

18
8 March 2002

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.

NIWA
Taihoro Nukurangi

Contributors

Australian Bureau of
Meteorology

Meteo France

Fiji Met Service

European Centre for Medium
Range Forecasting, ECMWF

NOAA Climate Prediction
Centre

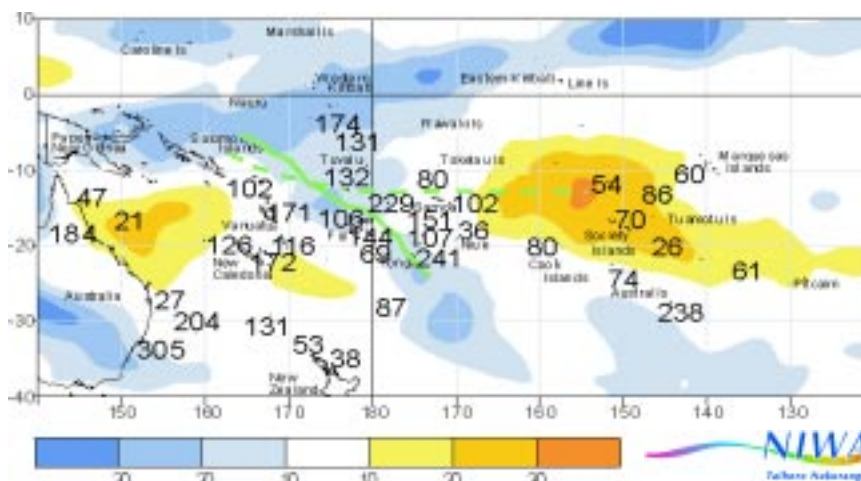
UK Meteorological Office

International Research Institute
for Climate Prediction, IRICP

World Meteorological
Organisation, WMO

February's climate

An extensive area of enhanced convection occurred from Papua-New Guinea to Eastern Kiribati, with another convective band associated with a southward displacement of the SPCZ extending from Tuvalu southeast through Tonga. Rainfall was well above average in parts of Western Kiribati, Fiji, southern Tonga and southern French Polynesia. Below average rainfall persisted over the Northern Cook Islands, much of French Polynesia, parts of the Queensland coast of Australia, and the Coral Sea. Unusually high air temperatures, due to much warmer than average seas, were measured in parts of Fiji, Samoa, and southern French Polynesia. Five tropical cyclones have occurred this season. 'Claudia', the only occurrence in February, developed west of New Caledonia on 11 February and tracked southeast passing north of Norfolk Island. A new tropical cyclone, 'Des' was west of New Caledonia at the time of writing. It is expected to take a southeast track toward northern New Zealand. *More on Page 2.*



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} , for February 2002 represented by shaded 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 February 2002 position of the South Pacific Convergence Zone (SPCZ), as identified from total rainfall, is indicated by the solid green line. The average SPCZ position is identified by the dashed green line. Data source: NOAA-CIRES Climate Diagnostics Center.

ENSO and sea surface temperatures

An extensive area of much warmer than usual water at the surface extends across much of the tropical Southwest Pacific, including Kiribati. A small region of cooler than normal sea surface temperatures remains in the eastern equatorial Pacific. A small area of warmer than normal SSTs now exists near the equator along the South American coast. The 3-month mean of the Southern Oscillation Index (SOI) is still neutral. The equatorial trades winds remain slightly enhanced east of the date line, but westerly anomalies occurred to the west. Most global SST forecast models indicate neutral El Niño-Southern Oscillation (ENSO) conditions for the next three months. *Details Page 2.*

The next three months (March to May 2002)

Below average rainfall is likely in a large part of the east of the region from Tokelau to the Marquesas, including Eastern Kiribati. Rainfall is projected to be above average in Niue, and average to above average from Fiji across to Tonga, and in Western Kiribati. Average rainfall is expected in the other parts of the region. *More on Page 3.*





