

# The Island Climate Update

## Collaborators

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Meteo France

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NOAA National Weather  
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NOAA Climate Prediction  
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International Research  
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Prediction

European Centre for  
Medium Range Weather  
Forecasts

UK Met Office

World Meteorological  
Organization

## August's climate

- The South Pacific Convergence Zone (SPCZ) extended from the Solomon Islands to the region south of the Cook Islands; very high rainfall occurred throughout much of Fiji and Tonga
- Suppressed convection occurred over Papua New Guinea with continued low rainfall in parts of Queensland, Australia
- Intermittent equatorial westerly wind bursts occurred
- Air temperatures were below average in Vanuatu and New Caledonia; it was warmer in Tuvalu, Samoa, and the Southern Cook Islands

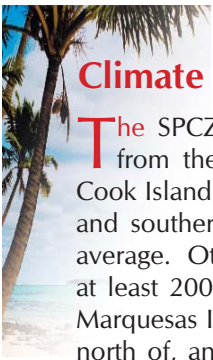
## Extreme events

- On the 21<sup>st</sup>, a tornado on the western side of Tongatapu Island (Tonga), causing severe damages to villages, crops and houses. The estimated cost of this event is up to \$T100,000

## El Niño Southern Oscillation and Seasonal Rainfall Forecasts

- Weak El Niño conditions are present in the central Pacific
- Enhanced convection is expected in the equatorial region of Western and Eastern Kiribati
- Near average or below average rainfall is likely in New Caledonia, Fiji, Tonga and the Marquesas Islands





## Climate developments in August 2004

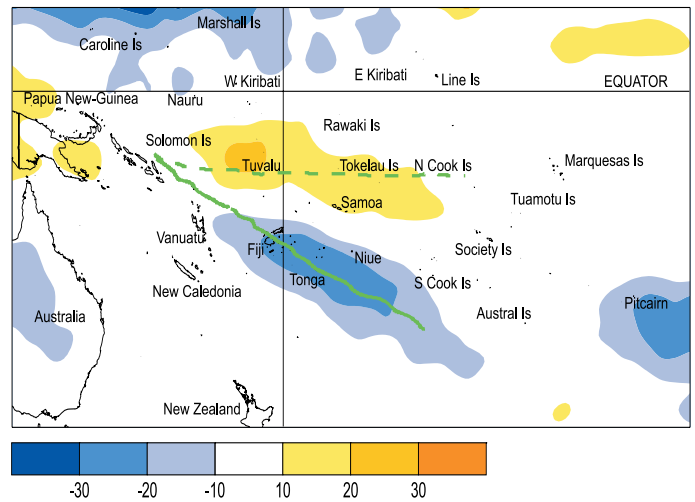
The SPCZ (South Pacific Convergence Zone) extended from the Solomon Islands to the region south of the Cook Islands. This included the main islands of Fiji, central and southern Tonga where rainfall was 200-400% above average. Other areas with enhanced convection and/or at least 200% of average rainfall were Pitcairn Island, the Marquesas Islands, Niue, much of Vanuatu, and the region north of, and including the Caroline and Marshall Islands (on the rim of a large region of very enhanced convection in the northwest tropical Pacific).

Suppressed convection occurred over Southeast Asia and Papua New Guinea, and also from Tuvalu to Samoa, including Tokelau. Rainfall continued below average in parts of Queensland, Australia. Rainfall was also below average in parts of New Caledonia, northern Tonga, northern New Zealand, and central French Polynesia.

Mean air temperatures were about 1.0°C below average in parts of Vanuatu and New Caledonia, and about 1.0°C above average in Tuvalu, Samoa, and the Southern Cook Islands.

Several periods of surface westerlies occurred in the western equatorial Pacific during the month, the most sustained being from the 16<sup>th</sup> through 19<sup>th</sup>.

Tropical Southwest Pacific mean sea-level pressures remained above average over northern Australia, and continued below average east of the Date Line from the Equator to Pitcairn Island, including Fiji and Tonga.

