Number 92, May 2008

The Island Climate Update

April's climate

- South Pacific Convergence Zone (SPCZ) extended from Papua New Guinea, over New Caledonia and Vanuatu to the northeast of New Zealand, and was displaced well southwest of normal.
- Suppressed convection from Western Kiribati to Eastern Kiribati and about the Equator with low rainfall, especially near Nauru.
- Below normal rainfall for the northern part of the Southern Cook Islands and in parts of Australia, but record high rainfall in New Caledonia, and near record high rainfall in Vanuatu.

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

- The strong La Niña episode present in the Pacific during past months is weakening. The event is expected to persist into the Southern Hemisphere winter.
- Average or below average rainfall is very likely along the equatorial Pacific from Western Kiribati to Eastern Kiribati, including Tuvalu, the Northern Cook Islands, Tuamotu, and the Marquesas. Average rainfall is forecast for the Solomon Islands and Samoa.
- Enhanced convection is likely to continue along a southwest displaced SPCZ, with average or above average rainfall for Papua New Guinea, Vanuatu, New Caledonia, the Austral Islands, Fiji, Tonga, Niue, and the Southern Cook Islands.

Collaborators

Pacific Islands National Meteorological Services

Australian Bureau of Meteorology

Meteo France

NOAA National Weather Service

NOAA Climate Prediction Centre (CPC)

International Research Institute for Climate and Society

European Centre for Medium Range Weather Forecasts

UK Met Office

World Meteorological Organization

MetService of New Zealand

SOPAC

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Climate developments in April 2008

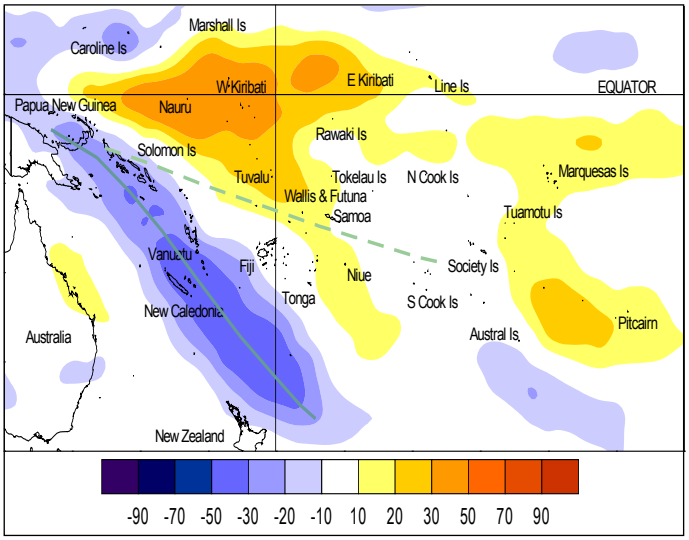
The South Pacific Convergence Zone (SPCZ) extended from Papua New Guinea southeast to Vanuatu and New Caledonia and southwest of Tonga and Fiji to the northeast of New Zealand, with an overall displaced position much further south and west than normal for April. A large region of very suppressed convection persisted along the Equator extending from Western to Eastern Kiribati and included Tuvalu, the Northern Cook Islands, Tuamotu, Pitcairn Island and the Marquesas Islands. Rainfall was well below average in Nauru and western Kiribati.

Rainfall was well above average in the Solomon Islands, parts of New Caledonia, and Vanuatu as a result of a southwest-displaced SPCZ. New high monthly rainfall totals were recorded for three stations in New Caledonia, and 1139 mm was recorded at Yate, while Bauerfield, Vanuatu recorded near record rainfall for the month (411.5 mm). New Caledonia also reported an average station average rainfall of 220 % from normal. Rainfall at Falelolo, Samoa (259.9 mm) was the seventh highest recorded since 1956. Norfolk Island also received heavy rainfall (336.4 mm), reporting 240 % of normal for the month.

In contrast, April rainfall was near or below normal over much of Kiribati, French Polynesia, the Northern Cook Islands, the Austral Islands and the Marquesas. Rainfall has been below average for each of the past 11 months in Kiribati. French Polynesia reports this is the eighth consecutive dry month, with 39 - 53% normal rainfall in Tuamotu and Tahiti. Fiji experienced high intensity and frequency rainfall, but overall the month was dry. Very low rainfall (19 % of normal) was also recorded at Brisbane, Australia, with Queensland experiencing the driest summer since 1951.

