Climate Services Division

ENSO Update

A weak La Niña continues in the Pacific Ocean

ISO 9001:2015 Certified Climate Services

Volume 16 : Issue 01
Issued: January 25, 2023
Next: March 24, 2023

Fiji Meteorological Service

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Content

In Brief

- *A weak La Niña event continues to persist in the tropical Pacific.*
- *The La Niña event is expected to weaken to ENSO neutral state (neither El Niño or La Niña) through the February to April 2023 period.*
- *While ENSO-neutral state is favored to continue for the rest of the 1st half of the year, there is great uncertainty in the ENSO state for the latter.*
- *Fiji usually experiences above normal rainfall during a La Niña event, which can lead to flooding especially during the wet season, which is from November to April.*

History and Current Situation

History

The tropical Pacific Ocean was in an ENSO-neutral state from July until early September 2022. However, the sea surface temperatures in the central and eastern equatorial Pacific Ocean cooled during September 2022 with a clear coupling between oceanic and atmospheric indicators implying establishment of a weak La Niña event. Since then the Pacific Ocean has been consistent with a weak La Niña event.

Current Situation

The sea surface temperatures are currently below average across most of the Pacific Ocean, but have gradually weakened in the recent weeks. Negative sub-surface temperature anomalies persists near the surface and at depth in the eastern and central Pacific, while positive subsurface temperature anomalies are present at depth in the western and central Pacific Ocean. Some positive anomalies are evident near the surface in the eastern Pacific Ocean.

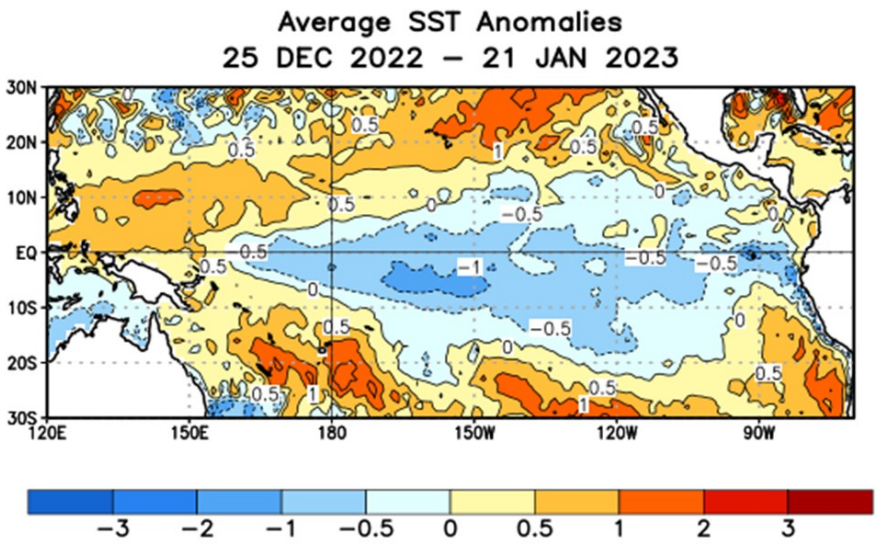
Though ocean temperatures have warmed in recent weeks, atmospheric indicators are largely unchanged and remain at La Niña levels. The Southern Oscillation Index (SOI) for December 2022 was +20.0, with the 5-month running mean of +13.9. The latest 30-days average SOI to 20th January 2023 was +17.4. Trade winds were stronger than average across the western and central tropical Pacific Ocean. Equatorial cloudiness near the Date Line have been mostly below average since June 2021. Overall, the atmospheric and oceanic indicators are indicative of a weak La Niña.

ENSO Outlook

The persistence of the cooler than average sub-surface temperatures in the central and eastern equatorial Pacific Ocean support continuation of a La Niña event over the coming month. However, most of the global climate models favor a transition from La Niña to neutral-ENSO state during February to April 2023 period. Once ENSO-neutral state is established, it is likely to continue during the rest of the first half of the year. There is significant uncertainty in the ENSO state for the later half of 2023.

Fiji usually experiences above normal rainfall during a La Niña event, which can lead to flooding especially during the wet season from November to April.

