

# The Island Climate Update

## July's climate

- The South Pacific Convergence Zone (SPCZ) was positioned southwest of normal, and contracted toward Papua New Guinea.
- Suppressed convection in the central part of the Southwest Pacific near Tokelau.
- Mostly well above normal rainfall for many parts of New Caledonia and the Solomon Islands.

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

- El Niño conditions exist in the equatorial Pacific, but region-wide atmospheric anomalies typical of El Niño are not as prominent. Many dynamical climate models project the continuation of El Niño through 2009.
- Below normal rainfall is forecast for Tokelau, the Marquesas and the Northern Cook Islands.
- Above normal rainfall is expected for Western Kiribati. Near or above normal rainfall is forecast for 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

MetService of  
New Zealand



## Climate developments in July 2009

The South Pacific Convergence Zone (SPCZ) was displaced slightly southwest of its normal position last month, and contracted toward the Equator. Convection intensified near the Federated States of Micronesia and northern Papua New Guinea and enhanced rainfall was also observed over Nauru and Western Kiribati during July. Suppressed convection existed southeast of Western Kiribati last month and near Tokelau. The regional circulation in July was characterised by more frequent low pressure over the Equator near Eastern Kiribati, south of the Austral Islands, and east of New Zealand. This pattern resulted in more frequent easterly anomalies in the northern Tuamotu Archipelago region and the Marquesas, with westerlies being more frequent in the Austral Islands.

Most stations in Papua New Guinea and New Caledonia received well above normal rainfall in July. High rainfall was also recorded in the Solomon Islands, the southern half of Vanuatu, most of Samoa, and in Western Kiribati. For Western Kiribati this is the second month in a row with considerable rainfall, and a break from drought conditions that persisted in the southern part of that island group during previous months. In addition, there were only three days in July without rain at Tarawa. In contrast to last month in Fiji, only three sites (Nadi, Lakita, and Rarawai) reported for the ICU had well above average rainfall, while 19 other sites received above normal rainfall for the month.

Drier than normal conditions occurred over much of the central and eastern regions of the South Pacific during July. Low rainfall totals in Tonga occurred at Niuafou'u and

Island Group	Location	Rainfall (mm)	% of avg	Comments
Australia	Townsville	0.2	1	Very low
Solomon Islands	Munda	591	184	Highest monthly total in the region
New Caledonia	Moue	220	259	Very high
Papua New Guinea	Kavieng	564	239	Very high
Takaroa	Tuamotu	34	41	Very low

## Soil moisture in July 2009

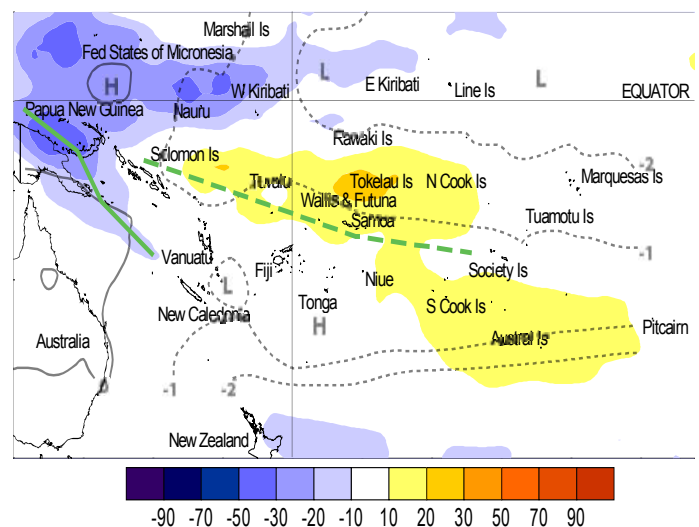
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but more stations will be included in the future.

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.

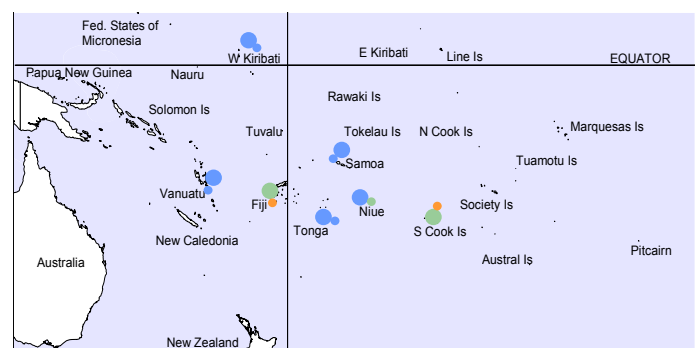
Hanan (Niue), Apia (Samoa), Port Vila (Vanuatu), Tarawa (Western Kiribati) and Fua'amotu (Tonga) project moist soil moisture conditions. Raratonga (Southern Cook Islands) and Nadi (Fiji) project moderate soil moisture at this time.

