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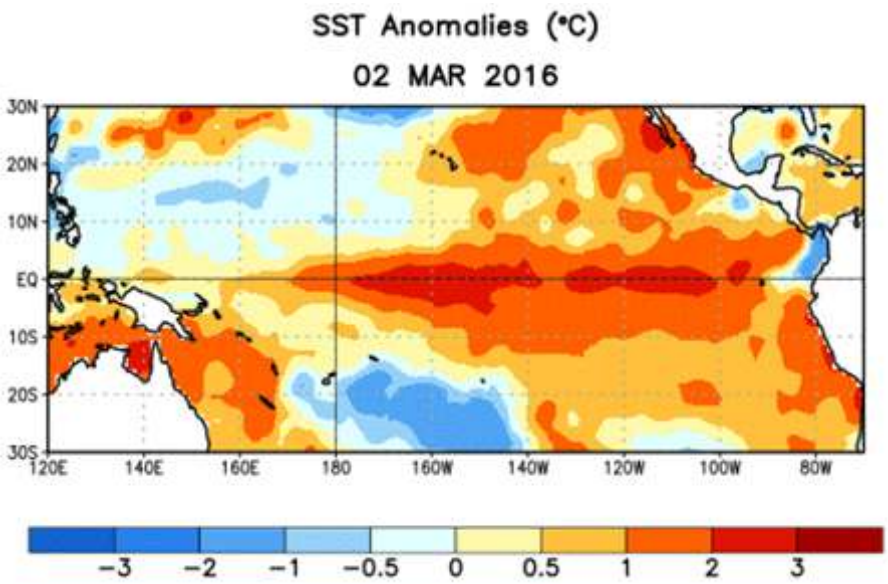
El Niño continues its steady decline; and there is possibility of development of La Niña



The Climate Prediction Center (CPC), an agency of the U.S. National Weather Service, in its monthly forecast on March 10, 2016 maintained its projections that current El Nino conditions, which have been linked to crop damage around the world, will likely dissipate by late Northern Hemisphere spring or early summer. It found Sea surface temperature (SST) anomalies* decreased across most of the central and eastern equatorial Pacific Ocean during February as shown in the figure.

Fig 1: Sea surface temperature (SST) anomalies decreased across most of the central and eastern equatorial Pacific Ocean during February. Anomalies are computed with respect to the 1981-2010 base period weekly norms. Source: *NOAA*

CPC's models indicated that El Niño** will weaken, with a transition to ENSO-neutral *** likely during the late spring or early summer 2016. Thereafter, the chance of La Niña**** conditions increases into the fall. While there is both model and physical support for La Niña following a strong El Niño, considerable uncertainty remains at this time. A transition to ENSO-neutral is likely during late Northern Hemisphere spring or early summer 2016, with close to a 50 percent chance for La Niña conditions to develop by the fall.

Likewise, the Bureau of Meteorology, Australia found that the 2015–16 El Niño continued its slow and steady decline. The tropical Pacific Ocean had cooled further over during first fortnight of March, and trade winds were near normal. However, the Southern Oscillation Index (SOI) remained very low, indicating that while El Niño was easing, and it was still capable of influencing Australian and global climate.

Comparison of global temperatures and precipitation pattern due to El Niño and La Niña

El Niño

In the Tropics, El Niño episodes - warm episode - are associated with increased rainfall across the east-central and eastern Pacific and with drier than normal conditions over northern Australia, Indonesia and the Philippines. Elsewhere, wetter than normal conditions tend to be observed during:

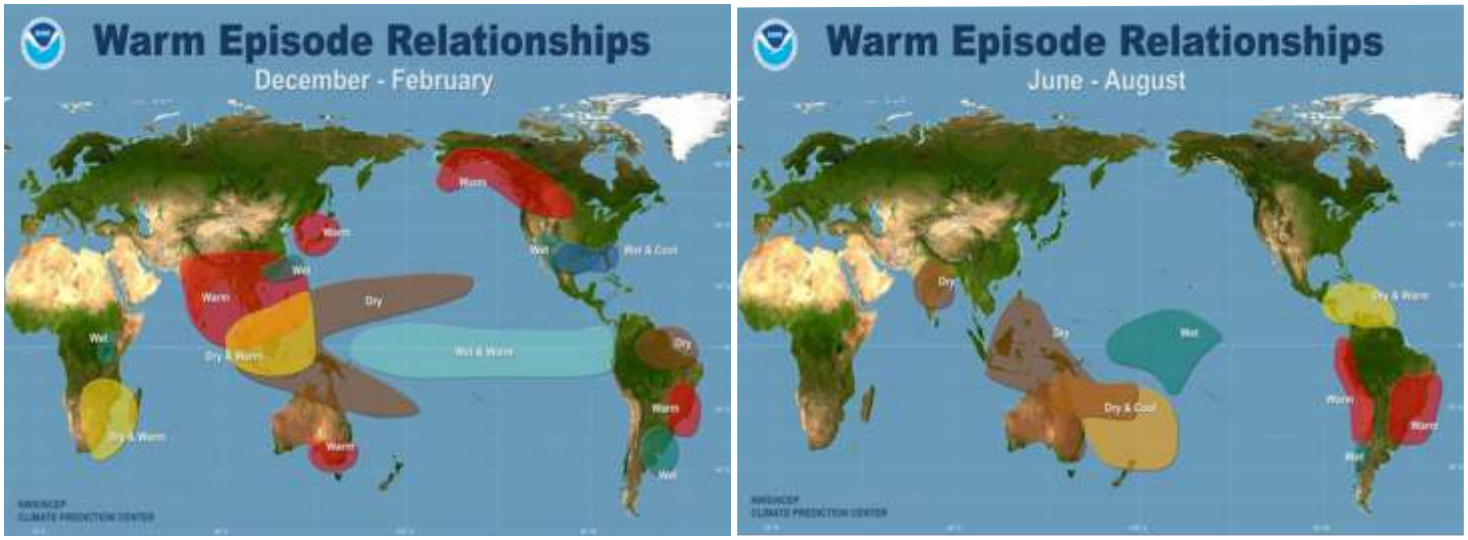


Fig 2 : Warm Episode Relationships. Source: *NOAA*

1) December-February along coastal Ecuador, northwestern Peru, southern Brazil, central Argentina, and equatorial eastern Africa, and
2) June-August in the inter mountain regions of the United States and over central Chile. Drier than normal conditions generally observed over northern South America, Central America and southern Africa during DJF, and over eastern Australia during June-August.

