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# La Niña and Its Impact on South American Agriculture

Mark D. Brusberg

Chief Meteorologist

USDA Office of the Chief Economist / World Agricultural Outlook Board

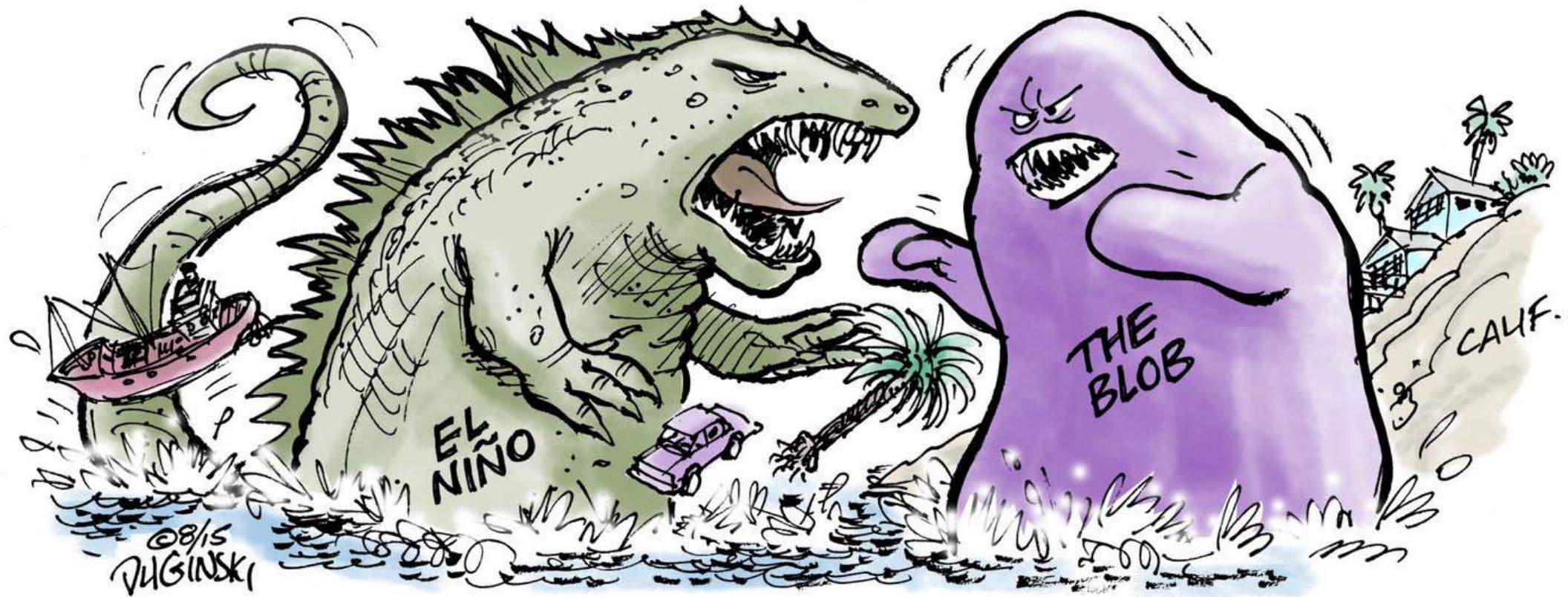
Presented To

**2018 Agricultural Outlook Forum**

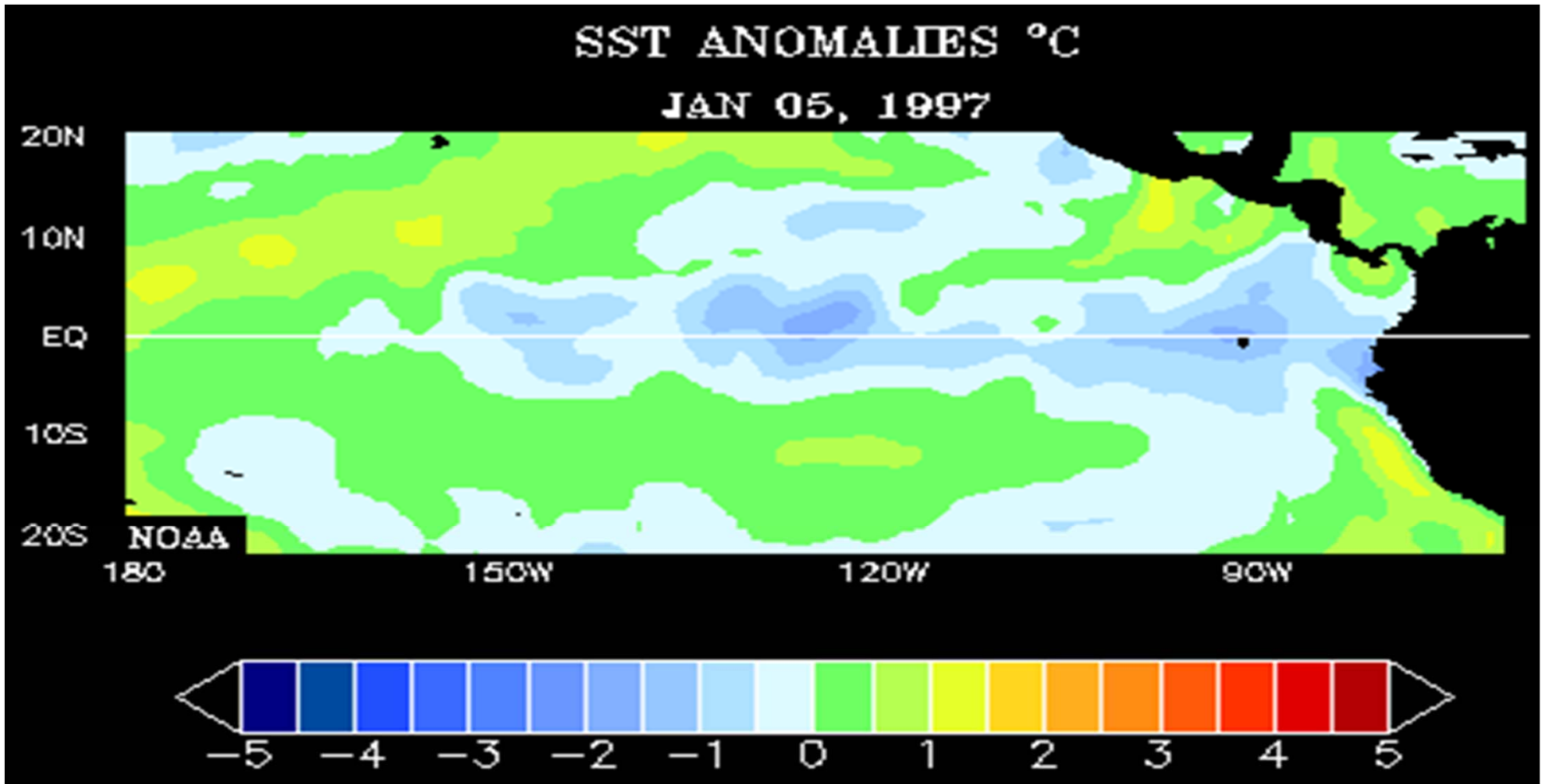
*Grain and Oilseeds Session*

February 23, 2018

## What is La Niña?



## What is La Niña?





\* **El Niño** means *The Little Boy*, or *Christ Child* in Spanish. El Niño was originally recognized by fishermen off the coast of South America in the 1600s, with the appearance of unusually warm water in the Pacific Ocean. The name was chosen based on the time of year (around December) during which these warm waters events tended to occur.

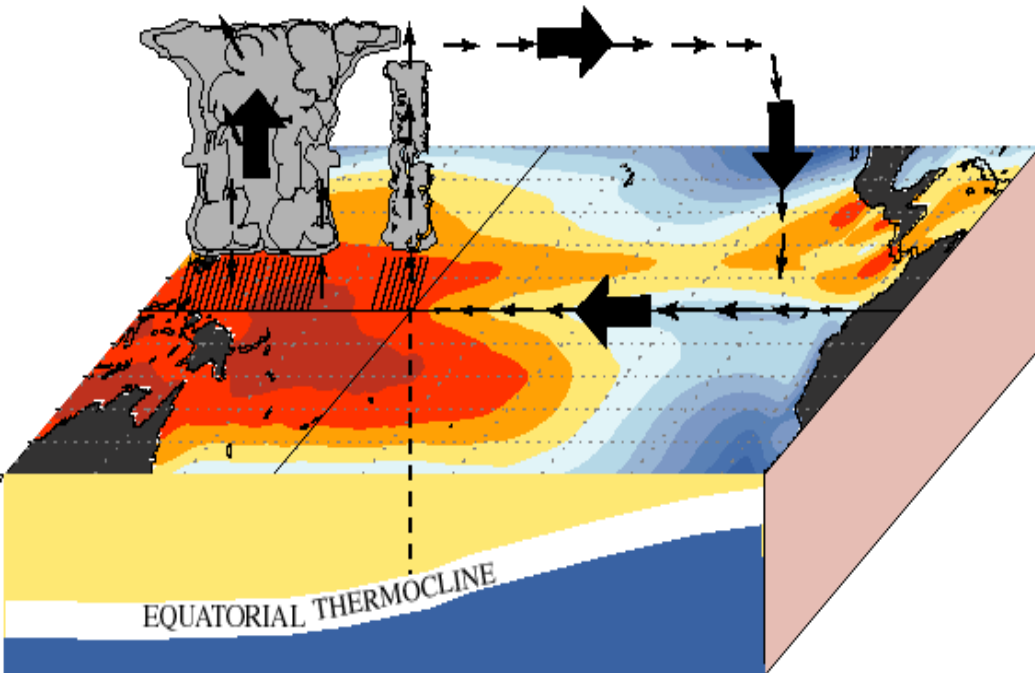


ANCHORED: A file photo of fishing boats anchored in Paita, Peru. The warmer waters last year ensured a huge drop in the volume of cold-water anchovies that were caught by the coast. Peru is the world's top producer of animal feed made of ground-up anchovy, known as fishmeal, and the lack of anchovies is one of the reasons that economic growth slowed to its weakest pace in five years. (Steff Gaulter – Gulf Times, July 26, 2015)

Photo: US Navy/Wikipedia

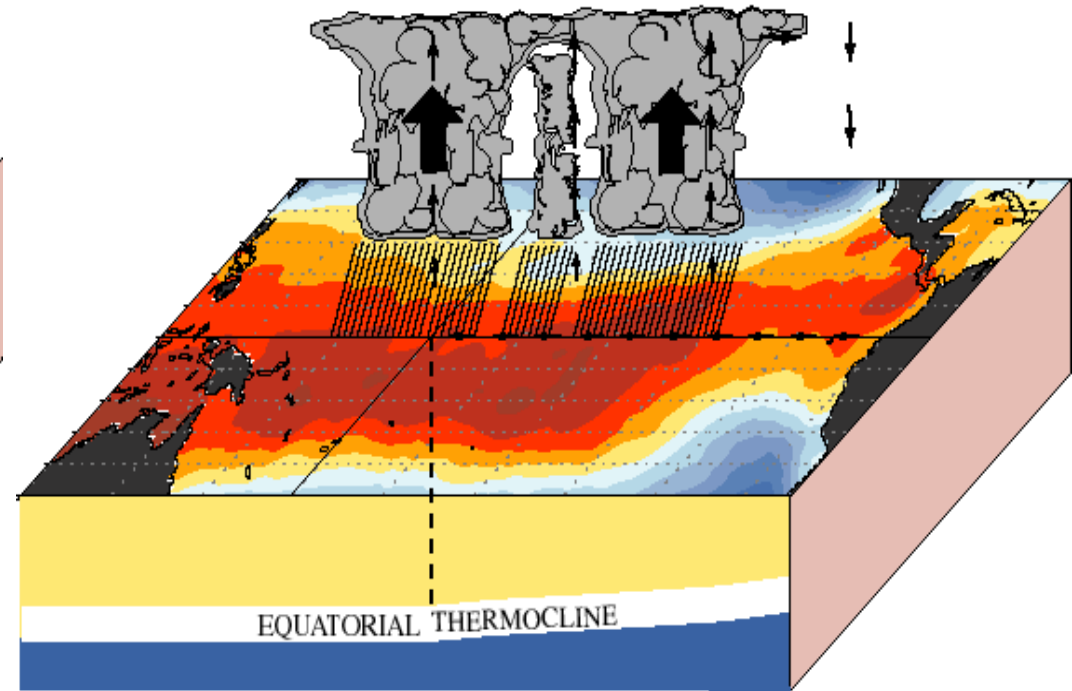
\* NOAA. What are El Niño and La Niña. National Ocean Service website, <https://oceanservice.noaa.gov/facts/ninonina.html>, accessed on 2/20/18.

## December - February Normal Conditions



- Easterly winds at surface in eastern Pacific (upwelling of nutrient rich water)
- Increased convection in western Pacific

## December - February El Niño Conditions



- Weak easterly or reversal of eastern easterlies (impedes upwelling / deeper thermocline)
- Increased convection in central Pacific

**La Niña** means *The Little Girl* in Spanish. La Niña is also sometimes called *El Viejo*, *anti-El Niño*, or simply "a cold event."

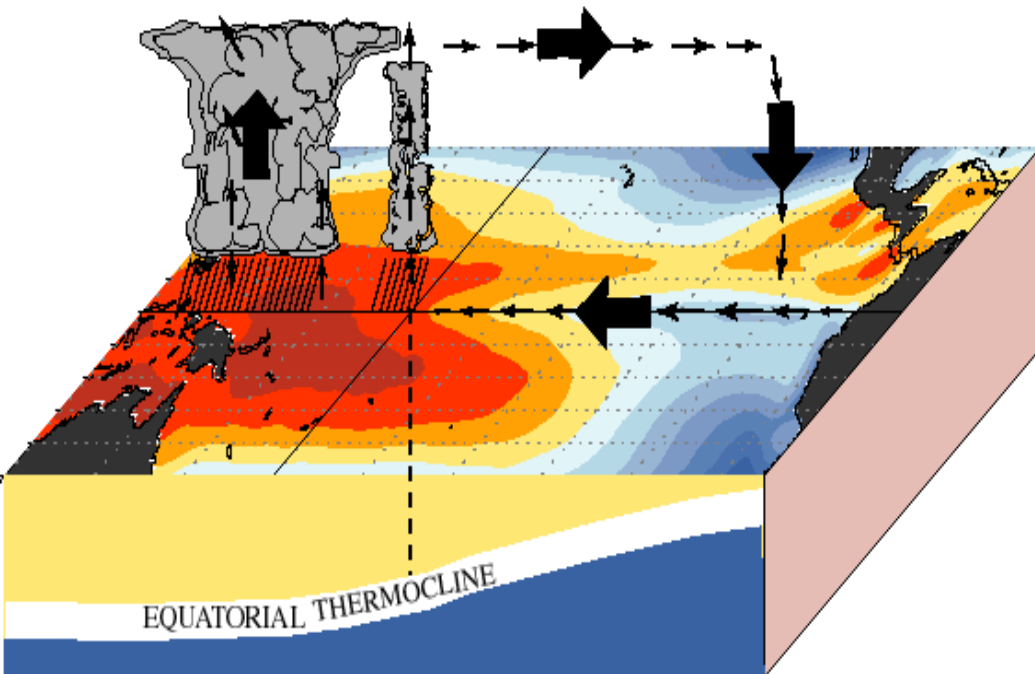
La Niña episodes represent periods of below-average sea surface temperatures across the east-central Equatorial Pacific. Global climate La Niña impacts tend to be opposite those of El Niño impacts. In the tropics, ocean temperature variations in La Niña also tend to be opposite those of El Niño.



El Niño was named by Peruvian fishers who noticed that the warming of ocean surface waters reduced their anchovy catch. Here fishers pull a load of anchovies off the coast of Peru during normal ocean conditions

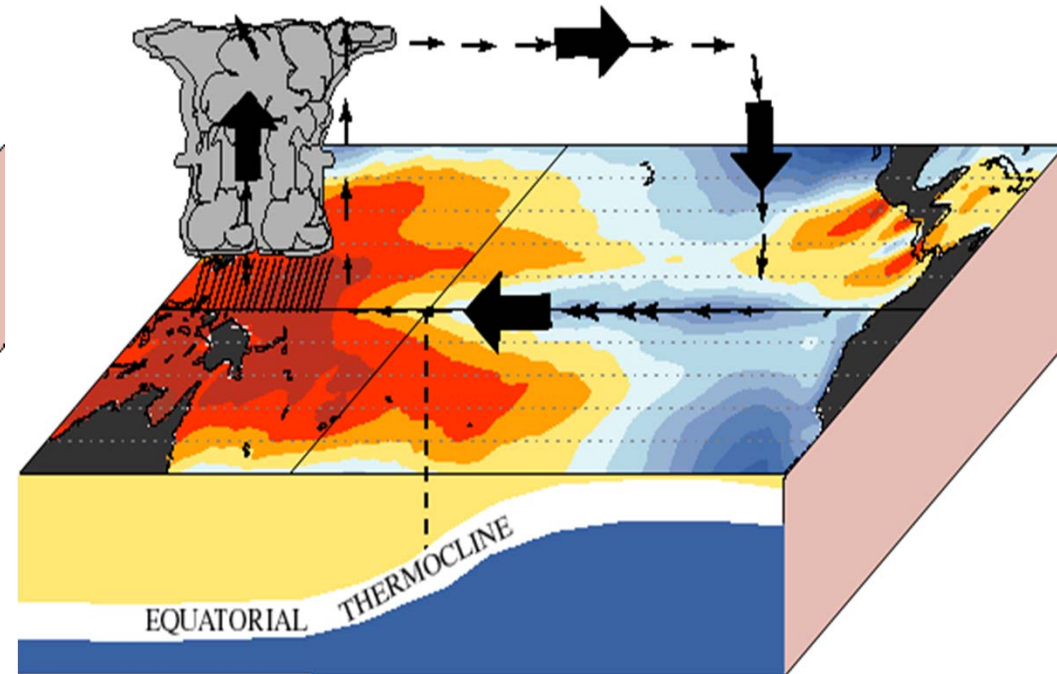
<http://www.waterencyclopedia.com/Da-En/El-Ni-o-and-La-Ni-a.html>

## December - February Normal Conditions



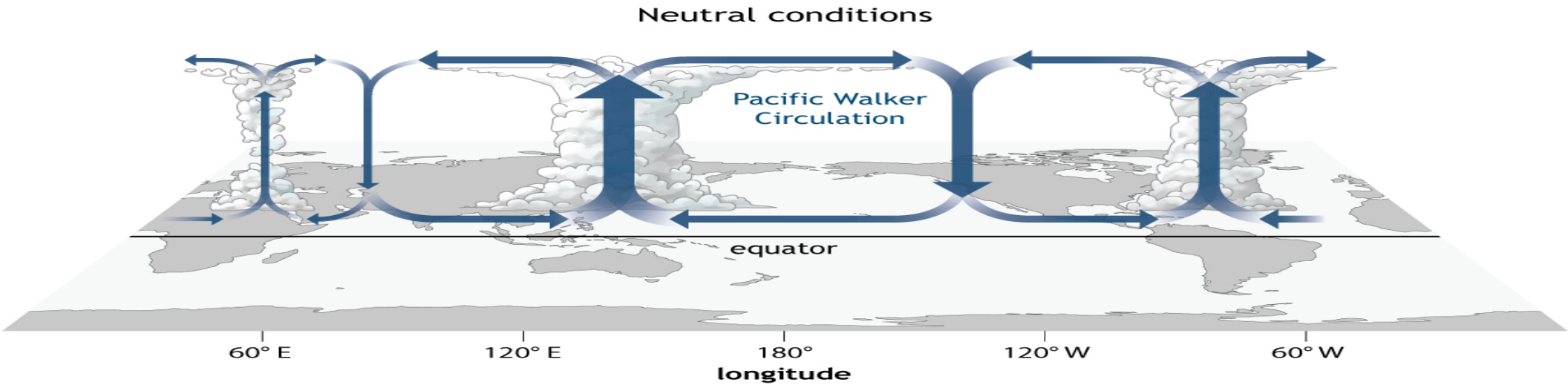
- Easterly winds at surface in eastern Pacific (upwelling of nutrient rich water)
- Increased convection in western Pacific