Country	Location	Rainfall (mm)	% of avg	Comments
New Caledonia	Ouloup	825.1	859	Record high
New Caledonia	La Tontouta	201.2	330	Record high
New Caledonia	Moue	603.2	490	Record high
French Polynesia	Rapa	599.2	258	Very High
Australia	Brisbane	16.8	19	Very low
Vanuatu	Bauerfield	411.5	198	Near record

Tropical Southwest Pacific mean sea-level pressures were below average in the north Tasman Sea and to the south of New Caledonia. This pressure pattern produced more north easterlies with abundant rain into northern New Zealand, and heavy rainfall in New Caledonia and the Solomon Islands.



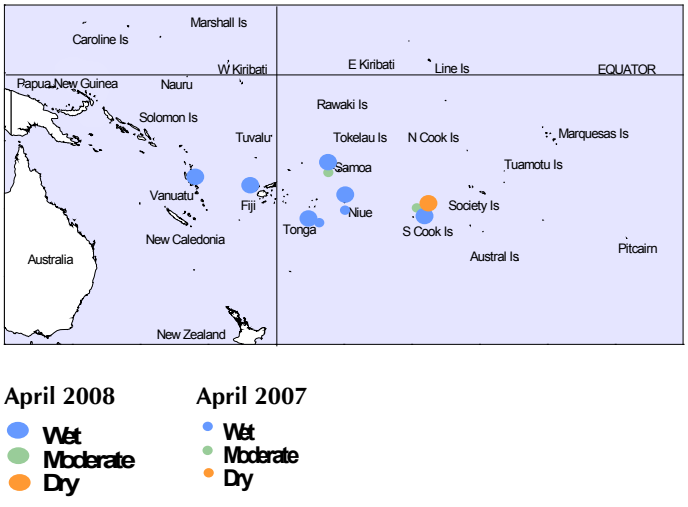
Outgoing Long-wave Radiation (OLR) anomalies, in Wm^2 are represented by hatched areas. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically results in higher rainfalls. The April2008 position of the 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, which is based on mean January rainfall for the South Pacific (after Linacre and Geerts, 1998) .

Soil moisture in April 2008

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, but 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 the available water already in the soil comes from rainfall, with 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 were made at the end of the month, and for practical purposes, generalisations were made about the available water capacity of the soils at each site.

French Polynesia reports important soil moisture deficits equal to or greater than – 50 % exist at multiple sites. Soils continued to be moist (at field capacity) for the time of year at Nadi (Fiji), Hanan Airport (Niue), and in Tonga. In the Southern Cook Islands conditions are dry in the north, while wetter in the southern part of the island group.



Estimated soil moisture conditions at the end of April 2008, using monthly rainfall data.

El Niño/Southern Oscillation (ENSO)

During April, La Niña conditions weakened significantly. In the equatorial Pacific Ocean the east-west dipole is still evident in the temperature anomalies, but the cold pool near the South American coast has weakened due to the presence of a warm water tongue off the coast of Ecuador.

