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The Island Climate Update

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

September's climate

- South Pacific Convergence Zone (SPCZ) near its normal location
- Exceptionally high rainfall in the Tuamotu Islands, and wet in parts of Tonga and Samoa
- Below average rainfall in parts of New Caledonia
- Temperature: Below average in parts of New Caledonia, and the Southern Cook Islands

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

- Current tropical Pacific climate patterns are consistent with El Niño conditions
- Above average rainfall expected over Western and Eastern Kiribati and Tuvalu
- Below average rainfall likely over New Caledonia



Climate developments in September 2006

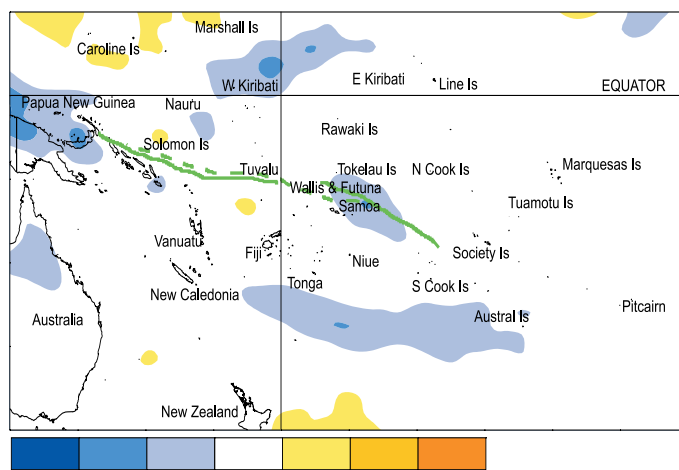
During September, convection associated with the SPCZ was near normal. There were weak regions of enhanced convection over Papua New Guinea, parts of Western Kiribati, Wallis and Futuna, and Samoa. There no significant areas of suppressed convection.

High September rainfall occurred in parts of the Tuamotu Islands (429% of normal) of French Polynesia, and parts of Fiji. Wet conditions also persisted over parts of Samoa and Tonga, where rainfall was 130 to 160% of average. Rainfall was 50% or less of average in parts of New Caledonia, Rikitea (French Polynesia) and parts of Tonga. Below average rainfall was also recorded in Niue.

Mean air temperatures were 0.5 °C or more below average in parts of New Caledonia, and the Southern Cook Islands.

Tropical Southwest Pacific mean sea-level pressures were above average over much of Australia, the Tasman Sea, and well east of New Zealand, along latitude 35° S. They were below average in tropical areas near the equator east of the Date Line.

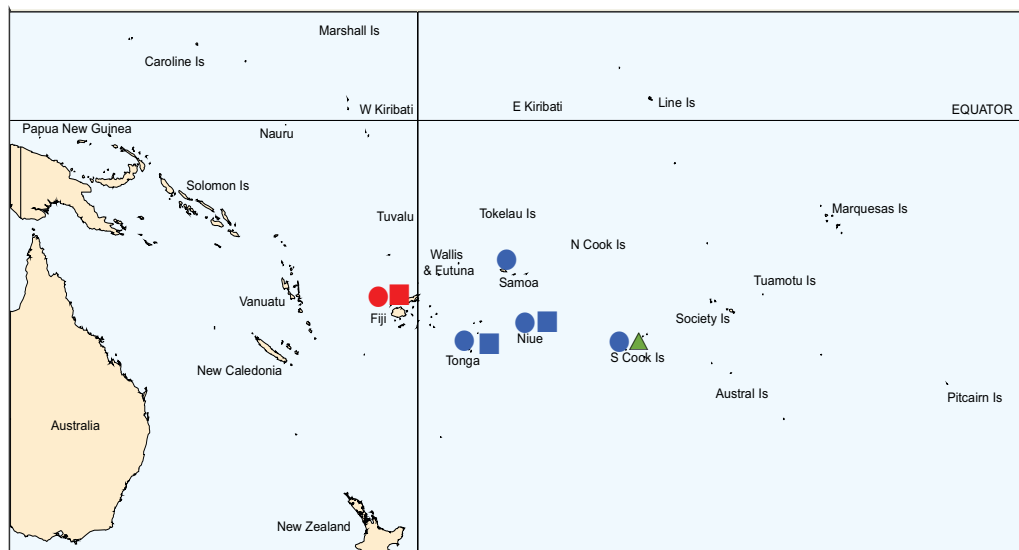
Equatorial surface westerlies occurred in about 25% of observations at Tarawa, a slight decrease in frequency from almost 30% during August 2006.