## December - February La Niña Conditions

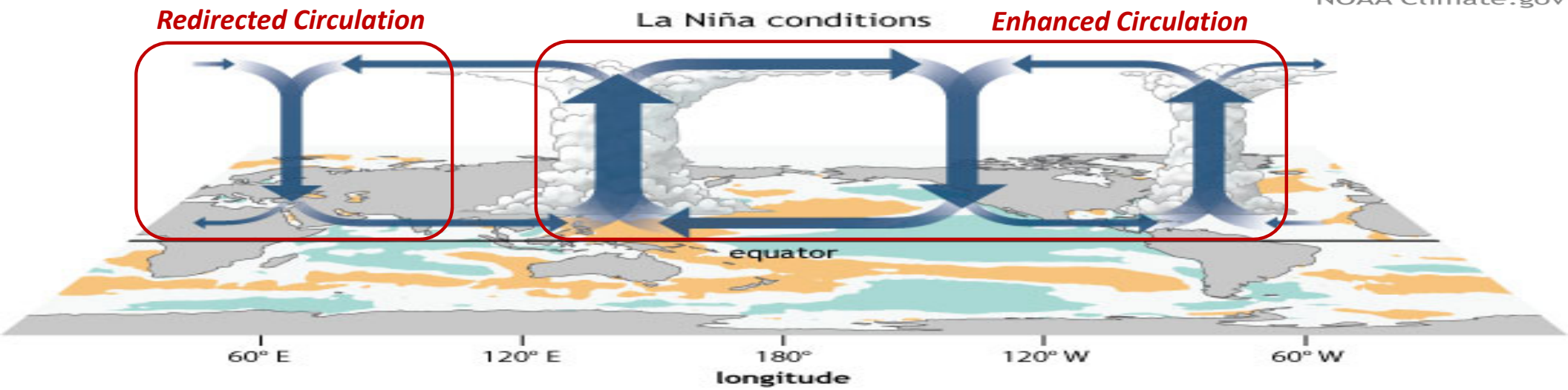


- Stronger surface easterlies in eastern Pacific (accentuates upwelling / thermocline closer to surface)
- Increased convection in western Pacific



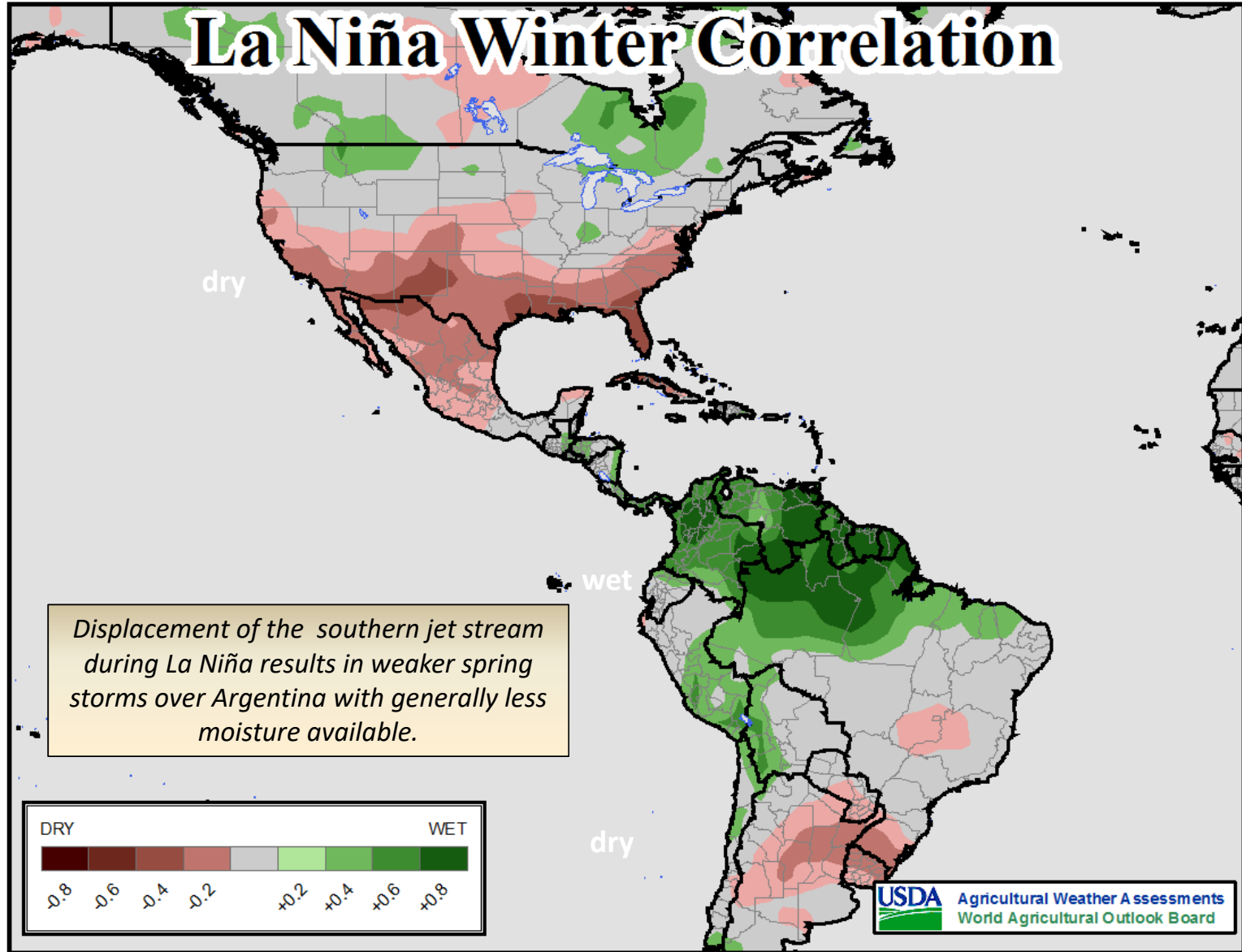


NOAA Climate.gov



NOAA Climate.gov

# La Niña Winter Correlation



**SOURCE:**  
*Long-Term Weather & Agricultural Outlooks*

*Eric Luebehusen*

Revisiting the 2016 La Niña & Looking Ahead to Spring 2017

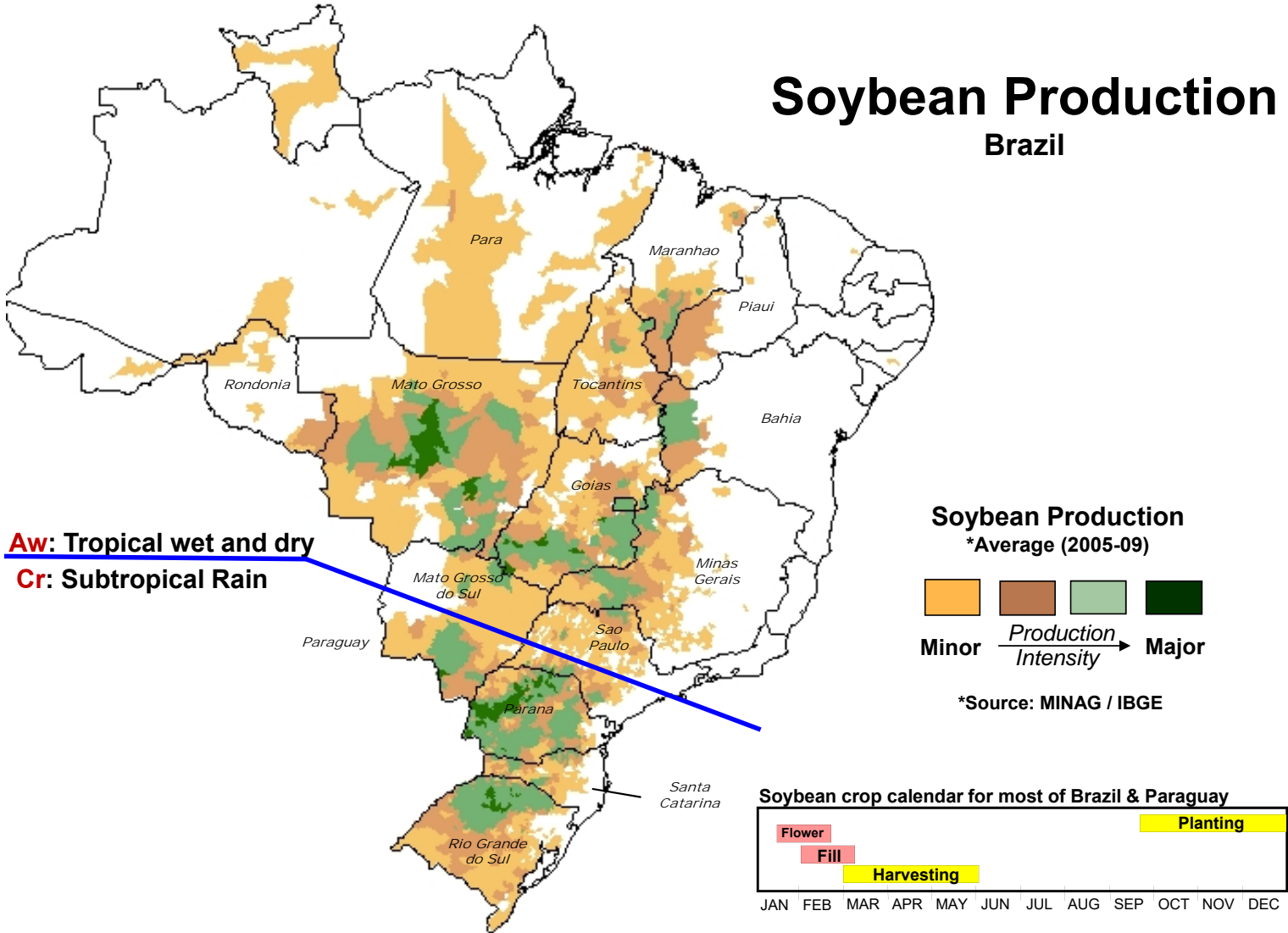
Agricultural Outlook Forum  
Washington, DC  
February 24, 2017

