Outline

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Recent Evolution and Current Conditions
Oceanic Niño Index (ONI)
Pacific SST Outlook
U.S. Seasonal Precipitation and Temperature Outlooks
Summary
ENSO Alert System Status: Not Active

ENSO-neutral conditions are present.*

Equatorial sea surface temperatures (SSTs) are near-to-above average across the Pacific Ocean.

The pattern of anomalous convection is generally consistent with ENSO-neutral.

ENSO-neutral is favored during the Northern Hemisphere winter 2019-20 (70% chance), continuing through spring 2020 (~65% chance).*

* 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 early June 2018 through May 2019, near-to-above average SSTs were present across most of the Pacific Ocean.

From July-September 2019, below-average SSTs expanded westward into the east-central Pacific.

Since mid-September, above-average SSTs expanded from the Date Line into the eastern Pacific Ocean.
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4: 1.0°C
- Niño 3.4: 0.4°C
- Niño 3: 0.2°C
- Niño 1+2: 0.3°C
SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

During the last four weeks, equatorial SSTs were near-to-above average across the Pacific.
During the last four weeks, equatorial SSTs were near-to-above average across the Pacific, the Atlantic Ocean, and the western Indian Ocean. SSTs were below average in the eastern Indian Ocean.
Weekly SST Departures during the Last Four Weeks

During the last four weeks, above-average SSTs persisted across the central equatorial Pacific.
Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, equatorial SST anomalies increased near the Date Line, and decreased in the east-central 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 (near average) and thermocline slope index (near average) reflect ENSO-neutral.

The monthly thermocline slope index represents the difference in anomalous depth of the 20°C isotherm between the western Pacific (160°E-150°W) and the eastern Pacific (90°-140°W).
Subsurface temperature anomalies decreased to near zero in late April. Weak anomalies were then present through mid-September, before increasing through mid-October. During mid-October through November, positive anomalies decreased. Since early December, positive anomalies have increased.
In the last two months, negative subsurface temperature anomalies have shifted to the eastern Pacific in association with an upwelling Kelvin wave.

Near the surface in the eastern Pacific, positive anomalies reflected a downwelling Kelvin wave.

Since late November, positive anomalies in the central Pacific have reflected a second downwelling Kelvin wave.
Positive OLR anomalies (suppressed convection and precipitation) were evident over Indonesia and just east of the Date Line. Negative OLR anomalies (enhanced convection and precipitation) were observed over a small region west of the Date Line.

Low-level (850-hPa) winds were near average across most of the equatorial Pacific Ocean.

Upper-level (200-hPa) winds anomalously easterly over the east-central equatorial Pacific.
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

Significant equatorial oceanic Kelvin wave activity (dashed and dotted lines) has been present throughout the period shown.

In the past month, an upwelling Kelvin wave and anomalous cooling (dotted line) moved into the eastern equatorial Pacific. Meanwhile, a downwelling Kelvin wave (dashed line) resulted in above-average subsurface temperatures across the central and east-central equatorial 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 upwelling and cooling occur in the trailing portion.
At times, the Madden Julian-Oscillation (MJO) has contributed to the eastward propagation of low-level wind anomalies.

Since early September, low-level westerly wind anomalies have generally persisted east of the Date Line.

In the last week, westerly wind anomalies continued over the central equatorial Pacific.
Upper-level (200-hPa) Velocity Potential Anomalies

Eastward propagation of anomalies has, at times, been evident.

From July to mid-September 2019, anomalous upper-level convergence (brown shading) persisted over the far eastern Pacific and S. America, while anomalous divergence (green shading) persisted over the east-central Pacific.

Since mid-September 2019, anomalous divergence has persisted over equatorial Africa and the western Indian Ocean.

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

Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).
Since July 2019, positive OLR anomalies have persisted over Indonesia.

Since mid-November, positive OLR anomalies have persisted near and just east of the Date Line, and also over the far western Pacific.

Drier-than-average Conditions (orange/red shading)
Wetter-than-average Conditions (blue shading)
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 +0.5ºC.

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

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 +/- 0.5ºC along with consistent atmospheric features. These anomalies must also be forecasted to persist for 3 consecutive months.
The most recent ONI value (September-November 2019) is +0.3°C.
Recent Pacific warm (red) and cold (blue) periods based on a threshold of +/- 0.5 °C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v5 SST anomalies in the Nino 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 over-lapping 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](#).
ENSO-neutral is most likely to continue through the Northern Hemisphere summer 2020.
A majority of models favor ENSO-neutral through the Northern Hemisphere summer 2020.
The CFS.v2 ensemble mean (black dashed line) predicts ENSO-neutral to continue into summer 2020.
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

During November, an amplified ridge-trough pattern covered the U.S., along with above-average temperatures in the far western U.S. and below-average temperatures in the central or eastern U.S.

During December, above-average temperatures were present across the U.S.

During the second half of December, below-average heights were present over the western U.S., with above-average heights across the central and eastern U.S.
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U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 28 December 2019

Percent of Average Precipitation

Temperature Departures (degree C)
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 28 December 2019
The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
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