ENSO: Recent Evolution, Current Status and Predictions

Update prepared by: Climate Prediction Center / NCEP
13 August 2018
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ENSO Alert System Status: El Niño Watch

ENSO-neutral conditions are present.*

Equatorial sea surface temperatures (SSTs) are near average across most of the Pacific Ocean.

There is ~60% chance of El Niño in the Northern Hemisphere fall 2018 (September-November), increasing to ~70% during winter 2018-19.

* Note: These statements are updated once a month (2nd Thursday of each month) in association with the ENSO Diagnostics Discussion, which can be found by clicking here.
From September 2017 to late March 2018, below-average SSTs persisted across the central and eastern Pacific Ocean.

Since early June, near-average SSTs have been present across most of the Pacific Ocean.
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4 0.5°C
- Niño 3.4 0.2°C
- Niño 3 -0.1°C
- Niño 1+2 -0.1°C
During the last four weeks, equatorial SSTs were near average across the central and eastern Pacific, while remaining above average in the western Pacific.
During the last four weeks, equatorial SSTs were above average in the western Pacific Ocean. SSTs were below average in the western Indian Ocean and near Indonesia.
During the last four weeks, above average SSTs have persisted in the western equatorial Pacific Ocean, while mostly near-average SSTs dominated the eastern Pacific.
During the last four weeks, negative changes were observed in the eastern equatorial Pacific.
Upper-Ocean Conditions in the Equatorial Pacific

The basin-wide equatorial upper ocean (0-300 m) heat content is greatest prior to and during the early stages of a Pacific warm (El Niño) episode (compare top 2 panels), and least prior to and during the early stages of a cold (La Niña) episode.

The slope of the oceanic thermocline is least (greatest) during warm (cold) episodes.

Recent values of the upper-ocean heat anomalies (above average) and thermocline slope index (near average) reflect ENSO-neutral conditions.

The monthly thermocline slope index represents the difference in anomalous depth of the 20ºC isotherm between the western Pacific (160ºE-150ºW) and the eastern Pacific (90º-140ºW).
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

Negative subsurface temperature anomalies lasted from August 2017 to February 2018. Since the end of February, temperature anomalies have increased and remained positive.
In the last two months, positive subsurface temperature anomalies were near the surface in the western and east-central equatorial Pacific Ocean.

Recently, small regions of negative subsurface temperature anomalies were near the surface in the eastern Pacific.
Tropical OLR and Wind Anomalies During the Last 30 Days

Positive OLR anomalies (reduced convection and precipitation) were evident near the Date Line and over western Indonesia.

Anomalous low-level (850-hPa) cross-equatorial winds were evident over the eastern Pacific Ocean.

Upper-level (200-hPa) westerly wind anomalies were evident over the eastern tropical Pacific Ocean.
Intraseasonal variability in the atmosphere (wind and pressure), which is often related to the Madden-Julian Oscillation (MJO), can significantly impact surface and subsurface conditions across the Pacific Ocean.

Related to this activity:

Significant weakening of the low-level easterly winds usually initiates an eastward-propagating oceanic Kelvin wave.
Weekly Heat Content Evolution in the Equatorial Pacific

From August 2017- early January 2018, negative subsurface temperature anomalies persisted in the central and eastern Pacific Ocean.

From December 2017- May 2018, successive Kelvin waves contributed to the eastward shift of positive and negative subsurface temperature anomalies.

Since early April 2018, positive subsurface temperature anomalies persisted across most of the equatorial Pacific, with the largest anomalies since mid-May 2018 occurring between ~150°-110°W.

Since early July 2018, positive subsurface temperature anomalies weakened in the far eastern Pacific.

Equatorial oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Downwelling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.
At times, the Madden Julian Oscillation (MJO) contributed to the eastward propagation of low-level wind anomalies.

During the past couple of weeks, westerly wind anomalies have emerged across much of the equatorial Pacific Ocean.

Westerly Wind Anomalies (orange/red shading)  
Easterly Wind Anomalies (blue shading)
Upper-level (200-hPa) Velocity Potential Anomalies

From mid February through June 2018, anomalous upper-level convergence (brown shading) persisted over the central Pacific.

Eastward propagation of regions of upper-level divergence (green shading) and convergence (brown shading) has been evident.

Unfavorable for precipitation (brown shading)
Favorable for precipitation (green shading)

Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).
Outgoing Longwave Radiation (OLR) Anomalies

Up through June 2018, positive OLR anomalies persisted over the central Pacific Ocean.

Since mid-July, positive OLR anomalies have been observed over the International Date Line.

Drier-than-average Conditions (orange/red shading)
Wetter-than-average Conditions (blue shading)
Oceanic Niño Index (ONI)

The ONI is based on SST departures from average in the Niño 3.4 region, and is a principal measure for monitoring, assessing, and predicting ENSO.

Defined as the three-month running-mean SST departures in the Niño 3.4 region. Departures are based on a set of improved homogeneous historical SST analyses (Extended Reconstructed SST - ERSST.v5). The SST reconstruction methodology is described in Huang et al., 2017, J. Climate, vol. 30, 8179-8205.)

It is one index that helps to place current events into a historical perspective
El Niño: characterized by a positive ONI greater than or equal to +0.5°C.

La Niña: characterized by a negative ONI less than or equal to -0.5°C.

By historical standards, to be classified as a full-fledged El Niño or La Niña episode, these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.

CPC considers El Niño or La Niña conditions to occur when the monthly Niño3.4 OISST departures meet or exceed +/- 0.5°C along with consistent atmospheric features. These anomalies must also be forecasted to persist for 3 consecutive months.
ONI (°C): Evolution since 1950

The most recent ONI value (May - July 2018) is +0.1°C.
Recent Pacific warm (red) and cold (blue) periods based on a threshold of +/- 0.5 °C for the Oceanic Niño Index (ONI) [3 month running mean of ERSST.v5 SST anomalies in the Niño 3.4 region (5N-5S, 120-170W)]. For historical purposes, periods of below and above normal SSTs are colored in blue and red when the threshold is met for a minimum of 5 consecutive overlapping seasons.

The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found [here](#).

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ENSO-neutral is favored through July-September 2018, with El Niño favored thereafter. Chances for El Niño are near 70% during Northern Hemisphere winter 2018-19.
The majority of models predict ENSO-neutral through summer 2018, with El Niño favored by August-October 2018.
The CFS.v2 ensemble mean (black dashed line) favors El Niño forming in the next few months and continuing through winter 2018-19.
During mid-June to mid-July 2018, anomalous ridging (and above-average temperatures) prevailed over most of the contiguous U.S.

Since mid-July, above-average heights and temperatures have shifted to the western contiguous U.S., while below-average heights and temperatures are evident over the central and eastern U.S.
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Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

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U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 11 August 2018
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The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
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