Outline

Summary
Recent Evolution and Current Conditions
Oceanic Niño Index (ONI)
Pacific SST Outlook
U.S. Seasonal Precipitation and Temperature Outlooks
Summary
ENSO Alert System Status: La Niña Watch

ENSO-Neutral conditions are present.*

Equatorial sea surface temperatures (SSTs) are near-to-below average across the central and eastern Pacific Ocean.

La Niña conditions are favored (~55%-65%) during the Northern Hemisphere fall and winter 2017-18.*

* 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.
Below average SSTs spanned most of the central and eastern Pacific Ocean through January 2017.

During January and February 2017, above-average SSTs expanded in the eastern Pacific Ocean.

From mid April to July 2017, near-to-above average SSTs spanned most of the equatorial Pacific.

During August 2017, above-average SSTs dissipated east of the date line.

Since September, SSTs were near-to-below average across the central and eastern Pacific, with generally negative anomalies seen recently.
The latest weekly SST departures are:

- Niño 4: -0.4°C
- Niño 3.4: -0.8°C
- Niño 3: -1.1°C
- Niño 1+2: -1.4°C
During the last four weeks, equatorial SSTs were below average across the central and eastern Pacific Ocean, and above average in the far western Pacific.
During the last four weeks, equatorial SSTs were above average in the far western Pacific and eastern Atlantic Oceans. SSTs were below average in the central and eastern Pacific.
During the last four weeks, below-average SSTs persisted across the eastern Pacific Ocean. SST anomalies were more variable in the east-central Pacific.
During the last four weeks, changes in equatorial SST anomalies were mostly negative across the Pacific Ocean.
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 conditions.

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).
Central and Eastern Pacific Upper-Ocean (0-300 m)
Weekly Average Temperature Anomalies

Negative subsurface temperature anomalies were present through December 2016. Positive anomalies were present from mid-January through March 2017 before weakening to near zero. Starting in mid-April and mid-June, positive anomalies strengthened before tapering off again. Since mid-July, anomalies have decreased and are negative.
Sub-Surface Temperature Departures in the Equatorial Pacific

In the last two months, negative subsurface temperature anomalies have expanded across the Pacific Ocean.

Recently, the strongest negative anomalies are between 170°W-90°W.
Tropical OLR and Wind Anomalies During the Last 30 Days

Negative OLR anomalies (enhanced convection and precipitation) were evident near Indonesia. Positive OLR anomalies (reduced convection and precipitation) were present over the central Pacific Ocean.

Low-level (850-hPa) winds were anomalous easterly over the west-central tropical North Pacific, and anomalous westerly over the eastern tropical North Pacific.

Upper-level (200-hPa) winds were anomalous westerly across the western 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 February 2017 through May 2017, positive subsurface temperature anomalies persisted in the western and eastern Pacific Ocean, with oceanic Kelvin waves resulting in anomalous temperature variability in the central Pacific.

During August 2017, an upwelling Kelvin wave resulted in below-average sub-surface temperatures across the east-central and eastern equatorial Pacific. Recently, negative sub-surface anomalies have persisted in those regions.

Equatorial oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Down-welling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.
Low-level (850-hPa) Zonal (east-west) Wind Anomalies (m s\(^{-1}\))

Low-level easterly wind anomalies generally have persisted over the central and western equatorial Pacific since May 2017.

Since January 2017, westerly wind anomalies were generally observed over the eastern Pacific Ocean.

In the last few weeks, anomalous easterlies were observed over most of the equatorial Pacific.

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

Since at least April 2017, anomalous upper-level divergence (green shading) generally persisted near Indonesia, while anomalous convergence (brown shading) persisted near the Date Line.

Eastward propagation of regions of upper-level divergence (green shading) and convergence (brown shading) is particularly evident during January-February 2017, April-May 2017, and since mid-July 2017.

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

Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).
From mid-May to late July 2017, OLR anomalies were negative near Indonesia.

Since mid-August 2017, positive OLR anomalies persisted over the central Pacific Ocean.
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.
**NOAA Operational Definitions for El Niño and La Niña**

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 (July - September 2017) is -0.1°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.

