Number 58, July 2005

The Island Climate Update

June's climate

- South Pacific Convergence Zone rather weak
- Above average rainfall in parts of Fiji, the Wallis and Futuna Islands, Tonga, and American Samoa
- Below average rainfall in parts of Western Kiribati, New Caledonia, and northern and central French Polynesia, Niue, Tuvalu, and Vanuatu
- Above average temperatures in Western Kiribati, Tuvalu and the Marquesas Islands; below average in parts of Fiji and the Austral Islands

El Niño/Southern Oscillation and seasonal rainfall forecasts

- Neutral El Niño conditions in the tropical Pacific
- Suppressed convection expected over Fiji, Tuamotu Islands, and Pitcairn Island
- Near or above average rainfall likely in Western Kiribati, Solomon Islands, Tuvalu, Tokelau, Northern Cook Islands, and the Marquesas Islands

Collaborators

Australian Bureau of Meteorology

Meteo France

Fiji Meteorological Service

NOAA National Weather Service

NOAA Climate Prediction Centre (CPC)

International Research Institute for Climate Prediction

European Centre for Medium Range Weather Forecasts

UK Met Office

World Meteorological Organization

SOPAC SPREP nzaid NIWA Taihoro Nukurangi

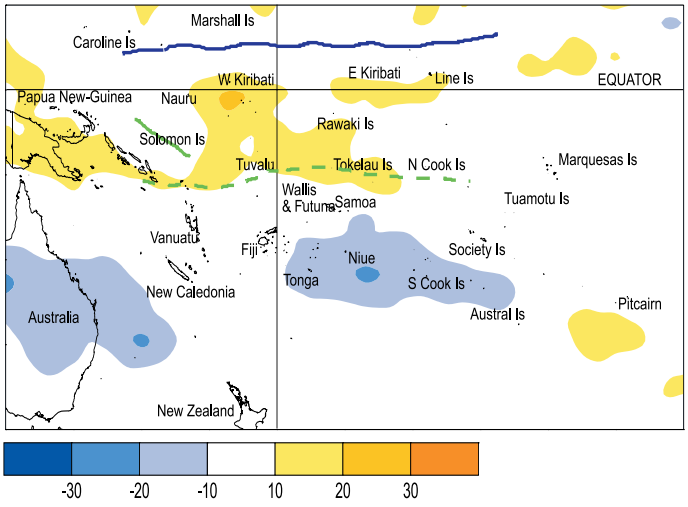
Climate developments in June 2005

The South Pacific Convergence Zone (SPCZ) was rather weak in June, affecting the region northeast of the Solomon Islands. North of the equator, the Inter-tropical Convergence Zone (ITCZ) extended from the Caroline Islands across the Date Line to the equatorial region well south of Hawaii. Areas of enhanced convection occurred from Tonga to the Austral Islands of Southern French Polynesia, and also over Australia and the North Tasman Sea. Extensive and hazardous flooding occurred on Queensland's Gold Coast and adjacent areas of far northern New South Wales at the end of June, some areas receiving as much as 500 mm in 24 hours. Rainfall was at least 125% of average in the Kermadec Islands, parts of Fiji (more than 500 mm on Rotuma Island), the Wallis and Futuna Islands, Tonga, and American Samoa.

Suppressed convection occurred over much of Indonesia, extending east to Papua New Guinea, the Solomon Islands, Tuvalu, Western Kiribati, and Tokelau. Rainfall was less than 50% of average in parts of Western Kiribati, New Caledonia, and Northern and Central French Polynesia, and 75% or less of average in Niue, Tuvalu, and Vanuatu.

Mean air temperatures were about 1.0 ºC above average in Western Kiribati, parts of Tuvalu, and the Marquesas Islands, consistent with warmer than normal sea surface temperatures, and about 0.5 ºC below average in parts of Fiji and the Austral Islands.