Mata'aho, which received 23% and 15% of normal rainfall, respectively. There were also dry conditions in northern Vanuatu (Sola and Pekoa), and in the Tuamotu Archipelago and parts of the Society Islands, with less than 50% of normal rainfall recorded in Gambier. Near normal rainfall was recorded for Bora Bora.

Warmer than normal conditions occurred as a whole across French Polynesia during July, with +0.5°C to +1.4°C above normal temperatures recorded. A new monthly mean temperature was also recorded for July at Faa'a, and a maximum daily temperature of 26.9°C was recorded at Rikitea. Across the Southwest Pacific in Australia, air temperatures were 1–2 °C above average in northern regions of the continent.



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 July 2009 position of the South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position, less extensive, 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.



July 2009

● Wet  
● Moderate  
● Dry

July 2008

● Wet  
● Moderate  
● Dry

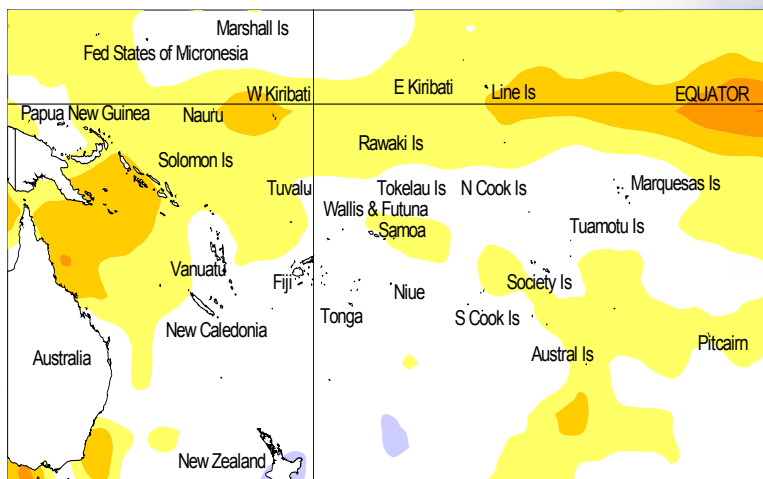
Estimated soil moisture conditions at the end of July 2009, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

## El Niño/Southern Oscillation (ENSO)

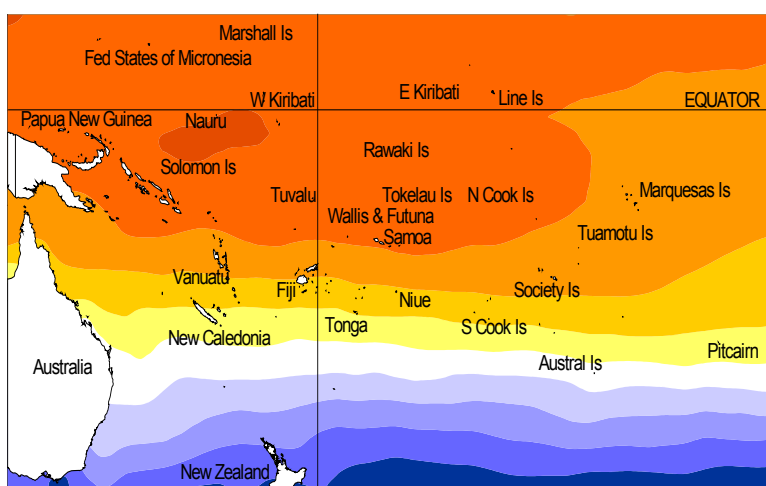
During July, conditions in the equatorial Tropical Pacific indicated that the ocean moved into an El Niño state, but the atmosphere has yet to respond. Sea surface temperature anomalies in the equatorial Pacific are generally positive and are broadly consistent with El Niño conditions. NINO 3 & 4 anomalies for July were +1.4°C and +0.8°C, respectively (3-month means +1.0°C and +0.6°C). Subsurface conditions are also consistent with El Niño, with a substantial positive heat content anomaly in the eastern Equatorial Pacific. However, positive temperature and heat anomalies extend right across the Pacific Basin, though cooling in the far west occurred from mid–July.

