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: El Niño Advisory

El Niño conditions are observed.*

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

The tropical Pacific atmospheric anomalies are consistent with El Niño.

El Niño is anticipated to continue through the Northern Hemisphere spring (with a 62% chance during April-June 2024).*

* 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.
Beginning in January 2023, SSTs transitioned from below-average to above-average.

Since March 2023, positive SST anomalies in the eastern Pacific Ocean gradually expanded westward.

In the last month, SST anomalies increased near the Date Line.
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4: 1.5°C
- Niño 3.4: 1.9°C
- Niño 3: 2.1°C
- Niño 1+2: 2.0°C
In the last four weeks, equatorial SSTs were above average across most of the Pacific Ocean, with near-to-below average SSTs in the western Pacific Ocean.
Global SST Departures (°C) During the Last Four Weeks

During the last four weeks, equatorial SSTs were above average across the central and eastern Pacific Ocean, in the far western Indian Ocean, and across much of the Atlantic Ocean. Equatorial SSTs were below average in the central and eastern Indian Ocean and around Papua New Guinea.
Weekly SST Departures during the Last Four Weeks

During the last 4 weeks, above-average SSTs have strengthened near the Date Line and in the east-central Pacific. Below-average SSTs have strengthened in the far western Pacific Ocean.
During the last four weeks, positive changes in equatorial SST anomalies were observed east of the Date Line (180°-130°W), while negative changes were evident in the eastern Pacific Ocean and west of the Date Line.
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 (below average) reflect El Niño.

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 were negative until mid-February 2023. Subsurface anomalies became positive in February and increased through mid-April 2023 before leveling off. From late May to mid-June 2023, anomalies increased. Anomalies decreased from mid-June to mid-July, increased from late July through August, and decreased again in September. Since early October, positive anomalies have gradually increased.
Sub-Surface Temperature Departures in the Equatorial Pacific

Positive subsurface temperature anomalies dominate most of the equatorial Pacific Ocean.

Positive subsurface temperature anomalies strengthened between 170°E-130°W.
Positive OLR anomalies (suppressed convection and precipitation) were evident around Indonesia, the Philippines, and Australia. Negative OLR anomalies (enhanced convection and precipitation) were observed from the Date Line and extend into the eastern Pacific Ocean.

Low-level (850-hPa) wind anomalies were westerly over most of the equatorial Pacific.

Upper-level (200-hPa) wind anomalies were easterly over most of the equatorial Pacific. An anomalous anticyclonic couplet straddles the equator around the Date Line.
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.

Between late November 2022 and late September 2023, five downwelling Kelvin waves occurred.

Since March 2023, above-average subsurface temperature anomalies have persisted across most of the Pacific Ocean.

Recently, a sixth downwelling Kelvin wave is shifting eastward from the central to eastern Pacific.

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.
The Madden Julian Oscillation (MJO) has contributed to the eastward propagation of low-level wind anomalies.

An eastward propagating pattern of westerly and easterly wind anomalies was clearly evident through mid-June 2023.

Since mid-July 2023, westerly wind anomalies have become more predominant over the equatorial Pacific Ocean.

Since early October 2023, westerly wind anomalies strengthened over the central and eastern equatorial Pacific.
Upper-level (200-hPa) Velocity Potential Anomalies

Since the beginning of the period, anomalous divergence (green shading) has generally persisted near the Date Line, while anomalous convergence (brown shading) continued over South America.

Starting in late September 2023, anomalous convergence strengthened near Indonesia.

Unfavorable for precipitation (brown shading)
Favorable for precipitation (green shading)
Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).
Since the beginning of the period, negative OLR anomalies (more convection) has persisted over the central equatorial Pacific Ocean, while periodically emerging in the eastern Pacific.

Since mid-July 2023, positive OLR anomalies persisted over Indonesia.
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).
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.
The most recent ONI value (August - October 2023) is 1.5°C.
Historical El Niño and La Niña Episodes Based on the ONI computed using ERSST.v5

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].

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El Niño is favored through Northern Hemisphere spring 2024, with chances gradually decreasing from the winter through the spring. A transition to ENSO-neutral is favored in May-July 2024.
The majority of models indicate El Niño will persist through April-June 2024 and then transition to ENSO-neutral.

At its peak (November-January), nearly all models suggest a moderate-to-strong El Niño (ONI values at or greater than 1.0°C).
The CFS.v2 ensemble mean (black dashed line) indicates El Niño will continue through the Northern Hemisphere spring 2024. A moderate-to-strong El Niño is favored in December-February (ONI between 1.0ºC and 2.0ºC).
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

From late September to late October, below-average heights persisted in the eastern North Pacific Ocean and/or western U.S. Over the north-central U.S. and central Canada, above-average heights (and temperatures) were evident. And, near the southeastern U.S., below-average heights (and temperatures) were predominant.

Beginning in late October, the overall pattern has shifted with below-average heights in the central/eastern North Pacific and above-average heights over most of the contiguous U.S.
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U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 18 November 2023
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 18 November 2023
U. S. Seasonal Outlooks
December 2023 - February 2024

The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
ENSO Alert System Status: **El Niño Advisory**

El Niño conditions are observed.*

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El Niño is anticipated to continue through the Northern Hemisphere spring (with a 62% chance during April-June 2024).*

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