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^{-2} (blue equals high rainfall and yellow equals low rainfall). The September 2006 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 average	Comments
French Polynesia	Tuamotu, Takarua	351.6	429	Record high
Fiji	Nausori	328.9	199	Extremely high
Tonga	Queen Lavinia	43.5	30	Low
Tonga	Lupelau'u	42.9	32	Low

Soil moisture in September 2006



Estimated soil moisture conditions at the end of September 2006, using monthly rainfall data.

Estimates of soil moisture shown in the map (above) 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 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 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 September 2006, Apia, Hanan Airport, Fua'motu and Rarotonga were at field capacity (full). Nadi soil moisture levels were dry.

El Niño/Southern Oscillation (ENSO)

The tropical Pacific currently shows a pattern consistent with El Niño conditions.

There has been continued warming in the upper layers of the Equatorial Pacific Ocean during the past three months. As of mid-September sea surface temperatures (SSTs) exceed 0.5°C above average throughout much of the equatorial Pacific and are more than $+1^{\circ}\text{C}$ above-average near the date line.

The NINO3 SST anomaly for September was around $+1.2^{\circ}\text{C}$ ($+0.8^{\circ}\text{C}$ for July–September) and NINO4 was around $+1.2^{\circ}\text{C}$ ($+0.9^{\circ}\text{C}$ for July–September). This is a significant increase from last month.

Subsurface temperatures show a more coherent structure of warm anomalies than last month.

Although the Southern Oscillation Index (SOI) has weakened in the last 30 days it continues to remain negative (now five consecutive months) with a value of -0.5 for September, and -1.1 for July–September. Given the increase in NINO3 and NINO4 SSTs, the weakening of the SOI is likely to be a temporary situation.

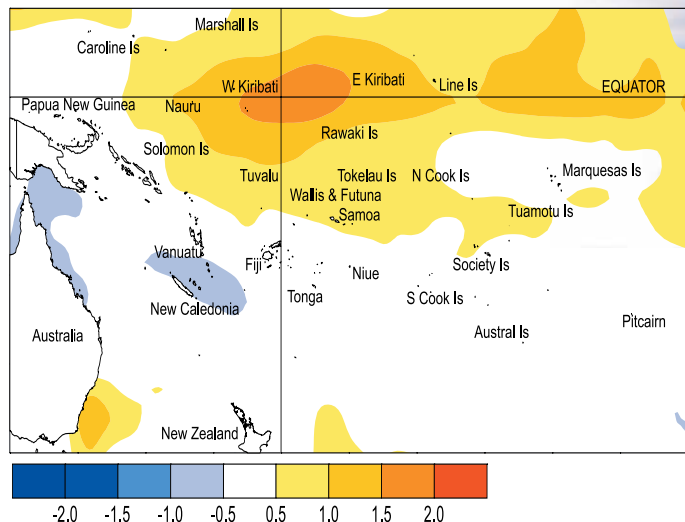
There have been reduced westerly wind anomalies along the equator in September and west of the Date Line, which contrasts with July and August. OLR anomalies continue to show a dipole pattern, however, this has drifted somewhat westwards in September: positive (i.e. drier) anomalies exist from the western Indian Ocean to Indonesia and negative (wetter) anomalies over Papua New Guinea. In contrast, the Madden–Julian Oscillation (MJO) has been more active during September and is forecast to strengthen over next few weeks.