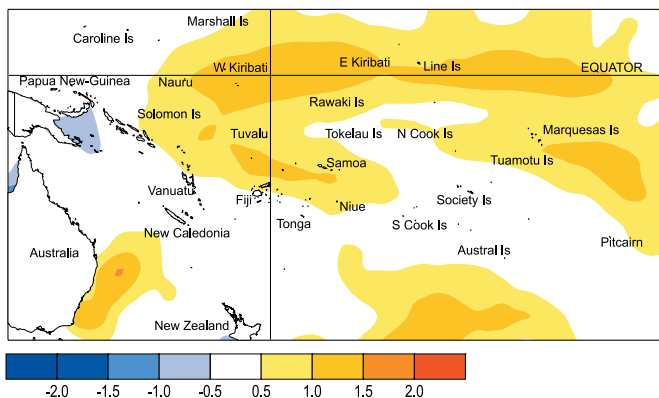


Outgoing Long-wave Radiation (OLR) anomalies, in Wm<sup>-2</sup>. The August 2004 position of the South Pacific Convergence Zone (SPCZ), as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line.

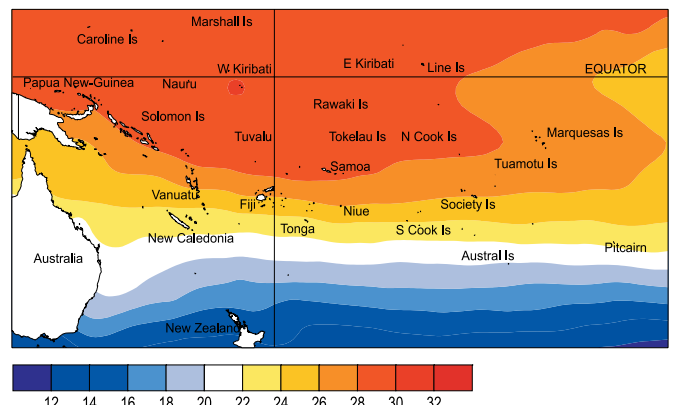
Country	Location	Rainfall (mm)	% of average	Comments
Fiji	Nadi Airport	256	394	Extremely high
Fiji	Nausori Airport	331	225	Extremely high
Fiji	Ono-i-Lau	294	249	Well above average
Tonga	Nuku'alofa	336	287	Extremely high
Tonga	Fua'amotu Airport	355	286	2 <sup>nd</sup> highest
French Polynesia	Hiva Hoa, Autona	202	213	Extremely high
Pitcairn Island	Pitcairn AWS	312	265	Well above average
Australia	Townsville Airport	<1	2	Extremely low
New Caledonia	Koumac	7	17	Well below average

The equatorial Pacific Ocean is in a weak El Niño state, however the ocean and the atmosphere are yet to be fully coupled. The Southern Oscillation Index (SOI) has become more negative over the past month, with a 3-month (July-August) mean reaching -1.1, the first time it has been that low since the spring of 2002. Equatorial sea surface temperature (SST) anomalies are above normal across much of the equatorial Pacific: for August, the NINO3, NINO4, and NINO3.4 SST anomalies were +0.3°C, +0.9°C, and +0.6°C, respectively (3-month means +0.1°C, +0.8°C, +0.5°C).

Subsurface temperatures show a positive anomaly (exceeding +2.0°C) now centred near 110°W and propagating eastward. August averaged OLR anomalies show some anomalous convection about and west of the Date Line north of the Equator, and westerly zonal wind anomalies are evident across much of the Equatorial Pacific at present. The majority of available models indicate neutral conditions in spring 2004, most with above average SSTs in the NINO3.4 region. Slightly more than half indicate El Niño conditions during summer 2004/05, with a weakening, back to neutral conditions, into autumn 2005.



Sea surface temperature anomalies (°C) for August 2004.



Mean sea surface temperatures (°C) for August 2004.



## Tropical rainfall outlook: September to November 2004

Continuing variability in the equatorial Pacific is expected to influence the Pacific rainfall for the coming three months. Even though this El Niño event is expected to be weak, the climate impacts will vary and can be extreme for some island countries.

