

ENSO: Recent Evolution, Current Status and Predictions



Update prepared by:
Climate Prediction Center / NCEP
29 May 2018

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.

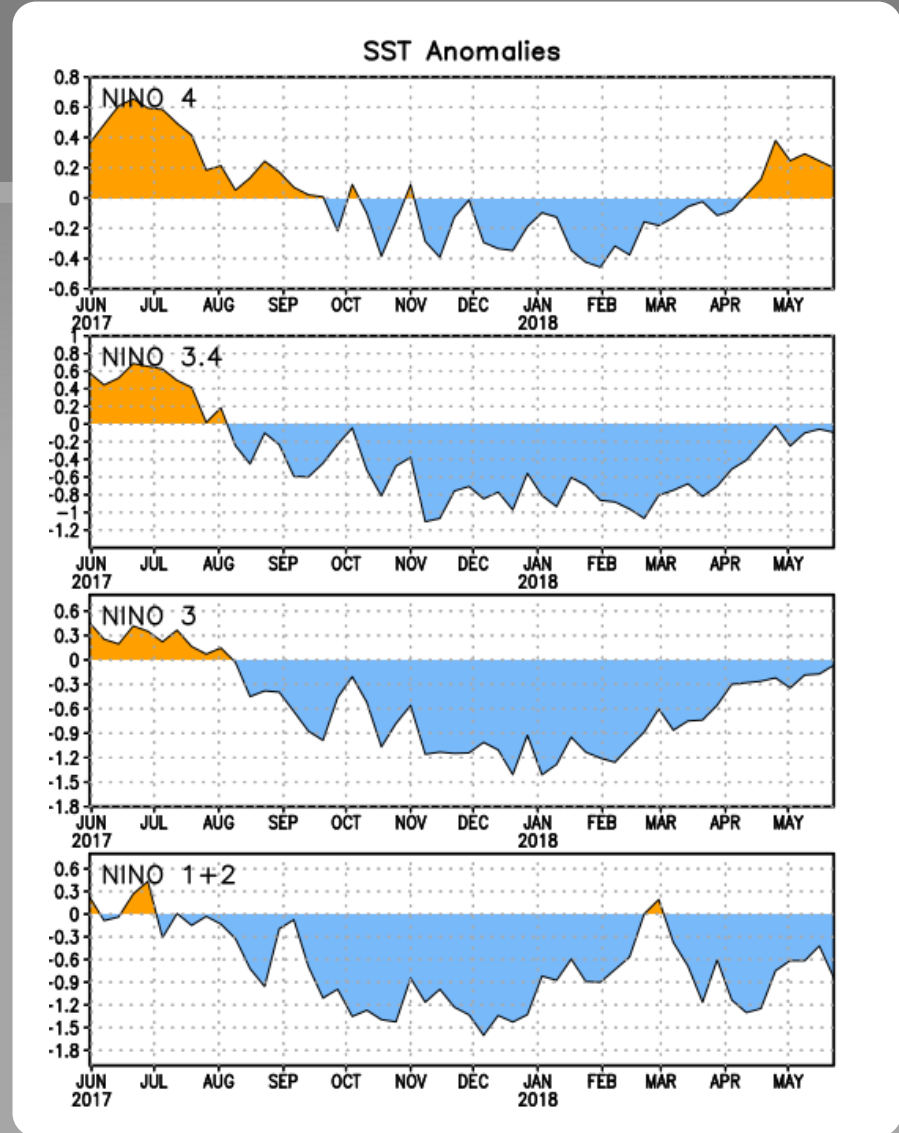
ENSO-neutral is favored through September-November 2018, with the possibility of El Niño nearing 50% by Northern Hemisphere winter 2018-19.

* 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](#).

Niño Region SST Departures (°C) Recent Evolution

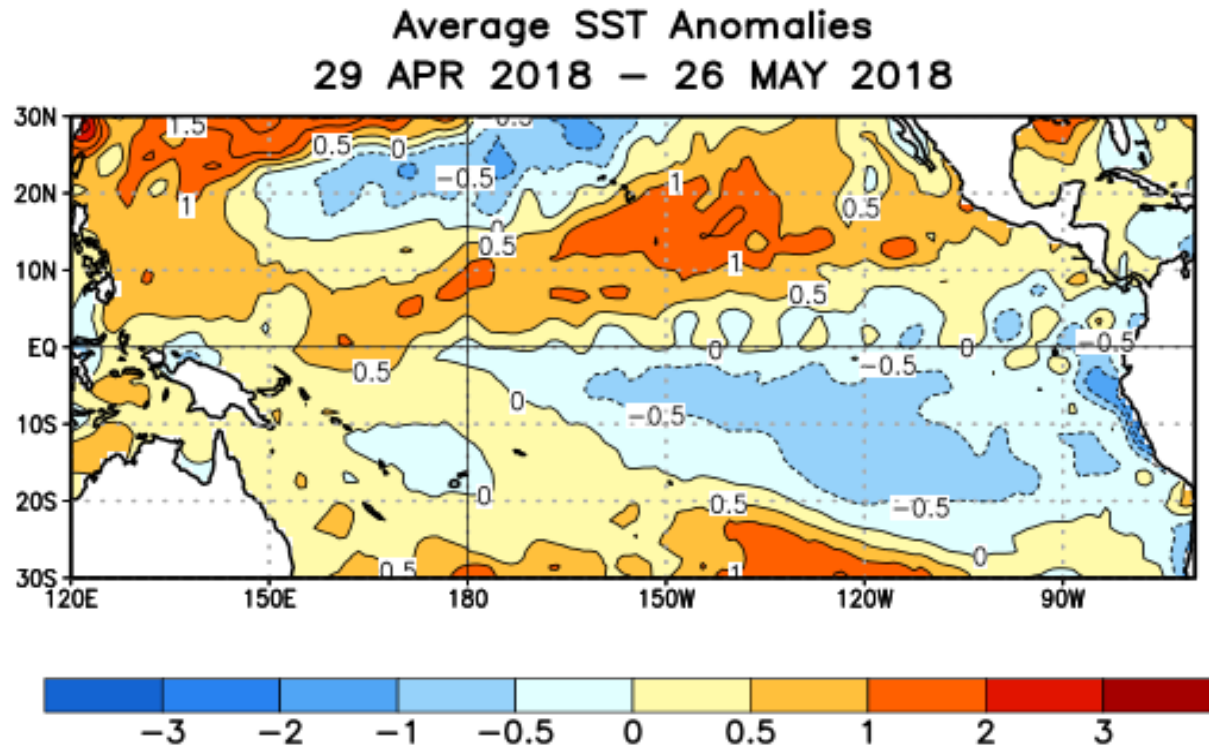
The latest weekly SST departures are:

Niño 4	0.2°C
Niño 3.4	-0.1°C
Niño 3	-0.1°C
Niño 1+2	-0.8°C



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

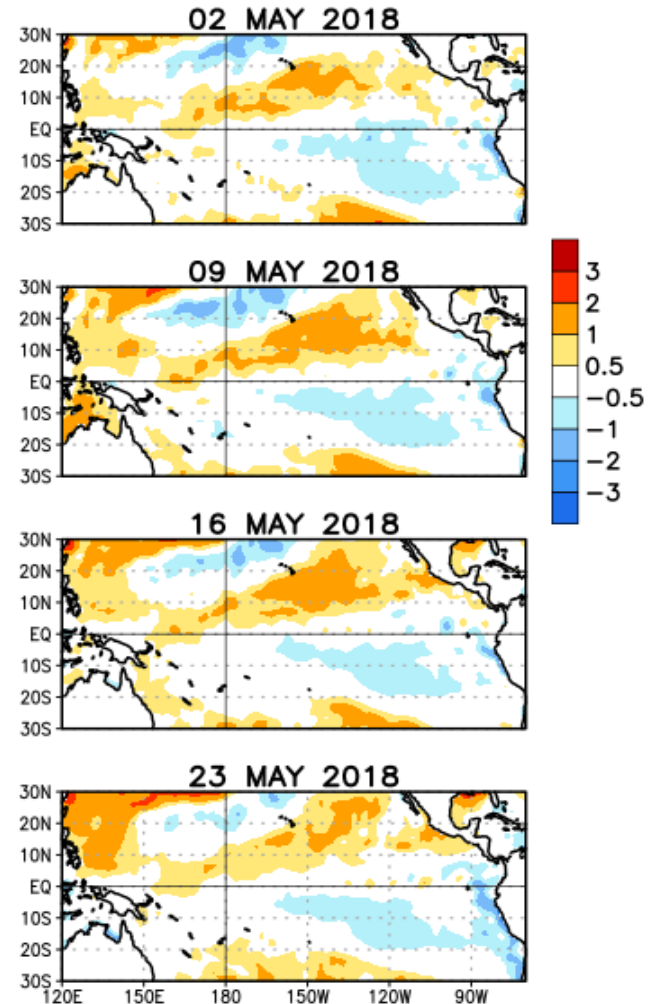
During the last four weeks, equatorial SSTs were near average across most of the Pacific Ocean, below average near South America, and above average in the western Pacific.



