

California Drought & Climate Outlook

October 11, 2016

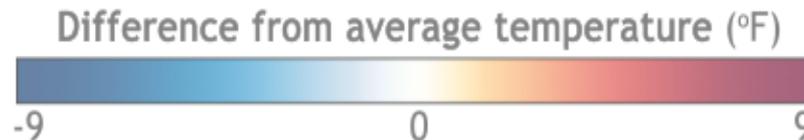
equator

Amanda Sheffield

California-Nevada Climate Applications Program

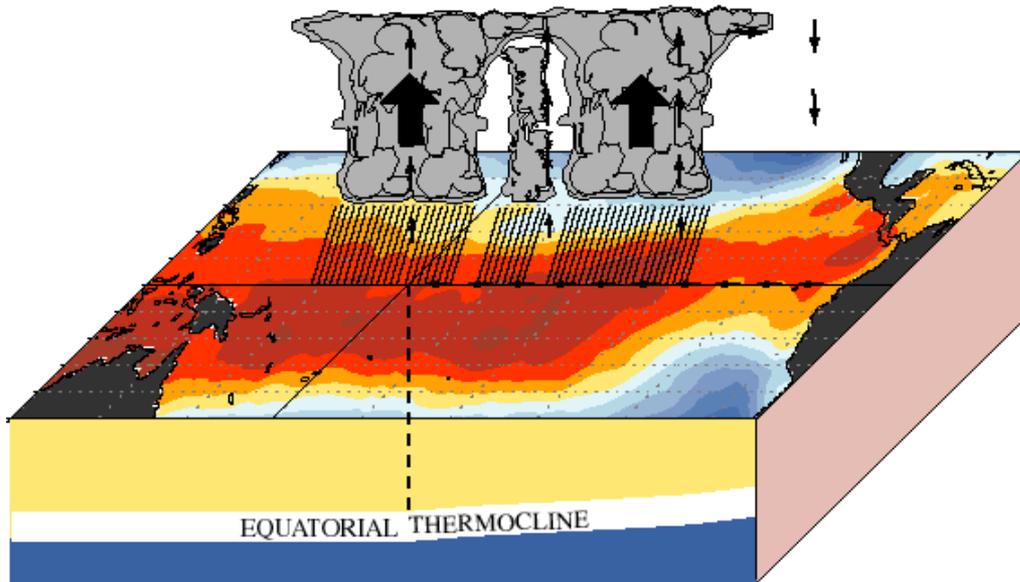
Scripps Institution of Oceanography, UCSD

August 2016
compared to 1981-2010

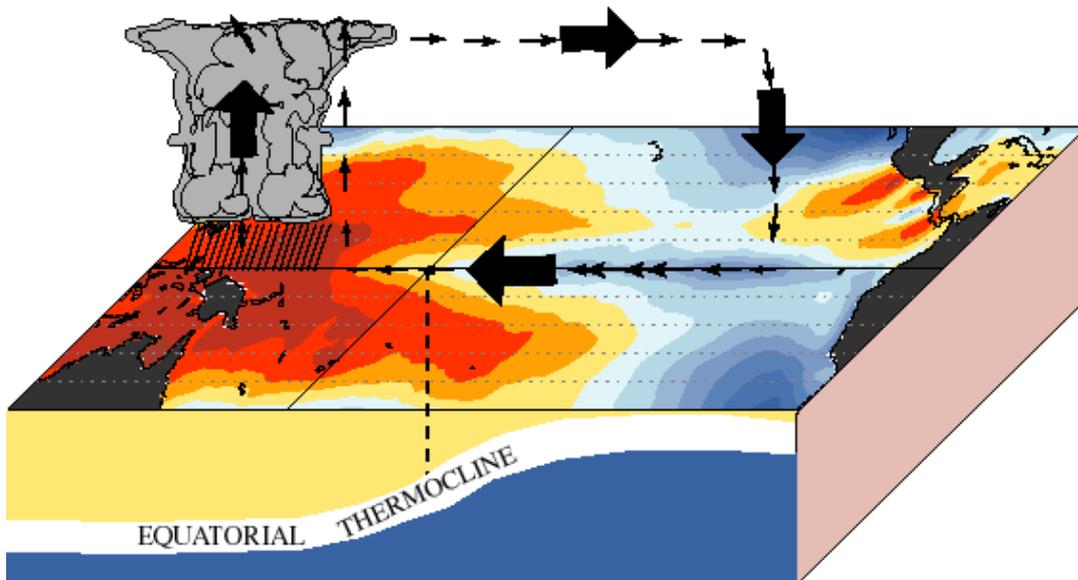


Climate.gov/NNVL
Data: Geo-Polar SST

December - February El Niño Conditions



December - February La Niña Conditions

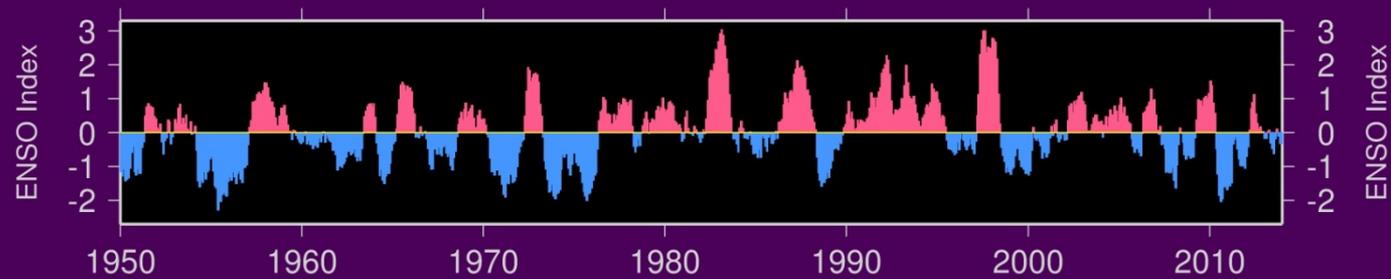
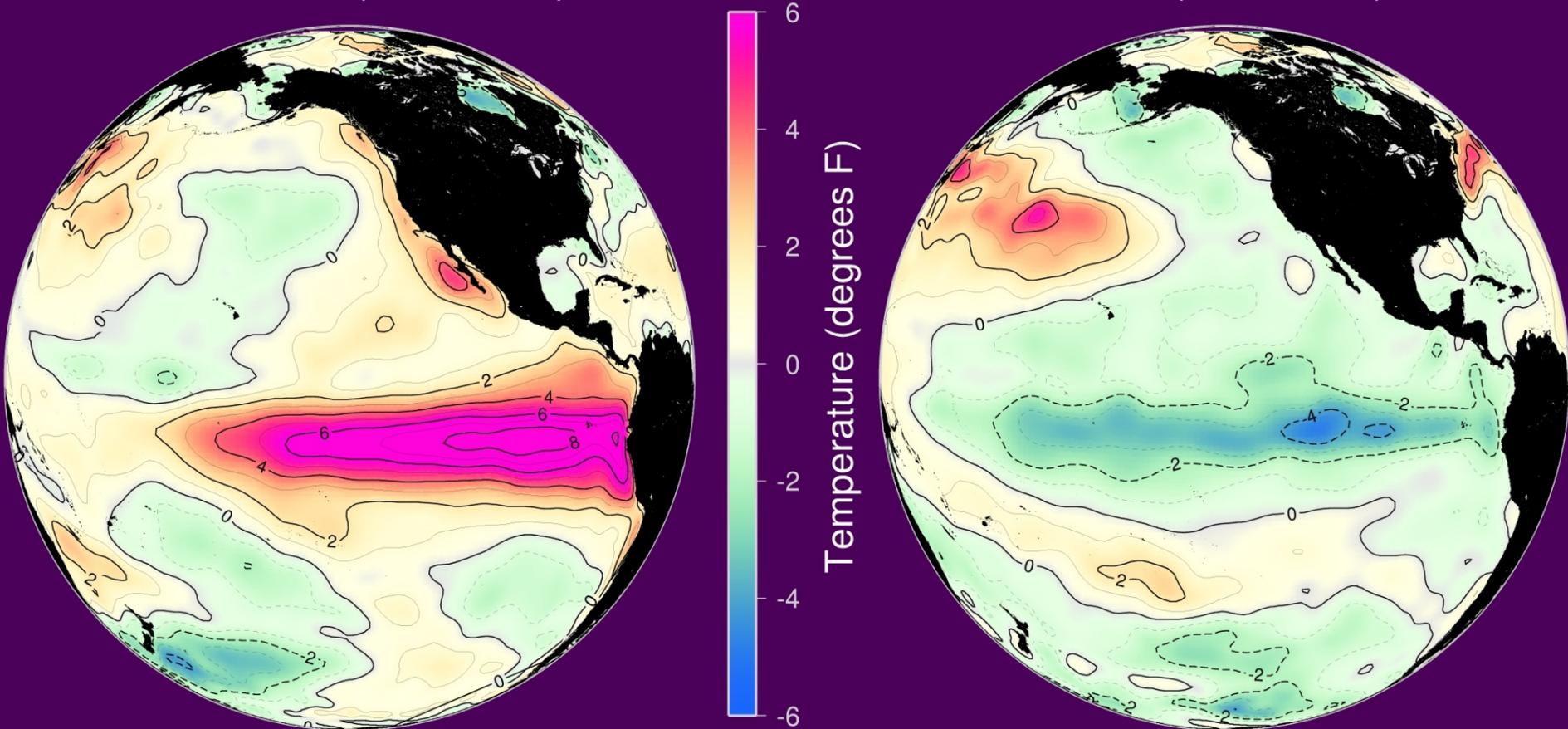