More than half of the statistical and coupled model predictions are now favoring El Niño conditions for the remainder of 2006 and through the southern hemispheric summer.

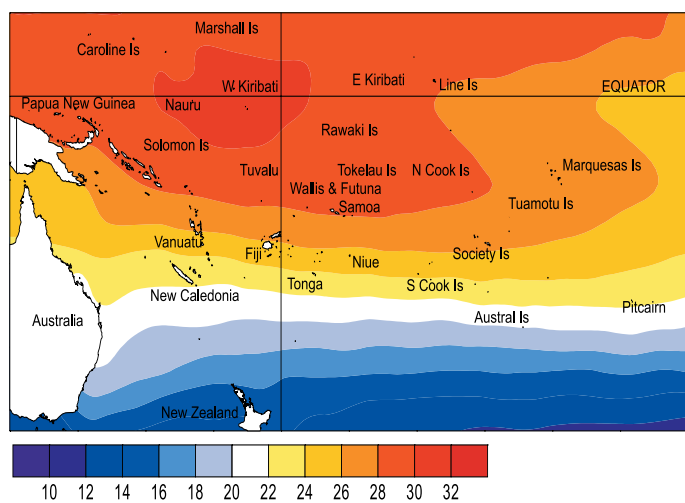
The International Research Institute for Climate and Society (IRI) (who have a higher threshold for an El Niño) indicate that El Niño conditions, in terms of tropical Pacific SST anomalies, have been crossed recently. Some caution remains however over whether the current climate patterns across the equatorial Pacific constitute a basin-wide El Niño event.

Forecast validation: July to September 2006

Areas of suppressed convection and below average rainfall were expected over Tuvalu and the Marquesas Islands, and near or below average rainfall was expected over Tokelau. A large region of enhanced convection and average or above average rainfall was expected to extend from Papua New Guinea southeast to Pitcairn Island, including the Solomon Islands, Vanuatu, Wallis and Futuna, Fiji, Tonga, Niue, the Southern Cook Islands, the Society Islands, and the Austral Islands. Near average rainfall was expected elsewhere.



Sea surface temperature anomalies ($^{\circ}\text{C}$) for September 2006.



Mean sea surface temperatures ($^{\circ}\text{C}$) for September 2006.

The World Meteorological Organisation (WMO) (September 26) cautiously states “the situation is expected to become clearer in the next 1-2 months”, while reminding that there is still a small possibility that the event could also dissipate in the next couple of months.

The WMO statement continues that the development of a basin-wide El Niño event is likely based on the prevailing situation and the general consistency of forecast models.

Furthermore, once El Niño conditions are established at this time of the year, they almost always persist until early the following year.

Areas of enhanced convection or above average rainfall affected the region near Papua New Guinea and over the Solomon Islands, as well as parts of French Polynesia and the Southern Cook Islands. Below average rainfall occurred over New Caledonia and the Northern Cook Islands. Rainfall was higher than expected in parts of French Polynesia and Samoa and lower than expected in Fiji, Tonga, and Niue. The ‘hit’ rate for the July–September 2006 outlook was about 70%.

Tropical Pacific rainfall – September 2006

Territory and station name	September 2006 rainfall total (mm)	September 2006 percent of average
Australia		
Cairns Airport	66.8	186
Townsville Airport	29.6	269
Brisbane Airport	27.4	107
Sydney Airport	144.8	230
Cook Islands		
Penrhyn	139.8	94
Rarotonga Airport	127.7	117
Fiji		
Rotuma	220.6	93
Udu Point	157.8	140
Nadi	88.3	126
Nausori	328.9	199
Ono-I-Lau	138.6	128
French Polynesia		
Hiva Hoa, Atuona	95.2	129
Bora Bora Motu	94.4	145
Tahiti - Faa'a	17.8	35
Tuamotu, Takaroa	351.6	429
Gambier, Rikitea	67.8	50
Tubuai	165.2	174
Rapa	232.8	142
New Zealand		
Kaitia	83	62
Whangarei Airport	90	71
Auckland Airport		