Weekly SST Departures during the Last Four Weeks

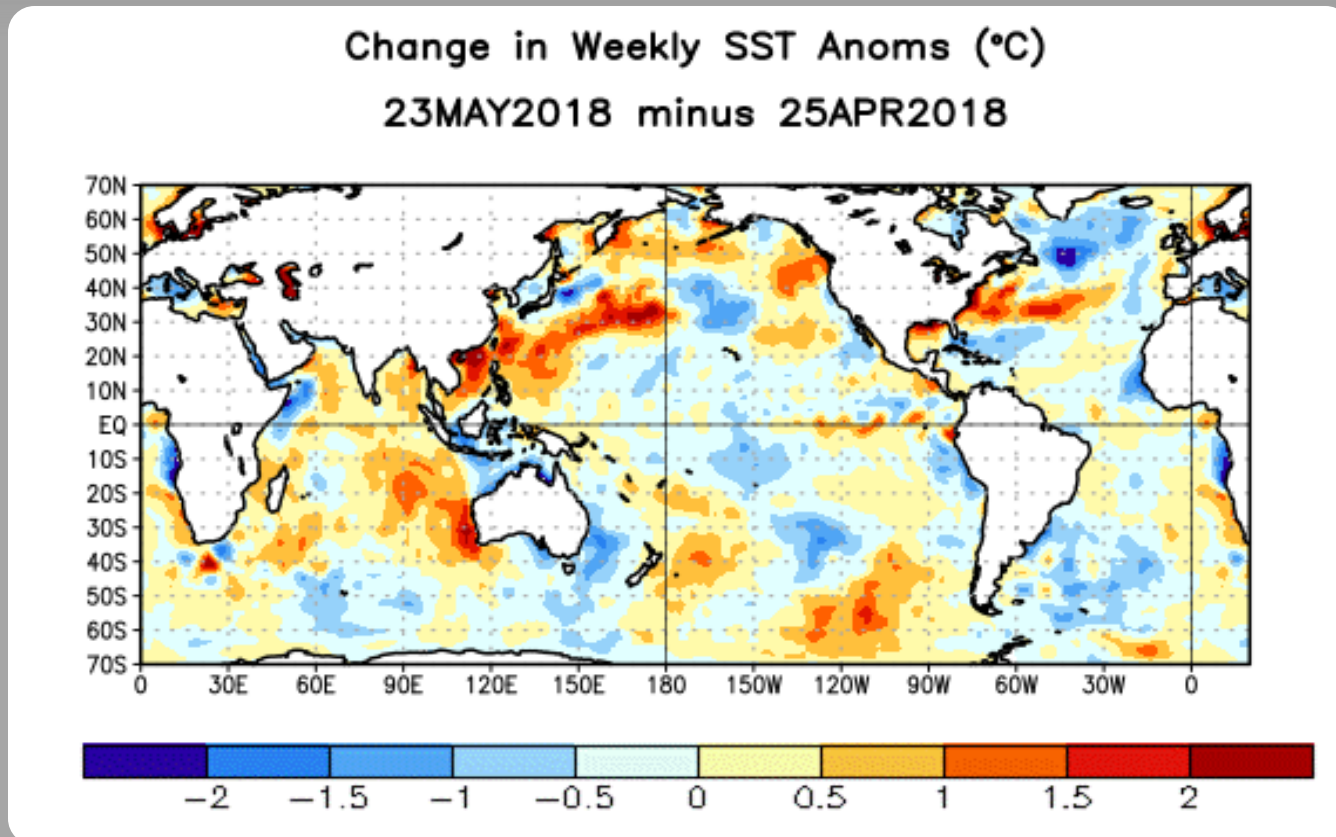
During the last four weeks, near average SSTs emerged across the equatorial Pacific Ocean. Positive SST anomalies have persisted in the western Pacific, while negative anomalies persisted near the coast of South America.

Weekly SST Anomalies (DEG C)



Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, mostly positive changes were observed across the eastern Pacific, while negative changes were evident in the east-central Pacific.



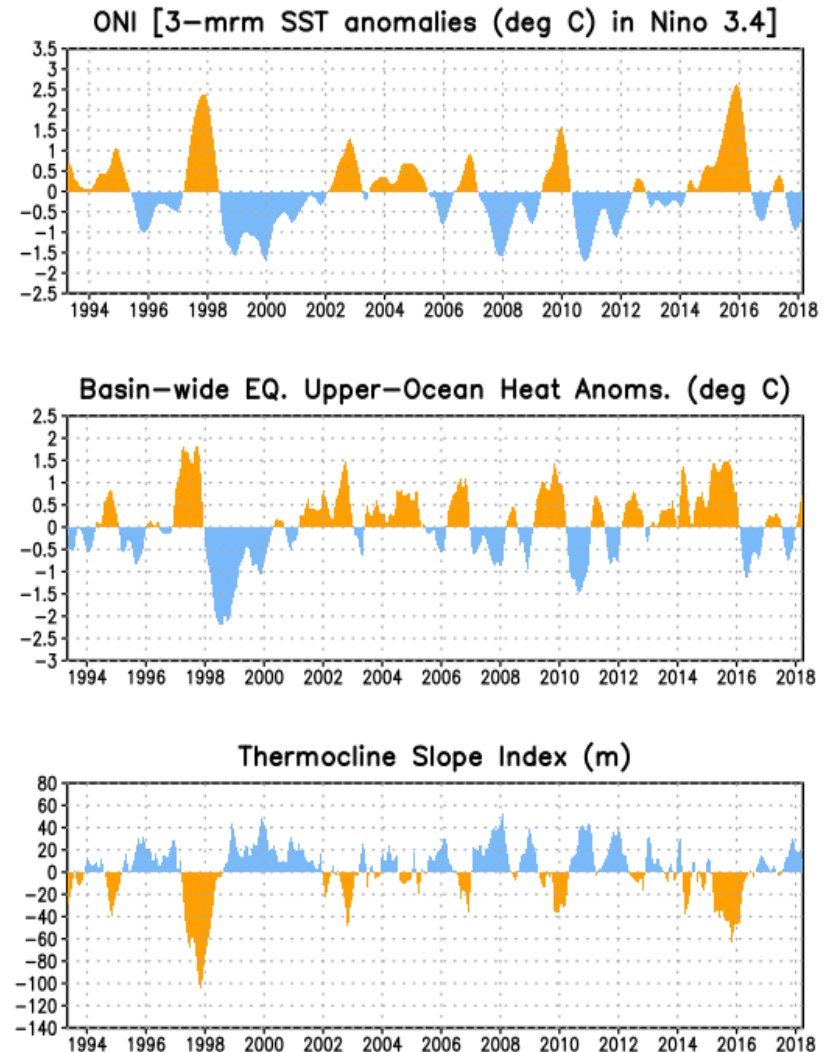
Upper-Ocean Conditions in the Equatorial Pacific

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.

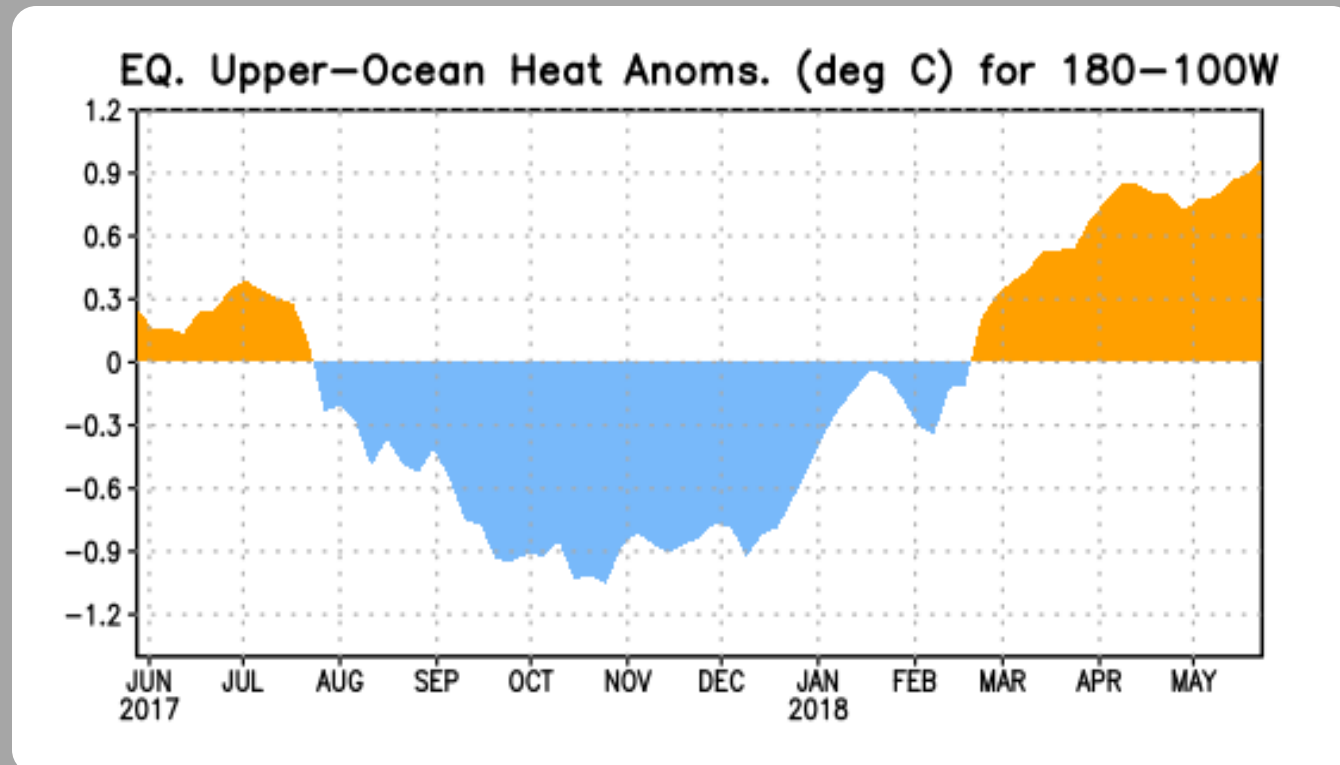
Recent values of the upper-ocean heat anomalies (slightly above average) and thermocline slope index (slightly above average) reflect ENSO-neutral conditions.