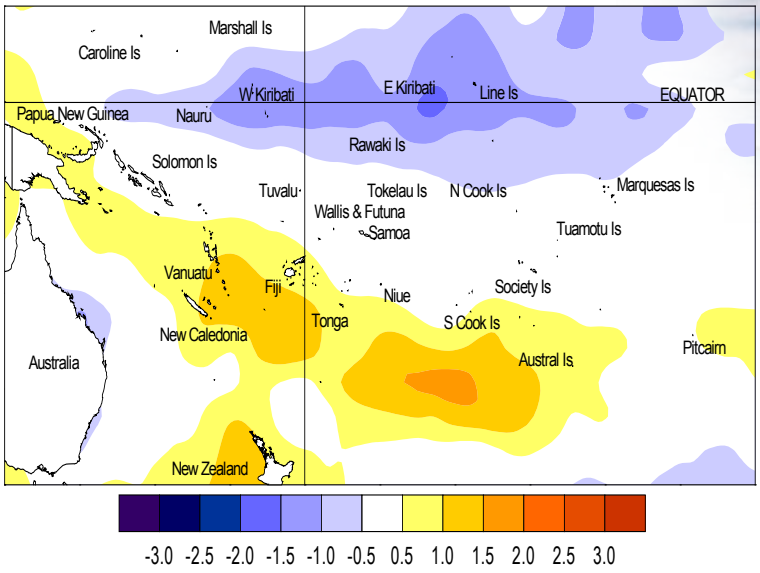
Across the equatorial Pacific, ocean surface temperature anomalies have eased dramatically. The NINO3 (eastern equatorial Pacific) anomaly was around 0.1 °C in April, compared to 1.5 °C in February (3-month mean 0.6 °C), while NINO4 (west-central equatorial Pacific) was near 1.0°C in April (3-month mean around 1.3 °C). SST anomalies are positive near the South American coast. At the subsurface, negative temperature anomalies have all but gone from the top 200 m, while a large positive anomaly remains west of the Date Line.

The near-equatorial trade winds remain enhanced west of the Date Line, but there are positive (westerly) zonal wind anomalies east of the Date Line. Consequently, there is a region of strong subsidence about and just west of the Date Line. The Southern Oscillation Index (SOI), also eased further in April to near +0.5 (3-month mean +1.2).

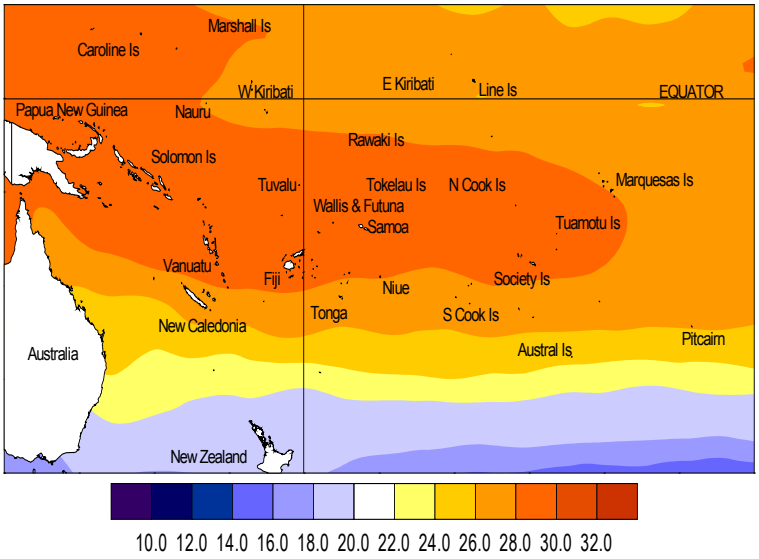
OLR anomalies show a coherent region of suppressed convection extending from east of Papua New Guinea to eastern Kiribati. The region of enhanced convection that was in the western Pacific has consolidated this month, and intensified to the southeast of Vanuatu and New Caledonia. Overall, the SPCZ is displaced well to the southwest of its normal position.

The TRMM ENSO precipitation index was near –2 for April. The MJO is weak at present, but there is an MJO pulse over the Indian Ocean which may progress eastward over the next couple of weeks.

Most climate models indicate conditions in the ENSO neutral range during May – July, or easing to neutral by the beginning of spring. The NCEP discussion of 10 April indicates La Niña becoming weak but persisting through July. The IRI summary of 16 April gives a 60% chance of La Niña conditions continuing through to June, with a 50% of neutral conditions thereafter.



Sea surface temperature anomalies (ºC) for April 2008

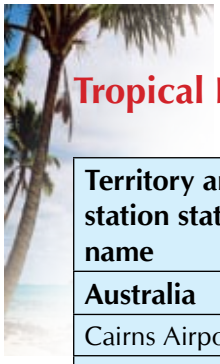


Mean sea surface temperatures (ºC) for April 2008

Forecast validation: February to April 2008

A La Niña-like pattern was expected, with a large region of suppressed convection along the equator encompassing Kiribati and including Tuvalu the Northern Cook Islands, the Marquesas, Tuamotu, and the Society Islands. Near average or below average rainfall was expected for the Solomon Islands and Samoa. Enhanced convection was anticipated along a southwest-displaced SPCZ extending from Vanuatu and New Caledonia eastward across Fiji, Tonga, Niue, the Southern Cook Islands, and the Austral Islands of French Polynesia, with average or above average rainfall.

