

# The Island Climate Update

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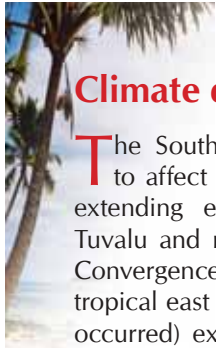
## August's climate

- The South Pacific Convergence Zone (SPCZ) over and east of the Solomon Islands; suppressed convection persists near the equator
- Rainfall well above average in the north of Vanuatu and parts of Central and Southern French Polynesia
- Well below average rainfall in western Viti Levu, Fiji
- Much warmer than normal in parts of Tuvalu, Tonga, Fiji, much of New Caledonia, and central and southern French Polynesia

## El Niño/Southern Oscillation (ENSO) and seasonal rainfall forecasts

- ENSO conditions borderline La Niña, with a 60% chance of La Niña developing over the coming months
- Enhanced convection and above average rainfall expected over Vanuatu, Wallis and Futuna, Tonga, and Niue
- Below average rainfall likely over Tuvalu, Western and Eastern Kiribati





## Climate developments in August 2007

The South Pacific Convergence Zone (SPCZ) continued to affect the Solomon Islands and northern parts of Fiji, extending east with weakly enhanced convection over Tuvalu and north of Samoa, and little activity further east. Convergence was also weakly enhanced over Australia's tropical east coast (where some unseasonably heavy rainfalls occurred) extending east across the north Tasman Sea. An elongated region of suppressed convection persisted along the equator from the region south of the Caroline Islands across Western and part of Eastern Kiribati and then further east (north of the Equator towards South America). Suppressed convection also affected the western and southern parts of Fiji, under the influence of the subtropical high pressure system.

Rainfall was 200% or more of normal in the north of Vanuatu and parts of central and southern French Polynesia, and also above normal in the south of New Caledonia, the north of Fiji, and much of Tuvalu. August rainfall was 50% or less of normal throughout the western and southern parts of Fiji. Only 1 mm was recorded at Nadi. It was dry in northern parts of New Caledonia.

August mean air temperatures were 1.0 °C or more above normal in parts of Tuvalu, Tonga, Fiji, much of New Caledonia, and central and southern French Polynesia. New Caledonia was unusually warm for August, and Fiji has been exceptionally warm with above average temperatures throughout the June–August period.

Tropical Southwest Pacific mean sea-level pressures were below average near 5°S of the Equator about and east of the Date Line, with high pressures south of 25°S in the eastern South Pacific.

Equatorial surface easterlies weakened by 10% in August, occurring in about 75% of observations at Tarawa, however, they were still quite persistent. The southeast trade winds were weaker than normal over Fiji. Enhanced trade winds occurred in the eastern South Pacific.

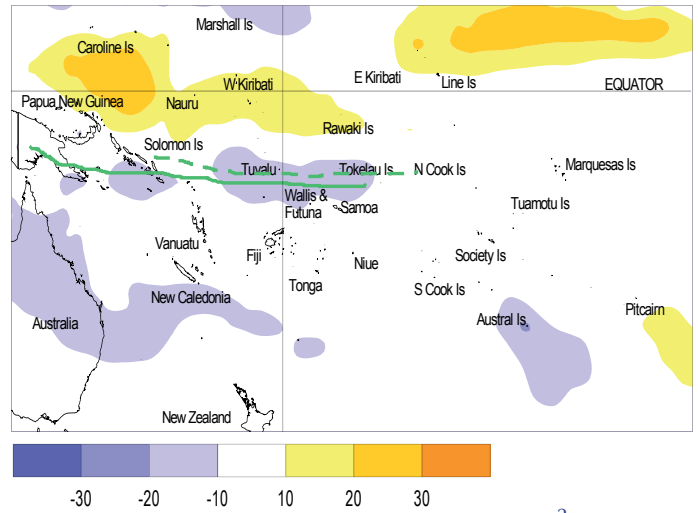
## Soil moisture in August 2007

Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model. It is planned to include more stations in the future.

The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to available water already in the soil comes from rainfall, and losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture level and its changes.

Please note that these soil moisture calculations are made at the end of the month. For practical purposes, generalisations were made about the available water capacity of the soils at each site.

