



El Niño/La Niña Update

November 2021

Current Situation and Outlook

La Niña conditions have developed in the tropical Pacific, with both oceanic and atmospheric indicators reaching the necessary thresholds during the September-October 2021 period. The latest forecasts from the WMO Global Producing Centres of Long-Range Forecasts indicate a high chance (90%) of tropical Pacific sea surface temperatures remaining at La Niña levels until the end of 2021, and a moderate chance (70-80%) for them to persist at La Niña levels through the first quarter of 2022. Most models indicate that the 2021/2022 La Niña is likely to be a weak-to-moderate event. National Meteorological and Hydrological Services (NMHSs) will closely monitor changes in the state of El Niño/Southern Oscillation (ENSO) over the coming months and provide updated outlooks.

After an extended period of ENSO-Neutral conditions during the middle of 2021 (i.e., neither El Niño nor La Niña were occurring), observations of the equatorial Pacific Ocean and atmosphere indicate that La Niña conditions developed during September-October 2021. Sea surface temperature anomalies in the eastern Pacific Ocean were mostly between -0.5 and -1.0 degrees Celsius, indicative of weak La Niña levels. Sub-surface temperature anomalies in the central and eastern equatorial Pacific were also below average, providing a supply of cooler water to the surface. The overlying atmospheric circulation was enhanced by and responded to the cooling oceanic conditions. Strengthened surface trade winds were observed over most of the equatorial Pacific Ocean, with anomalous westerly winds evident at upper levels. The Southern Oscillation index (SOI) was also mostly positive, indicating higher surface pressure over the central southern Pacific and lower surface pressure over the western Pacific. Above-average

rainfall and convection was periodically evident over Indonesia, along with a clear and persistent pattern of below-average rainfall over the western and central Pacific Ocean. All of these anomalies are consistent with the re-emergence of a weak La Niña, which follows the La Niña observed in late 2020 and early 2021.

Using the recent observations as the starting point for their seasonal prediction systems, the WMO Global Producing Centres of Long-Range Forecasts have produced global-scale forecasts for the coming months. The models at all of the WMO Centres indicate that sea surface temperature anomalies in the east-central Pacific (also measured by the Niño-3.4 index) are highly likely to remain in the La Niña range during the remainder of 2021. Predictions for December 2021-February 2022 indicate a 90% chance for La Niña to continue. The likelihood of ENSO-neutral is estimated to be about 10% and for El Niño it is near zero. However, probabilities for La Niña during these seasons vary somewhat between the different forecasting centres, ranging from approximately 70% to 95%. Most models indicate east-central Pacific sea surface temperature anomalies will reach a minimum in December 2021 or January 2022, with the La Niña event gradually weakening between February and May 2022. The average Niño-3.4 index value from the WMO multi-model average is near -1.1 degrees Celsius at its minimum, corresponding to a weak-to-moderate La Niña event. For the January-March 2022 season, the Niño-3.4 index is likely to be between -0.5 and -1.0 degrees Celsius, with a 70 to 80% chance of La Niña. Thus, there is a high chance for La Niña conditions to last through at least early 2022, with a possible transition to ENSO-neutral in the March-May 2022 season as anomalies weaken.

It is important to note that El Niño and La Niña are not the only factors that drive global and regional climate patterns, and further that the magnitudes of ENSO indicators do not directly correspond to the magnitudes of their effects. At the regional level, seasonal outlooks need to assess the relative effects of both the ENSO state and other locally relevant climate drivers. Regionally and locally applicable information is made available via regional and national seasonal climate outlooks, such as those produced by WMO Regional Climate Centres (RCCs), Regional Climate Outlook Forums (RCOFs) and National Meteorological and Hydrological Services (NMHSs).

In summary:

- The tropical Pacific transitioned to La Niña in September-October 2021, with below-average temperatures in the surface and sub-surface ocean across the central and eastern Pacific Ocean. Atmospheric conditions are also consistent with a weak La Niña.

- Model predictions and expert assessment indicate a 90% probability for La Niña during December 2021- February 2022. For the January-March 2022 season, there is a 70 to 80% chance of La Niña to persist.
- The predicted multi-model average of sea surface temperature anomalies in the east-central Pacific Ocean is most negative in December 2021 or January 2022 (around -1.1 degrees Celsius), thereafter gradually weakening toward ENSO-neutral levels in March-May 2022.

