

The Island Climate Update

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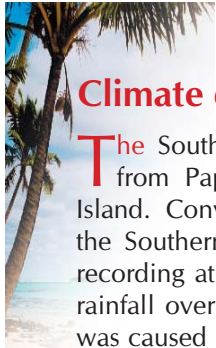
September's climate

- The South Pacific Convergence Zone (SPCZ) extended from Papua New Guinea to Rotuma Island (Fiji). Convergence also occurred south of Fiji east to the Southern Cook Islands
- High rainfall persisted throughout much of Tonga
- Below average rainfall occurred in Vanuatu, New Caledonia, central and southern French Polynesia and Pitcairn Island
- Above average air temperatures occurred in Samoa and the Society Islands of French Polynesia

El Niño/Southern Oscillation and Seasonal Rainfall Forecasts

- The tropical Pacific continues on the brink of weak El Niño conditions
- Enhanced convection is expected in the equatorial region of Western and Eastern Kiribati
- Below average rainfall is forecast for New Caledonia, Samoa and the Southern Cook Islands



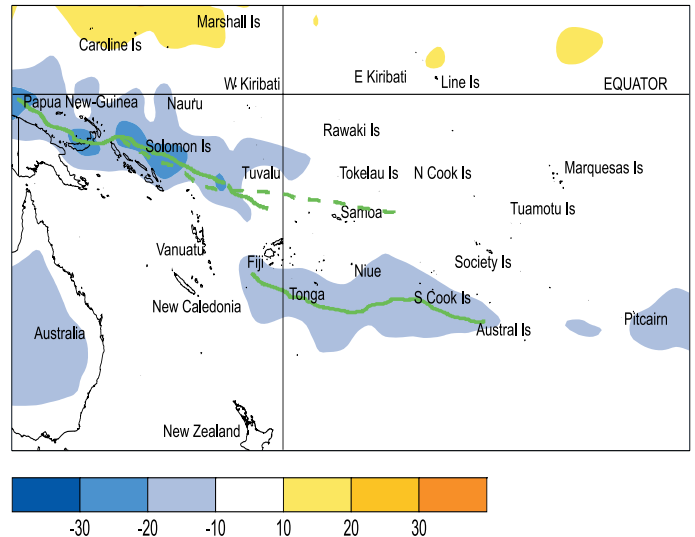


Climate developments in September 2004

The South Pacific Convergence Zone (SPCZ) extended from Papua New Guinea south-southeast to Rotuma Island. Convergence also occurred south of Fiji east to the Southern Cook Islands, including Tonga, some areas recording at least 200% of average rainfall. The enhanced rainfall over Papua New Guinea and the Solomon Islands was caused by cross-equatorial northerlies converging with the southern hemisphere trade winds. Enhanced convection and/or at least 125% of average rainfall also occurred in the far northern and southern islands of Fiji, Niue, the northern islands of Tuvalu, the Marquesas Islands, and Pitcairn Island.

Rainfall was 50% or less of average throughout much of Vanuatu, New Caledonia, the Tuamotu, Society and Austral Islands of French Polynesia, and Pitcairn Island. Rainfall was also less than 50% of average in several Northern and Central sites in Fiji.

Mean air temperatures were near average in New Caledonia, and more than 0.5°C above average in Samoa and the Society Islands of French Polynesia. Tropical Southwest Pacific mean sea-level pressures remained above average over Australia, and continued below average east of the Date Line.



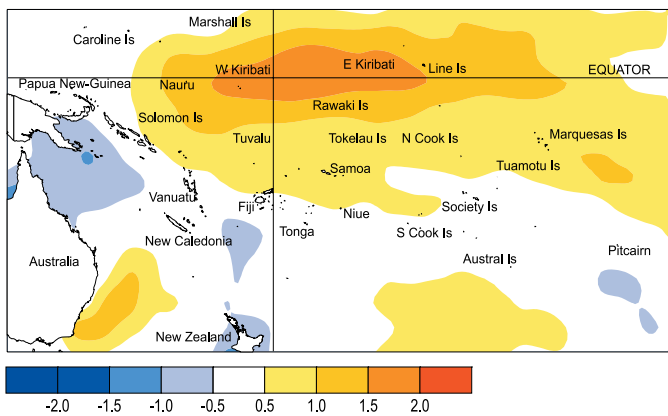
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} . The September 2004 position of the South Pacific Convergence Zone (SPCZ), as identified from total rainfall, is indicated by the solid green line. The average position of the SPCZ is identified by the dashed green line.

