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The Island Climate Update



An overview of the present climate in the tropical South Pacific, with an outlook for the coming months, to assist in dissemination of climate information in the Pacific region

Produced by the National Institute of Water and Atmospheric Research, New Zealand

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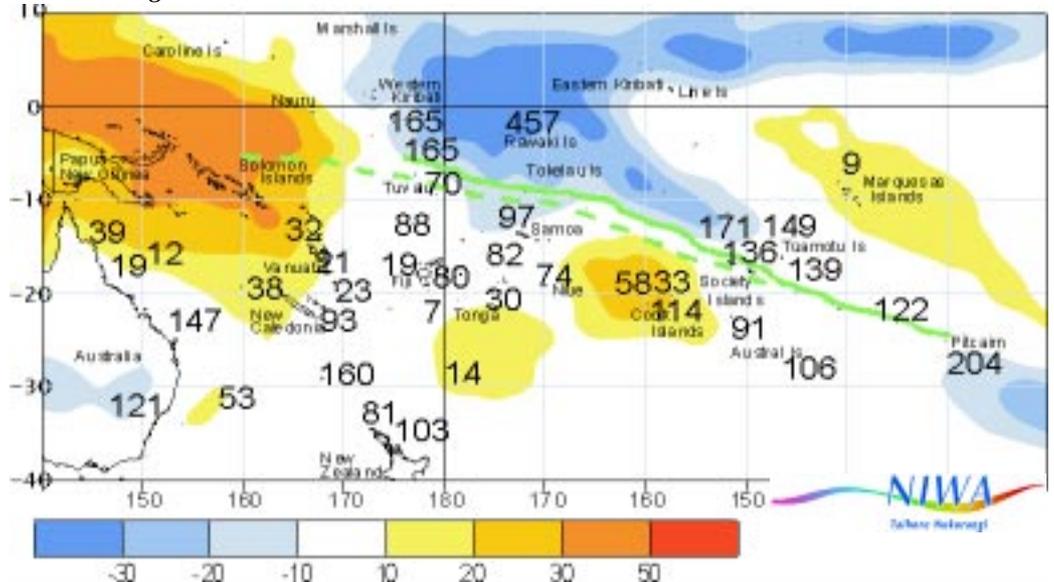
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December's climate

The El Niño episode is continuing to affect Southwest Pacific rainfall patterns, with enhanced convection and above average rainfall over Western and Eastern Kiribati, and the Northern Cook Islands, and contrasting areas of suppressed convection and well below average rainfall extending from Papua-New Guinea, southeast to the north of New Caledonia, including the Coral Sea, the Solomon Islands, and Vanuatu. Rainfall was also well below average in parts of Fiji and Tonga, as well as the Marquesas Islands in northern French Polynesia, and above average in the Society Islands of French Polynesia, and on Pitcairn Island. The South Pacific Convergence Zone (SPCZ) was displaced further east than average. There were two tropical cyclones 'Yolanda' and 'Zoe' during December.

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Outgoing Long-wave Radiation (OLR) anomalies, in Wm^2 are represented by hatched areas, and rainfall percentage of average, shown by numbers. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically mean higher rainfalls. The December 2002 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.

ENSO and sea surface temperatures

The El Niño event in the tropical Pacific is expected to weaken and ease back to neutral during autumn 2003. The Southern Oscillation Index (SOI) strengthened slightly in December to -1.3, with a three month mean of -1.0, indicating continuing El Niño/Southern Oscillation (ENSO) conditions in the region. Sea surface temperatures (SSTs) in the equatorial Pacific strengthened during December.

Details Page 2.

The next three months January to March 2003

The El Niño related convection and tendency towards above average rainfall is expected to persist in Eastern and Western Kiribati, the Society Islands and Pitcairn Island. Rainfall should tends to trend below average or average from New Caledonia, east to Niue and the Marquesas Island.

More on Page 3.



