



# **The 2017-2018 U. S. Winter Outlook**

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# Outline

- **About the Seasonal Outlook**
- Review of 2016-17 U. S. Winter (DJF) Outlook
- Potential Climate Features impacting U. S. Winter
- 2017-18 U. S. Winter (DJF) Outlook
- Sub-seasonal Outlooks

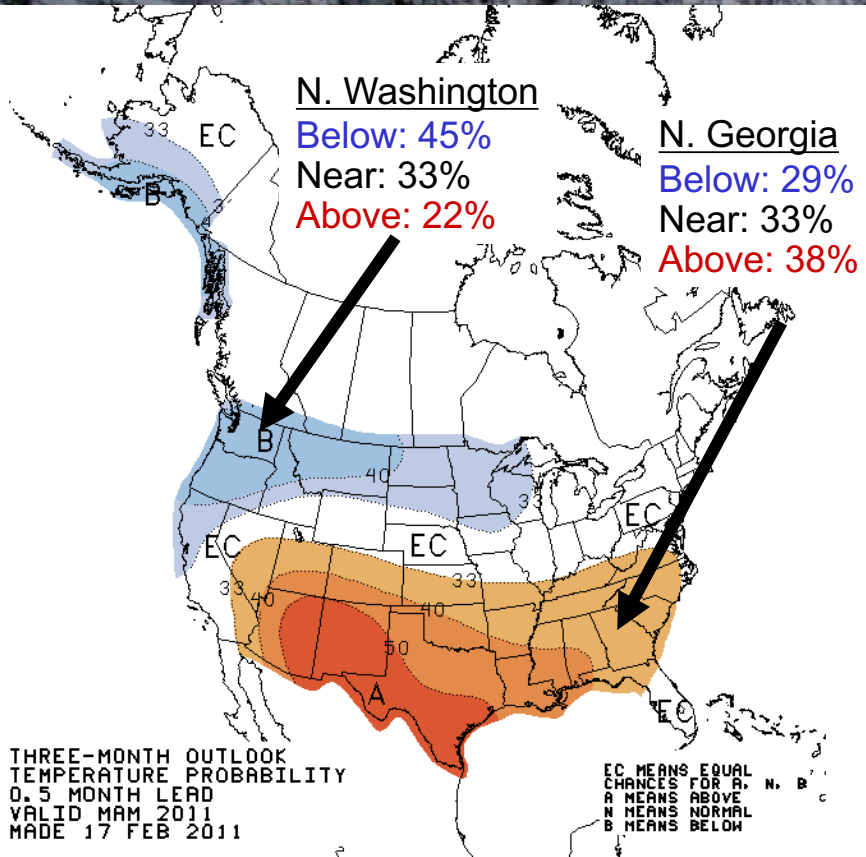


# Outlook Categories and Probabilities

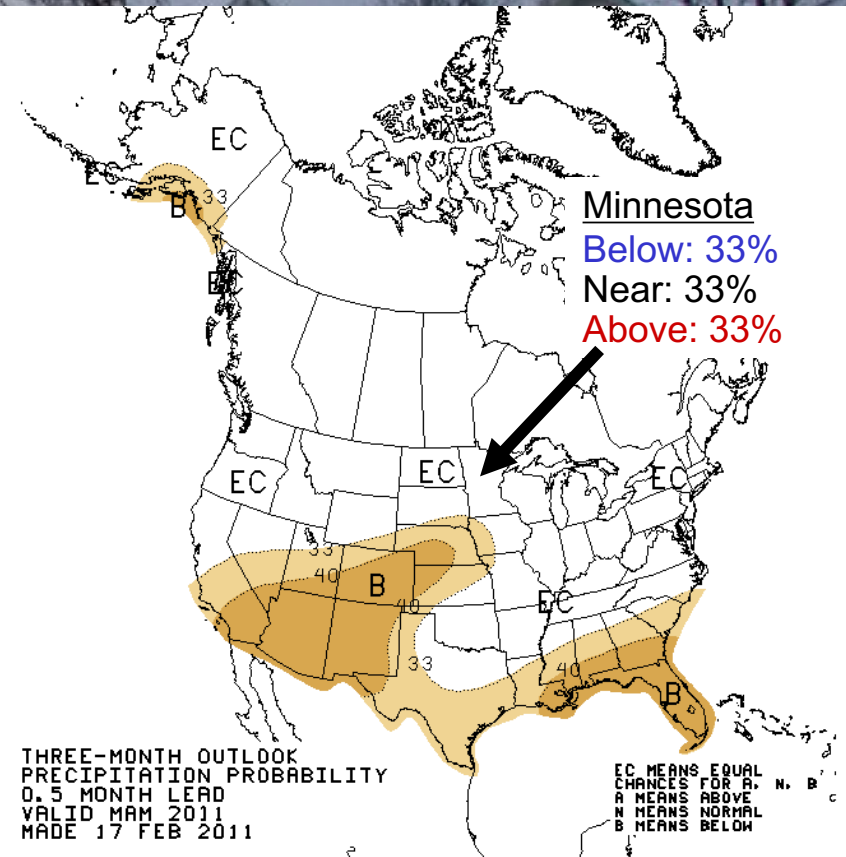
- **Seasonal outlooks are prepared for average temperature and total accumulated precipitation category**
- **Three categories are used (terciles). These are BELOW-, NEAR- and ABOVE-normal (median), for temperature (precipitation).**
- **Regions where the likelihoods of the three categories are the same (33.33...% each) are designated as “EC”, for equal chances.**
- **In non-EC regions the labels on the contours give the total probability of the dominant category.**

# U. S. Seasonal Outlooks Interpretation

## Temperature



## Precipitation





# About the Seasonal Outlook

- Each month, near mid-month CPC prepares a set of 13 outlooks for 3-month “seasons” (any set of 3 adjacent months) for lead times ranging from  $\frac{1}{2}$  month,  $1\frac{1}{2}$  months,  $2\frac{1}{2}$  months,  $3\frac{1}{2}$  months, ...,  $12\frac{1}{2}$  months.

**Next Outlook: October 19**

**Final Winter Outlook: November 16**

- The outlook for each successive/prior lead time overlaps the prior/successive one by 2 months. This overlap makes for a smooth variation from one map to the next.



# Outline

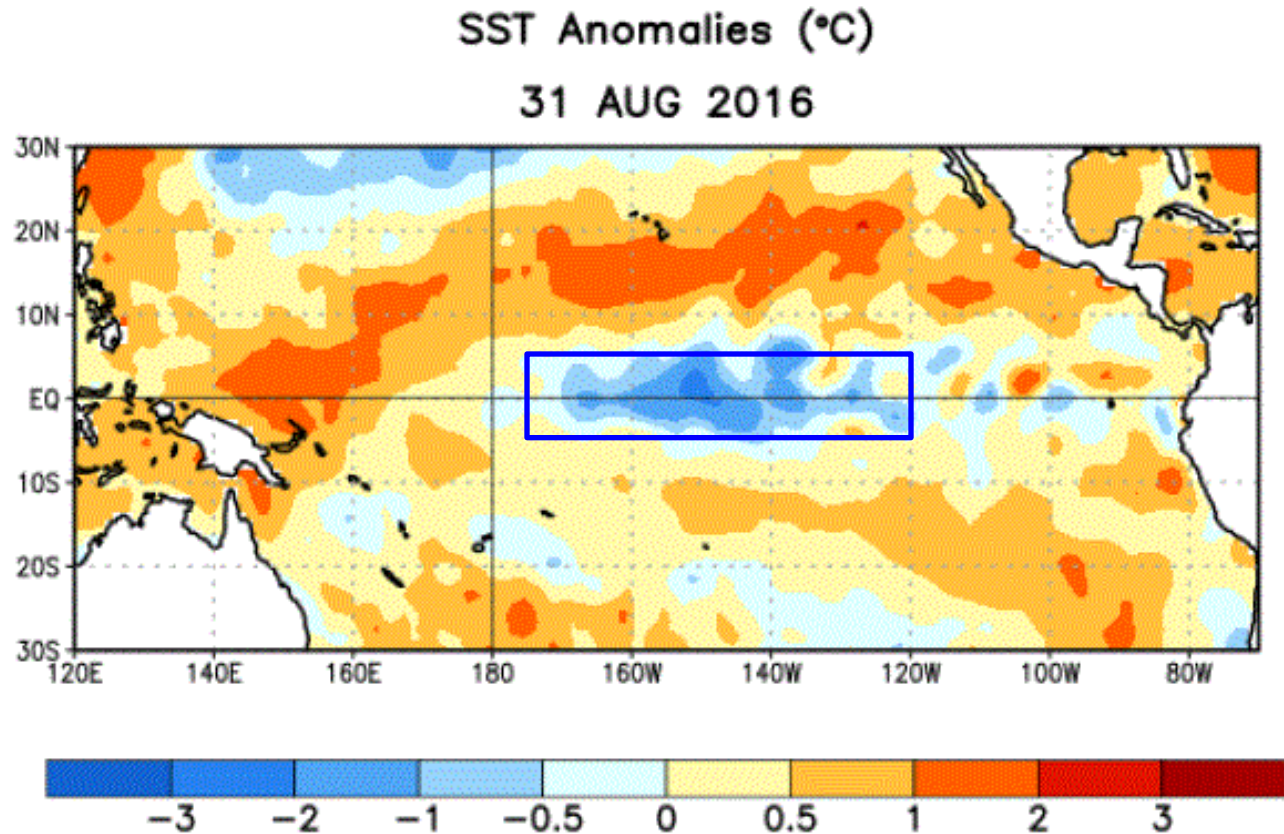
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# Winter 2016-17 Outlook Rationale (from Sept. 2016)

- Last year's strong El Niño dissipated during the Spring, with neutral conditions prevailing since.
- ENSO-neutral is favored to persist through the winter, with about a 40% chance that La Niña will develop.
- AO has been and continues to be erratic. Large swings possible in any year (e.g. DJF 2009-10).
- DJF temperature trends relative to 1981-2010 base period are generally small over country; precipitation trends resemble La Niña.
- Forecast consistent with models with slight nod toward weak La Niña.

*ENSO-Neutral conditions are slightly favored (between 55-60%) during the upcoming Northern Hemisphere fall and winter 2016-17.*







# Pacific Niño 3.4 SST Outlook

Models generally favor that Niño 3.4 will be between zero and  $-1.0^{\circ}\text{C}$  during late 2016 and early 2017.