The state of ENSO will continue to be carefully monitored by WMO Members and partners. More detailed interpretations of the implications for regional climate variability will be carried out routinely by the climate forecasting community over the coming months and will be made available through the National Meteorological and Hydrological Services.

For web links of the National Meteorological Hydrological Services, please visit:

<https://public.wmo.int/en/about-us/members>

For information and web links to WMO Regional Climate Centres (RCCs) please visit:

<https://public.wmo.int/en/our-mandate/climate/regional-climate-centres>

For information and web links to Regional Climate Outlook Forums (RCOFs) please visit:

<https://public.wmo.int/en/our-mandate/climate/regional-climate-outlook-products>

For the latest Global Seasonal Climate Update (GSCU) based on WMO Global Producing Centres of Long-Range Forecasts, please visit:

<https://www.wmolc.org/gscuBoard/list>

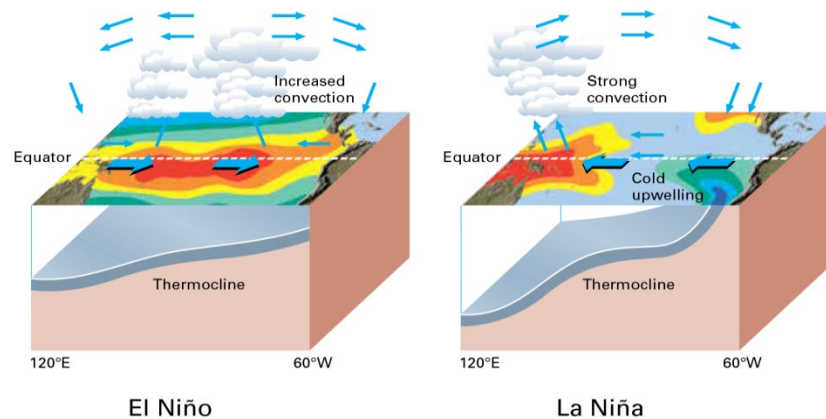
An archive of all WMO El Niño/La Niña Updates issued so far, including this one, is available at:

<https://community.wmo.int/activity-areas/climate/wmo-el-ninola-nina-updates>

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El Niño/La Niña Background



Typical circulation patterns during El Niño/La Niña (Source: WMO, 2003, "Climate into the 21st Century").

Climate Patterns in the Pacific

Research conducted over recent decades has shed considerable light on the important role played by interactions between the atmosphere and ocean in the tropical belt of the Pacific Ocean in altering global weather and climate patterns. During El Niño events, sea surface temperatures in the central and eastern tropical Pacific Ocean become substantially warmer than normal. In contrast, during La Niña events, the sea surface temperatures in these regions become colder than normal. These temperature changes are strongly linked to major climate fluctuations around the globe and, once initiated, such events can last for 12 months or more. The strong El Niño event of 1997–1998 was followed by a prolonged La Niña phase that extended from mid-1998 to early 2001. El Niño/La Niña events change the likelihood of particular climate patterns around the globe, but the outcomes of each event are never exactly the same. Furthermore, while there is generally a relationship between the global impacts of an El Niño/La Niña event and its intensity, there is always potential for an event to generate serious impacts in some regions irrespective of its intensity.

Forecasting and Monitoring the El Niño/La Niña Phenomenon

The forecasting of Pacific Ocean developments is undertaken in a number of ways. Complex dynamical models project the evolution of the tropical Pacific Ocean from its currently observed state. Statistical forecast models can also capture some of the precursors of such developments. Expert analysis of the current situation adds further value, especially in interpreting the implications of the evolving situation below the ocean surface. All forecast methods try to incorporate the effects of ocean-atmosphere interactions within the climate system. The meteorological and oceanographic data that allow El Niño and La Niña episodes to be monitored and forecast are drawn from national and international observing systems. The exchange and processing of the data are carried out under programmes coordinated by the WMO.

WMO El Niño/La Niña Update

The WMO El Niño/La Niña Update is prepared on a quasi-regular basis (approximately every three months) through a collaborative effort between WMO and the International Research Institute for Climate and Society (IRI) as a contribution to the United Nations Inter-Agency Task Force on Natural Disaster Reduction. It is based on contributions from the leading centres around the world monitoring and predicting this phenomenon and expert consensus facilitated by WMO and IRI.

For more information on the Update and related aspects, please visit:

<https://public.wmo.int/en/our-mandate/climate/el-niñola-niña-update>