The atmospheric circulation in the region does not yet appear to be coupled with the ocean. The July SOI reverted to positive values (+0.2 for the month) with a three-month mean also near zero. OLR anomalies show a region of enhanced convection about and (mostly) west of the Date Line, and the TRMM ENSO precipitation index is only weakly positive (around +0.1). Significant positive zonal wind anomalies have been evident over the western Pacific throughout July, but have not yet penetrated east of the Date Line. The MJO has been weak since late June, but an event may develop in August

The global climate model ensemble assessed by NIWA show almost all dynamical models with warm (El Niño) conditions through the end of the year, while all statistical models indicate neutral conditions through October. The July NCEP ENSO discussion suggests weak-moderate El Niño conditions through the rest of 2009. The IRI summary estimates at least an 80% probability of El Niño through the rest of the year. The Bureau of Meteorology indicates that the ocean is in an El Niño state and that the atmosphere is now moving in that direction.



Sea surface temperature anomalies (°C) for July 2009



Mean sea surface temperatures (°C) for July 2009

## Forecast validation: May to July 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 May – July 2009. Near to below average rainfall was expected for Eastern Kiribati and the Marquesas. Near normal rainfall was forecast for Pitcairn Island and Samoa. Enhanced convection was forecast for Papua New Guinea and Vanuatu, Fiji, Niue, and the Southern Cook Islands, with above average rainfall. New Caledonia, Tonga, Wallis & Futuna, and the Austral Islands were expected to receive near or above average rainfall. No clear precipitation

guidance was offered for the Western Kiribati, the Solomon Islands, the Tuamotu Archipelago and the Society Islands

The May – July 2009 forecast validation was calculated for 13 island groups (two countries did not report rainfall values; four were forecast as climatology and were unscorable). The global island group ‘hit’ rate was 74%, 21% higher than average for May forecasts, and 13% higher than the average for all months combined. Rainfall was overprojected for Vanuatu and the Southern Cook Islands, while it was underprojected for Samoa.

## Tropical Pacific rainfall – July 2009

Territory and station name	July 2009 rainfall total (mm)	July 2009 percent of average
<b>Australia</b>		
Cairns Airport	5	17
Townsville Airport	0	1
Brisbane Airport	4	6
Sydney Airport	53	42
<b>Cook Islands</b>		
Penrhyn	N/A	N/A
Aitutaki	N/A	N/A
Rarotonga Airport	47	45
<b>Fiji</b>		
Rotuma Island	251	108
Udu Point	65	73
Nadi Airport	74	164
Nausori	101	86
<b>French Polynesia</b>		
Hiva Hoa, Atuona	103	66
Bora Bora	75	100
Tahiti – Faa'a	42	79
Tuamotu, Takaroa	34	41
Gambier, Rikitea	73	47
Tubuai	101	70
Rapa	203	81
<b>Kiribati</b>		
Tarawa	226	144
Kanton	101	135
<b>New Zealand</b>		
Kaitiaia	145	87
Whangarei Airport	168	104
Auckland Airport	112	85
<b>New Caledonia</b>		
Ile Art, Belep	76	52
Koumac	119	225
Ouloup	138	152
Ouanaham	188	186
Poindimie	174	135
La Roche	245	247
La Tontouta	161	252
Noumea	143	204
Moue	220	259
<b>Niue</b>		
Hanan Airport	90	77
Liku	59	46

Territory and station name	July 2009 rainfall total (mm)	July 2009 percent of average
<b>North Tasman</b>		
Lord Howe Island	85	45
Norfolk Island	144	97
Raoul Island	69	41
<b>Samoa</b>		
Faleolo Airport	114	134
Apia	163	142
Nafanua	175	84
Afiamalu	353	183
Alafua	196	143
<b>Solomon Islands</b>		
Taro	321	N/A
Munda	591	184
Auki	387	175
Honiara	148	149
Henderson	153	153
Kira Kira	467	142
Santa Cruz, Lata	392	113
<b>Tonga</b>		
Niuafu'ou	31	23
Mata'aho Airport	16	15
Lupepau'u	56	57
Salote Airport	100	111
Nuku'alofa	123	129
Fua'amotu Airport	189	172
<b>Tuvalu</b>		
Nanumea	65	31
Nui Island	167	69
Funafuti	174	69
Nuilakita	255	128
<b>Vanuatu</b>		
Sola	125	51
Pekoa	46	54
Lamap	116	122
Port Vila	144	212
Tanna/Whitegrass	110	
Aneityum	198	185
<b>Papua New Guinea</b>		
Port Moresby	10	37
Wewak	383	205
Kavieng	564	239