Mid-Sep 2016 Plume of Model ENSO Predictions

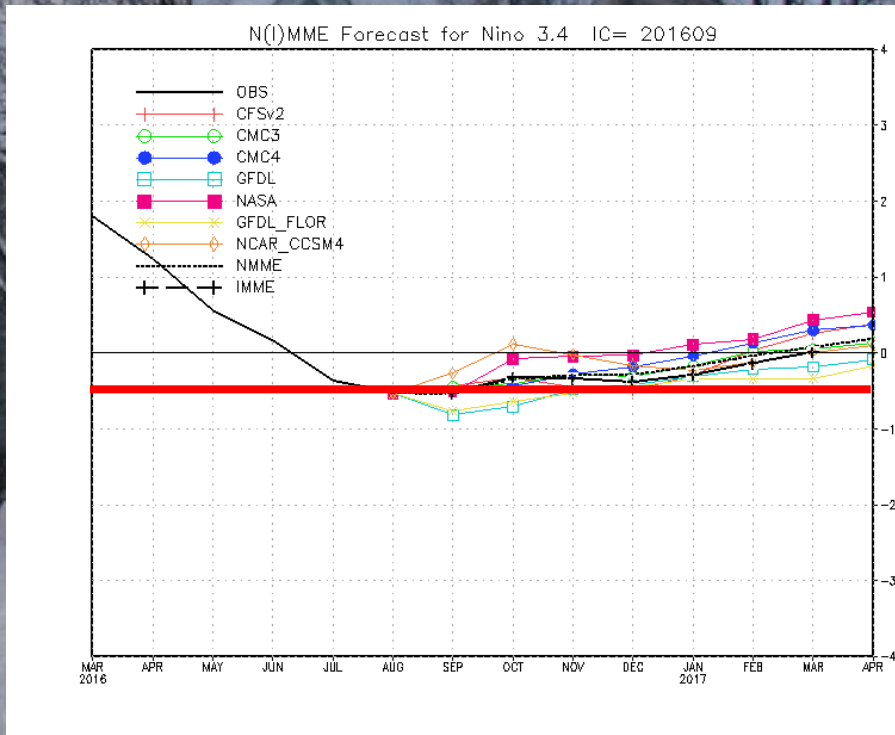
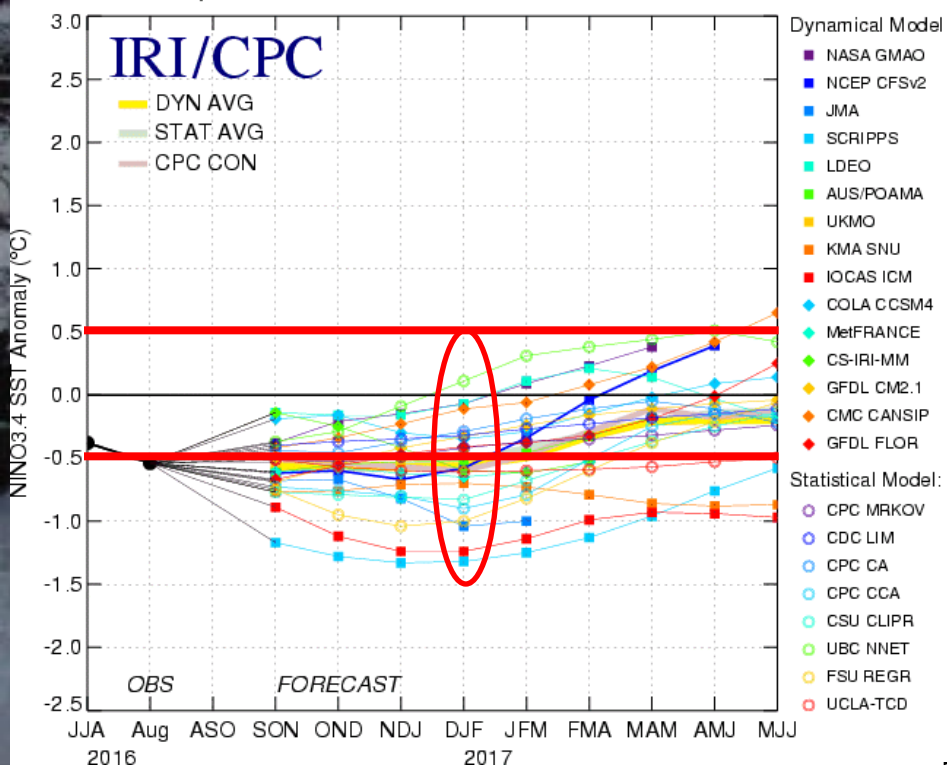
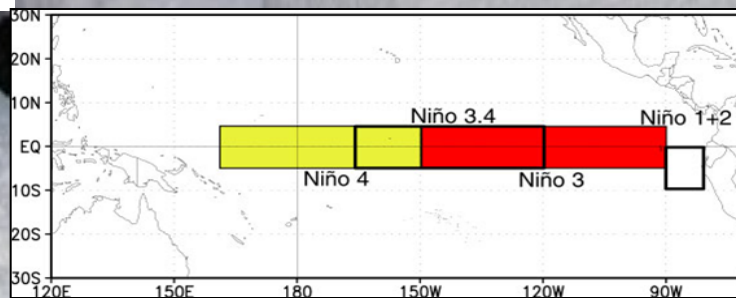
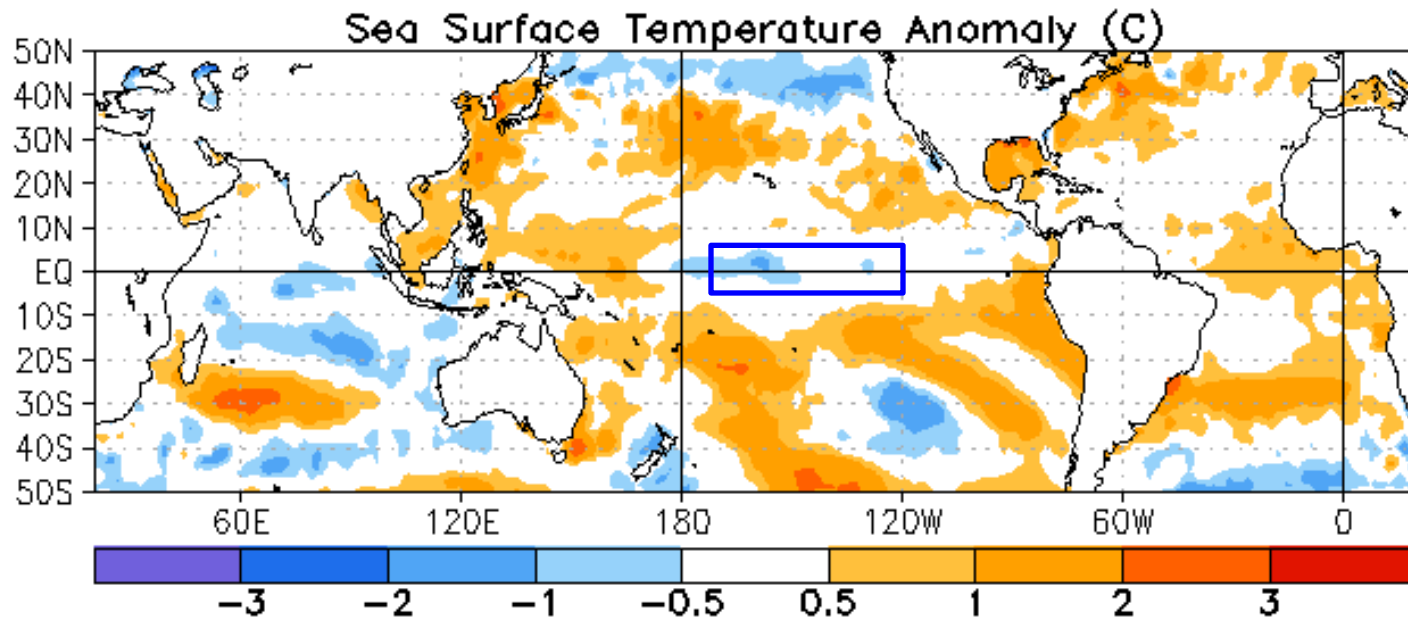


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 13 September 2015).



