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Frequently Asked Questions on the El Niño-Southern Oscillation Phenomena

What are El Niño and La Niña?

El Niño and La Niña are opposite phases of a naturally occurring powerful climate pattern known as the El Niño-Southern Oscillation (ENSO). Shaped by interactions between the tropical Pacific Ocean and the atmosphere above, ENSO is a major driver of year-to-year changes in rainfall, temperature and extreme weather worldwide.

During an El Niño event, sea-surface temperatures in the central and eastern tropical Pacific Ocean become unusually warm and trade winds weaken. In the case of La Niña, the opposite happens. Sea-surface temperatures in the same region become unusually cool while trade winds strengthen. When ocean temperatures remain close to average, conditions are considered ENSO-neutral.

When do they take place?

El Niño and La Niña typically occur every two to seven years. They generally begin developing between March and June and reach their peak intensity between November and February. El Niño events can last up to 18 months and La Niña up to three years.

The most recent multiyear La Niña lasted from late 2020 to early 2023. It was followed by the strong El Niño of 2023 – 2024. La Niña conditions developed again in late 2025 and lasted until early 2026.

When were they first identified?

El Niño was first recognized in the nineteenth century by fishermen in Peru and Ecuador, who noticed that unusually warm coastal waters sometimes appeared and reduced their fish catches. Scientists later found that these local changes were part of a much larger ocean-atmosphere pattern across the tropical Pacific.

Interest in predicting El Niño grew after the 1972 – 1973 event which contributed to the collapse of the Peruvian anchovy fishing industry, then the largest in the world, with effects that spread through the global economy. The first successful El Niño prediction was made in 1986, when researchers at Columbia University used experimental numerical models to predict the 1986 – 1987 event several months in advance.

How do El Niño and La Niña affect weather and climate?

El Niño typically has a warming effect on global temperatures, with the strongest influence often felt in the year after they develop. They are commonly associated with increased rainfall and flooding in parts of South America, East Africa and the southern United States, as well as drought conditions in Central America, northeastern South America, the Caribbean region, eastern and northern Australia, Indonesia, southern Africa and parts of South Asia. El Niño can also reduce hurricane activity in the Atlantic basin and increase it in the eastern Pacific.

La Niña on the other hand produces broadly opposite climate patterns and tends to have a temporary cooling effect on global temperatures. However, impacts vary from one event to another, depending on the intensity and timing of the event and how it interacts with other climate drivers. Not all regions are affected, and even within the same region, impacts can differ.

Are they caused by climate change?

No, El Niño and La Niña are naturally occurring phases of ENSO, driven by interactions between the tropical Pacific Ocean and the atmosphere. There is currently no clear scientific evidence that climate change is increasing the frequency or intensity of El Niño or La Niña events.

However, a warmer ocean and atmosphere can add heat and moisture to the climate system, which may worsen some ENSO-related extremes, including heatwaves and heavy rainfall. The strong 2023 – 2024 El Niño added a temporary warming effect on top of the long-term warming trend, contributing to 2024 becoming the hottest year on record.

What are the trade and economic impacts?

El Niño and La Niña can disrupt trade through lower agricultural output, damaged infrastructure, higher transport costs, energy shortages, fisheries losses and commodity price volatility.

The 2015 – 2016 El Niño triggered the worst drought in southern Africa in 35 years, cutting regional maize production by roughly 25% and worsening food insecurity. In Asia-Pacific, heat and drought during the 2023 – 2024 El Niño affected key export commodities, including rice, palm oil and wheat. India restricted non-basmati white rice exports to secure domestic stockpiles, helping push global rice prices to 15-year highs.

Floods and landslides can damage roads, bridges, ports and railways, while drought can lower river levels and restrict inland navigation. During the 2023 El Niño, low water levels in the Panama Canal restricted ship traffic from August onward.

The same event reduced tuna catches in Ecuador by 30% and significantly affected anchovy fishing in Peru. Because Peru is a major fishmeal exporter, these impacts rippled through livestock and aquaculture supply chains.

Drought can also reduce hydropower generation, raising electricity costs, increasing fuel imports and affecting manufacturing. In Asia-Pacific, countries dependent on hydropower, including Viet Nam, the Lao People's Democratic Republic and Malaysia, faced power shortages as reservoir levels fell during the 2023 – 2024 El Niño.

La Niña can also have major economic impacts. In 2016 – 2017, it contributed to severe drought in the Horn of Africa. By June 2017, 26.5 million people were affected through crop losses, livestock deaths and worsening food insecurity.

How are they predicted?

El Niño and La Niña are predicted by monitoring conditions in the tropical Pacific Ocean and using climate models to estimate how they might evolve over the coming months. Monitoring relies on a global network of observations, including satellites, ocean buoys, research ships and atmospheric measurements operated by National Meteorological and Hydrological Services (NMHSs) and international partners. These forecasts draw on observations of sea-surface temperatures, winds, rainfall, air pressure and ocean heat content. Improved seasonal forecast models can now predict climate patterns one to six months in advance.

One of the main tools used to track ENSO events is the Oceanic Niño Index (ONI). It measures whether sea-surface temperatures in a key area of the equatorial Pacific called the Niño 3.4 region are warmer or cooler than their long-term average over a three-month period. Warmer-than-average conditions point to El Niño, while cooler-than-average conditions point to La Niña.

In a warming climate, scientists are also looking at the Relative Oceanic Niño Index (RONI). It measures how warm or cool the Niño 3.4 region is compared to the rest of the tropics at the same time. This helps separate ENSO conditions from the broader warming of the global ocean.

How is the strength of El Niño events classified?

El Niño is classified as "strong", "moderate" or "weak". There is at present no universally accepted scientific definition of a "super" El Niño. Official climate outlooks usually rely on quantitative measures such as ONI rather than subjective labels.

What is the role of the World Meteorological Organization (WMO)?

WMO coordinates international monitoring and forecasting of El Niño and La Niña by bringing together observations, climate model outputs and expert assessment from leading climate centres around the world.

WMO issues regular El Niño/La Niña Updates, prepared in collaboration with the International Research Institute for Climate and Society (IRI) and a global network of climate and forecasting centres. These consensus-based updates draw on contributions from Global Producing Centres for Seasonal Prediction (GPCs-SP), Regional Climate Centres (RCCs) and other institutions that monitor and forecast ENSO conditions.

WMO also issues Global Seasonal Climate Updates, which look beyond El Niño and La Niña to include other climate drivers, such as the Indian Ocean Dipole, the North Atlantic Oscillation and the Arctic Oscillation. These updates use forecasts from WMO GPCs-SP.

At regional level, WMO supports Regional Climate Outlook Forums through its RCCs, which translate global climate signals into regional outlooks and forecasts. These are then used by NMHSs to provide tailored guidance for governments and climate-sensitive sectors, including agriculture, water, health, energy and disaster risk reduction.