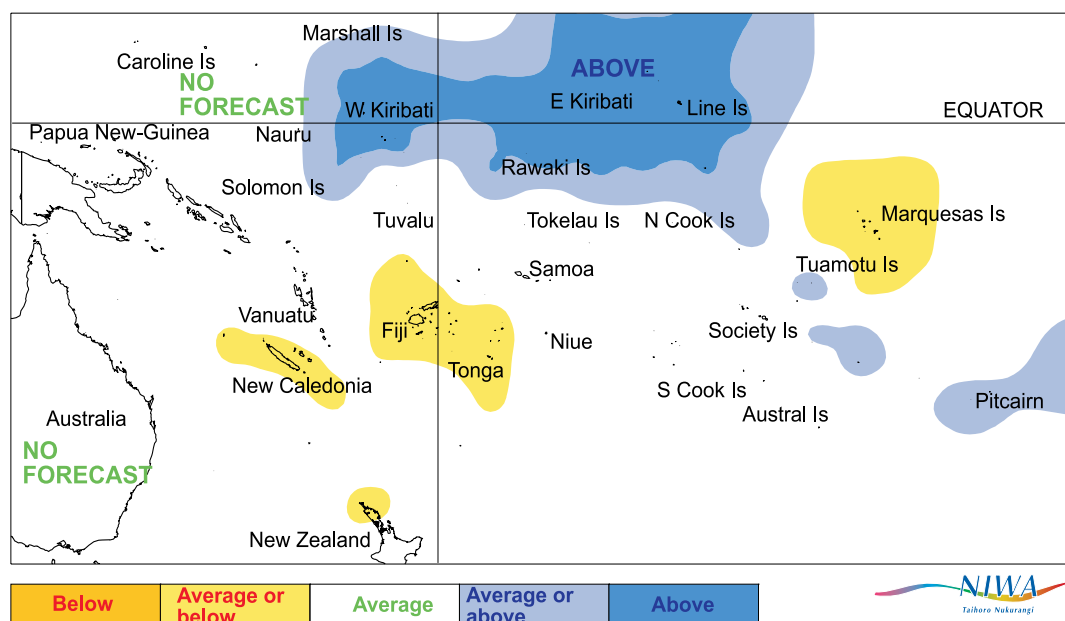
Rainfall is expected to be above average in the equatorial region of Western and Eastern Kiribati. Another region of enhanced convection is expected near the Tuamotu Islands extending southeast to Pitcairn Island, where rainfall is likely to be near average or above average.

Suppressed convection is expected in the south of the Coral Sea extending east to the Date Line, where rainfall is forecast to be near average or below average for New Caledonia, Fiji and Tonga. Rainfall is also expected to be near average or below average over the Marquesas Islands. Rainfall is likely to be near average elsewhere in the region.

The seasonal rainfall model skill is low to moderate for most island countries in the region.

Island group	Rainfall outlook	Outlook confidence
Western Kiribati	Above 20:30:50	Moderate - high
Eastern Kiribati	Above 20:30:50	Moderate - high
Tuamotu Islands	Average or Above 20:40:40	Moderate
Pitcairn Island	Average or Above 15:40:45	Moderate
Papua New Guinea	Average 25:50:25	Moderate
Solomon Islands	Average 20:45:35	Moderate
Vanuatu	Average 35:45:20	Moderate
Tuvalu	Average 25:50:25	Moderate
Wallis and Futuna	Average 20:50:30	Low - moderate
Tokelau	Average 30:40:30	Low
Niue	Average 20:50:30	Low - moderate
Samoa	Average 30:45:25	Moderate
Northern Cook Islands	Average 20:50:30	Moderate
Southern Cook Islands	Average 25:50:25	Moderate
Society Islands	Average 30:40:30	Moderate
Austral Islands	Average 25:50:25	Low
New Caledonia	Average or Below 45:40:15	Low - moderate
Fiji	Average or Below 35:40:25	Low - moderate
Tonga	Average or Below 40:35:25	Low - moderate
Marquesas Islands	Average or Below 45:40:15	Moderate

NOTE: Rainfall estimates for the next three months for Pacific Islands are given in the above table. The tercile probabilities (e.g. 20:30:50) are derived from the interpretation of several global climate models. They correspond to the odds of the observed rainfall being in the lowest (driest) one third of the rainfall distribution, the middle one third, or the highest (wettest) one third of the distribution. On the long-term average, rainfall is equally likely (33% chance) in any tercile.



Rainfall outlook map for September to November 2004.

## Forecast validation: June to August 2004

Enhanced convection with above average rainfall was expected over Papua New Guinea, with average or above average rainfall in the Solomon Islands and Western Kiribati. Another region of average or above average rainfall was forecast for the Southern Cook Islands, and the Society and Tuamotu Islands, with above average rainfall in the Austral Islands. Suppressed convection was expected over Eastern Kiribati, extending southwest to Vanuatu, including Tokelau, Samoa, Tuvalu, and Fiji, where rainfall was expected to be average or below average.

Rainfall was expected to near average elsewhere.