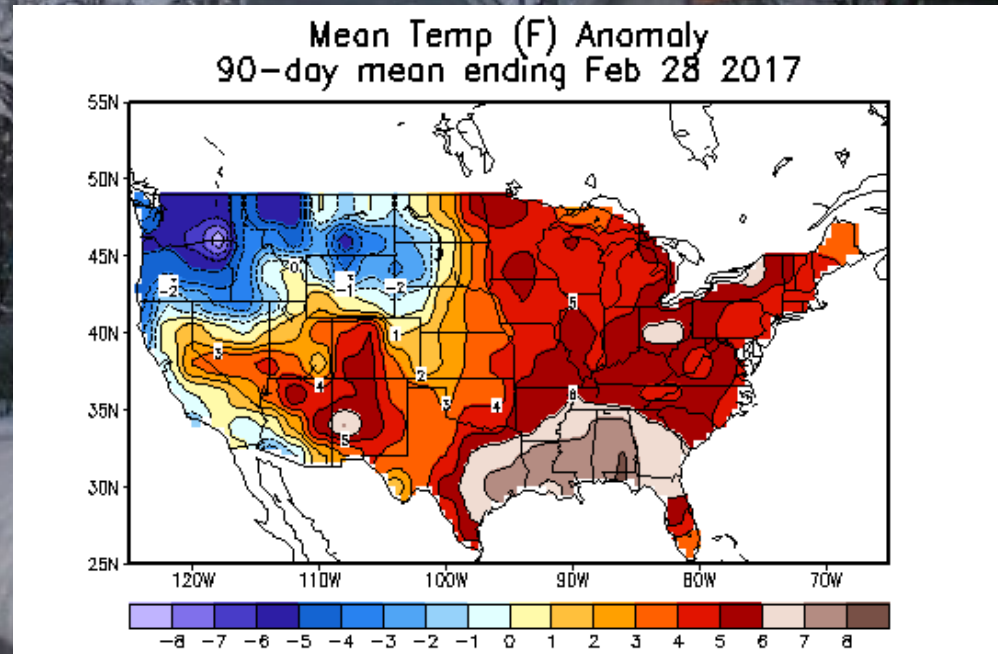
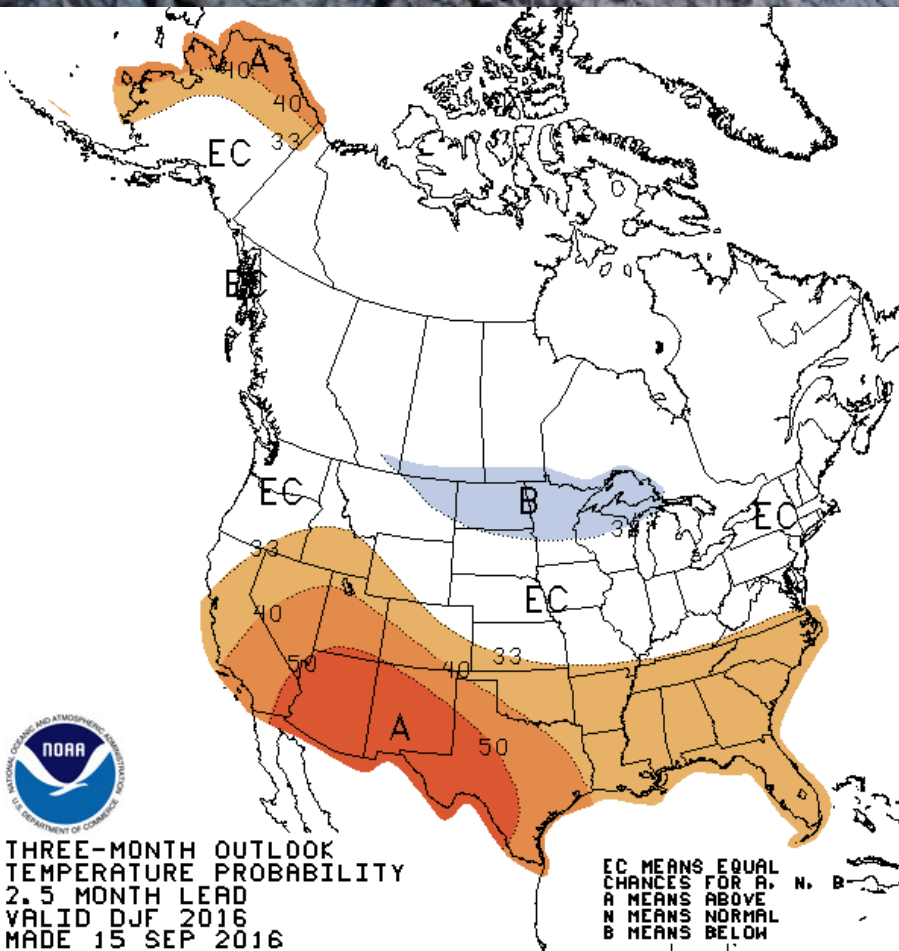
## January 2017 SST Anomalies



DJF Oceanic Niño Index = -0.4



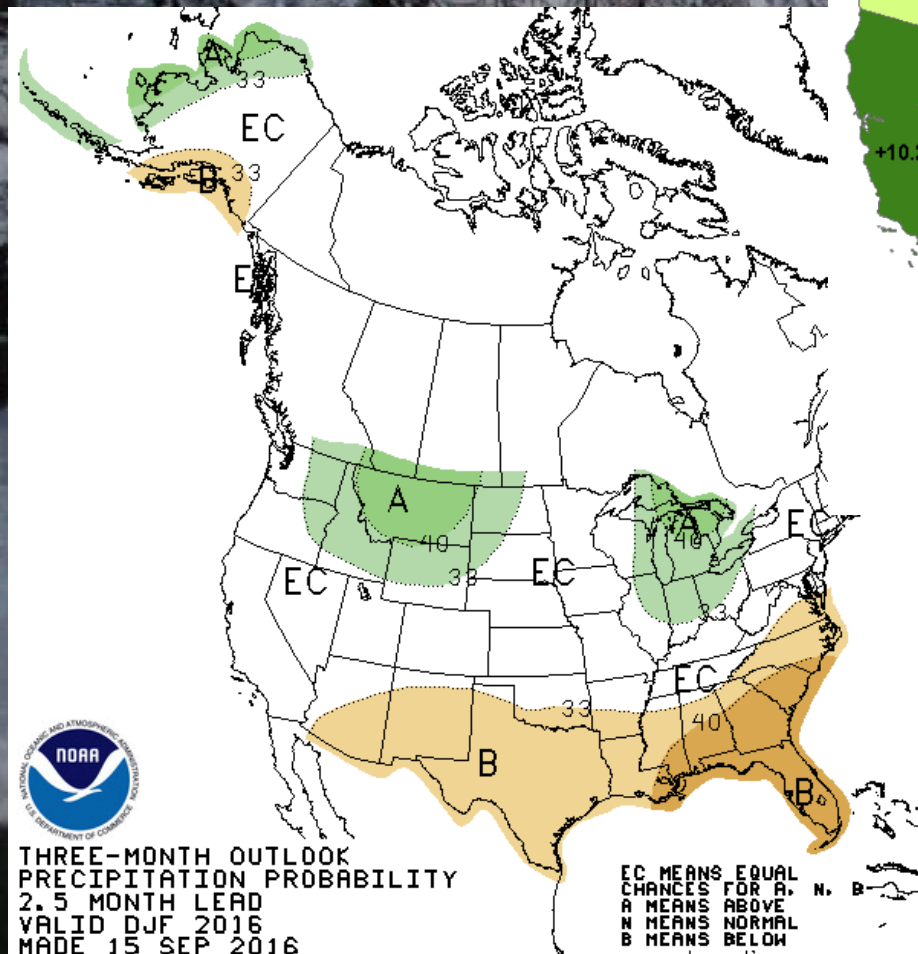
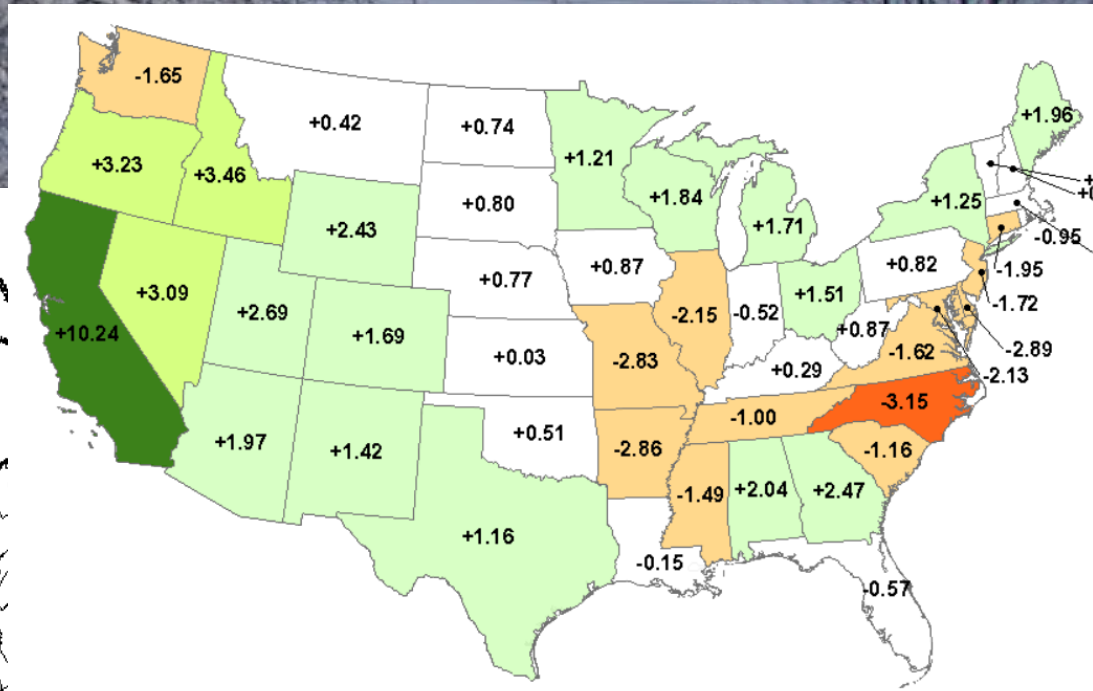
# December 2016 – February 2017 Temperature Outlook