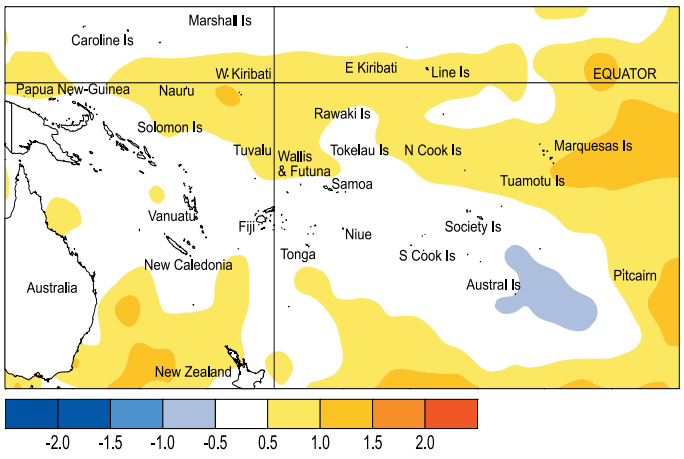
Anticyclones in the eastern Tasman Sea produced above average mean sea-level pressures over New Caledonia and Vanuatu. Pressures were below average over French Polynesia and the Cook Islands.



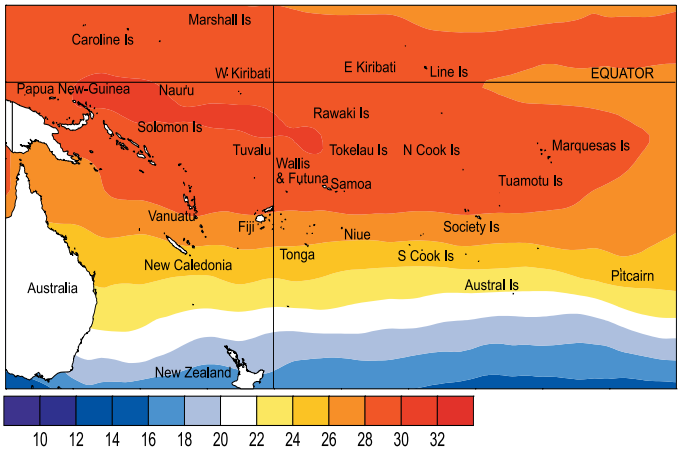
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2}. The June 2005 position of the SPCZ, as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line (blue equals high rainfall and yellow equals low rainfall). The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

Along the equator, surface equatorial easterlies occurred in 95% of observations at Tarawa, with very few westerlies recorded.

Country	Location	Monthly Rainfall (mm)	% of average	Comments
Fiji	Rotuma Island	514	223	Extremely high
French Polynesia	Tahiti-Faaa	12	19	Well below average
New Caledonia	Ile Art, Belep	19	16	Well below average
New Caledonia	Koumac	7	11	Extremely low
New Caledonia	La Tontouta	16	18	Extremely low



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



Mean sea surface temperatures (°C) for June 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) rose to near zero in June, after a strong negative excursion in May. The 3-month April – June mean SOI was –0.9. The NINO3, NINO4, and NINO3.4 SST anomalies were all between +0.6 and +0.7 °C for June, and for April – June. Equatorial Pacific subsurface temperature anomalies are currently weak, slightly positive above 100 m and slightly negative beneath that. The Madden-Julian Oscillation (MJO) has been inactive for the past several weeks and outgoing longwave radiation anomalies were generally small in June, apart from continued suppressed convection over Indonesia.

Most available models indicate neutral conditions (mostly with positive NINO3.4 anomalies) through the rest of 2005. The Japan Meteorological Agency (JMA) model has been revised, with a new bias-correction applied, reducing its persistently warm forecast into the neutral range. The Scripps/MPI model develops a warm event by Christmas, and a few others move in that direction. The latest US National Center for Environmental Prediction/Climate Prediction Center (NCEP/CPC) statement suggests neutral conditions through September – November, with considerable uncertainty towards the end of the year. The International Research Institute on Climate Prediction (IRICP) summary gives a 65% chance of neutral conditions persisting through to December, with a 30% chance of an El Niño developing, and 5% for La Niña.

Tropical rainfall outlook: July to September 2005

The tropical Pacific is in neutral ENSO conditions and this is likely to influence the rainfall patterns across the region.