- **ENSO Observations & Forecast with examples from previous La Niña & Neutral conditions**
- **Sub-Seasonal to Seasonal Temperature and Precipitation Forecast**

El Nino/Southern Oscillation (ENSO) Sea Surface Temperatures (Departure from Normal)

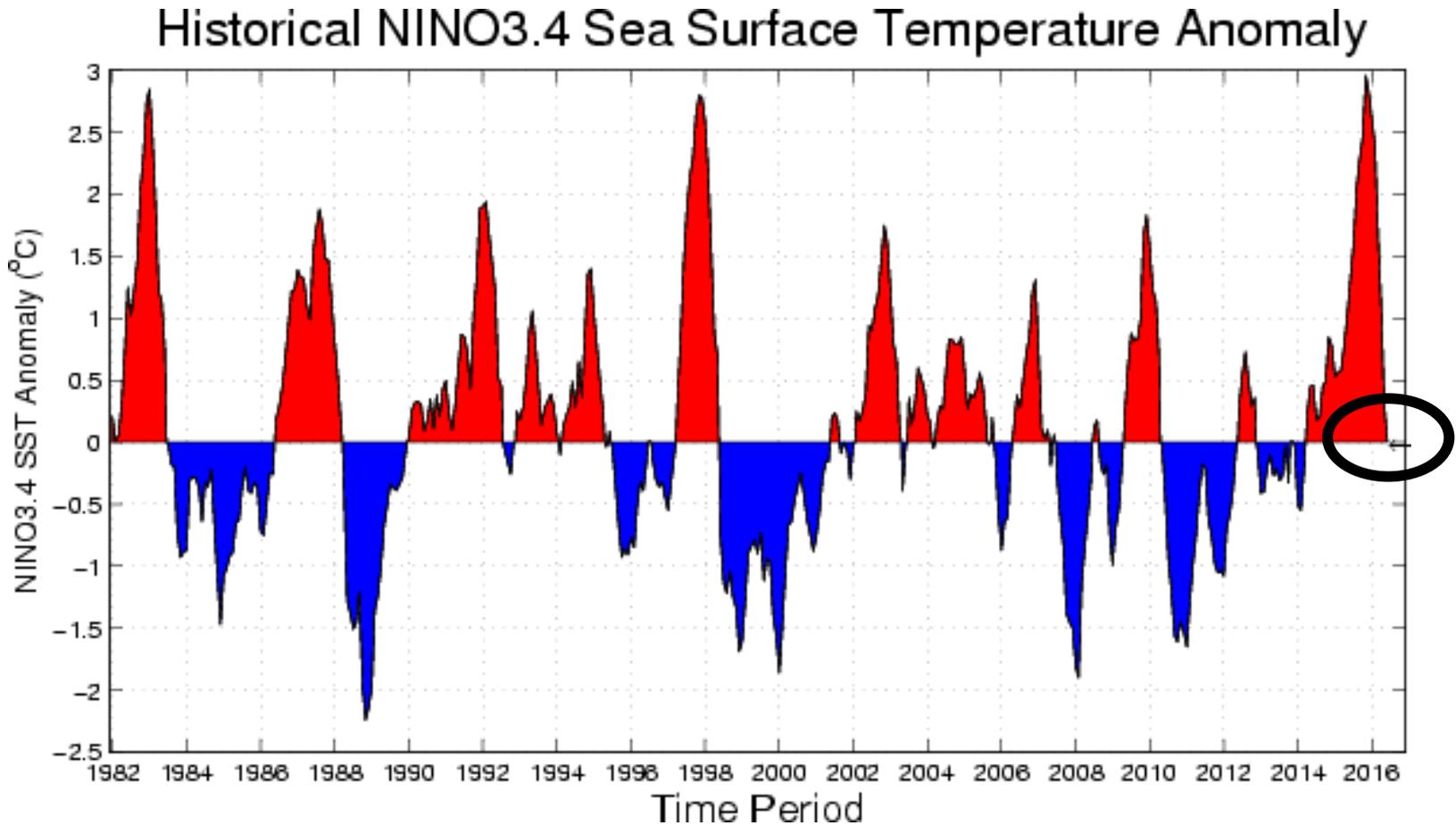
El Nino (Dec 1997)

La Nina (Dec 1999)



Development of Cool Tropical Pacific

Sea Surface Temperature Anomalies in 2016 Following Warm El Nino Conditions of 2015

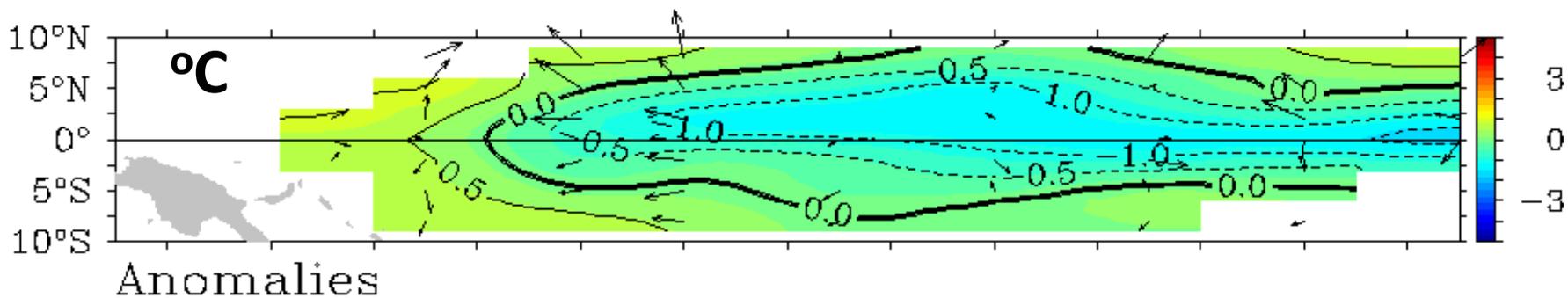


Current Ocean Temperature Conditions

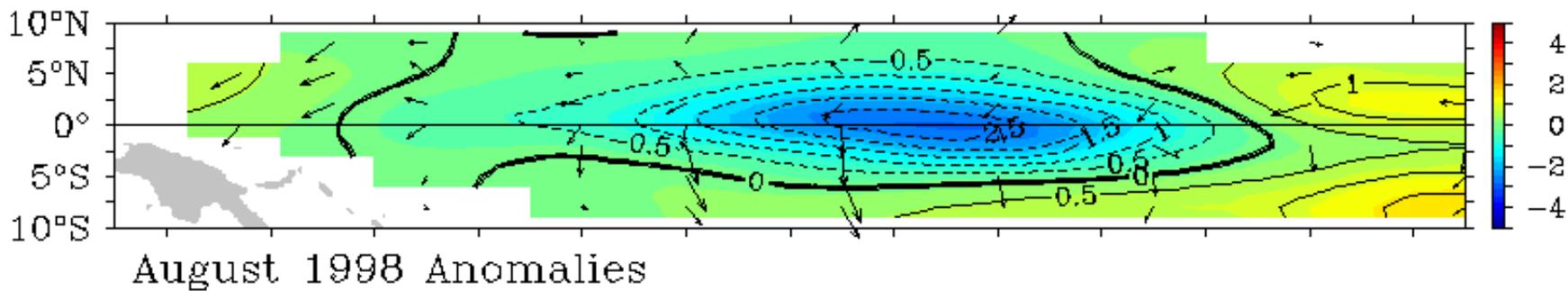
(Departure from normal for this time of year, °C)