Heidke Skill Score: 47.7  
Coverage: 67%



# December 2016 – February 2017 Precipitation Outlook

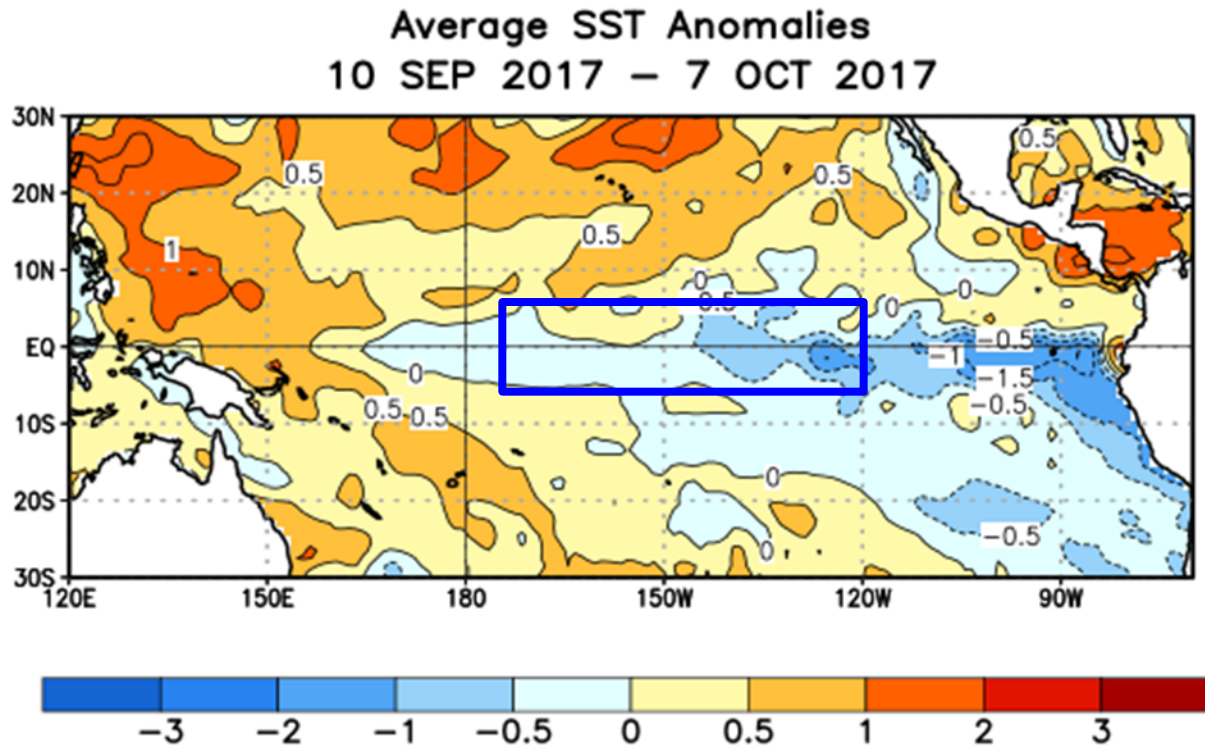




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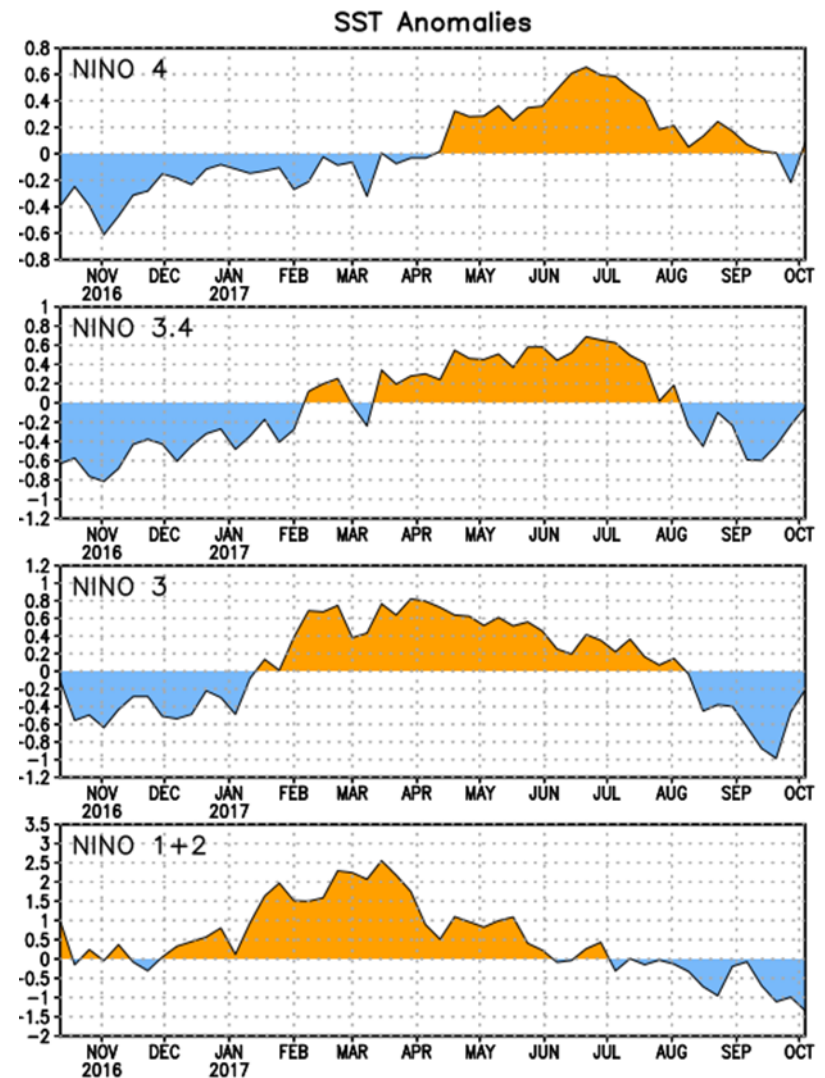
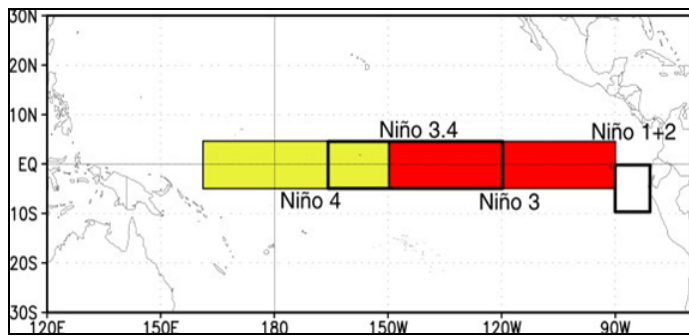
*There is an increasing chance (~55-60%) of La Niña during the Northern Hemisphere fall and winter 2017-18.*

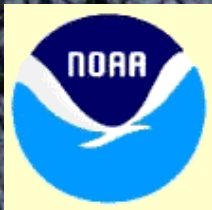


# Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	0.1°C
Niño 3.4	0.0°C
Niño 3	-0.2°C
Niño 1+2	-1.4°C





# Pacific Niño 3.4 SST Outlook

Models generally favor that Niño 3.4 will be between  $-0.5^{\circ}$  and  $-1.0^{\circ}\text{C}$  during late 2017 and early 2018.

Mid-Sep 2016 Plume of Model ENSO Predictions

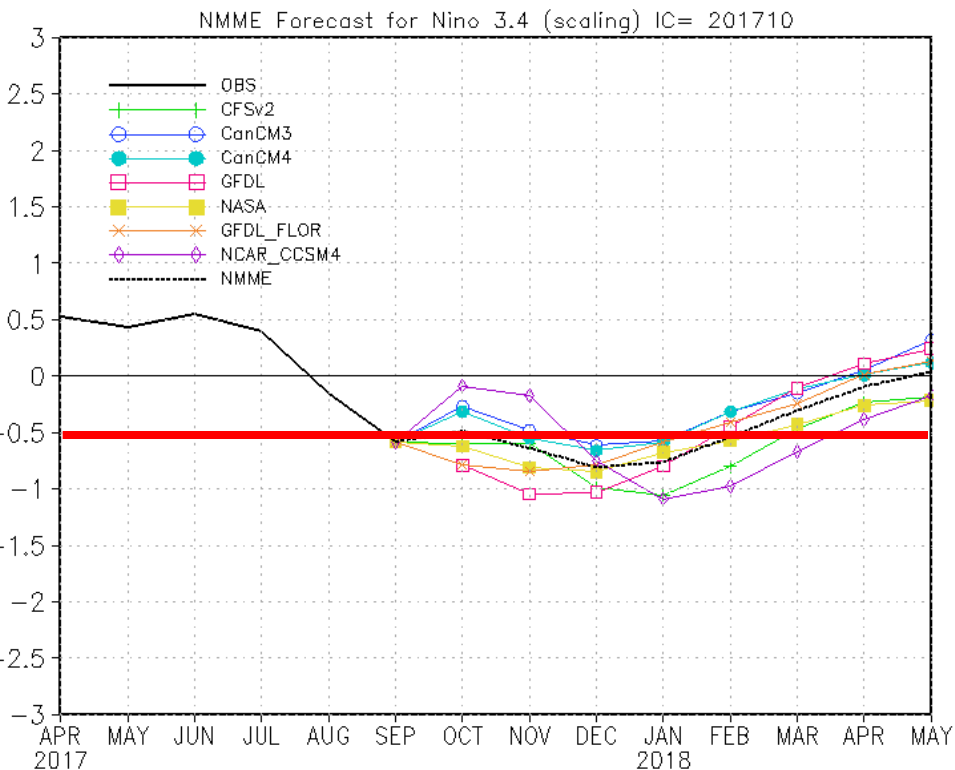
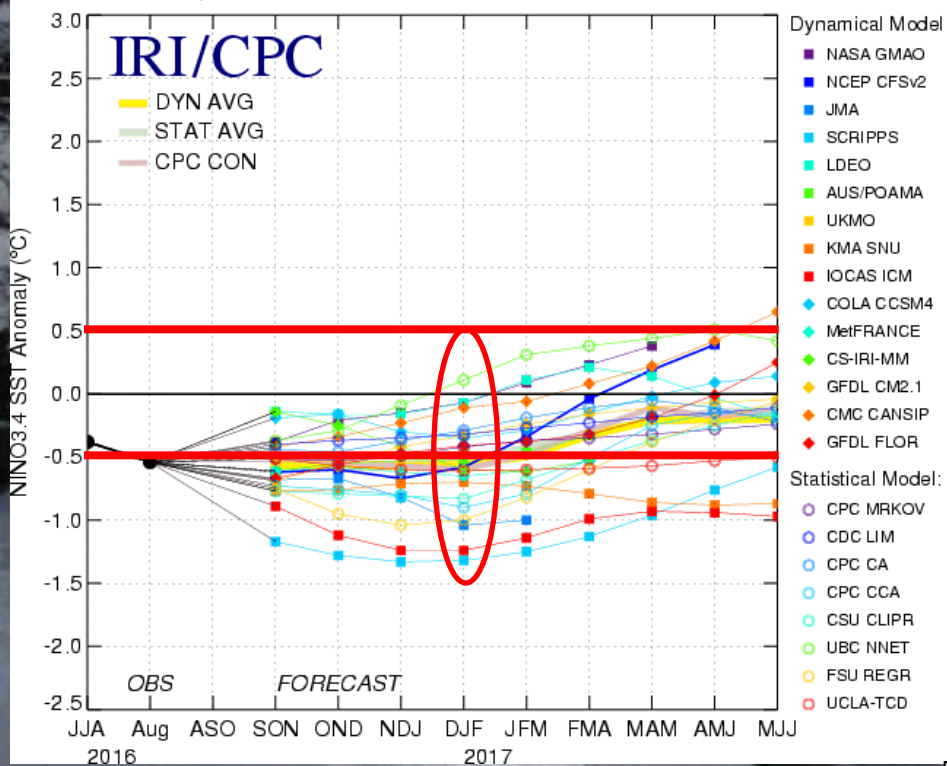
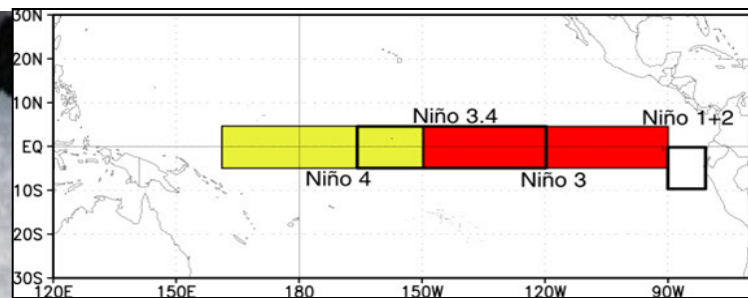


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 September 2017).