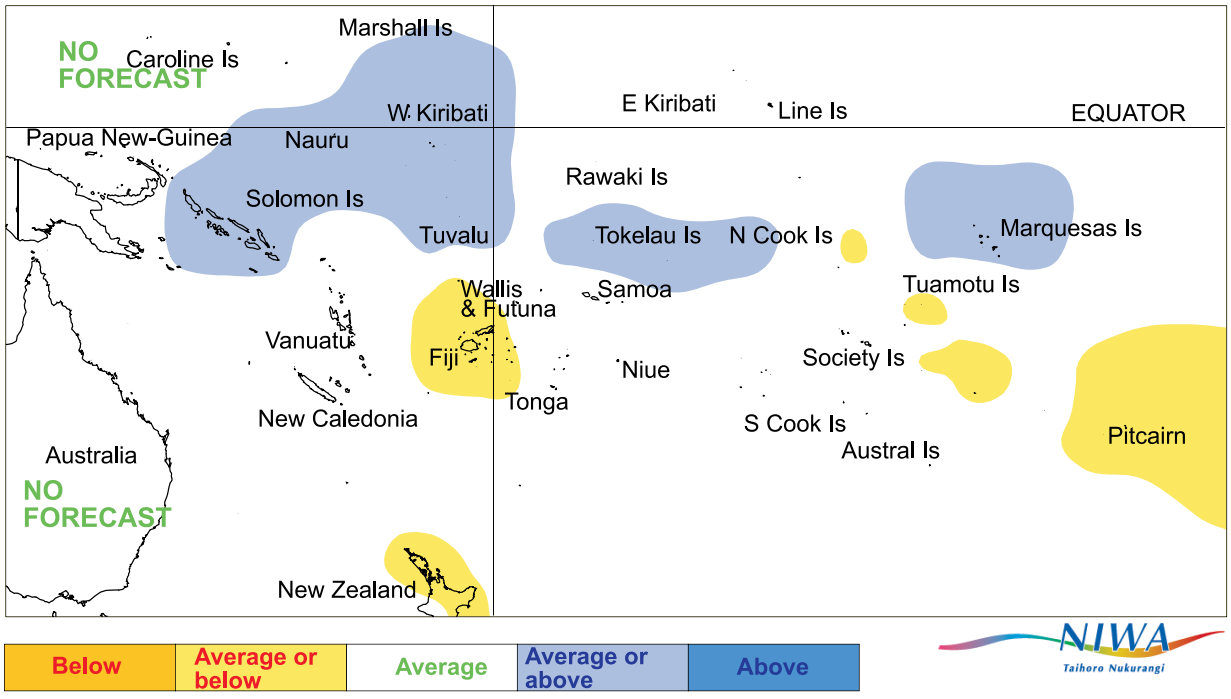
Enhanced convection is expected in the equatorial region from the Solomon Islands to the Marquesas Islands, including Western Kiribati, Tuvalu, Tokelau, and the Northern Cook Islands, where rainfall is expected to be near or above average.

Rainfall is forecast to be near or below average for Fiji, Tuamotu Islands of French Polynesia, and Pitcairn Island. Near average rainfall is expected over the rest of the islands in the region.

The model confidence levels remain in the 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
Western Kiribati	15:40:45 (Near average or above)	Low – moderate
Solomon Islands	15:45:40 (Near average or above)	Moderate
Tuvalu	15:40:45 (Near average or above)	Low – moderate
Tokelau	15:40:45 (Near average or above)	Moderate
Northern Cook Islands	20:40:40 (Near average or above)	Low – moderate
Marquesas Islands	20:40:40 (Near average or above)	Low – moderate
Eastern Kiribati	20:45:35 (Near average)	Low – Moderate
Papua New Guinea	35:45:20 (Near average)	Low – moderate
Samoa	25:45:30 (Near average)	Low – moderate
Vanuatu	35:45:20 (Near average)	Low – moderate
Wallis & Futuna	30:40:30 (Near average)	Low – moderate
Tonga	25:50:25 (Near average)	Moderate
Niue	20:45:35 (Near average)	Low – moderate
Southern Cook Islands	30:45:25 (Near average)	Low – moderate
Society Islands	35:45:20 (Near average)	Moderate
Austral Islands	30:45:25 (Near average)	Low – moderate
New Caledonia	35:35:30 (Climatology)	Low
Fiji	40:40:20 (Near average or below)	Low – moderate
Tuamotu Islands	40:40:20 (Near average or below)	Moderate
Pitcairn Island	45:40:15 (Near average or below)	Moderate

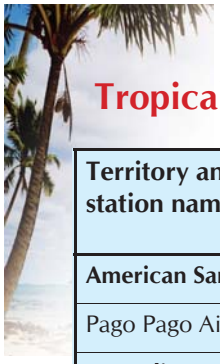


Rainfall outlook map for July to September 2005.

Forecast validation: April to June 2005

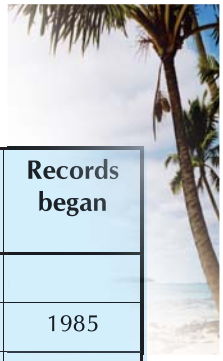
Average or above average rainfall was expected in Western Kiribati and the Northern Cook Islands. Suppressed convection with below average rainfall was expected in the Marquesas Islands with near or below average rainfall in Eastern Kiribati, Fiji, Samoa, and the Austral Islands. Rainfall was expected to be near average rainfall elsewhere in the region.

