

Number 59, August 2005

# The Island Climate Update

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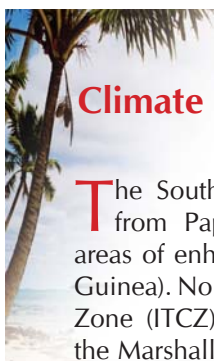
## July's climate

- South Pacific Convergence Zone extends from Papua New Guinea to Tuvalu
- Rainfall well above average in parts of Fiji and the Southern Cook Islands
- Temperatures above average in Western Kiribati, Tuvalu and much of the French Polynesia; below average in Fiji and Vanuatu

## El Niño/Southern Oscillation and seasonal rainfall forecasts

- Tropical Pacific continues in a neutral El Niño/Southern Oscillation state
- Near or above average rainfall likely over Papua New Guinea, the Solomon Islands, Wallis and Futuna, the Northern Cook Islands and the Marquesas Islands.
- Near or below average rainfall expected over Western and Eastern Kiribati, Fiji, the Southern Cook Islands and the Pitcairn Island





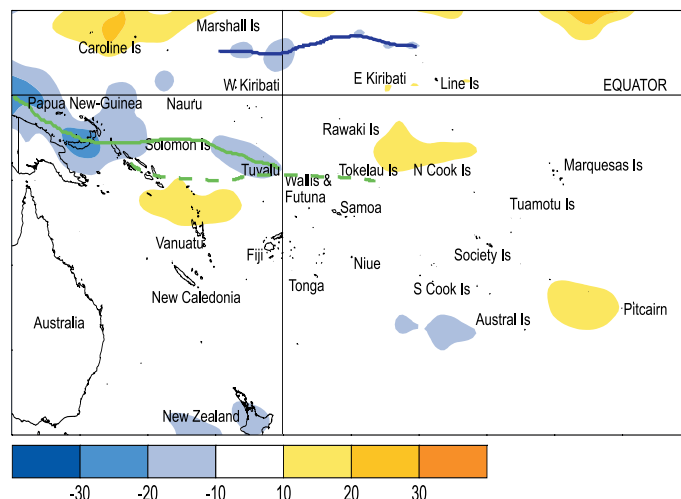
## Climate developments in July 2005

The South Pacific Convergence Zone (SPCZ) extended from Papua New-Guinea to Tuvalu (associated with areas of enhanced convection, especially near Papua New Guinea). North of the Equator, the Inter-tropical Convergence Zone (ITCZ) extended eastward from the region south of the Marshall Islands. Overall outgoing long-wave radiation (OLR) anomalies were rather weak, and there were no large areas of suppressed convection.

Rainfall was more than 200% of average in parts of Queensland (Australia), Fiji, and the Southern Cook Islands, and at least 125% of average in parts of Western and Eastern Kiribati, southern Vanuatu, southern Tonga, Niue, central French Polynesia, and northern New Zealand. Rainfall was less than 50% of average in northern Tonga, the Norfolk and Kermadec Islands, and less than 75% of average in parts of southern French Polynesia.

Mean air temperatures were about 1.0 °C above average in Western Kiribati and northern and central French Polynesia, and about 0.5 °C about average in Tuvalu. In contrast they were about 1.0 °C below average in Fiji, and 0.5 °C below average in Vanuatu.

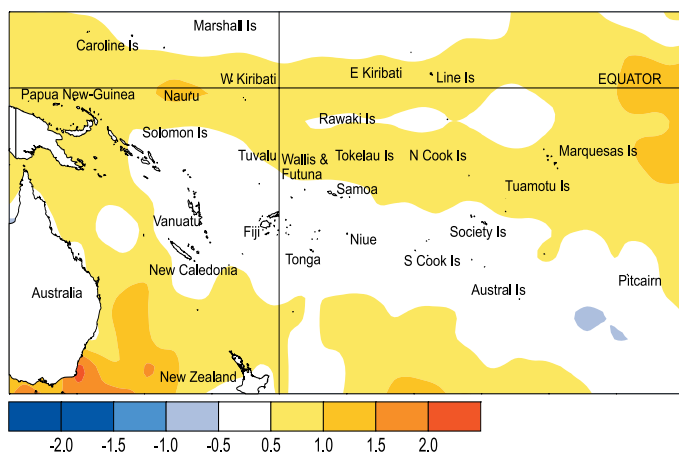
Tropical Southwest Pacific mean sea-level pressures were above average at 30° latitude over Australia, the north Tasman Sea, and further east toward the Date Line. Pressures were below average over along the Equator, east of Western Kiribati.