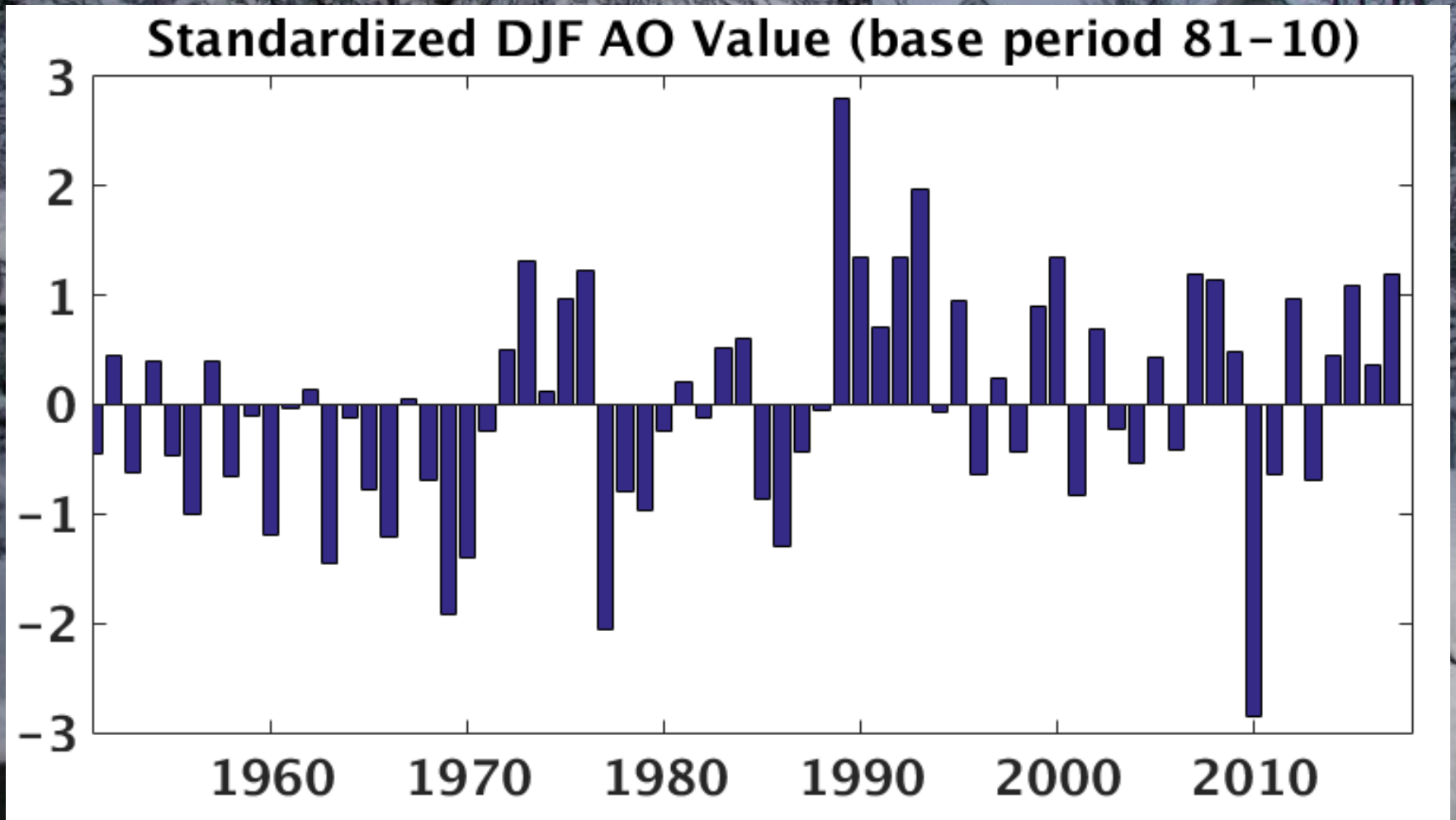


# NORTH ATLANTIC OSCILLATION/ ARCTIC OSCILLATION

- A major source of intraseasonal variability over the U. S., Atlantic and Europe during winter.
- Modulates the circulation pattern over the high latitudes thereby regulating the number and intensity of significant weather events affecting the U.S., such as cold air outbreaks.
- Currently there is no reliable capability to forecast the seasonal phase.



# NH Winter Arctic Oscillation (AO)





# Optimal Climate Normal (OCN)

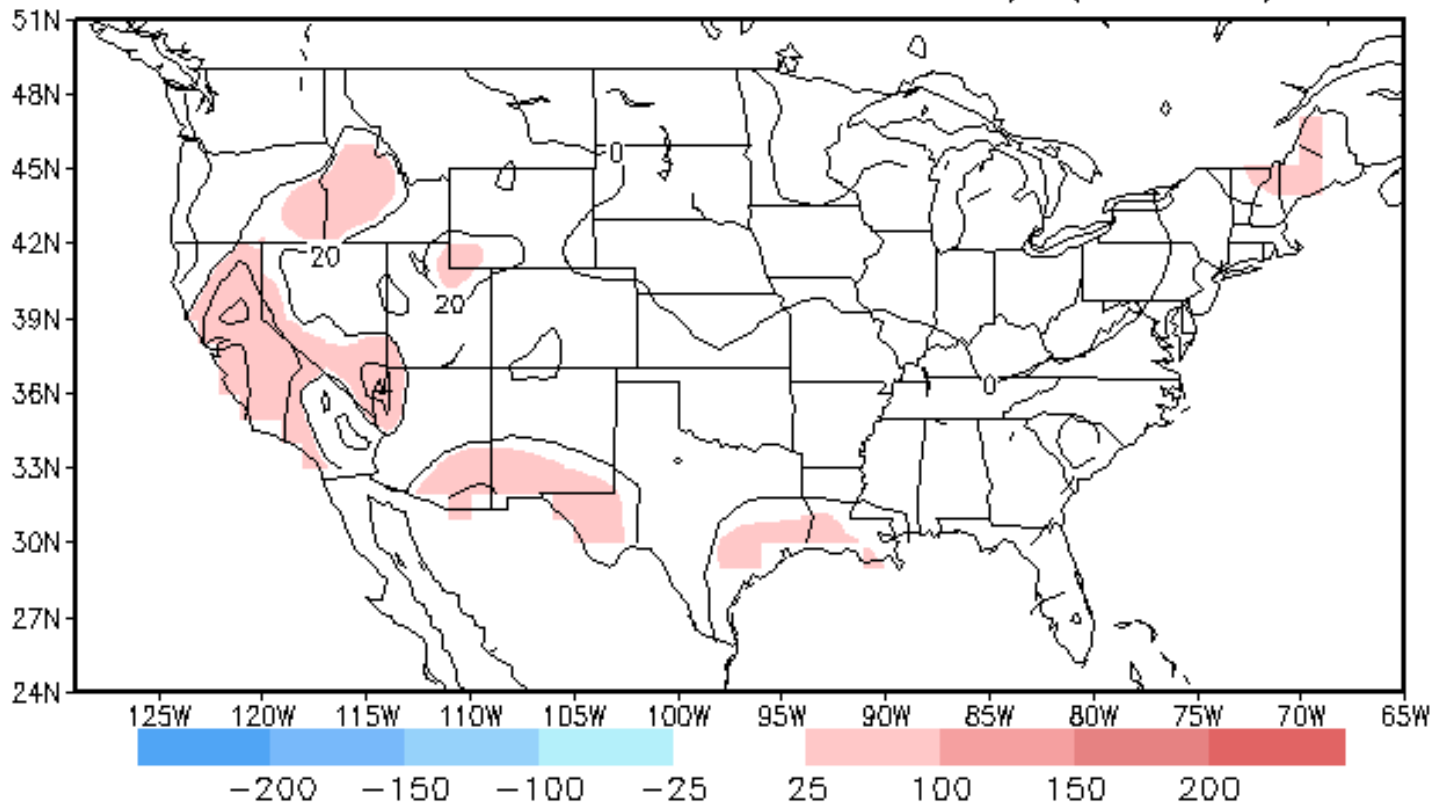
- **OCN, as it is used as a tool at CPC is, quite simply, a measure of the trend. For a given station and season, the OCN forecast is the difference between the seasonal mean temperature during the last 15 years and the 30 year climatology.**



# December - February OCN

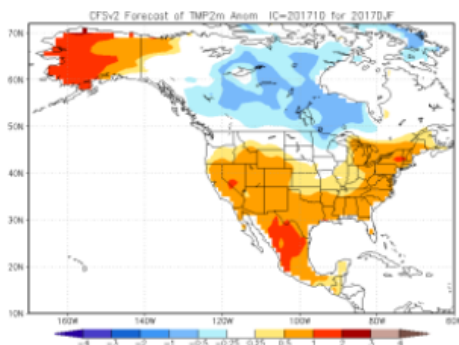
## 2002-2016

hmgz temperature OCN (15 year) forecast for DJF  
base 1981-2010; units: anomaly (sdX100)

