

ENSO: Recent Evolution, Current Status and Predictions



Update prepared by:
Climate Prediction Center / NCEP
5 May 2025

Outline

Summary

Recent Evolution and Current Conditions

Oceanic Niño Index (ONI)

Pacific SST Outlook

U.S. Seasonal Precipitation and Temperature Outlooks

Summary

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ENSO Alert System Status: **Final La Niña Advisory**

ENSO-neutral conditions are present.*

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

ENSO-neutral is favored during the Northern Hemisphere summer, with a greater than 50% chance through August-October 2025.

* 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](#).

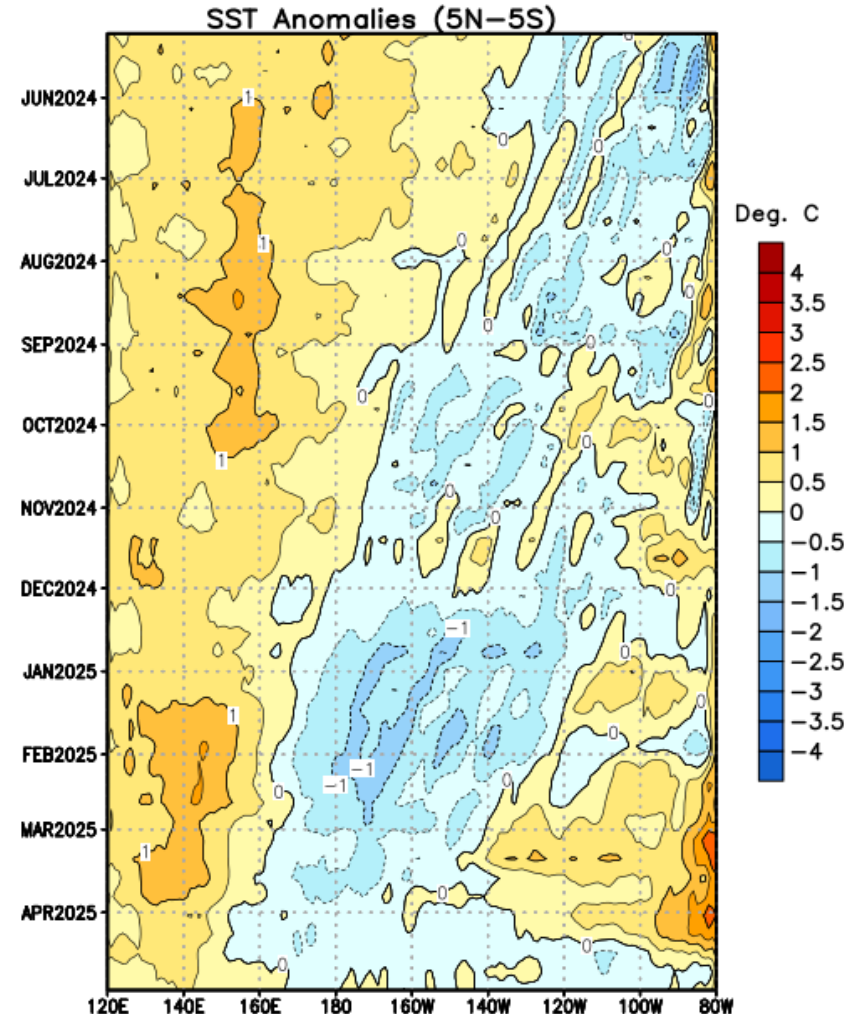
Recent Evolution of Equatorial Pacific SST Departures (°C)

Beginning in mid-March 2024, mostly near-to-below-average sea surface temperatures (SSTs) emerged in the eastern Pacific Ocean and expanded westward.

Since early December 2024, below-average SSTs persisted across the central Pacific.

During February and March 2025, SST anomalies increased across most the equatorial Pacific.

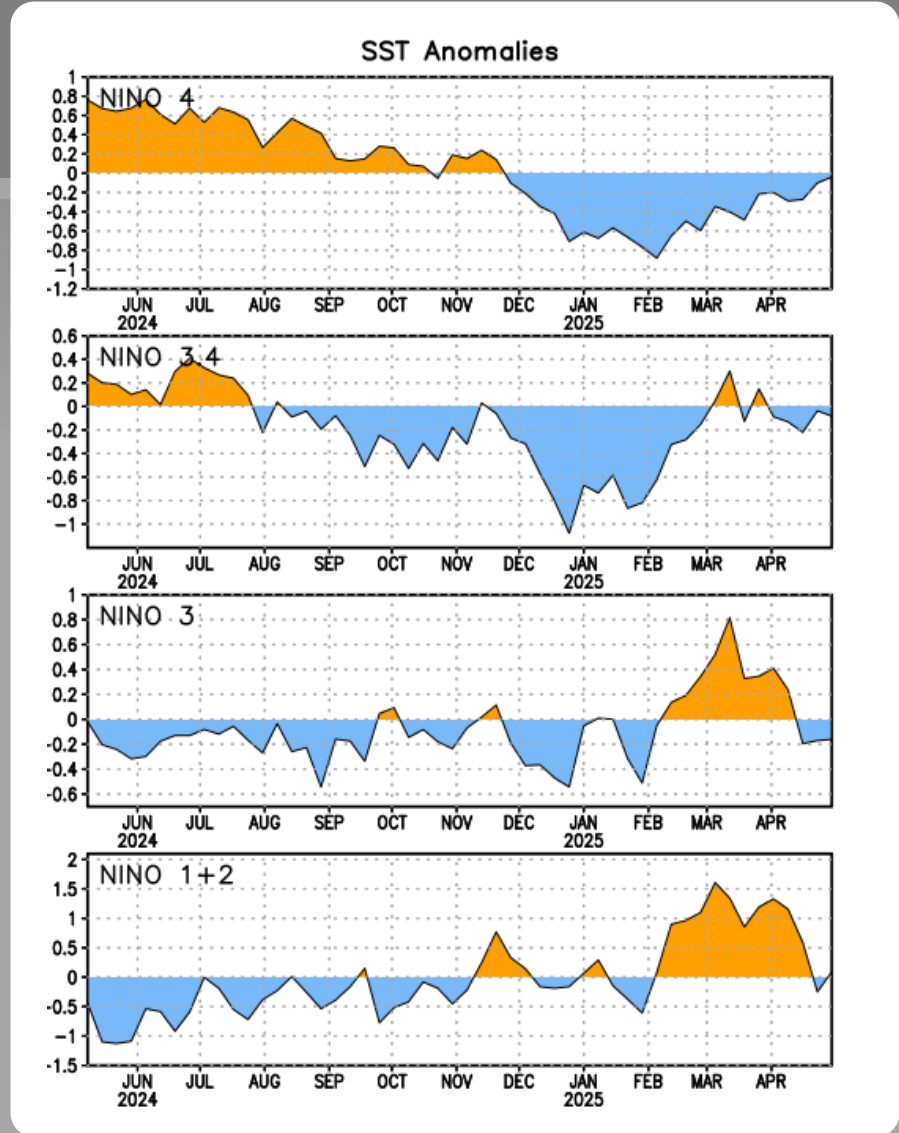
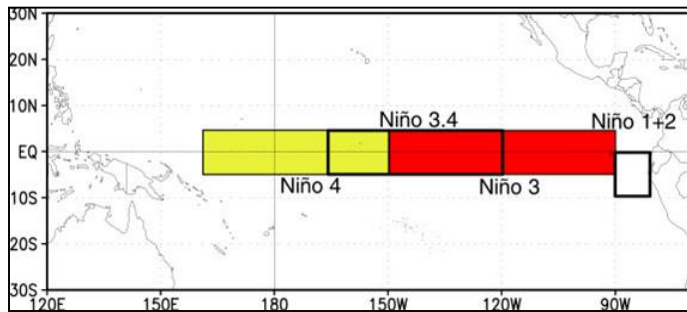
Since mid-April, SSTs have been near average across the central and eastern Pacific Ocean.



