

The Island Climate Update

November's climate

- The South Pacific Convergence Zone (SPCZ) was displaced southwest of normal near Papua New Guinea and the Solomon Islands.
- Suppressed convection in the central part of the Southwest Pacific near Fiji and Samoa.
- Mostly well below normal rainfall for many parts of Vanuatu, New Caledonia, Fiji, and Tonga.

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

- El Niño conditions exist in the equatorial Pacific. Many dynamical climate models project the continuation of El Niño into early autumn 2010.
- Below normal rainfall is forecast for New Caledonia, Vanuatu, Niue, and Tonga.
- Above normal rainfall is expected for Western Kiribati, Eastern Kiribati and Tokelau.
- Above normal SSTs are forecast for Eastern Kiribati. Normal or above normal SSTs are forecast for the Northern Cook Islands, Marquesas, the Tuamotu Archipelago, Western Kiribati, the Solomon Islands, and Papua New Guinea. SSTs are expected to be near or below normal around Fiji, and near normal elsewhere in the southwest Pacific.

Collaborators

Pacific Islands National
Meteorological Services

Australian Bureau of
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Meteo France

NOAA National Weather
Service

NOAA Climate Prediction
Centre (CPC)

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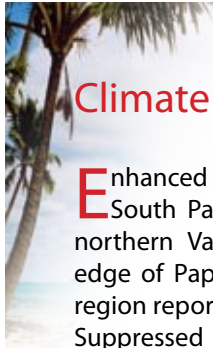
European Centre for
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UK Met Office

World Meteorological
Organization

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Climate developments in November 2009

Enhanced convection along a partially southwest displaced South Pacific Convergence Zone (SPCZ) were seen near northern Vanuatu, northern Queensland, and the eastern edge of Papua New Guinea during November. Most of the region reported well below normal rainfall during the month. Suppressed convection existed in the central portion of the southwest Pacific, particularly around Fiji, southern Vanuatu and New Caledonia. The regional circulation in November was characterised by more frequent low pressure to the southeast of the Society Islands and higher than normal pressure to the northwest of New Zealand and over Australia. This pattern resulted in more frequent easterly and southeasterly anomalies across the much of southwest Pacific, and southerly flow entering the region from the east of New Zealand. Easterly anomalies were particularly evident across Fiji, Vanuatu, and New Caledonia.

Very high rainfall was recorded at only a few stations in the region this past month. In Western Kiribati, 244mm (185% of normal) of rain fell during November, and this is the sixth month in a row with considerable rainfall at that location. Positive rainfall anomalies in Western Kiribati are still more pronounced than in central and eastern parts of Kiribati. In Tonga, 222mm (155% of normal) rainfall was recorded at Lupepau'u, and in the Society Islands rainfall was well above normal at Tahiti (253mm, 196% of normal) and Bora Bora (246mm, 135% of normal). In addition, Funafuti (Tuvalu) received, 418mm of rainfall (176% of normal), which was the highest total reported for the region this past month.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Fiji	Ono-i-lau	3	2	Record low
New Zealand	Whangarei	6	7	Record low
Samoa	Nafanua	106	N/A	Record low
Vanuatu	Tanna	6	N/A	Very low
Solomon Islands	Honiara	52	36	Very low

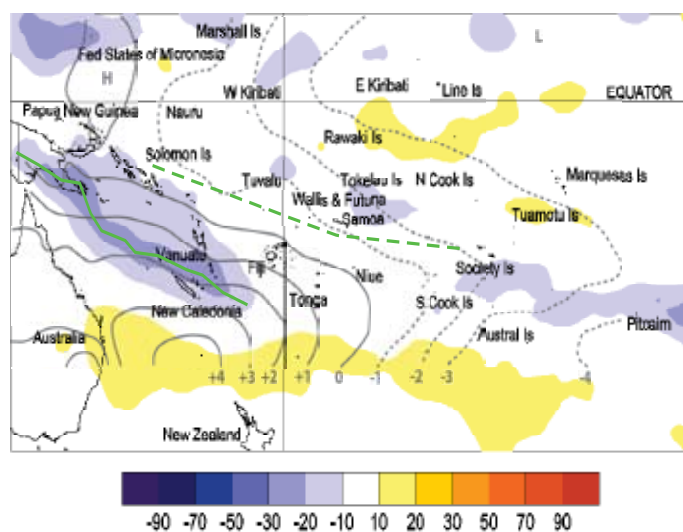
Soil moisture in November 2009

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.