## Potential Impacts on South American Agriculture



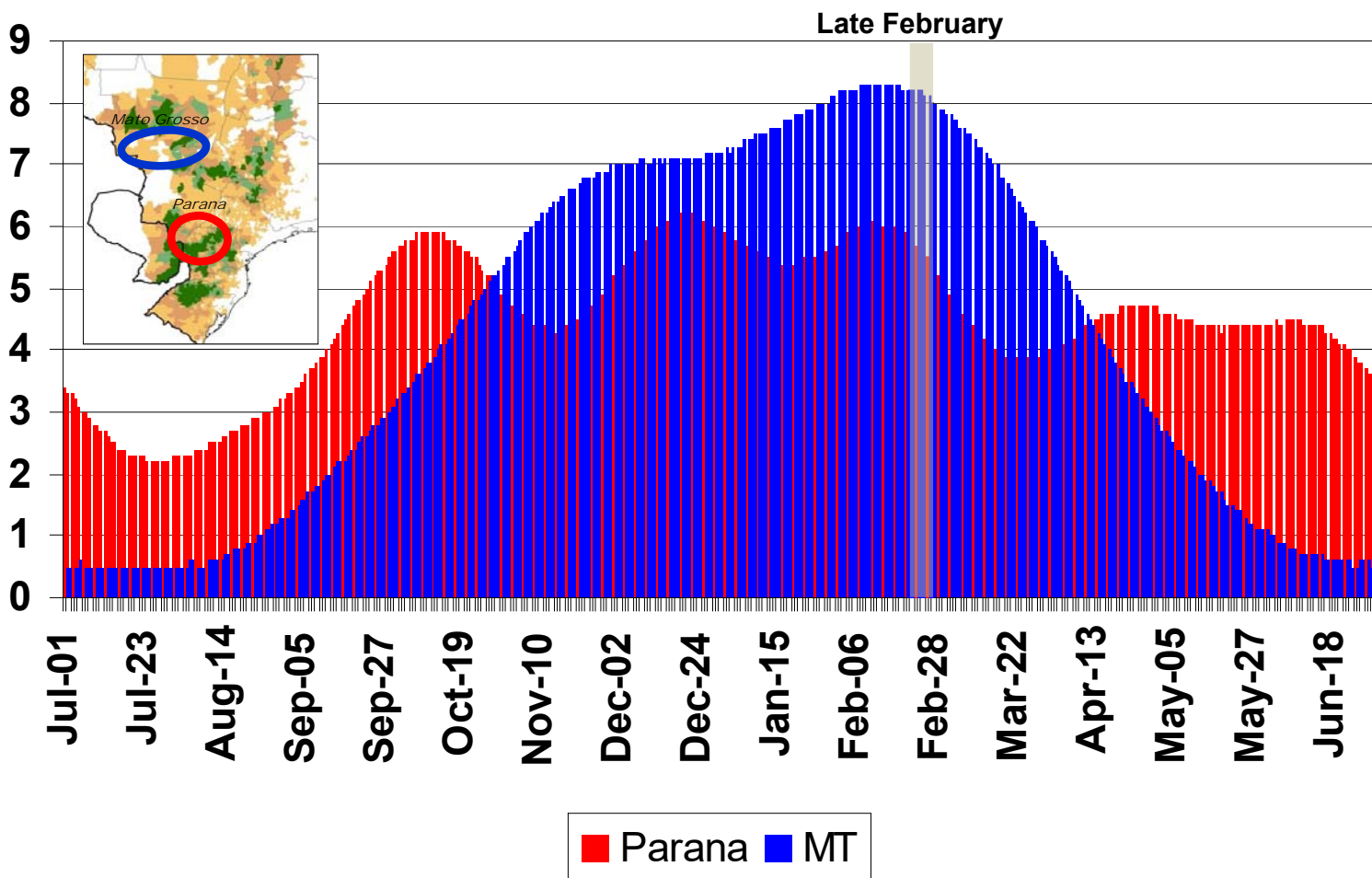
Lalo de Almeida for The New York Times

# Soybean Production Brazil



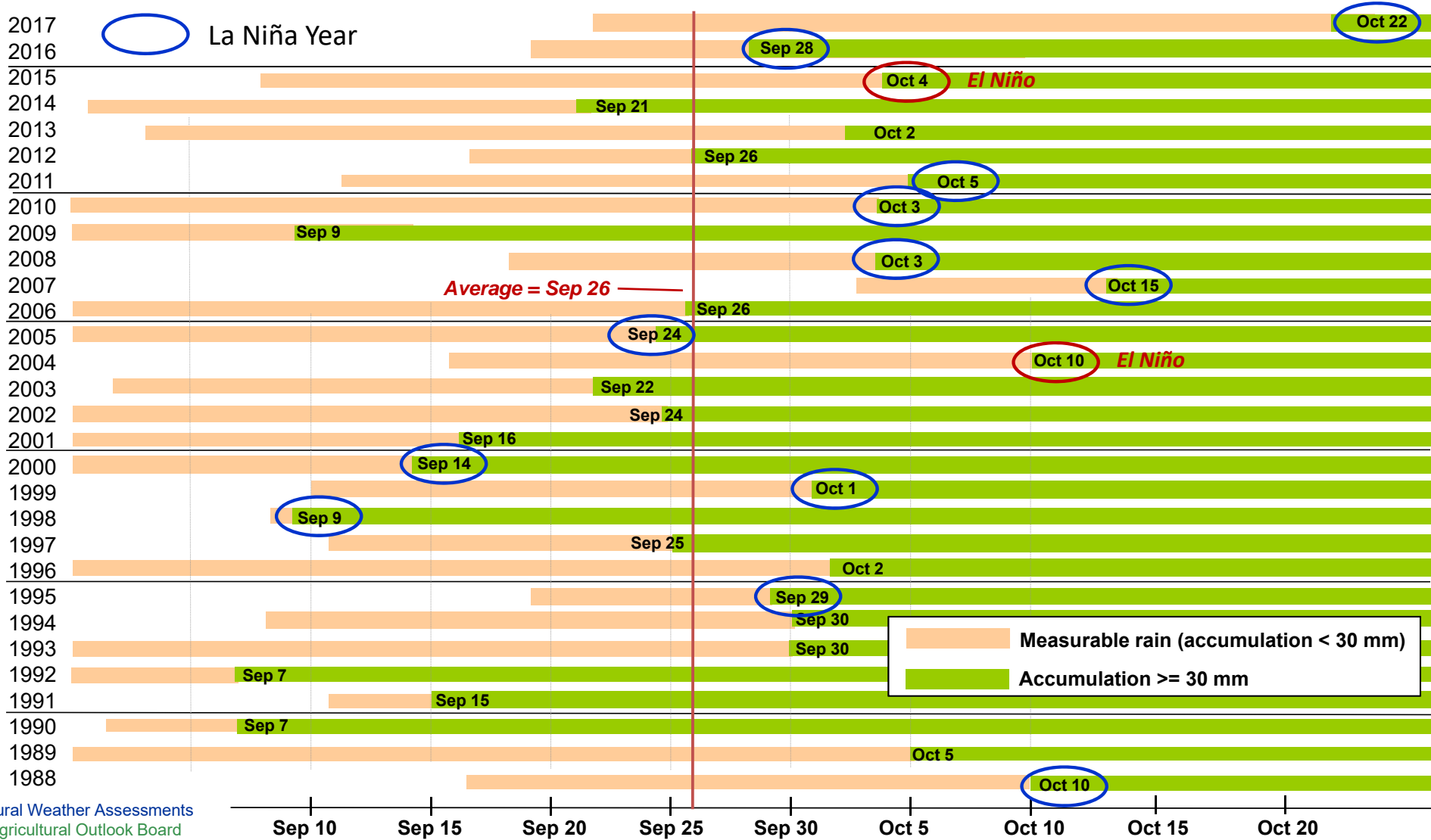


# Brazil: Normal Daily Rainfall (mm)

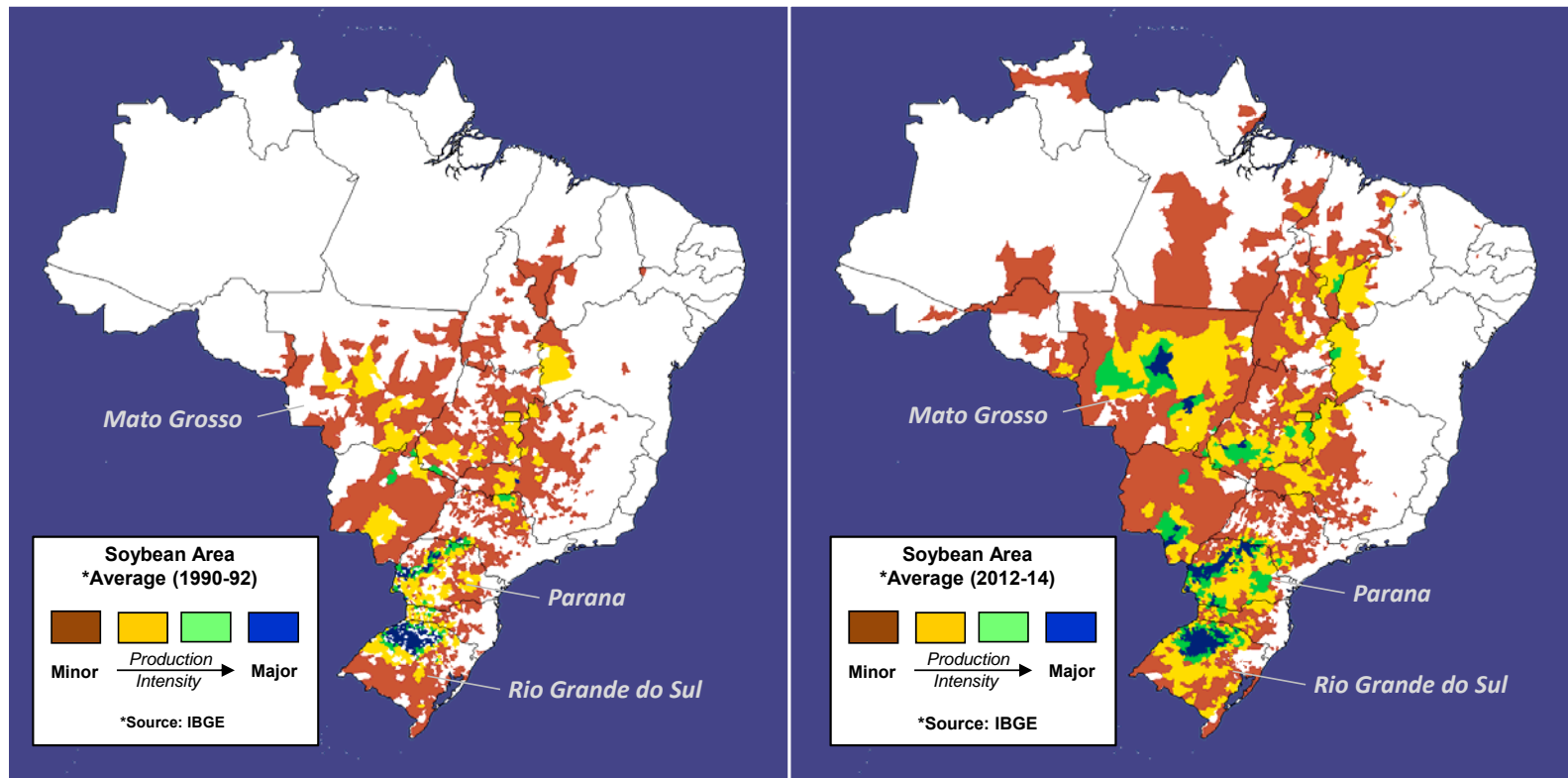


■ Parana ■ MT

# Mato Grosso, Brazil – Yearly Starts to the Rainy Season



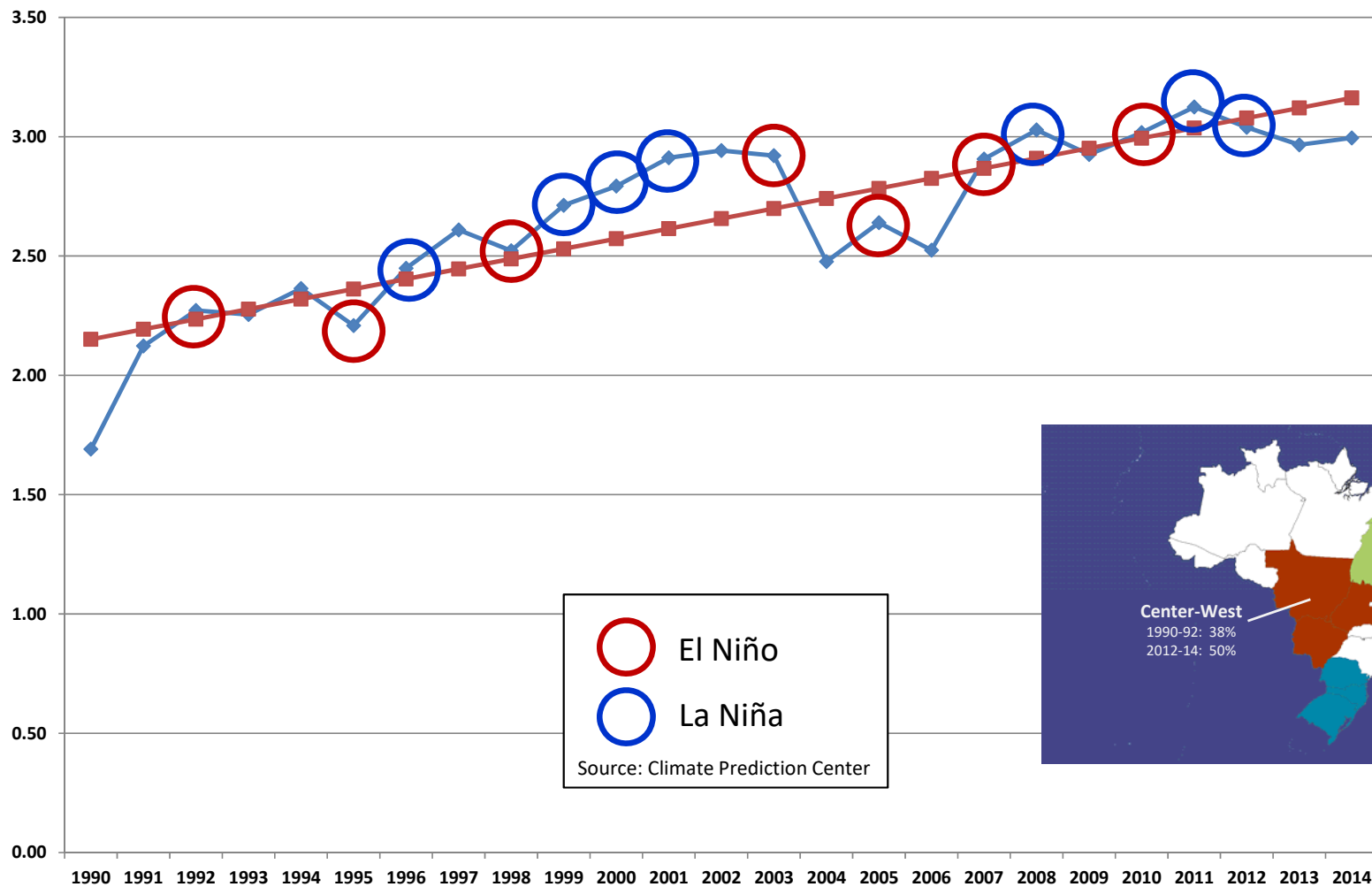
## Brazil Soybean Area 1990-92 versus 2012-14



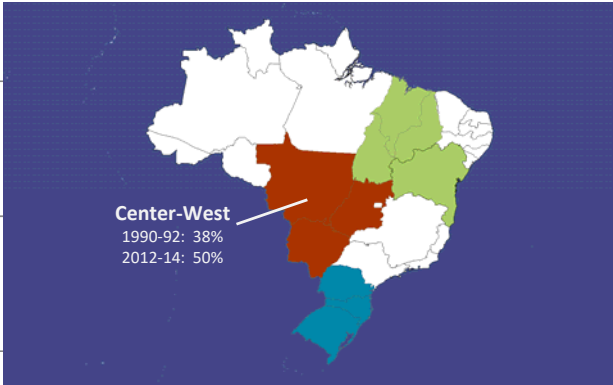
### Shift in Area (% of Total Area)

	<u>1990-92</u>	<u>2012-14</u>
Mato Grosso	17.5%	30.7%
Parana	21.5%	17.9%
RGDS	26.2%	13.6%

## Center West Soybean Yields



○ El Niño  
○ La Niña  
 Source: Climate Prediction Center

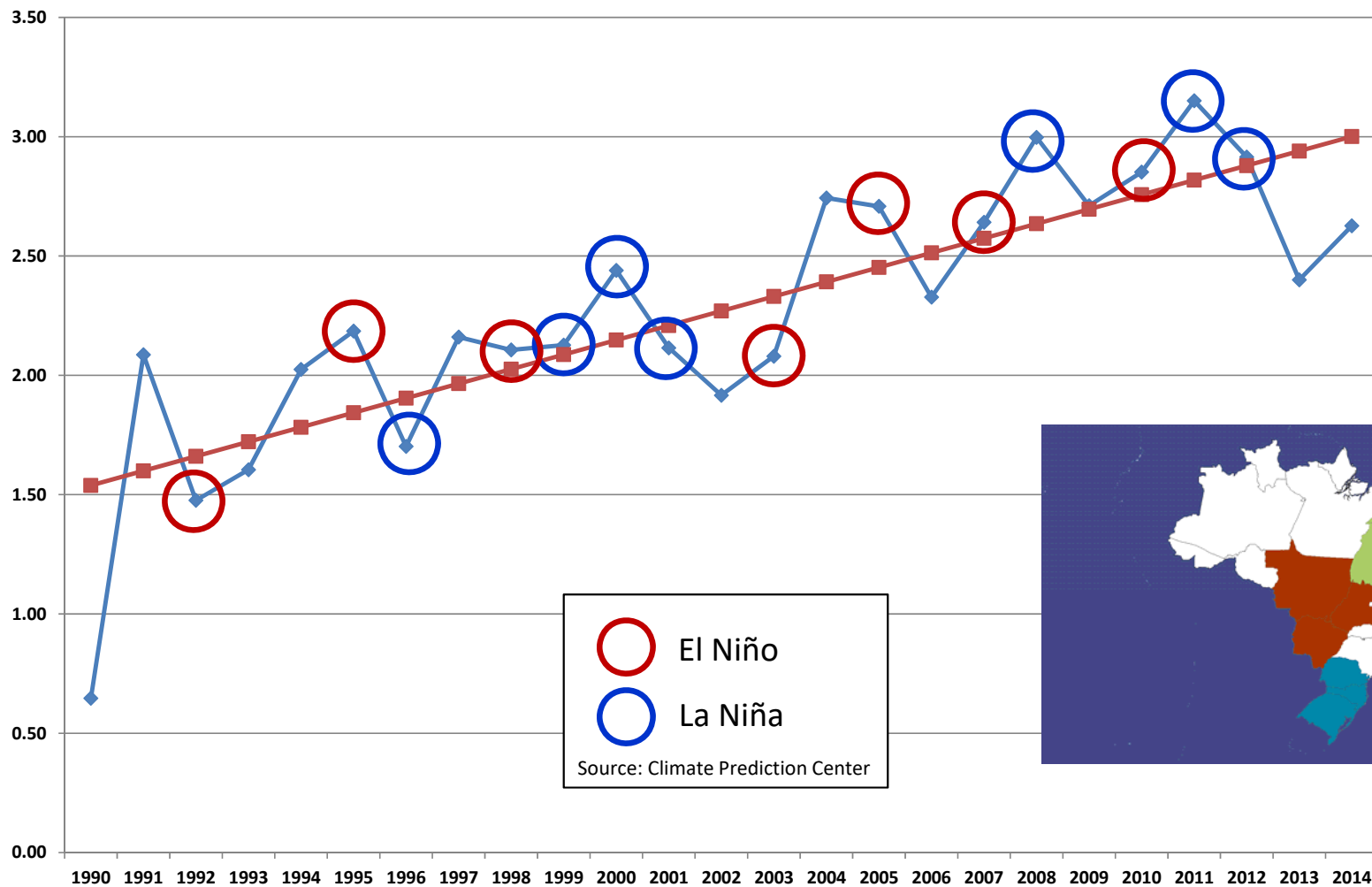


◆ Observed    ■ Predicted

**Source: IBGE**



## MaPiToBa Soybean Yields

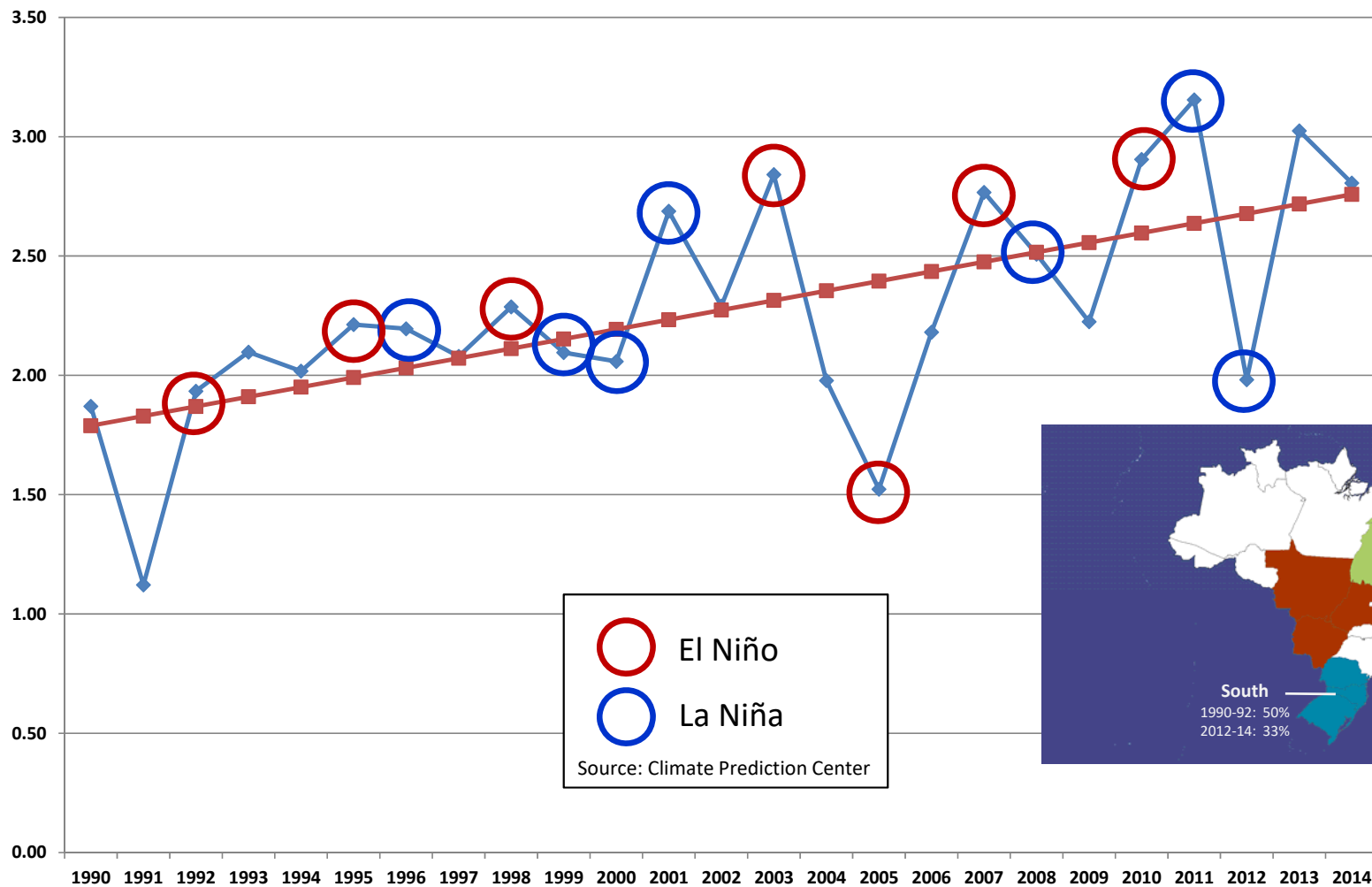


○ El Niño  
○ La Niña  
 Source: Climate Prediction Center

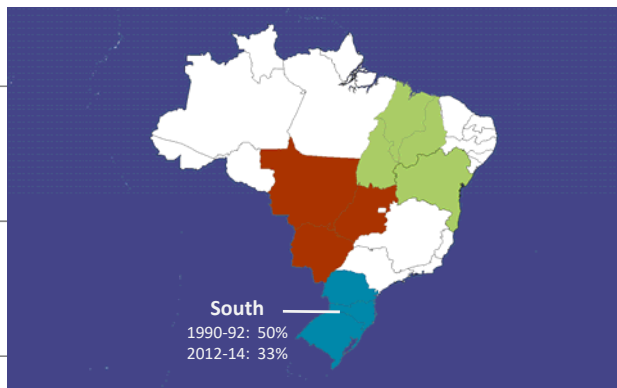
◆ Observed ■ Predicted

Source: IBGE

## South Soybean Yields



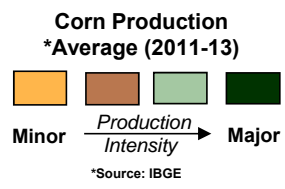
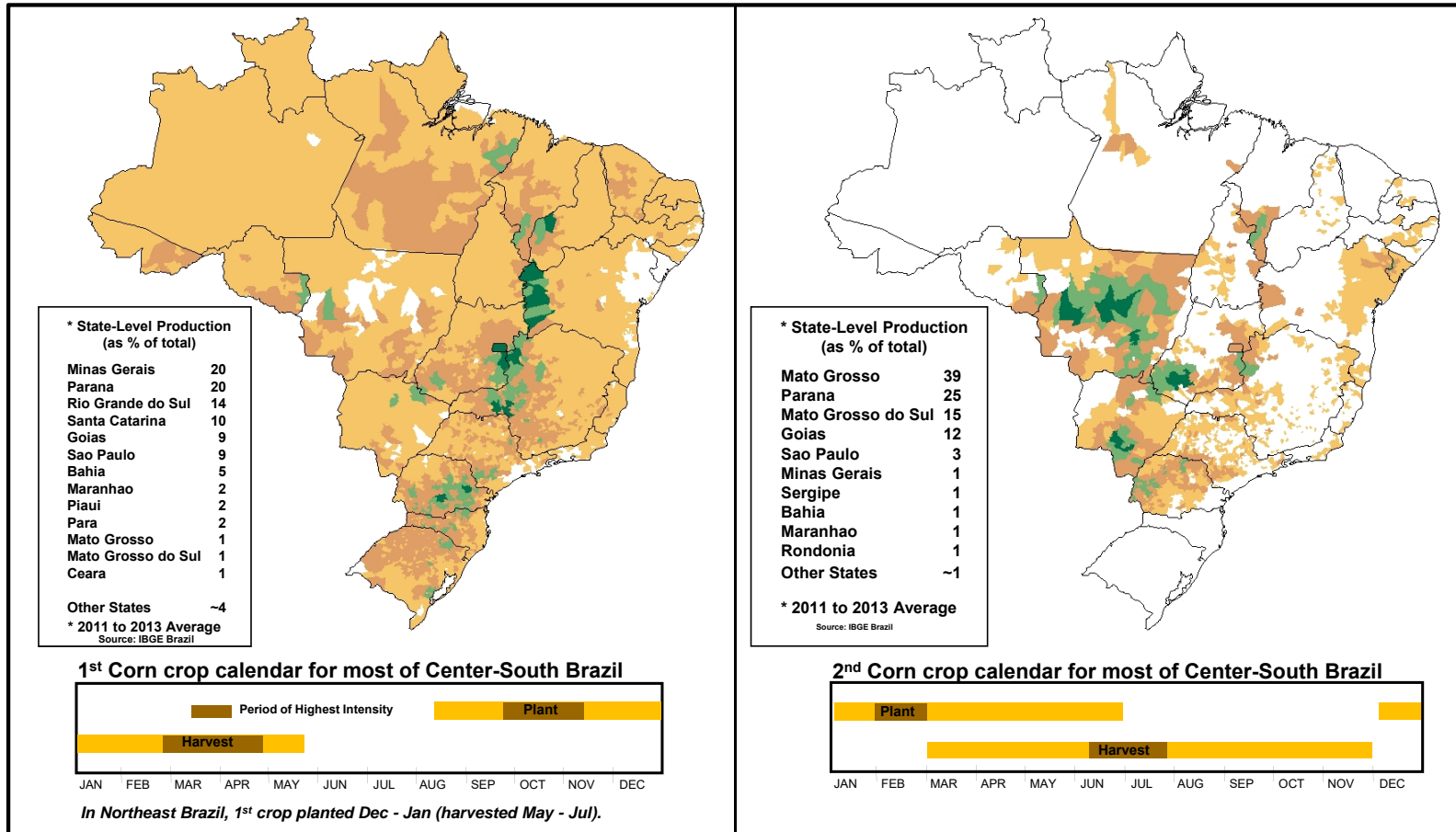
○ El Niño  
○ La Niña  
 Source: Climate Prediction Center