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).



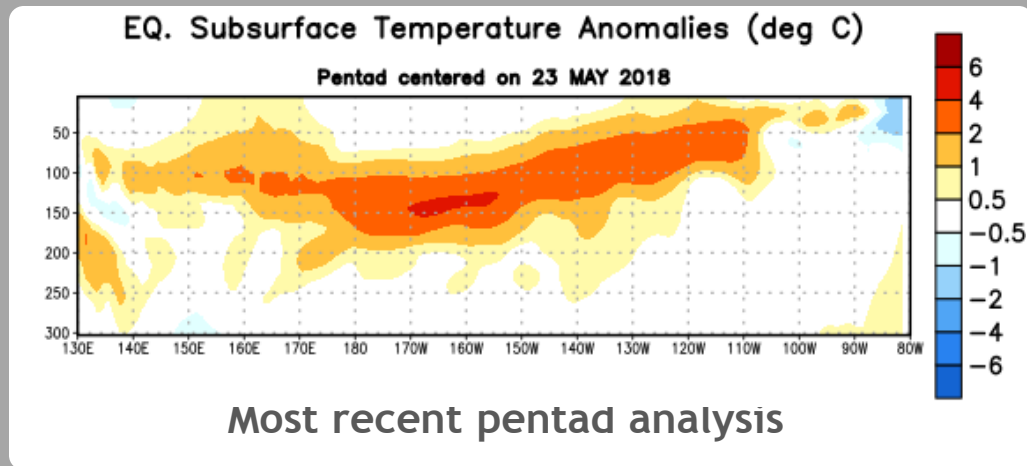
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

Negative subsurface temperature anomalies lasted from August 2017 to February 2018. Since the end of February, temperature anomalies increased and have remained positive.

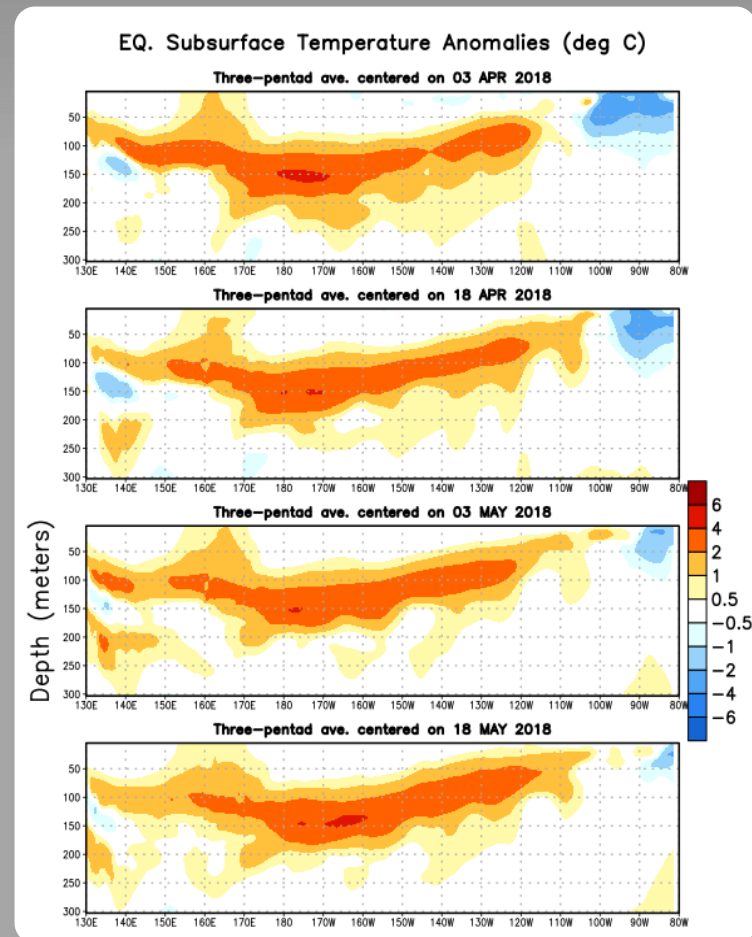


Sub-Surface Temperature Departures in the Equatorial Pacific

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



Negative temperature anomalies in the far eastern Pacific have weakened significantly.

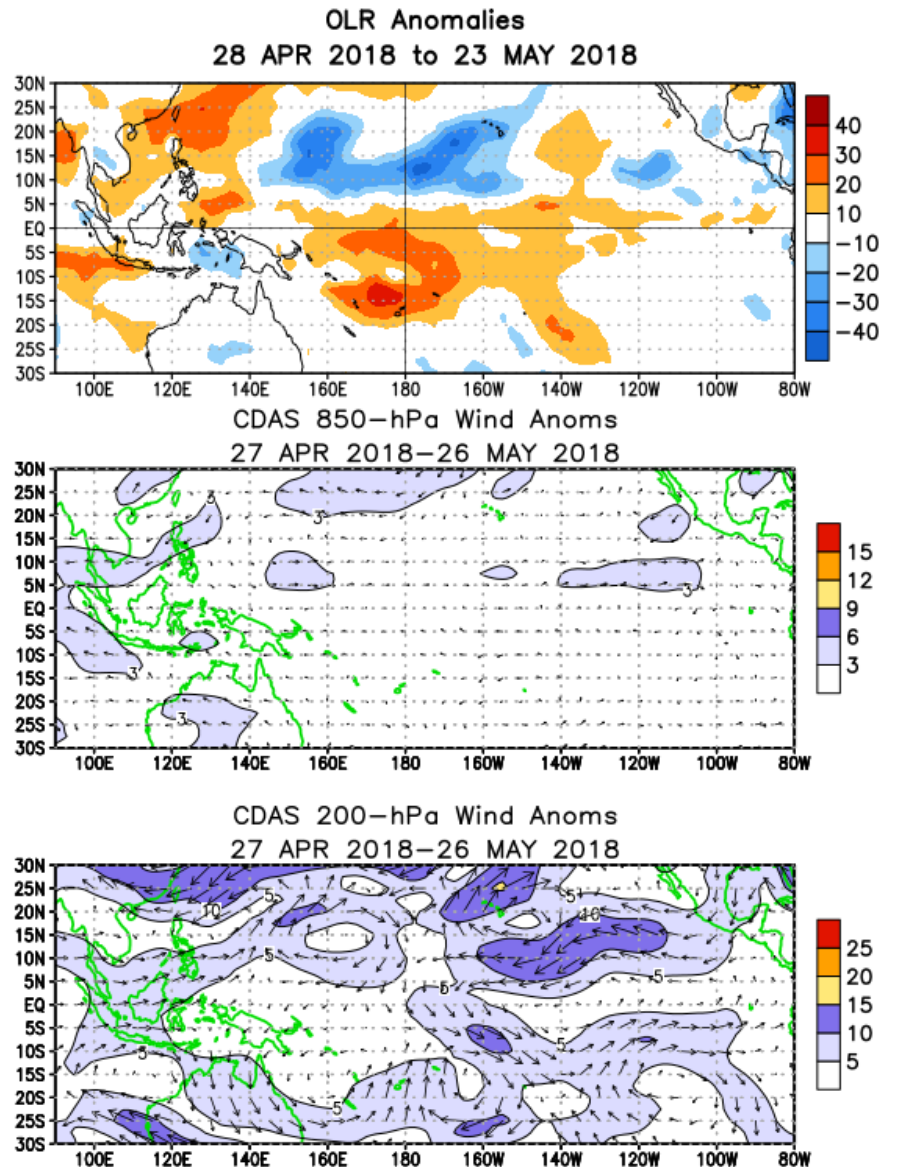


Tropical OLR and Wind Anomalies During the Last 30 Days

Positive OLR anomalies (reduced convection and precipitation) were near the Date Line, east-central Pacific, and over parts of Indonesia.

Anomalous low-level (850-hPa) westerly winds were evident over the western and eastern tropical Pacific Ocean, just north of the equator.

Anomalous upper-level (200-hPa) westerly winds were observed over the eastern Pacific, and anomalous cross equatorial flow was evident near the Date Line.



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.