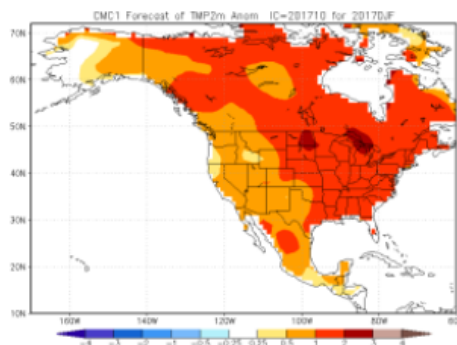


# Individual NMME Model Forecasts DJF

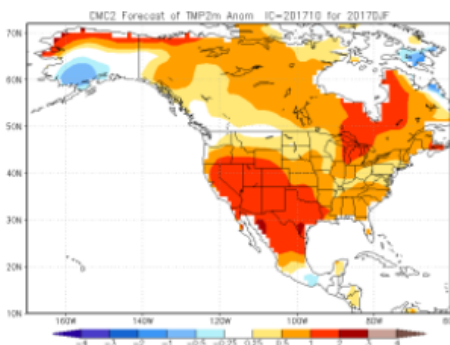
**NCEP CFSv2**



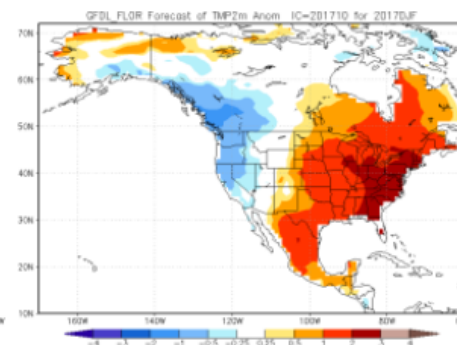
**CMC1 CanCM3**



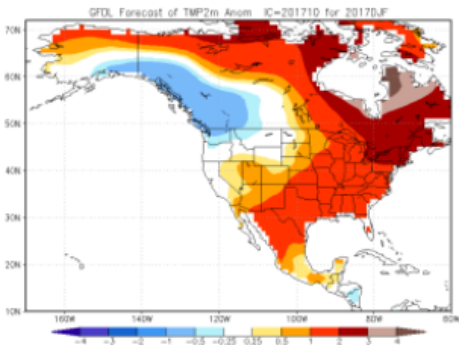
**CMC2 CanCM4**



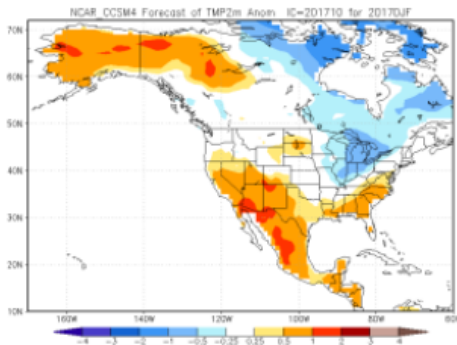
**GFDL FLOR**



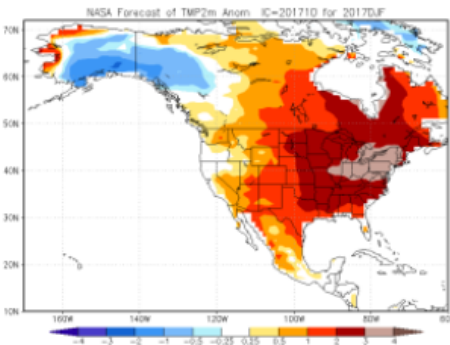
**GFDL CM2.1**



**NCAR CCSM4**



**NASA GEOS5**

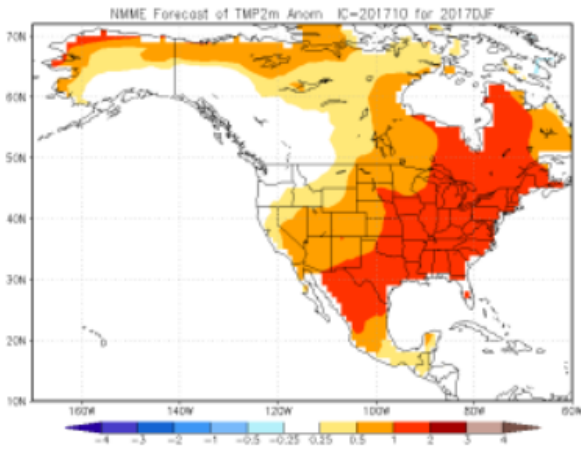


Forecast updated Oct. 8, 2017

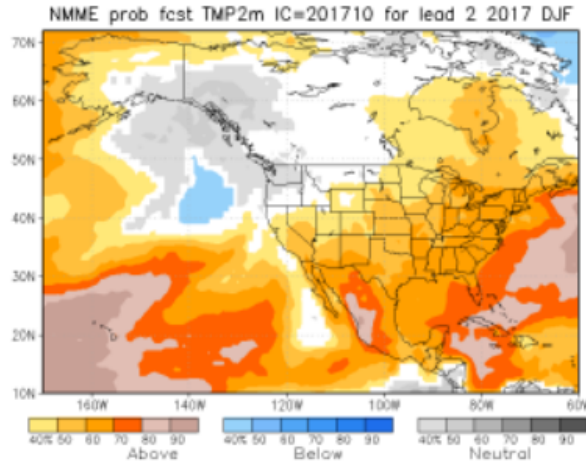


# National Multi-Model Ensemble

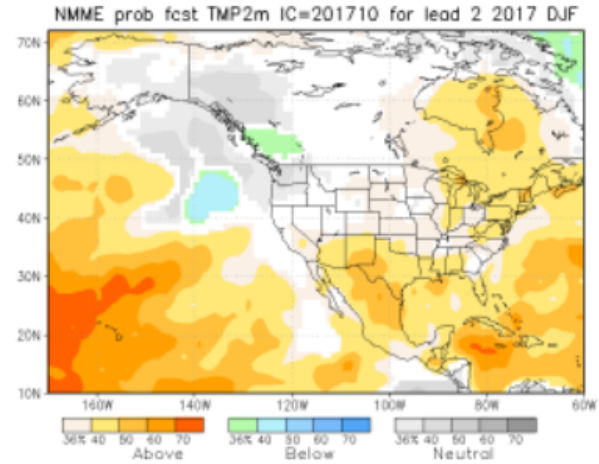
NMME



Prob fcst



PAC calib. prob fcst



Forecast updated Oct. 8, 2017



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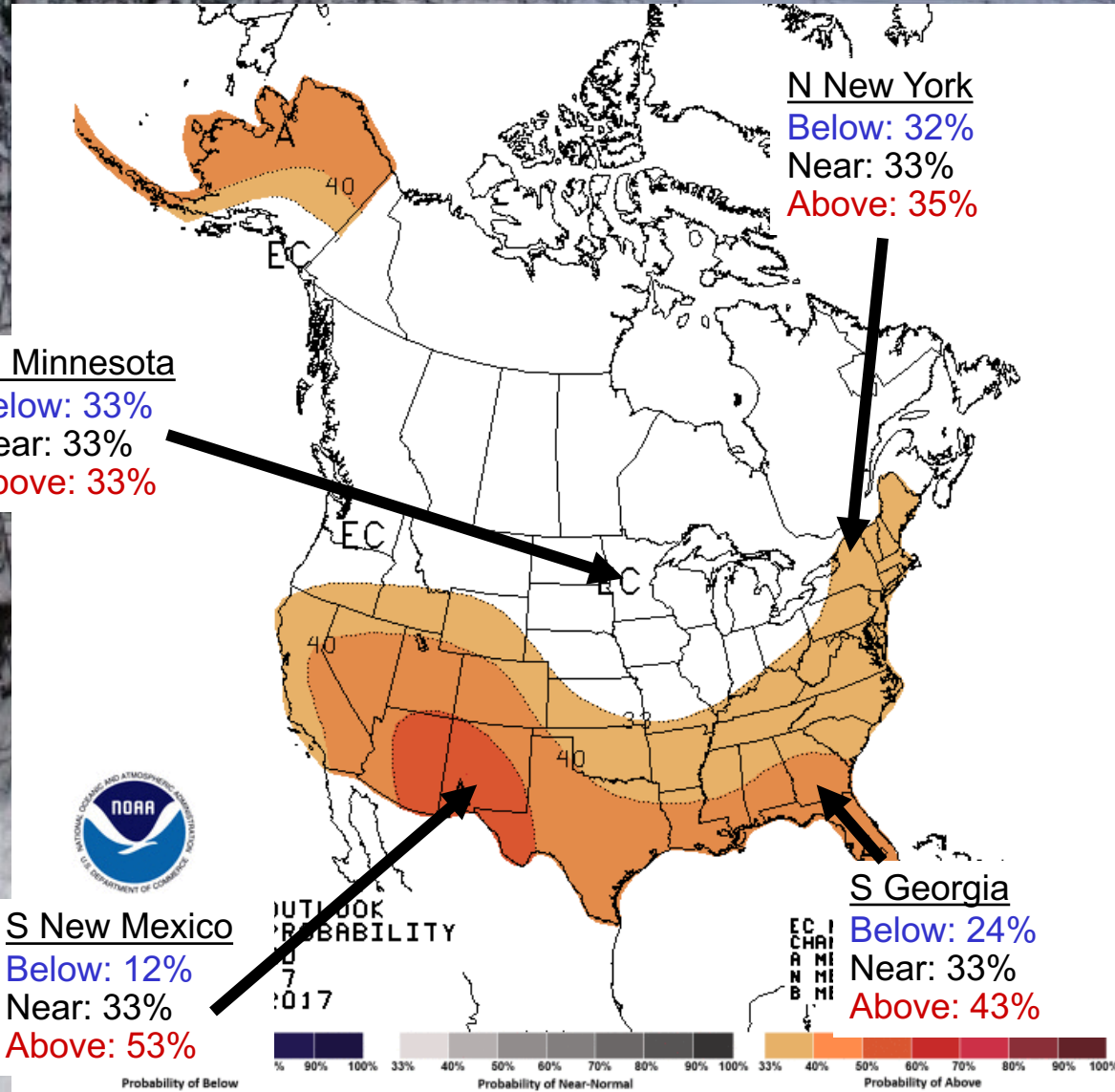
# Winter 2017-18 Outlook Rationale

- ENSO-neutral conditions have prevailed since last winter's weak La Niña faded last winter.
- La Niña is favored to develop during the fall and persist through the winter (~60% chance).
- AO has been and continues to be erratic. Large swings possible in any year (e.g. DJF 2009-10).
- DJF temperature trends relative to 1981-2010 base period are generally small but positive over country; precipitation trends resemble La Niña.
- Forecast consistent with models with nod toward weak La Niña. Adjustments possible as we get closer to winter.