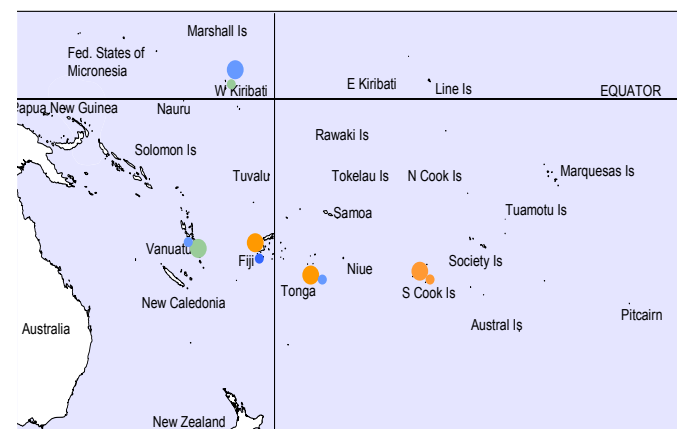
The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to the available water already in the soil comes from rainfall, with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture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

Aitutaki (Southern Cook Islands), Nadi (Fiji), and Fua'amotu (Tonga) project important soil moisture deficits at this time. Tarawa (Western Kiribati) projects moist soil moisture, while Vila (Vanuatu) is moderate at this time.

As a whole, the regional rainfall developments were largely characterised by drier than normal conditions for many island groups as a result of the continuation and strengthening of El Niño during November. Well below normal rainfall occurred over most of Vanuatu and New Caledonia last month, with many stations recording 30% to 60% of normal levels. Southeast Australia was also very dry, with Sydney reporting only 13mm of rain for the month. Dry conditions were also reported for Samoa, and extended to neighboring Tonga, which had three stations that received less than 60% of normal rainfall during November.



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 November 2009 position of the South Pacific Convergence Zone (SPCZ) southwest of normal near the Solomon Islands, but was incoherent west of Fiji. The average SPCZ position 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.



November 2009 November 2008

- Wet
- Moderate
- Dry

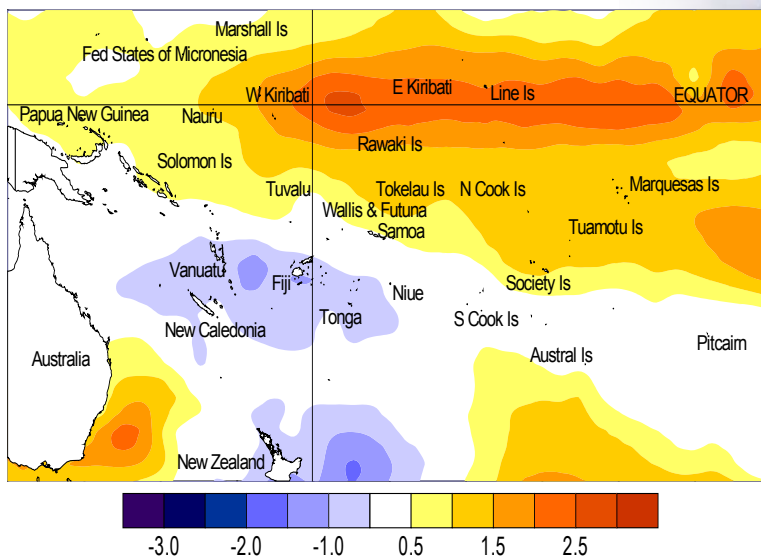
Estimated soil moisture conditions at the end of November 2009, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

El Niño/Southern Oscillation (ENSO)