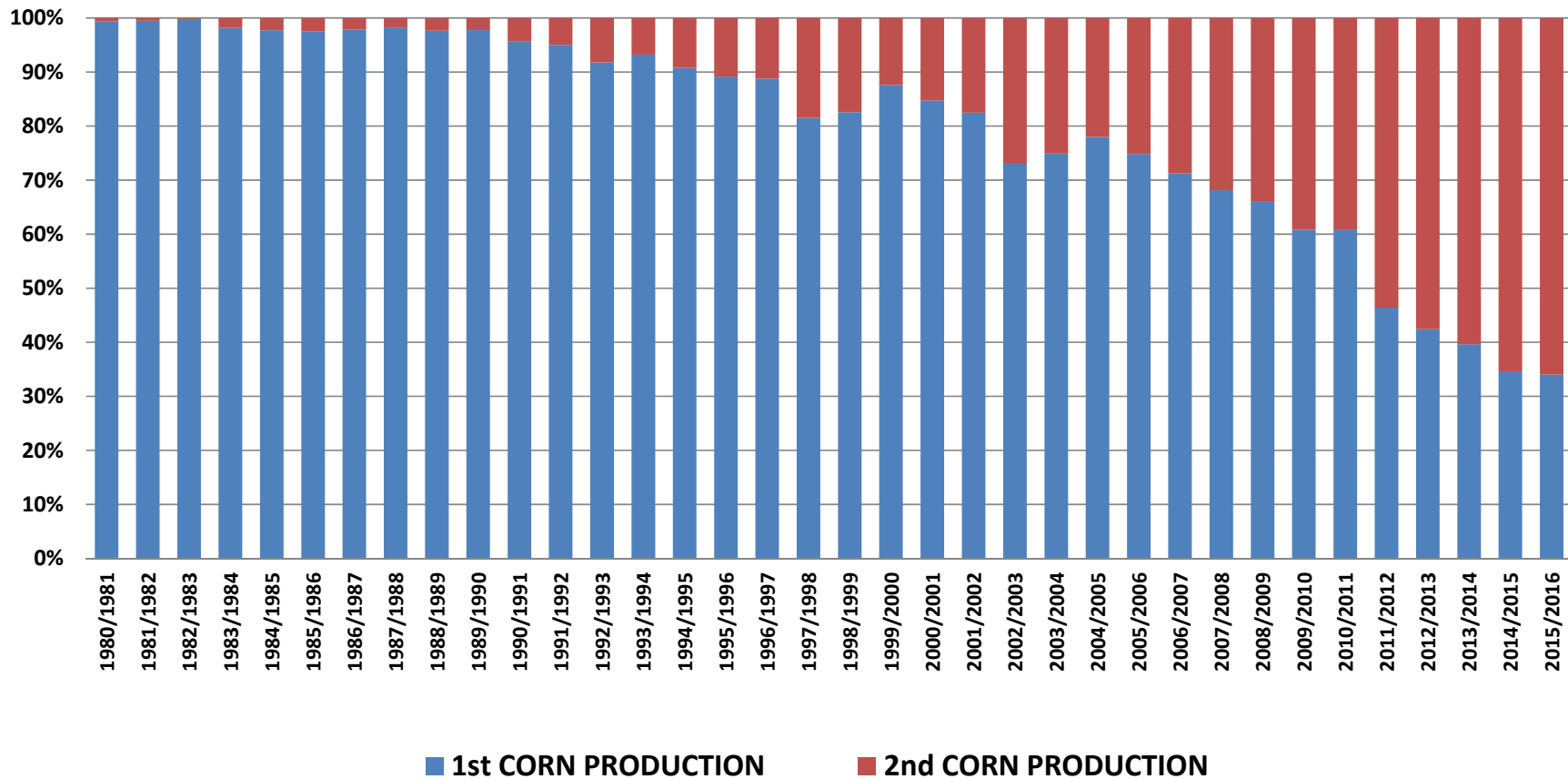
◆ Observed    ■ Predicted

**Source: IBGE**

# Brazil Corn Production

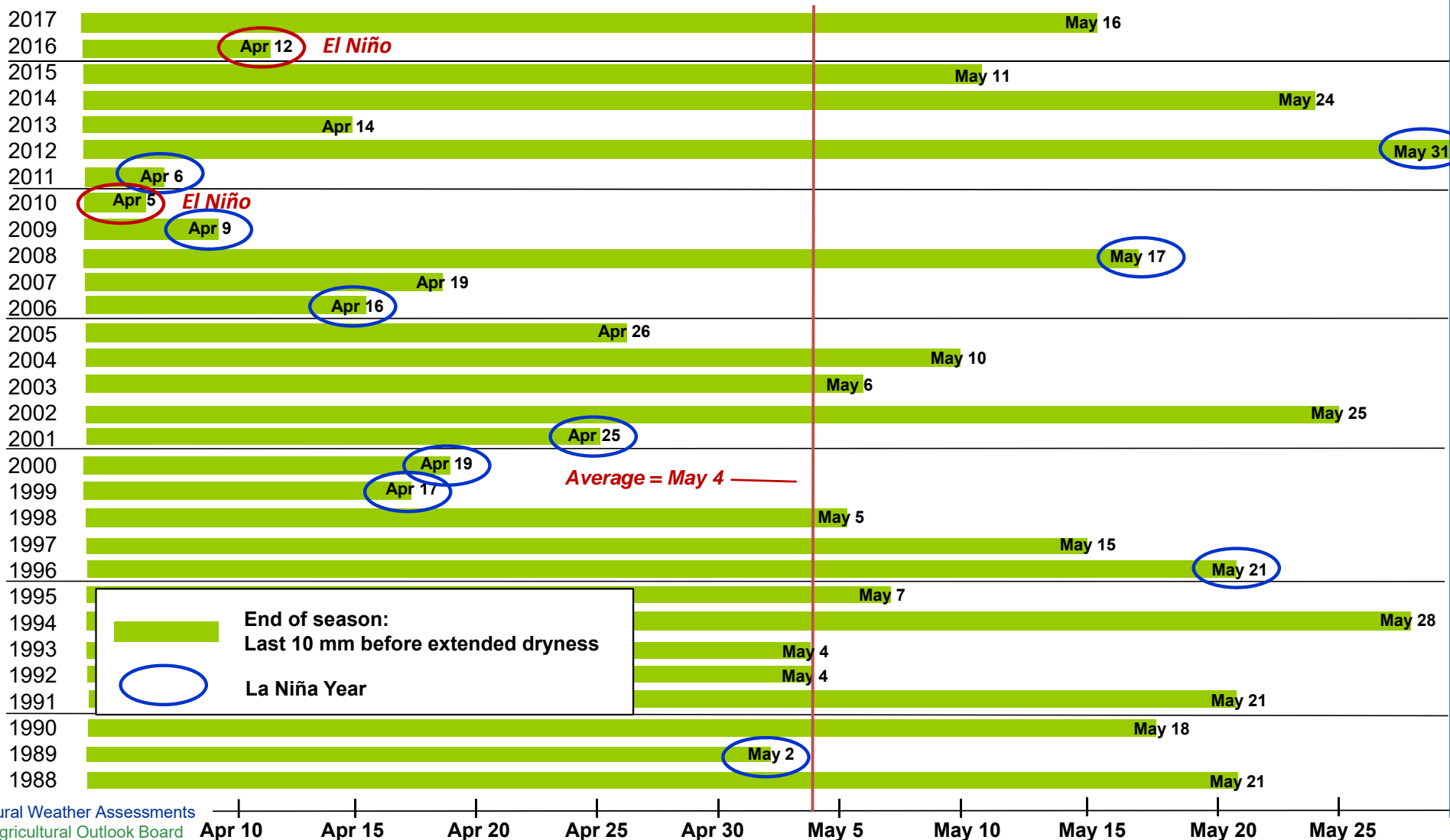


## Brazil Corn Production: Percent of Total Production by Season

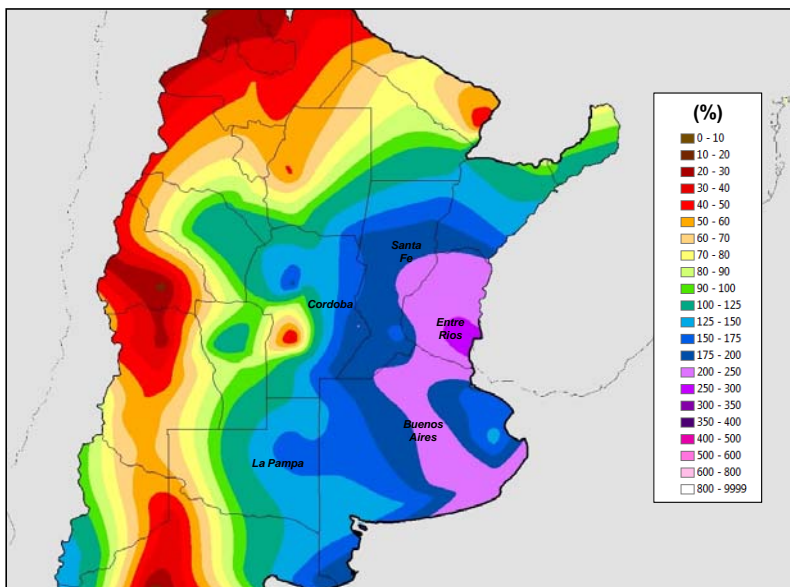




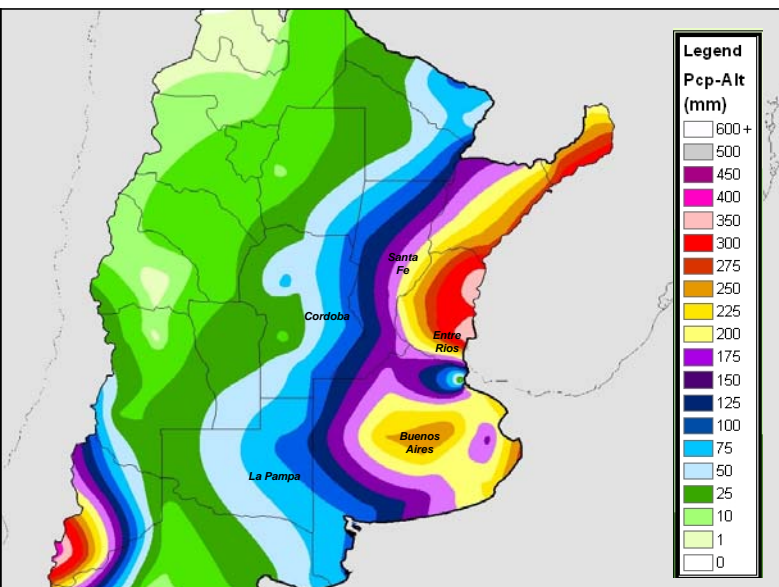
# Mato Grosso, Brazil – Yearly End to the Rainy Season



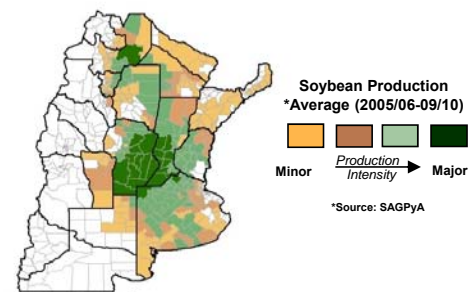
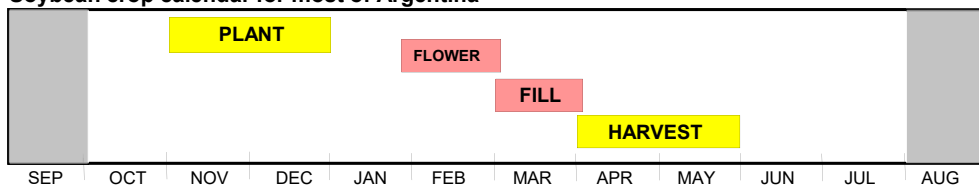
**Percent of Normal Rainfall (%)  
August - September 2017**



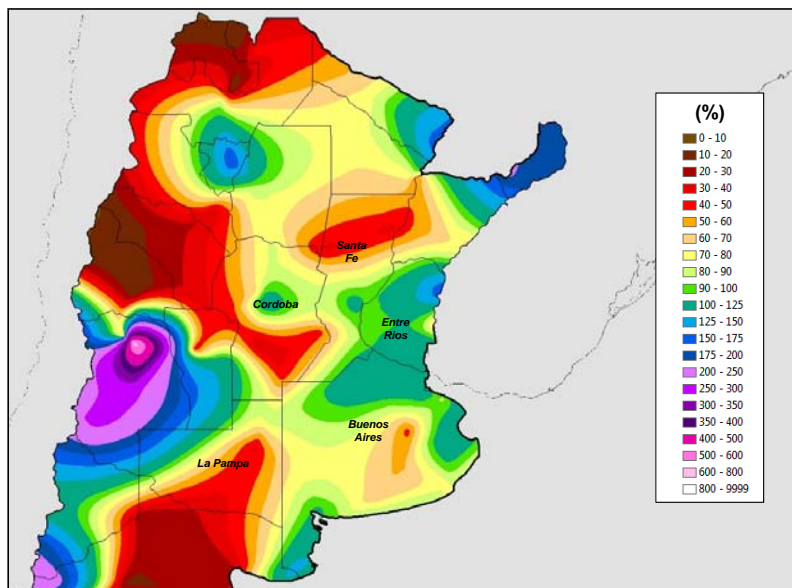
**Rainfall (mm)  
August - September 2017**



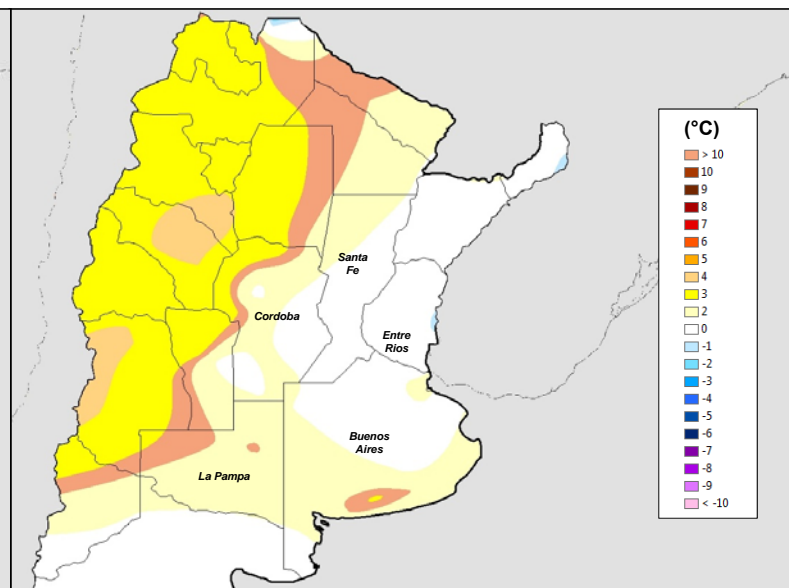
**Soybean crop calendar for most of Argentina**



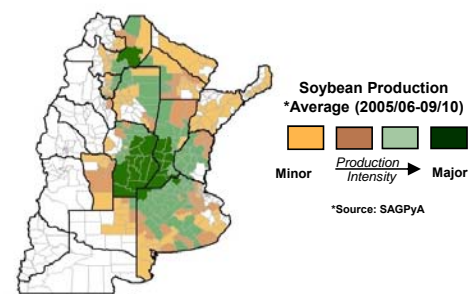
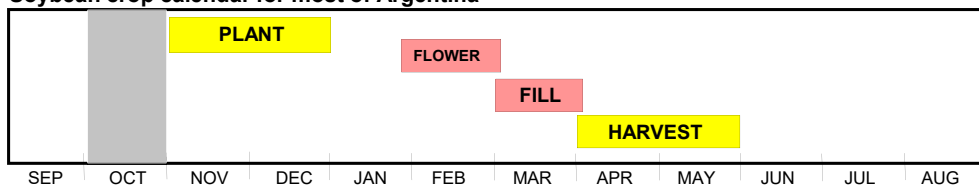
**Percent of Normal Rainfall (%)  
October 2017**



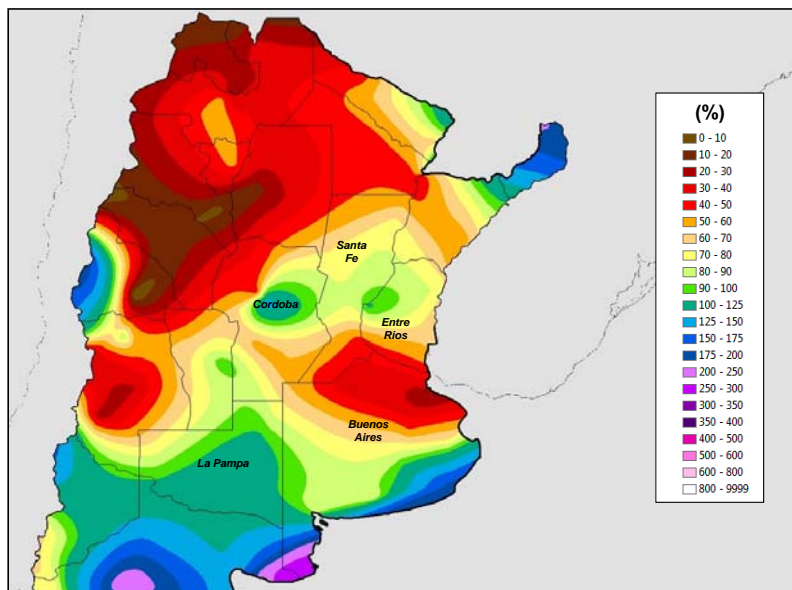
**Temperature Departure from Normal (C)  
October 2017**



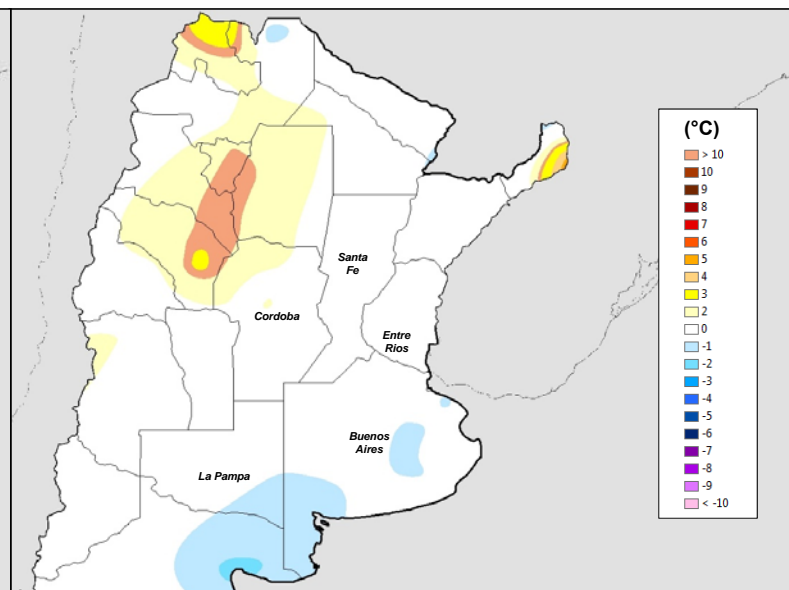
**Soybean crop calendar for most of Argentina**



