Poindimie	266	135
La Roche	150	98
La Tontouta	95	114
Noumea	118	102
Moue	228	171

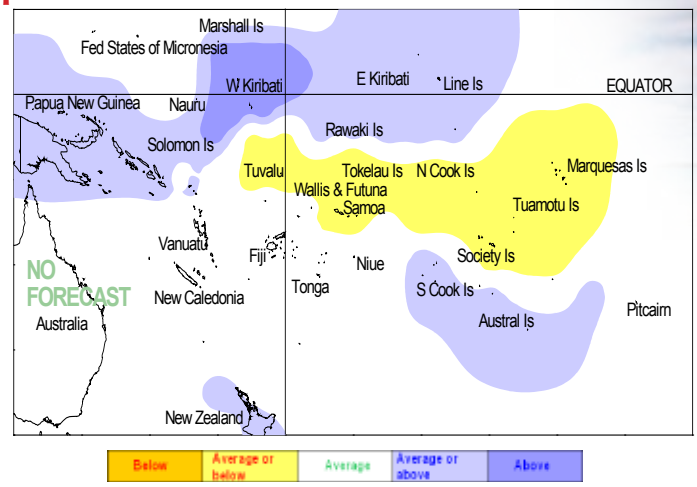
Territory and station station name	June 2009 rainfall total (mm)	June 2009 percent of average
Niue		
Hanan Airport	200	222
Liku	156	193
North Tasman		
Lord Howe Island	119	65
Norfolk Island	112	73
Raoul Island	148	87
Samoa		
Faleolo Airport	184	198
Apia	170	128
Nafanua	188	N/A
Afiamalu	345	N/A
Maota	N/A	N/A
Solomon Islands		
Taro	N/A	N/A
Munda	189	83
Auki	133	77
Honiara	20	21
Henderson	37	63
Kira Kira	223	93
Santa Cruz, Lata	235	95
Tonga		
Niuafo'ou	92	84
Mata'aho Airport	17	13
Lupepau'u	95	75
Salote Airport	149	186
Nuku'alofa	60	63
Fua'amotu Airport	73	72
Tuvalu		
Nanumea	154	77
Nui Island	130	65
Funafuti	194	90
Nuilakita	552	286
Vanuatu		
Sola	262	91
Pekoa	343	221
Lamap	107	82
Port Vila	94	55
Tanna/Whitegrass	103	71
Aneityum	263	173

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.

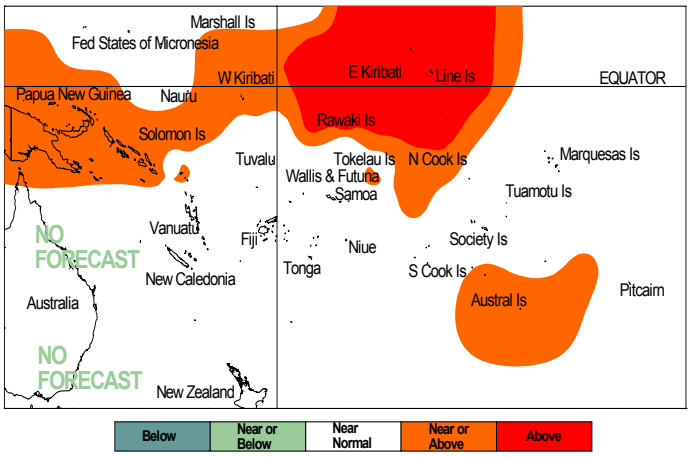
Tropical rainfall and SST outlook: July to September 2009

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



Rainfall outlook map for July to September 2009

The global models have shown significant shifts to near-neutral SST conditions for most of the Southwest Pacific region during the remainder of Austral winter. However, a projected increase in the near equatorial Pacific sea surface temperatures is observed in the northwest corner of the Southwest Pacific in most models. For July – September 2009, above average temperatures are forecast for Eastern Kiribati. A region of near or above average sea surface temperatures are forecast around Papua New Guinea and the Solomon Islands, Western Kiribati, the Northern Cook Islands, and the Austral Islands. Near normal SSTs are forecast for the remainder of the southwest Pacific.



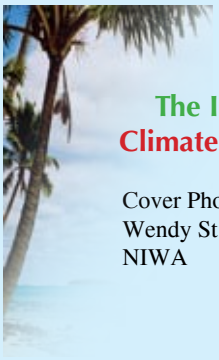
SST outlook map for July to September 2009

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 July is 64%, 3% higher than the long-term average for all months combined. The SST forecast confidence is mostly high for this period.

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

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



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.

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
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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
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