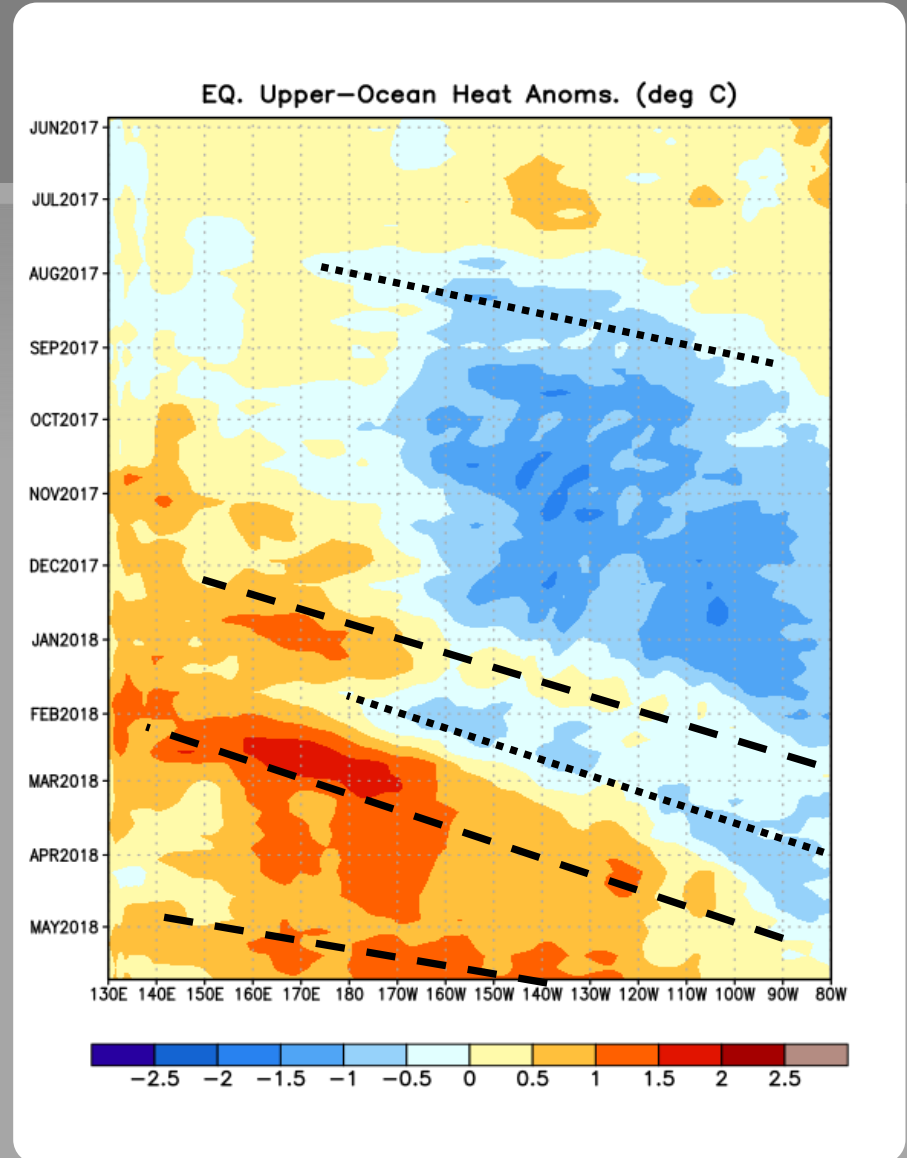
Weekly Heat Content Evolution in the Equatorial Pacific

From August 2017- early January 2018, negative subsurface temperature anomalies persisted in the central and eastern Pacific Ocean.

From December 2017- May 2018, successive Kelvin waves contributed to the eastward shift of positive and negative subsurface temperature anomalies.

More recently, positive temperature anomalies have been shifting eastward into the 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.



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

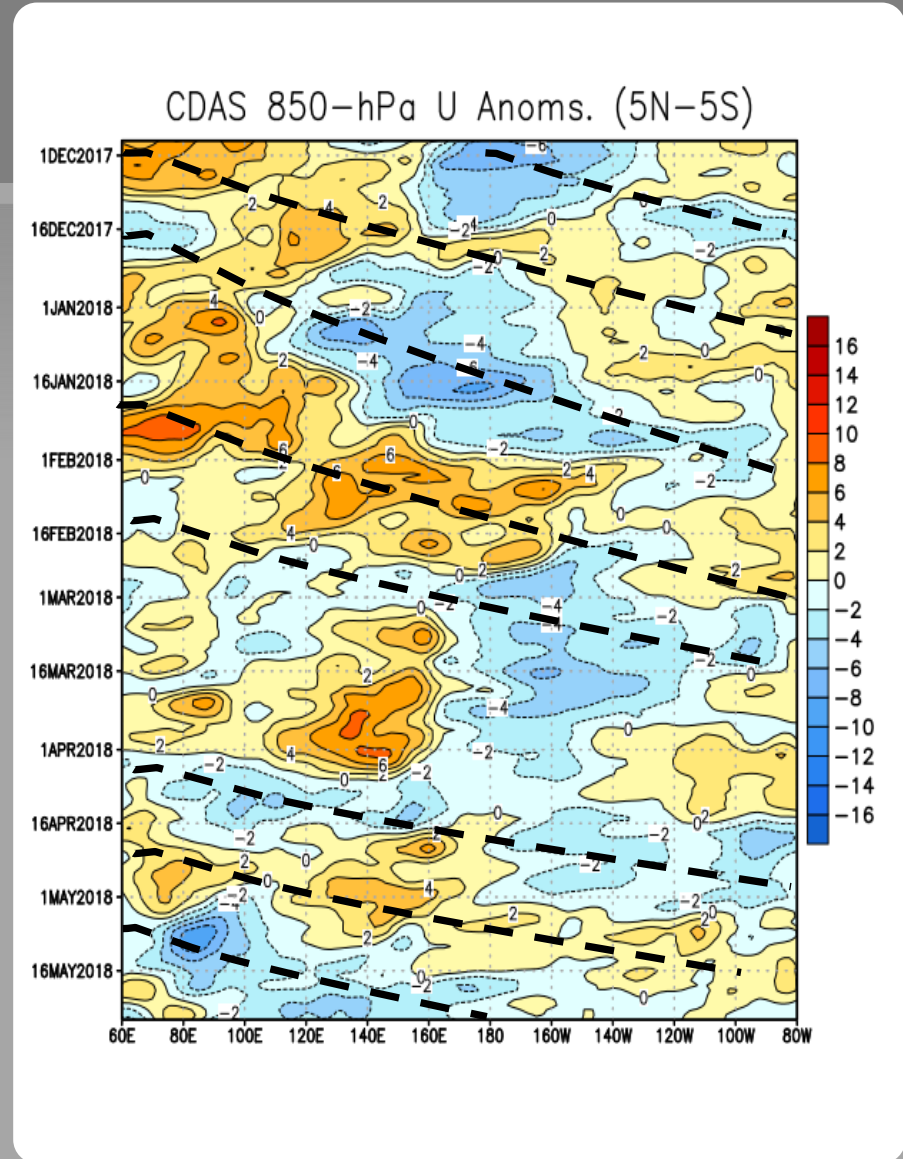
Through mid-January 2018, easterly wind anomalies prevailed across the central equatorial Pacific.

Up to late February 2018 and during April-May 2018, the Madden Julian Oscillation (MJO) contributed to the eastward propagation of low-level wind anomalies.

During the last couple of weeks, easterly wind anomalies have shifted eastward into the central Pacific.

Westerly Wind Anomalies (orange/red shading)

Easterly Wind Anomalies (blue shading)



Upper-level (200-hPa) Velocity Potential Anomalies

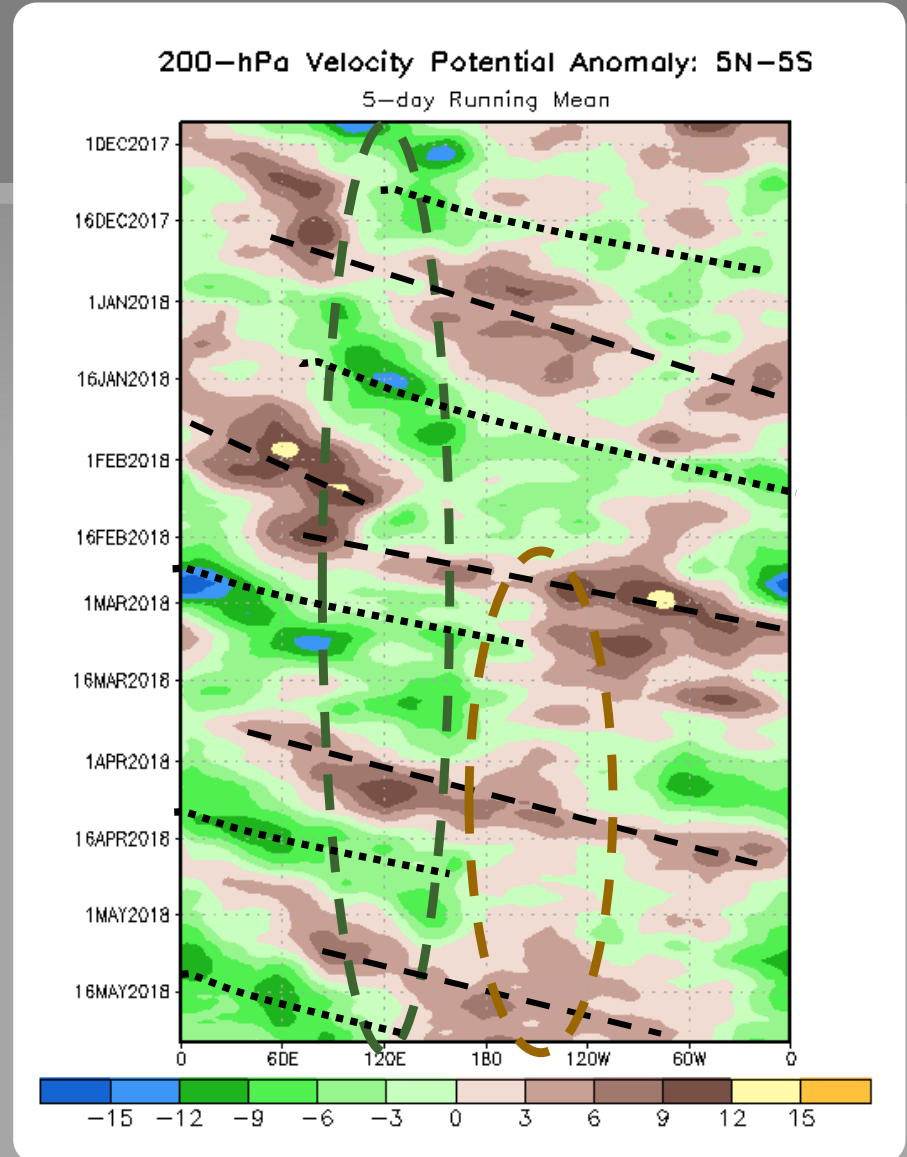
During this period, anomalous upper-level divergence (green shading) generally persisted near Indonesia. Since mid February, anomalous upper-level convergence (brown shading) has persisted over the central Pacific.