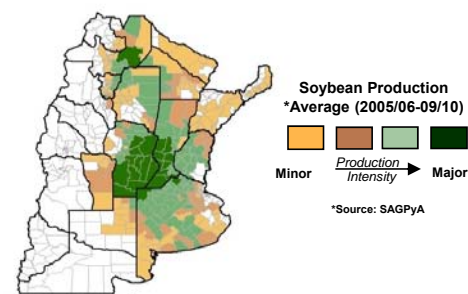
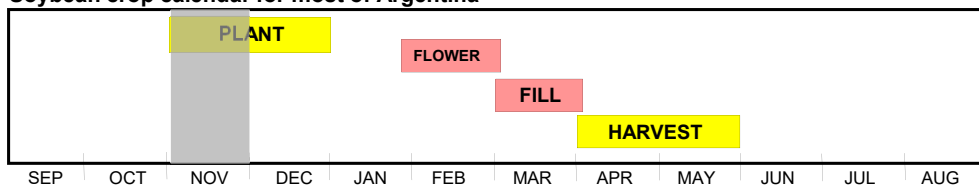
**Percent of Normal Rainfall (%)  
November 2017**



**Temperature Departure from Normal (C)  
November 2017**

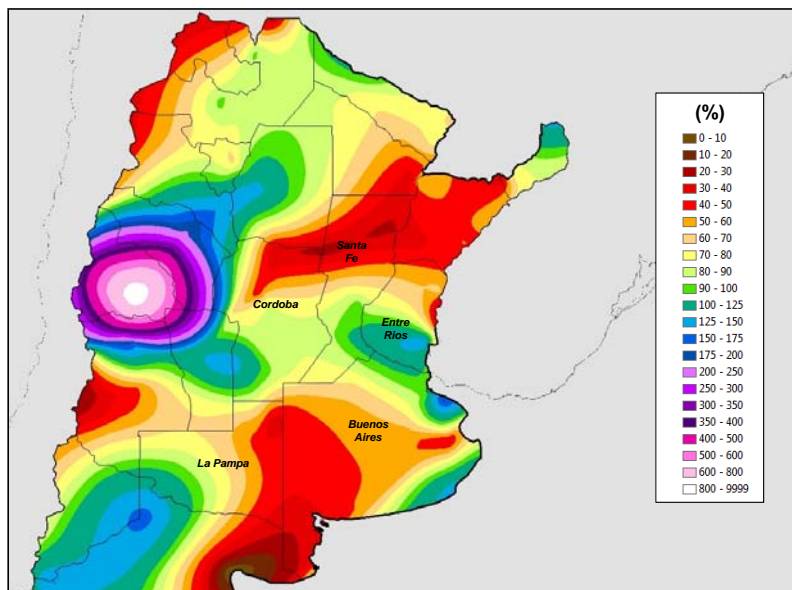


**Soybean crop calendar for most of Argentina**

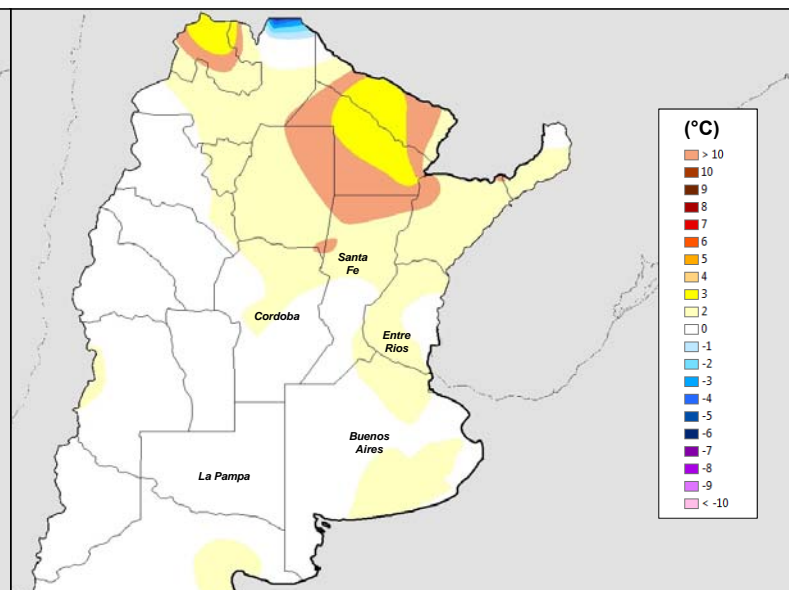




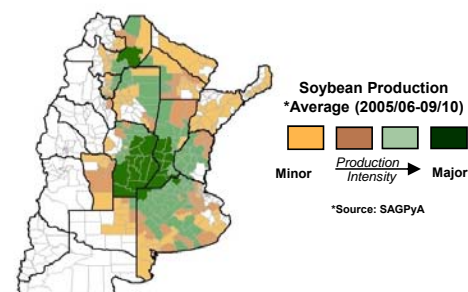
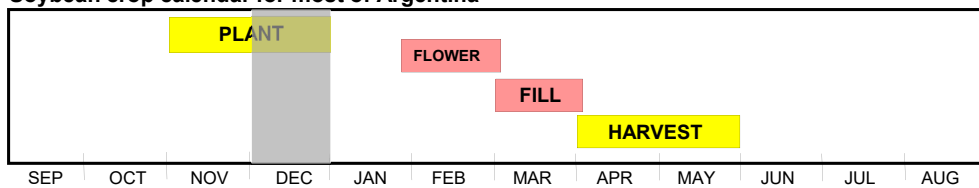
**Percent of Normal Rainfall (%)  
December 2017**



**Temperature Departure from Normal (C)  
December 2017**



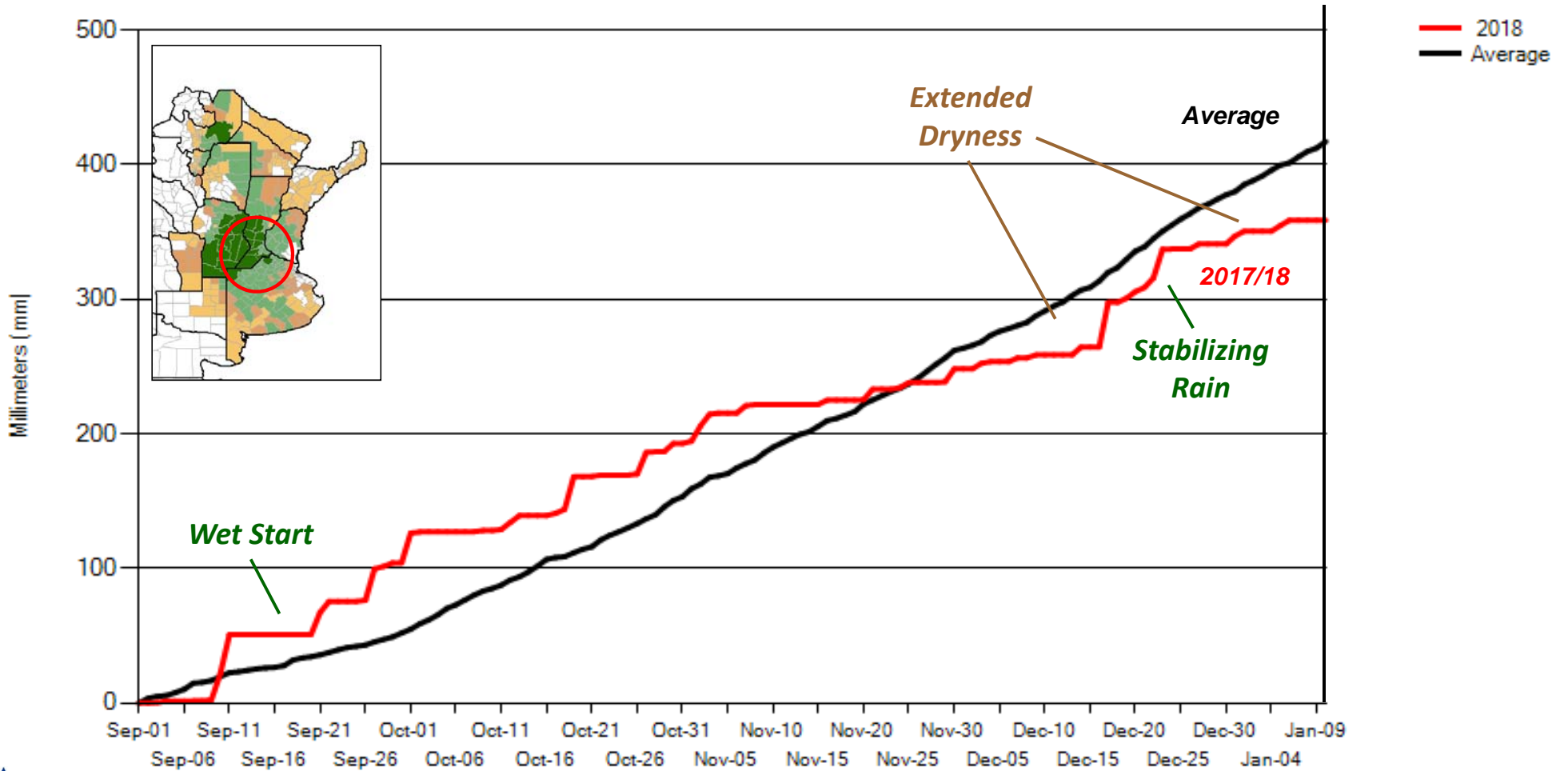
**Soybean crop calendar for most of Argentina**