Territory and station name	September 2006 rainfall total (mm)	September 2006 percent of average
Niue		
Hanan Airport	47.6	57
New Caledonia		
Ile Art, Belep	33.2	63
Koumac	17.0	45
Ouloup	80.8	126
Ouanaham	78.0	92
Poindimie	106.8	119
La Roche	96.2	130
La Tontouta	14.6	47
Noumea	31.6	77
Moue	48.2	82
North Tasman		
Lord Howe Island	89.2	63
Norfolk Island	13.8	15
Raoul Island	51	46
Samoa		
Faleolo	96.3	65
Apia	218	152
Tonga		
Lupepau'u	191.2	157
Salote Airport	144.3	130
Fua'amotu Airport	100.5	85
Queen Lavinia	43.5	30
Niukatoputapu	42.9	32
Nuku'alofa	119.4	98

Rainfall totalling 200 percent or more is considered well above average. Totals of 40 percent 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.

Tropical rainfall outlook: October to December 2006

The seasonal rainfall forecast patterns in the Pacific region are consistent with the developing El Niño conditions in equatorial Pacific Ocean.

Enhanced convection is likely in the equatorial region of Western and Eastern Kiribati and Tuvalu where rainfall is expected to be above average. Rainfall is expected to be near or above average over Tokelau, Northern Cook Islands and Pitcairn Island.

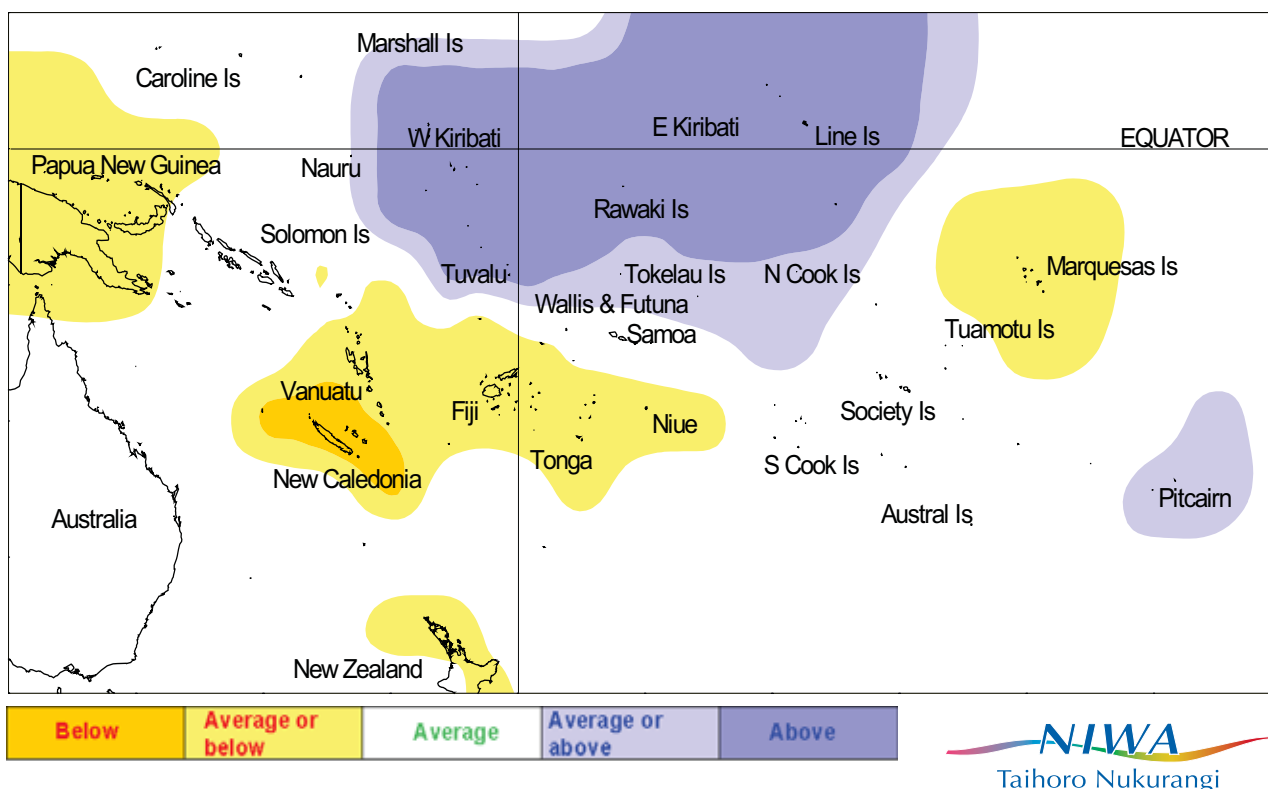
Suppressed convection with below average rainfall is likely over New Caledonia while near or below average rainfall is expected over Papua New Guinea, Vanuatu, Fiji, Tonga, Niue, and the Marquesas Islands.

