Climate Services Division

ENSO Update

El Niño could develop later during 2017

ISO 9001:2008 certified Climate Services

Volume 10 : Issue 02
March 24, 2017

Fiji Meteorological Service

Content

In Brief

- *The Tropical Pacific is in a neutral El Niño-Southern Oscillation (ENSO) state (neither El Niño nor La Niña);*
- *ENSO–neutral conditions are expected to continue through most of the first half of 2017, with increasing chances of weak El Niño conditions developing towards the end of 2017;*
- *Average or above average rainfall is expected over most places through the March to May 2017 period;*
- *Normal daytime and night-time air temperatures are anticipated through the March to May 2017 period;*
- *Sea surface temperatures in the Fiji region are favoured to be normal during the coming three months;*
- *Fiji is still in its tropical cyclone and wet season. Thus, all communities should remain alert, updated with latest weather forecasts and take appropriate precautionary measures when alerts and warnings are issued.*

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 could not be declared. While the cool sea surface temperature anomalies have now almost dissipated, some features of the atmosphere, especially cloudiness and rainfall in the tropical Pacific, are still displaying La Niña like characteristics.

Current Situation

The sea surface temperatures (SSTs) are currently near normal across most of the equatorial Pacific, with above normal SSTs in the far eastern and western equatorial Pacific Ocean. During the last two months, negative subsurface temperature anomalies have dissipated across the equatorial Pacific Ocean and warmer than normal anomalies now evident.

Convection in the equatorial Pacific are leaning towards a weak La Niña like conditions, with below normal could cover near the Dateline and above normal could cover in the Indonesian region. The South Pacific Convergence Zone (SPCZ) was displaced southwest of its normal position during the past month, a feature typical of a La Niña event. However, the Southern Oscillation Index (SOI) have been generally within the neutral range since mid-October 2016, with the latest 30-day average to March 18th at –0.5.

ENSO Outlook

ENSO neutral conditions are favoured (85% chance) to persist through the March to May 2017 period. During the second half of the year, the chances for El Niño conditions developing increases substantially to reach over 50% in August to October 2017 period. However, it must be noted that this outlook overlaps the ENSO transition months (March to May) during which most models have their lowest forecast accuracy.

The ENSO Diagnostic Discussion from the National Oceanic and Atmospheric Administration of USA (9 March 2017) states that ENSO-neutral conditions are favoured to continue through at least the Northern Hemisphere spring (March to May) 2017, with increasing chances for El Niño development into the fall (September to November).

The Australian Bureau of Meteorology's latest NINO3.4 outlooks indicate temperatures in the central tropical Pacific Ocean will continue to warm over the next six months. Thus, this increases the chance of El Niño forming later this year.

Observations of Previous Three Months

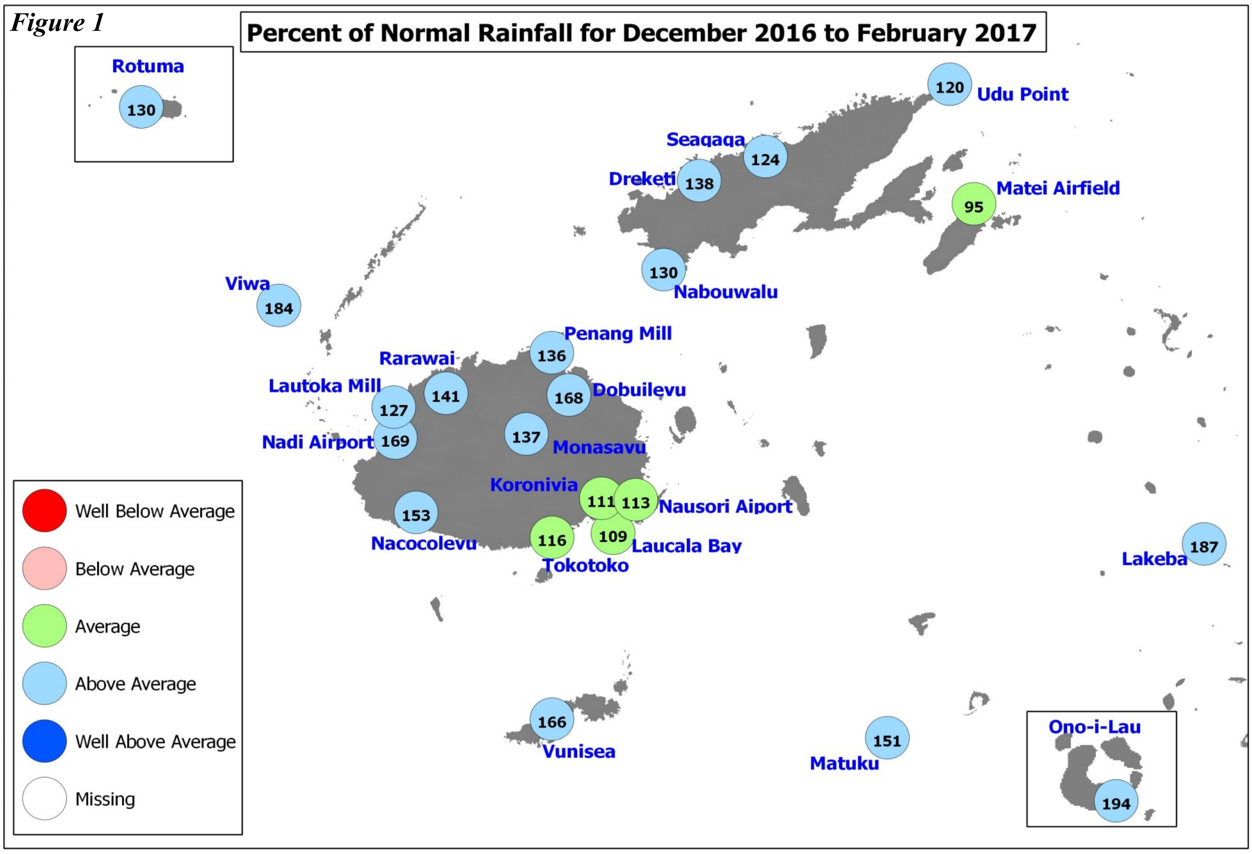
The previous three months have been dominated by active South Pacific Convergence Zone (SPCZ), 8 tropical disturbances/ depressions, semi permanent high pressure systems, broad southeast Trade winds and troughs of low pressure.