The rainfall outlook for the February – April 2008 period was very similar to what was forecast, the 'hit' rate being 68%, 6% higher than average. Rainfall higher than expected in the Solomon Islands and Samoa.



Tropical Pacific rainfall – April 2008

Territory and station station name	April 2008 rainfall total (mm)	April 2008 percent of average
Australia		
Cairns Airport	188.2	99
Townsville Airport	218.2	352
Brisbane Airport	16.8	19
Sydney Airport	146.6	150
Cook Islands		
Penrhyn	124.2	61
Aitutaki	36.2	17
Rarotonga Airport	208.3	99
Fiji		
Rotuma Island	279	95
Udu Point	151.0	55
Nadi Airport	192	120
Nausori	260	73
French Polynesia		
Hiva Hoa, Atuona	118.4	68
Bora Bora	246.8	134
Tahiti – Faa'a	81.8	71
Tuamotu, Takaroa	72.4	61
Gambier, Rikitea	70.6	47
Tubuai	193.8	106
Rapa	599.2	258
Kiribati		
Tarawa		
Kanton		
New Zealand		
Kaitaia	133	140
Whangarei Airport	167	143
Auckland Airport	102.2	108
New Caledonia		
Ile Art, Belep	387.6	144
Koumac	283.2	436
Ouloup	825.1	859
Ouanaham	697.6	545
Poindimie	565.8	233
La Roche	484.5	362
La Tontouta	201.2	330
Noumea	189.4	184
Moue	603.2	490

Territory and station station name	April 2008 rainfall total (mm)	April 2008 percent of average
Niue		
Hanan Airport	218.6	97
Liku	196.7	104
North Tasman		
Lord Howe Island	65	40
Norfolk Island	336.4	240
Raoul Island*	218	214
Samoa		
Faleolo Airport	259.9	144
Apia	157.9	70
Nafanua	159.2	64
Afiamalu	235.5	68
Maota	126.3	56
Tonga		
Niuafoo'o	290.9	116
Mata'aho Airport	74.4	29
Lupepau'u	249.7	119
Salote Airport		
Nuku'alofa	71.1	43
Fua'motu Airport	92	58
Tuvalu		
Nanumea	129.2	54
Nui Island	133.3	56
Funafuti	131.1	49
Nuilakita	67.8	28
Vanuatu		
Sola	447.2	96
Pekoa	185.5	61
Lamap	188.9	96
Port Vila	338.2	29
Tanna/Whitegrass	371.6	
Bauerfield	411.5	198
Aneityum	322.9	167

