

Number 56, May 2005

The Island Climate Update

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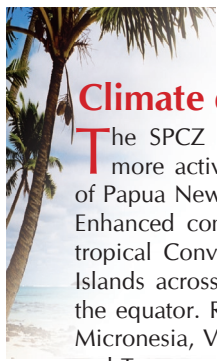
April's climate

- High rainfall in parts of Vanuatu, Fiji, New Caledonia, Niue, and Tonga, caused by active South Pacific Convergence Zone: floods in Fiji
- Active Inter-Tropical Convergence Zone near the equator
- Warmer in Fiji, Samoa, and Tonga, as well as Northern and Central French Polynesia
- Cooler in parts of New Caledonia and Southern French Polynesia

El Niño/Southern Oscillation and seasonal rainfall forecasts

- Significant chance of an El Niño developing by southern hemisphere spring
- Rainfall is expected to be near or above average over the Solomon Islands, Vanuatu, and the Southern Cook Islands
- Below average rainfall likely in the Marquesas Islands





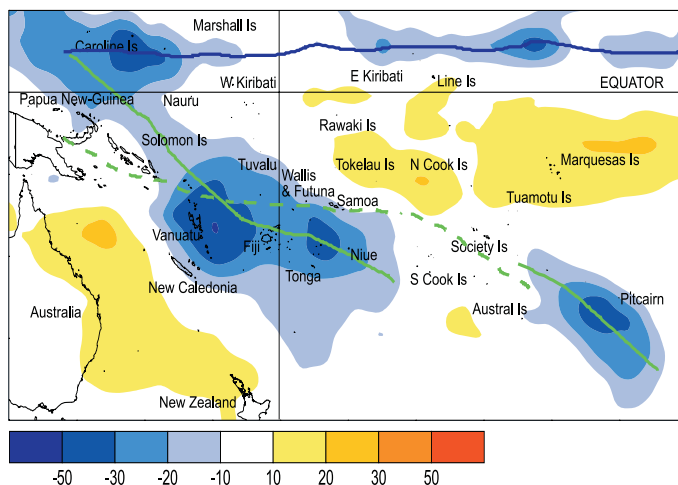
Climate developments in April 2005

The SPCZ (South Pacific Convergence Zone) was noticeably more active than in March, extending from the region north of Papua New Guinea southeast towards Fiji, and across to Niue. Enhanced convection was also associated with the ITCZ (Inter-tropical Convergence Zone), which extended from the Caroline Islands across the Date Line and further east about 5° north of the equator. Rainfall was at least 125% of average over much of Micronesia, Vanuatu, and parts of Fiji and New Caledonia, Niue, and Tonga, some locations recording more than 300% of normal. Rainfall occurred almost every day from 6 to 20 April in Fiji's Western Division. Extensive flooding occurred in the Northern and Western Divisions over 16–20 April, closing almost 50 roads. There were several fatalities. It was very wet in Vanuatu, Peko recording 950 mm for April, 5 days exceeding 100 mm.

In contrast, suppressed convection and below average rainfall occurred east of the Date Line, from Tokelau to the Marquesas Islands. Rainfall was less than 50% of average in Northern and Central French Polynesia. Another region of suppressed convection occurred over much of Australia (and Southeast Asia) across the Tasman Sea to New Zealand, where rainfall was generally well below average.

Mean air temperatures were at least 0.5 °C above average in Fiji, Samoa, and Tonga, as well as Northern and Central French Polynesia. Temperatures were at least 0.5 °C below average in parts of New Caledonia and Southern French Polynesia.