Enhanced convection and above average rainfall affected the region from Vanuatu to Tonga, including Fiji, Western Samoa, and Niue, as well as the Marquesas Islands and Pitcairn Island. Rainfall was higher than expected in both these regions. Rainfall was below average in Tuvalu. Rainfall was lower than forecast in Papua New Guinea, along with central and southern French Polynesia. The overall 'hit' rate for the June to August 2004 rainfall outlook was about 50%.



## Tropical Pacific rainfall - August 2004

Territory and station name	August 2004 rainfall total (mm)	Long-term average (mm)	August 2004 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
<b>Australia</b>						
Cairns Airport	9.8	27	36	0	140	1941
Townsville Airport	0.2	13	2	0	258	1940
Brisbane Airport	10.6	43	25	0	126	1929
Sydney Airport	104.6	79	132	1	378	1929
<b>Cook Islands</b>						
Rarotonga EWS	116.4	109	107			2000
<b>Penrhyn</b>	13.8	193	7	21	613	1937
<b>Fiji</b>						
Rotuma	150.8	208	73	24	592	1912
Nadi	256	65	394	0	286	1942
Nausori	331.2	147	225	29	393	1956
Ono-i-Lau	293.8	118	249	2	348	1943
<b>French Polynesia</b>						
Hiva Hoa, Atuona	202	95	213	14	231	1951
Tahiti - Faaa	17.4	44	40	0	111	1919
Tuamotu, Takaroa	36.4	66	55	12	170	1953
Tuamotu, Hereheretue	30	63	48	6	177	1962
Gambier, Rikitea	140	119	118	38	332	1952
Tubuai	135	136	99	41	293	1953
Rapa	217.4	229	95	108	567	1951
<b>Kiribati</b>						
Christmas Is/Kirimati	21.8	54	40	0	373	1951
Tarawa	241	153	158	3	507	1946
<b>Kanton Is</b>	36	95	38	5	214	1937
<b>New Caledonia</b>						
Ile Art, Belep	37.2	68	55	9	193	1962
Koumac	7	42	17	0	194	1951
Ouloup	72.4	75	97	0	341	1966
Ouanaham	92.4	81	114	3	206	1961
Poindimie	54.8	103	53	4	246	1965
La Roche	89.8	92	98	16	246	1956
La Tontouta	34.2	58	59	6	251	1949
Noumea	51.6	71	73	10	290	1863
Moue	42.8	85	50	18	187	1972
<b>Niue</b>						
Hanan Airport	212	99	214	39	179	1996

## Tropical Pacific rainfall - August 2004



Territory and station name	August 2004 rainfall total (mm)	Long-term average (mm)	August 2004 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
<b>New Zealand</b>						
Kaitaia	85	152	56	67	309	1985
<b>Whangarei Airport</b>	66.8	139	48	27	325	19937
Auckland Airport	73	108	68	35	218	1962
<b>North Tasman</b>						
Lord Howe Island	89.6	141	64	13	309	1886
Norfolk Island	63.6	123	52	46	230	1921
Raoul Island	125.4	128	98	6	494	1937
<b>Pitcairn Island</b>	312.4	118	265	15	325	1940
<b>Samoa</b>						
Faleolo	92.9	161	58	8	332	1951
Apia	72.4	111	65	2	391	1890
<b>Tonga</b>						
Queen Lavinia	52.3	117	45	10	444	1971
Niutoputapu	52.2	97	54	5	333	1947
Lupepau'u	169.7	89	191	32	134	1995
Salote Pilolevu Airport	224.9	100	225	10	341	1947
Nuku'alofa	336	117	287	17	273	1944
Fua'amotu Airport	355.2	124	286	16	366	1980
<b>Tuvalu</b>						
Nanumea	175.8	233	75	35	705	1941
Nui Island	82.1	221	37	43	580	1941
Funafuti	159.8	232	69	41	1196	1927
Nuilakita Island	145.1	198	73	26	557	1942
<b>Vanuatu</b>						
Pekoa	<i>137.8</i>	74	186	14	328	1951
Lamap	<i>103</i>	59	175	5	165	1960
Bauerfield	<i>140.6</i>	61	230	14	184	1985
Burtonfield	<i>121.2</i>	32	379	9	231	1961
Aneityum	<i>139</i>	92	151	14	404	1958
<b>Wallis &amp; Futuna</b>						
Wallis Island, Hihifo	20.6	133	15	20	323	1951

Rainfall totalling 200 percent or more is normally well above average. Totals of 40 percent or less are normally well below average. **Highlighted values are new records.**

Data are as received and may be subject to change with later quality control. The data in italics are obtained from synoptic weather reports and can sometimes differ from the true values, due to communications or station outage, etc. Superscripts represent days of missing data.