Ministry for the Environment and Territory
Department for Global Environment, International and Regional Co-operation



New Zealand Agency for International Development
Nga Hoe Tuputupu-mai-tawhiti





Climate developments in December 2002

El Niño continues to enhance convection over Kiribati

Suppressed convection from Papua New Guinea to the Southern Cook Islands

The SPCZ was displaced further east than average, with enhanced convection from Tuvalu southeast to the Society Islands. This region merged with the Inter-tropical Convergence Zone (ITCZ), which was enhanced over Kiribati, and in the central equatorial Pacific just north of the equator. Episodes of equatorial surface westerlies that have been enhancing the ENSO linked convection over Kiribati, weakened further, reaching their lowest frequency at Tarawa (24% of observations) since June 2002.

Climate Models show El Niño likely to weaken in the Autumn of 2003

Equatorial Pacific SSTs intensified during December

El Niño-related temperature and wind anomalies in the Equatorial Pacific continue to propagate eastwards in December, as the event came close to maturity.

CLIMATE EXTREMES IN DECEMBER 2002

Country	Location	Rainfall (mm)	% of average	Comments
Australia	Willis Island	11	12	Well below average
Vanuatu	Pekoa	38	14	Extremely low
New Caledonia	Ile Art, Beep	33	22	Extremely low
Fiji	Nadi Airport	26	14	Extremely low
Fiji	Ono-I-Lau	9	7	Record low
New Zealand	Raoul Island	18	14	Well below average
French Polynesia	Hiva Hoa, Atuona	7	9	Record low

Country	Location	Max Air Temp (°C)	Date	Comments
French Polynesia	Hao	32.4		Record High

December rainfall was at least 125% of average (and approximately 300 mm, or more) over a broad region from Western and Eastern Kiribati, southeast to Pitcairn Island, including the Society Islands of French Polynesia, and the Northern Cook Islands.

The large region of suppressed convection persisted over Indonesia, extending to Papua-New Guinea, the Coral Sea, the Solomon Islands, Vanuatu and the north of

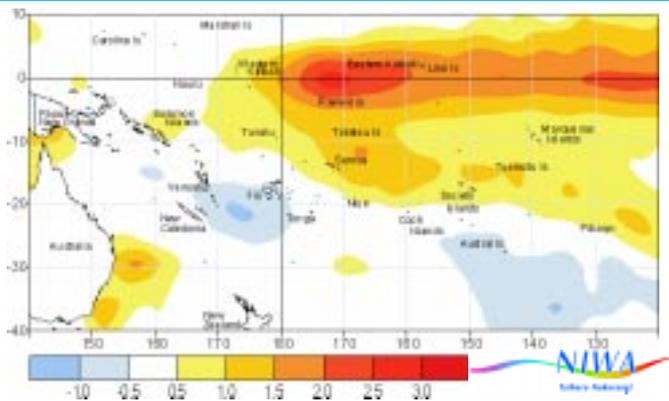
New Caledonia, where rainfall totals were less than 50% of average in many areas. Rainfall was also less than 50% of average in many areas from Fiji to Tonga, as well as the Marquesas Islands in northern French Polynesia.

A new high maximum temperature record (32.4°C) was set at Hao, French Polynesia during December. It broke the record set in 1964 (32.3°C).

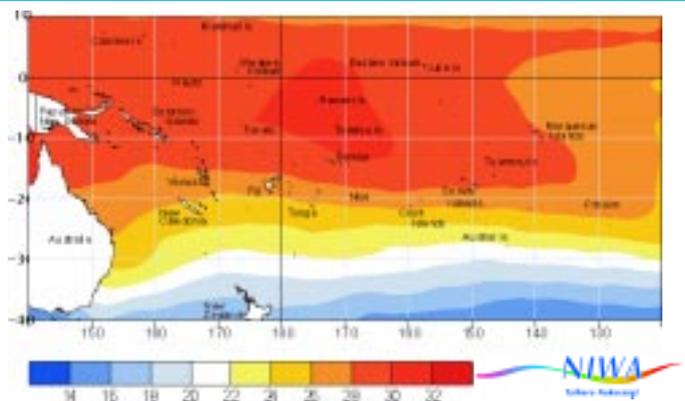
The NINO3 SST anomaly (+1.7°C) is now significantly higher than the NINO4 anomaly (+1.3°C) for the first time in this event. Three-month (Oct-Dec) means are about +1.5°C and +1.4°C for NINO3 and 4, respectively. Westerly zonal wind anomalies extend to near 140°W, and the region of enhanced Equatorial convection has strengthened near the dateline. The area of suppressed convection in the west affects northern Australia and also the Coral Sea, New Caledonia and southeast towards northern New Zealand.