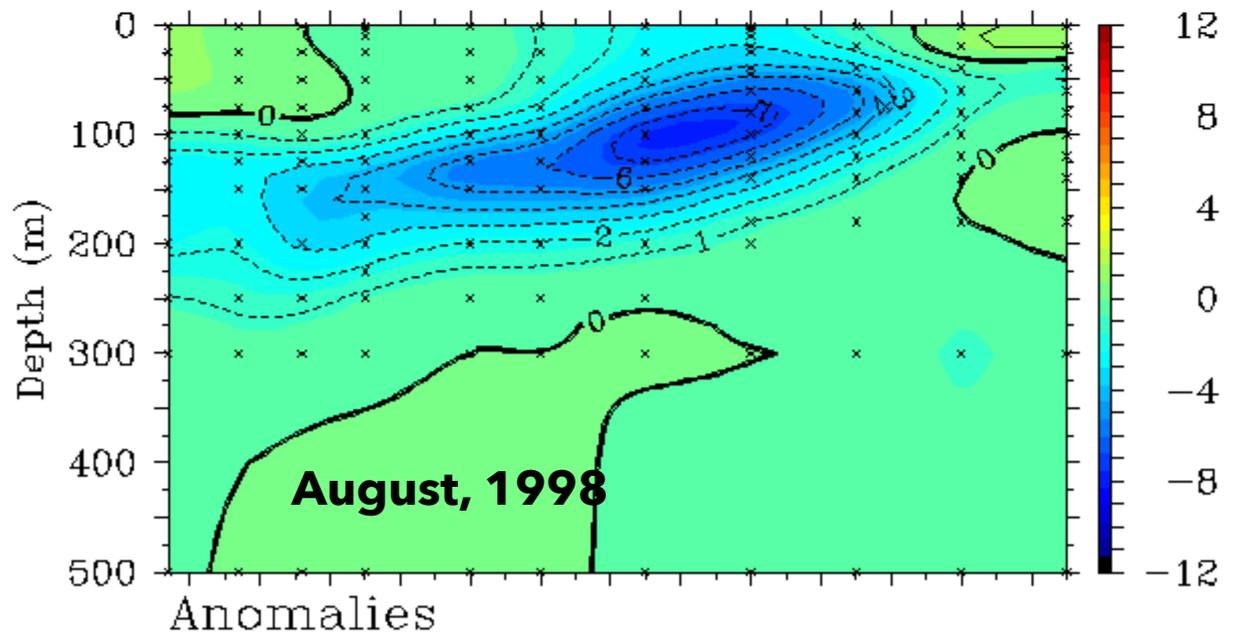
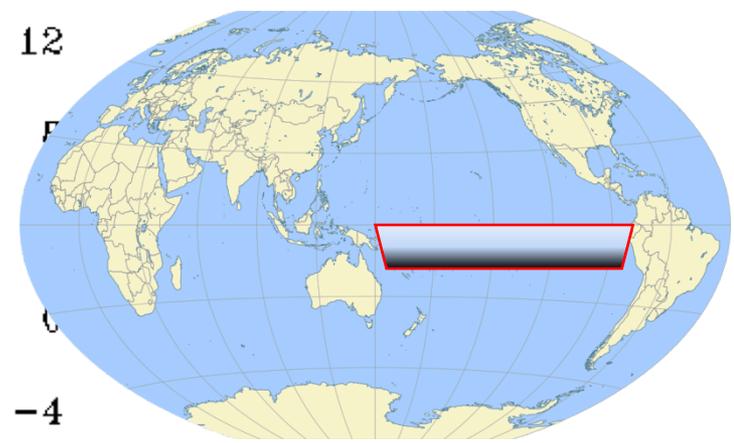
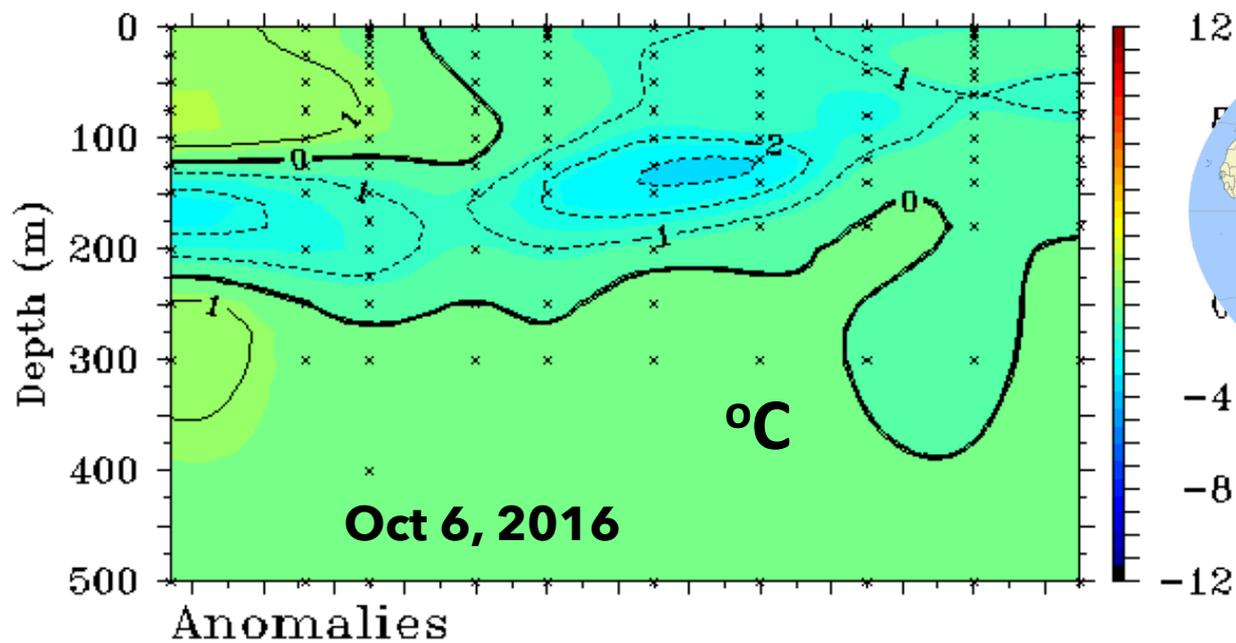