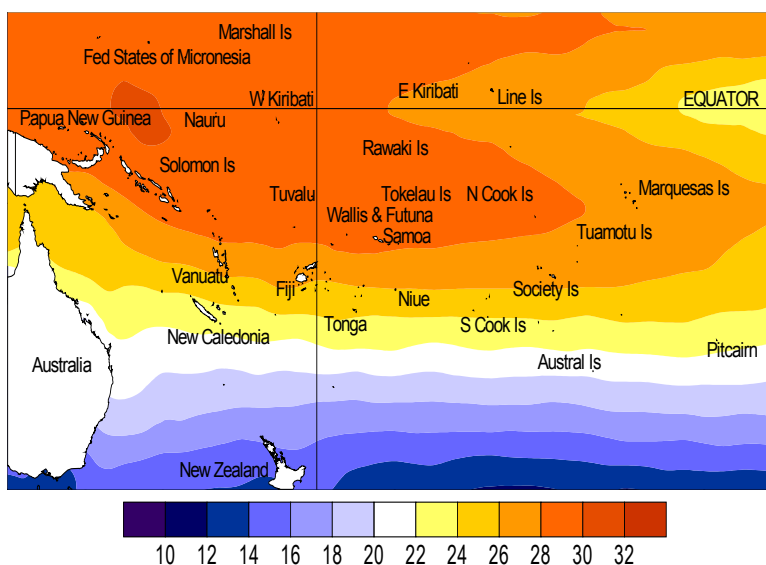
During November, El Niño conditions in the equatorial Pacific strengthened during October and November. Equatorial sea surface temperature anomalies increased across much of the Pacific. For the last two months, NINO4 has been more positive than NINO3. In November, NINO3 and NINO4 anomalies were +1.5°C and +1.7°C (3-month SON means +1.3°C and +1.4°C). The upper-ocean equatorial heat content increased further in November, and there was a very large and positive subsurface temperature anomaly of +5°C near 125°W and 100m depth.

In the atmosphere, the SOI weakened slightly from its October value of -1.6, with a November average of -0.8 (and SON mean of -0.7). The strong westerly wind anomalies east of the Dateline that existed during October weakened and reversed in the first half of November, but westerlies returned towards the end of the month. Convection over the Tropical Pacific was quite unusual during November, with all the most intense convection well away from the Equator, and mostly centralised in the Southern Hemisphere. In what is perhaps an indication of this unusual convection pattern, the TRMM ENSO precipitation index crossed into the La Niña range at -0.49. There was a big movement of the MJO during November, but its phase was such as to promote equatorial convection in the Indian Ocean and suppress it in the Pacific west of the Dateline.

The global climate model ensemble assessed by NIWA show all dynamical models (and all but one statistical model) with warm conditions through to the end of February 2010. The dynamical models continue the warm conditions through autumn 2010 but with a general easing to neutral conditions by winter. The NCEP ENSO discussion from 5 November suggests the El Niño is expected to continue to strengthen, and persist at least through southern summer. The IRI summary (19 November) indicates a 96% probability for El Niño conditions for the coming summer season.



Sea surface temperature anomalies (°C) for November 2009



Mean sea surface temperatures (°C) for November 2009

Tropical Cyclone guidance and activity: November 2009 to April 2010

Tropical cyclone (TC) activity in the southwest Pacific is expected to be near normal for the 2009–10 season. On average, nine TCs occur in the region each year between November and April. Countries east of the date line, including Niue and Tonga, are at higher risk than normal because of the current weak El Niño. French Polynesia (Society and Austral Islands) and the southern Cook Islands can also be affected by TCs during El Niño, so these islands should also remain vigilant. More details about the 2009–10 TC outlook can be found at <http://www.niwa.co.nz/news-and-publications/news/all/tropical-cyclone-outlook-normal>

Forecast validation: September to November 2009

A region of suppressed convection was forecast for the southwest Pacific encompassing Tokelau, the Northern Cook Islands, Tonga, Fiji, New Caledonia, and Papua New Guinea. Near to below average rainfall was expected for those areas. Below average rainfall was forecast for the Marquesas. Near normal rainfall was forecast for Niue, Southern Cook Islands, Wallis & Futuna, the Austral Islands and Pitcairn Island. Enhanced convection was expected along the Equator extending from Western to Eastern Kiribati, and also near the Solomon Islands, with a forecast of near or above normal rainfall, with Western Kiribati and the Solomon Islands forecast

to receive above normal rainfall. No clear precipitation guidance was offered for Vanuatu, Tuamotu Archipelago, Samoa, and the Society Islands.

The September–November 2009 forecast validation was calculated for 13 island groups (five Pacific Islands were forecast as climatology and were unscorable). The global island group 'hit' rate was 65%, 2% lower than average for September forecasts, and 4% higher than the average for all months combined. Rainfall was over projected for the Marquesas, and underprojected for Niue.Society Islands.