December 2016 and February 2017 were significantly wetter months with majority of the stations recording *above average* to *well above average* rainfall, while generally *average* to *below average* rainfall was recorded in January 2017. The accumulated rainfall over the past three months (December 2016 to February 2017) was *above average* at most of the places (Figure 1). The exception to this was the Central Division, where *average* rainfall was received.

Tropical Depression, TD04F, resulted in an overwhelming amount of rainfall over the eastern half of Viti Levu and parts of the Northern Division during December 2016. Rakiraki town was severely flooded, with Rewa River also breaking its bank. A number of landslides were reported with Qamea Island badly affected.

During February 2017, tropical depression, TD09F, resulted in very significant rainfall over the Western and Eastern Divisions. Over the 72-hour period from 6th to 8th, Nagado received 508mm of rainfall, followed by Nadi Airport with 478mm, Tavua with 446mm, Lautoka Mill with 441mm and Nadarivatu with 432mm. The maximum 24-hour rainfall during the passage of TD09F was registered at Nadi Airport with 275mm on the 7th, followed by Nagado with 271mm on the 8th, and Tavua with 238mm on the 8th. Consequently, severe flooding was recorded in parts of the Western Division.

Figure 1



Rainfall and Temperature Outlook

The SCOPIC model (the seasonal rainfall guidance tool used by FMS) favours *average* or *above average* rainfall over most parts of the country through the March to May 2017 period. The confidence in the SCOPIC predictions at this time of the year are generally *low* to *moderate*. It should be noted that the global climate models also favour *average* or *above average* rainfall in the Fiji region for the same period.

The air temperatures, both maximum and minimum temperatures are favoured to be near *normal* through both the March to May and June to August 2017 periods. The sea surface temperatures in the Fiji region is favoured to be *normal* through the March to May 2017 period.

Table 1: Rainfall Distribution for December 2016 to February 2017

Stations	December 2016 Rainfall (mm)	January 2017 Rainfall (mm)	February 2017 Rainfall (mm)	December 2016 to February 2017 Total Rainfall (mm)
Nadi Airport	269.9	314.1	786.6	1370.6
Laucala Bay, Suva	761.8	305.1	351.3	1418.2
Nacocolevu, Nadroga	231.2	252.8	576.6	1060.6
Udu Point	460.1	217.9	494.0	1172.0
Nabouwalu	764.9	292.2	626.4	1683.5
Dreketi	430.0	179.5	736.5	1346.0
Seaqaqa	552.5	276.5	711.5	1540.5
Koronivia	917.5	234.9	486.9	1639.3
Tokotoko, Navua	1060.4	343.7	562.8	1834.1
Nausori Airport	924.2	296.4	433.8	1654.4
Monasavu	1103.3	711.6	466.2	2281.1
Penang Mill	668.2	170.9	512.7	1396.8
Rarawai Mill, Ba	247.9	415.0	716.0	1378.9
Lautoka Mill	217.6	182.4	697.0	1097.0
Dobuilevu	811.5	358.5	515.0	1685.0
Matei Airfield, Taveuni	664.0	210.4	314.7	1189.1
Vunisea, Kadavu	299.4	392.8	474.0	1166.2
Lakeba	453.5	228.8	525.1	1207.4
Matuku	193.1	166.4	571.2	930.7
Ono-i-Lau	273.5	148.9	590.9	1013.3

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).

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	Matuku	Dobuilevu, Koronivia, Nausori, Penang, Rarawai and Vunisea	Lautoka and Suva
6-month	-	-	Nausori, Navua, Rarawai and Udu Point
12-month	Koronivia, Lakeba and Udu Point	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:
Fiji Meteorological Service, Private Mail Bag NAP0351, Nadi Airport, Fiji. Phone : 6724888, Fax : 6724050. Visit website at http:/www.met.gov.fj for other products and services. Email: climate@met.gov.fj or fms@met.gov.fj.
All correspondences must be addressed to the Director of Meteorology.