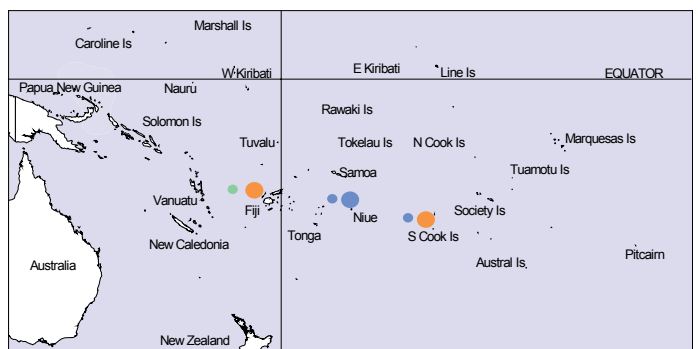
At the end of August 2007, Rarotonga soils were dry for the second consecutive month, and Nadi soils were also dry, with mild drought-like conditions in the northwest and west of Viti Levu and Kandavu. Hanan soils remained moist (at field capacity).



Outgoing Long-wave Radiation (OLR) anomalies, in  $Wm^{-2}$  (blue equals high rainfall and yellow equals low rainfall). The August 2007 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.

Country	Location	Rainfall (mm)	% of avg.	
Fiji	Nadi	1	2	Extremely low
New Caledonia	Ile Art, Beleep	11	22	Well below average
New Caledonia	Moue	185	208	Well above average
Vanuatu	Lamap	159	269	Well above average
French Polynesia	Tubuai	326	240	Extremely high

Country	Location	Mean temp. (°C)	% of avg.	
New Caledonia	Noumea	21.3	+1.2	Extremely high
Fiji	Nadi Airport	25.4	+1.8	Extremely high
Tuvalu	Funafuti	29.2	+1.3	Extremely high
Tonga	Fua'amotu Airport	22.5	+1.4	Extremely high
French Polynesia	Tahiti-Faaa	26.0	+1.3	Extremely high
French Polynesia	Rapa	19.3	+1.5	Extremely high



Estimated soil moisture conditions at the end of August 2007, using monthly rainfall data.

## El Niño/Southern Oscillation (ENSO)

Conditions in the tropical Pacific are in a borderline La Niña state, and these indicators have strengthened over the last month.

Sea surface temperature (SST) in the equatorial Pacific became more strongly negative east of 140°W with anomalies expanding westward during August, the oceanic anomaly field showing a weak La Niña pattern, with an enhanced 'cold tongue' evident near the South American coast (and northeast of Northern French Polynesia) and a partial 'warm horseshoe' in the extratropics of both hemispheres (also evident in SSH anomalies). The NINO3 anomaly decreased to -0.9 °C in August (June–August average -0.5) and the NINO4 anomaly was +0.3 °C (June–August mean also +0.3 °C). During August equatorial subsurface temperatures showed a significant negative anomaly (-2 °C) in the top 150 metres in the eastern Pacific, with positive anomalies (+1 °C) in the same layer west of the Date Line.

Equatorial easterlies were stronger than average in the western and central Pacific with suppressed convection near and east of the Date Line. The SOI rose during August to +0.1 (June–August, 0.0).

Tropical OLR anomalies show suppressed convection in the equatorial region near and east of the Date Line, with a weak area of enhanced convection over parts of Indonesia. The TRMM-based ENSO precipitation index was -0.5, in the neutral range. Although the Madden-Julian Oscillation (MJO) is weak, it shows some activity in the Indian Ocean (phase 2).

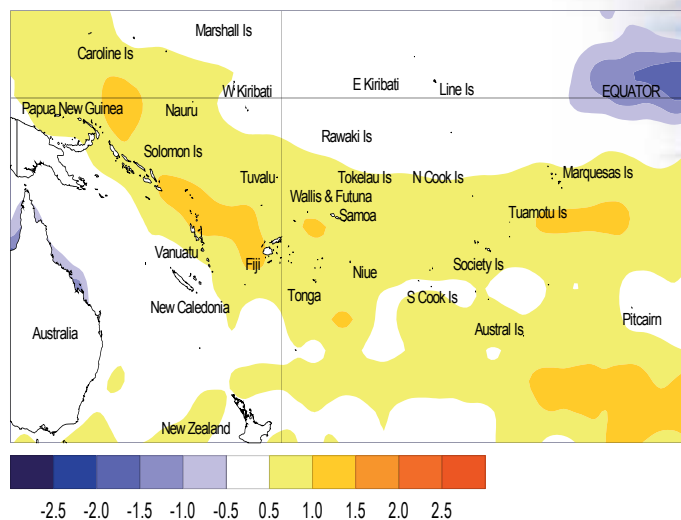
Overall, these show a weak La Niña in development, with atmospheric and oceanic conditions in the eastern Pacific in a La Niña state, although conditions in the western Pacific do not exhibit this behaviour yet. Model guidance anticipates La Niña conditions to strengthen.