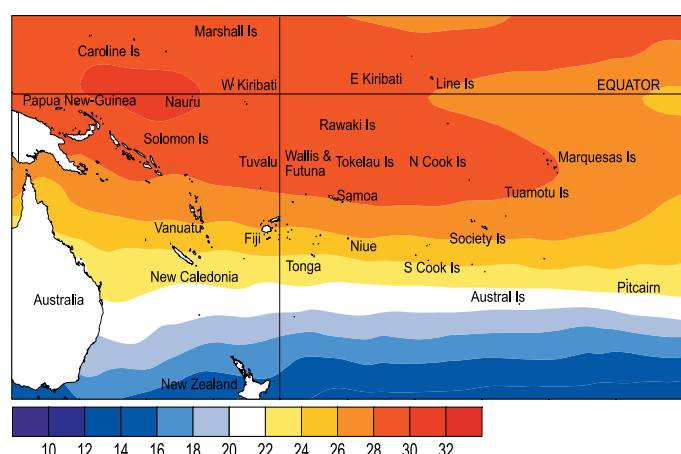
Outgoing Long-wave Radiation (OLR) anomalies, in  $\text{Wm}^{-2}$ . The July 2005 position of the SPCZ, as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line (blue equals high rainfall and yellow equals low rainfall). The July position of the ITCZ is indicated by the solid blue line.

Along the Equator, surface equatorial easterlies occurred in 78% of observations at Tarawa, westerlies being infrequent.

Country	Location	Monthly Rainfall (mm)	% of average	Comments
Cook Islands	Rarotonga EWS	258	248	Well above average
Fiji	Nausori	230	195	Well above average
Tonga	Mata'aho Airport	7	7	Extremely low



Sea surface temperature anomalies (°C) for July 2005.



Mean sea surface temperatures (°C) for July 2005.

The tropical Pacific Ocean is in a neutral state (no El Niño or La Niña), but equatorial Pacific sea surface temperature (SST) anomalies remain positive. The Southern Oscillation Index (SOI) has been near zero during June and July, with the 3-month May - July mean at  $-0.4$ . The NINO3, NINO4, and NINO3.4 SST anomalies were all between  $+0.6$  and  $+0.7^\circ\text{C}$  in July, and have been near those levels for most of 2005. Equatorial SST anomalies have risen recently west of the Date Line. The main feature in Equatorial Pacific subsurface temperature profile is a region of negative anomalies below 100m depth in the central Pacific, which has intensified in the last few weeks. Outgoing longwave radiation (OLR) anomalies show a region of enhanced convection west of of the Date Line, where convection had previously been suppressed.

OLR anomalies elsewhere remain small. The Madden Julian Oscillation (MJO) has been inactive for the past two months.

Most available models indicate neutral conditions (mostly with positive NINO3.4 anomalies) through the rest of 2005. The Scripps/MPI and LDEO dynamical models develop a warm event over the summer, while the Linear Inverse Model predicts a cooling over the next several months. The latest NCEP/CPC statement suggests neutral conditions through the rest of the year, but with positive SST anomalies in the "Niño regions". The IRICP summary gives a 70-75% chance of neutral conditions persisting through to December, with a 25% chance of an El Niño developing, and 5% for La Niña.





## Tropical rainfall outlook: August to October 2005

Enhanced convection is expected from Papua New Guinea extending east to the Marquesas Islands, including the Solomon Islands, Wallis and Futuna and the Northern Cook Islands, where rainfall is expected to be near or above average.