Country	Location	Rainfall (mm)	% of average	Comments
Cook Islands	Rarotonga Airport	288.7	265	Highest
Fiji	Ono-i-Lau	213.0	197	Well above average
French Polynesia	Hiva Hoa, Autona	143.6	208	Well above average
Tonga	Salote Pilolevu Airport	212.5	191	Well above average
Tonga	Fua'amotu Airport	245.4	213	Well above average
French Polynesia	Tahiti-Faaa	11.8	23	Well below average
French Polynesia	Gambier, Rikitea	16.6	14	Extremely low
French Polynesia	Tubuai	16.4	14	Extremely low
New Caledonia	Koumac	2.8	7	Extremely low
New Caledonia	Ouloup	10.4	18	Extremely low
New Caledonia	La Tontouta	8.8	23	Well below average

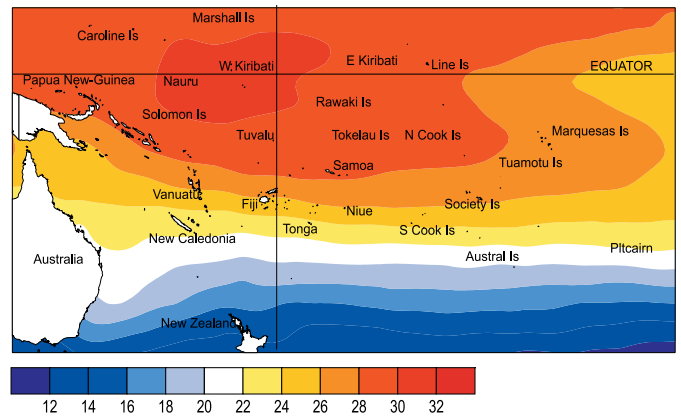
Despite the equatorial Pacific sea surface and subsurface temperatures being in an El Niño state, the atmosphere is yet to respond to the oceanic signals. The Southern Oscillation Index (SOI) weakened during September to -0.4, with the three month mean (July to September) at -0.7. Equatorial sea surface temperature (SST) anomalies rose compared to August. The NINO3.4 average anomaly was +0.9°C (August was +0.6°C) and July to September mean was +0.6°C. The subsurface temperature profiles show a region of positive anomalies (+2°C or more) in the eastern Pacific at ~100 m depth.

The positive zonal wind anomalies seen in August abated during September.

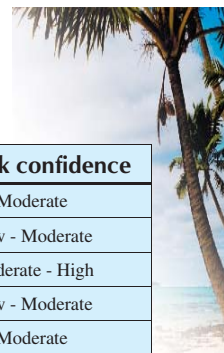
The majority of the available global climate models indicate neutral conditions to the end of 2004 and into early 2005 with above average SSTs in the NINO3.4 region. Less than half (5 out of 12) indicate El Niño conditions for the first quarter of 2005 and almost all models indicate neutral conditions by late autumn 2005. None of the models are predicting cool conditions in the equatorial Pacific over the next 9 months.



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



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



Tropical rainfall outlook: October to December 2004

The current incoherent El Niño/Southern Oscillation (ENSO) state in the equatorial Pacific is expected to influence rainfall to some extent across the region for the coming three months.