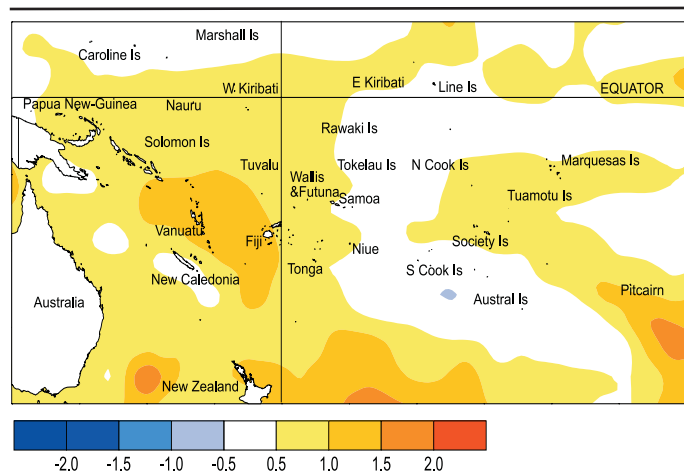
Tropical Southwest Pacific mean sea-level pressures continued above average in most areas about and west of the Date Line. They were near average over central French Polynesia, and below average in the eastern equatorial region and from Vanuatu to the Southern Cook Islands. Along the equator, surface



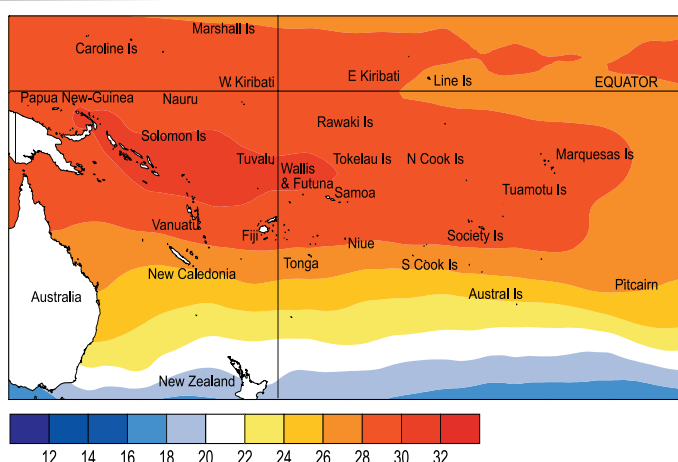
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} . The April 2005 position of the SPCZ, as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line (blue equals high rainfall and yellow equals low rainfall).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

equatorial westerlies occurred in only 1% of observations at Tarawa, reflecting a strengthening of the easterlies.

Country	Location	Monthly Rainfall (mm)	% of average	Comments
Fiji	Vunisea	786	336	Record high
Fiji	Nadi Airport	425	266	Well above average
New Caledonia	Ouanaham	346	232	Well above average
New Caledonia	La Roche	434	319	Well above average
New Caledonia	Noumea	243	213	Well above average
Niue	Hanan Airport	444	198	Extremely high
French Polynesia	Hiva, Autona	25	27	Extremely low
French Polynesia	Tuamotu, Takarua	29	23	Well below average



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



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

The tropical Pacific Ocean warmed rapidly during the second half of April, resulting in the resurgence of borderline El Niño conditions (which could also be described as a "neutral but in a warm" state). The Southern Oscillation Index (SOI) decreased in April to -1.3, making the February to April mean -1.6 (the 3-month mean SOI has been below -1 all of 2005 so far).

The equatorial Pacific Ocean positive subsurface temperature anomaly noted last month is now surfacing in the eastern Pacific, with SST anomalies east of the Date Line rising rapidly from mid April.

The NINO3 SST anomaly rose to about +0.4 °C in April, with NINO4 near +0.6 °C, and NINO3.4 about +0.4 °C. Surface zonal wind anomalies have become positive across the equatorial

Pacific, more strongly west of the Date Line. Outgoing longwave radiation (OLR) anomalies showed a very active SPCZ in April, with suppressed convection east of the Date Line, south of the equator.

Most available models indicate neutral conditions (with positive NINO3.4 anomalies) through July 2005, and into the southern hemisphere spring. The latest US National Center for Environmental Prediction (NCEP/CPC) statement forecasts El Niño Southern Oscillation neutral conditions for the next three months. The International Research Institute on Climate Prediction (IRICP) summary describes the present situation as a neutral (but slightly warm) state, and gives a 65% chance of neutral conditions persisting through July 2005. The Australian Bureau of Meteorology says that chance of El Niño developing is about 30 to 50%, but this will rise if current trends persist.