Tropical Pacific rainfall – November 2009

Territory and station name	November 2009 rainfall total (mm)	November 2009 percent of average
Australia		
Cairns Airport	213	220
Townsville Airport	25	41
Brisbane Airport	31	32
Sydney Airport	13	16
Cook Islands		
Penrhyn	105	47
Aitutaki	N/A	N/A
Rarotonga Airport	50.7	37
Fiji		
Rotuma Island	205	73
Udu Point	62	30
Nadi Airport	41	31
Nausori	110	45
French Polynesia		
Hiva Hoa, Atuona	112	118
Bora Bora	246	135
Tahiti – Faa'a	253	196
Tuamotu, Takarua	75	36
Gambier, Rikitea	212	93
Tubuai	170	131
Rapa	125	72
Kiribati		
Tarawa	244	185
Kanton	20	36
New Zealand		
Kaitia	15	15
Whangarei Airport	6	7
Auckland Airport	22	27
New Caledonia		
Ile Art, Belep	49	44
Koumac	N/A	N/A
Ouloup	N/A	N/A
Ouanaham	31	29
Poindimie	95	51
La Roche	76	66
La Tontouta	9	16
Noumea	36	61
Moue	68	67
Niue		
Hanan Airport	183	105
Liku	215	141

Territory and station name	November 2009 rainfall total (mm)	November 2009 percent of average
North Tasman		
Lord Howe Island	8	7
Norfolk Island	9	13
Raoul Island	6	6
Samoa		
Faleolo Airport	149	64
Apia	89	34
Nafanua	106	N/A
Afiamalua	281	N/A
Alafua	140	N/A
Solomon Islands		
Taro	298	126
Munda	251	107
Auki	112	54
Honiara	52	36
Henderson	52	30
Kira Kira	174	74
Santa Cruz, Lata	368	106
Tonga		
Niufo'ou	280	123
Mata'aho Airport	N/A	N/A
Lupepau'u	222	155
Salote Airport	63	55
Nuku'alofa	40	36
Fua'amotu Airport	40	40
Tuvalu		
Nanumea	140	81
Nui Island	317	118
Funafuti	418	176
Nuilakita	295	106
Vanuatu		
Sola	389	122
Pekoa	83	42
Lamap	59	46
Port Vila	40	26
Tanna/Whitegrass	6	N/A
Aneityum	69	46
Papua New Guinea		
Port Moresby	141	243
Wewak	90	45
Kavieng	164	67

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.**

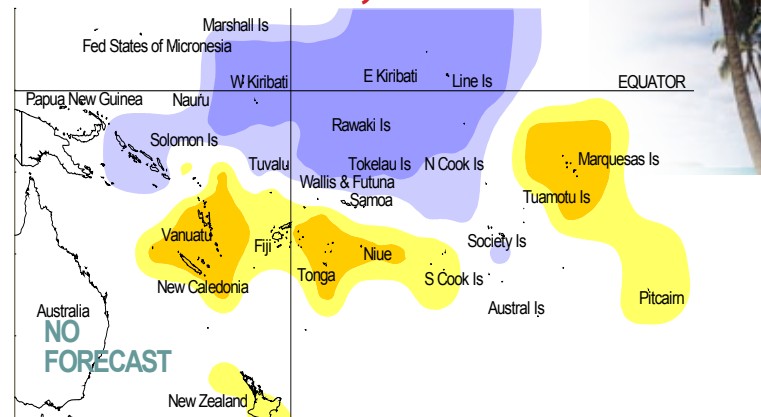
Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and * denotes synoptic values.

Tropical rainfall and SST outlook: December 2009 to February 2010

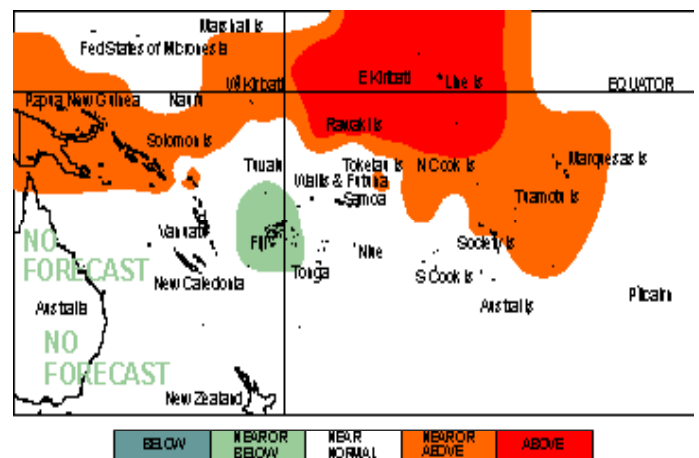
During December 2009 – February 2010, a region of suppressed convection is likely in the southwest Pacific encompassing Niue, Tonga, New Caledonia, and Vanuatu. Below average rainfall is expected for all of those island groups. Near or below normal rainfall is expected for Fiji, Wallis & Futuna, the Southern Cook Islands, the Marquesas, and Pitcairn Island. Enhanced convection is likely along the Equator extending from Western to Eastern Kiribati, and also near Tokelau, with an expectation of above rainfall for those islands. Near normal rainfall is forecast for Papua New Guinea, Samoa, the Tuamotu Archipelago, and the Austral Islands.