Near average rainfall is expected elsewhere in the region.

Confidence in the forecast model is around moderate to high for this time of the year.

Island group	Rainfall outlook	Outlook confidence
Western Kiribati	20:30:50 (Above average)	Moderate – high
Eastern Kiribati	20:30:50 (Above average)	Moderate – high
Tuvalu	25:30:45 (Above average)	Moderate – high
Tokelau	20:40:40 (Average or above)	Moderate
Northern Cook Islands	20:40:40 (Average or above)	Moderate
Pitcairn Island	20:40:40 (Average or above)	Moderate
Solomon Islands	20:45:35 (Near average)	Moderate
Samoa	35:45:20 (Near average)	Moderate
Wallis & Futuna	30:40:30 (Near average)	Moderate
Tuamotu Islands	30:45:25 (Near average)	Moderate
Southern Cook Islands	30:40:30 (Near average)	Moderate
Society Islands	25:50:25 (Near average)	Moderate
Austral Islands	25:45:30 (Near average)	Moderate
Papua New Guinea	45:40:15 (Average or below)	Moderate
Vanuatu	40:40:20 (Average or below)	Moderate
Fiji	40:40:20 (Average or below)	Moderate
Tonga	40:40:20 (Average or below)	Moderate
Niue	40:40:20 (Average or below)	Low – moderate
Marquesas Islands	45:40:15 (Average or below)	Moderate – high
New Caledonia	45:30:25 (Below average)	Moderate – high

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 October to December 2006.

Tropical cyclone guidance for the 2006–07 season

Weak to moderate El Niño conditions are likely to increase the chances of tropical cyclone activity for several tropical South Pacific countries over coming months.

For the coming tropical cyclone season, from November 2006 – May 2007, we are likely to see above average numbers of tropical cyclones in several parts of the South Pacific near and east of the Date Line. Countries with increased risk over this period include Fiji, Wallis and Futuna, Tonga, Niue, and the southern Cook Islands. Islands west of the Date Line are still likely to experience tropical cyclones, with a normal rate of occurrence.