Figure 1: Sea Surface Temperatures (SSTs) in the Pacific Ocean

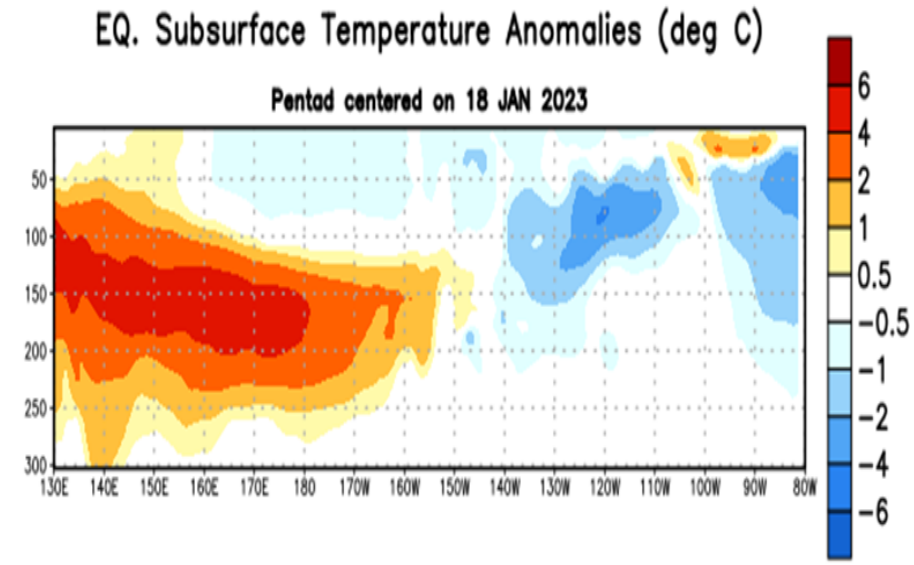


SSTs are below average across most of the equatorial Pacific Ocean, but gradually weakened in recent weeks.

[Sustained warm SSTs in the equatorial Pacific Ocean are associated with El Niño events and cool anomalies with La Niña events].

Image source: USA's National Oceanic and Atmospheric Administration (NOAA).

Figure 2: Sub-surface Waters in the Equatorial Pacific Ocean

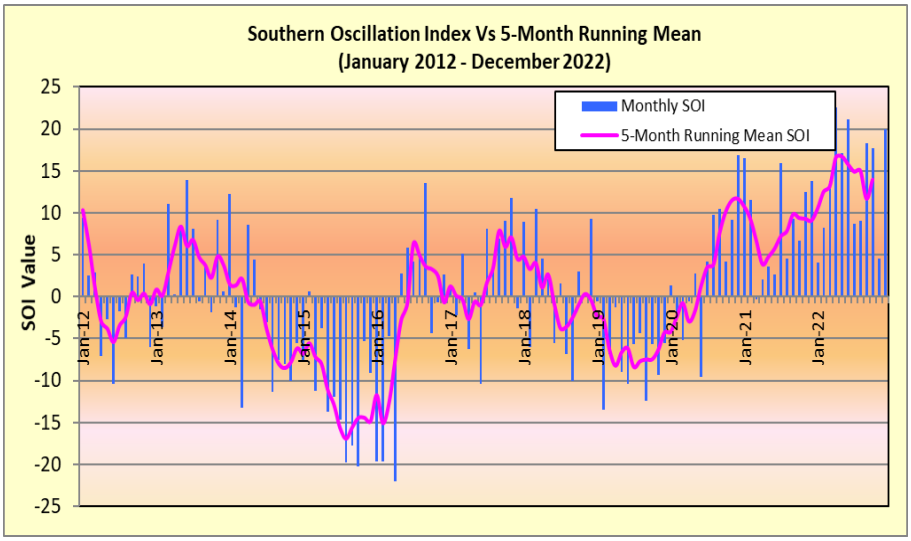


Negative subsurface temperature anomalies continued to weaken, but weak anomalies continuing to persist near the surface of the central and eastern Pacific Ocean. Positive sub-surface temperature anomalies persist at depth in the western and central Pacific Ocean and small area near the surface in the eastern Pacific Ocean.

[Waters below the surface of the Ocean are good indicator of what may eventually happen at the surface in the coming months].

Image source: NOAA.