There has been a general strengthening in ENSO model forecasts since July, with 65% of the models showing La Niña conditions through to the end of November, and 50% of the models extending the La Niña into early 2008. Almost all models tend neutral after that.

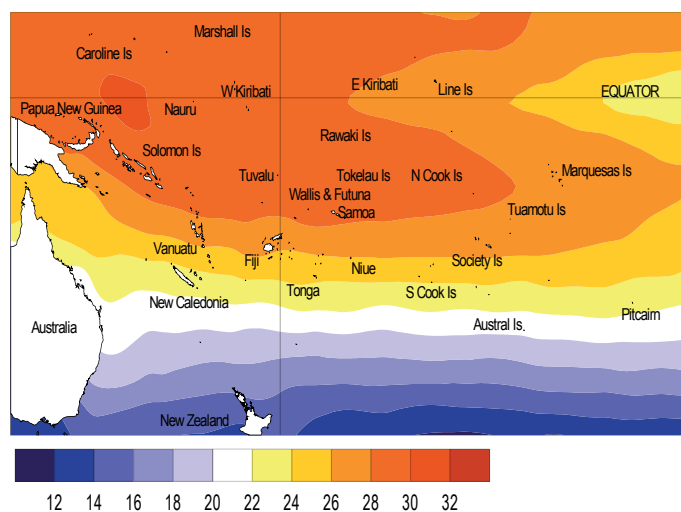
The Scripps model differs, in that it indicates a warm event developing during the southern summer, persisting into autumn

## Forecast validation: June to August 2007

Two areas of enhanced convection and above average rainfall were expected, one over the Solomon Islands, and the other affecting Wallis and Futuna, Samoa, the Northern Cook Islands, and the Society Islands. Near or above average rainfall was forecast from Papua New Guinea southeast to the Tuamotu Islands including Vanuatu, Tokelau, Tonga, Niue, and the Southern Cook Islands. Suppressed convection with below average rainfall convection was expected over Eastern Kiribati and Tuvalu, with near or below average rainfall in Western Kiribati. Near average rainfall was expected elsewhere.



Sea surface temperature anomalies (°C) for August 2007.



Mean sea surface temperatures (°C) for August 2007

2008. The NCEP synopsis suggests La Niña conditions will continue to develop and possibly strengthen during spring. The IRI synthesis continues to give a probability of 60% for a La Niña over the next few months. The probability of El Niño conditions re-emerging during the forecast period remains below 10%.

Suppressed convection and below average rainfall occurred as expected in the equatorial region about and east of the Date Line, including Western and Eastern Kiribati. Rainfall was also below average (as expected) in Tonga and the Society Islands (drier than expected). Rainfall was above average as expected in Vanuatu and the Tuamotu Islands. The 'hit rate' for the June–August 2007 rainfall outlook was about 70%.

## Tropical Pacific rainfall – August 2007

Territory and station name	August 2007 rainfall total (mm)	August 2007 percent of average
<b>Australia</b>		
Cairns Airport	12.2	45
Townsville Airport	4.2	32
Brisbane Airport	110.0	256
Sydney Airport	84.6	107
<b>Cook Islands</b>		
Penrhyn	232.4	120
Rarotonga Airport	80.0	73
Rarotonga EWS	68.4	63
<b>Fiji</b>		
Rotuma	361.8	174
Udu Point	104.3	123
Nadi	1.1	2
Nausori	72.2	49
Ono-I-Lau	35.4	30
<b>French Polynesia</b>		
Hiva Hoa, Atuona	166.0	118
Bora Bora, Motu	56.2	106
Tahiti – Faa'a	22.8	47
Tuamotu, Takaroa	139.8	225
Gambier, Rikitea	85.6	52
Tubuai	325.8	240
Rapa	308.2	127
<b>Niue</b>		
Hanan	109.2	90

Territory and station name	August 2007 rainfall total (mm)	August 2007 percent of average
<b>New Zealand</b>		
Kaitiaia	93.2	61
Whangarei Airport	175.2	126
Auckland Airport	96.6	89
<b>New Caledonia</b>		
Ile Art, Belep	11.4	22
Koumac	27.0	82
Ouloup	41.4	53
Ouanaham	25.0	35
Poindimie	94.4	93
La Roche	44.0	54
La Tontouta	81.0	156
Noumea	92.4	142
Moue	185.4	208
<b>North Tasman</b>		
Lord Howe Island	23.4	17
Norfolk Island	48.0	39
Raoul Island	68.2	53
Tuvalu		
Nanumea	160.1	69
Nui Island	398.1	180
Funafuti	449.3	194
Nuilakita	241.0	122
<b>Vanuatu</b>		
Sola	368.5	163
Pekoa	126.9	171
Lamap	158.5	269
Port Villa	80.1	154
Tanna/Whitegrass	21.9	41
Aneityum	131.1	143

Rainfall totalling 200% or more is considered well above average. Totals of 40% 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. \* denotes synoptic values.