# Pacific Dialogue on Water and Climate

Dr Marc Overmars, SOPAC

## Island Vulnerability

The vulnerability of Small Island Countries has received increasing attention since the Barbados Conference on the Sustainable Development of Small Island Developing States in 1994.

The particular vulnerability of islands is often described in terms of their remoteness, small size and exposure to climatic instability. The significance of the climatic component of vulnerability has drawn particular attention to the impacts of climate variability and change on Pacific Island Countries (PICs).

Climatic events in the region, such as El Niño Southern Oscillation (ENSO) episodes; the reverse condition to El Niño, La Niña; and tropical cyclones causing either droughts or floods, have a large impact on the water resources of PICs.

In addition to current climatic variability, there is the possibility of climate change and sea level rise caused by the enhanced greenhouse effect resulting from worldwide emissions of greenhouse gases. Climate change scenarios for PICs vary according to location and the models used. Most models predict an increase in frequency of El Niño episodes and increased intensity of cyclones.



## Pacific Dialogue on Water and Climate

The vulnerability of Small Island Countries was also acknowledged by the global water community through the inclusion of "Water in Small Island Countries" as a special theme at the 3rd World Water Forum that was held in Kyoto, Japan from 16-23 March 2003. The South Pacific Applied Geoscience Commission (SOPAC) and the Asian Development Bank (ADB) jointly led this "Water in Small Island Countries" session.

As part of the Pacific preparations for the 3rd World Water Forum, a regional consultation on sustainable water management was held in conjunction with the "Pacific Dialogue on Water and Climate". This dialogue was initiated "to improve the capacity in water resources management to cope with the impacts of increasing variability of the world's climate, by establishing a platform through which policymakers and water resources managers have better access to, and make better use of, information generated by climatologists and meteorologists."<sup>2</sup>

## Outcomes

As a result of the regional consultation Ministers, Heads of Delegation and representatives of civil society groups with responsibilities for water affairs from 16 small island countries in the Pacific, as well as East Timor and the Maldives agreed upon the implementation of the "Pacific Regional Action Plan for Sustainable Water Management" Relevant to the Dialogue on Water and Climate, the regional action plan contained three key messages as follows:

•Key Message 1: Strengthen the capacity of small island countries to conduct water resources assessment and monitoring as a key component of sustainable water resources management.

•Key Message 2: There is a need for capacity development to enhance the application of climate information to cope with climate variability and change.

•Key Message 3: Change the paradigm for dealing with Island Vulnerability from disaster response to hazard assessment and risk management, particularly in Integrated Water Resource Management.



## From Vision to Action

Based on the Key Messages the need for regular climate information and hydrological training have been identified by the New Zealand Agency for International Aid (NZ AID) as two needs for Pacific Island countries that can be addressed through their assistance to the Pacific Type II Partnership Initiative on Sustainable Water Management.

NZ AID agreed to the funding of a programme to provide monthly climate information through the Pacific Island Climate Update (ICU) and develop and strengthen the basic hydrological training needs of small island countries in the Pacific.

The publication of the ICU has been continued and plans are being developed to broaden its scope to include additional information for end users in Pacific islands, such as the effects of forecast climate on an island's water resources (rainfall, surface and ground waters).



A wider distribution of the ICU will enhance the application of climate information by climate sensitive sectors such as energy, water supply, agriculture, etc. As a result of SOPAC's involvement, the ICU will be disseminated to a wider group of end-users in the Pacific, including national hydrological services, water utility managers and disaster managers.

<sup>1</sup>[http://list.sopac.org.fj/Secretariat/Programmes/H2O/3rd\\_world\\_water\\_forum/index.html](http://list.sopac.org.fj/Secretariat/Programmes/H2O/3rd_world_water_forum/index.html)

<sup>2</sup><http://www.waterandclimate.org/home.html>

For further information, please contact Dr Marc Overmars at SOPAC, e-mail [marc@sopac.org](mailto:marc@sopac.org)



## The Island Climate Update

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Wendy St George,  
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### 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**

Requests for Pacific Island climate data should be directed to the Meteorological Services concerned.

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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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