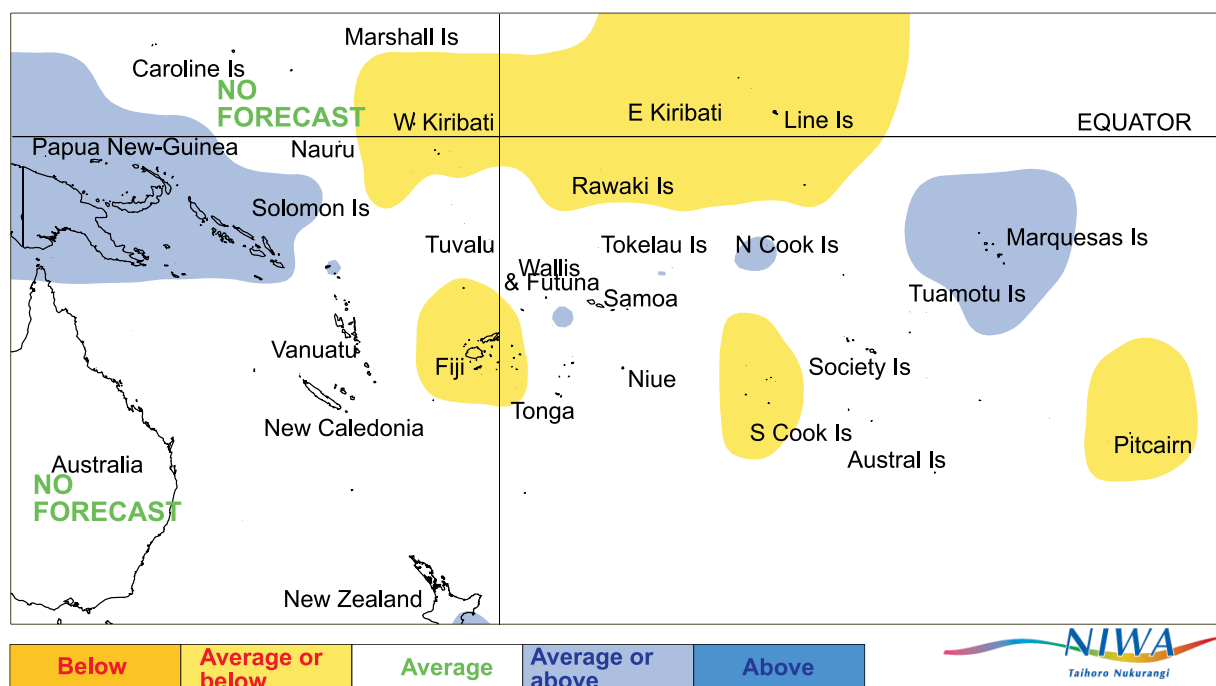
Near or below average rainfall is forecast for Western and Eastern Kiribati, Fiji, the Southern Cook Islands and the Pitcairn Island.

Rainfall is expected to be near average elsewhere in the region.

The skill of the global rainfall forecast models remain in low to moderate range.

NOTE: Rainfall estimates for Pacific Islands for the next three months are given in the 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.

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

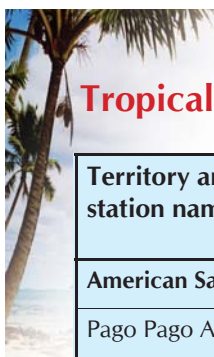


Rainfall outlook map for August to October 2005.

## Forecast validation: May to July 2005

Enhanced convection and average or above average rainfall was expected over the Solomon Islands and Vanuatu, as well as the Southern Cook Islands. Suppressed convection with below average rainfall was expected in the Marquesas Islands, with near or below average rainfall in the Tuamotu Islands, as well as Tuvalu and Tokelau. Rainfall was expected to be near average rainfall elsewhere in the region.

Areas of above average (and higher than expected) rainfall occurred from Tonga northeast to the Marquesas Islands, including American Samoa and the Tuamotu Islands of French Polynesia. Rainfall was below average (and lower than expected) over Tokelau, Wallis and Futuna, and the Austral Islands. Rainfall was near average elsewhere. The overall 'hit' rate for the May-July 2005 rainfall outlook was about 60%.