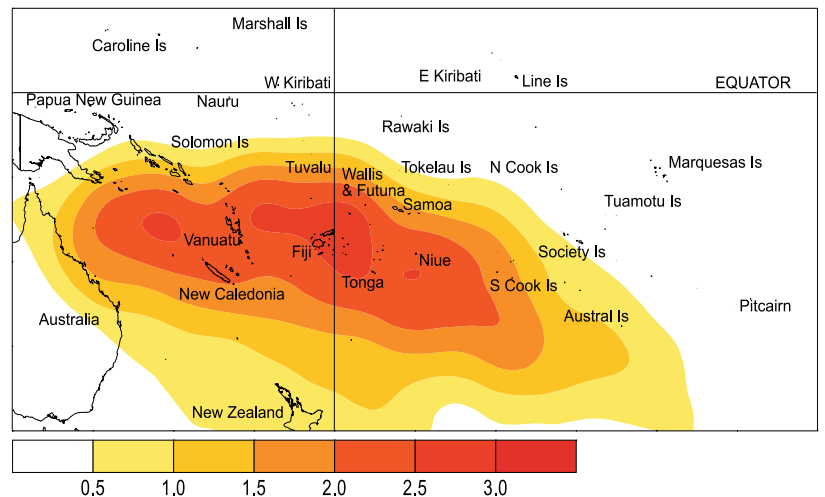
Tropical sea surface temperatures, which play an important role in the development of tropical cyclones, are presently above average along the equator across the entire Pacific Basin. Climate forecasting organisations in the Pacific are in general agreement that we are seeing the development of a weak to moderate El Niño, although the situation is still evolving. This brings above normal risk of tropical cyclones near and east of the Date Line. There is a good chance that the first tropical cyclone of the coming season in the South Pacific region may occur before the end of November, about a month earlier than is normal in either a neutral or La Niña seasons. About ten tropical cyclones on average can be expected over the entire Southwest Pacific region during a weak El Niño season.

In the Southwest Pacific, tropical cyclones usually develop in the wet season, from November through April, but occasionally occur in May. Peak cyclone occurrence is usually from January to March. In seasons similar to the present, several tropical cyclones usually occur in the region between Vanuatu and Niue with some affecting other areas. About half of the tropical cyclones that develop reach hurricane force with mean wind speeds at least 64 knots (118 km/h).

Southwest Pacific tropical cyclones are grouped into classes ranging from 1 to 5, with 5 being the strongest. On average four per season reach at least class 4 with mean wind speeds of at least 64 knots or 118 km/h, while two usually reach class 5 with mean speeds in excess of 90 knots or 167 km/h. Last season (2005/06) in the South Pacific, Cyclones Larry and Monica were particularly severe, both reaching class 5 in strength. These were especially destructive to coastal and some populated environments in Queensland and the Northern Territory of Australia. Three class 4 tropical cyclones occurred further east, but these missed populated areas.

For further information:
Contact your local Meteorological Service.

Country	Average over all years	Average over Weak ENSO years	Comment
Fiji	2.3	2.4 – 2.8	Increased risk
Tonga	2.0	2.3 – 2.7	Increased risk
Niue	1.8	2.2 – 2.6	Increased risk
Wallis and Futuna	1.8	2.1 – 2.6	Increased risk
Southern Cook Islands	1.6	1.8 – 2.2	Increased risk
Samoa	1.5	1.5 – 1.9	Average – increased risk
Tuvalu	1.1	1.1 – 1.5	Average – increased risk
Solomon Islands	1.4	1.2 – 1.6	Average risk
Northern New Zealand	0.9	0.7 – 0.9	Average risk
Northern Cook Islands	0.8	0.7 – 0.9	Average risk
Austral Islands	0.8	0.8 – 1.0	Average risk
Society Islands	0.8	0.6 – 0.8	Average risk
Tokelau	0.8	0.6 – 0.8	Average risk
Papua New Guinea	0.6	0.4 – 0.6	Average risk
Tuamotu Islands	0.4	0.1 – 0.2	Average risk
Pitcairn Island	0.3	0.1 – 0.2	Average risk
Vanuatu	3.0	2.0 – 2.6	Variable risk - uncertain
New Caledonia	2.7	1.8 – 2.4	Variable risk - uncertain
Marquesas Islands	0.1	0.0 – 0.1	Cyclones unlikely
Western Kiribati	0.0	0.0	Cyclones unlikely
Eastern Kiribati	0.0	0.0	Cyclones unlikely



Average annual number of Tropical Cyclones, weak -moderate Nov-May ENSO periods, from 1969/70-2004/05

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

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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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