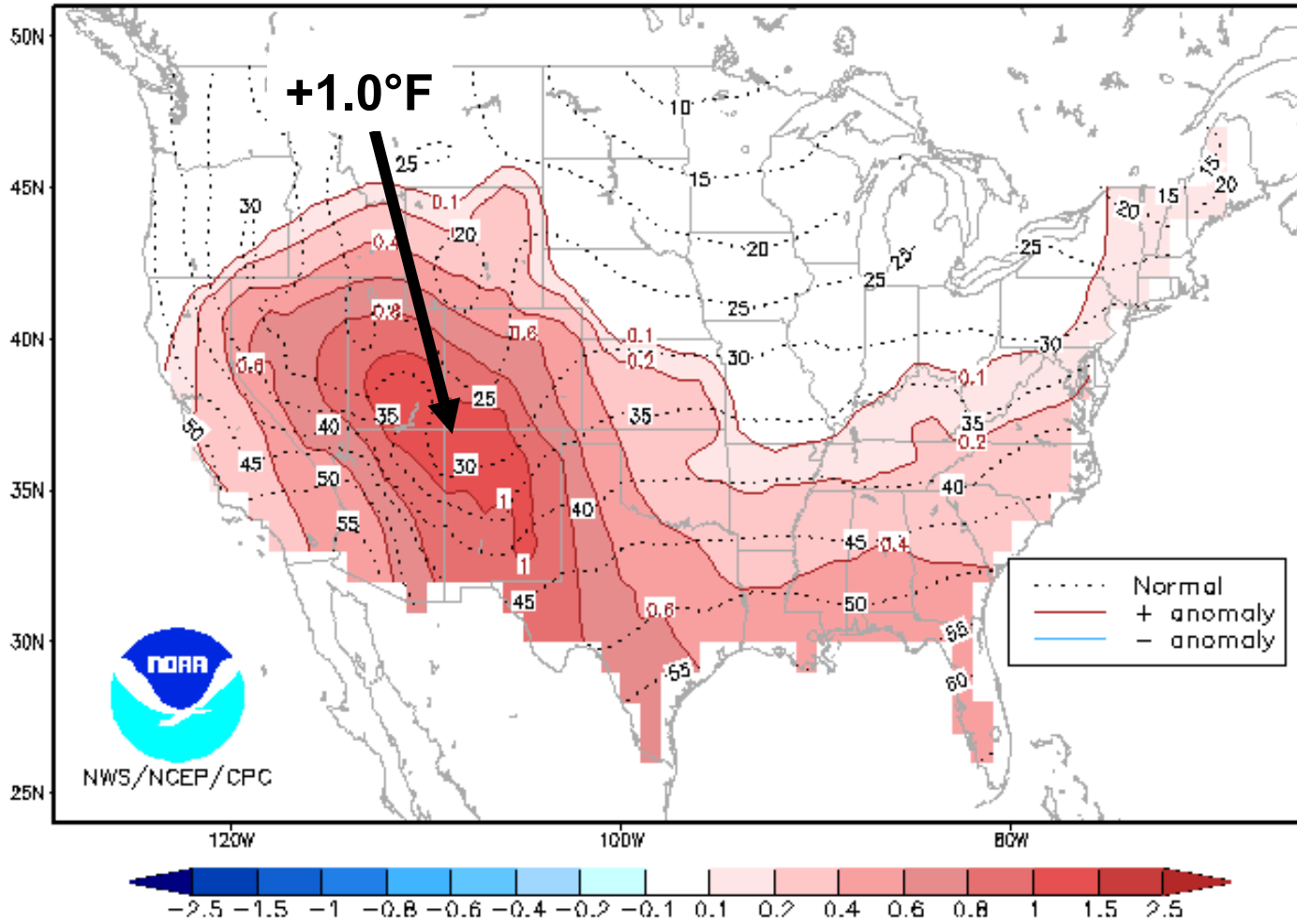


# December 2017 – February 2018 Temperature Outlook





# Average Departure of Mid-Value Temperature Outlook Distribution



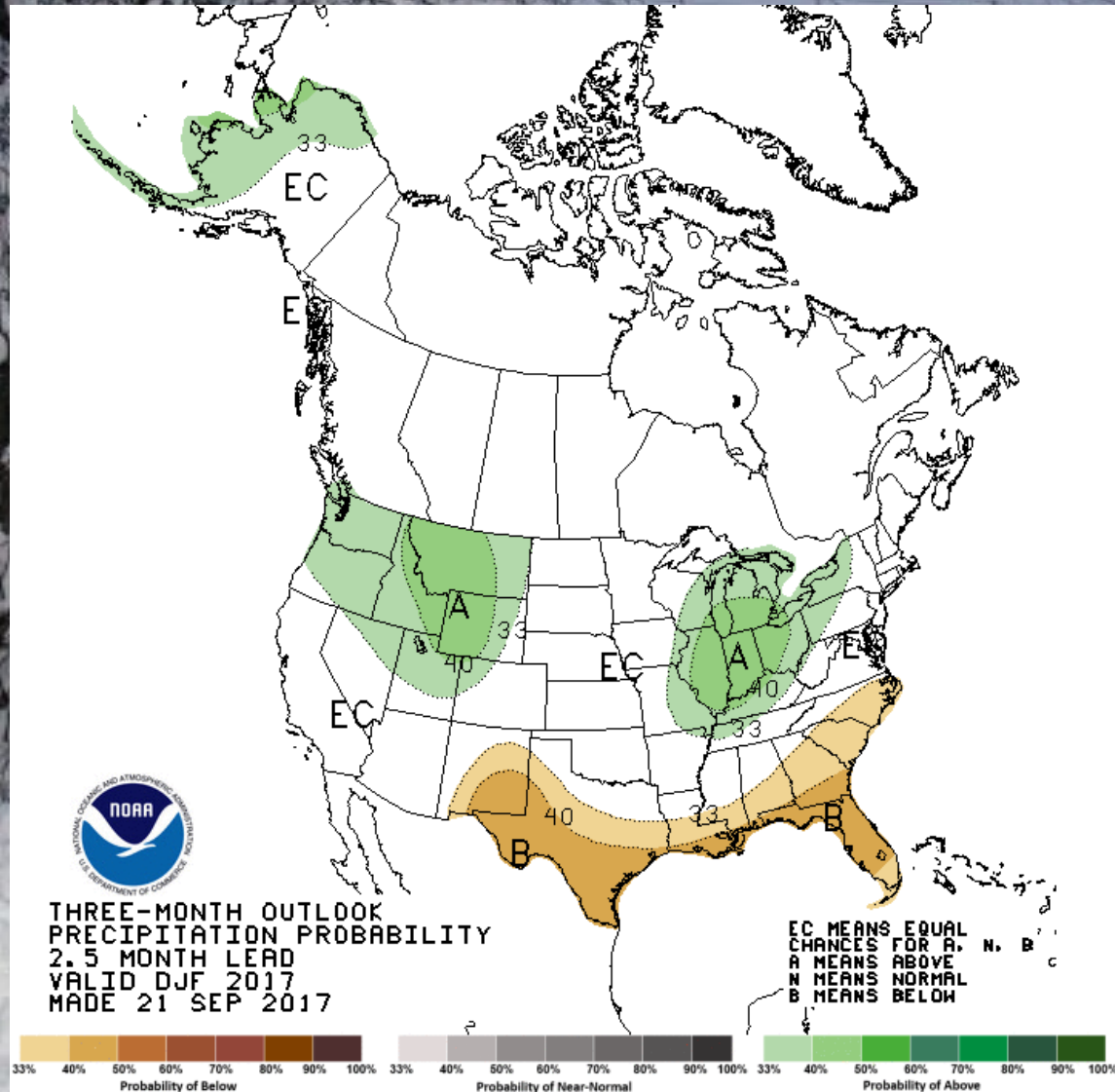
**HDD  
Projections:**

**~1.7% less than  
1981-2010**

**~12.4% more  
than 2016-17**

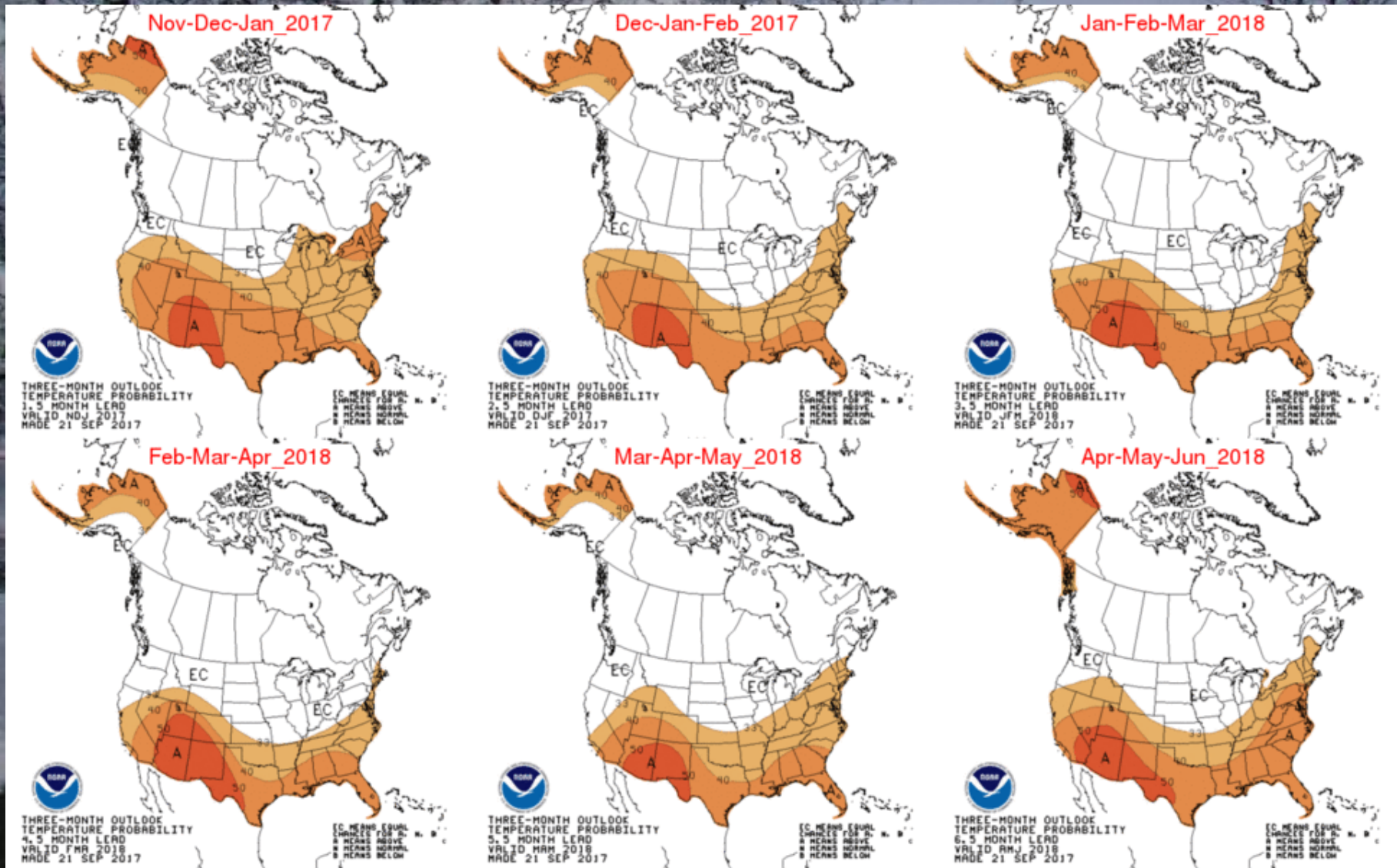


# December 2017 – February 2018 Precipitation Outlook





# Seasonal Temperature Outlooks NDJ 2017-18 – AMJ 2018



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# Challenge of Filling the Week 3-4 Gap