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.**

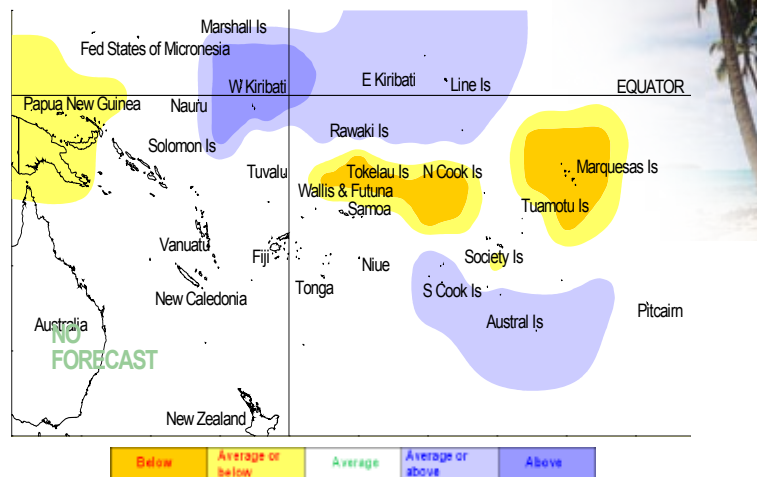
Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and \* denotes synoptic values.

## Tropical rainfall and SST outlook: August to October 2009

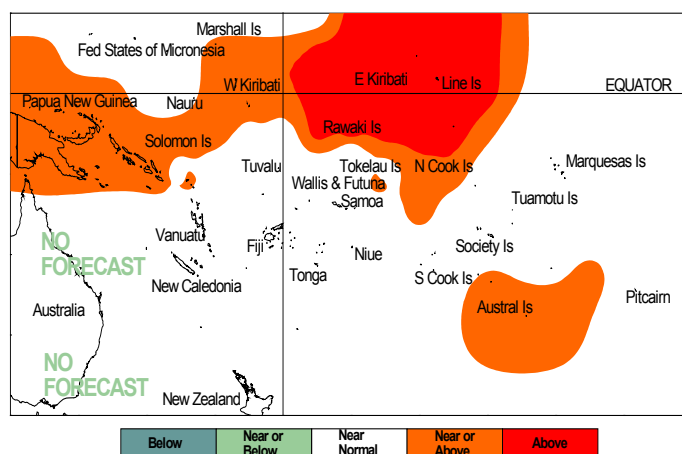
During August – October 2009, a region of suppressed convection is likely in the southwest Pacific encompassing Tokelau, the Northern Cook Islands, and the Marquesas, with below average rainfall expected for those areas. Near to below average rainfall is expected for Papua New Guinea and the Society Islands. Near normal rainfall is forecast for Niue, the Tuamotu Archipelago, New Caledonia, and Pitcairn Island. Enhanced convection is likely along the Equator extending from Western to Eastern Kiribati, and in the area around 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, Tuvalu, Tonga, Samoa, Wallis & Futuna, and the Solomon Islands.

The global models have exhibited an increase in the near equatorial Pacific sea surface temperatures for the northwest corner of the Southwest Pacific. For August – October 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, the Solomon Islands, Western Kiribati, the Northern Cook Islands, the Marquesas and the Society Islands. Near normal SSTs are forecast for the remainder of the southwest Pacific.

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 August is 61%, equivalent to the long-term average for all months combined. The SST forecast confidence is mostly high for this period, but the greatest uncertainty localised around the Marquesas and Eastern Kiribati.



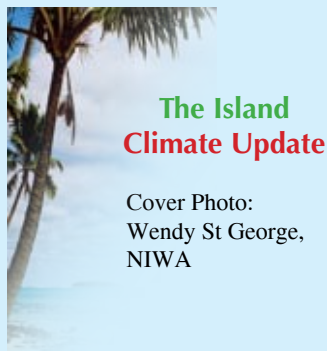
Rainfall outlook map for August to October 2009



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



## 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/>

### International Partners

Meteo-France  
New Caledonia: <http://www.meteo.nc/>  
French Polynesia: <http://www.meteo.pf/>

Bureau of Meteorology (Australia)  
<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/>