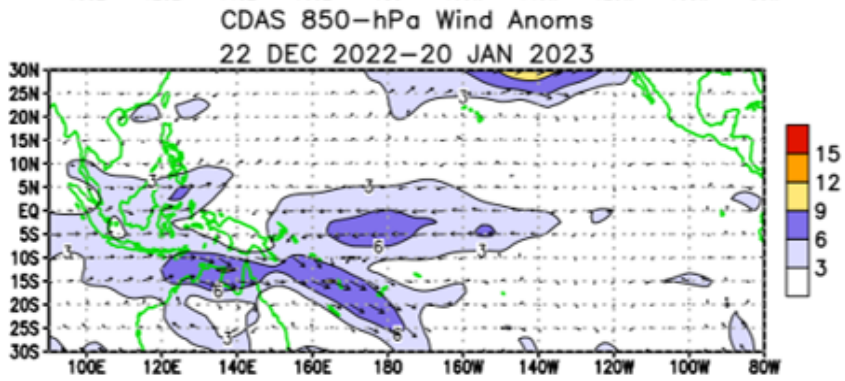
Figure 3: Southern Oscillation Index (SOI)



The SOI for December 2022 was +20.0, with the 5-month running mean of +13.9. The latest 30-days average SOI to 20th January 2023 was +17.4.

[Sustained values of SOI above +7 indicate presence of La Niña event and sustained values below -7 signify El Niño event].

Figure 4 : Near surface winds in the Pacific Ocean

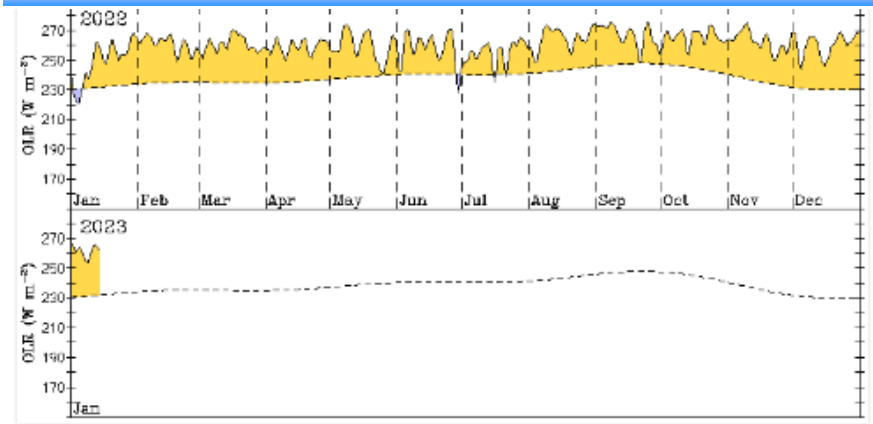


Trade winds were stronger than average across the western and central tropical Pacific Ocean during recent weeks.

[During El Niño there is a sustained weakening, or reversal, of the trade winds across much of the tropical Pacific. Conversely, during La Niña, there is a sustained strengthening of the Trade winds].

Image source: NOAA.

Figure 5 : Cloudiness near the Dateline

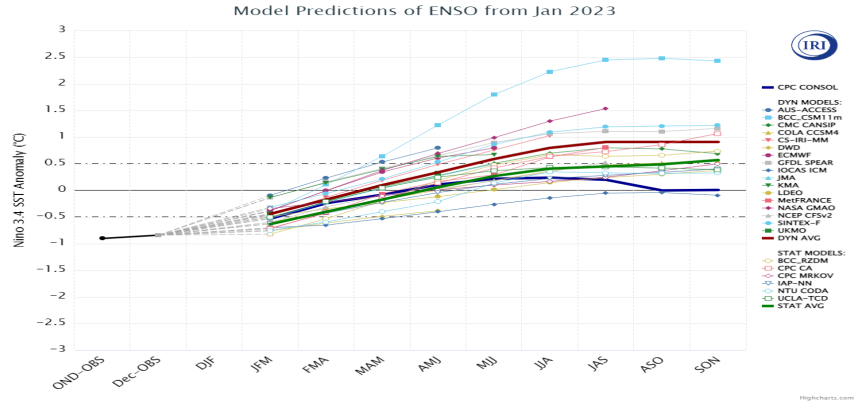


Persistent suppressed cloudiness near the Date Line continues.

[Equatorial cloudiness near the Date Line typically increases during El Niño (negative OLR anomalies) and decreases during La Niña (positive OLR anomalies)].

Image source: Australian Bureau of Meteorology.

Figure 6: Climate Model Predictions of ENSO



Climate models on average suggest a return to neutral conditions during February to April 2023 period.

Image source: International Research Institute for Climate and Society.

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).