Climate developments in February 2002

Active convection over equatorial waters about and west of the date line

Low rainfall in the Northern Cook Islands and much of French Polynesia

An extensive area of enhanced convection occurred over equatorial waters about and west of the date line, from Papua-New Guinea to Eastern Kiribati, with another convective band associated with a southward displacement of the SPCZ extending from Tuvalu southeast across Fiji and Tonga. Rainfall was at least 125% of average at many locations within these convective regions, but more than 200% of average in

CLIMATE EXTREMES IN FEBRUARY 2002				
Country	Location	Rainfall (mm)	% of normal	Comments
Fiji	Labasa Airport	837	229	Very high
Tonga	Nuku'alofa	572	241	Very high
French Polynesia	Rapa	474	238	Highest
French Polynesia	Tuamotu, Hereheretue	37	26	Lowest

Country	Location	Mean air temperature, °C	Departure from average	Comments
French Polynesia	Tubai	27.2	+1.3	Highest
French Polynesia	Rapa	25.8	+1.7	Highest

Country	Location	Extreme maximum air temperature, °C	Comments
French Polynesia	Hao	32.7	Highest
French Polynesia	Tubai	31.6	Highest

some northern and central areas of Fiji and southern Tonga. Rainfall totalling more than 400 mm was measured at Fua'amotu, Tonga from 18 to 22 February. It was extremely wet in Rapa, southern French Polynesia, due to high rainfall (over 400 mm) during the last week of the month. Sunny conditions, with less than 75% of average rainfall, persisted over the Northern Cook Islands and many islands in French Polynesia. Below

normal rainfall (less than 50% of average) persisted along parts of the Queensland coast of Australia, extending into the Coral Sea.

Unusually high mean February air temperatures (1.5 to 1.8°C above average), associated with much warmer than average sea surface temperatures, were measured in parts of Fiji, Samoa, and southern French Polynesia.

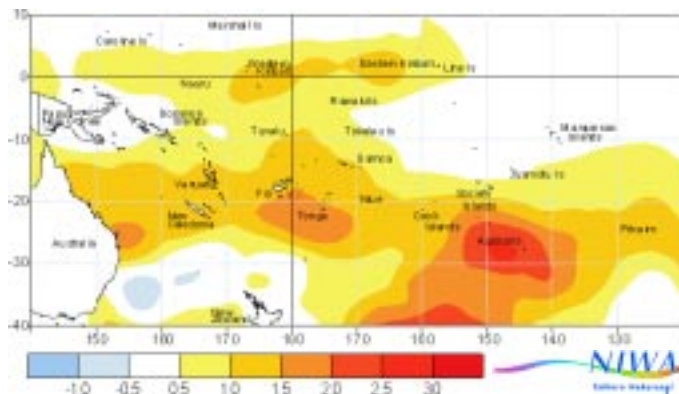
Much warmer seas across the whole of the tropical Southwest Pacific

A warm ENSO event is possible later this year

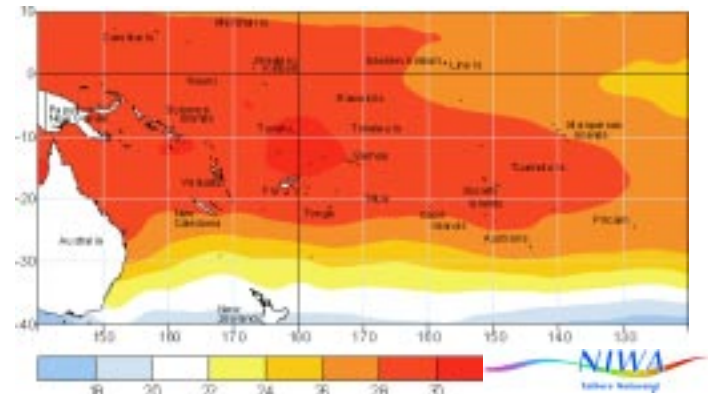
In the tropical Southwest Pacific, a very extensive area of much warmer than usual water at the surface (at least 1.0°C above average) extends from the Coral Sea right across to the region well east of Pitcairn Island, encompassing most islands between 15 and 25°S. The warmest surface waters (30-31°C) surround the Solomon Islands