October 6, 2016



August, 1998

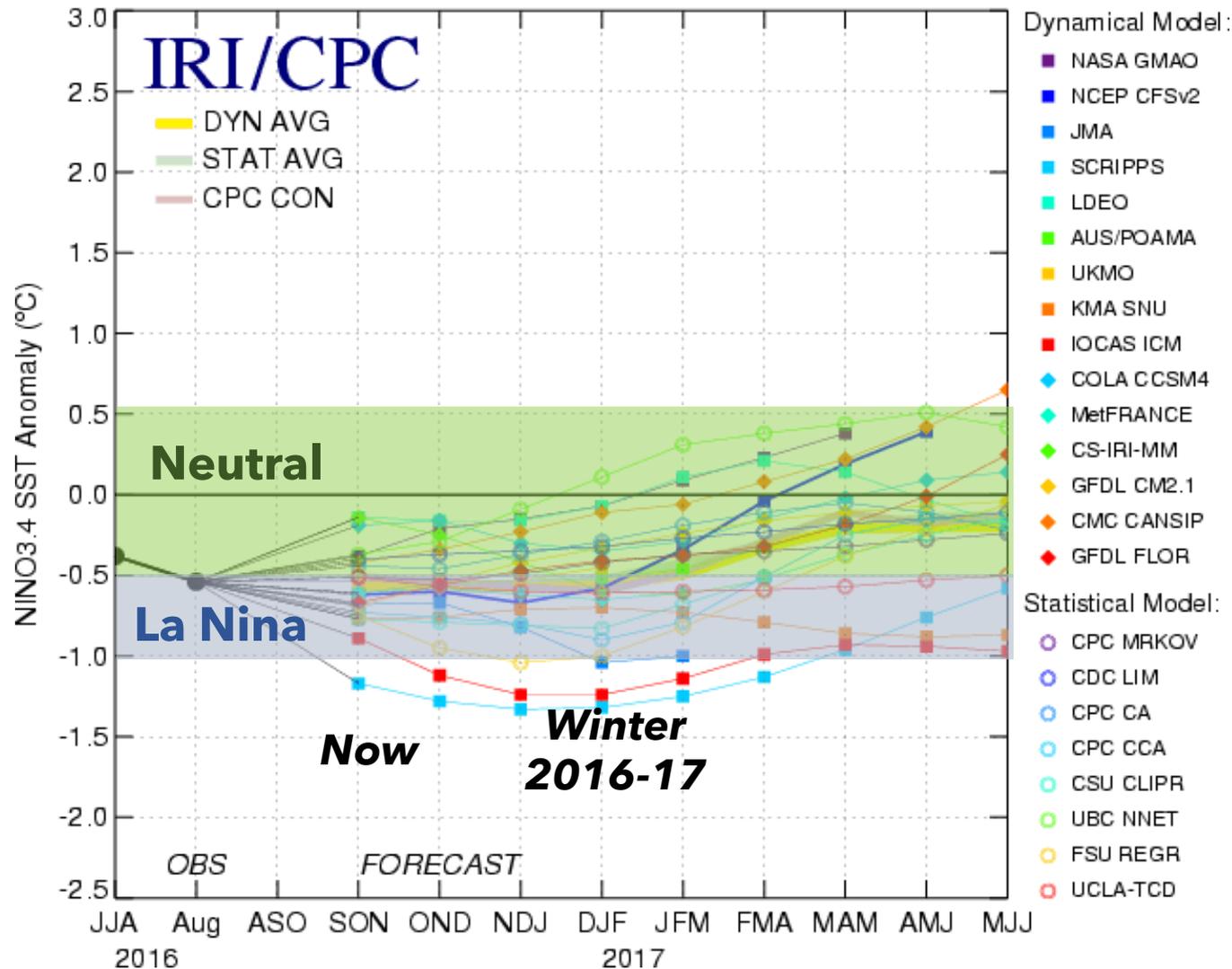




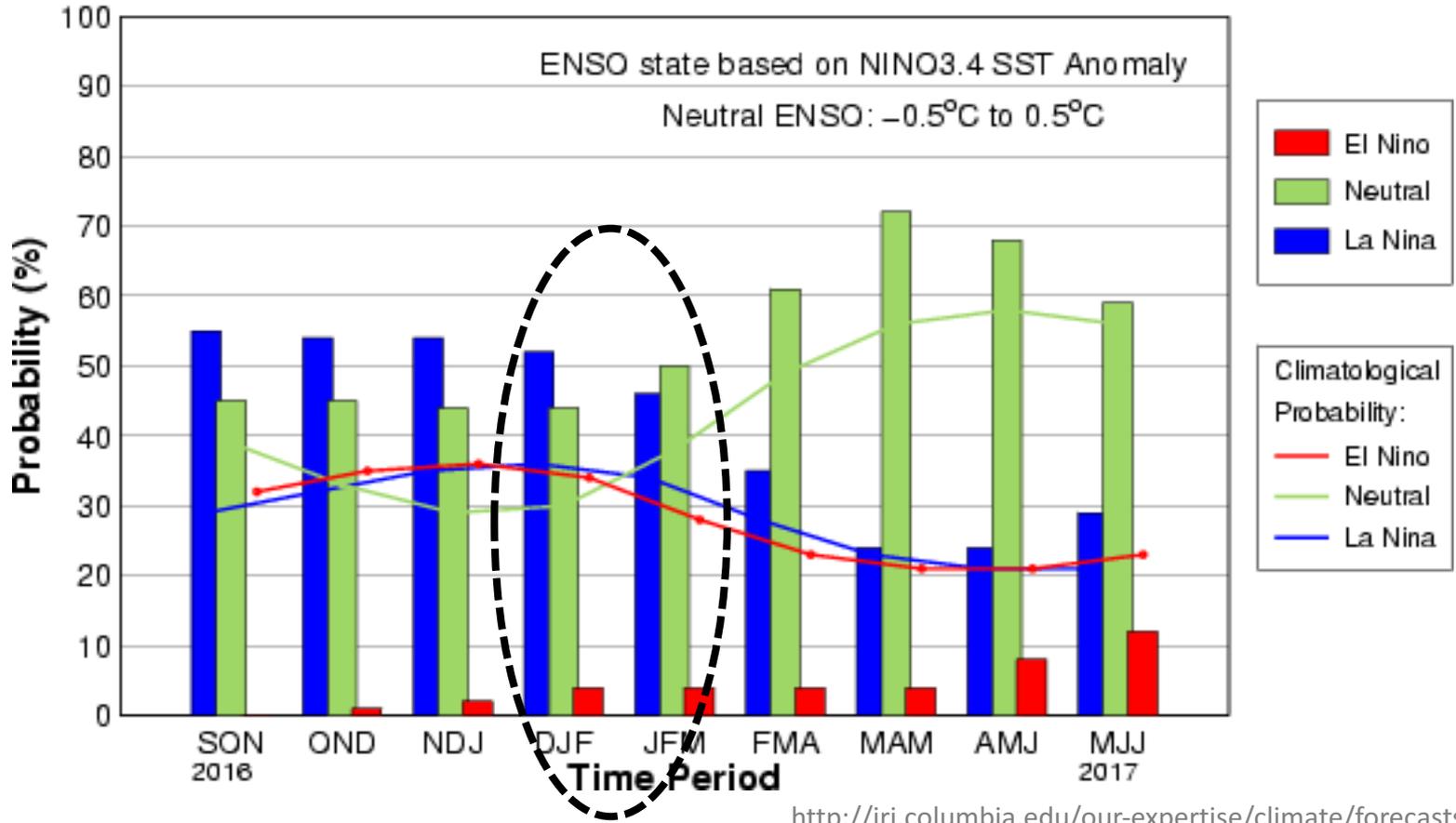
(Departure from normal water temperature for this time of year, °C)

Weak La Niña or ENSO Neutral Forecasted

Plume of Predictions of Tropical Pacific El Niño/La Niña Status through the Coming Season (from mid-September 2016)



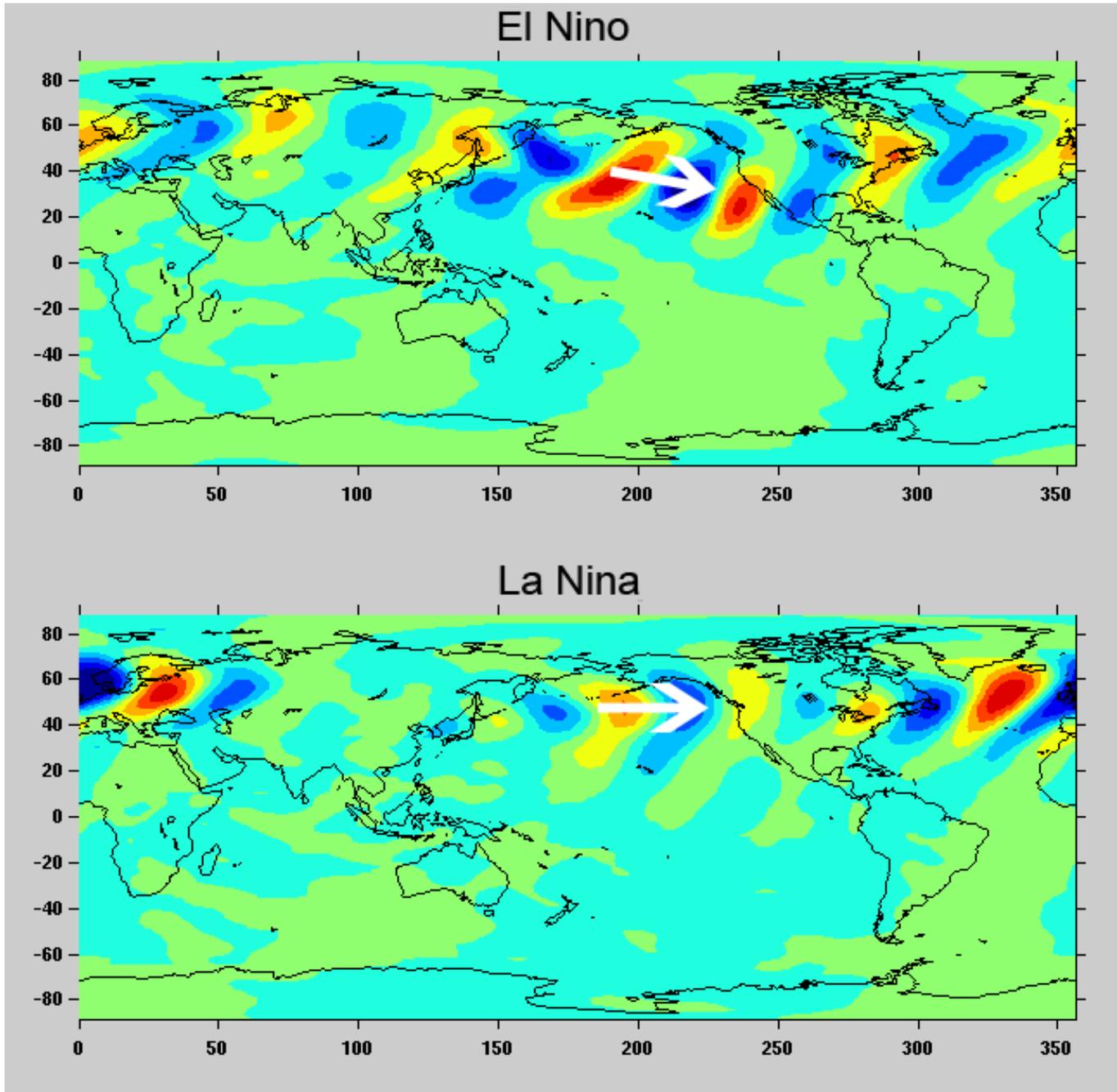
Mid-Sep IRI/CPC Model-Based Probabilistic ENSO Forecast