Also, eastward propagation of regions of upper-level divergence (green shading) and convergence (brown shading) have been evident.

Unfavorable for precipitation (brown shading)

Favorable for precipitation (green shading)

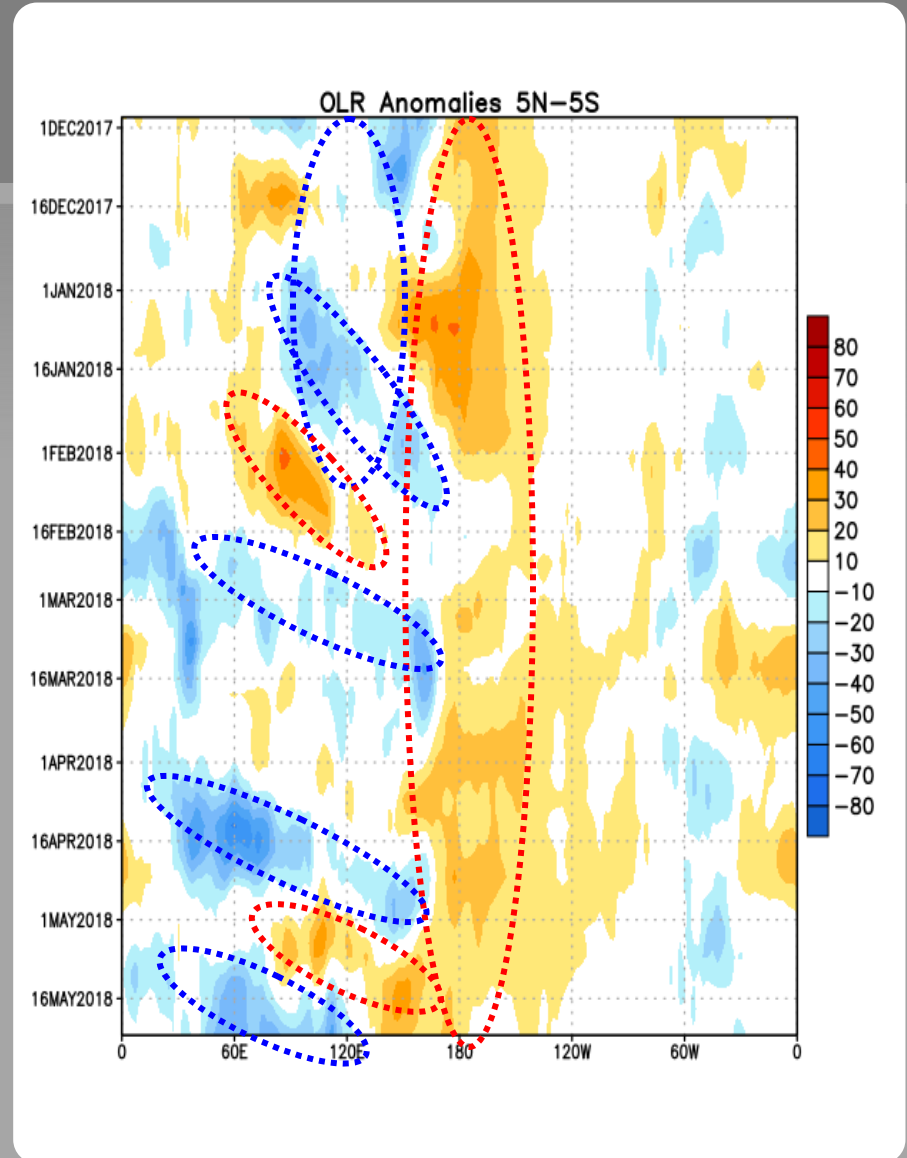
Note: Eastward propagation is not necessarily indicative of the Madden-Julian Oscillation (MJO).



Outgoing Longwave Radiation (OLR) Anomalies

At least since October 2017, positive OLR anomalies persisted over the central 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

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 .

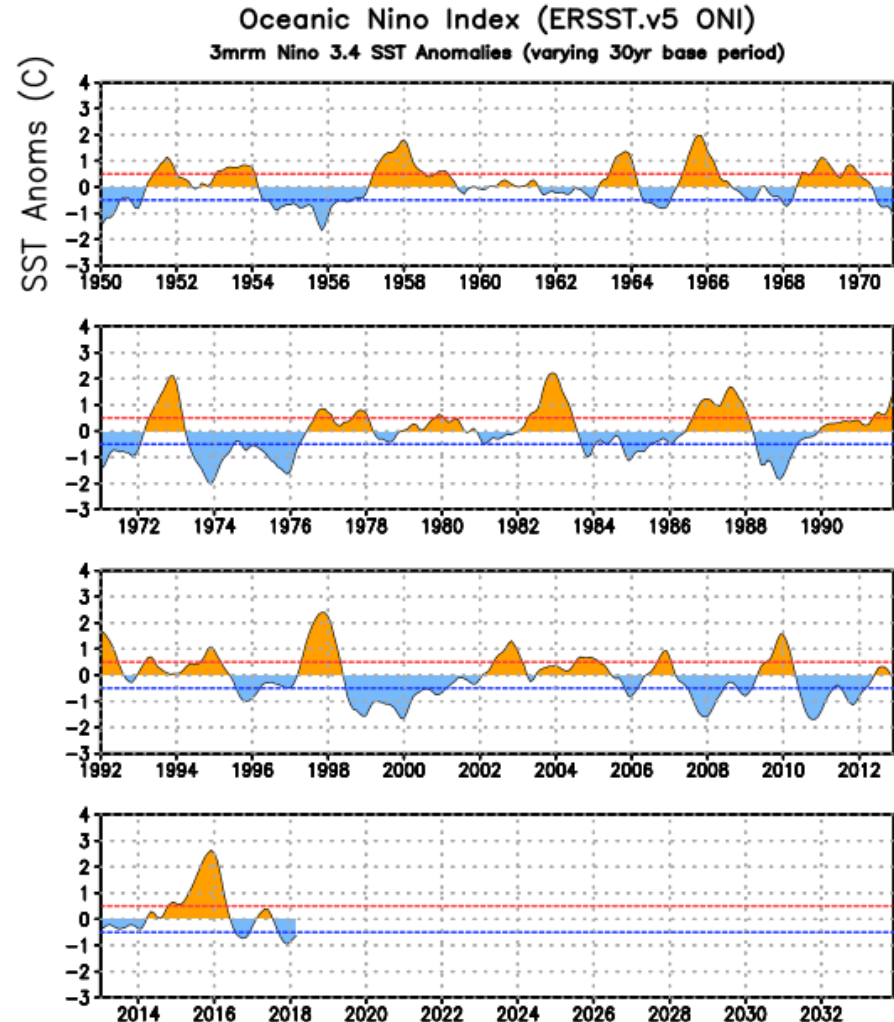
By historical standards, to be classified as a full-fledged El Niño or La Niña episode, these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.

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 2018) is -0.6°C .

