Climate Services Division

# ENSO Update

## Neutral conditions expected to continue

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# Fiji Meteorological Service

**Content**



***In Brief***

- *The Tropical Pacific continues to exhibit neutral El Niño-Southern Oscillation (ENSO) conditions;*
- *ENSO neutral conditions are favoured through most of the first half of 2017;*
- *Above average rainfall is expected over most places through the January to March 2017 period, while average or above average rainfall is likely through the April to June 2017 period;*
- *Normal to below normal daytime and generally above normal night-time air temperatures are anticipated through the January to March 2017 period;*
- *Sea surface temperatures in the Fiji region are favoured to be normal to above normal during coming three months;*
- *The 2016-17 tropical cyclone season began on 1 November 2016 and ends on 30 April 2017. For Fiji, two to three cyclones are predicted to pass through the Fiji Waters this season, with one likely to reach or exceed category 3 status.*

## History and Current Situation

### History

Following the dissipation of the 2015-16 El Niño event in around May 2016, oceanic conditions reached weak La Niña state around August 2016. However, some of the overlying atmospheric indicators did not fully couple to reinforce this oceanic change. Thus, a La Niña event was not declared. Nevertheless, some features of the atmosphere and ocean, especially sea surface temperatures and cloudiness, have persistently been at near La Niña level since August 2016.

### Current Situation

Sea surface temperatures in the equatorial Pacific Ocean are mostly close to average, but warm anomalies have established in the far east. The cool subsurface temperatures that were evident across the subsurface of central and equatorial Pacific Ocean has progressively warmed and shrunk in volume since September 2016.

The Southern Oscillation Index (SOI) remains at neutral level since mid-October with the latest 30-average as of 21st January at +1.7. Trade winds have strengthened recently in the western tropical Pacific and has been consistently near average over the eastern half of the tropical Pacific. On the other hand, cloudiness near the Dateline in the equatorial Pacific has been below average since August 2016, a pattern consistent with a La Niña event.

## ENSO Outlook

Recent climate observations indicate that continuation of ENSO neutral conditions are likely for most of the 1st half of 2017. Most climate models favour strong warming after mid-2017, however it must be noted that this outlook overlaps the ENSO transition period during which most models have their lowest forecast accuracy.

The ENSO Diagnostic Discussion from the National Oceanic and Atmospheric Administration of USA (12 January 2017) predicts that the ENSO-neutral conditions will continue through the first half of 2017. The CPC/IRI probabilistic outlook updated on 19th January 2017 states that the probability for neutral conditions is near or above 90% from January to March through April to June 2017, dropping to between 60 and 65% from June to August through September to November.

The Australian Bureau of Meteorology's assessment in the ENSO Wrap-up of 17th January 2017, indicates that neutral ENSO conditions are likely to persist till mid-2017, with all models indicating that the central Pacific is likely to warm over the coming months.

# Neutral conditions expected to continue



## Observations of Climate Anomalies

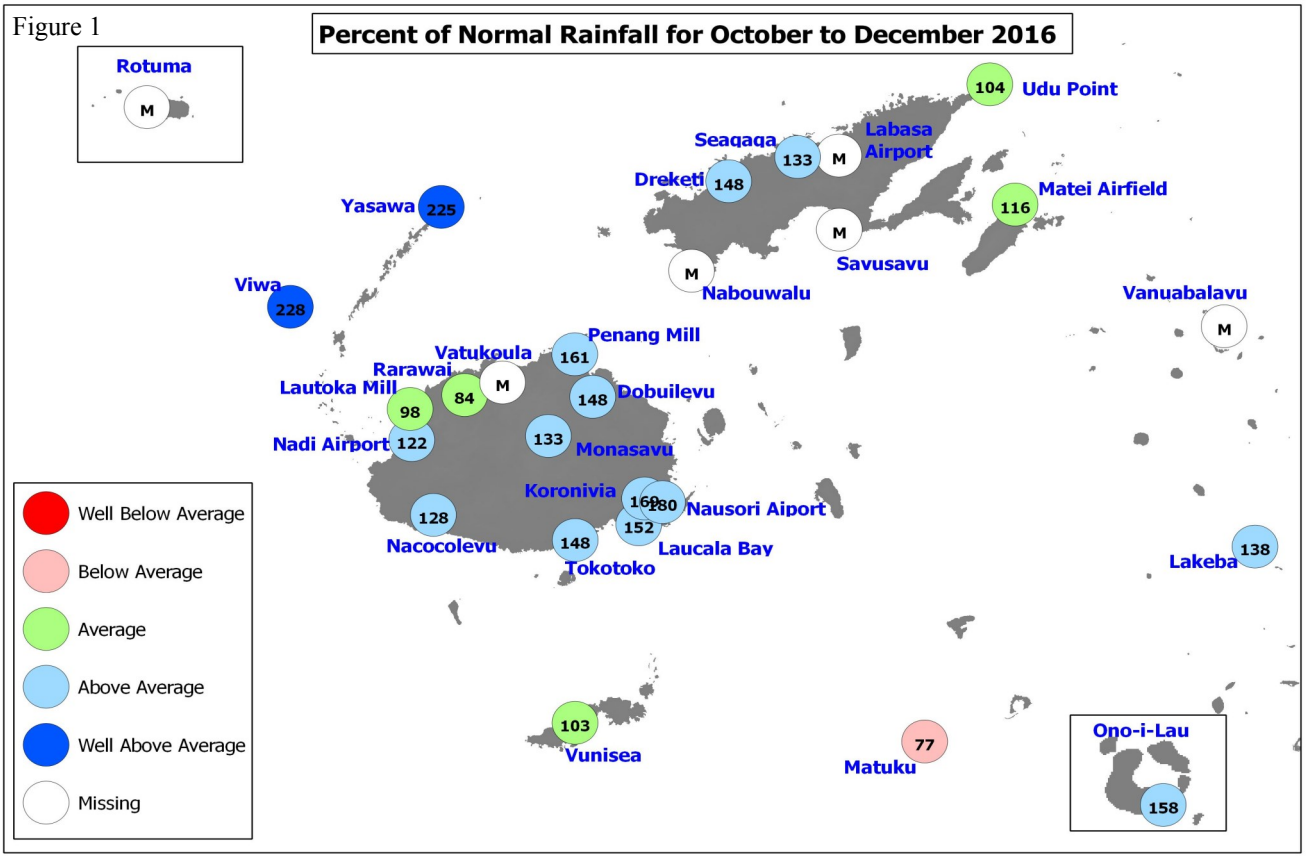
The previous three months have been dominated by semi permanent high pressure systems, broad southeast Trade winds, troughs of low pressure and a slow moving tropical depression, TD04F.