| | La Niña | Neutral | El Niño |
|-----------------------|---------|---------|---------|
| Climatology | 35% | 30% | 35% |
| NDJ, 2016-17 | 54% | 44% | 2% |
| DJF, 2016-2017 | 52% | 44% | 4% |
| JFM, 2017 | 46% | 50% | 4% |

How does La Niña affect our weather?

Colored
blobs
show
example
storms
coming
across
Pacific in El
Niño and
La Niña
year



Average Effect of La Niña on Winter Precipitation

(Departure from normal winter, %)

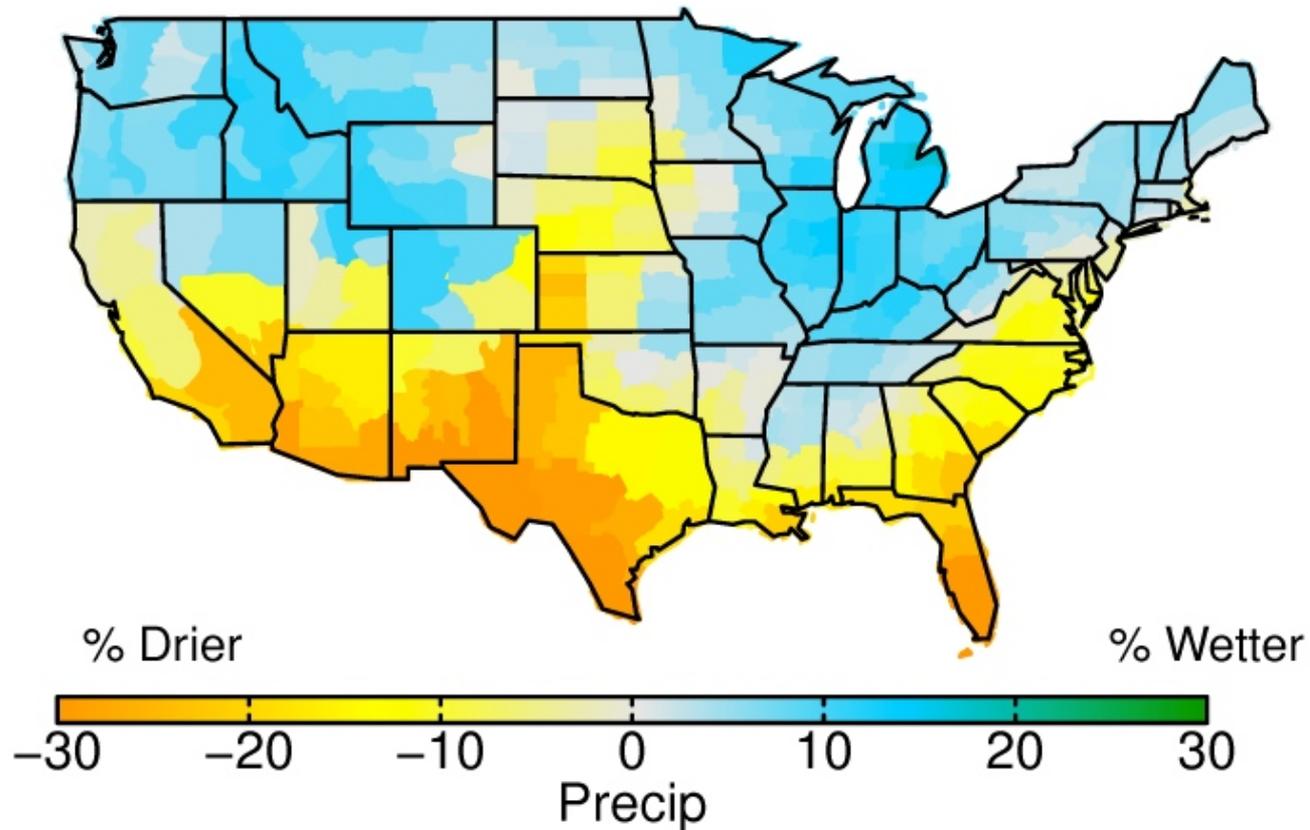


Figure courtesy of David W. Pierce (SIO)

Average Effect of La Niña on Winter Temperature

(Departure from normal winter, deg F)

Effect of La Nina Dec–Jan–Feb (deg–F)

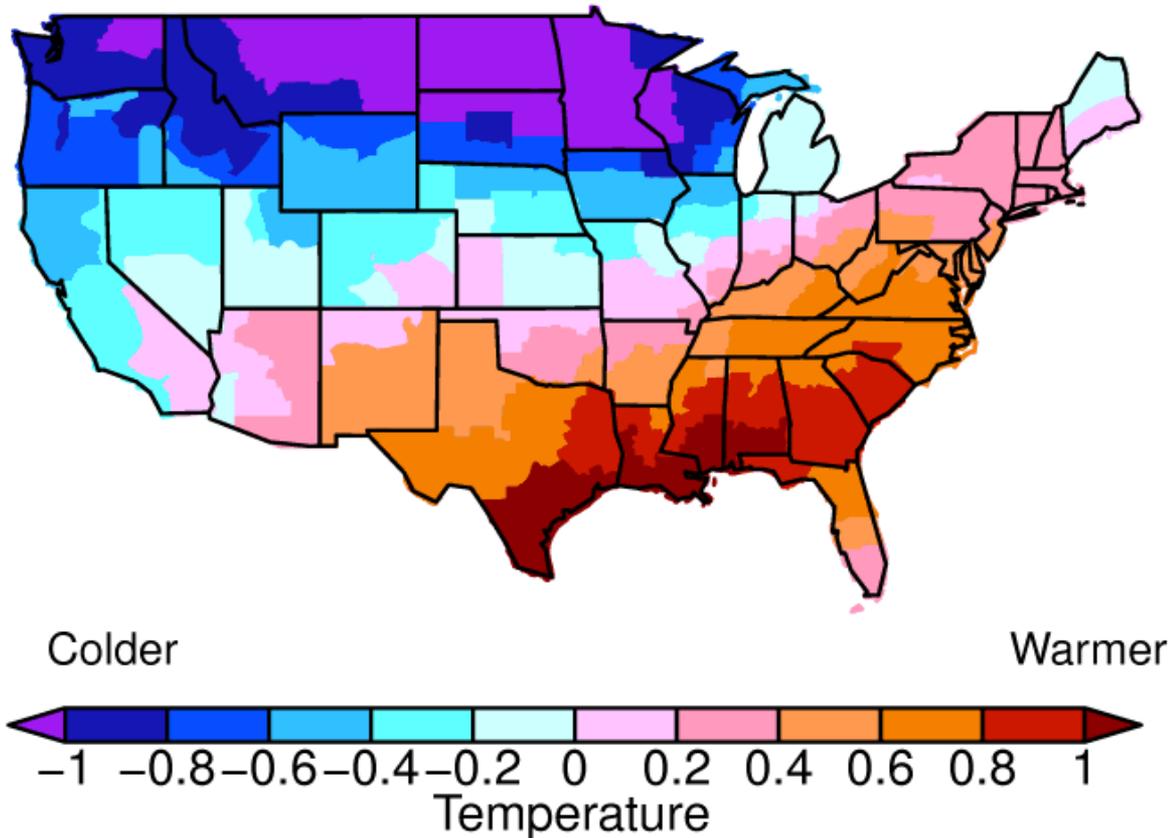
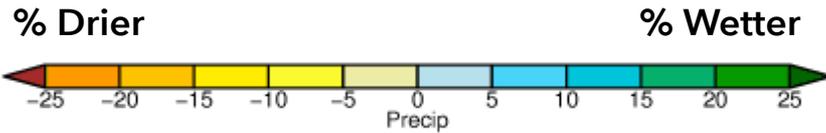
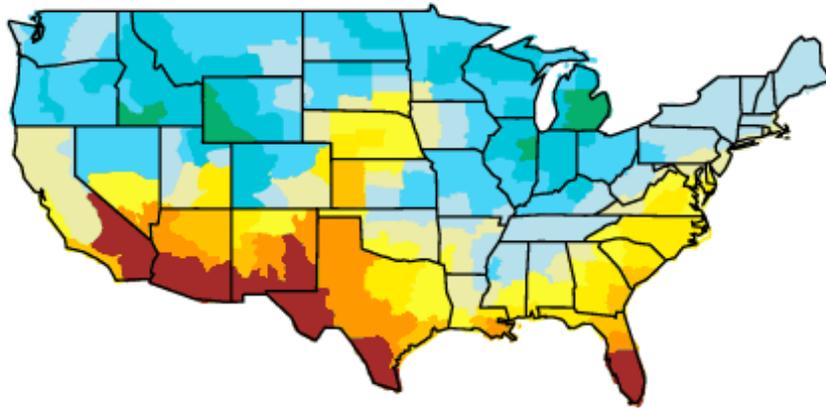