Tropical rainfall outlook: May to July 2005

The tropical Pacific is in a neutral but borderline El Niño state. Because the forecast period is for the transitional months, the rainfall forecasts does not show a very strong pattern in the Pacific region.

However, enhanced convection is expected over the Solomon Islands, Vanuatu, and the Southern Cook Islands where rainfall is forecast to be near or above average.

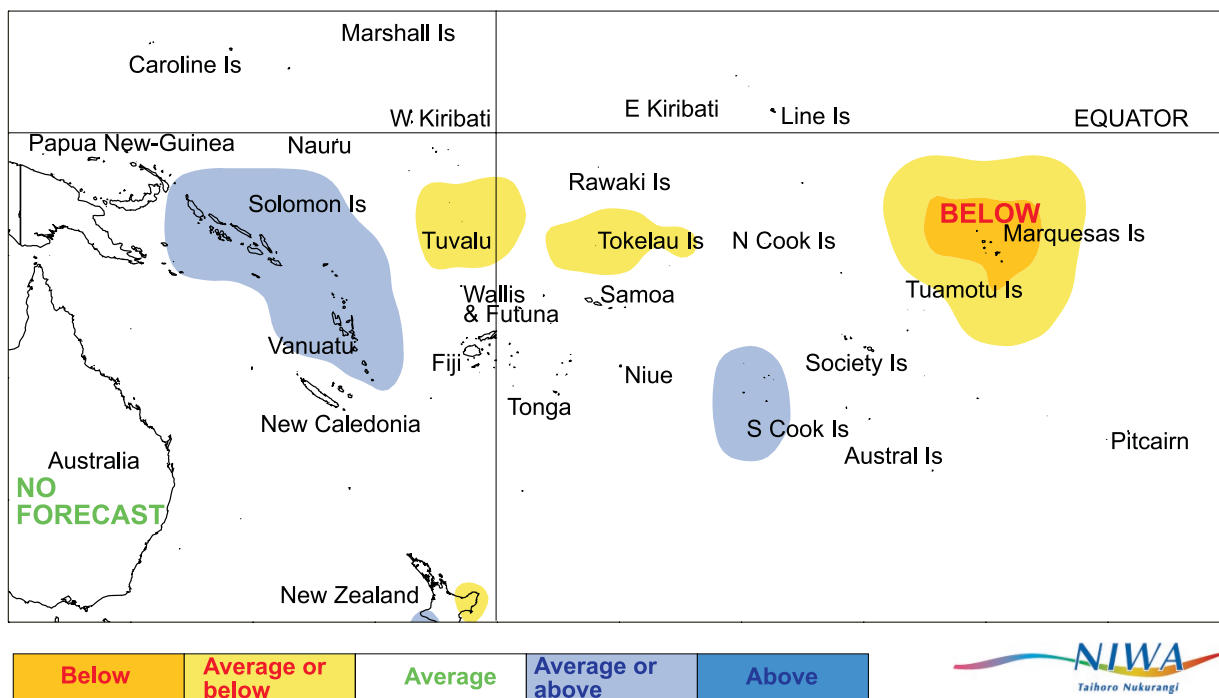
Suppressed convection is likely over the Marquesas Islands, where rainfall is expected to be below average. Another region of suppressed convection is expected over Tuvalu and Tokelau, where rainfall is forecast to be near or below average.

Rainfall is expected to be near average for most of the other countries in the forecast region.

Since the forecast period coincides with the transition from the wet to dry seasons, confidence of the global forecast models is low to moderate.

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

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.

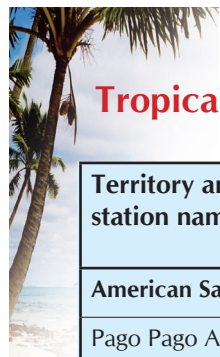


Rainfall outlook map for May to July 2005.

Forecast validation: February to April 2005

Enhanced convection was expected over Eastern and Western Kiribati and Tokelau, with average or above average rainfall in Tuvalu, the Northern Cook Islands, the Austral Islands, and Pitcairn Island. Suppressed convection with below average rainfall was expected in the Marquesas Islands, and average or below average rainfall was expected over the Solomon Islands, Vanuatu, New Caledonia, and Fiji, as well as Samoa. Near average rainfall was expected elsewhere.