# 6 - MAIN CROP AREA

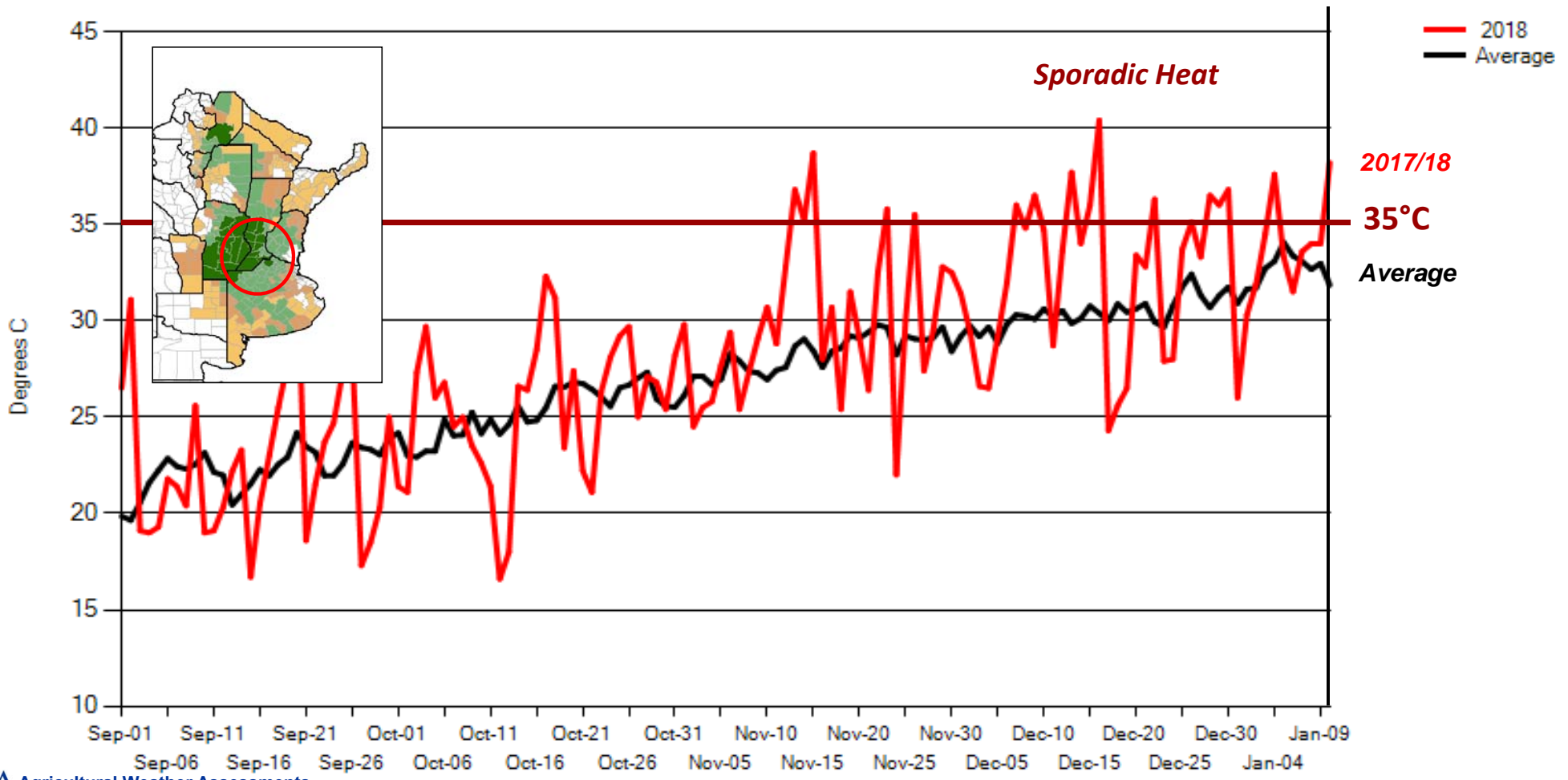
Cumulative Precipitation

January  
Lockup

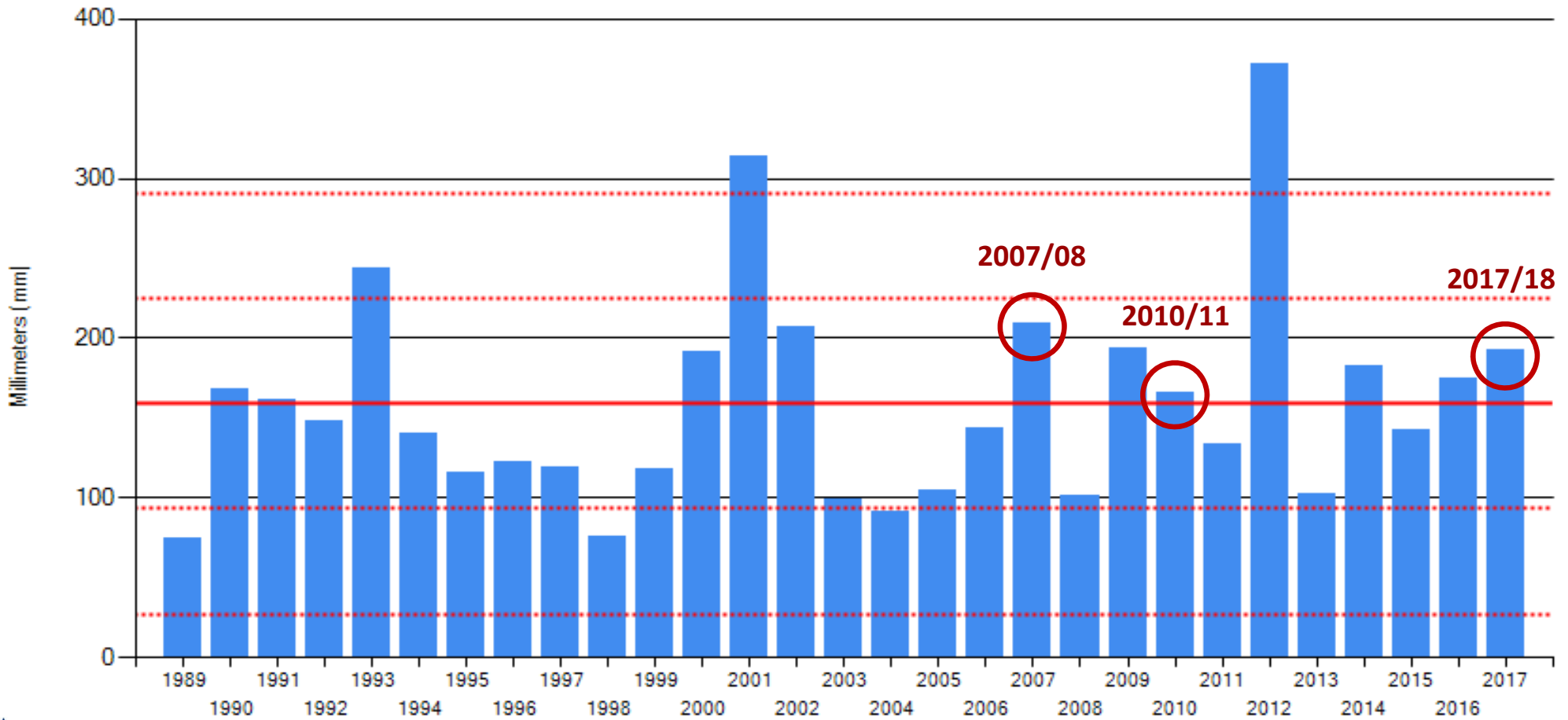


### 6 - MAIN CROP AREA Extreme Maximum Temperatures

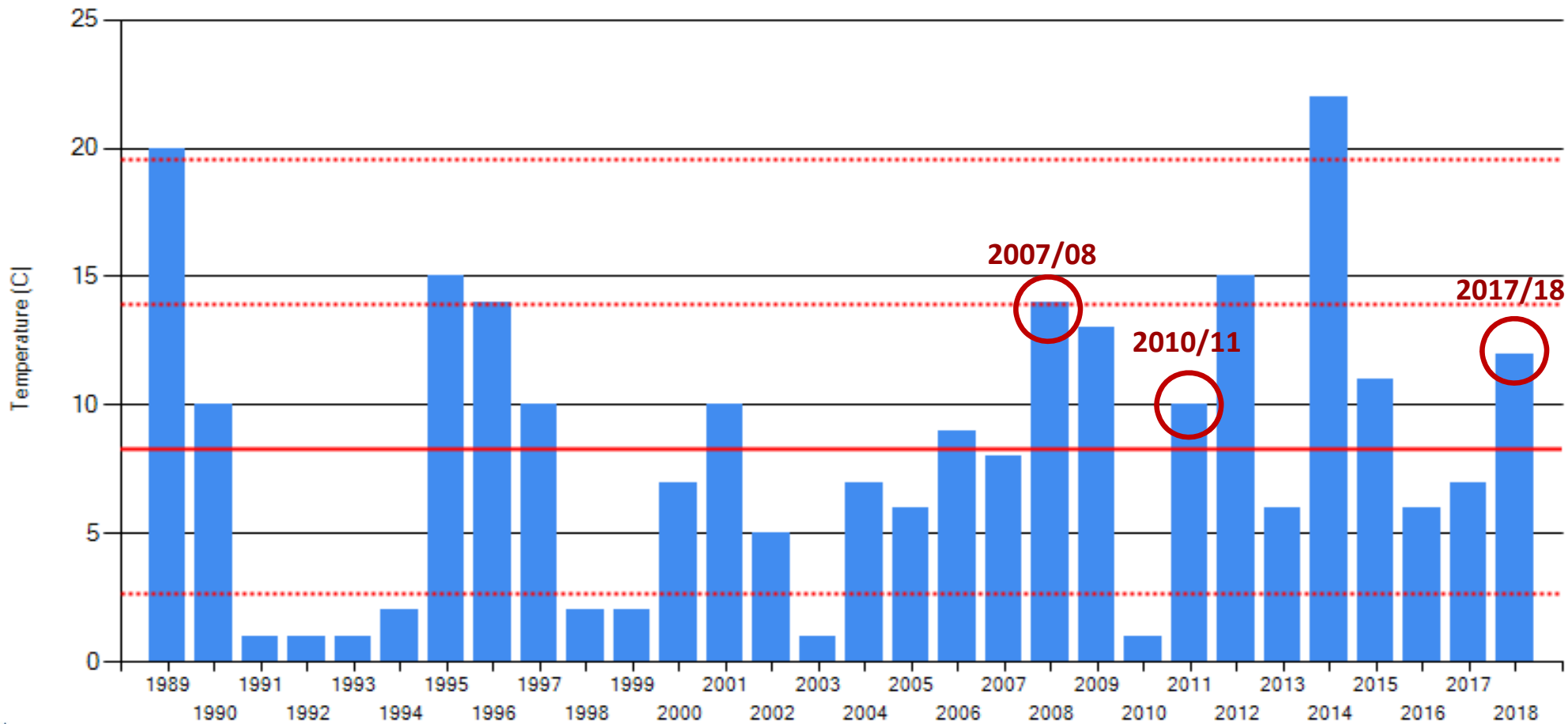
January  
Lockup



**6 - MAIN CROP AREA**  
**Total Precipitation: Sep 1 to Oct 31**

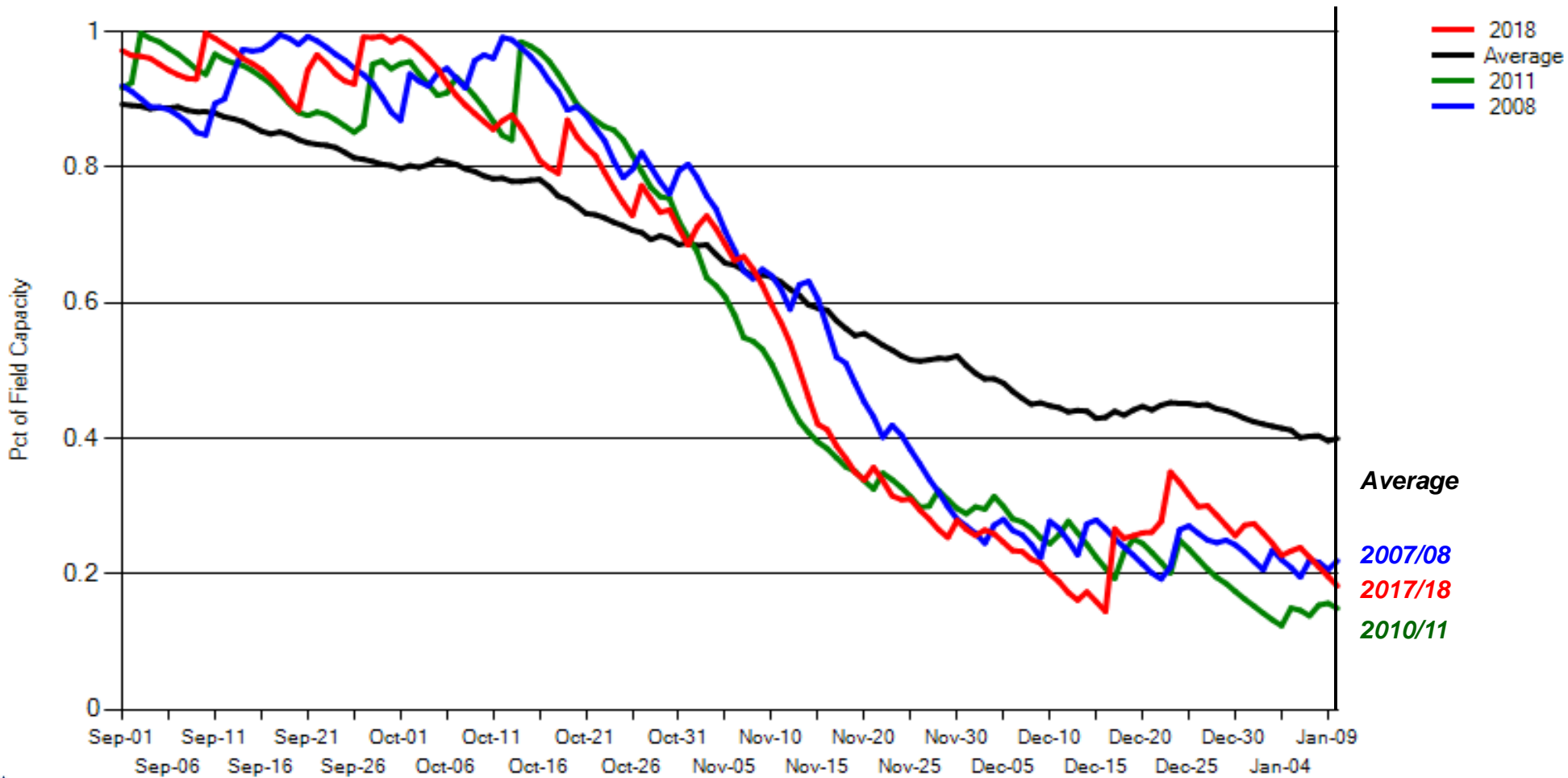


**6 - MAIN CROP AREA**  
**Extreme Maximum Temperature: Dec 1 to Jan 10**  
**# Days  $\geq 35^{\circ}\text{C}$**

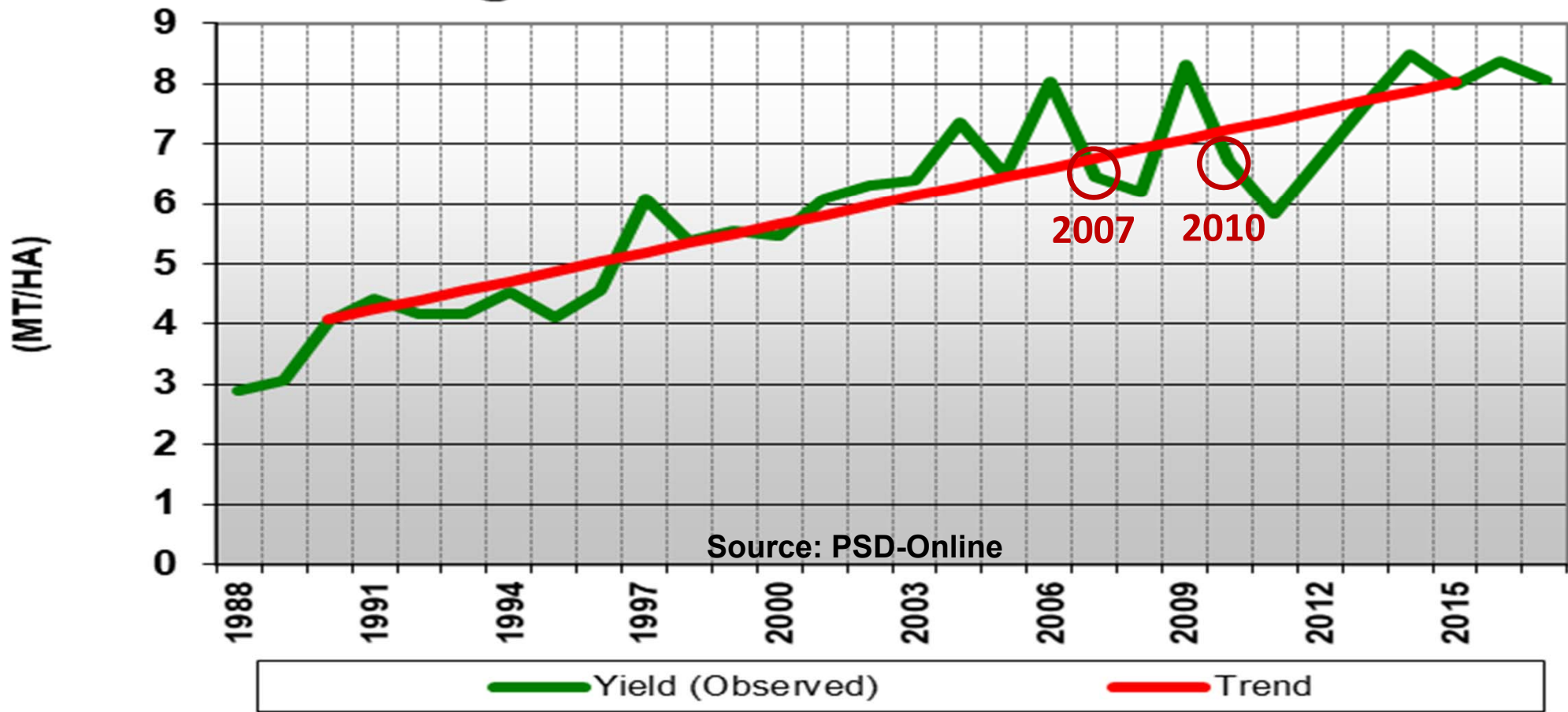


**6 - MAIN CROP AREA**  
Soil Moisture (Warm Season Crops)

**January  
Lockup**

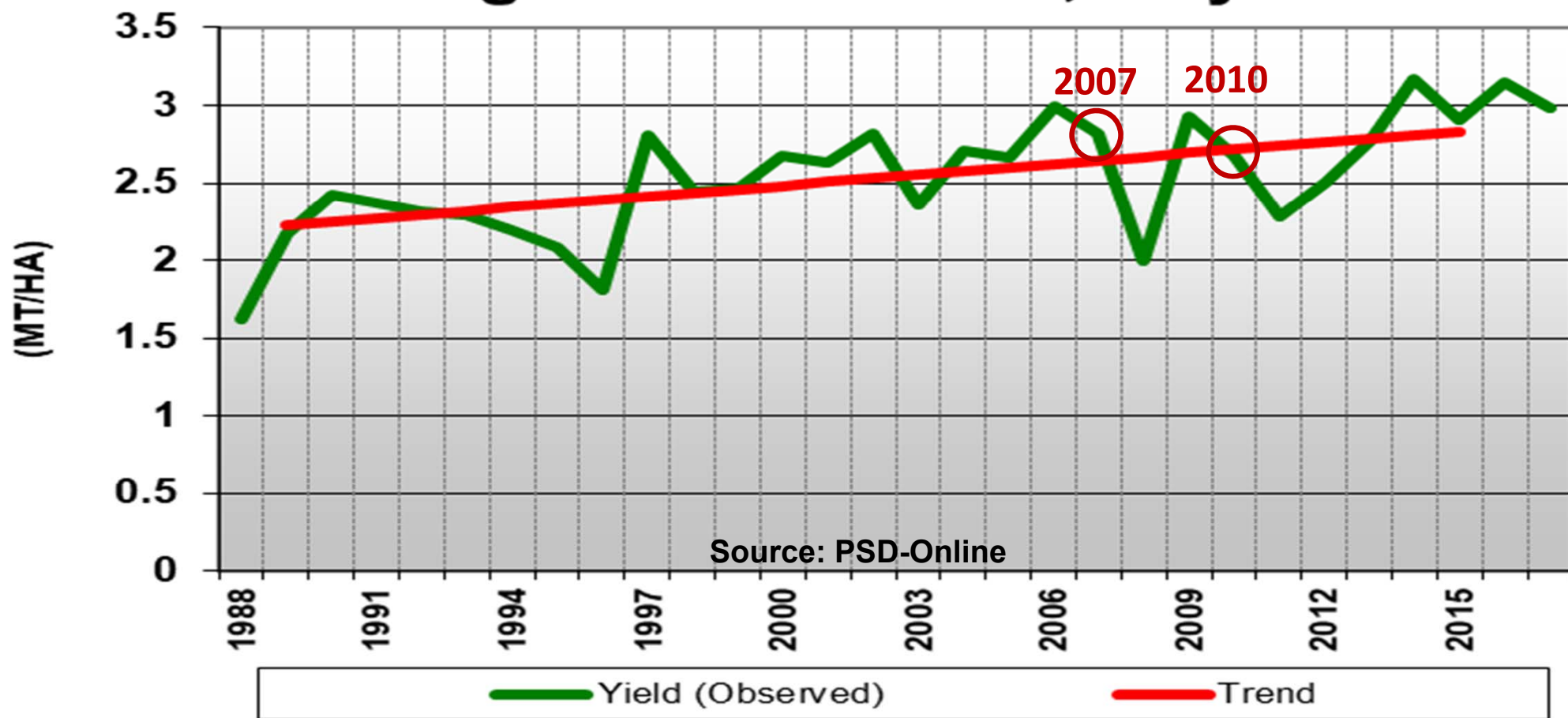


# Argentina: Corn

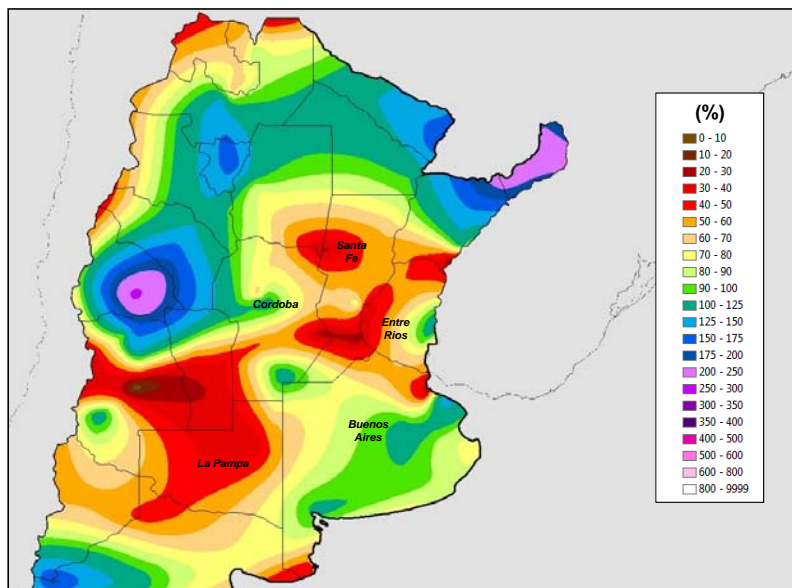




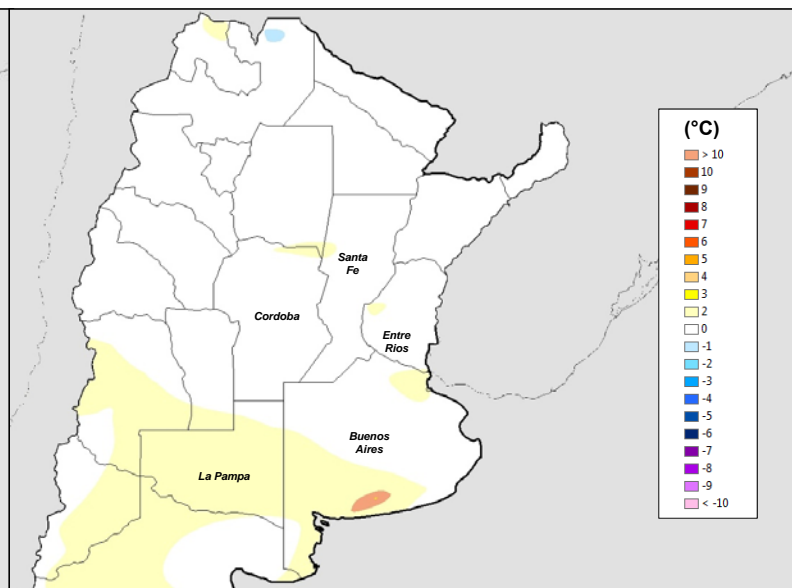
# Argentina: Oilseed, Soybean



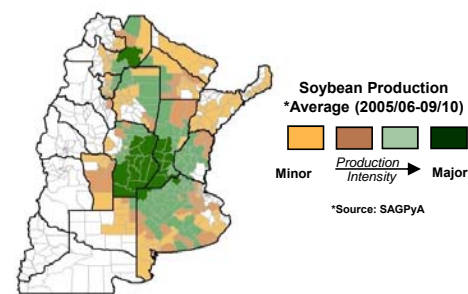
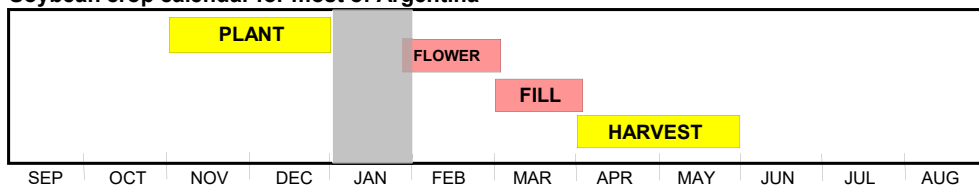
**Percent of Normal Rainfall (%)  
January 2018**



**Temperature Departure from Normal (C)  
January 2018**



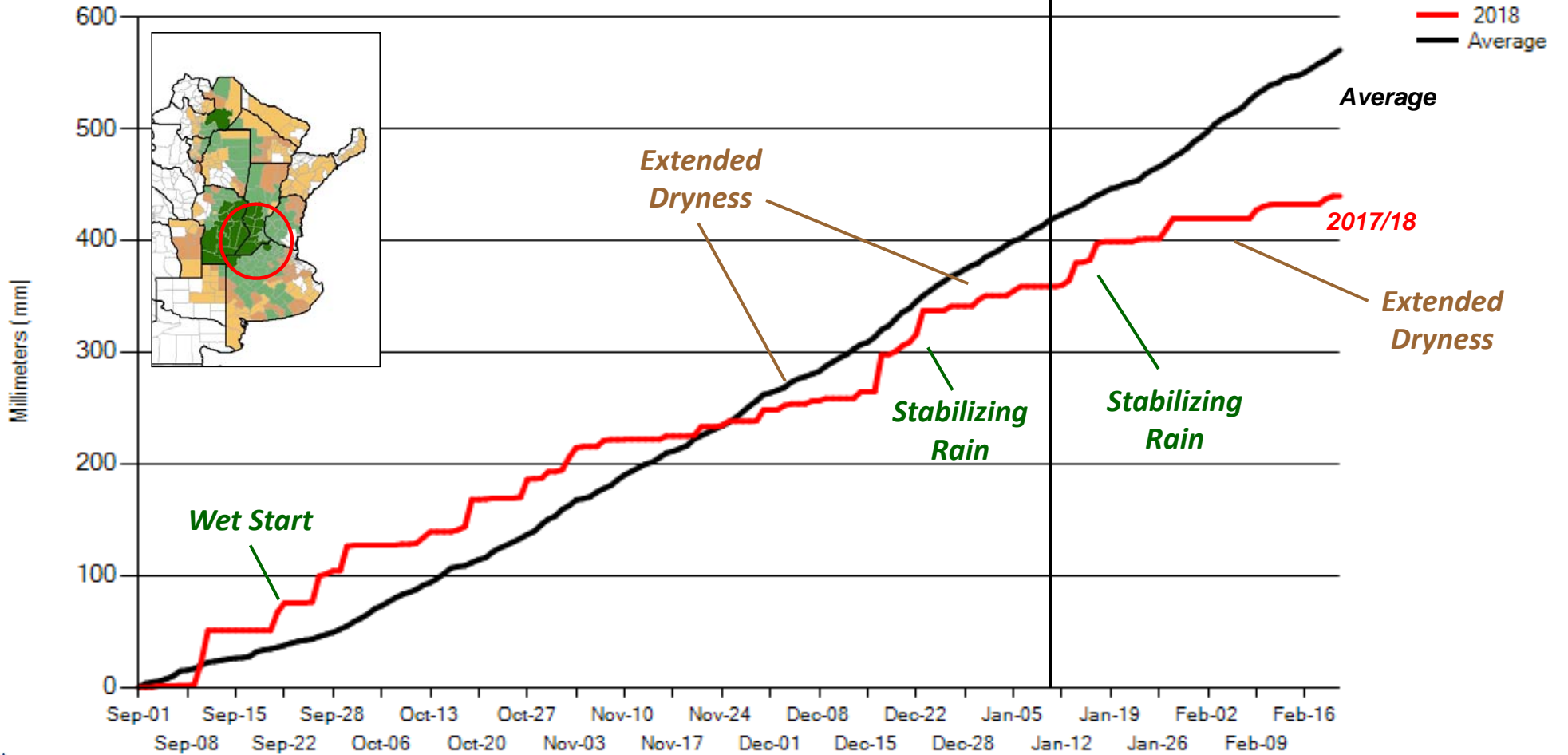
**Soybean crop calendar for most of Argentina**