Figure courtesy of David W. Pierce (SIO)

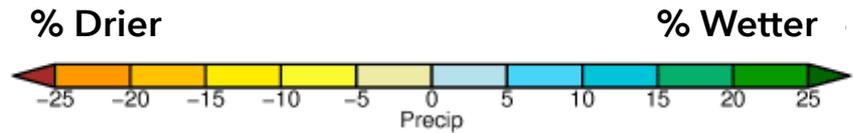
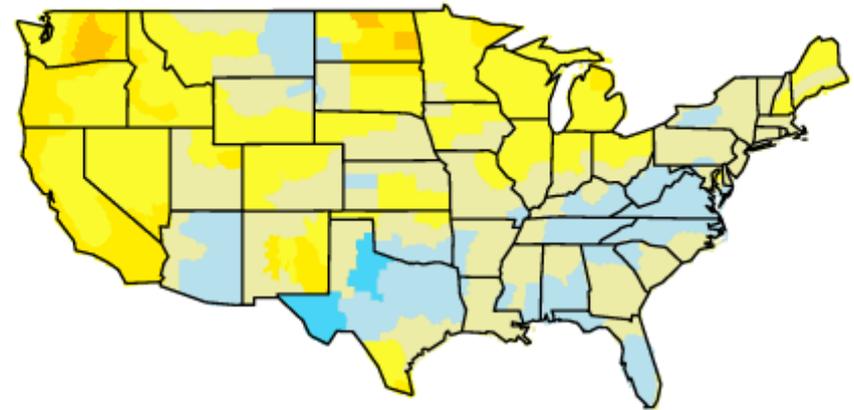
Average Effect of on Winter Precipitation

(Departure from normal winter, %)

La Niña

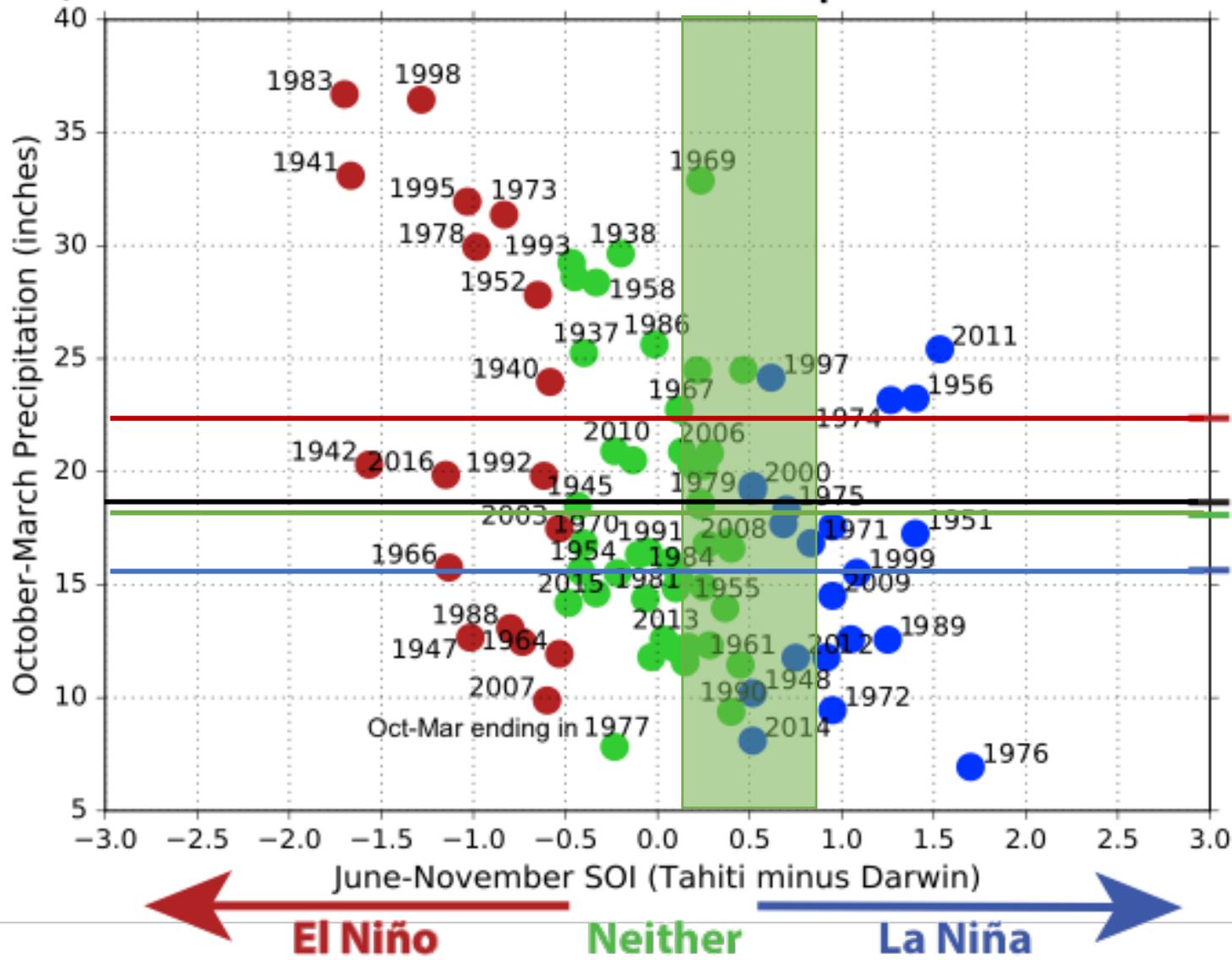


Neutral



CA Division 4 October-March Precipitation

(versus Southern Oscillation Index for prior June-November)