El Niño episodes also contribute to large-scale temperature departures throughout the world, with most of the affected regions experiencing abnormally warm conditions during December-February. Some of the most prominent temperature departures include:

1) Warmer than normal conditions during December-February across southeastern Asia, southeastern Africa, Japan, southern Alaska and western/central Canada, southeastern Brazil and southeastern Australia;
2) Warmer than normal conditions during June-August along the west coast of South America and across southeastern Brazil; and
3) Cooler than normal conditions during December-February along the Gulf coast of the United States

The impacts of ongoing El Nino match with impacts shown in picture above. In India, for example, strong El Niño led to reduced rain from the southwest monsoon. Rainfall in 2015 from monsoons, which sweep over most of India from June to September, was 14 percent below the average. The reduction was more than 40 percent in some areas. This reduced monsoon worsen the situation created by reduced monsoon of 2014 which was 12 % low than normal due to a mild El Niño. Moreover, this El Niño is also responsible for unusually heavy rainfall in Nov- Dec 2015 in the southern parts of India and Sri Lanka.

In South Africa, where El Niño, causes dry and warm weather between December to February, a drought hit the production of main food crop - Corn- so badly that South Africa - normally a corn exporter - would need to import more than four million tons of corn from Mexico and Brazil and other South American countries to meet the demand. Corn yields were already 30 % low last season; therefore, due to current drought and subsequent import will shoot the corn price in market, eventually, forcing the people to reduce other expenses to spend more on food.

La Niña

During La Niña episodes - cold episode -, rainfall is enhanced across the western equatorial Pacific, Indonesia and the Philippines and is nearly absent across the eastern equatorial Pacific. Elsewhere, wetter than normal conditions tend to be observed during December-February over northern South America and southern Africa, and during June-August over southeastern Australia. Drier than normal conditions are generally observed along coastal Ecuador, northwestern Peru and equatorial eastern Africa during December - February, and over southern Brazil and central Argentina during June-August.

La Niña episodes also contribute to large-scale temperature departures throughout the world, with most of the affected regions experiencing abnormally cool conditions. Some of the most prominent temperature departures include:

1) Below-normal temperatures during December-February over southeastern Africa, Japan, southern Alaska, and western/central Canada, and southeastern Brazil; more than normal rainfall is observed over southeastern Africa and northern Brazil.
2) Cooler than normal conditions during June-August across India and southeastern Asia, along the west coast of South America, across the Gulf of Guinea region, and across northern South America and portions of central America. Therefore, rainfall associated with the summer monsoon in Southeast Asia tends to be greater than normal, especially in northwest India and Bangladesh. This generally benefits the Indian economy, which depends on the monsoon for agriculture and industry.
3) Warmer than normal conditions during December-February along the Gulf coast of the United States; and, dry and cooler conditions along the coast of western South America.
4) Wet weather in northern Australia. The 2010 La Niña event correlates with one of the worst floods in the history of Queensland, Australia. More than 10,000 people were forced to evacuate and economic losses were more than $2 billion.

Fig 3 : Cold Episode Relationships. Source: *NOAA*

***Sea Surface Temperature anomalies** in degrees Celsius, or "SST anomalies" for short, are how much temperatures depart from what is normal for that time of year. This makes sense; we might say that we had a "warm winter" even though it was still much colder than summer. What we mean is that it was warmer than a normal winter; in our parlance, we would say that it was a "positive anomaly". An unusually cold winter would be a "negative anomaly". For Pacific SST, an anomaly in the range of 1.5 to 3.5 degrees Celsius would be considered characteristic of an El Niño; the warmer and more widespread the water, the stronger the El Niño.

****El Niño** refers to the large-scale ocean-atmosphere climate phenomenon linked to a periodic warming in sea-surface temperatures across the central and east-central equatorial Pacific (between approximately the date line and 120°W). El Niño represents the warm phase of the El Niño / Southern Oscillation (ENSO) cycle and; sometimes, it is termed as a Pacific warm episode. El Niño originally referred to an annual warming of sea-surface temperatures along the west coast of tropical South America.

*****ENSO-neutral** refers to those periods when neither El Niño nor La Niña is present. These periods often coincide with the transition between El Niño and La Niña events. During ENSO - neutral periods the ocean temperatures, tropical rainfall patterns, and atmospheric winds over the equatorial Pacific Ocean are near the long-term average.

******La Niña** refers to the periodic cooling of ocean surface temperatures in the central and east-central equatorial Pacific that occurs every three to five years or so. La Niña represents the cool phase of the El Niño /Southern Oscillation (ENSO) cycle; and, sometimes, it is termed as a Pacific cold episode. La Niña originally referred to an annual cooling of ocean waters off the west coast of Peru and Ecuador. La Niña events may last between one and three years, unlike El Niño, which usually lasts no more than a year. Both phenomena tend to peak during the Northern Hemisphere winter.

Source: *NOAA, Bureau of Meteorology, Australia, National Geographic, and New York Times*

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