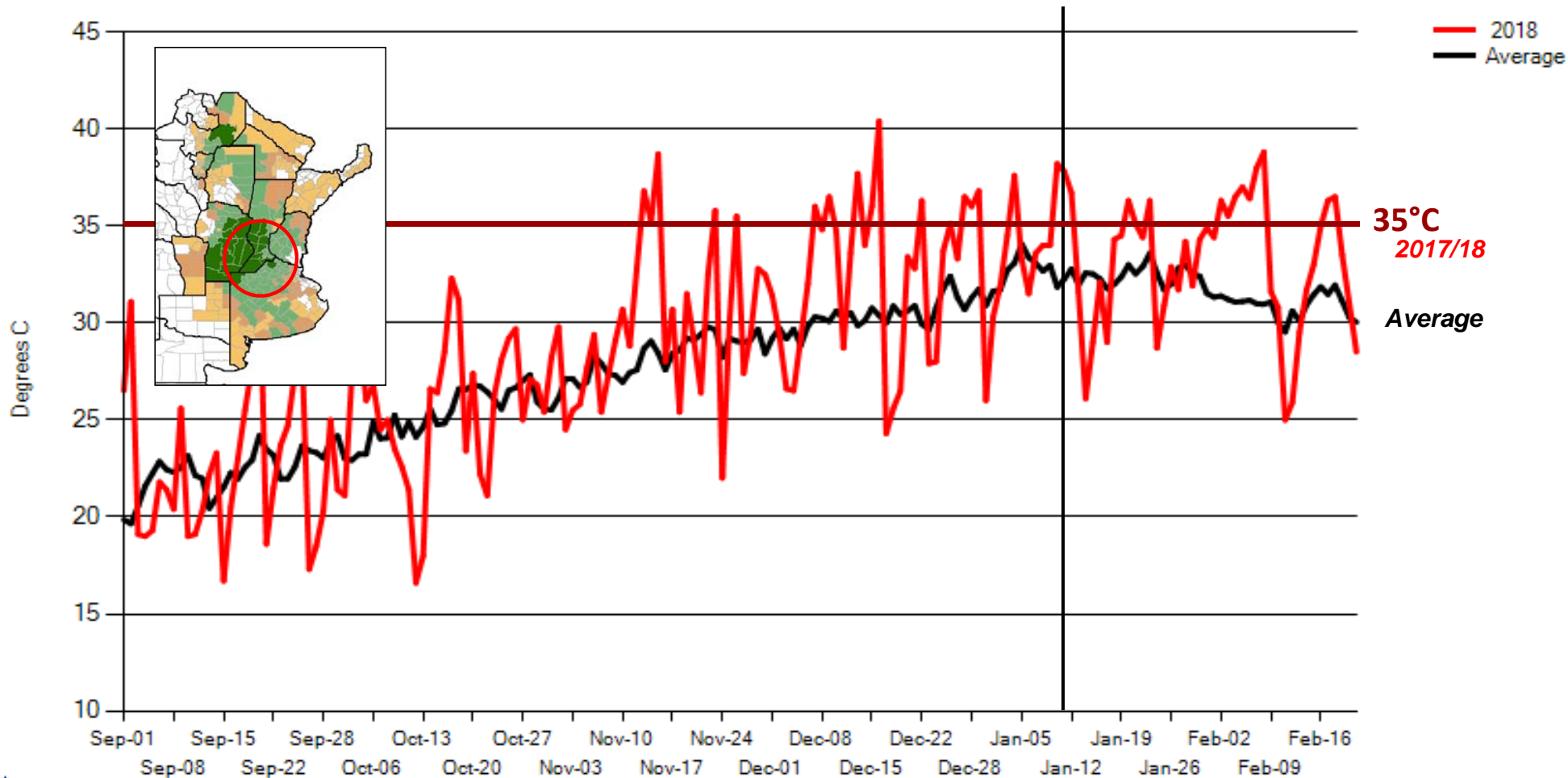
# 6 - MAIN CROP AREA

Cumulative Precipitation

January  
Lockup

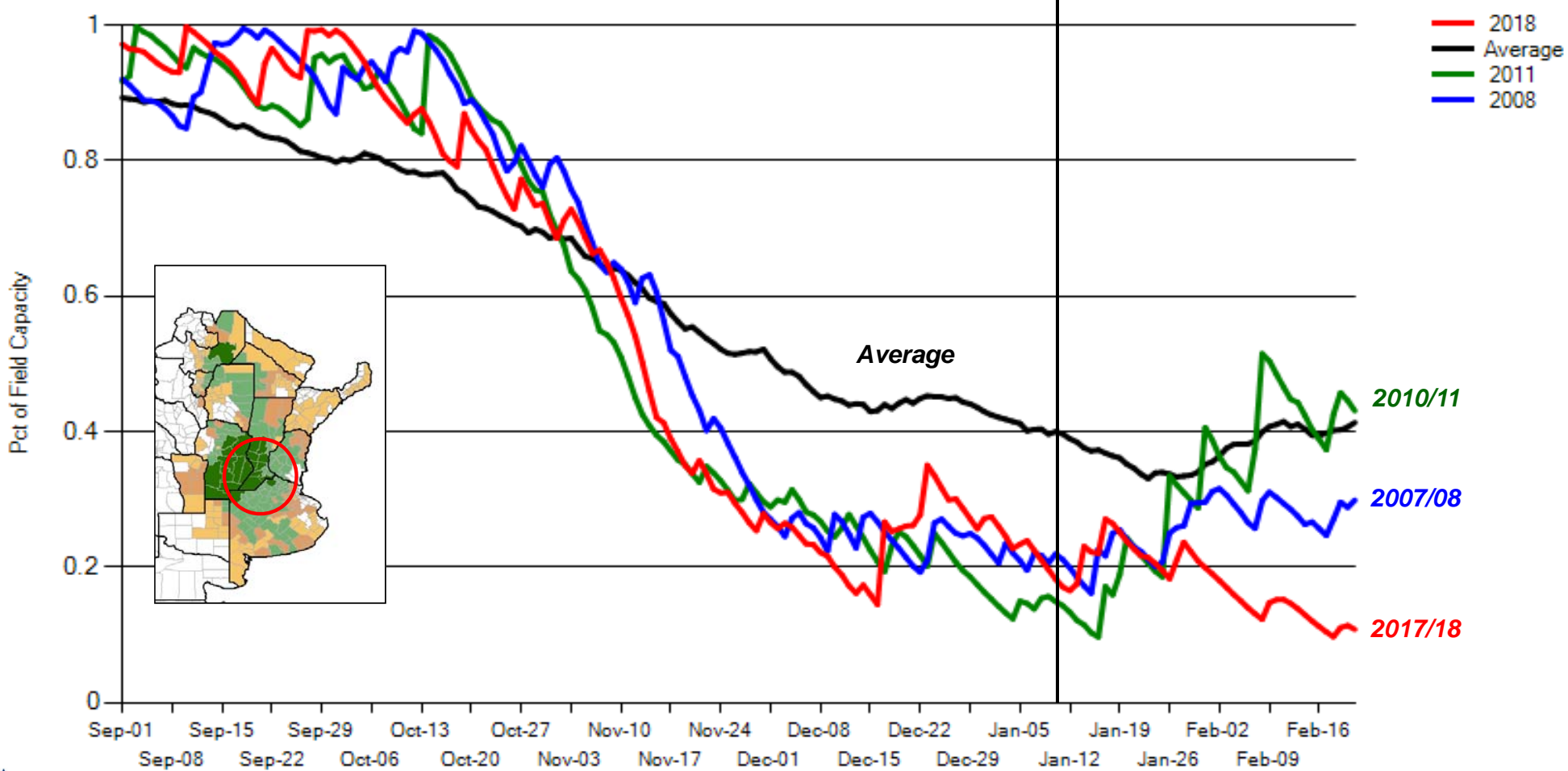


**6 - MAIN CROP AREA**  
Extreme Maximum Temperatures *January*  
*Lockup*



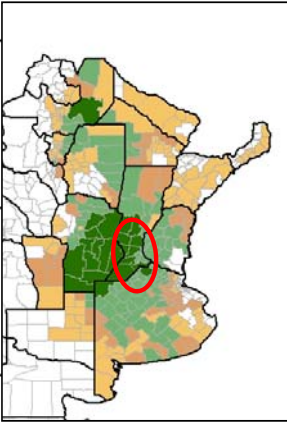
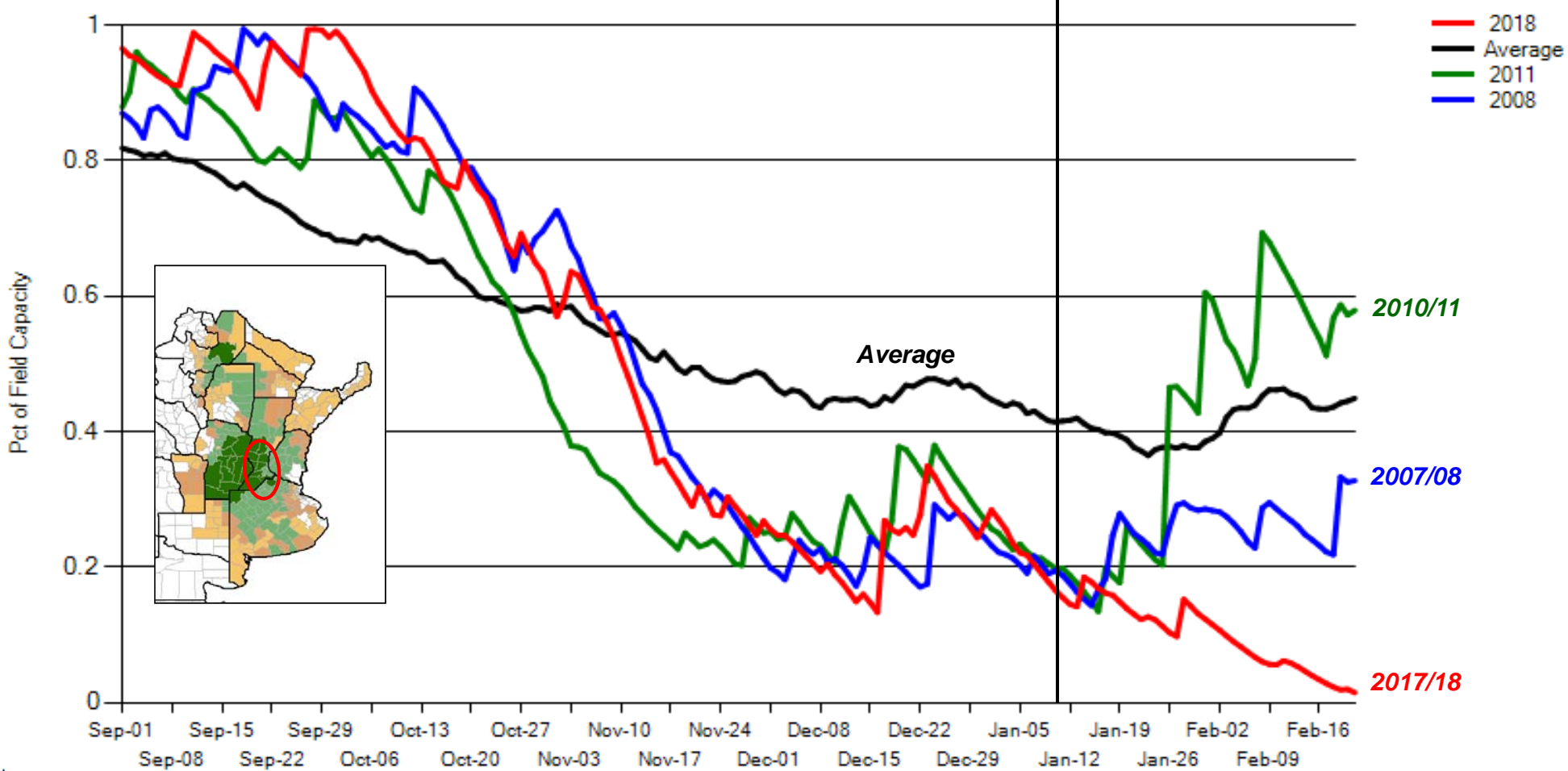
**6 - MAIN CROP AREA**  
Soil Moisture (Warm Season Crops)

*January Lockup*



**3 - C & S SANTA FE**  
 Soil Moisture (Warm Season Crops)

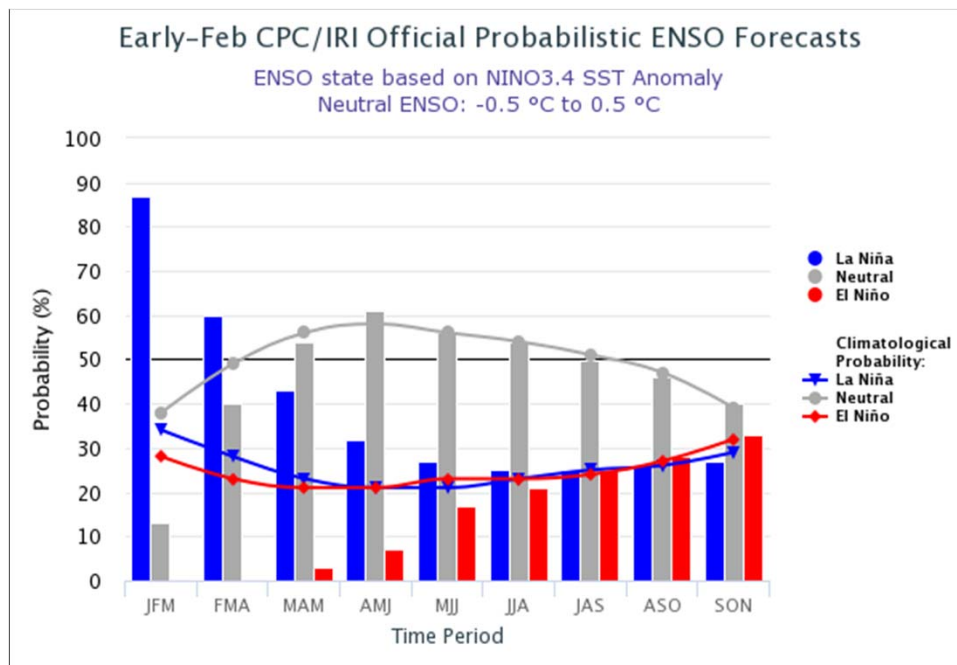
*January Lockup*



# CPC/IRI Probabilistic ENSO Outlook

Updated: 8 February 2018

A transition from La Niña to ENSO-neutral is expected during the Northern Hemisphere spring (~55% chance of ENSO-neutral during March-May). Thereafter, ENSO-neutral conditions are favored through fall 2018.

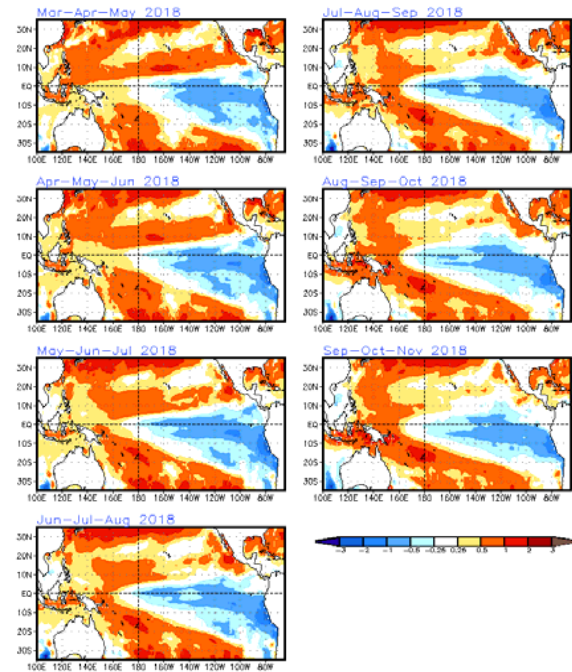
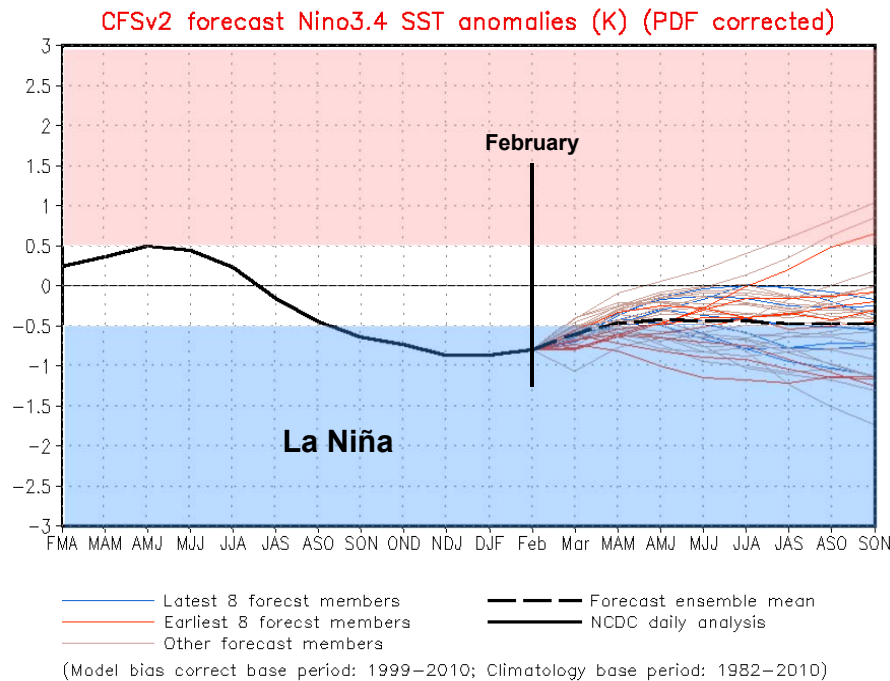