Areas of below average rainfall occurred over the Northern Cook Islands and northern New Zealand. Rainfall was above average in Vanuatu, Tokelau, Niue, and the Marquesas Islands, and near average elsewhere. Rainfall was higher than expected in Vanuatu, Niue, and the Marquesas Islands, and lower than expected in Eastern and Western Kiribati and Tonga. The overall 'hit' rate for the February–April 2005 rainfall outlook was about 65%, the highest score in 10 months. For the Southern Cook Islands, this was the 10th consecutive forecast with a good outcome.



Tropical Pacific rainfall – April 2005

Territory and station name	April 2005 rainfall total (mm)	Long-term average (mm)	April 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
American Samoa						
Pago Pago Airport	365.8	330	111			1966
Australia						
Cairns Airport	185.2	190	97	15	1941	1941
Townsville Airport	19.2	62	31	0	546	1940
Brisbane Airport	848.0	90	94	3	502	1929
Sydney Airport	24.8	98	25			1929
Cook Islands						
Penryhn	60.0	203	30	36	468	1937
Mauke	224.2	156	144	4	415	1929
Rarotonga Airport	205.8	211	98	24	566	1929
Rarotonga EWS	215.6	211	102	190	286	2000
Fiji						
Rotuma	408.4	294	139	48	634	1912
Udu Point	372.6	276	135			1946
Nadi	424.8	160	266	22	580	1942
Nausori	394.0	356	111	59	1217	1956
Ono-i-Lau	188.1	157	120	21	595	1943
French Polynesia						
Hiva Hoa, Atuona	24.6	92	27	17	414	1951
Tahiti - Faaa	39.0	112	35	3	401	1919
Tuamotu, Takaroa	28.8	127	23	18	447	1953
Tuamotu, Hereheretue	82.8	127	65	11	290	1962
Gambier, Rikitea	290	147	197	18	349	1952
Tubuai	106.8	195	55	30	418	1953
Rapa	160.0	249	64	71	735	1951
New Caledonia						
Ile Art, Belep	200.2	176	114	29	431	1962
Koumac	81.0	70	116	1	341	1951
Ouloup	191.6	100	192	4	323	1966
Ouanaham	345.8	149	232	8	859	1961
Poindimie	269.8	233	116	42	982	1965
La Roche	434.0	136	319	12	518	1956
La Tontouta	53.6	72	74	3	195	1949
Noumea	242.7	114	213	6	430	1863
Moue	154.2	129	120	29	325	1972

Tropical Pacific rainfall – April 2005



Territory and station name	April 2005 rainfall total (mm)	Long-term average (mm)	April 2005 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
New Zealand						
Kaitaia	17.3	95	18	10	249	1985
Whangarei Airport	4.6	117	4	25	346	1937
Auckland Airport	20.8	95	22	13	225	1962
Niue						
Hanan Airport	444.4	225	198	52	346	1996
North Tasman						
Lord Howe Island	64.8	162	40	17	702	1886
Norfolk Island	24.6	140	18	18	429	1921
Raoul Island	135.4	102	133	15	539	1937
Tokelau						
Nukunonu	96.8	164	59	0	377	1946
Tonga						
Lupepau'u	460.9	209	221	49	456	1995
Sallote Pilolevu Airport	195.7	190	103	2	497	1947
Fua'amotu Airport	188.8	159	119	18	331	1980
Tuvalu						
Nanumea	221.0	239	92	75	565	1941
Nui Is	375.7	240	157	65	583	1941
Funafuti	330.8	270	123	70	620	1927
Nuilakita Island	407.9	241	169	62	752	1941
Vanuatu						
Sola						1958
Pekoa	949.7	302	314	67	935	1951
Lamap	565.6	197	287	96	400	1960
Bauerfield	416.3	208	200	117	425	1985
Burtonfield	343.1	99	347	16	333	1961
Aneityum	594.7	193	308	34	770	1958
Wallis & Futuna						
Wallis Island, Hihifo	400.2	245	163	96	558	1951
Maopopo, Futuna Island	472.6	331	143			

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.