Equatorial subsurface temperature anomalies appear to be weakening east of the dateline, but are still above +2°C across most of the eastern Pacific mixed layer. The SOI strengthened slightly in December to near -1.3, bringing the 3-month mean to -1.0.

Most Global Climate Models (8 out of 11) are predicting a return to neutral conditions during autumn 2003.



Sea surface temperature anomalies (°C) for December 2002



Mean sea surface temperatures (°C) for December 2002



Forecast validation

Forecast period: October to December 2002

The El Niño related region of enhanced convection over Western and Eastern Kiribati was expected to persist, resulting in continued above average rainfall and above average or average rainfall in Tuvalu, Tokelau and the Marquesas Island. A tendency towards below average rainfall was expected from Papua New Guinea to the Society Islands, including New Caledonia, Vanuatu, Fiji, Tonga, Niue and the Southern Cook Islands. Near average rainfall was projected elsewhere.

The overall rainfall anomaly pattern was very similar to the forecast pattern. The only differences were the region of above average rainfall, which extended southeast to Pitcairn, and the average or below average rainfall region, which extended north to include the Northern Cook Islands. The overall 'hit rate' for the October to December 2002 rainfall outlook was 70%, the 3rd highest score of the 26 outlooks so far.

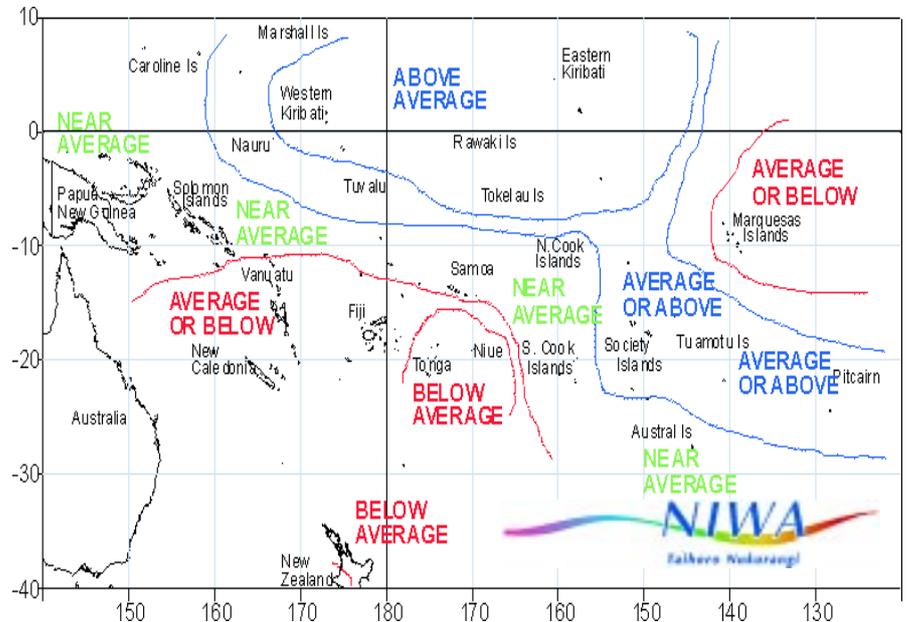


Rainfall outlook: January to March 2003

Above average or average rainfall in equatorial latitudes from west to east and Society and Pitcairn Island.

Below average or average rainfall from Vanuatu, New Caledonia, trending east to Niue and the Marquesas Islands.

Mainly average rainfall expected elsewhere.



Rainfall outlook map for January to March 2003

Enhanced convection in the equatorial Pacific region is expected to continue from January till March 2003, resulting in an increased likelihood of above average rainfall in both Western and Eastern Kiribati and Tokelau.