Niño Region SST Departures (°C) Recent Evolution

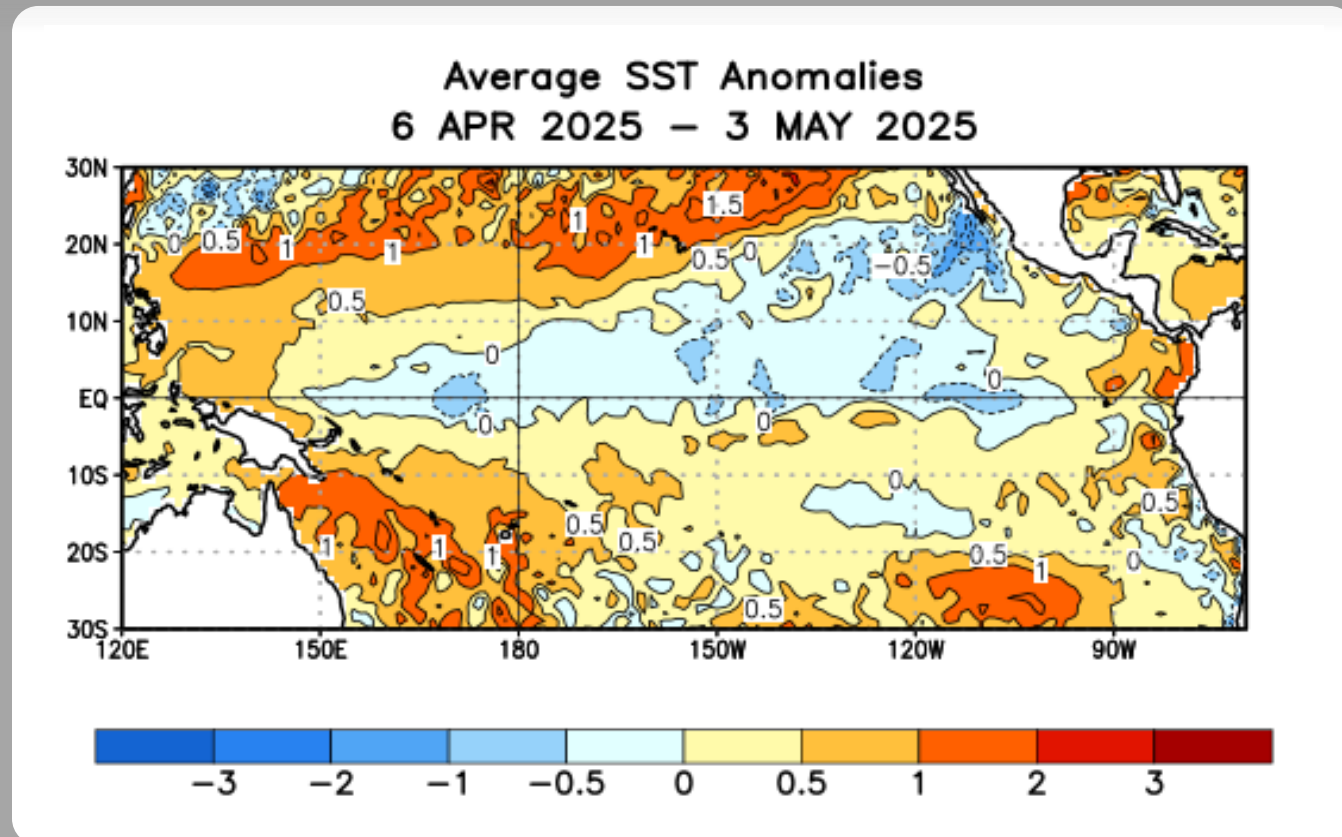
The latest weekly SST departures are:

Niño 4	0.0°C
Niño 3.4	-0.1°C
Niño 3	-0.2°C
Niño 1+2	0.1°C



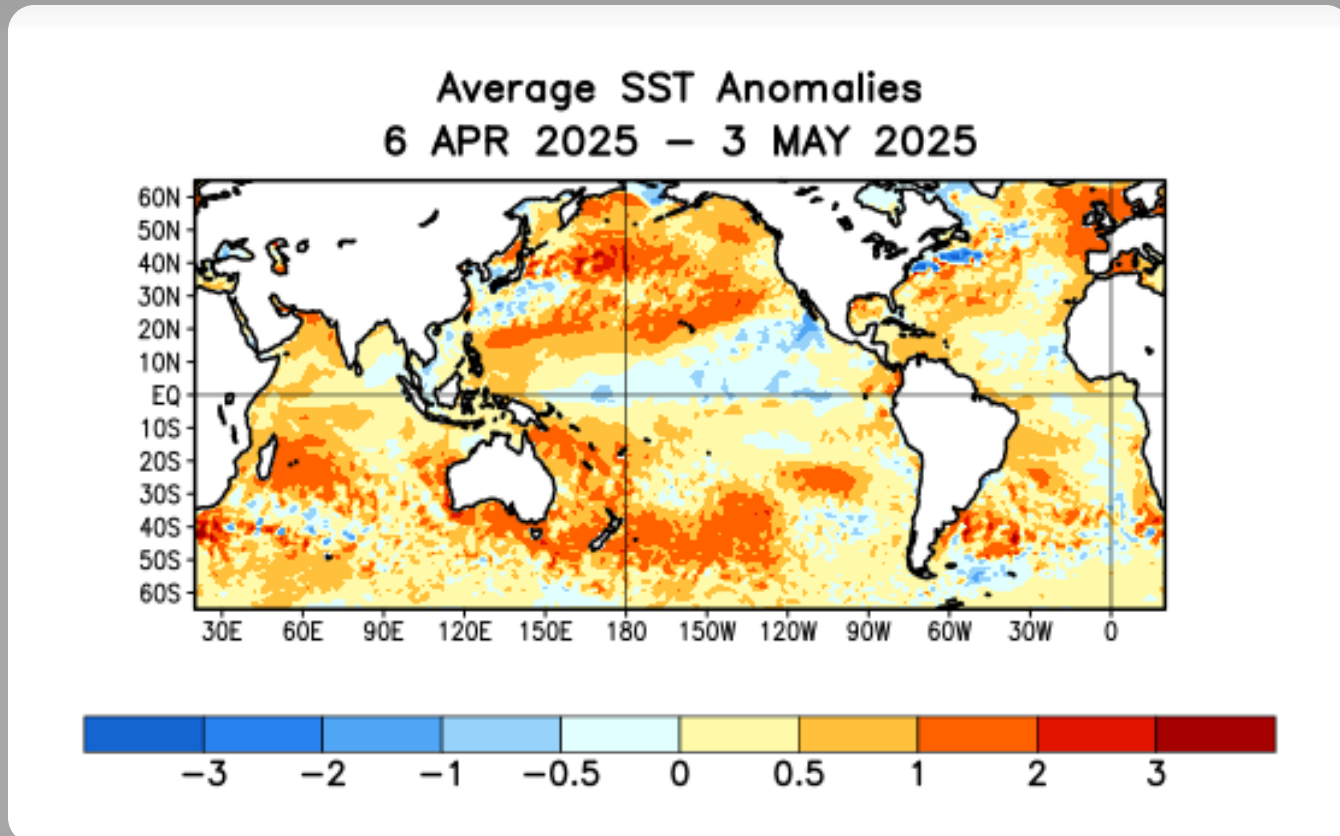
SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

In the last four weeks, equatorial SSTs were generally near average across the Pacific Ocean, with slightly below-average SSTs evident in parts of the central and east-central Pacific.



Global SST Departures (°C) During the Last Four Weeks

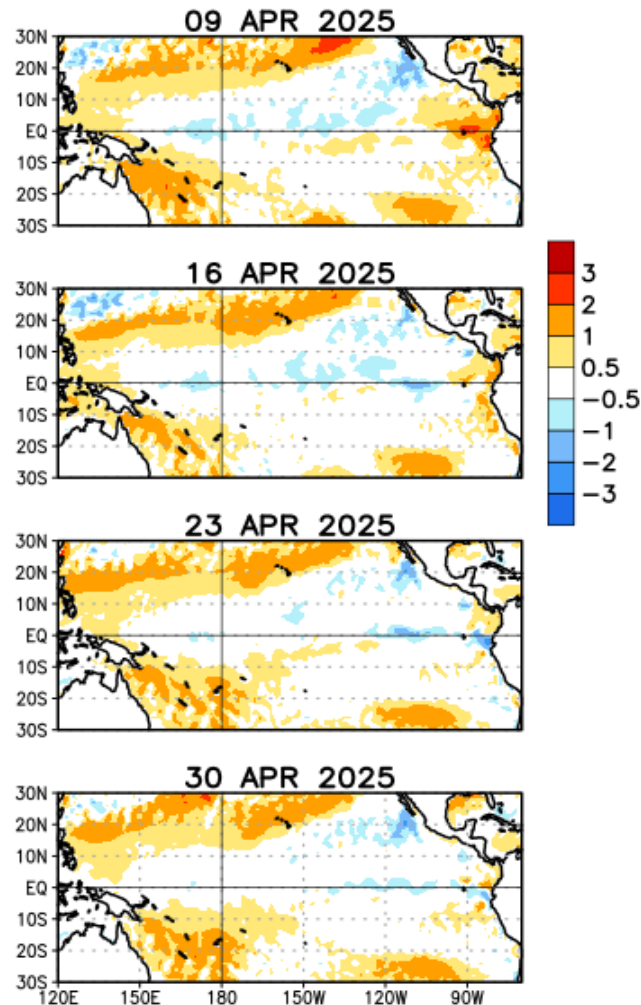
During the last four weeks, equatorial SSTs were mostly near average across the global Tropics.