The global models are continuing to show elevated temperatures in the near equatorial Pacific sea surface for the northern half of the Southwest Pacific. Most SST anomalies are consistent with the projections from last month. Above average sea surface temperatures are forecast for Eastern Kiribati. A region of near or above average sea surface temperatures is forecast around Papua New Guinea, the Solomon Islands, Western Kiribati, the Northern Cook Islands, the Marquesas and the Tuamotu archipelago. Near normal SSTs are forecast for the remainder of the southwest Pacific, except for Fiji, with near or below average SSTs.

The confidence in the multi-model ensemble forecast skill for this seasonal rainfall outlook is moderate to moderately high. In the past, the average region-wide hit rate for rainfall forecasts issued in December is 67%, 6% higher than the long-term average for all months combined. The SST forecast confidence is mostly high, but the greatest uncertainty is localised around the Marquesas and Eastern Kiribati.



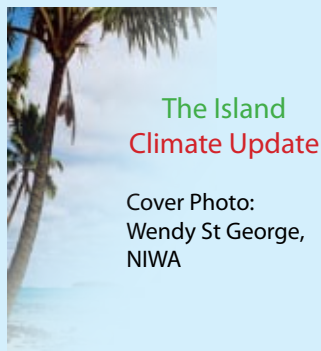
Rainfall outlook map for December 2009 to January 2010



SST outlook map for December 2009 to January 2010

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)	15:30:55 (Above)	High	Kiribati (Eastern)	20:30:50 (Above)	Moderate
Kiribati (Eastern)	20:35:45 (Above)	Moderate-High	Cook Islands (Northern)	25:35:40 (Near or Above)	Moderate-High
Tokelau	20:35:45 (Above)	Moderate	Kiribati (Western)	25:35:40 (Near or Above)	High
Society Islands	25:35:40 (Near or Above)	Moderate	Marquesas	25:35:40 (Near or Above)	High
Tuvalu	25:35:40 (Near or Above)	High	Papua New Guinea	25:40:35 (Near or Above)	Moderate-High
Cook Islands (Northern)	25:40:35 (Near or Above)	Moderate-High	Solomon Islands	25:40:35 (Near or Above)	Moderate-High
Solomon Islands	25:40:35 (Near or Above)	Moderate	Tuamotu Islands	25:40:35 (Near or Above)	High
Austral Islands	30:40:30 (Near normal)	Moderate-High	Austral Islands	30:40:30 (Near normal)	High
Papua New Guinea	30:40:30 (Near normal)	Moderate-High	Cook Islands (Southern)	30:40:30 (Near normal)	Moderate
Samoa	30:40:30 (Near normal)	Moderate	New Caledonia	30:40:30 (Near normal)	High
Tuamotu Islands	30:40:30 (Near normal)	Moderate	Niue	30:40:30 (Near normal)	High
Cook Islands (Southern)	35:40:25 (Near or Below)	Moderate	Pitcairn Island	30:40:30 (Near normal)	High
Wallis & Futuna	35:40:25 (Near or Below)	Moderate	Samoa	30:40:30 (Near normal)	High
Marquesas	40:35:25 (Near or Below)	Moderate	Society Islands	30:40:30 (Near normal)	High
Pitcairn Island	40:35:25 (Near or Below)	Moderate	Tokelau	30:40:30 (Near normal)	High
Fiji	40:35:25 (Near or Below)	Moderate	Tonga	30:40:30 (Near normal)	High
New Caledonia	45:30:25 (Below)	Moderate	Tuvalu	30:40:30 (Near normal)	High
Niue	45:35:20 (Below)	Moderate-High	Vanuatu	30:40:30 (Near normal)	High
Tonga	45:35:20 (Below)	Moderate-High	Wallis & Futuna	30:40:30 (Near normal)	High
Vanuatu	45:35:20 (Below)	Moderate	Fiji	35:40:25 (Near or Below)	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

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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/>