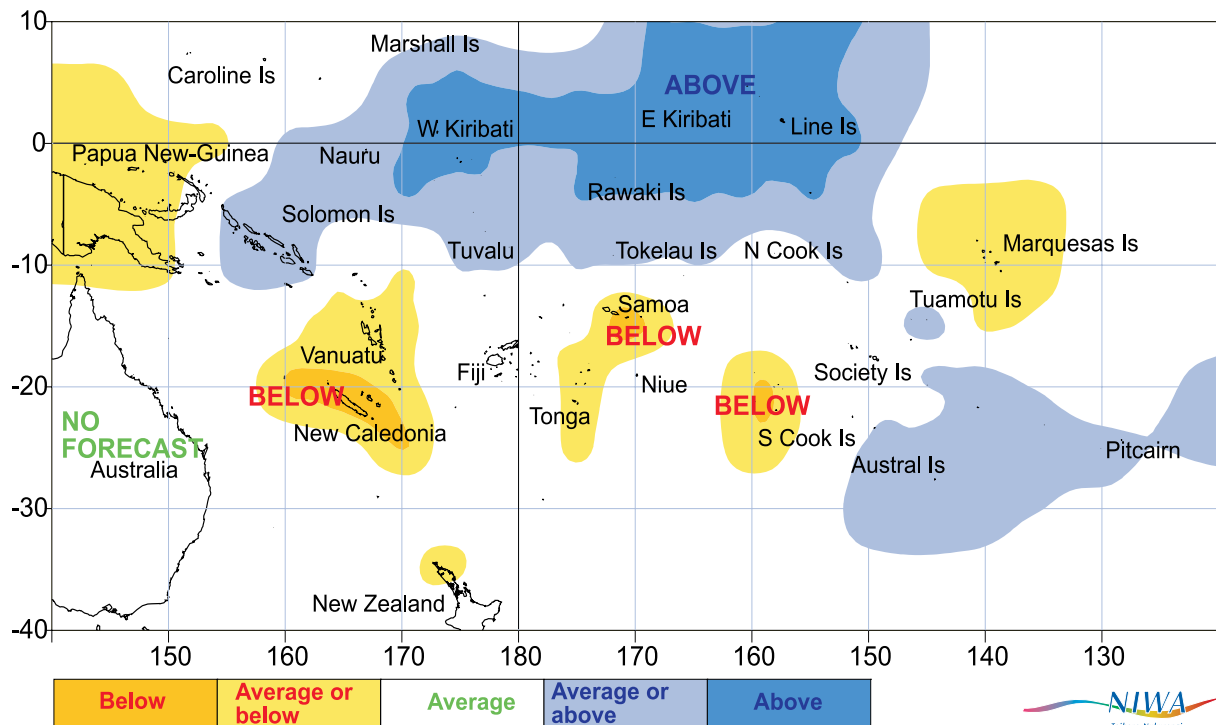
Enhanced convection is expected in the equatorial region of Western and Eastern Kiribati, where rainfall is likely to be above average. Near or above average rainfall is expected from the Solomon Islands trending eastwards to Tokelau including Tuvalu. Another region of near average or above average rainfall is expected over the Austral and Tuamotu Islands of French Polynesia and Pitcairn Island.

Suppressed convection is expected over New Caledonia, Samoa and the Southern Cook Islands, where rainfall is likely to be below average. Near or below average rainfall is forecast for Papua New Guinea, Vanuatu, Tonga and 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	20:30:50 (Above average)	Moderate
Eastern Kiribati	25:30:45 (Above average)	Low - Moderate
Solomon Islands	20:40:40 (Near average or above)	Moderate - High
Tuvalu	25:35:40 (Near average or above)	Low - Moderate
Tokelau	20:40:40 (Near average or above)	Moderate
Austral Islands	20:40:40 (Near average or above)	Moderate
Tuamotu Islands	25:35:40 (Near average or above)	Low - Moderate
Pitcairn Island	15:40:45 (Near average or above)	Moderate
Wallis & Futuna	30:45:25 (Near average)	Moderate
Fiji	35:40:25 (Near average)	Low - Moderate
Niue	30:50:20 (Near average)	Moderate
Northern Cook Islands	25:50:25 (Near average)	Low - Moderate
Society Islands	30:40:30 (Near average)	Low - Moderate
Papua New Guinea	40:40:20 (Near average or below)	Moderate - High
Vanuatu	40:40:20 (Near average or below)	Low - Moderate
Tonga	40:45:15 (Near average or below)	Low - Moderate
Marquesas Islands	40:40:20 (Near average or below)	Low
New Caledonia	50:35:15 (Below average)	Moderate
Samoa	45:30:25 (Below average)	Low - Moderate
Southern Cook Islands	50:30:20 (Below average)	Low

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 October to December 2004.