and an area further east between Tuvalu and Samoa. A region of positive SST anomaly (also at least 1°C above average) is well established about the date line (around Kiribati) in the Equatorial Pacific. Negative temperature anomalies continue east of about 150°W, but have weakened since January. Sub-surface sea temperature observations show a very strong positive anomaly (centred at 100-120°W at 50 m depth) in the eastern Pacific, and positive anomalies have broken through to the surface between South America and 100°W over the past few weeks. Most global SST forecast models indicate that the El Niño-Southern Oscillation (ENSO) climate pattern is expected to remain in a near-neutral

phase for the next three months. However, an "alert" is in place as there is a possibility that warm ENSO conditions could develop by spring, although it remains too early to make a confident prediction as forecast confidence remains low at this time of year. The Southern Oscillation Index (SOI) has been weakly positive for the past two months, because of above average pressures in Tahiti. The 3-month mean of -0.1 is still neutral, with no sign yet of a negative trend. The trade winds continued to be slightly enhanced in the central Equatorial Pacific, with westerly anomalies in the west (due to a westerly wind burst toward the end of February, although not as strong as the one during December).



Sea surface temperature anomalies (°C) for February 2002



Mean sea surface temperatures (°C) for February 2002



Forecast validation

Forecast period: December 2001 to February 2002

The trade winds were expected to remain slightly enhanced across the central Pacific, pushing the SPCZ a little further south than usual. Resulting rainfall was expected to be below average in Tokelau, Eastern Kiribati, Samoa, the Northern Cook Islands, and the Marquesas Islands of French Polynesia. Average rainfall was expected in other parts of French Polynesia and from Fiji to Tuvalu. Average to above average rainfalls were projected for most places west of 170°E, including Tonga,

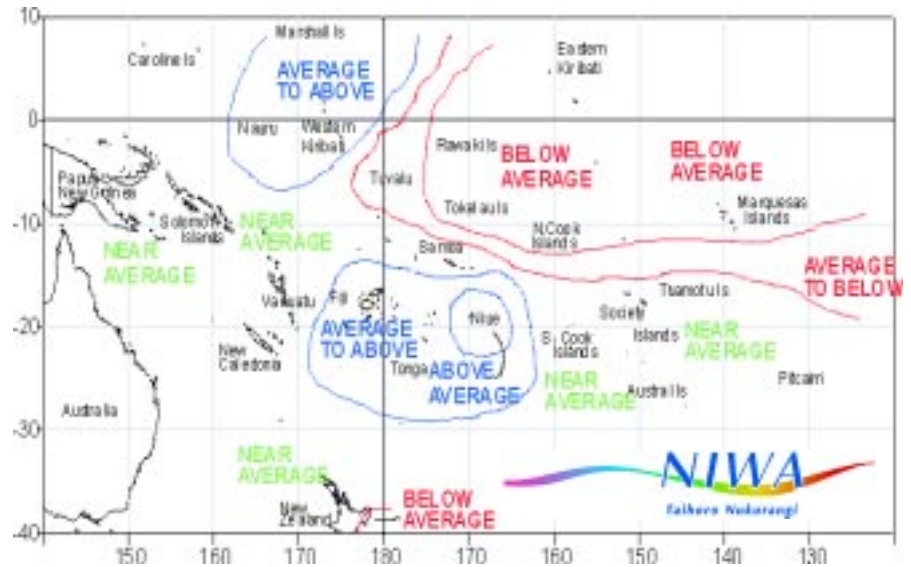
and the Southern Cook Islands. This scenario was correct for many islands. Rainfall was lower than expected in Vanuatu and the Southern Cook Islands, and higher than forecast in areas of Eastern Kiribati, Tuvalu, Fiji, Samoa, and the Tuamotu Islands. Mixed rainfall patterns occurred over Vanuatu, the Northern Cooks, Society and Austral Islands. The overall 'hit rate' for the December to February rainfall outlook was about 60%.