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: May to July 2008

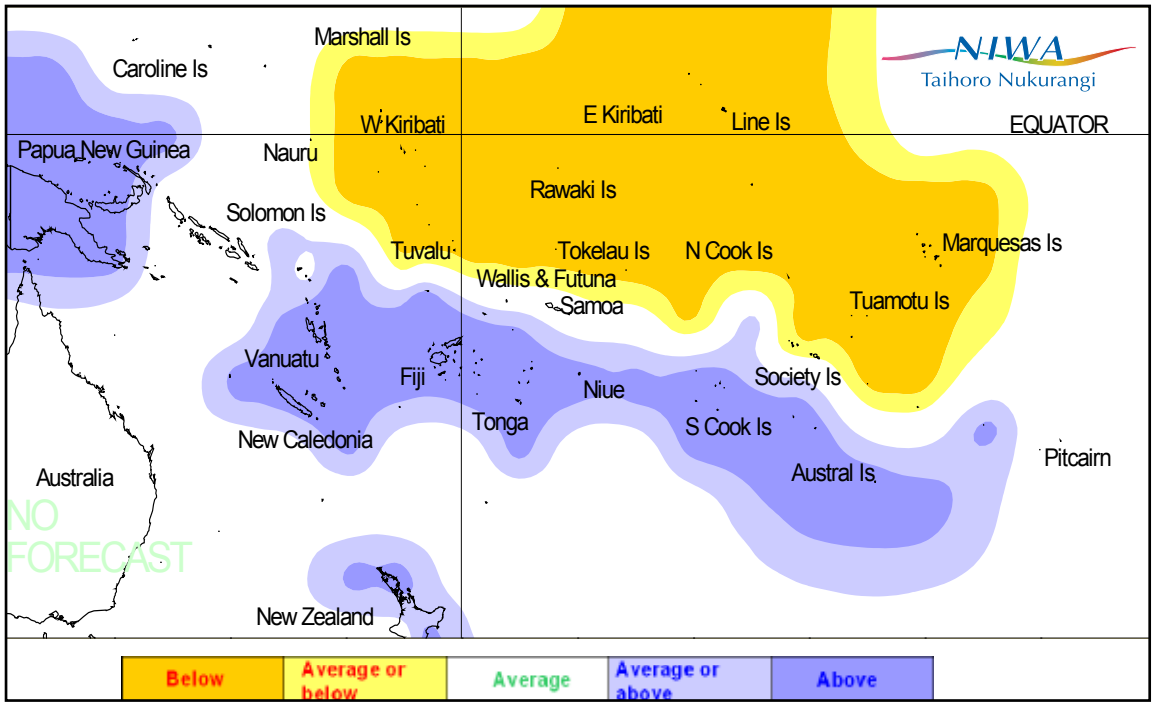
La Niña conditions are still very likely to influence rainfall patterns during this period. A large area of suppressed convection is very likely along the equatorial Pacific from Western Kiribati to Eastern Kiribati, including Tuvalu, the Northern Cook Islands, Tuamotu, and the Marquesas Islands. Near average rainfall is likely for the Solomon Islands and Samoa., while normal to above normal rainfall is likely for Pitcairn Island and the Society Islands.

Enhanced convection is likely from Papua New Guinea extending southeast to Vanuatu through to the Austral Islands of French Polynesia, including New Caledonia, Fiji, Tonga, the Southern Cook Islands, and Niue, which are expected to receive near or above average rainfall.

The confidence in the forecast model skill for this seasonal outlook is moderate to moderately high for most Pacific Island countries. In the past, the average region-wide hit rate for forecasts issued in April is 52%, 8% lower than the long-term average for all months combined.

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 outputs 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.

Island Group	Rainfall Outlook	Outlook confidence
Vanuatu	10:25:65 (Above)	Moderate-High
Papua New Guinea	15:30:55 (Above)	Moderate
Tonga	15:30:55 (Above)	Moderate-High
Fiji	15:35:50 (Above)	Moderate-High
New Caledonia	15:35:50 (Above)	Moderate
Niue	15:35:50 (Above)	Moderate-High
Austral Islands	20:30:50 (Above)	Moderate-High
Cook Islands (Southern)	25:30:45 (Above)	Moderate-High
Society Islands	25:35:40 (Near or above)	Moderate
Wallis & Futuna	25:35:40 (Near or above)	Moderate-High
Pitcairn Island	25:40:35 (Near or above)	Moderate-High
Samoa	30:35:35 (Near normal)	Moderate
Solomon Islands	30:35:35 (Near normal)	Moderate
Tuamotu Islands	45:30:25 (Below)	Moderate
Kiribati (Eastern)	45:35:20 (Below)	Moderate
Kiribati (Western)	45:35:20 (Below)	Moderate
Cook Islands (Northern)	55:30:15 (Below)	Moderate
Tokelau	55:30:15 (Below)	Moderate
Marquesas	60:25:15 (Below)	Moderate-High
Tuvalu	65:20:15 (Below)	Moderate



Rainfall outlook map for May to July 2008

A Consolidated High Quality Database of Southern Hemisphere Tropical Cyclones

Howard J. Diamond – NOAA/National Climatic Data Center and Auckland University
David Jones and Yuriy Kuleshov – Australian BoM/National Climate Centre

Over the past couple of years, a project has been undertaken and funded by the Australian Bureau of Meteorology, NOAA's National Climatic Data Center, and the Australian (BoM) Greenhouse Office in order to improve the quality of Tropical Cyclone (TC) data in the Southern Hemisphere (SH) that includes the following three basins: (1) the South Indian Ocean from 30 °E to 90 °E; (2) the Australian region from 90 °E to 135° E; and (3) the Southwest Pacific basin from 135 °E to 120 °W. This geographic breakout while not matching the formal World Meteorological Organization areas of forecast responsibilities, are done so from a climatological rather than forecast area perspective that essentially falls into some natural breakout patterns related to the longitude crossing of storms.