Forecast validation: July to September 2004

Above average rainfall was expected in the Austral Islands, with average or above average rainfall in Samoa, Niue, the Southern Cook Islands, and the Society Islands. Enhanced convection with average or above average rainfall was also expected over Western and Eastern Kiribati and Tuvalu. Suppressed convection was expected over Vanuatu, New Caledonia, and Fiji, with average or below average rainfall there.

Enhanced convection and/or above average rainfall affected the region from Vanuatu to the southern Cook Islands, including Fiji and Tonga, as well as Pitcairn Island. Rainfall was higher than expected in these regions, as well as the Marquesas Islands. Rainfall was below average in New Caledonia, and lower than forecast in Tuvalu and much of central and southern French Polynesia. The overall 'hit' rate for the July to September 2004 rainfall outlook was about 50%.



Tropical Pacific rainfall - September 2004

Territory and station name	September 2004 rainfall total (mm)	Long-term average (mm)	September 2004 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
Australia						
Cairns Airport	6.4	36	18	0	103	1941
Townsville Airport	6.2	11	56	0	81	1940
Brisbane Airport	31.0	35	89	0	104	1929
Sydney Airport	79.4	63	126	2	249	1929
Cook Islands						
Rarotonga Airport	288.7	109	265	13	268	1929
Fiji						
Rotuma	324.7	238	136	48	899	1912
Nadi	72.2	70	103	0	279	1942
Nausori	146.8	165	89	12	473	1956
Ono-i-Lau	213.0	108	197	5	374	1943
French Polynesia						
Hiva Hoa, Atuona	143.6	69	208	5	148	1951
Bora Bora Motu	60.2	82	73	8	233	1951
Tahiti - Faaa	11.8	51	23	1	297	1919
Tuamotu, Takaroa	30.8	83	37	11	220	1953
Tuamotu, Hereheretue	45.0	80	56	10	337	1962
Gambier, Rikitea	16.6	117	14	27	248	1952
Tubuai	16.4	121	14	10	330	1953
Rapa	142.6	196	73	46	597	1951
Kiribati						
Butaritari	310.1	152	204	0	560	1945
Tarawa	176.7	126	140	1	377	1946
Kanton Is	94.7	85	111	2	330	1937
New Caledonia						
Ile Art, Belep	36.2	67	54	0	415	1962
Koumac	2.8	40	7	0	237	1951
Ouloup	10.4	57	18	2	253	1966
Ouanaham	23.2	77	30	2	412	1961
Poindimie	127.4	91	140	2	272	1965
La Roche	27.6	75	37	5	338	1956
La Tontouta	8.8	39	23	3	205	1949
Noumea	26.6	47	57	0	168	1863
Moue	73.6	58	127	7	217	1972
Niue						
Hanan Airport	160.3	83	193	36	172	1996