## Tropical rainfall outlook: September to November 2007

A La Niña-like pattern, with a large region of enhanced convection is expected from Vanuatu southeast to the Southern Cook Islands, with above average rainfall likely over Vanuatu, Wallis and Futuna, Tonga, Niue, and Fiji's Rotuma Island.

Average or above average rainfall is expected in Papua New Guinea, the Solomon Islands, New Caledonia, Fiji, Samoa, the Southern Cook Islands, and Pitcairn Island.

Suppressed convection with below average rainfall is expected over Western and Eastern Kiribati, and Tuvalu.

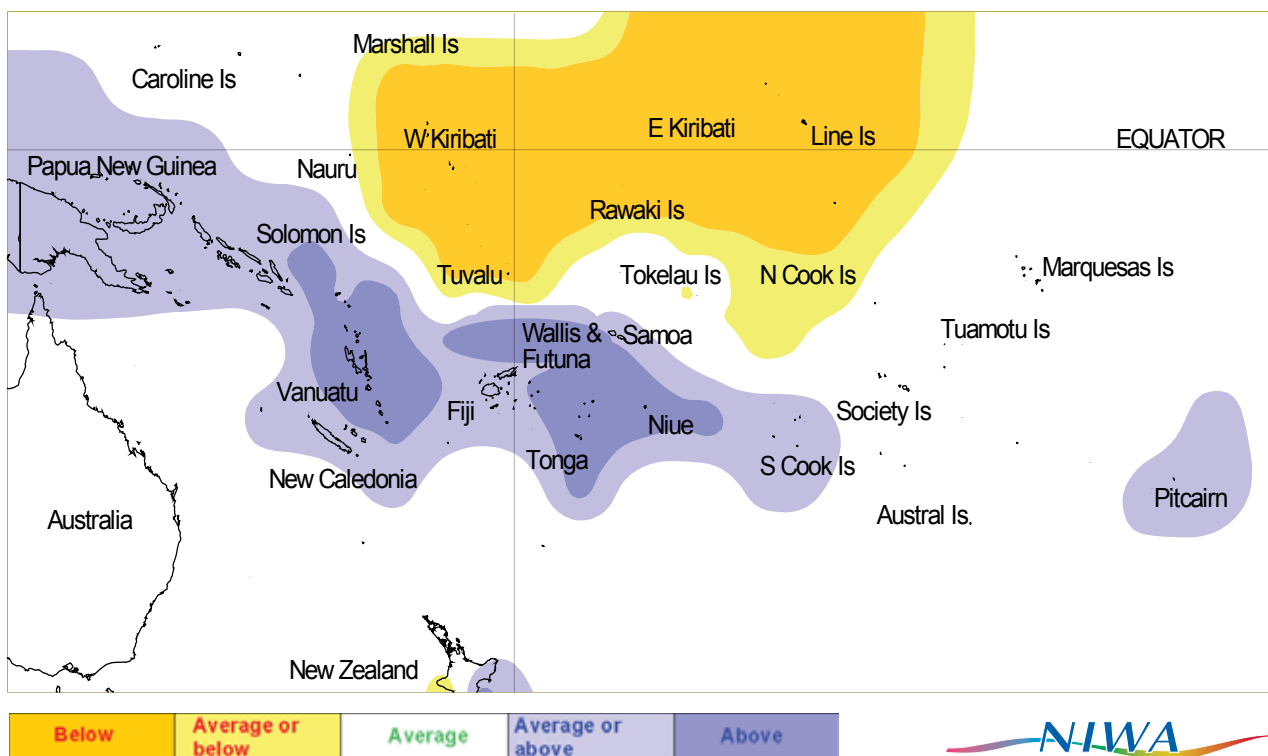
Near or below average rainfall is likely in the Northern Cook Islands.

Near average rainfall is expected in Tokelau and French Polynesia.

Confidence in the forecast model skill, for this seasonal outlook, is moderate for most Pacific Island countries. In the past, the average region-wide hit rate for forecasts issued in September has been 60%.