Weekly SST Departures during the Last Four Weeks

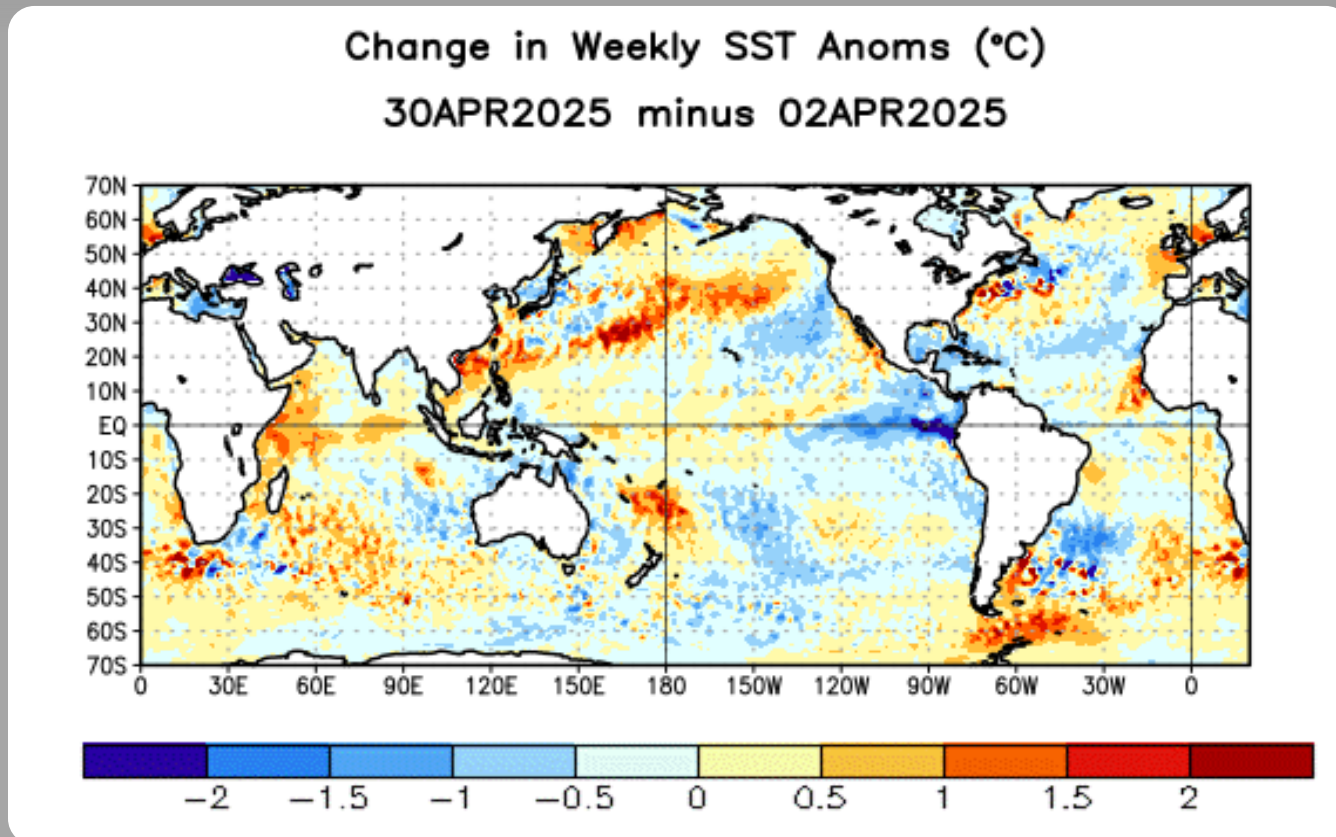
During the last 4 weeks, SSTs became mostly near average across the equatorial Pacific, with positive SST anomalies dissipating in the far western and eastern Pacific Ocean.

Weekly SST Anomalies (DEG C)



Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, negative SST anomaly changes were evident in the eastern equatorial Pacific Ocean.



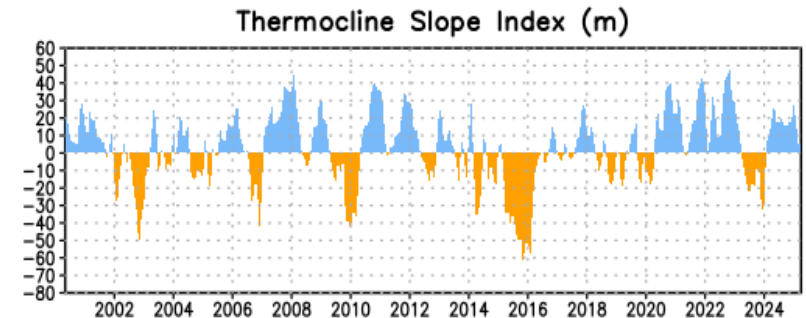
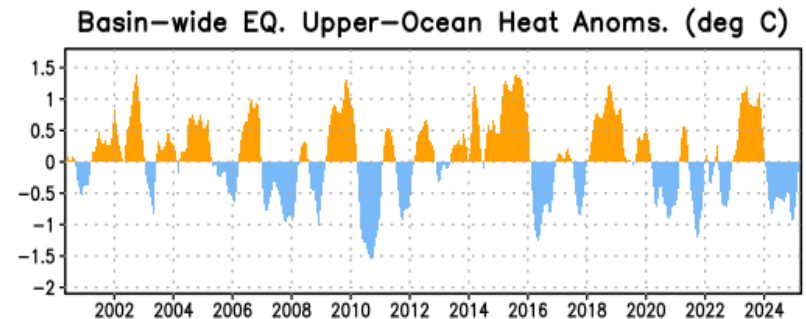
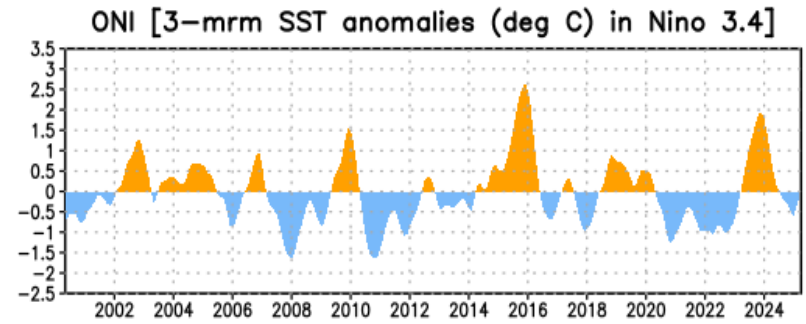
Upper-Ocean Conditions in the Equatorial Pacific

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.

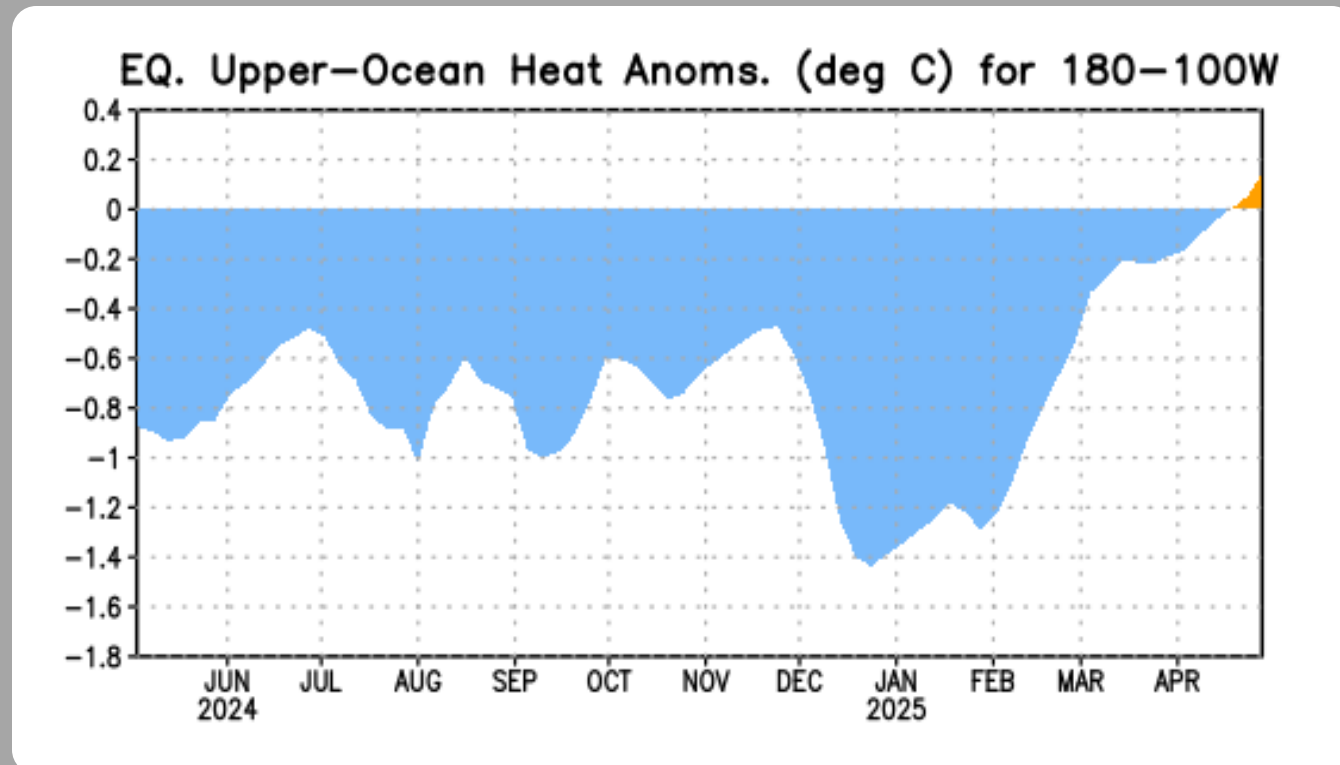
Recent values of the upper-ocean heat anomalies (near-to-below average) and thermocline slope index (near-to-above average) reflect ENSO-neutral.

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).



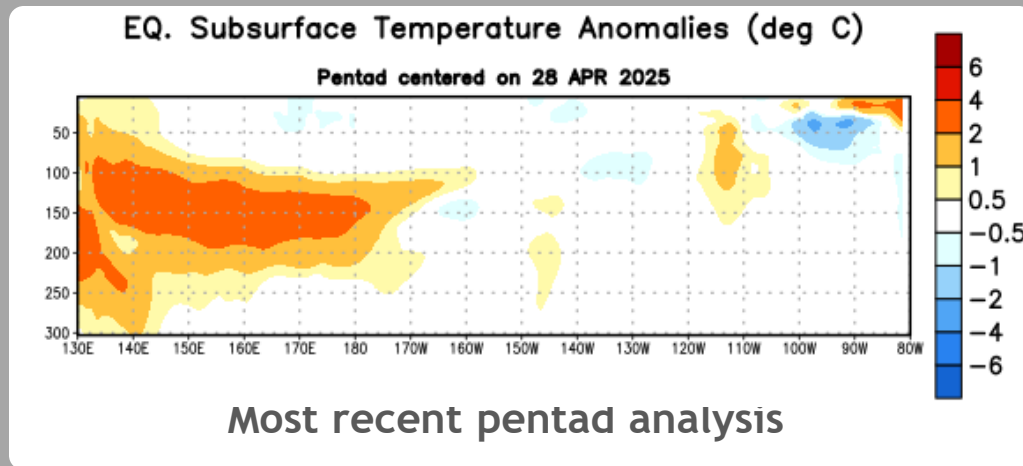
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

Since the start of the period, negative subsurface temperature anomalies have dominated. Negative anomalies strengthened in December 2024, reaching a minimum late in the month. In February and March 2025, negative anomalies significantly weakened. In April 2025, near-average temperatures returned.

