Starting on Oct. 11, 2021, the weekly sea surface temperature data is based on OISSTv2.1 (Huang et al., 2021). This impacts slides #4-9. The source data is available at this link.
Summary

ENSO Alert System Status: La Niña Advisory

La Niña is present.*

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

The tropical Pacific atmosphere is consistent with La Niña.

La Niña is favored to continue through the Northern Hemisphere winter 2021-22 (~95% chance) and transition to ENSO-neutral during the spring 2022 (~60% chance during April-June).*

* 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.
During September 2020 to March 2021, the core of the strongest negative SST anomalies shifted from the eastern to the central Pacific Ocean.

From March to July 2021, equatorial SSTs gradually returned to average over most of the Pacific Ocean.

In the last week, below-average equatorial SSTs persisted across the Pacific Ocean.
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4: -0.4°C
- Niño 3.4: -1.1°C
- Niño 3: -1.4°C
- Niño 1+2: -0.9°C
SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

In the last four weeks, equatorial SSTs were below average across most of the Pacific Ocean.
During the last four weeks, equatorial SSTs were below average across most of the Pacific Ocean, and were above average in the eastern Atlantic Ocean and parts of the central and western Indian Ocean.
During the last 4 weeks, negative SST anomalies weakened near the Date Line and persisted across the east-central and eastern Pacific Ocean.
Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, negative changes in equatorial SST anomalies were observed in the east-central Pacific. Positive SST changes were evident in the western, central, and eastern 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 (below average) and thermocline slope index (above average) reflect La Niña.

*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

From mid-March to early July 2021, subsurface temperature was above average. Negative temperature anomalies returned in July and strengthened in September. From mid-October to mid-November, negative anomalies weakened, followed by persistence through late December. Recently, negative anomalies have weakened again.
Sub-Surface Temperature Departures in the Equatorial Pacific

During the last two months, negative subsurface temperature anomalies have weakened near the Date Line, while persisting across most of the eastern Pacific Ocean.

Remaining at depth, positive subsurface temperature anomalies have shifted eastward to 150°W.
Tropical OLR and Wind Anomalies During the Last 30 Days

Positive OLR anomalies (suppressed convection and precipitation) were located over the central Pacific Ocean. Negative OLR anomalies (enhanced convection and precipitation) were observed around Indonesia and the western Pacific.

Low-level (850-hPa) easterly wind anomalies were evident over parts of the east-central and eastern equatorial Pacific Ocean.

Upper-level (200-hPa) westerly wind anomalies were observed over most of the equatorial Pacific Ocean. An upper-level anomalous cyclonic couplet was evident over the central tropical 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.

During March through May 2021, positive anomalies shifted eastward in association with two downwelling Kelvin waves.

In July and in September, negative subsurface temperature anomalies shifted eastward associated with two upwelling Kelvin waves.

Since mid-November, another upwelling Kelvin wave was evident and shifting eastward. Since mid-December, a downwelling Kelvin wave is apparent and is shifting eastward.

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 the beginning of the period, easterly wind anomalies have generally dominated over the central and east-central Pacific, except for breaks during early-to-mid-August, late October, and late December-to-early January.

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

During most of the period, anomalous divergence (green shading) generally remained over Indonesia or the western Pacific, while anomalous convergence (brown shading) persisted over the eastern Pacific Ocean.

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

Since late July 2021, positive OLR anomalies were evident over the western and/or central Pacific Ocean.

Negative OLR anomalies were evident over Indonesia from mid-August to early October 2021, and again beginning in early November 2021.

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.

Note: a different SST dataset is used for weekly SST monitoring (slides #4-9) and is using OISSTv2.1 (Huang et al., 2021).
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 (October - December 2021) is -1.0°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 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 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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La Niña is expected to continue through Northern Hemisphere winter 2021-22 and into spring 2022. A transition to ENSO-neutral is expected by April-June 2022.
A majority of models indicate La Niña is expected to continue through winter 2021-22 and into spring 2022.
The CFS.v2 ensemble mean (black dashed line) predicts La Niña to continue through spring 2022 and transition to ENSO-neutral by summer.
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

From early November to early December, anomalous ridging and above-average temperatures were present over the western half of the U.S., with anomalous troughing and below-average temperatures observed over parts of eastern North America.

In early December, the retraction of the Asian-Pacific jet stream was linked to a strong anomalous ridge over the North Pacific Ocean. An anomalous trough formed downstream over western North America. An anomalous ridge and above-average temperatures were evident over the south-central and eastern contiguous U.S. This pattern is consistent with La Niña.
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U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 8 January 2022
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 8 January 2022
The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
ENSOS Alert System Status: La Niña Advisory

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