

Early Signs of Weak La Niña Developing

Although the El Niño Southern Oscillation (ENSO) is still neutral with most oceanic (sea surface temperatures-SST) and atmospheric (Southern Oscillation Index-SOI) indicators are within neutral range, there is an increasing early signs of a weak La Niña developing around Spring (September-October-November). In addition, the negative Indian Ocean Dipole (IOD) is likely to continue for the Spring season. The IOD is a recently discovered climate driver that influences the climate of PNG, especially the southern coastal and highlands regions of PNG and is defined by the difference in sea surface temperatures between the eastern and western tropical Indian Ocean. A negative phase typically results in above-average rainfall and a positive phase brings drier than average rainfall season in PNG. A negative IOD is declared when the IOD index has been consistently below the IOD threshold (-4.0°C) for at least 8 weeks.

Furthermore, the Madden-Julian Oscillation (MJO) also influences the country's climate on an intra-seasonal timescale. This originates in the Indian Ocean and propagates eastwards across the Maritime continent every 30-60 days, impacting the climate of the host countries. Currently the MJO is in the western Indian Ocean. An MJO in the western Indian Ocean has little influence on rainfall in PNG, however it typically acts to strengthen the trade winds resulting in stronger winds across the southern coastal regions of PNG.

In short, despite the dry season, there is very high chance that the country will receive above normal rainfall across much of the country for the next three months. With the continuation of the negative IOD and the emerging of the weak La Niña in Spring, the country is expected to experience more wetter days with potential for flooding in worst cases so it is crucial to start planning for more wet days now.

Sea Surface Temperature (SST) Anomaly (BOM)

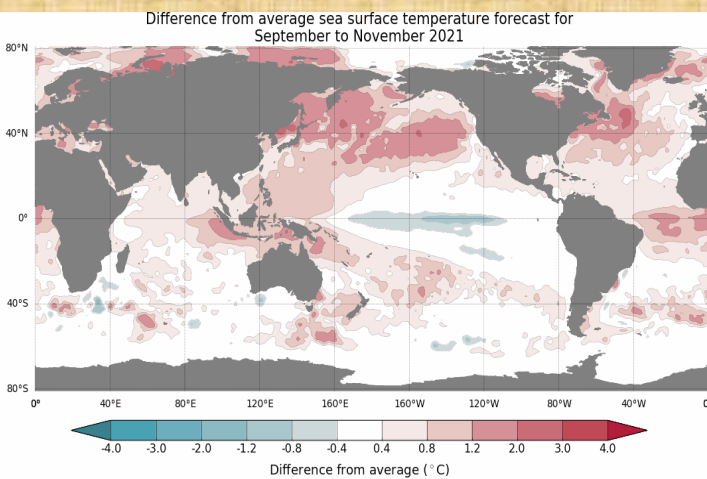


Figure 1: SST anomaly for SON 2021

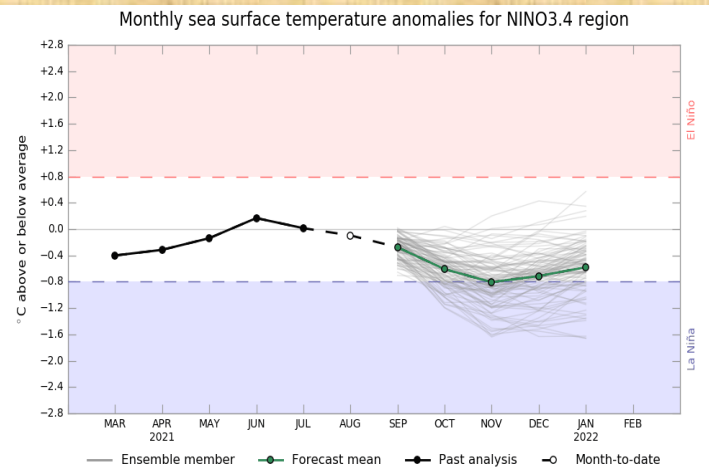


Figure 2: Monthly SST anomaly for NINO3.4 region

Figure 1 and 2 above shows the forecasted sea surface temperature (SST) anomalies for the Pacific Ocean for the periods Sep-Oct-Nov (SON) and Monthly SST anomaly for NINO3.4 region respectively. The SST in the far western equatorial Pacific shows warmer than average condition, including parts of the Maritime Continent and PNG whilst the SST anomalies in the equatorial eastern Pacific shows weak negative SST anomalies. The monthly SST anomaly for NINO3.4 region indicates an ENSO neutral condition with a possibility of heading into a weak La Niña come November-December-January 2022.