Tropical Cyclones in the Cook Islands

Arona Ngari, Director, Cook Islands Meteorological Service

Background

During the 2004/05 tropical cyclone season, February was the most memorable among Cook Islanders living at home and abroad. It was the month that five cyclones (Meena, Nancy, Olaf, Percy, and Rae - See Figure 1) occurred within a period of five weeks. Four of these cyclones reached sustained wind speeds of over 100 knots (185 km/h), and gusts of 140 knots (259 km/h), a record frequency of occurrence for the Cook Islands. One cyclone also recorded the lowest barometric pressure ever measured for a cyclone in the South Pacific – 900 hPa.

Percy and Olaf formed northwest of Samoa, where the sea surface temperature was at least 28 °C in February, and more than 30 °C during the previous few months. Meena and Nancy formed between Samoa and the Northern Cook Islands before moving in to the Southern Cook Islands area. Rae formed southeast of Niue.

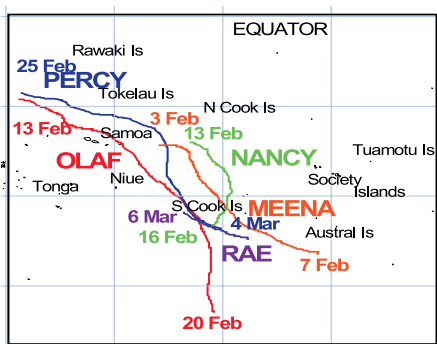


Figure 1: Tropical cyclone tracks

Damage from the Tropical Cyclones

What stood out about these cyclones was the havoc they created on some of the islands that they passed over or close by. For example, when Meena was closest to Rarotonga, it brought storm surges and high winds to the northern part of the island, blowing rubble into buildings along the uptown area in Avarua. The roof of a restaurant was breached by huge waves, which also demolished premises along the coastal area. The estimated height of these waves was about 14 m. The highest estimated sustained winds within the cyclone were 125 knots (232 km/h), with estimated gusts of 155 knots (287 km/h). Recorded winds were 46 knots (85 km/h) with gusts of 64 knots (119 km/h). The lowest central pressure recorded in Aitutaki was 985.9 hPa.

The arrival of Nancy brought storm surges to the eastern parts of Rarotonga, where several buildings were inundated with seawater,

and even some of the hurricane safety centres were threatened by the storm surge. Mean wind speeds reached 53 knots (98 km/h), with gusts to 88 knots (163 km/h) at Rarotonga. The lowest pressure recorded there was 987.5 hPa at Rarotonga.

Olaf almost merged with Nancy, forcing it to track closer to Rarotonga. This cyclone wreaked havoc in the northwestern part of the island, rubble and trees were strewn on buildings, and windows broken in some hotels on this side of the island. The highest recorded winds at Rarotonga Airport were 38 knots (70 km/h), with gusts to 51 knots (95 km/h).

Percy devastated the islands of Pukapuka and Nassau in the Northern Cook Islands, but by the time it reached the Southern Cook Islands nine days later, it had weakened. Cyclone Percy recorded the lowest barometric pressure ever in a South Pacific cyclone (estimated at 900 hPa or 898 hPa recorded by NOAA). The highest sustained winds recorded at Pukapuka were 90 knots (167 km/h), with gusts up to 120 knots (222 km/h). A state of emergency was declared for Pukapuka and Nassau.

Rae lasted for only about 10 hours as a cyclone. Rae brought much needed rain to wash away the sea-spray that had been brought by the former cyclones, which gave the islands some more greenery that was lost during the earlier cyclones. The maximum winds recorded were 30 knots (56 km/h), with gusts of 40 knots (74 km/h).

Although the small islands of the Cook Islands were hit by five tropical cyclones this cyclone season, there were no casualties. Pukapuka and Nassau were the worst affected islands in the group as they were hit by two cyclones, and a state of emergency was declared twice. Most of the other islands in the group reported minor damage.



The Island Climate Update

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Your comments and ideas about The Island Climate Update are welcome. Please contact:

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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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