The Week 3-4 outlook period is within a time range that:

(1) Primarily no longer benefits from predictability due to atmospheric initial conditions (i.e., Week-2) and

(2) Is at times in a range too short to reliably benefit from slowly evolving parts of the climate system (ocean, land, etc.) known to aid longer time scale prediction (monthly to seasonal outlooks)

- Consequently, the Week 3-4 time range often suffers from low predictability

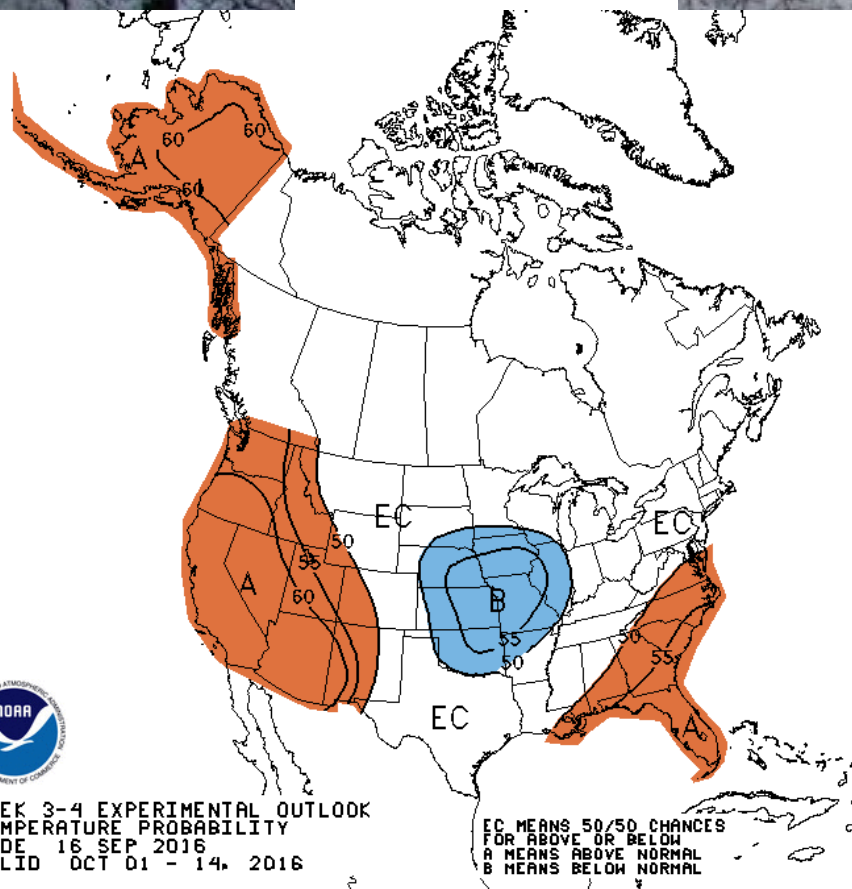
- Important to understand this limitation to manage expectations

# Product Description

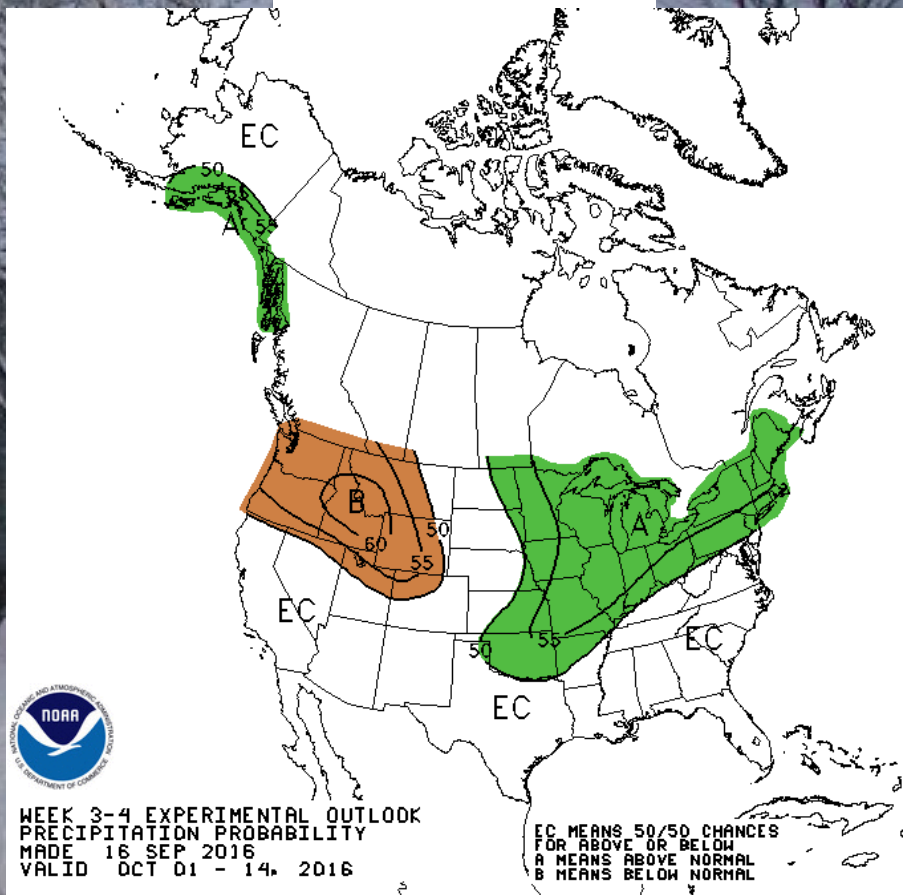
- The experimental product is 2-class (above or below-average) temperature and precipitation outlook maps for the favored category of *two-week* mean temperature and *two-week* total accumulated precipitation
- The target is a combined two week outlook for Weeks 3-4 in the future
- Outlook maps depict probabilities for the favored category
- The product is released once per week every Friday at approximately 3 PM ET
- First experimental outlook was released on September 18, 2015
- Temperature Outlook became operational on May 19, 2017

# Experimental Product Format

## Temperature



## Precipitation



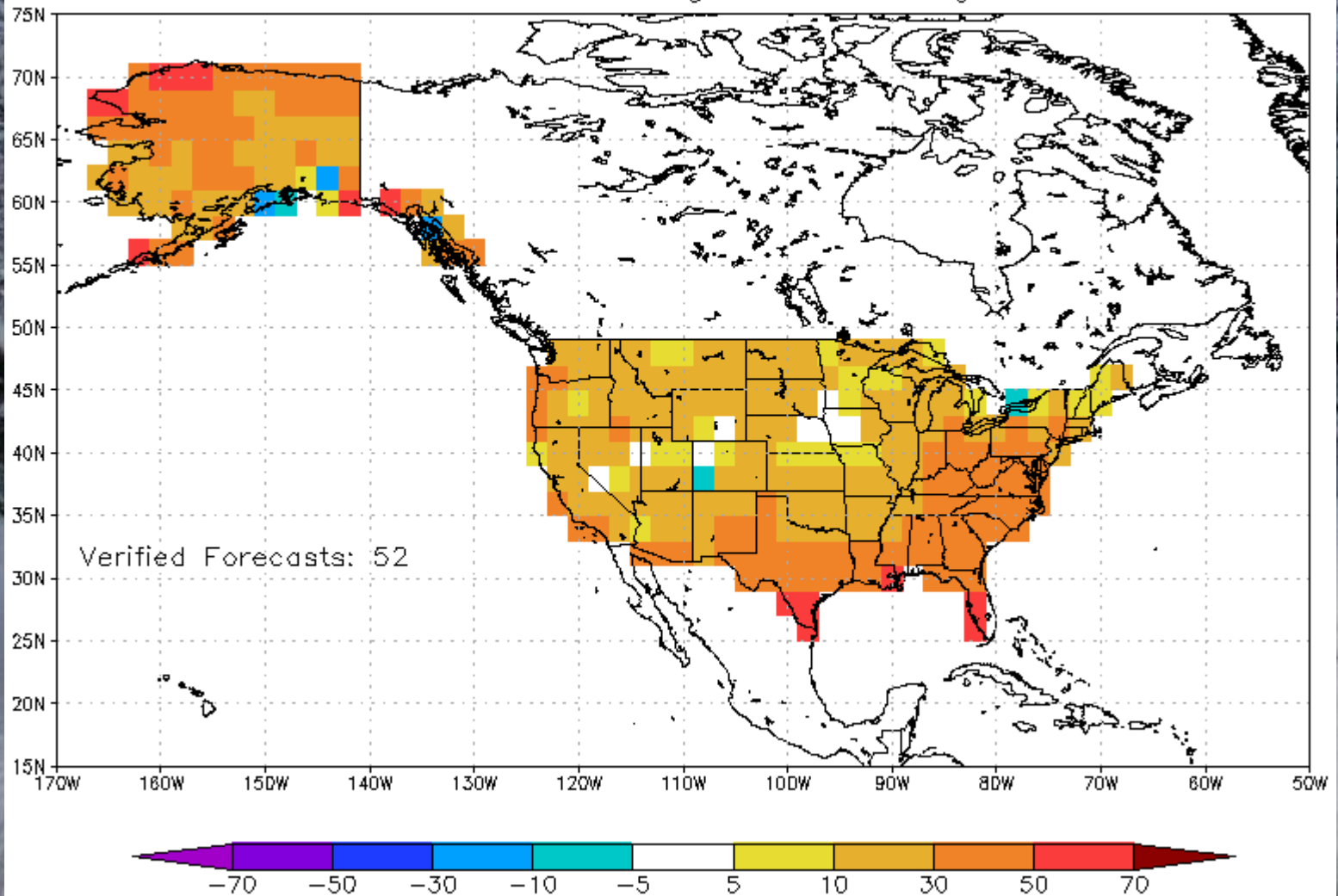
Orange: Above average temperatures favored  
Blue: Below average temperatures favored  
Equal Chances (EC): Equal odds for above/below

Green: Above average precipitation favored  
Brown: Below average precipitation favored  
Equal Chances (EC): Equal odds for above/below



# Regional Verification

Weeks 3/4 Temperature Heidke Skill Scores  
Forecasts From 18Aug2016 to 18Aug2017



# Regional Verification

Weeks 3/4 Precipitation Heidke Skill Scores  
Forecasts From 18Aug2016 to 18Aug2017