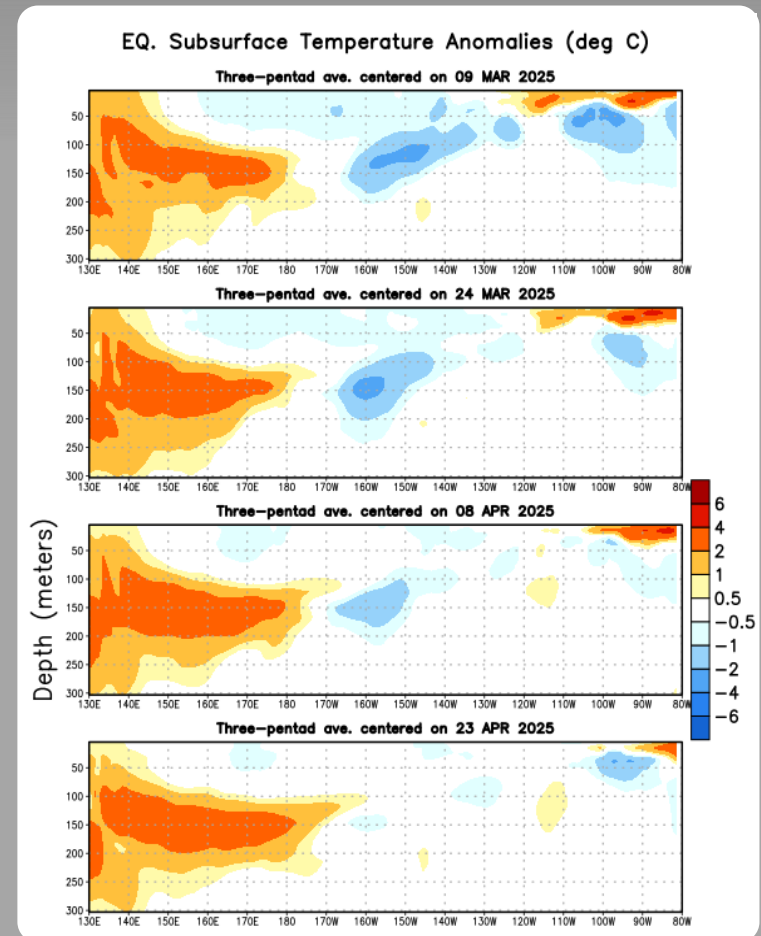


Sub-Surface Temperature Departures in the Equatorial Pacific

Over the the last couple of months, negative subsurface temperature anomalies weakened in the central and east-central Pacific Ocean.



Above-average temperatures remain in the western Pacific, mostly at depth (100-250m).

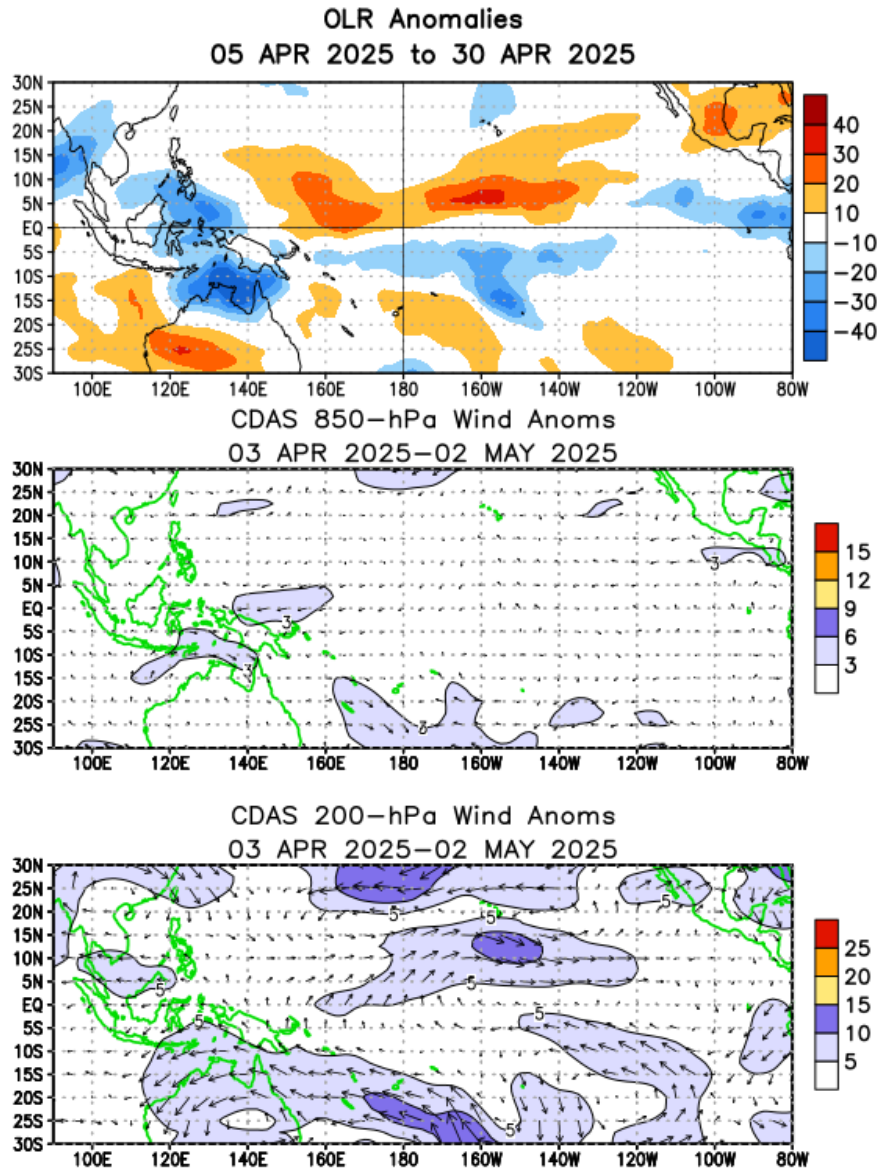


Tropical OLR and Wind Anomalies During the Last 30 Days

Above-average OLR (suppressed convection and precipitation) was observed around the Date Line and western Pacific, centered mostly north of the equator. Below-average OLR (enhanced convection and precipitation) was evident over the Philippines, northern Australia, and the eastern Pacific.

Low-level (850-hPa) winds were near average across the equatorial Pacific Ocean, with a small area of easterly wind anomalies over the far western equatorial Pacific Ocean.

Upper-level (200-hPa) wind anomalies were near average across the equatorial Pacific Ocean.



Intraseasonal Variability

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.

Low-level (850-hPa) Zonal (east-west) Wind Anomalies (m s^{-1})

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

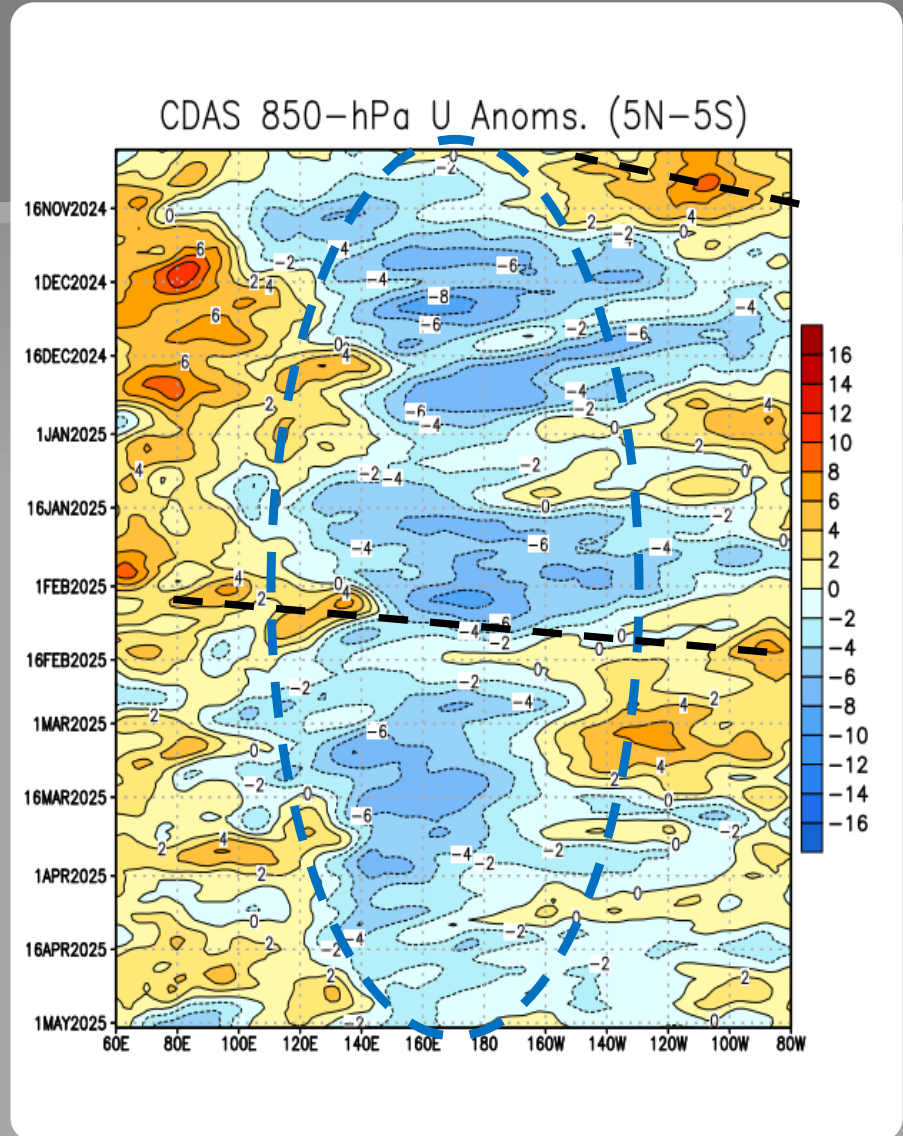
Since July 2024, easterly wind anomalies have mostly dominated over the central and east-central Pacific Ocean, with some shorter-lived periods of westerly wind anomalies.