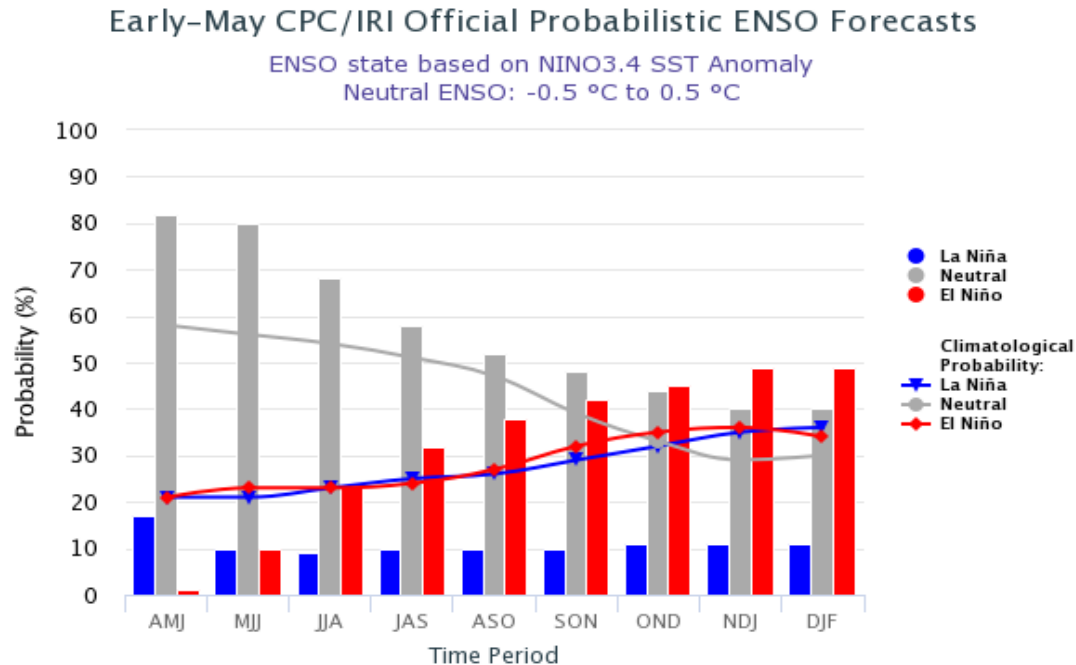
El Niño ↑
Neutral
La Niña ↓



CPC/IRI Probabilistic ENSO Outlook

Updated: 10 May 2018

ENSO-neutral is favored through September-November 2018, with the possibility of El Niño nearing 50% by Northern Hemisphere winter 2018-19.



IRI/CPC Pacific Niño 3.4 SST Model Outlook

The majority of models predict ENSO-neutral through summer 2018, with an elevated chance of El Niño by fall/winter 2018.

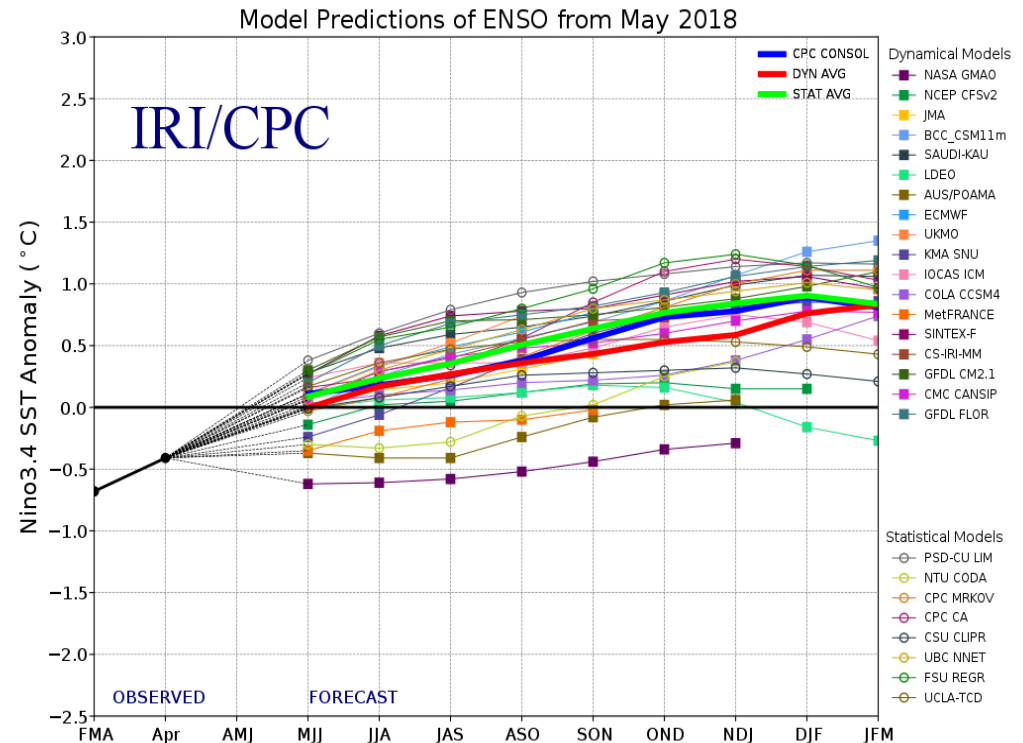


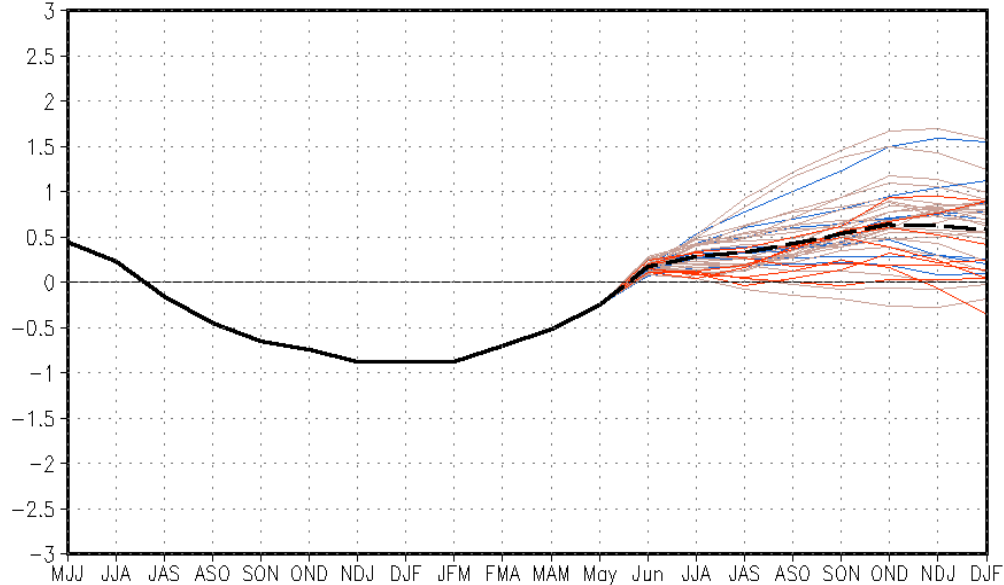
Figure provided by the International Research Institute (IRI) for Climate and Society (updated 18 May 2018).

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

Issued: 27 May 2018

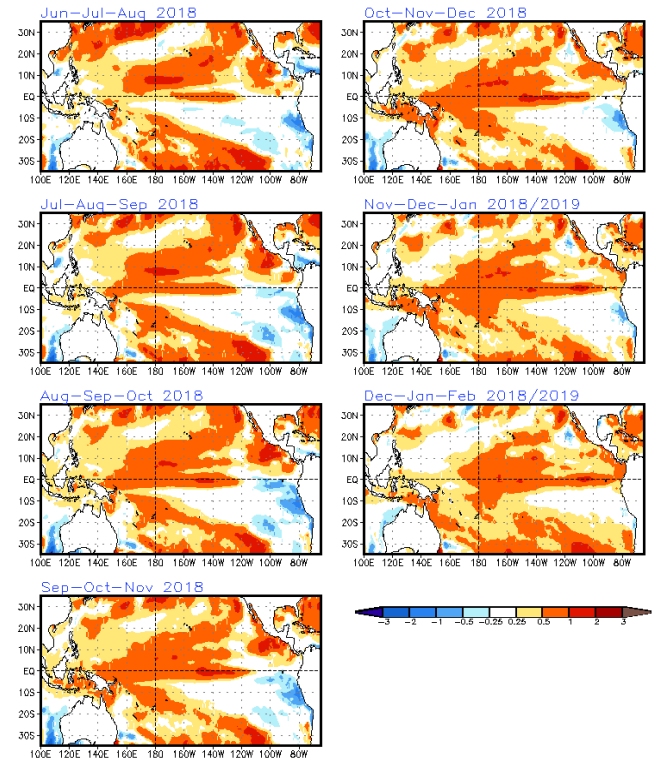
The CFS.v2 ensemble mean (black dashed line) favors ENSO-neutral through Northern Hemisphere fall 2018, and a weak El Niño during winter 2018-19.

