



El Niño/La Niña Update

January 2021

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CP

Current Situation and Outlook

The 2020-2021 La Niña event appears to have peaked in October-December as a moderate strength event. The latest forecasts from the WMO Global Producing Centers of Long-Range Forecasts indicate a moderate likelihood (65%) that the La Niña event will continue into February-April. The odds shift rapidly thereafter, indicating a 70% chance that the tropical Pacific will return to ENSO-neutral conditions by the April-June 2021 season. The outlook for the second half of the year is currently uncertain. National Meteorological and Hydrological Services will closely monitor changes in the state of El Niño/Southern Oscillation (ENSO) over the coming months and provide updated outlooks.

La Niña conditions have been in place since August-September 2020, according to both atmospheric and oceanic indicators. The sea surface temperature anomalies in the central/eastern-central equatorial Pacific reached peak magnitude during October-November 2020. The anomalies in the eastern-central Pacific have somewhat plateaued near -1.0 degree Celsius, with some minor fluctuations over the past several weeks. Cooler than normal sub-surface anomalies arrived in the eastern Pacific during the second quarter of 2020; they began to cool sea surface temperatures there and were subsequently reinforced by enhanced trade winds in the central/western-central equatorial Pacific. Cool anomalies persist in the sub-surface waters, but have weakened since the peak.

Enhanced trade winds and stronger-than-average upper level westerly winds have been present in the tropical Pacific since mid-2020. Cloudiness and rainfall have been below average in the central and west-central tropical Pacific, and slightly above average around the Maritime

Continent throughout the 2020-2021 La Niña. The Southern Oscillation Index (represented by standardized Tahiti minus Darwin sea-level pressure difference) has also been at La Niña levels since September 2020 and reached a new high in December. The ocean patterns and corresponding atmospheric changes are typical of a mature La Niña that has peaked. While the below-average sub-surface sea temperatures will support some persistence of sea surface temperatures at La Niña levels, the anomalies in the subsurface ocean structure are evolving in a manner consistent with phase transition from La Niña to ENSO-neutral conditions. Past observations show that the ENSO conditions typically transition sometime during April to June.

These recent conditions from December and January are the starting point for climate models from the WMO Global Producing Centres of Long-Range Forecasts to produce global-scale forecasts for the coming months. The predictions for February-April 2021 indicate a 65% likelihood that the La Niña conditions will continue through this season. However, the tropical Pacific is also beginning to transition. Approximately 60% of models predict that the La Niña sea surface temperature anomalies will weaken to ENSO-neutral levels by March-May 2021, and they indicate a 70% chance for ENSO-neutral conditions to prevail during April-June 2021. Based on the model predictions and expert assessment, the likelihood for La Niña conditions to continue through the April-June 2021 season is estimated to be about 30%, and the likelihood for El Niño is near-zero. During February-April 2021 the sea surface temperatures in the eastern-central tropical Pacific are likely to be below average, in the range of -0.3 to -1.0 degrees Celsius, and during April-June 2021, they are anticipated to be within -1.2 to +0.1 degrees Celsius deviation from average. The most likely time for a return to ENSO-neutral conditions is between March and May 2021. Forecasts at long leads, and in particular those that extend through the boreal spring, tend to be less accurate. At forecast lead times extending through the middle of the year, the model forecasts widely differ in their predictions, with about one-third indicating a persistent or redeveloped La Niña event, one-third indicating neutral, and one-third indicating El Niño development.

It is important to note that El Niño and La Niña are not the only factors that drive global and regional climate patterns, and 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:

- La Niña appears to have peaked in October-November 2020 as a moderate strength event, based on both oceanic and atmospheric indicators.
- Model predictions and expert assessment indicate a 65% probability that La Niña conditions persist through February-April 2021 and a 70% probability for La Niña to transition to neutral conditions by April-June 2021.
- For the second half of the year, model predictions differ considerably on whether ENSO-neutral will remain, La Niña conditions persist or redevelop, or El Niño conditions develop.
- Sea surface temperatures in the eastern-central Pacific are predicted to be below-average during January-March 2021, in the range of -0.6 to -1.0 degrees Celsius. For April-June 2021, they are predicted to range between -1.2 to +0.1 degrees deviation from average.

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 forecast based on WMO Global Producing Centres of Long-Range Forecasts, please visit:

https://ftp.cpc.ncep.noaa.gov/mingyue/GSCUWMO/Forecasts/GSCU_FMA2021_Jan2021-fin.pdf

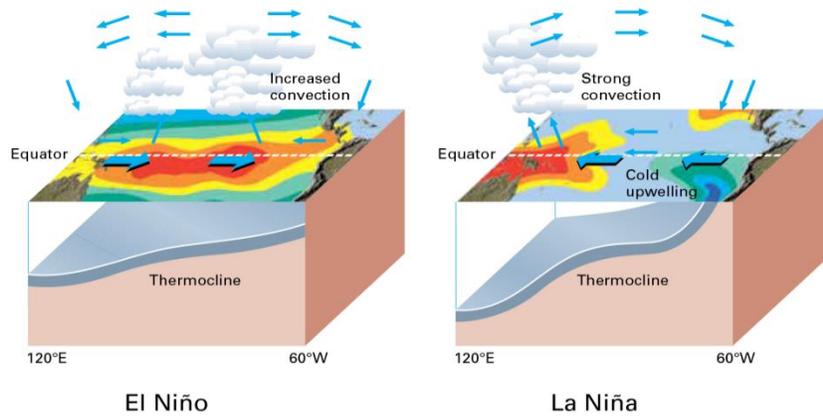
An archive of all WMO El Niño/La Niña Updates issued so far, including this one, is available at:

<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

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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>