Since early April 2025, easterly wind anomalies have weakened.

In February and early March 2025, westerly wind anomalies strengthened over the eastern Pacific Ocean.

Westerly Wind Anomalies (orange/red shading)

Easterly Wind Anomalies (blue shading)

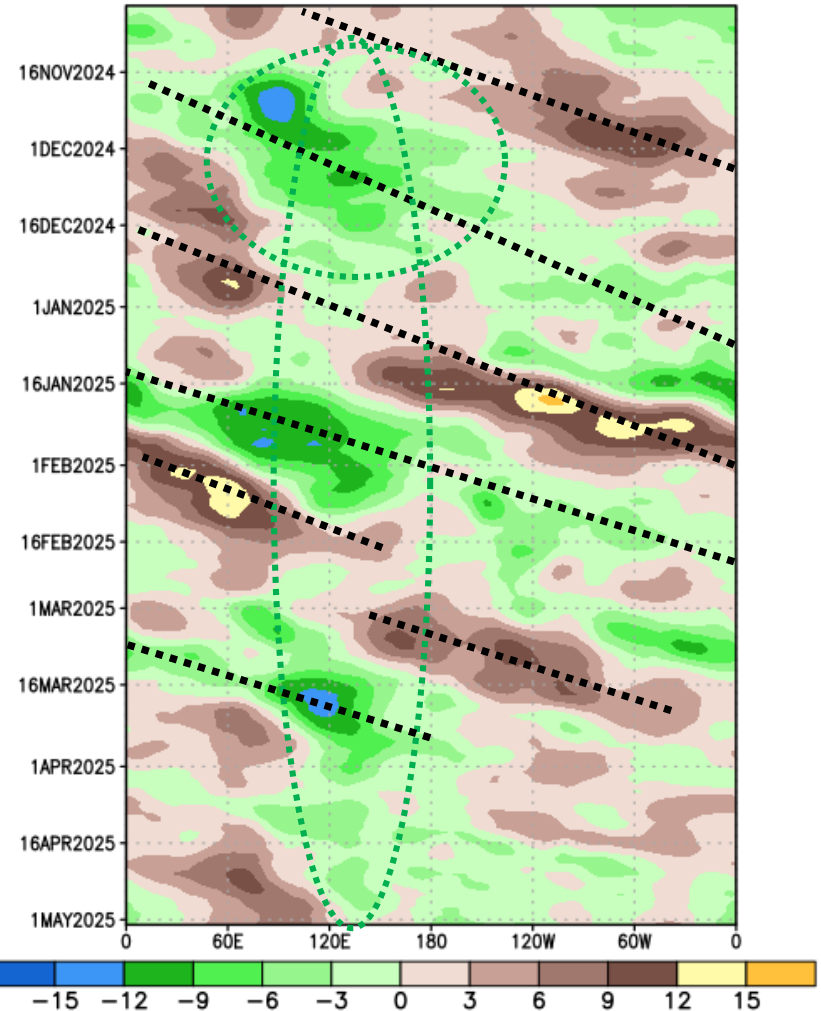


Upper-level (200-hPa) Velocity Potential Anomalies

At times, regions of anomalous divergence (green shading) and convergence (brown shading) shifted eastward.

Since the beginning of the period, anomalous divergence has been periodically evident over Indonesia and/or the western Pacific.

200-hPa Velocity Potential Anomaly: 5N–5S
5-day Running Mean



Unfavorable for precipitation (brown shading)

Favorable for precipitation (green shading)

Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).

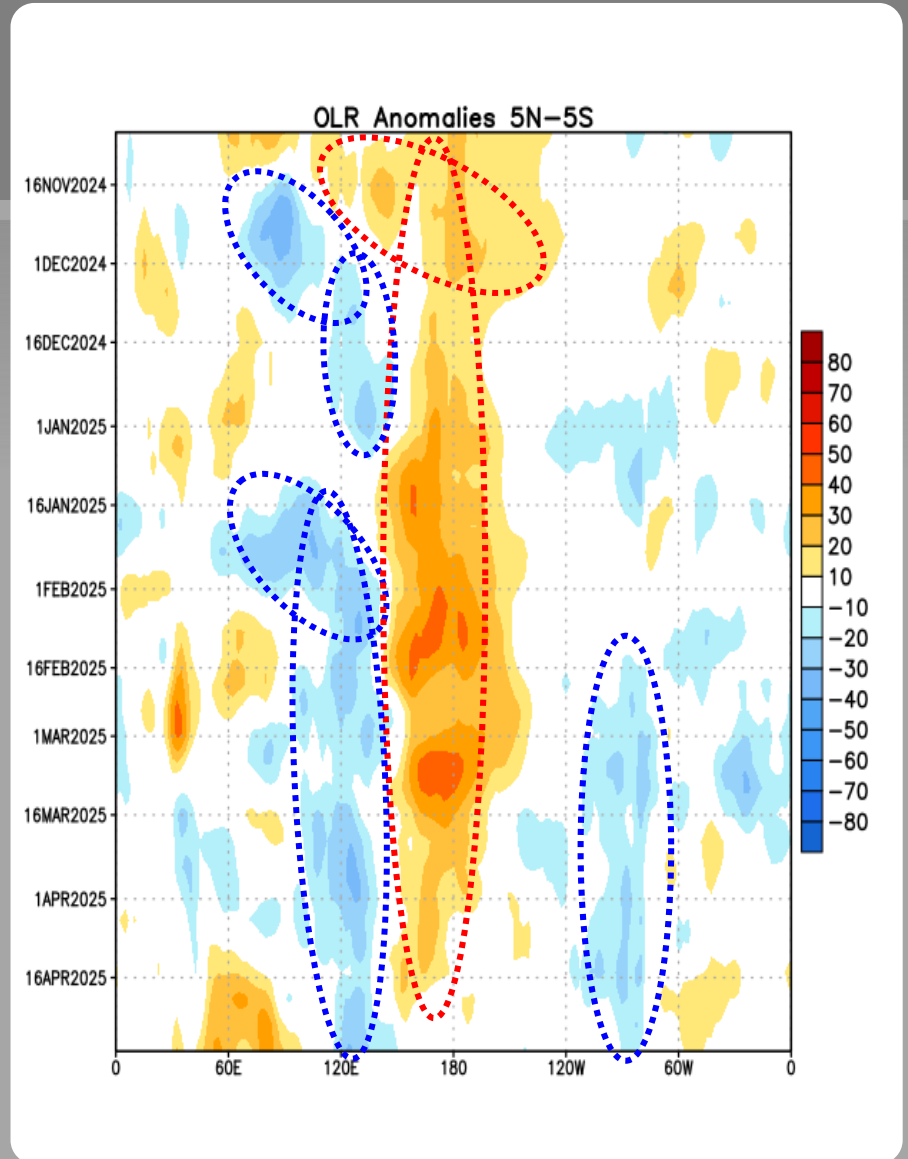
Outgoing Longwave Radiation (OLR) Anomalies

Through mid-April 2025, positive OLR anomalies (suppressed convection/rainfall) persisted near the Date Line.

Beginning in early December 2024, negative OLR anomalies (enhanced convection/rainfall) emerged over Indonesia.

Since mid-February 2025, negative OLR anomalies have persisted over the eastern Pacific Ocean.

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 $+0.5^{\circ}\text{C}$.

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

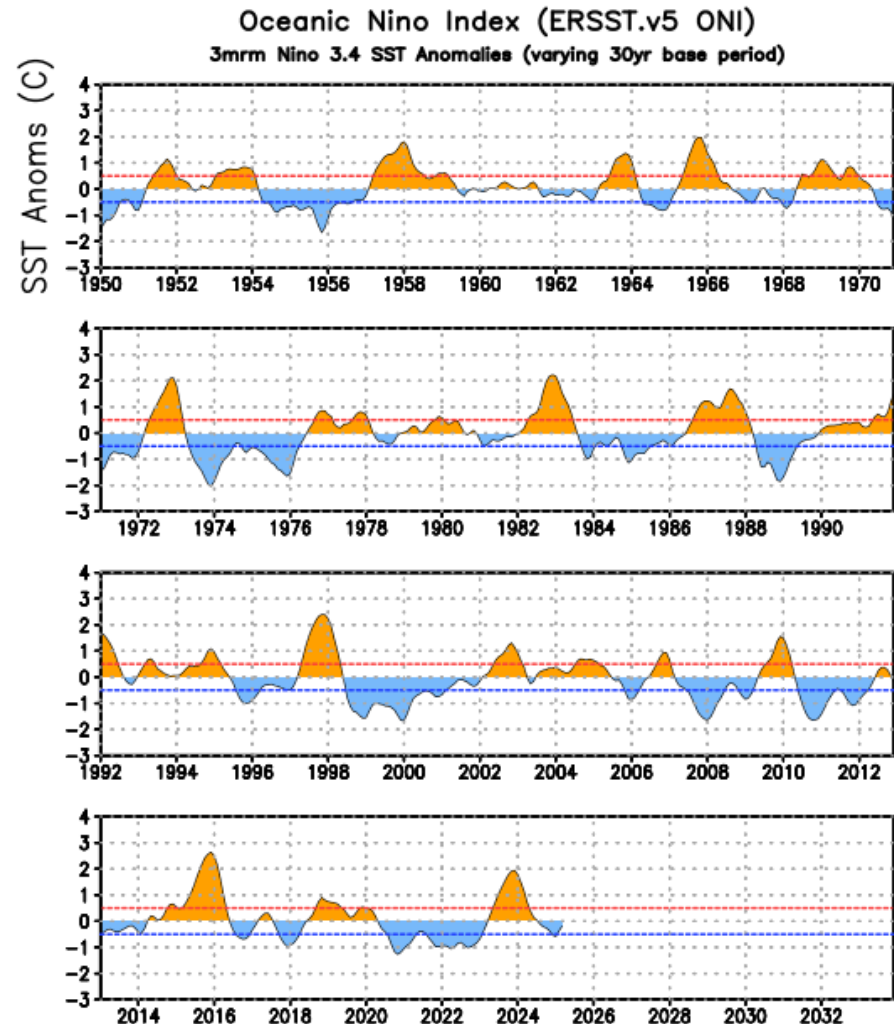
By historical standards, to be classified as a full-fledged El Niño or La Niña episode, these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.