Island Group	Rainfall Outlook	Outlook confidence
Vanuatu	20:35:45 (Above)	Moderate
Wallis & Futuna	20:35:45 (Above)	Moderate
Tonga	20:35:45 (Above)	Moderate
Niue	25:35:40 (Above)	Low
Papua New Guinea	20:40:40 (Near or above)	Moderate
Solomon Islands	20:40:40 (Near or above)	Moderate
New Caledonia	25:35:40 (Near or above)	Moderate
Fiji	20:40:40 (Near or above)	Moderate
Samoa	20:40:40 (Near or above)	Moderate
Southern Cook Islands	20:40:40 (Near or above)	Moderate
Pitcairn Island	20:40:40 (Near or above)	Moderate
Tokelau	20:45:35 (Near average)	Low
Society Islands	20:50:30 (Near average)	Moderate
Tuamotu Islands	25:45:30 (Near average)	Low
Austral Islands	25:45:30 (Near average)	Moderate
Marquesas	30:45:25 (Near average)	Moderate
Northern Cook Islands	40:40:20 (Near or below)	Moderate
Tuvalu	45:30:25 (Below)	Moderate
Western Kiribati	50:30:20 (Below)	High
Eastern Kiribati	45:35:20 (Below)	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 August to October 2007



# Schools of the Pacific Rainfall Climate Experiment (SPaRCE)

Dr Susan Postawko and Dr Mark Morrissey (University of Oklahoma)

The Schools of the Pacific Rainfall Climate Experiment (SPaRCE) is a cooperative field project involving the meteorological services, schools, and community groups from Pacific island nations. These groups participate in collecting and analyzing a unique set of environmental measurements. Working from a grassroots level throughout the Pacific Islands, the SPaRCE program strives to enhance education and communication regarding the weather and climate in one of the most environmentally vulnerable regions of the planet. The program is administered from the School of Meteorology at the University of Oklahoma in the United States of America, with support from the U.S. National Oceanic and Atmospheric Administration.

The SPaRCE program has been operating across the Pacific basin since 1992. During this time the program has undergone many changes in response to local Pacific island needs. The basic tenet of the program, however, has remained the same: to provide basic meteorological and climatological information to any interested group, supply some basic meteorological equipment to these interested groups, and facilitate the exchange of information between the global research community and local island communities.

Within this project, students and community groups have the opportunity to become involved in a hands-on, scientifically valid research program, in which the sciences of meteorology and climatology are presented in a regionally-relevant context. In addition, the implications of climate change brought about by human activities are discussed as they apply to individuals and to society as a whole.



During the past 15 years over 500 schools and community groups have participated in the program at various times. Each participating group is provided a package containing a direct-read rain gauge, a maximum/minimum thermometer, data sheets

Students from Eauripik, Yap, Federated States of Micronesia, putting up their new shelter for weather instruments

on which to record measurements, workbooks, and a single-use camera. The first workbook introduces the SPaRCE program, explains the protocols to site the rain gauge and thermometer, and how to make the daily measurements. Other workbooks include basic meteorological, climatological, and environmental information, as well as simple exercises and questions to aid teachers in classroom discussions. Additionally, a quarterly newsletter is sent to all participating groups that contains news about the program as well as current environmental information of general interest. There is no charge to participate in the SPaRCE program.

In addition to basic education, one of the original motivations for the SPaRCE program was to increase the measurement of rainfall across the Pacific at a relatively low cost by involving interested local groups. The tropical Pacific is one of the most important regions of the world in terms of global weather and climate studies. In a region made up of so many independent island nations, international cooperation is vital to monitoring of the environment. The SPaRCE measurement sites have made a significant contribution to the daily rainfall database for the Pacific. These data have played a key role in many major science studies. In most countries the data are also incorporated into the local Meteorological Service database, which allows better local and regional assessment of water resources.

The SPaRCE program has attempted to bridge the gap between climate researchers and local communities by presenting often confusing scientific information at a level understandable by the layperson. This has been done through the SPaRCE workbooks as well as printed posters and a web site open to any group with Internet access (<http://www.evac.ou.edu/sparce>). SPaRCE scientists have also been involved in a large number of informational workshops concerning weather, climate, and climate change. These workshops have been presented to a variety of audiences, including schools, governmental agencies, and local communities.

In a rapidly changing world, education is the key to ensuring that all citizens of our planet have a basic understanding of vital issues such as global climate change, and other environmental problems that affect us all.

If you would like further information about the SPaRCE program, please contact: Dr. Susan Postawko (email address: [spostawk@ou.edu](mailto:spostawk@ou.edu)), or Dr. Mark Morrissey (email address: [mmorris@ou.edu](mailto:mmorris@ou.edu))  
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## The Island Climate Update

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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, Wallis and Futuna**

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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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