CFSv2 forecast Nino3.4 SST anomalies (K) (PDF corrected)



— Latest 8 forecast members
— Earliest 8 forecast members
— Other forecast members
- - - Forecast ensemble mean
— NCDc daily analysis

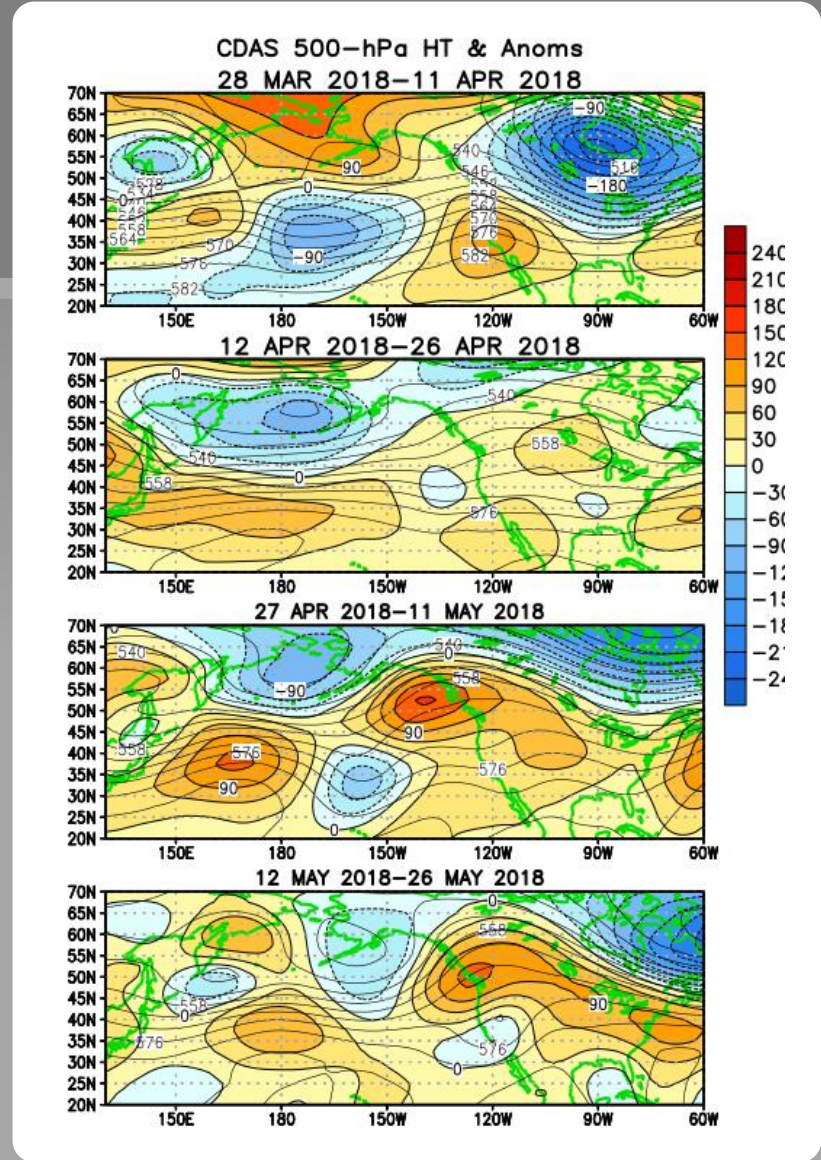
(Model bias correct base period: 1999–2010; Climatology base period: 1982–2010)



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

During late March to late April 2018, anomalous ridging over the western United States was accompanied by an anomalous trough (and below-average temperatures) over the central or eastern contiguous United States.

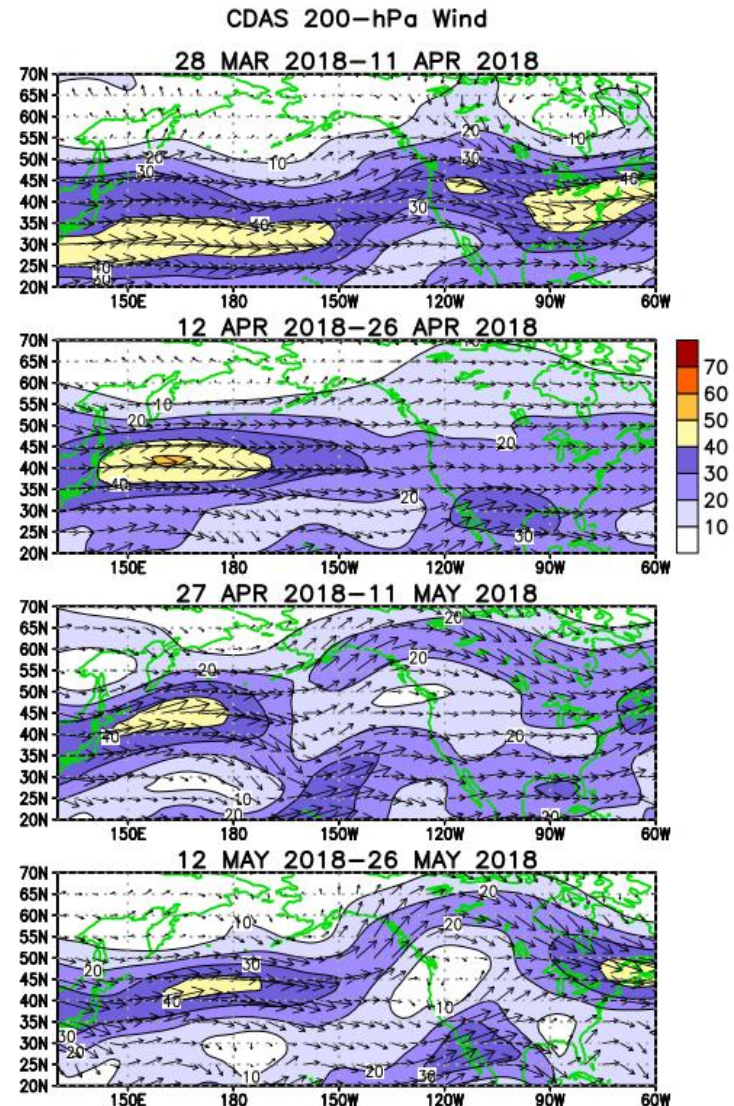
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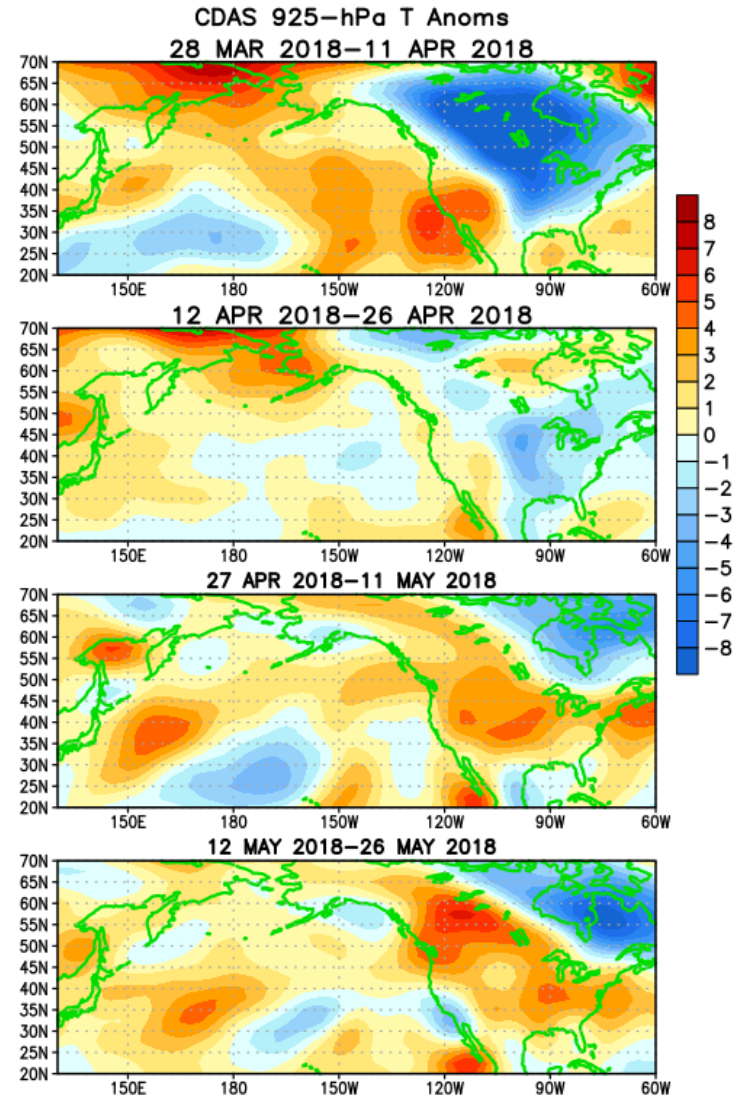
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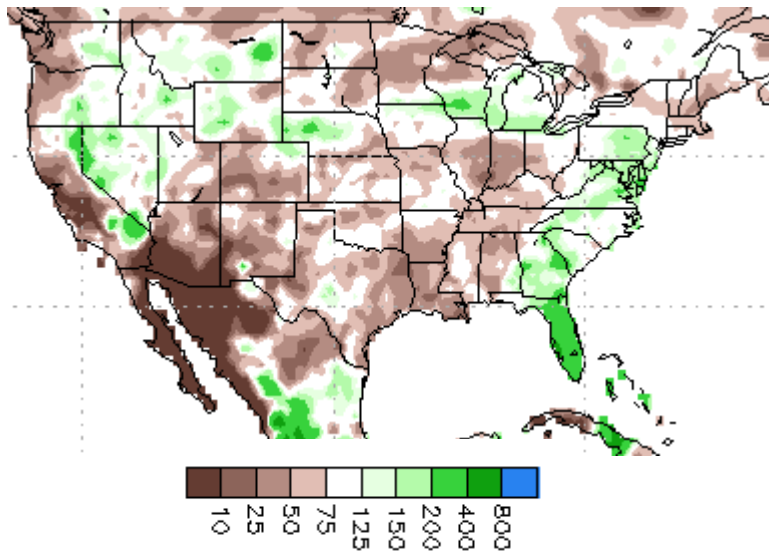
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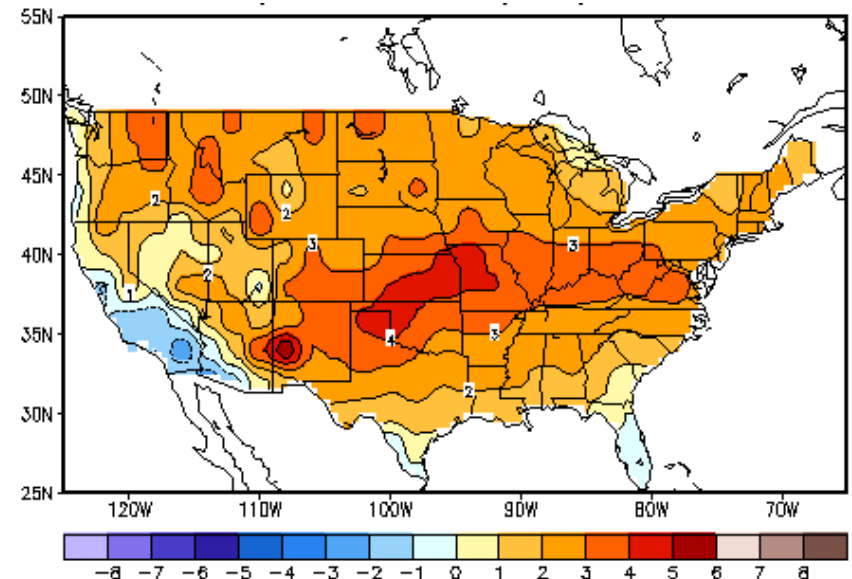
U.S. Temperature and Precipitation Departures During the Last 30 Days