## Tropical Pacific rainfall – July 2005

Territory and station name	July 2005 rainfall total (mm)	Long-term average (mm)	July 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
<b>American Samoa</b>						
Pago Pago Airport	121.9	160	76			1966
<b>Australia</b>						
Cairns Airport	64.6	29	223	0	145	1941
Townsville Airport	25.0	14	179	0	<b>174</b>	1940
Brisbane Airport	16.6	63	26	1	399	1929
Sydney Airport	75.4	126	60			1929
<b>Cook Islands</b>						
Penryhn	121.8	139	88	11	659	1937
Rarotonga Airport	258.1	104	248	13	298	1929
Rarotonga EWS	255.4	104	246	39	207	2000
<b>Fiji</b>						
Rotuma	106.2	199	53	34	622	1912
Udu Point	92.5	89	104	8	326	1946
Nadi	61.0	45	136	0	190	1942
Nausori	230.4	118	195	18	560	1956
Ono-I-Lau	56.2	92	61	1	222	1943
<b>French Polynesia</b>						
Hiva Hoa, Atuona	98.6	120	82	20	357	1951
Bora Bora, Motu	51.4	101	51	3	316	1951
Tahiti - Faaa	79.0	56	141	2	253	1919
Tuamotu, Takaroa	28.4	82	35	12	311	1953
Tuamotu, Hereheretue	78.2	90	87	20	250	1962
Gambier, Rikitea	62.6	128	49	27	250	1952
Tubuai	80.6	138	58	28	299	1953
Rapa	160.0	247	65	93	518	1951
<b>Kiribati</b>						
Tarawa	192.9	157	123	1	507	1946
<b>New Caledonia</b>						
Ile Art, Belep	87.6	114	77	2	427	1962
Koumac	40.2	56	72	1	221	1951
Ouloup	44.2	95	47	10	256	1966
Ouanaham	124.0	106	117	12	500	1961
Poindimie	153.0	140	109	11	393	1965
La Roche	81.6	98	83	10	497	1956
La Tontouta	69.8	68	103	8	229	1949
Noumea	94.8	85	112	11	271	1863
Moue	63.8	98	65	21	235	1972

## Tropical Pacific rainfall – July 2005



Territory and station name	July 2005 rainfall total (mm)	Long-term average (mm)	July 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
<b>New Zealand</b>						
Kaitaia	266.6	166	161	25	358	1985
Whangarei Aiport	227.8	162	141	24	498	1937
Auckland Airport	161.8	131	124	36	304	1962
<b>Niue</b>						
Hanan Airport	188.4	100	188	35	192	1996
<b>North Tasman</b>						
Lord Howe Island	200.0	187	107	72	496	1886
Norfolk Island	68.8	148	46	44	292	1921
Raoul Island	48.2	168	29	40	323	1937
<b>Tonga</b>						
Queen Lavinia	91.7	136	67	8	474	1971
Niutoputapu Airport	7.4	109	7	4	542	1947
Lupepau'u	170.7	99	172	59	188	1995
Nuku'alofa	143.2	95	151	29	259	1944
Fua'amotu Airport	164.8	110	150	25	235	1980
<b>Tuvalu</b>						
Nanumea	180.0	208	87	21	549	1941
Nui Island	403.5	243	166	60	710	1941
Funafuti	359.9	252	143	72	617	1927
Nuilakita Island	279.4	200	140	43	490	1942
<b>Vanuatu</b>						
Sola	164.6	244	67			1958
Pekoa	97.6	85	115	12	679	1951
Lamap	104.4	95	110	16	425	1960
Bauerfield	58.9	77	76	8	266	1985
Port Vila	56.7	68	83	5	246	1947
Whitegrass	60.6					
Burtonfield	57.0	43	133	2	216	1961
Aneityum	132.5	107	124	10	216	1958
<b>Wallis &amp; Futuna</b>						
Wallis Island, Hihifo	81.8	161	51	68	455	1951
Maopopo, Futuna Island	51.8	165	31			

Rainfall totalling 200 percent or more is considered well above average. Totals of 40 percent 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. The data in italics are obtained from synoptic weather reports. These can sometimes differ from the true values, due to communications or station outage, etc.