Rainfall is expected to be average or above average in Tuvalu, Society Islands and Pitcairn Island. A tendency for below average or average rainfall from Vanuatu, New Caledonia, trending east to Niue

and the Marquesas Islands. Near average rainfall is likely elsewhere.

The forecast model skills for this outlook are generally moderate or high for most countries in the region.



Tropical cyclone update

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The tropical cyclone season is now well underway, with two cyclones, 'Yolanda and Zoe' (one less than the normal ENSO frequency for the November - December period) having occurred so far this season.

Tonga on the 5th. Maximum sustained winds reached 74 km/h, with heavy rainfall. Fortunately no damage was caused by this event.

'Yolanda' developed over southern Tuvalu on 1st December, and then tracked south, passing east of Fiji on the 4th, and then southeast over southern

'Zoe' formed on 24th December, also over southern Tuvalu, and then tracked west to affect the Solomon Islands from the 28th through 30th. The cyclone tracked southeast to pass between Vanuatu and Fiji over the 30th and 31st.

Probabilities of rainfall departures from average

Broad-scale rainfall patterns and anomalies in the southern tropical Pacific area are estimated from the state of large-scale regional climate factors, such as La Niña or El Niño, their effect on the South Pacific and Tropical Convergence Zones, surface and sub-surface sea temperatures, and computer models of the global climate.

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

The probabilities shown express the expected shift in the distribution from the long-term average, based on predictions of oceanic and atmospheric conditions. The amount of inter-model forecast consistency is indicated by the levels of confidence expressed in the table.

TROPICAL PACIFIC RAINFALL OUTLOOK (JANUARY - MARCH 2003)

Island Group	Rainfall Outlook	Confidence in the Outlook
Western Kiribati	15:20:65 (Above)	High
Eastern Kiribati	15:20:65 (Above)	High
Tokelau	20:30:50 (Above)	Moderate
Tuvalu	20:40:40 (Average or above average)	Moderate
Society Island	20:40:40 (Average or above average)	Moderate
Pitcairn Island	15:45:40 (Average or above average)	Moderate
Papua New Guinea	25:50:25 (Near average)	Low
Solomon Islands	25:50:25 (Near average)	Moderate
Wallis & Futuna	20:45:35 (Near average)	Moderate
Samoa	20:60:20 (Near average)	Moderate
Northern Cook Islands	20:50:30 (Near average)	Moderate
Southern Cook Islands	35:45:20 (Near average)	Moderate
Austral Islands	25:50:25 (Near average)	Moderate
Vanuatu	40:50:10 (Average or below average)	High
New Caledonia	45:40:15 (Average or below average)	Moderate
Fiji	45:40:15 (Average or below average)	High
Maquesas	45:40:15 (Average or below average)	Moderate
Tonga	50:30:20 (Below average)	High
Niue	50:30:20 (Below average)	Moderate - high

Tropical Cyclone Update

By Jim Salinger, Jim Renwick, Stuart Burgess, and Ashmita Gosai, NIWA

For some South Pacific countries east of the dateline the chances of tropical cyclone activity are higher than normal for the January – May period.

'Yolanda' developed over southern Tuvalu on 1 December, and then tracked south, passing east of Fiji on the 4th, and then southeast over southern Tonga on the 5th. Maximum sustained winds reached 74 km/h, with heavy rainfall. Fortunately no damage was caused by this event. 'Zoe' formed on 24th December from a tropical depression near Tuvalu and Fiji's Rotuma Island, intensifying to tropical cyclone intensity as it tracked west on the 26th. The system became very intense over the Santa Cruz Islands of Tikopia and Anuta in the Solomon Islands, from the 28th through 30th generating huge seas, with estimated maximum sustained wind speeds of 287 km/h (Category 5, i.e. the strongest in hurricane definitions), and gusts to 350 km/h reported. This event was very destructive to these islands, ripping foliage off most of the vegetation, and wiping out the coconut and other plantations. The islanders were fortunate that they could take shelter in caves, however it will be some time before life returns to normal. The cyclone then tracked southeast to pass between Vanuatu and Fiji on the 30th and 31st, losing intensity.