El Niño in the Pacific is related to the east-west movement of warm water (SST) in the Tropics. When warm SST anomalies are closer to Australia, PNG receives above normal rainfall (La Niña) and when cooler SST anomalies are present closer to Australia, PNG receives below normal rainfall (El Niño). In a neutral (Non-ENSO) year, PNG receives normal rainfall.

Papua New Guinea Satellite Rainfall Monitoring

Background

Provided below are experimental products from the Australian Bureau of Meteorology under the Space-based weather and climate extremes monitoring demonstration project (SEMDP). In the absence of our usual NIWA satellite rainfall monitoring maps, we will be using this products as capable replacements with the view to improving and validating them over time.

Figure A shows the space-based rainfall estimate for the 30-day total till 01 Aug 2021 while Figure B shows the 30-day total rainfall anomaly till 01 Aug 2021. Figure C, on the other hand, shows the 3-month Standardized Precipitation Index (SPI) ending July 2021.

It's encouraging to note that for the past 30 days till 01 August 2021, the country has been receiving above average rainfall for much of the country. This is not usual at this time of the year as the country is still at the peak of its dry season as reflected in Figure A.

However, when we compare this observed rainfall for the past 30 days till 01 Aug 2021 against the long-term average (Figure B), the extent of the dryness across the country becomes self-evident. This image shows very clearly that for the past month, much of the north-eastern part of the country have been experiencing drier conditions whilst the southern parts of the country have been receiving above average rainfall (Figure B).

The Standardized Precipitation Index (SPI) is an index commonly employed to characterize drought. It compares how different the observed rainfall is to the average for that period by measuring the number of standard deviations it is away from the mean. Typically, values below -1.5 are considered 'severely dry' and those below -2 are considered 'extremely dry', whilst values above $+2$ are indicative of 'extremely wet' conditions.

With the above explanation in mind, it is fair to say that eastern half of Manus, parts of New Ireland, northern tip of AROP and mainland of west Sepik and Madang are experiencing drought-like conditions whilst other parts of the country are either in drought-watch or out of drought as depicted in Figure C below.

The actual rainfall received from our in-situ stations located at Momote in Manus and Kavieng both shows clear signs of deficient rainfall received in support of the satellite observation. Momote recorded its lowest 11th rainfall for July whilst Kavieng recorded its 16th lowest rainfall for July.