# Aftermath and lessons learned from the 2004/05 tropical cyclone season in the Cook Islands

Imogen Ingram, Te Pa Mataiapo, Rarotonga, Cook Islands

This article covers the aftermath of the five tropical cyclone season which affected the Cook Islands in February and discusses the relief, recovery and reconstruction. Last month's Island Climate Update summarised the adaptation of the communities leading up to and during the cyclone season.

## Relief and Recovery

One of the main impacts was the closure of the airports and roads due to debris and damages from the cyclones. The first priority of the Cook Islands Government was to open the airport and as many roads as possible so that relief items could be supplied to the rural areas for recovery and for the preparation for further cyclones. A group of 20 soldiers arrived to assist with recovery under the FRANZ agreement (France, Australia and New Zealand). Residents also cleared debris which could pose a threat during following cyclones.

The New Zealand International Aid and Development Agency provided assistance to the Cook Islands by funding Cook Island residents living in New Zealand to help with assistance and rehabilitation after the cyclones. They worked on restoring electricity, phone and water services in Rarotonga and the outer islands over a two week period.

The next priority was to provide assistance to the commercial sector and other government departments to restore infrastructure. After the five cyclones, the Cook Islands received significant international aid and assistance which almost restored life back to normal for most of the Southern Cook Islands by mid-March 2005.

However, this was not the case for the northern group atoll of Pukapuka, which was the worst to be affected by Cyclone Percy. Most buildings had lost their roofs, so residents suffered a few days of wet and cramped conditions. The immediate needs there included tents for shelter, dry clothing, water and food, and medicines. Rough seas delayed the shipping of supplies and the airport was unusable until the debris was cleared.

Pukapuka was inundated by waves, which contaminated wells and arable lands. Without roofs, it was difficult to capture rainfall so potable water supplies fell. Red Cross officials organised a shipment of fresh water from American Samoa, speeding the delivery time. FRANZ later delivered a desalinator to provide drinking water, but the reliable supply of such water has been a continuing problem.

Hydroponics had already been introduced through a Ministry of Agriculture food security program, and could provide the means to avoid long-term dependence on imported foods until traditional methods can be used again.

Cyclone Percy severely damaged the 13-year old solar energy programme on Pukapuka, as most of the photovoltaic panels sited on the roofs were dislodged. An estimated 60% of these are salvageable. Diesel generation for electricity requirements has been proposed, but given the high price of diesel and the lack of technical maintenance skills, the reinstatement of the solar energy system, perhaps with back up by wind generation, is the preferred option for this remote atoll group,

## Reconstruction

The New Zealand Government has contributed nearly NZ\$1.8 million in immediate response by June 2005. Disaster relief packages are available from the banks for personal and business banking customers who have suffered property damage, crucial for reconstruction as insurance against cyclone damage is not available.

The Cyclone Emergency Assistance Loan recently negotiated with the Asian Development Bank provides the government with a flexible resource to finance priority requirements in reinstating essential public services. The two-year program includes technical assistance to strengthen disaster and recovery management, including damage assessments.

The damage to infrastructure, government properties, beaches and private housing for Rarotonga alone is estimated at NZ\$7 million, 7% of the annual budget for the Cook Islands government for the 2005 year of NZ\$101million.

The current estimate by government of the total costs for rebuilding communities, infrastructure, services, supplies and vegetation affected by the cyclones is NZ\$25 million over a 10-year period. The Cook Islands Minister of Finance believes that mere restoration is short-sighted and that reconstruction in a manner which minimizes future destruction from tropical cyclones would ensure funds have been spent more effectively.

Imogen Ingram is traditional leader in Rarotonga, Cook Islands. She was born and studied in New Zealand but resides in the Cook Islands now.



## The Island Climate Update

Cover Photo:  
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.

## Acknowledgements

This bulletin is produced by NIWA and made possible with financial support from the New Zealand Agency for International Development (NZAID), with additional support from the South Pacific Geosciences Commission (SOPAC) and the Secretariat for the Pacific Regional Environmental Programme (SPREP).

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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