Project Aims

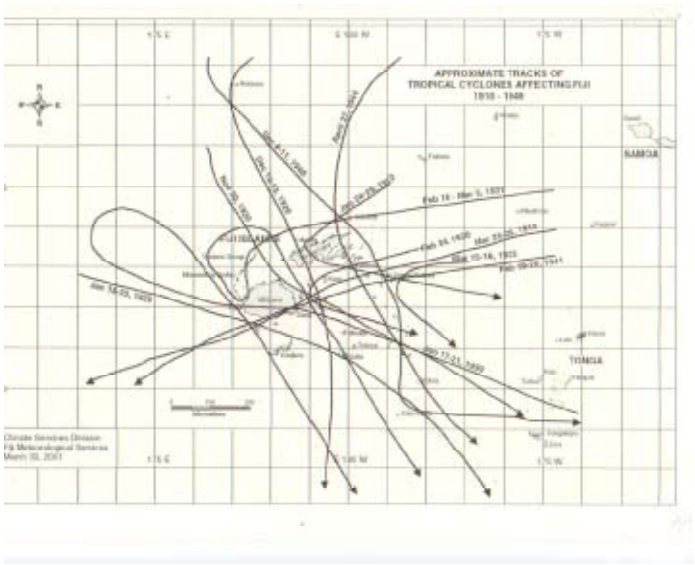
The objective of this project centres around three prime areas: (1) to develop a high-quality tropical cyclone database for the South Pacific and Indian Oceans including Australia, covering tracks and intensity; (2) to provide observational data for verifying and better understanding climate model projections of tropical cyclone changes, including potential changes due to the influence of global warming; and (3) to develop a range of web-based tools to support the use and dissemination of data and analyses coming out of this project. Essentially, the project started with an examination of the South Pacific and South Indian portions of the existing SH TC database at the BoM was closely examined with particular attention paid to TC records obtained from the various national meteorological services databases in Australia, La Réunion, Fiji, New Zealand, and New Caledonia beginning with the 1969/70 TC season, which is considered the start of the satellite record.

Data recovery and processing

In addition, paper data from various sources in the Southwest Pacific, prior to the satellite era, are being digitized in an attempt to bring the SH TC database back to as far as is possible. Some discrepancies among the datasets were identified and are being rectified. Best track tropical cyclone data from the National Meteorological and Hydrological Services for 1969/70 to 2005/06 TC seasons were obtained, verified and quality of records was improved. A high-quality TC database for the South Pacific and the South Indian Ocean, incorporating the Australian region, was compiled, and a specialized website for disseminating results and data was developed that can be found at http://www.bom.gov.au/climate/change/.

Future directions for tropical cyclone research

On-going work involves the development of a climatology of TCs in the Southwest Pacific and South Indian Ocean basins, thereby providing an improved estimate of the climatological risks posed by these storms as well as the associated vulnerability of low-lying island states to the effects of TCs. In addition, an effort to document and analyze TC variability and trends in the basins, to evaluate observed trends and relationships to climate change, is underway. Finally, work is taking place to develop an experimental seasonal forecasting scheme for tropical cyclones thereby informing communities of conditions favorable to both active as well as inactive TC seasons.



A sample of tropical cyclone track data being digitized (Courtesy of the Fiji Meteorological Service).

Howard Diamond has worked for NOAA since 1981 and is the U.S. Global Climate Observing System program manager. David Jones is the head of climate analysis at the Australian Bureau of Meteorology. Yuriy Kuleshov is a climate researcher in the National Climate Centre based at the Australian Bureau of Meteorology.

The Island Climate Update

Cover Photo: Wendy St George, NIWA

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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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