November was considerably drier than *normal*, while October and December were significantly wet with *above average* to *well above average* rainfall recorded at most sites. Accumulated rainfall over the past three months (October to December 2016) ranged from *average* to *well above average*. The only exception to this was Matuku, which recorded *below average* rainfall (Figure 1).

TD04F resulted in an extraordinary amount of rainfall in parts of the country from December 12th to the 20th. Consequently, a number of stations received record high total monthly rainfall for December, especially stations in the Central Division. Furthermore, new daily high rainfall record for December was set at Matei Airfield and Nabouwalu. Rakiraki town was severely flooded, with Rewa River also breaking its bank. A number of landslides were reported resulting from prolonged heavy rainfall in various parts of the country with Qamea Island being badly affected.

Exceptionally hot and humid conditions were experienced on occasions with a number of stations recording maximum temperatures above 33°C during the 2nd half of November and the 1st week of December. Levuka recorded daily maximum temperature as high as 38.0°C on the December 2nd, followed by Yaqara with 36.4°C on the December 5th.

Figure 1




## Rainfall and Temperature Outlook

The SCOPIC model favours *above average* rainfall over most parts of the country through the January to March 2017 period. The confidence in the SCOPIC predictions at this time of the year are generally *moderate* to *high*. The exception to this is the Central Division, where the confidence is *very low*. It is noted that the global climate models favour *average* or *above average* rainfall in the Fiji region for the same period. Taking into consideration that January to March is the peak wet season months and the anticipated *above average* rainfall, there is elevated risk of flooding in the coming months.

The air temperatures are anticipated to be *normal* or *below normal* through the January to March 2017 period, while *normal* air temperatures are favoured for the April to June 2017 period. The sea surface temperature in the Fiji region is favoured to be *normal* or *above normal* through January to March 2017 period.

## Table 1: Rainfall Distribution for October to December 2016

| Stations | October Rainfall (mm) | November Rainfall (mm) | December Rainfall (mm) | October to December 2016 Total Rainfall (mm) |
|---|---|---|---|---|
| Nadi Airport | 164.6 | 123.4 | 269.9 | 557.9 |
| Laucala Bay, Suva | 291.9 | 118.0 | 761.8 | 1171.7 |
| Nacocolevu, Nadroga | 171.9 | 141.7 | 231.2 | 544.8 |
| Rotuma | 423.6 | 351.2 | Missing | - |
| Udu Point | 145.7 | 60.5 | 460.1 | 666.3 |
| Savusavu Airfield | 268.8 | 73.1 | Missing | - |
| Labasa Airport | 202.6 | 23.4 | Missing | - |
| Nabouwalu | Missing | 122.4 | 764.9 | - |
| Dreketi | 188.5 | 132.5 | 430.0 | 751.0 |
| Seaqaqa | 181.0 | 185.5 | 552.5 | 919.0 |
| Koronivia | 273.4 | 120.2 | 917.5 | 1311.1 |
| Tokotoko, Navua | 398.2 | 72.6 | 1060.4 | 1531.2 |
| Nausori Airport | 300.5 | 73.7 | 924.2 | 1298.4 |
| Monasavu | 326.7 | 480.7 | 1103.3 | 1910.7 |
| Penang Mill | 72.5 | 126.0 | 668.2 | 866.7 |
| Rarawai Mill, Ba | 143.0 | 18.5 | 247.9 | 409.4 |
| Lautoka Mill | 153.2 | 110.7 | 217.6 | 481.5 |
| Dobuilevu | 113.0 | 189.5 | 811.5 | 1114.0 |
| Yasawa-i-Rara | 176.2 | 71.6 | 670.6 | 918.4 |
| Matei Airfield, Taveuni | 127.4 | 124.8 | 664.0 | 916.2 |
| Vunisea, Kadavu | 174.9 | 60.8 | 299.4 | 535.1 |
| Lakeba | 139.5 | 28.7 | 453.5 | 621.7 |
| Matuku | 90.9 | 33.0 | 193.1 | 317.0 |
| Ono-i-Lau | 175.7 | 105.4 | 273.5 | 554.6 |