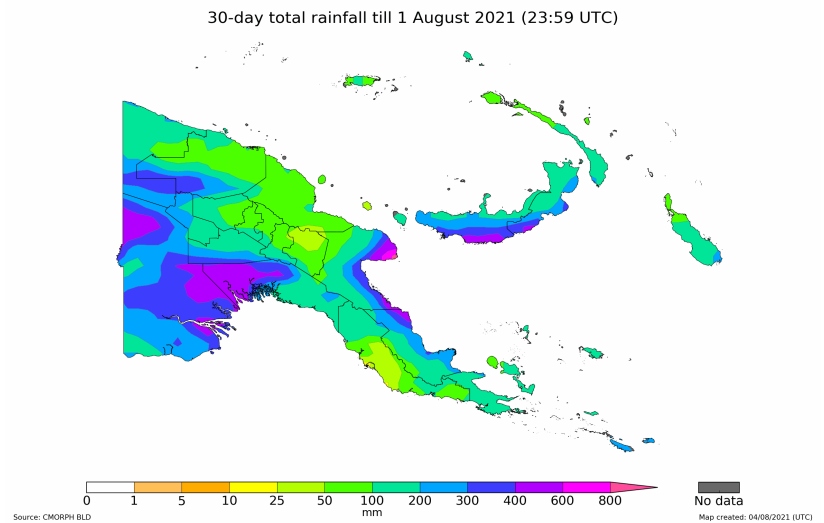


Figure A

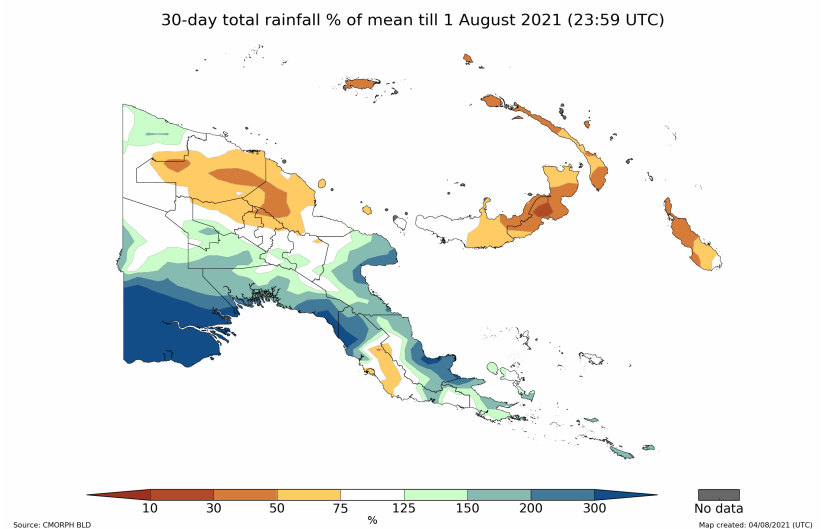


Figure B

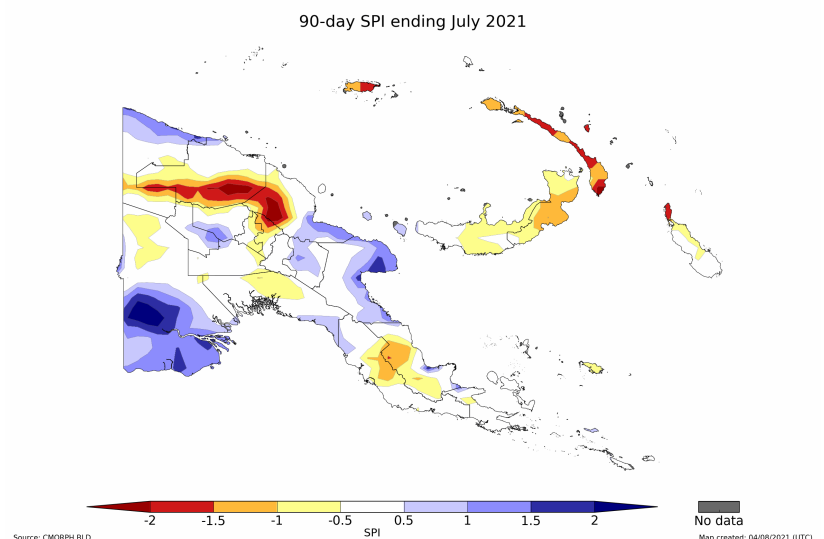


Figure C

Country Situation

The monthly rainfall for the country is as shown in Table 1 below.

The highest rainfall for the month of July was recorded at Wewak (319.8 mm) which was the 4th highest rainfall ever received for the month of July and the lowest rainfall recorded at Port Moresby (15.2mm). Despite the dry season, it is promising to see much of the country continue to receive very good rains. At the moment, there is no sign of drought-like situation in the country as per the observed rainfall across the country.

Port Moresby on the other hand, is beginning to show signs of stress due to continuous decline in rainfall over the past two months.