Rainfall outlook: March to May 2002

Lower rainfall continuing in the equatorial east

- Below average rainfall in equatorial latitudes from Tokelau east
- Trending towards above average in Western Kiribati, and from Fiji across to Niue
- Mainly average rainfall in other areas



Rainfall outlook map for March to May 2002

The trades were again slightly stronger than average in February east of the dateline, and weaker to the west. The SPCZ was located from east of the Solomon Islands, across Fiji and Tonga: displaced south of its normal position.

Rainfall is projected to be above average in Niue, and average to above average from Fiji across to Tonga, and in Western Kiribati. Below average rainfall is likely in a large part of the east of the region north of about 12°S from Tokelau to the

Marquesas, including Eastern Kiribati. Average rainfall is expected in the other parts of the region.

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 (MARCH - MAY 2002)

Island Group	Rainfall Outlook	Confidence in the Outlook
Niue	20:30:50 (Above)	Moderate
Western Kiribati	20:45:35 (Average to above average)	Low
Fiji	20:40:40 (Average to above average)	Low
Tonga	20:40:40 (Average to above average)	Low
Papua-New Guinea	15:60:25 (Near average)	Moderate
Solomon Islands	20:50:30 (Near average)	Moderate
Vanuatu	30:55:15 (Near average)	Moderate
New Caledonia	30:30:40 (Near average)	Low
Wallis & Futuna	30:45:25 (Near average)	Low
Southern Cook Islands	20:55:25 (Near average)	Moderate
Society & Tuamotu Islands	30:50:20 (Near average)	Low
Austral Islands	10:55:35 (Near average)	Moderate
Samoa	25:50:25 (Near average)	Low
Pitcairn Island	30:50:20 (Near average)	Moderate
Tuvalu	40:40:20 (Average to below)	Low
Tokelau	50:35:15 (Below)	Moderate
Northern Cook Islands	55:30:15 (Below)	Moderate
Eastern Kiribati	50:35:15 (Below)	Moderate
Marquesas	60:30:10 (Below)	Moderate

El Niño Update

The following is based on a statement prepared for the United Nations Interagency Task Force on Natural Disaster Reduction as a collaborative effort between the World Meteorological Organization and the International Research Institute for Climate Prediction (IRI), drawing also on contributions from regional climate authorities including the Australian Bureau of Meteorology and NIWA, issued on 6 February 2002. NIWA has included additional information (highlighted) due to more recent trends, and will continue to monitor the situation. Further updates will provide readers with information on possible impacts on the Southwest Pacific Island climate.

Climate patterns in the Pacific

Interactions between the atmosphere and ocean in the tropical belt of the Pacific Ocean modulate global weather and climate patterns. During El Niño events, for example, sea temperatures at the surface in the central and eastern tropical Pacific Ocean become substantially warmer than normal. During La Niña events, the sea surface temperatures in these regions become lower than normal. These temperature changes can drive major climate fluctuations around the globe, and, once initiated, such events can last for 12 months or more. The last El Niño event occurred during 1997-1998 with severe drought affecting the western Pacific region, especially communities in Papua-New Guinea. This was followed by the prolonged La Niña phase that extended from mid-1998 to early 2001.

Present situation and outlook

Historical records show the approximate March-June period to be a favoured one for transitions to El Niño or La Niña. Most expert interpretations indicate that it is rather early in the year for a confident El Niño outlook to be made for the remainder of 2002. However, developments in the tropical Pacific are leading the experts to watch the situation very closely and to remain on alert. The conditions beneath the surface of the Equatorial Pacific that have attracted attention were largely triggered by a significant burst of westerly winds in the Equatorial western Pacific during December. **This burst created a pulse of warmer than normal water beneath the surface that is currently migrating east in the eastern Pacific and has just appeared at the surface near the equator along the South American coast.** Present conditions in the tropical Pacific are thought to be unlikely by themselves to

trigger an El Niño, and further initiating signals will be watched for in the next few weeks and months. The onset of further significant westerly wind bursts in the Equatorial western Pacific could enhance the development of an El Niño. The unusually warm conditions at present in the Equatorial Pacific near the dateline could also contribute to the onset of an El Niño.