Areas of below average rainfall occurred from Tokelau to the Austral Islands, including the Cook Islands and the Society Islands, as well as northern New Zealand. Rainfall was above average and higher than expected from New Caledonia to American Samoa, including Vanuatu and Tonga, and also over the Marquesas and Tuamotu Islands. Rainfall was near average elsewhere. Totals were lower than expected in Tokelau,and over northern New Zealand. The overall 'hit' rate for the April – June 2005 rainfall outlook was about 60%.



Tropical Pacific rainfall – June 2005

Territory and station name	June 2005 rainfall total (mm)	Long-term average (mm)	June 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
American Samoa						
Pago Pago Airport	*340.2*	161	211			1966
Australia						
Cairns Airport	32.8	48	68	3	144	1941
Townsville Airport	34.4	20	172	0	**107**	1940
Brisbane Airport	152.0	71	214	1	701	1929
Sydney Airport	63.0	126	50			1929
Cook Islands						
Penryhn	117.8	143	82	13	570	1937
Rarotonga Airport	131.6	112	118	9	280	1929
Rarotonga EWS	127.8	112	114			2000
Fiji						
Rotuma	513.9	234	220	18	554	1912
Udu Point	211.5	116	182	13	641	1946
Nadi	80.1	65	123	0	266	1942
Nausori	180.6	151	120	27	428	1956
French Polynesia						
Hiva Hoa, Atuona	68.0	170	40	13	587	1951
Bora Bora, Motu	*8.6*	103	8	15	262	1951
Tahiti - Faaa	11.6	61	19	0	271	1919
Tuamotu, Takaroa	201.8	102	198	22	319	1953
Tuamotu, Hereheretue	*58.8*	103	57	9	332	1962
Gambier, Rikitea	131.2	167	79	52	290	1952
Tubuai	112.2	103	109	16	275	1953
Rapa	281.0	204	138	72	412	1951
Kiribati						
Tarawa	64.8	161	40	1	373	1946
Kanton Island	123.4	99	125	3	152	1937
New Caledonia						
Ile Art, Belep	18.8	117	16	2	427	1962
Koumac	7.4	70	11	4	238	1951
Ouloup	87.2	127	69	10	307	1966
Ouanaham	99.4	160	62	34	383	1961
Poindimie	111.8	202	55	25	728	1965
La Roche	110.8	154	72	7	319	1956
La Tontouta	15.8	90	18	19	233	1949
Noumea	47.0	104	45	16	402	1863
Moue	65.6	136	48	46	321	1972

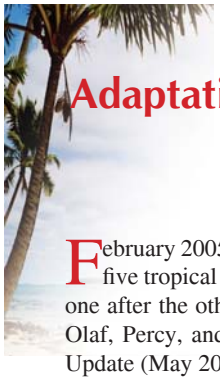


Tropical Pacific rainfall – June 2005

Territory and station name	June 2005 rainfall total (mm)	Long-term average (mm)	June 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
New Zealand						
Kaitaia	108.4	149	73	65	261	1985
Whangarei Aiport	98.2	165	60	32	427	1937
Auckland Airport	109.2	116	94	60	220	1962
Niue						
Hanan Airport	60.4	90	67	15	203	1996
North Tasman						
Lord Howe Island	154.4	184	84	65	387	1886
Norfolk Island	105.4	153	69	33	457	1921
Raoul Island	240.2	170	141	45	376	1937
Tonga						
Queen Lavinia	377.9	110	344	11	457	1971
Niuatoputapu Airport	85.5	135	63	6	463	1947
Lupepau'u	180.7	126	143	12	440	1995
Fua'amotu Airport	171.7	101	170	17	239	1980
Tuvalu						
Nanumea	*150.7*	200	75	1	373	1941
Funafuti	*152.8*	215	71	57	567	1927
Nuilakita Island	*118.3*	193	61	28	571	1942
Vanuatu						
Sola	334.4	288	116	29	672	1958
Pekoa	112.1	155	72	36	523	1951
Lamap	93.4	130	72	20	479	1960
Bauerfield	25.0	171	15	33	560	1985
Port Vila	*46.8*	145	32	20	598	1947
Whitegrass	38.8					
Burtonfield	*34.0*	82	41	22	168	1961
Aneityum	*288.6*	152	190	53	355	1958
Wallis & Futuna						
Wallis Island, Hihifo	*121.0*	182	66	60	298	1951
Maopoopo, Futuna Island	*250.2*	199	126			

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.