<table>
<thead>
<tr>
<th>Year</th>
<th>DJF</th>
<th>JFM</th>
<th>FMA</th>
<th>MAM</th>
<th>AMJ</th>
<th>MJJ</th>
<th>JJA</th>
<th>JAS</th>
<th>ASO</th>
<th>SON</th>
<th>OND</th>
<th>NDJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0.6</td>
<td>0.6</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.3</td>
<td>-0.6</td>
<td>-0.8</td>
</tr>
<tr>
<td>2006</td>
<td>-0.8</td>
<td>-0.7</td>
<td>-0.5</td>
<td>-0.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>2007</td>
<td>0.7</td>
<td>0.3</td>
<td>0.0</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.5</td>
<td>-0.8</td>
<td>-1.1</td>
<td>-1.4</td>
<td>-1.5</td>
<td>-1.6</td>
</tr>
<tr>
<td>2008</td>
<td>-1.6</td>
<td>-1.4</td>
<td>-1.2</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.6</td>
<td>-0.7</td>
</tr>
<tr>
<td>2009</td>
<td>-0.8</td>
<td>-0.7</td>
<td>-0.5</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.7</td>
<td>1.0</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>2010</td>
<td>1.5</td>
<td>1.3</td>
<td>0.9</td>
<td>0.4</td>
<td>-0.1</td>
<td>-0.6</td>
<td>-1.0</td>
<td>-1.4</td>
<td>-1.6</td>
<td>-1.7</td>
<td>-1.7</td>
<td>-1.6</td>
</tr>
<tr>
<td>2011</td>
<td>-1.4</td>
<td>-1.1</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.5</td>
<td>-0.7</td>
<td>-0.9</td>
<td>-1.1</td>
<td>-1.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>2012</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.0</td>
<td>-0.2</td>
</tr>
<tr>
<td>2013</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.2</td>
<td>-0.3</td>
</tr>
<tr>
<td>2014</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>2015</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>2.1</td>
<td>2.4</td>
<td>2.5</td>
<td>2.6</td>
</tr>
<tr>
<td>2016</td>
<td>2.5</td>
<td>2.2</td>
<td>1.7</td>
<td>1.0</td>
<td>0.5</td>
<td>0.0</td>
<td>-0.3</td>
<td>-0.6</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.6</td>
</tr>
<tr>
<td>2017</td>
<td>-0.3</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
</tbody>
</table>
La Niña is favored (~55%-65%) during the Northern Hemisphere fall and winter 2017-18.
The multi-model averages predict La Niña to develop and persist through the remainder of the year and into early 2018.
The CFS.v2 ensemble mean (black dashed line) favors La Niña during the Northern Hemisphere fall and winter 2017-18.
During late August to early September 2017, an anomalous trough (and below-average temperatures) was present over eastern North America, and an anomalous ridge (and above-average temperatures) was present over the western contiguous U.S.

After mid September, the pattern of anomalies flipped. An anomalous trough (and below-average temperatures) was observed over the western U.S. and an amplified ridge (and above-average temperatures) occurred over the eastern U.S.
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

During late August to early September 2017, an anomalous trough (and below-average temperatures) was present over eastern North America, and an anomalous ridge (and above-average temperatures) was present over the western contiguous U.S.

After mid September, the pattern of anomalies flipped. An anomalous trough (and below-average temperatures) was observed over the western U.S. and an amplified ridge (and above-average temperatures) occurred over the eastern U.S.
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

During late August to early September 2017, an anomalous trough (and below-average temperatures) was present over eastern North America, and an anomalous ridge (and above-average temperatures) was present over the western contiguous U.S.

After mid September, the pattern of anomalies flipped. An anomalous trough (and below-average temperatures) was observed over the western U.S. and an amplified ridge (and above-average temperatures) occurred over the eastern U.S.
U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 21 October 2017
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 21 October 2017

Percent of Average Precipitation

Temperature Departures (degree C)
The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
ENSO Alert System Status: La Niña Watch

ENSO-Neutral conditions are present.*

Equatorial sea surface temperatures (SSTs) are near-to-below average across the central and eastern Pacific Ocean.

La Niña conditions are favored (~55%-65%) during the Northern Hemisphere fall and winter 2017-18.*

* 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.