CPC considers El Niño or La Niña conditions to occur when the monthly Niño3.4 OISST departures meet or exceed $\pm 0.5^{\circ}\text{C}$ 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 (February - April 2025) is -0.2°C .

El Niño ↑
Neutral
La Niña ↓



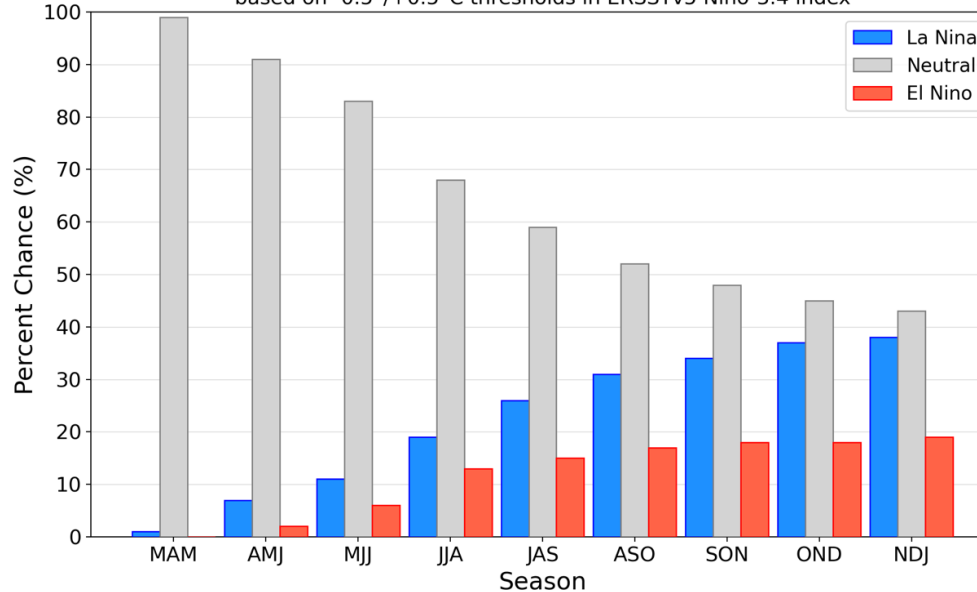
CPC Probabilistic ENSO Outlook

Updated: 10 April 2025

ENSO-neutral is favored to persist through the Northern Hemisphere summer 2025, with a greater than 50% chance through August-October 2025. During the fall and early winter, ENSO-neutral is slightly favored over the possible return of La Niña.

Official NOAA CPC ENSO Probabilities (issued April 2025)

based on $-0.5^{\circ}/+0.5^{\circ}\text{C}$ thresholds in ERSSTv5 Niño-3.4 index



IRI Pacific Niño 3.4 SST Model Outlook

Most models favor ENSO-neutral to prevail through the Northern Hemisphere fall and winter 2025-26.

The uncertainty increases at longer forecast horizons.

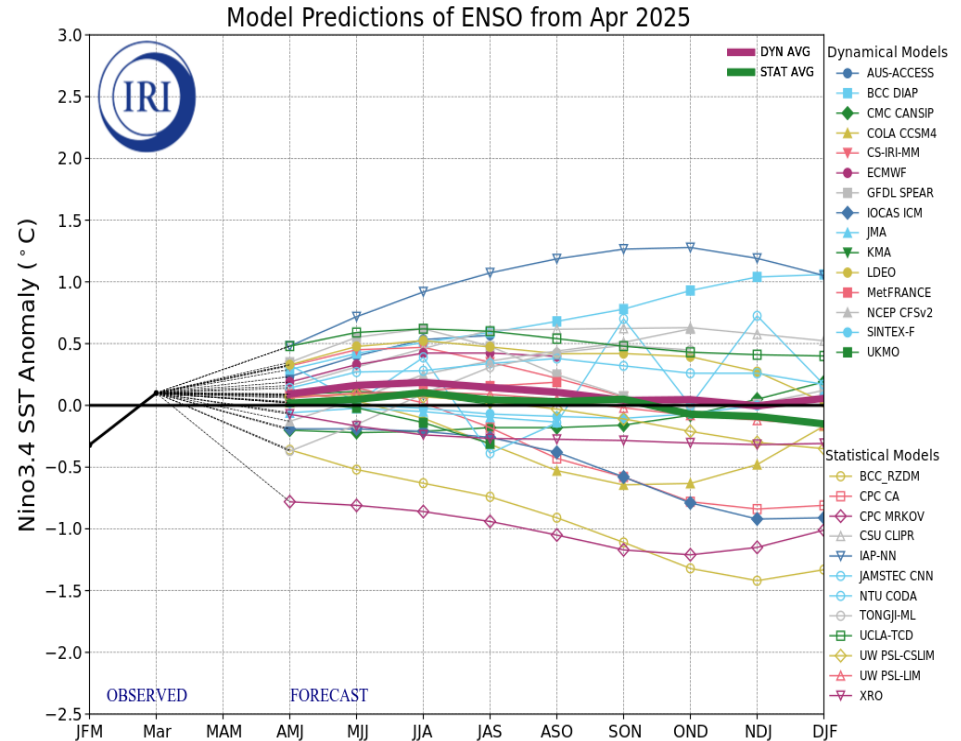
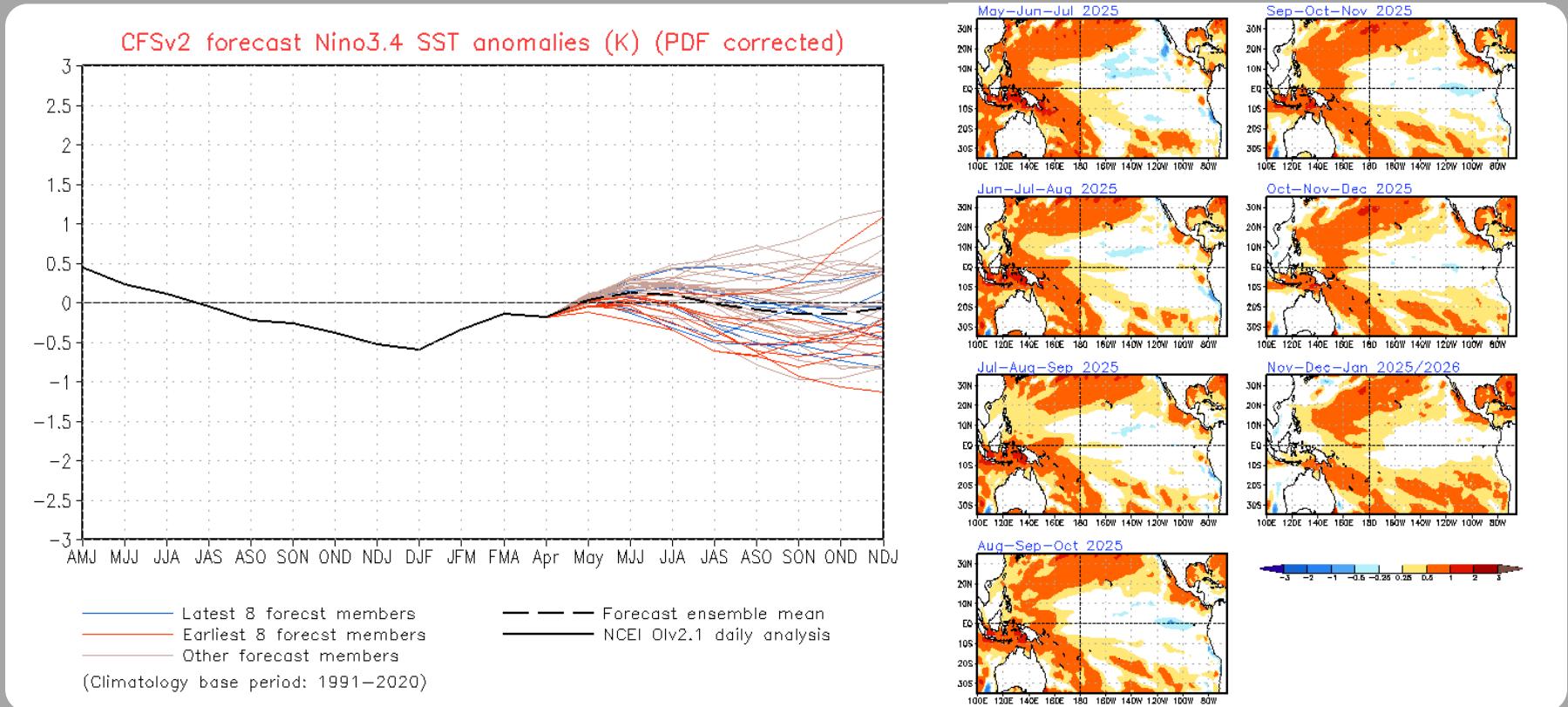


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 21 April 2025).