Adaptation behaviour before to the 2004/05 tropical cyclone season in the Cook Islands

Imogen Ingram, Te Pa Mataiapo, Rarotonga, Cook Islands

February 2005 will remain memorable in the Cook Island's history as five tropical cyclones battered the small island nation in that month, one after the other. A summary of the five cyclones – Meena, Nancy, Olaf, Percy, and Rae can be found in Issue 56 of the Island Climate Update (May 2005).

Meena affected the northern part of the country, and Nancy caused havoc over the eastern coast of the main island of Rarotonga. Olaf battered the western part of Rarotonga where most of the resorts are located. Percy and Rae were not as destructive as the earlier cyclones but they did cause minor damage.

Each successive cyclone resulted in improvements to the country's hazard planning procedures and strategies through a very steep learning process due to the frequency and close proximity of each cyclone. Although there was no loss of life from the five cyclones, there was a lot of damage to the environment, property, infrastructure, and livelihood of people, which will require considerable funds and take years to recover. The outer islands were significantly more vulnerable than the main islands, and the damage was much greater in terms of human livelihood, and the recovery will be slower.

Fortunately, there was ample warning given to the residents of the Cook Islands prior to the cyclones in order for them to prepare for the tropical cyclone season. As early as November 2004, the Cook Islands Meteorological Service (CIMS) issued a tropical cyclone outlook for the season 2004/05 (November to April). The Civil Defence Agency in the Cook Islands took heed of the cyclone outlook, and started advertising and advising the local population on measures that should be taken to ensure that they were be prepared, should a cyclone head their way. Residents were educated about some of the basic necessities that should be kept, like food, water, a transistor radio, and a torch with spare batteries, and the people of the Cook Islands took heed of this advice.

Immediately before to the onslaught of the cyclones, generally 1 to 2 days before, cyclone warnings were broadcast over the radio. This gave enough time for people to ensure that their properties were secure (by boarding the windows and tying down roofs, and evacuating immediate coastal areas where there was a threat of storm surges and swells). Those who had internet access were also given websites that provided cyclone updates and warnings. However, when the cyclone was imminent, satellite communications equipment, such as satellite dishes, were moved into storage for safe keeping which meant no communications were available.

It was different for those living in the outer islands. Residents there complained they were unable to receive the broadcasts from Radio Cook Islands, as apparently the signal strength had been reduced for economic reasons. Some residents were able to use the radios in their motor vehicles, but it was a very worrying time for most because of the uncertainty. At one point, Mr Tom Wichman, a ham radio operator, was the only means of contact with the atoll of Nassau. He had to relay the weather forecasts to his contact on Nassau at predetermined times, and for some hours there was no contact while the equipment was moved to the other side of the atoll because of high seas.

There have been other legislative introductions to ensure protection of property and life in the Cook Islands as well. Since the introduction of the 1995 Environment Act, structures within 30 m of the mean high water mark had to be elevated, so that storm sea surge damage would be minimised. It is believed that this adaptation to the building regulations saved a lot of dwellings, as evidenced by the piles of coral rocks surrounding many seaside residences. Some businesses did not evacuate all their effects, and suffered damage and stock losses to sea surges. Most, however, boarded up their buildings and moved their stock and fittings into containers, which were then shifted to safety inland.

After taking into account all the precautions and preparations for the cyclones, there was nothing more the people of the Cook Islands could do, but hope that they had done everything possible. The radio station continued broadcasting on Rarotonga, sometimes receiving eyewitness reports from badly affected areas. There was also the need to urge people to stay indoors, as there was a tendency to go sightseeing. On the main island of Rarotonga, staff from the Ministry of Works contracted private firms circulated with their heavy machinery, in order to keep the roads cleared. It was an amazing and heartwarming sight to see the orange lights of a bulldozer drive by at the height of Cyclone Nancy, clearing the road of fallen trees and other debris.

Cook Islanders did prepare for the cyclones, but there were too many, and they were too close together, for them to recover quickly. Most of the country is still struggling to recover with limited funds.

The next issue of the Island Climate Update will cover the aftermath of the five cyclones and lessons learned from them.

The Island Climate Update

Cover Photo: Wendy St George, NIWA

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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.