## Explanatory Note - El Niño and La Niña

ENSO is an irregular cycle of persistent warming and cooling of SSTs in the tropical Pacific Ocean. The warm extreme is known as El Niño and cold extreme, La Niña.

The term El Niño was given to a warming of the ocean near the Peruvian coast in South America that appears around Christmas. Scientists now refer to an El Niño event as sustained warming over a large part of central and eastern equatorial Pacific Ocean. This warming is usually accompanied by persistent negative values of Southern Oscillation Index (SOI), a decrease in the strength or reversal of the trade winds, increase in cloudiness near Dateline in the equatorial Pacific and a reduction in rainfall over most of Fiji (not immediate effect as there is a lag period) which can, especially during moderate to strong events, lead to drought.

La Niña is a sustained cooling of the central and eastern equatorial Pacific Ocean. The cooling is usually accompanied by persistent positive values of SOI, an increase in strength of the equatorial trade winds, decrease in cloudiness near the Dateline in the equatorial Pacific and higher than average rainfall for most of Fiji (not immediate effects as there is a lag period), with frequent and sometimes severe flooding, especially during the wet season (November to April).

# Neutral conditions expected to continue



## Table 2: Drought Monitor

| Timescale | Sites currently under Meteorological Drought | Sites currently under Meteorological Drought Warning Status | Sites currently under Meteorological Drought Watch |
|---|---|---|---|
| **3-month** | Matei Airfield, Navua and Udu Point | Nausori Airport, Penang, Rarawai and Vunisea | Dobuilevu, Monasavu, Suva and Viwa |
| **6-month** | Koronivia, Lakeba, Matei Airfield, Suva and Udu Point | - | Monasavu, Nausori Airport, Navua, Penang and Rarawai |
| **12-month** | Koronivia, Lakeba, Nausori Airport, Navua, Penang, Rarawai, Seaqaqa, Savusavu, Suva, Udu Point and Yasawa-i-Rara | - | Nacocolevu and Vunisea |

## Background Information on Drought Monitor

*FMS currently uses the Standardized Precipitation Index (SPI) for monitoring monthly rainfall variability in Fiji. The selection of the SPI method follows extensive research into its suitability for Fiji conditions in comparison with other notable indices by both the Fiji Meteorological Service and Australian Bureau of Meteorology (via the AusAID Pacific Islands Climate Prediction Project). The SPI was developed in 1993 at the Colorado State University in the United States of America to be a relatively simple, year-round index, applicable to the water supply conditions in the United States. Since then, it has become the most widely used index for operational drought monitoring.*

*The SPI is widely accepted because of its special characteristic of being able to be normalized to a location and in time. Rainfall data needs to be normalized, as statistically, rainfall is not normally distributed. Rainfall is zero bounded and no rainfall days outnumber rainfall days. Fiji rainfall is also positively skewed. This standardization technique allows the SPI to determine the rarity of a current drought event, as well as the probability of the rainfall necessary to end the current drought. It allows the SPI to be computed at any location and at any number of time scales, depending on the impacts of interest to the user. Because SPI values fit a typical normal distribution, one can expect these values to be within one standard deviation approximately 68% of the time, within two standard deviations 95% of the time and within three standard deviations 99% of the time. A related interpretation would be that moderate drought occurs 16 times in 100 years, severe drought occurs two or three times in 100 years, and extreme drought occurs once in approximately 200 years. The fundamental strength of the SPI is that it can be calculated for a variety of time scales. This versatility allows the SPI to monitor short-term water supplies, such as soil moisture, important for agricultural production, and longer-term water resources such as groundwater supplies, stream flow and reservoir storage.*

*Drought status for 24 sites are provided in Table 2. FMS monitors rainfall deficiencies (drought status) at three time-scales that are indicators of meteorological and as well as applied to agricultural and hydrological drought conditions:*

- *3-months – most shallow rooted agricultural crops, small streams and small water tanks;*
- *6-months – most deep rooted agricultural crops, fruit trees, small rivers and reservoirs; and*
- *12-months – medium to large rivers, medium to large reservoirs, shallow wells, dam storages.*



***For more information, contact:***
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***All correspondences must be addressed to the Director of Meteorology.***