Years 1933/1934-2015/2016
 $r^2 = 0.16$
Correlation = -0.4

Mean = 22.48 in
Mean all = 18.57 in
Mean = 18.21 in
Mean = 15.99 in

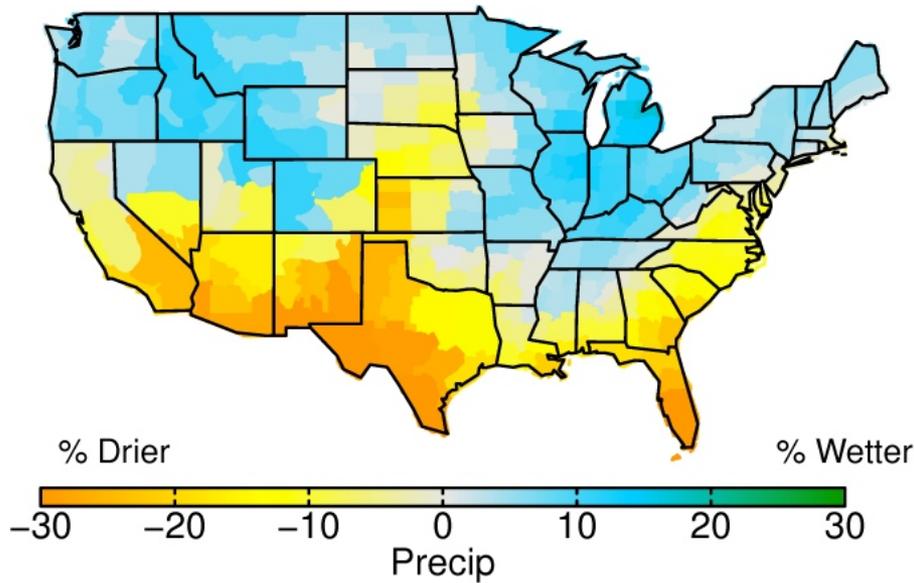


Western Regional Climate Center

Average La Niña vs. 4 Years of Drought

(Departure from normal for winter, %)

Average La Niña response



Drought, 2012-2015

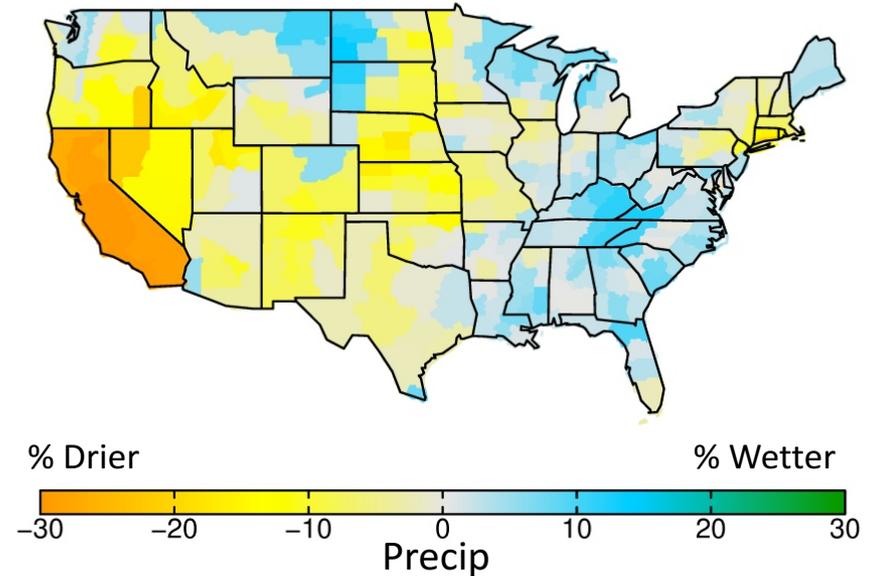
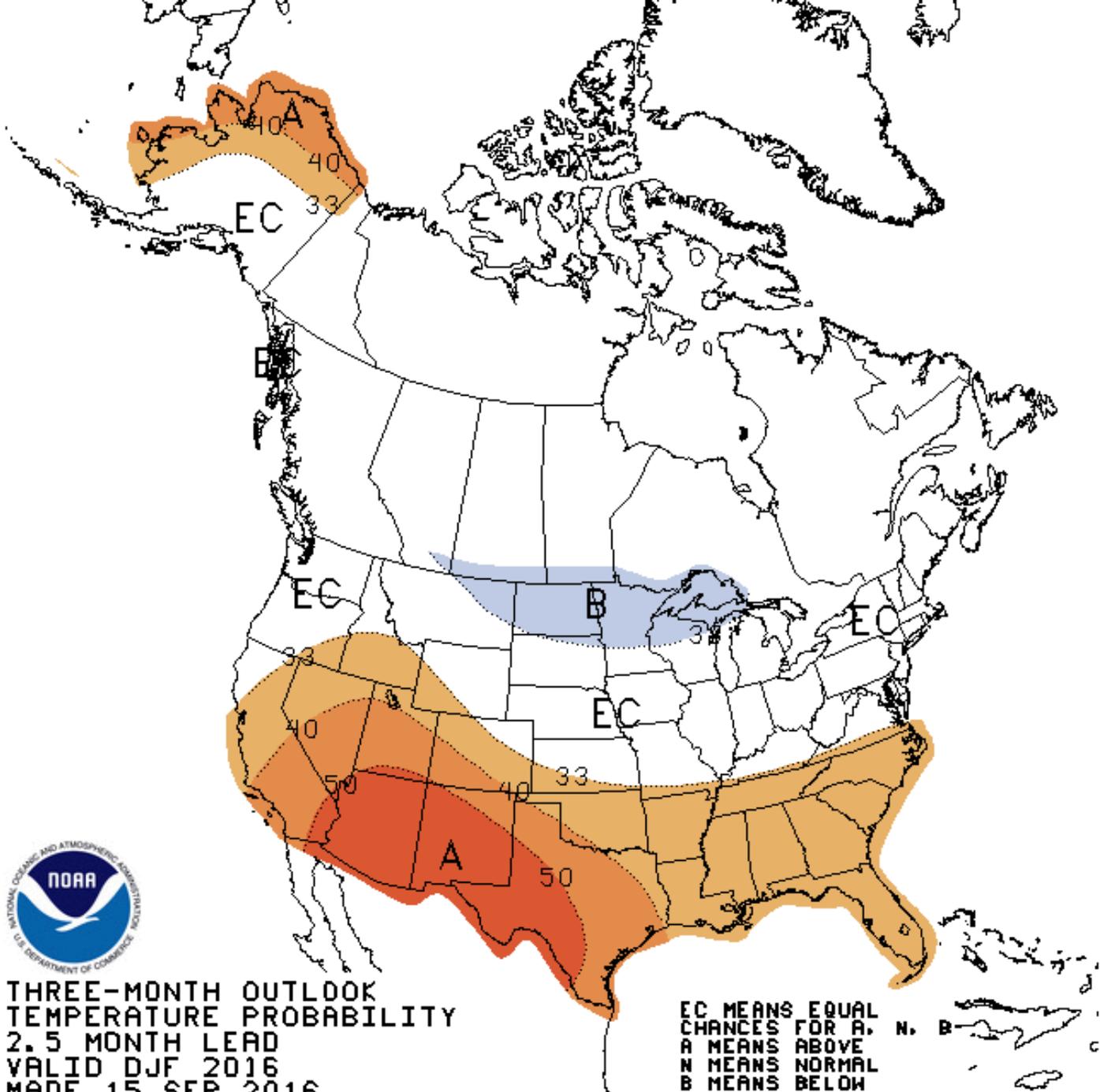