SST Outlook: NCEP CFS.v2 Forecast (PDF corrected)

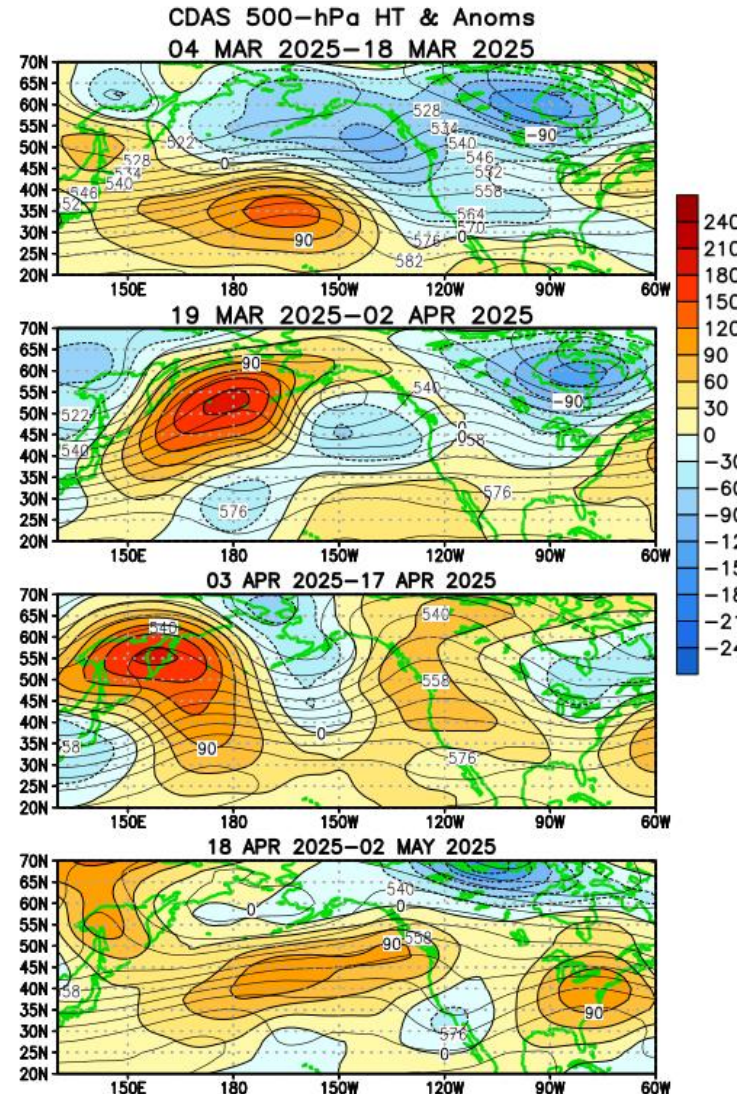
Issued: 4 May 2025

The CFS.v2 ensemble mean (black dashed line) indicates ENSO-neutral is favored to persist through the Northern Hemisphere fall and early winter 2025-26.



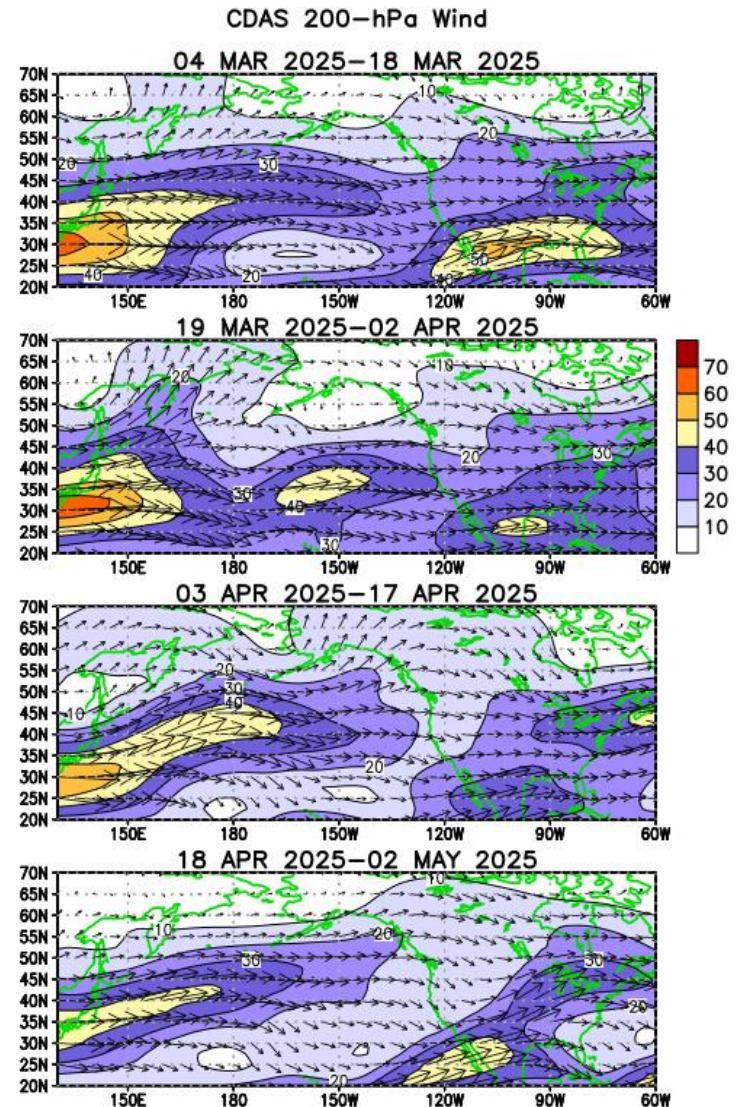
Atmospheric anomalies over the North Pacific and North America During the Last 60 Days

Since mid-March 2025, above-average heights and temperatures persisted over the eastern U.S. The pattern over the North Pacific Ocean has been variable.



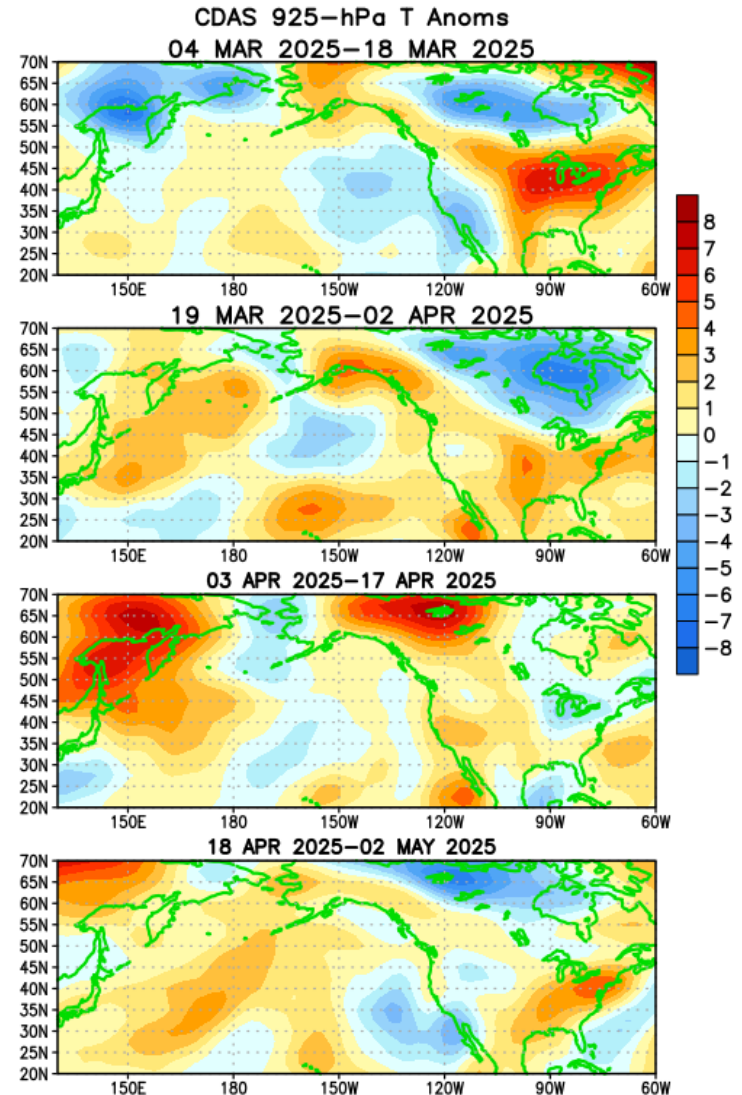
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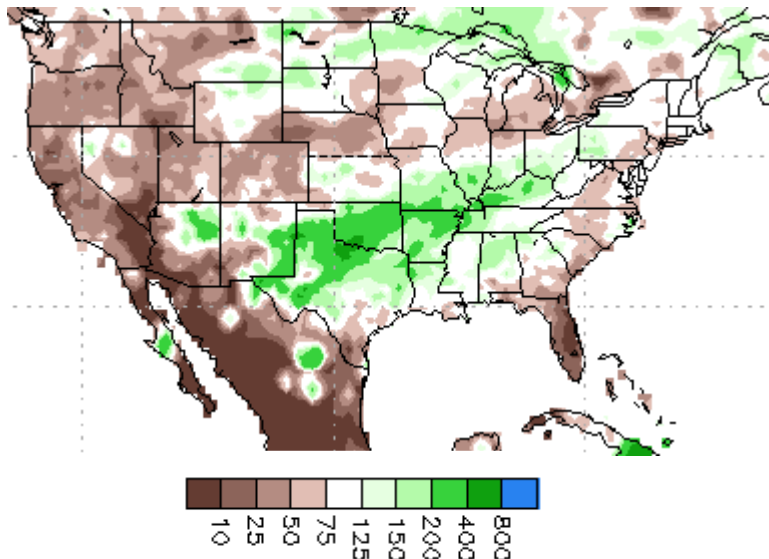
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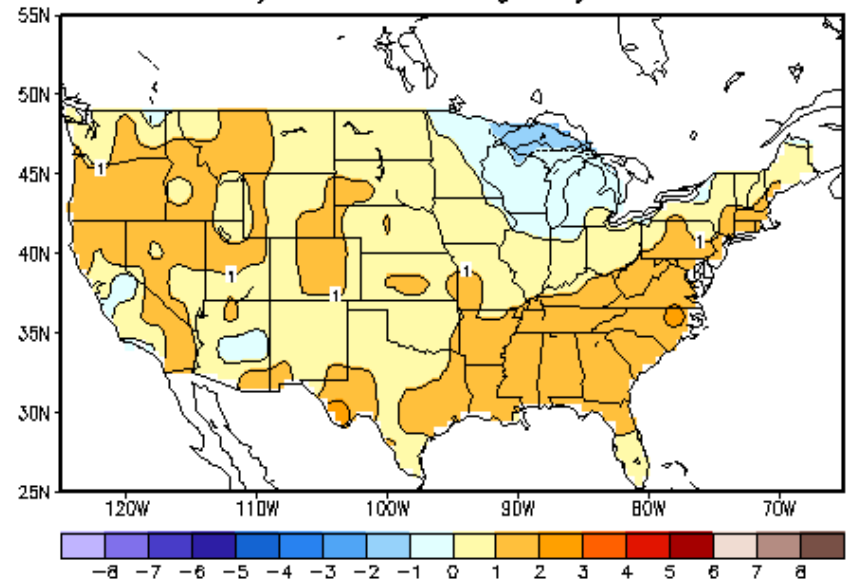
U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 3 May 2025

