NOAA National Weather Service OCTOBER 2007

What are El Niño, La Niña, and ENSO?

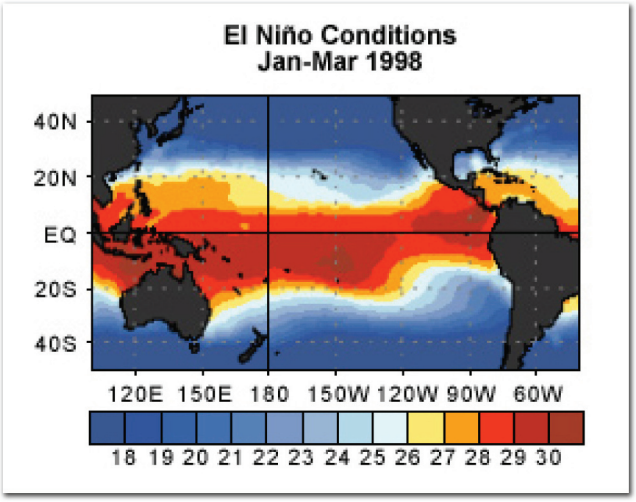
Near the end of each calendar year, ocean surface temperatures warm along the coasts of Ecuador and northern Peru. In the past, local residents referred to this annual warming as “El Niño,” meaning “The Child,” due to its appearance around the Christmas season. The appearance of El Niño signified the end of the fishing season and the arrival of the time for Peruvian fishermen to repair their nets and maintain their boats. Every two to seven years a much stronger warming appears along the west coast of South America, which lasts for several months and is often accompanied by heavy rainfall in the arid coastal regions of Ecuador and northern Peru. Over time the term El Niño began to be used in reference to these major warm episodes.

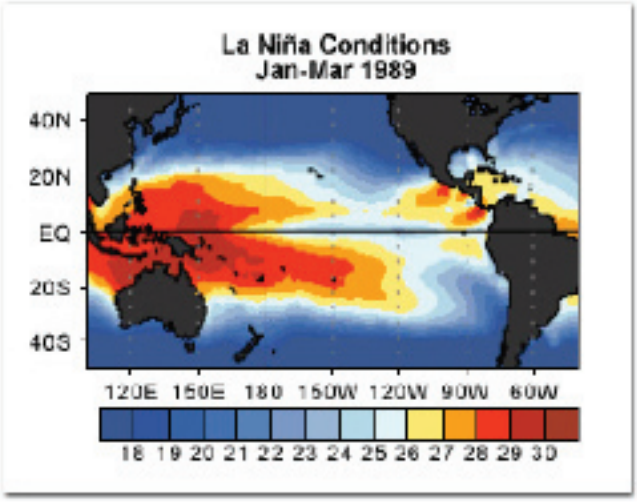
In contrast to El Niño, La Niña is characterized by anomalously cool water in the central and east-central equatorial Pacific. Both El Niño and La Niña result in changes in the intensity and distribution of rainfall in the Tropics and in changes in the patterns of sea level pressure and atmospheric circulation that affect many areas worldwide. The El Niño/ La Niña phenomena are the main sources of year-to-year variability in weather and climate for many areas of the world. El Niño and La Niña tend to alternate in an irregular cycle, which is often referred to as the ENSO cycle. El Niño episodes tend to:

- Develop during the Northern Hemisphere spring season
- Occur every 3-5 years
- Usually last for 9-12 months.

In contrast, La Niña may last 1-3 years; however, there is considerable event-to-event variability in the timing, intensity and evolution of both El Niño and La Niña. Periods when neither El Niño nor La Niña is present are referred to as ENSO-neutral.

Maps showing latitudes, longitudes, and ocean temperatures (in degrees Celsius)
(NOAA/NCEP/CPC)





Why do we have ENSO?

ENSO appears to be a necessary mechanism for maintaining long-term global climate stability by transporting heat from the Tropics to the higher latitudes.

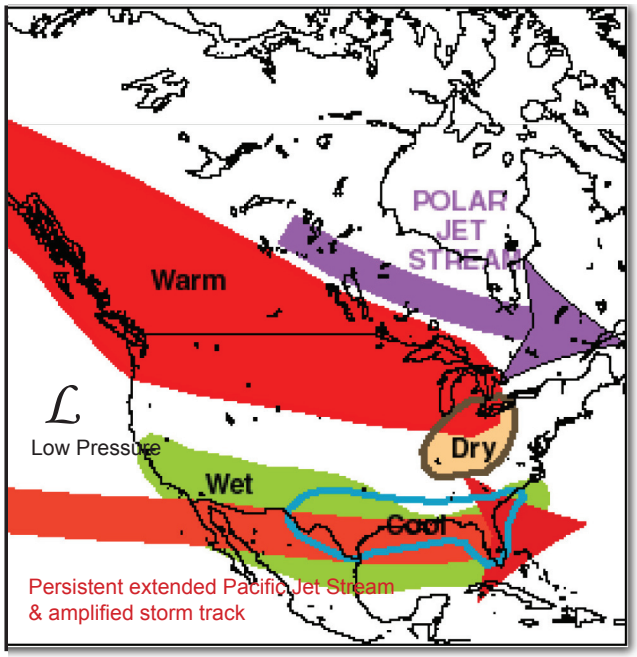
Effects of El Niño on the U.S.

El Niño impacts can vary substantially from one event to another. However, there are some sections of the United States where impacts are fairly consistent and predictable, especially when associated with strong El Niño episodes.

In general, El Niño results in increased precipitation across California and the southern tier of states, and decreased precipitation in the Pacific Northwest and in the Ohio and Tennessee Valleys. A milder than normal winter across the northern states and western Canada is also a common effect. In the eastern United States, El Niño episodes favor more coastal storms at the expense of Alberta Clippers (fast eastward-tracking storms across the northern states) in winter and early spring. During the warm season, El Niño influences hurricane development, resulting in more eastern Pacific hurricanes and fewer Atlantic hurricanes.

Effects of La Niña on the U.S.

Seasonal precipitation impacts are generally opposite to those of El Niño. During La Niña winters, large portions of central North America experience increased storminess, and an increased frequency of significant cold-air outbreaks, while the southern states experience less storminess and precipitation. There also tends to be considerable month-to-month variations in temperature, rainfall, and storminess across central North America during the winter and spring seasons. In the eastern U.S., during the winter, there are generally fewer coastal storms and more Alberta Clippers (fast eastward-tracking storms across the northern states) than normal. In the summer and autumn, La Niña can influence hurricane development, often resulting in fewer eastern Pacific hurricanes and more Atlantic hurricanes.



Typical Winter Patterns during El Niño (NOAA/NCEP/CPC)

Where Can I Find More Information?

The NOAA Climate Prediction Center web site has myriad resources, including educational materials, information on current conditions and outlooks, and links to other informative sites:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml

NOAA has created one primary web site that allows access to many other resources:
http://www.elnino.noaa.gov