Summary of the present situation

- Warm water has just appeared at the surface in the eastern Equatorial Pacific.
- Computer models vary on whether the situation will develop further into an El Niño event.
- The potential for the onset of El Niño events in the past has generally been clearer towards the end of the first quarter of the year.

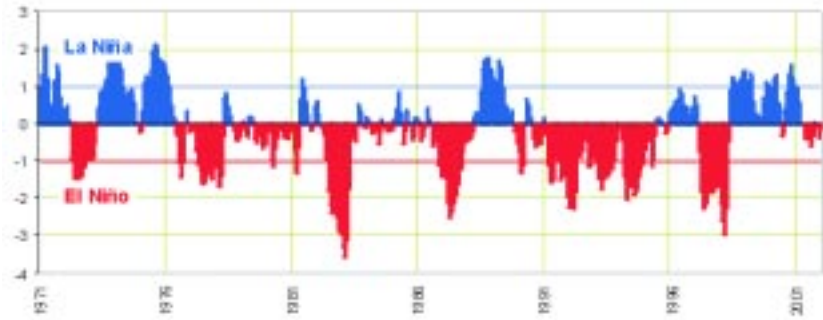


Digital Imagery © copyright 2001 PhotoDisc, Inc.

Tropical cyclone update

Five tropical cyclones so far

Five tropical cyclones have occurred so far this season, which is well below average at this stage. 'Claudia' developed west of New Caledonia at 21°S 157°E on 11 February, and was the first this season to form west of the date line, reaching hurricane force (with estimated maximum sustained winds of about 140 km/h) as it tracked southeast to pass north of Norfolk Island from 12-13 February. A new tropical cyclone, 'Des' developed northwest of New Caledonia near 19°S 161°E on 6 March. So far, maximum sustained winds have reached about 95km/h. It is expected to take a southeast track toward northern New Zealand. This is still the period of peak tropical cyclone occurrence for the Southwest Pacific. On average two tropical cyclones occur in March in seasons similar to the present, decreasing to one during the April-May period. The highest frequencies have normally occurred over the Coral Sea east to Fiji, including Vanuatu and New Caledonia. The April issue of the ICU will provide an update on tropical cyclone information.



The El Niño Southern Oscillation Index (SOI) is an indicator of the changes in pressure patterns across the Equatorial Pacific that occur as part of the development of El Niño (red curve below the zero line) and La Niña (blue curve above the red line) conditions. Strong El Niño conditions existed when the curve was below the red line. The most recent La Niña phase ended in early 2001, with the SOI hovering near neutral over the last few months (far right of graph).

The Island Climate Update



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

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

The Editor: **Dr Jim Salinger**, NIWA, Private Bag 109 695, Newmarket, Auckland, New Zealand.

E-mail: j.salinger@niwa.cri.nz Telephone: int + 64 9 375 2053 Facsimile: int +64 9 375 2051

Technical Services: **Stuart Burgess**, NIWA, PO Box 14-901, Wellington, New Zealand.

E-mail: s.burgess@niwa.cri.nz Telephone: int + 64 4 386 0300 Facsimile: int +64 4 386 0341

Design: Alan Porteous

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.

Acknowledgements

This bulletin is made possible with financial support from the New Zealand Ministry of Foreign Affairs and Trade Official Development Assistance Programme, Wellington, New Zealand. Additional technical support is provided by the National Institute of Geophysics and Volcanology (INGV) through the guidance of Dr. Antonio Navarra and Dr. Sergio Castellari (email: castellari@ingv.it).

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.

NOTICE OF COPYRIGHT: The contents of The Island Climate Update may be freely disseminated provided the source is acknowledged.