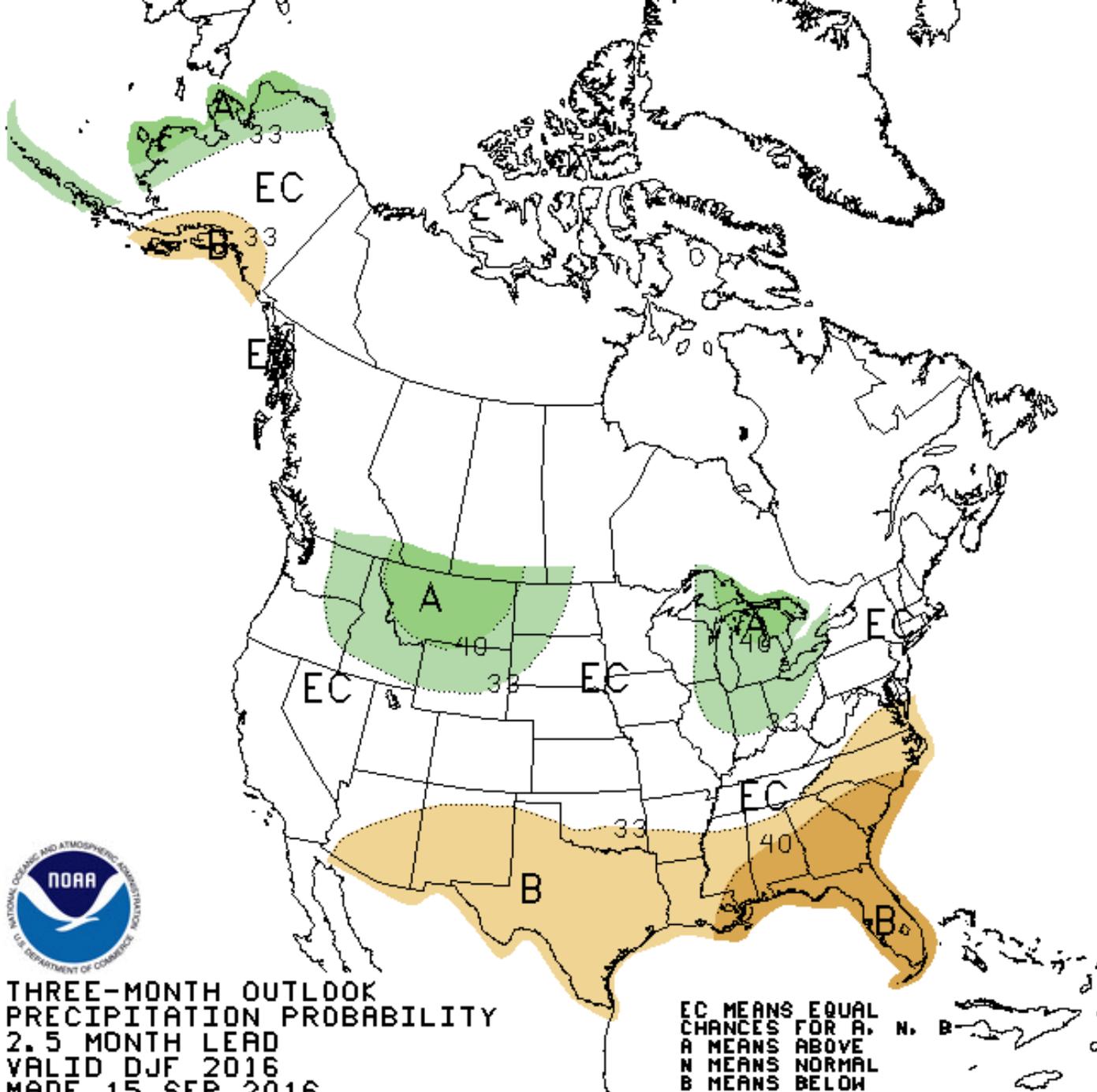
Figure courtesy of David W. Pierce (SIO)



THREE-MONTH OUTLOOK
 TEMPERATURE PROBABILITY
 2.5 MONTH LEAD
 VALID DJF 2016
 MADE 15 SEP 2016

EC MEANS EQUAL
 CHANCES FOR A,
 A MEANS ABOVE
 N MEANS NORMAL
 B MEANS BELOW

N. B. C.



THREE-MONTH OUTLOOK
 PRECIPITATION PROBABILITY
 2.5 MONTH LEAD
 VALID DJF 2016
 MADE 15 SEP 2016

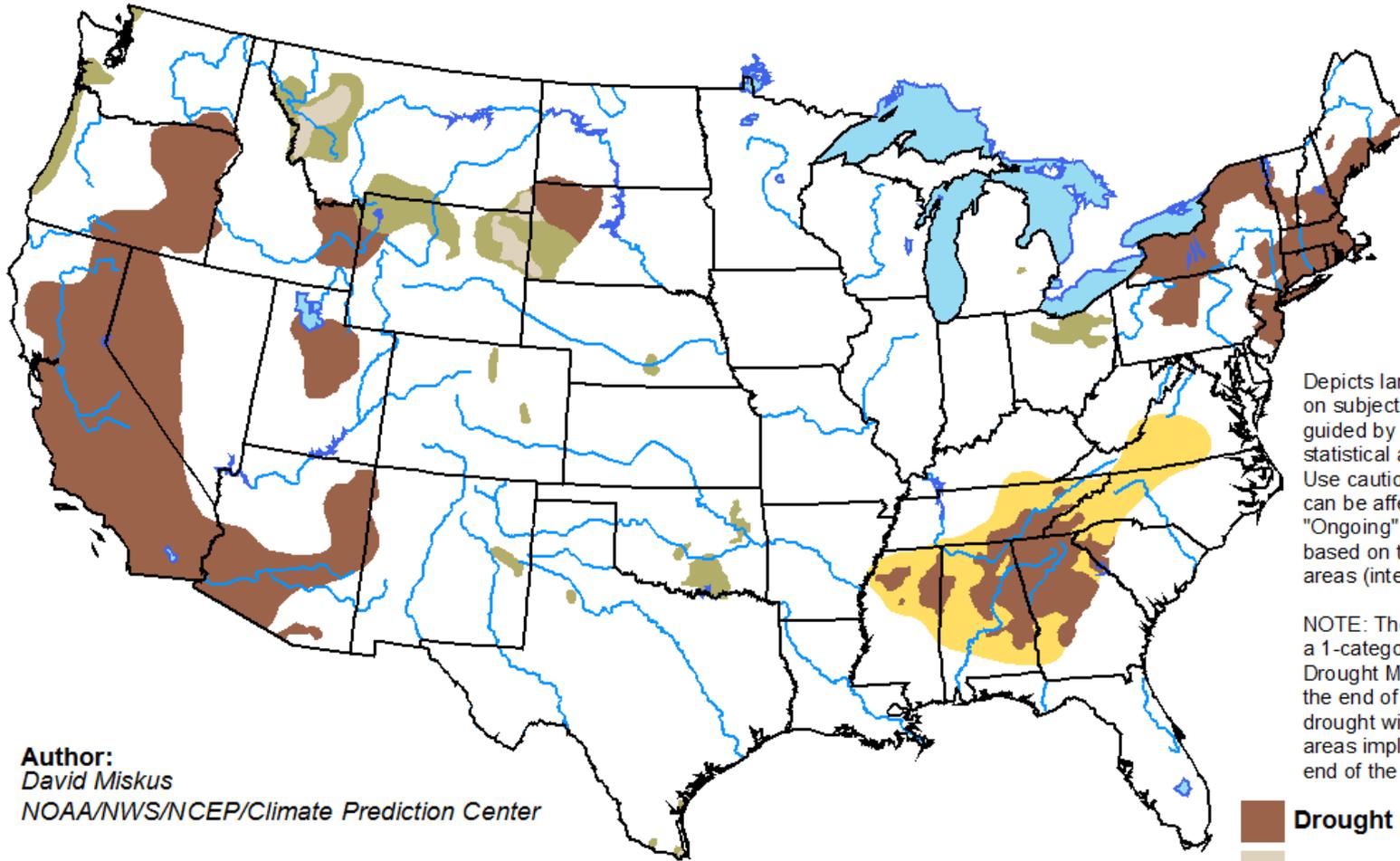
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U.S. Seasonal Drought Outlook valid for September 15 - December 31, 2016

Drought Tendency During the Valid Period

Released September 15, 2016

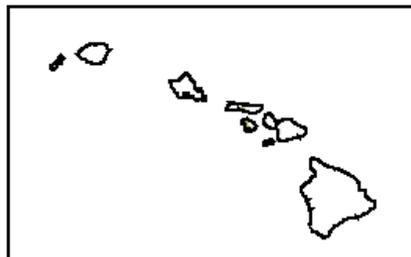
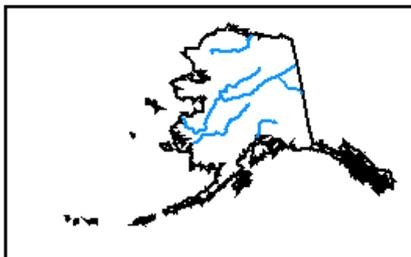


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:
David Miskus
NOAA/NWS/NCEP/Climate Prediction Center

-  Drought persists
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely



<http://go.usa.gov/3eZ73>

Summary

- Extended range prediction beyond the two week time frame relies on more slowly changing elements of the climate system that have been connected to our weather and climate – such as ENSO
- This year's warmer ocean conditions, or El Niño conditions, ended earlier this summer
- La Niña conditions for this water year had been forecasted, but the tropical ocean and atmosphere are currently mild – or in a **state of neutral conditions or near a weak La Niña**. Models (as of Sept 15th) are projecting this state to prevail this fall and winter, although its certainly not impossible that La Nina conditions could still develop.
- We looked at the past 5 years in comparison to observed La Niñas, including the atmospheric setup
- There are **many pathways that the climate system can follow after a large El Nino events**, what's to be determined is where and when, or if, atmospheric rivers or individual storms will visit California this winter.
- **Next ENSO Forecast Update: October 13th & 20th**