Percent of Average Precipitation



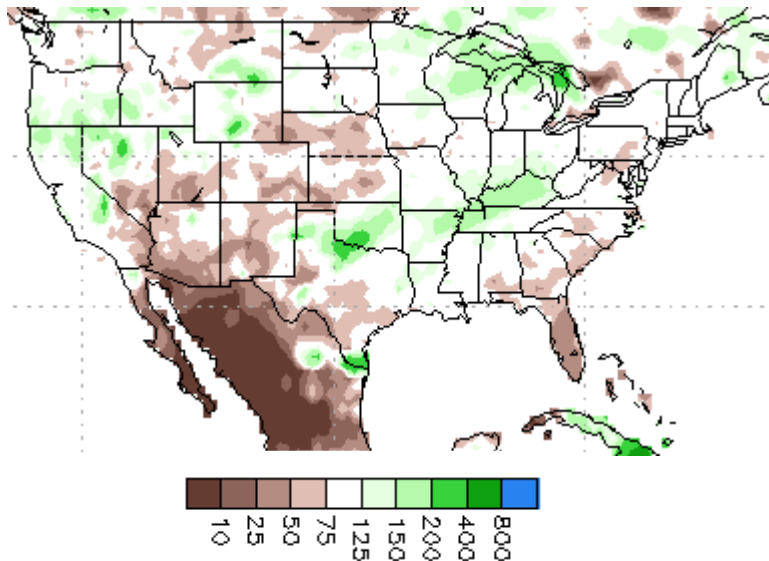
Temperature Departures (degree C)



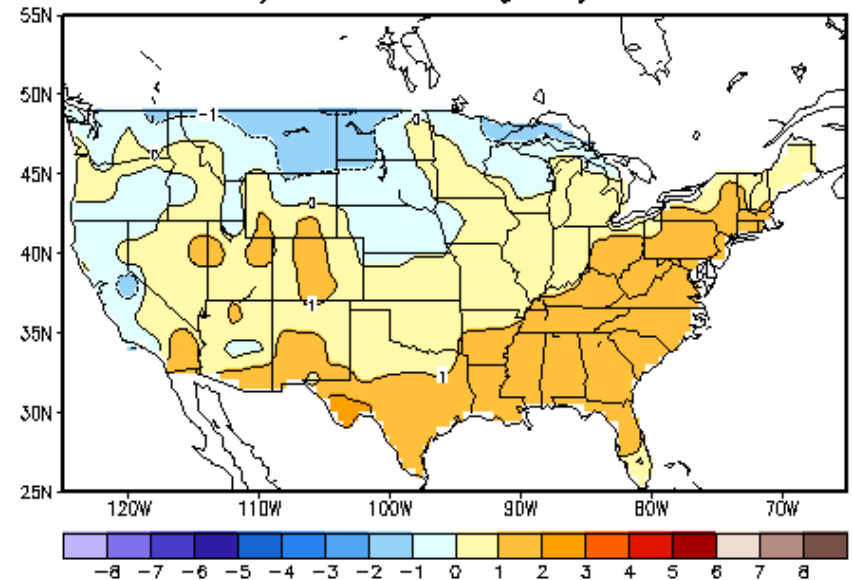
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 3 May 2025

Percent of Average Precipitation



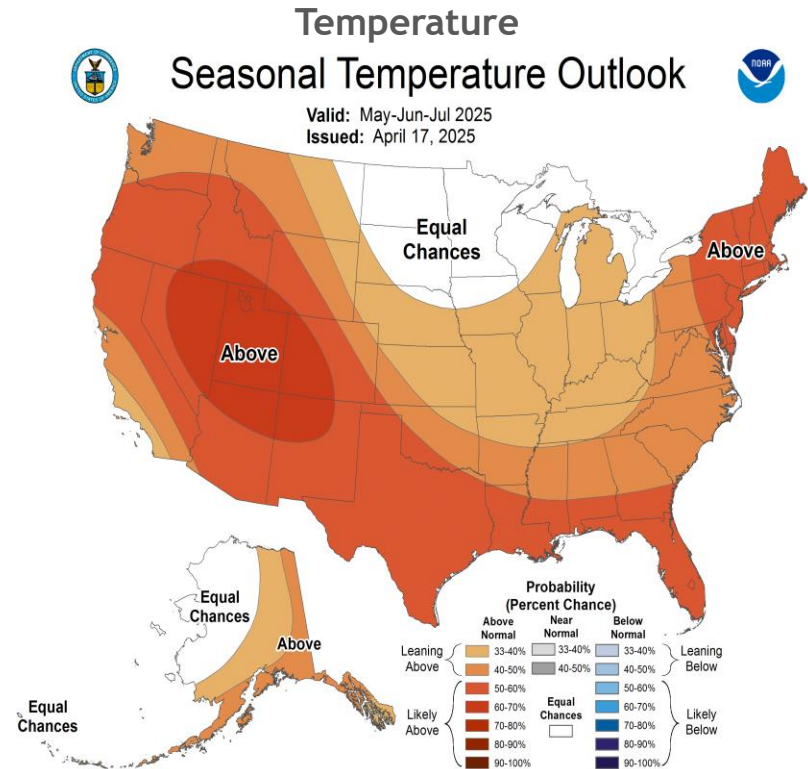
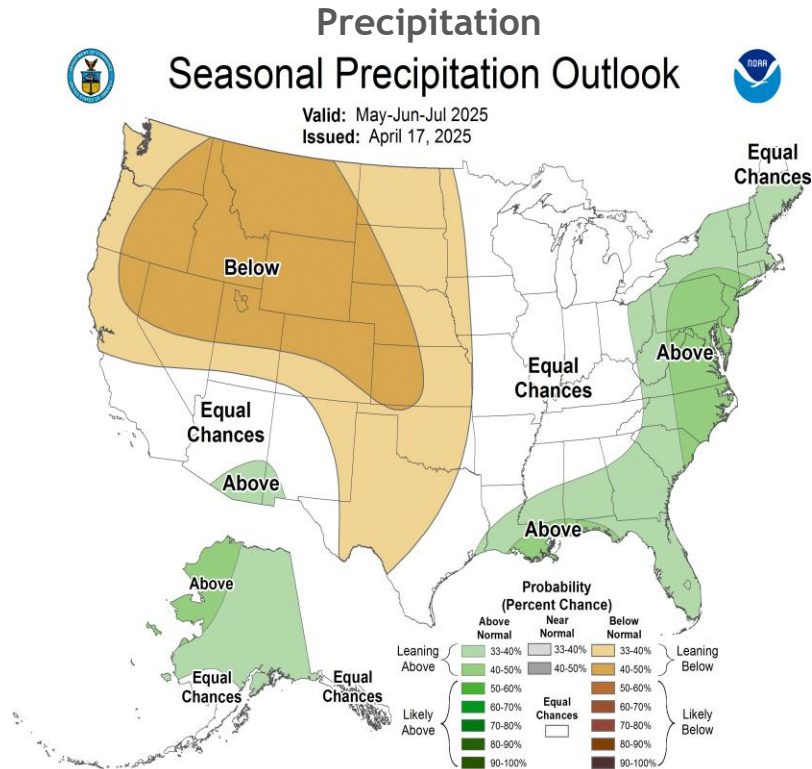
Temperature Departures (degree C)



U. S. Seasonal Outlooks

May-July 2025

The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.



Summary

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ENSO-neutral conditions are present.*

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ENSO-neutral is favored during the Northern Hemisphere summer, with a greater than 50% chance through August-October 2025.

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