The tropical cyclone season has yet to peak, and some Pacific Island countries east of the dateline are likely to experience a higher risk of tropical cyclone occurrence than is usual. It should be noted that tropical cyclones are still very likely about and west of the dateline, as has occurred (but with a lower than normal frequency of occurrence there). This eastward elongation of the normal pattern is expected because of the mature moderate El Niño conditions affecting the tropical Pacific region. The Southern Oscillation Index remains negative, and is expected to remain so throughout the peak period of the cyclone season. Countries with increased risk over the January to May 2003 period (see Table 1) are: Wallis and Futuna, Samoa, Tokelau, Niue, the northern and Southern Cook Islands, and Society and Austral Islands of French Polynesia.

In seasons similar to the present during January to May, on average eight tropical cyclones usually occur over the whole of the South West Pacific, but there can be more or less. The peak period of cyclone occurrence is during January, February, and March. On average, the highest numbers occur in the region around Vanuatu and the adjacent Coral Sea.

Table 1 and Fig 1 show the average number of tropical cyclones passing near the main island groups of the Southwest Pacific over the January through May period during moderate El Niño conditions.

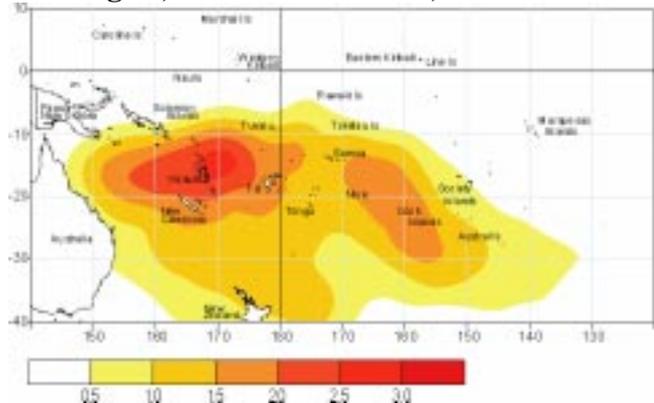


Fig 1 Tropical Cyclone Occurrence, Moderate El Niño January-May periods, 1970-2001(Average number of tropical cyclones)

Area	Average no of cyclones 1970-2001	Average over Moderate El Niño Years	Comment on Risk
Wallis & Futuna	1.3	1.5	Increased
Samoa	1.1	1.3	Increased
Tokelau	0.5	0.9	Increased
Northern Cook Islands	0.6	1.1	Increased
Southern Cook Islands	1.2	1.9	Increased
Society Islands/Tahiti	0.6	0.7	Increased
Austral Islands	0.6	1.0	Increased
Vanuatu	2.7	2.5	Average
Fiji	1.9	1.8	Average
Tuvalu	0.8	0.9	Average
Niue	1.4	1.4	Average
Northern New Zealand	0.9	1.1	Average
Pitcairn Island	0.3	0.3	Average
New Caledonia	2.6	1.8	Reduced
Solomon Islands	1.2	0.8	Reduced
Tonga	1.7	1.2	Reduced
Southern PNG	0.5	0.2	Reduced
Tuamotu	0.4	0.2	Reduced

Table 1 Tropical Cyclone Occurrence, Moderate El Niño January-May periods, 1970-2001(Average number of tropical cyclones)

*For the southwest Pacific, "tropical cyclone" is a tropical low-pressure system intense enough to produce sustained gale force winds (at least 34 knots or 63 km/h). A "severe tropical cyclone" produces sustained hurricane force winds (at least 64 knots or 118 km/h), and corresponds to the hurricanes or typhoons of other parts of the world.

The February 2003 issue of the ICU will provide an update on information relating to any occurrences of the tropical cyclones in our forecast region of the South West Pacific.



Visit The Island Climate Update website at: www.niwa.co.nz/NCC/ICU/.

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 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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DISCLAIMER: 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 meteorological services. 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 contents.

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