Tropical Pacific rainfall - September 2004



Territory and station name	September 2004 rainfall total (mm)	Long-term average (mm)	September 2004 percent of average	Lowest on record (mm)	Highest on record (mm)	Records began
New Zealand						
Kaitaia	71.1	133	53	42	223	1985
Whangarei Airport	35.1	126	28	22	311	1937
Auckland Airport	76.1	97	78	39	208	1962
North Tasman						
Lord Howe Island	126.2	141	90	27	322	1886
Norfolk Island	73.8	91	81	25	216	1921
Raoul Island	54.2	110	49	41	269	1937
Pitcairn Island	86.4	125	69	6	325	1940
Samoa						
Faleolo	29.3	148	20	15	398	1951
Apia	58.7	143	41	1	593	1890
Tonga						
Lupepau'u	146.9	122	120	13	385	1995
Salote Pilolevu Airport	212.5	111	191	2	308	1947
Fua'amotu Airport	245.4	118	208	21	371	1980
Queen Lavinia/Niuafo'o'u	154.4	117	132	10	444	1971
Nuku'alofa	288.2	122	236	12	333	1944
Tuvalu						
Nanumea	<i>212.0</i>	174	122	8	455	1941
Nui Island	<i>280.4</i>	184	152	7	456	1941
Funafuti	<i>186.5</i>	206	91	47	879	1927
Nuilakita Island	<i>187.0</i>	195	96	36	476	1942
Vanuatu						
Sola	422.0	253	167	87	996	1958
Pekoa	88.0	145	61	3	612	1951
Lamap	37.1	75	49	8	159	1960
Bauerfield	29.5	80	37	3	218	1985
Port Vila	32.2	87	37	1	338	1947
Aneityum	42.8	80	54	8	200	1958
Wallis & Futuna						
Wallis Island, Hihifo	42.8	103	42	3	195	1951
Maopopo, Futuna Island	75.8	171	44			

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.



ENSO Update

Current oceanic observations show El Niño/Southern Oscillation (ENSO) characteristics in the tropical Pacific region which are not coupled with the atmosphere

In July 2004, the tropical Pacific showed mixed warming and cooling signals, and Southern Oscillation Index (SOI) fluctuations occurred from April 2004. The equatorial sea surface temperature (SST) anomalies were below average near the South American coast but above average over the remainder of the equatorial tropical Pacific east of the Date Line. These were more than 1°C above average near the Date Line. The NINO3 SST anomaly was +0.0°C while NINO4 was +1.0°C. The subsurface temperatures at 150 m depth just east of the Date Line showed a strong positive anomaly (exceeding +3.0°C), which developed following a strong westerly wind burst at 160°E in June 2004. There was also reduced convection in the Indonesian and Australian regions and along the equatorial Pacific.

During August 2004, the SOI became more negative with the 3-month mean reaching -1.1 (June-August), the lowest since spring 2002. Equatorial SST anomalies were above normal across much of the Pacific with NINO3 and NINO4 SST anomalies being +0.3°C and +0.9°C respectively. Subsurface temperatures showed a positive anomaly (exceeding +2.0°C) centred near 110°W and propagating eastwards. There was some anomalous convection about and west of the Date Line north of the Equator and the westerly zonal wind anomalies were evident across the equatorial Pacific.

September 2004 had mixed signals, with the sea surface and subsurface temperatures showing El Niño diagnostics, but with the atmosphere yet to couple and respond to the oceanic signals. The SOI weakened during September to -0.4 while the equatorial SST anomalies increased compared with August. The NINO3.4 anomaly was +0.9°C (August was +0.6°C) and the subsurface temperatures were +2.0°C or more in the eastern Pacific at ~100 m depth. The westerly wind anomalies seen in August abated during September.

Overall, the oceanic observations show a weak El Niño state, but the atmosphere is yet to become coupled to the oceans. It is therefore difficult to categorise the current El Niño/Southern Oscillation (ENSO) state in the Pacific. However, there are other observations which are diagnostic of weak El Niño impacts such as the reduced convection over the Indonesian region and cooler SSTs in the Southwest Pacific. Several climate models (5 out of 12) are forecasting a weak El Niño event based on warming of the SSTs in the NINO3.4 region through to early 2005. Hence, the current incoherence in oceanic and atmospheric signals in the tropical Pacific means that there is a continuing need for close monitoring of the weak ENSO situation and its climate impacts.

Acknowledgements

The Australian Bureau of Meteorology, the International Research Institute for Climate Prediction (US), US National Center for Environmental Prediction, World Meteorological Organization, US Climate Prediction Center and the Pacific National Meteorological Services.



**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 South Pacific Regional Environmental Programme (SPREP).

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