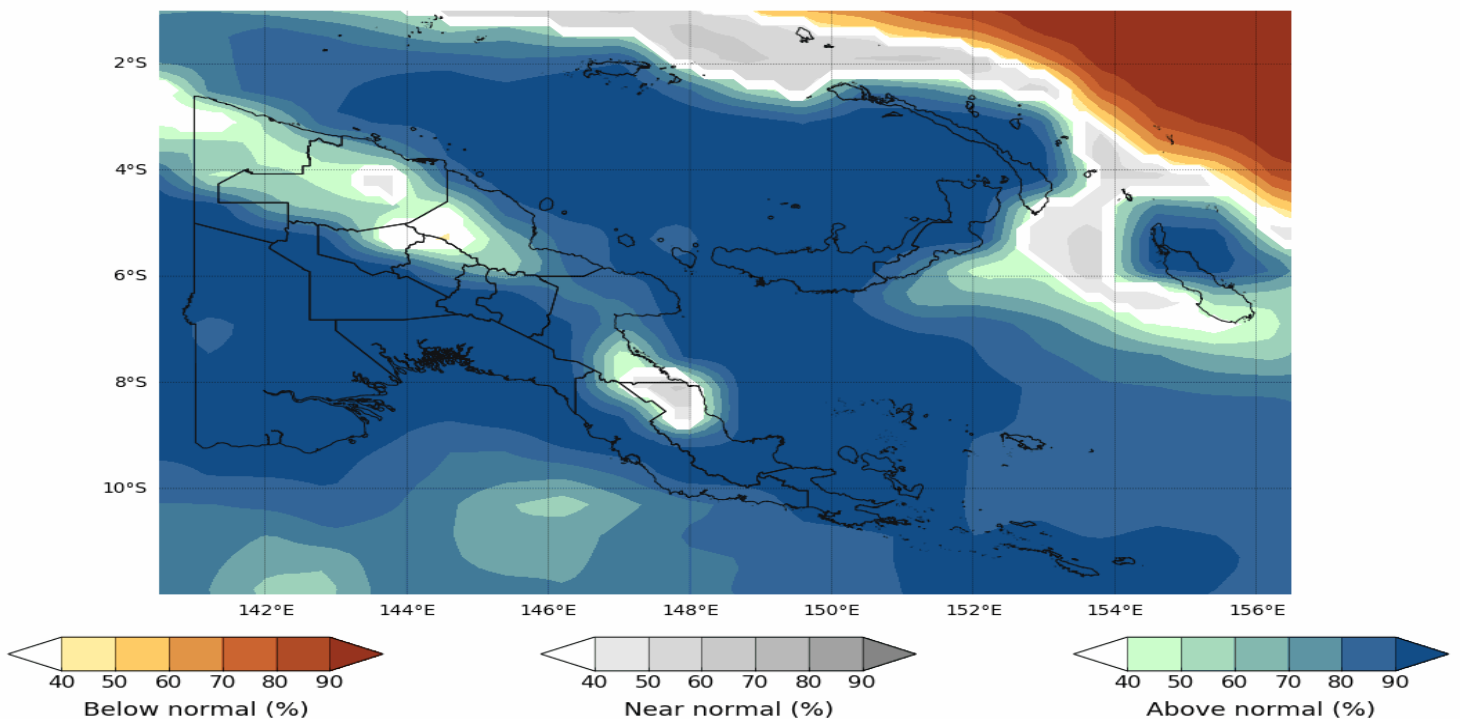
Note:

The tercile rainfall probability forecast for Sep-Oct-Nov 2021 from ACCESS-S1 model is as depicted in figure below.

Station	May	Jun	Jul
Madang	-	-	-
Momote	321.4	173.8	202.8
Kavieng	324.4	-	140.6
Nadzab	68.8	130.4	162.8
Gurney	-	-	-
Goroka	118.4	-	28.0
Misima	222.0	-	-
Port Moresby	18.8	30.4	15.2
Wewak	305.2	318.0	319.8
Vanimo	257.6	247.8	206.8

Rainfall Outlook (Sep-Nov 2021)

Tercile rainfall probabilities for August to October 2021





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EXTENDED RAINFALL OUTLOOK (OND2021)

Tercile rainfall probabilities for
October to December 2021