End Date: 27 May 2018

Percent of Average Precipitation



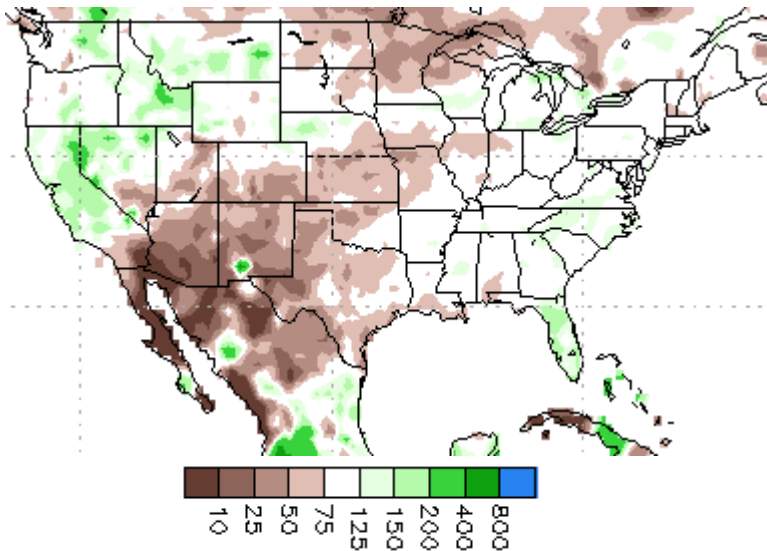
Temperature Departures (degree C)



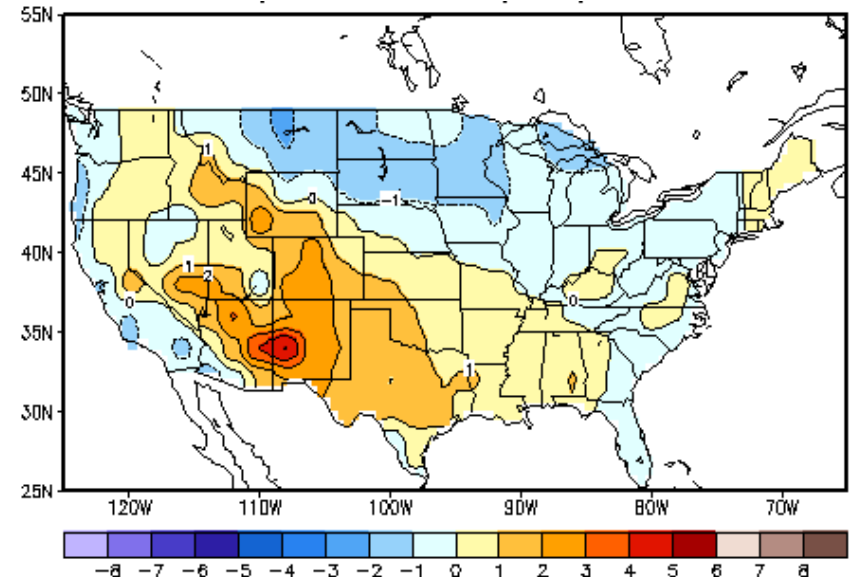
U.S. Temperature and Precipitation Departures During the Last 90 Days

End Date: 27 May 2018

Percent of Average Precipitation



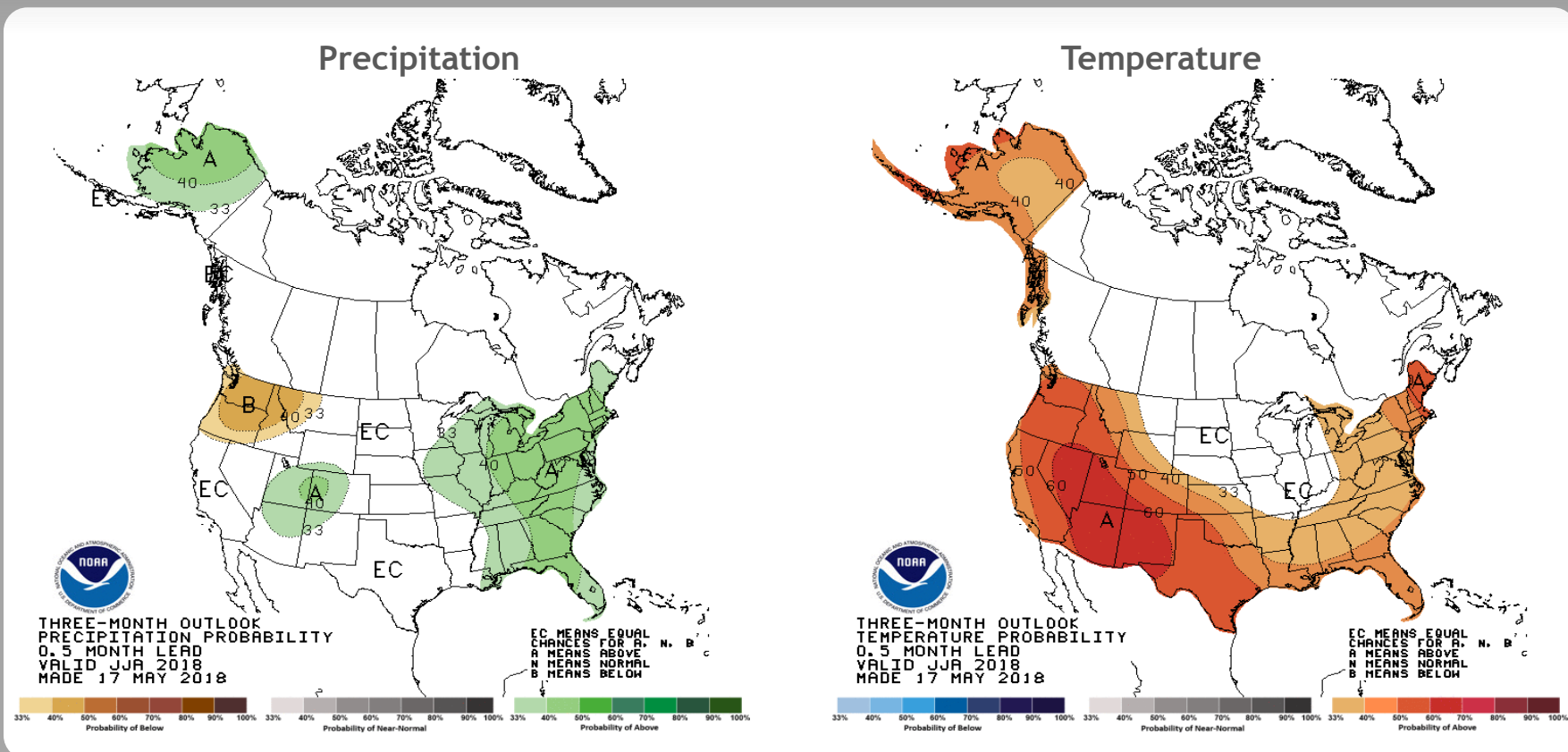
Temperature Departures (degree C)



U. S. Seasonal Outlooks

June - August 2018

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



Summary

ENSO Alert System Status: Final La Niña Advisory

ENSO-neutral conditions are present.*

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