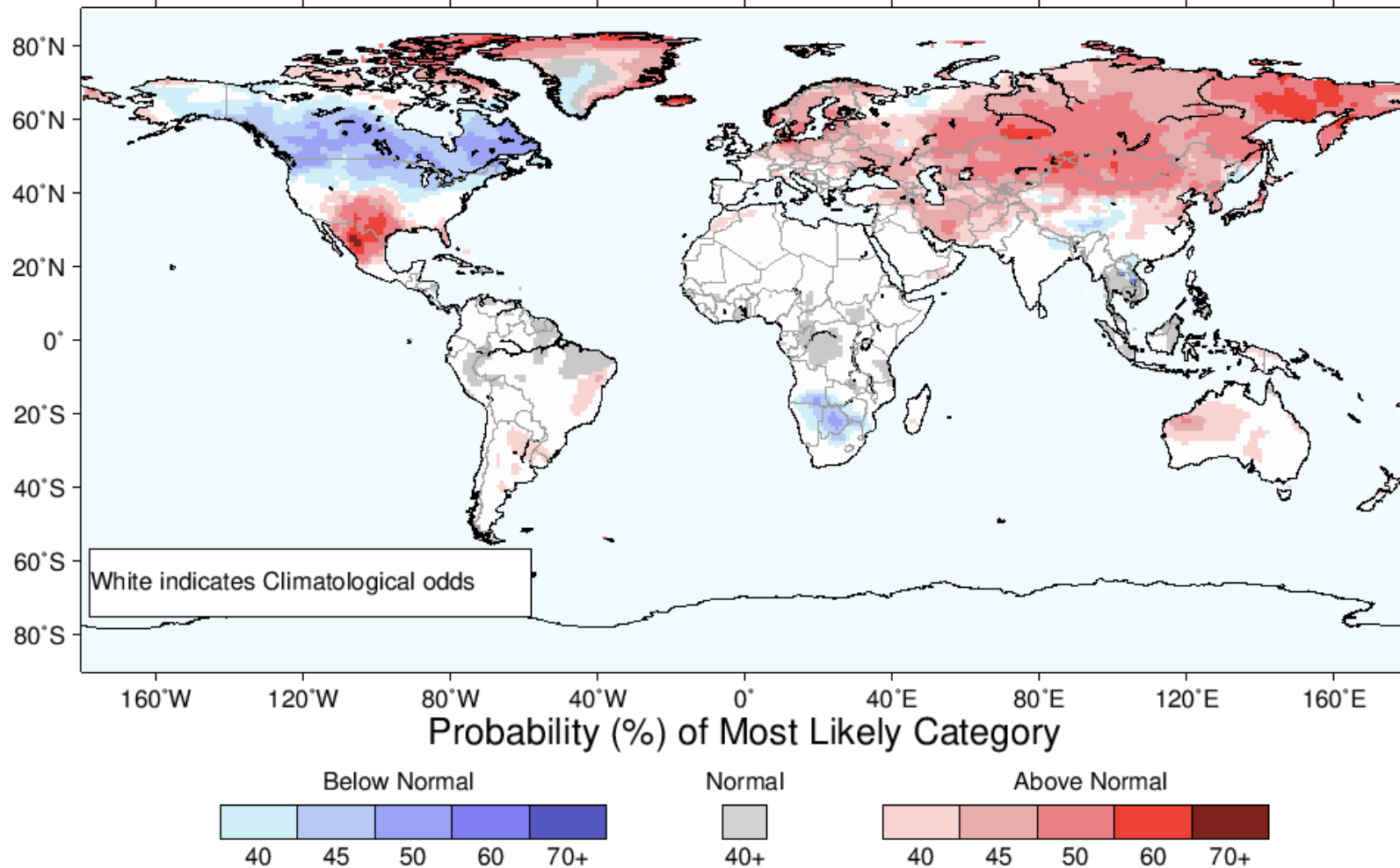
# SST Outlook: NCEP CFS.v2 Forecast (PDF corrected)

Issued: 18 February 2018

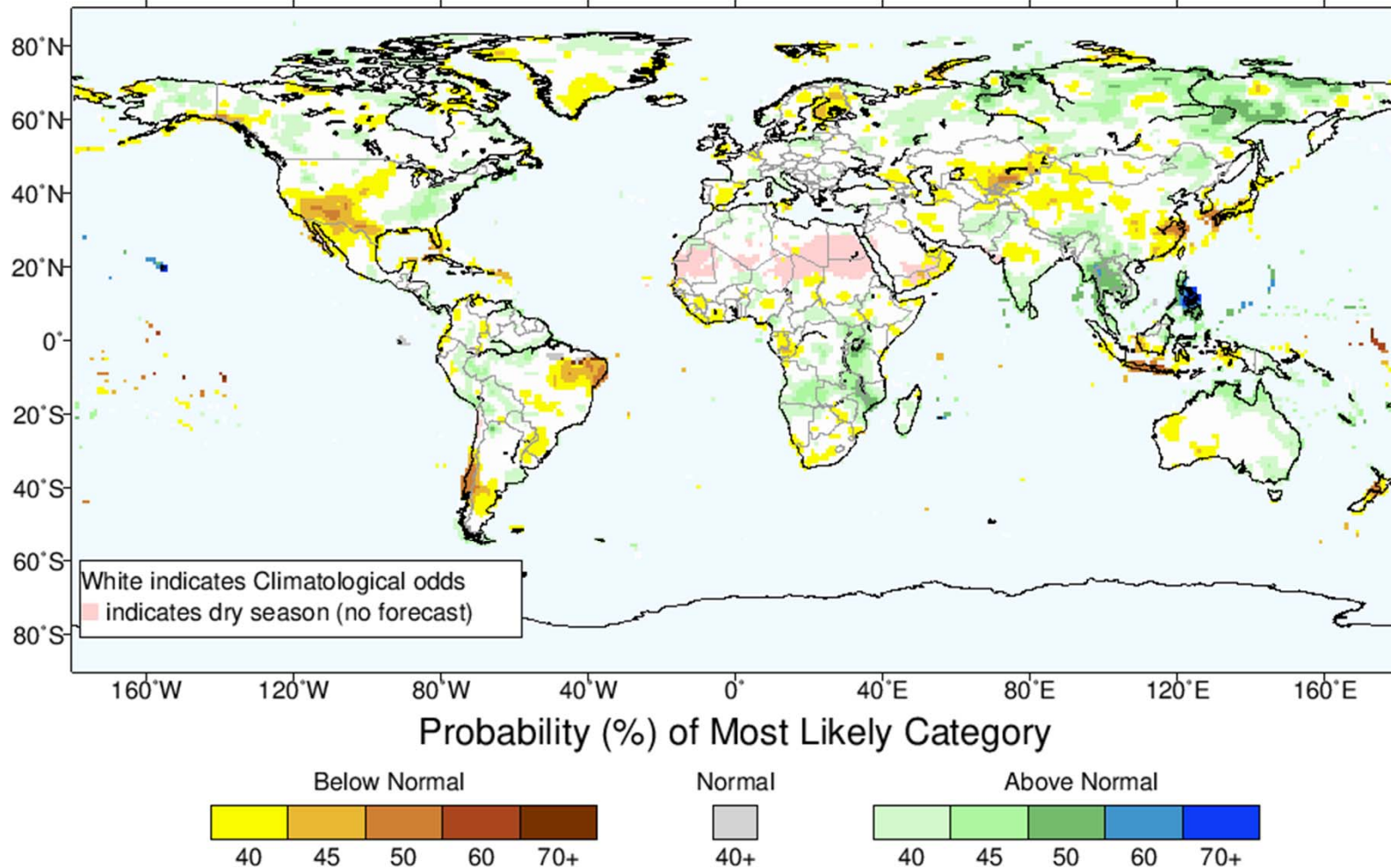
The CFS.v2 ensemble mean (black dashed line) favors borderline ENSO-neutral or La Niña conditions through the Northern Hemisphere summer 2018.

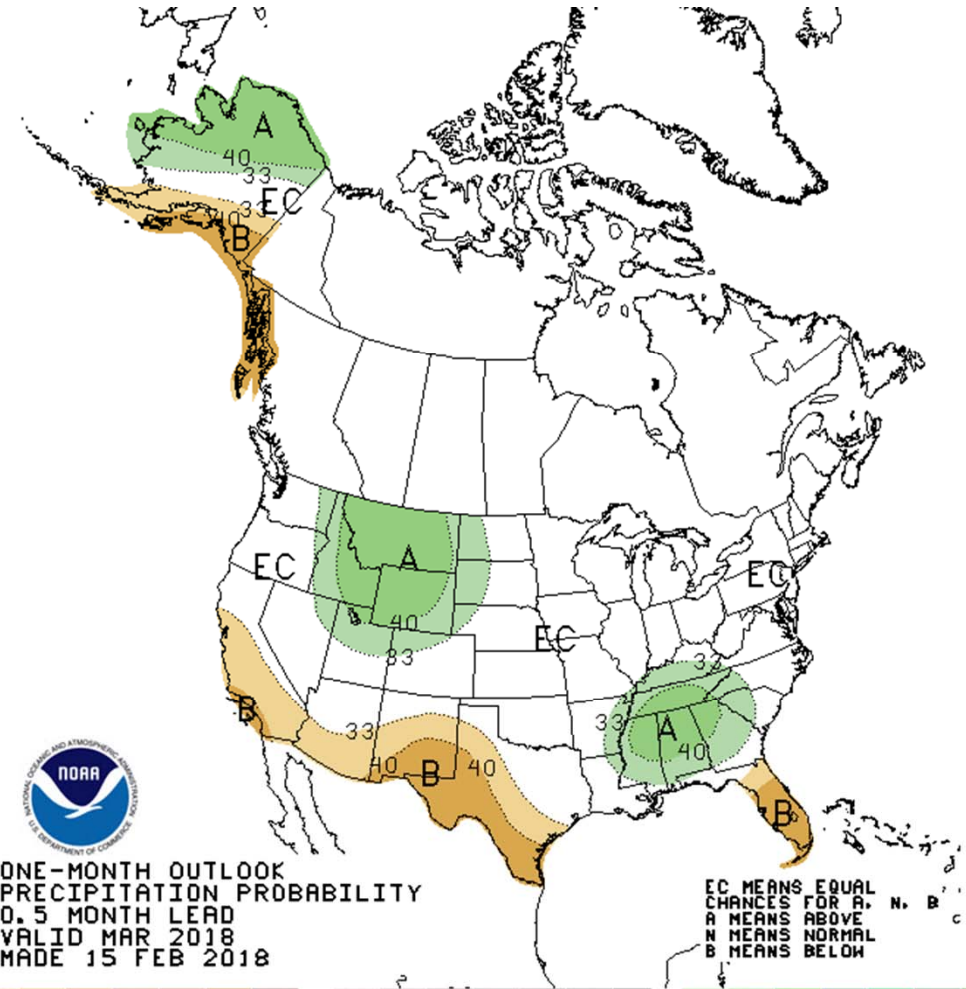
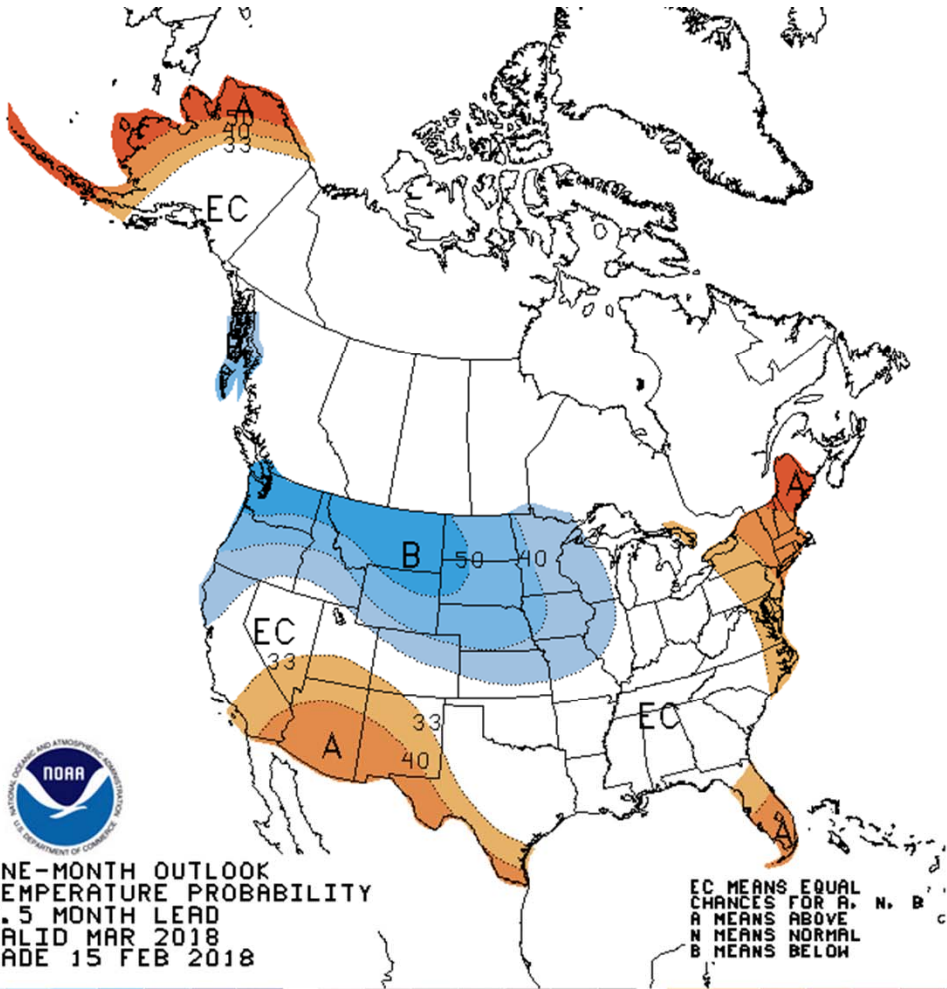


# IRI Multi-Model Probability Forecast for Temperature for March–April–May 2018, Issued February 2018

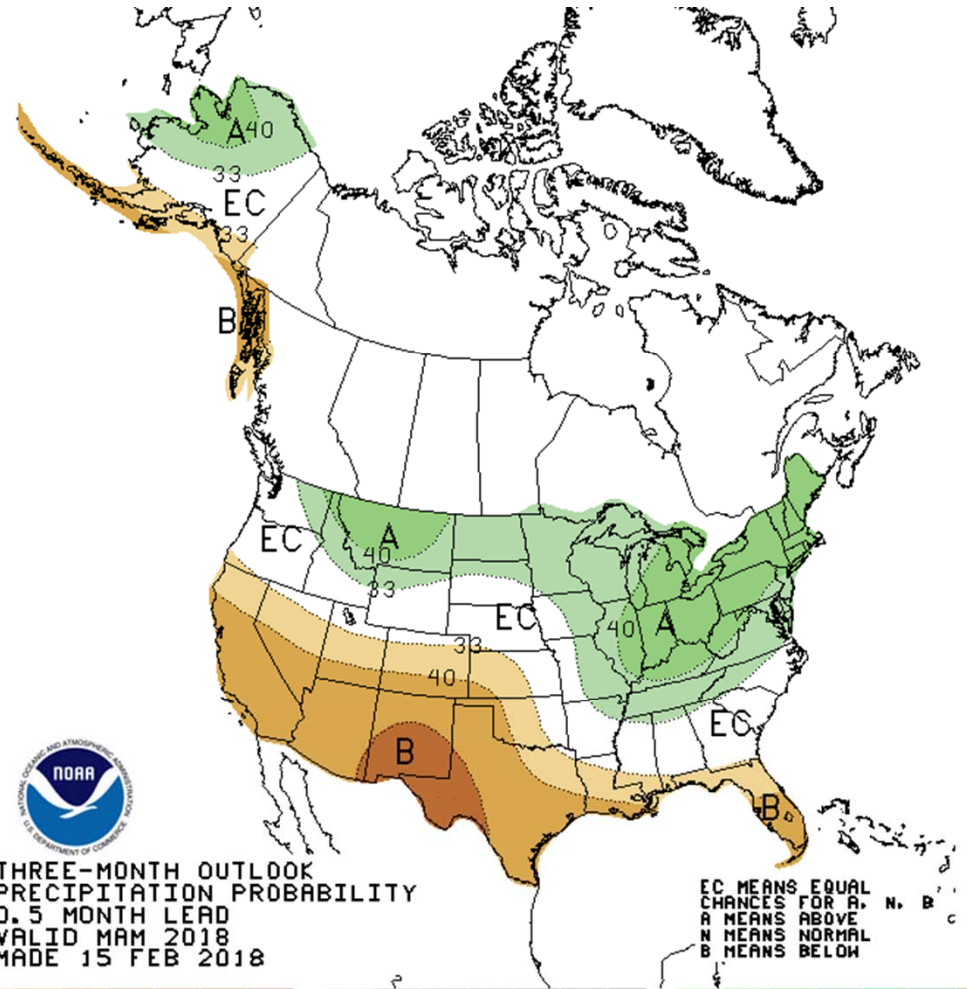
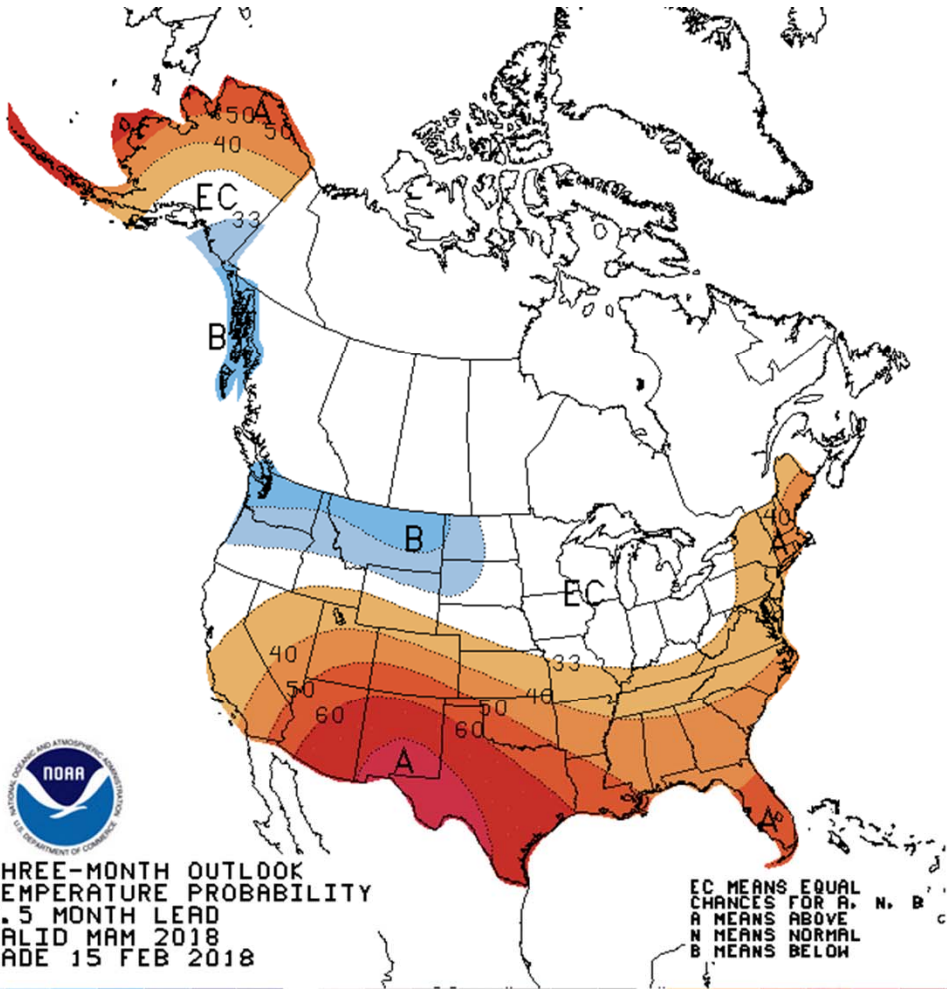


# IRI Multi-Model Probability Forecast for Precipitation for March–April–May 2018, Issued February 2018





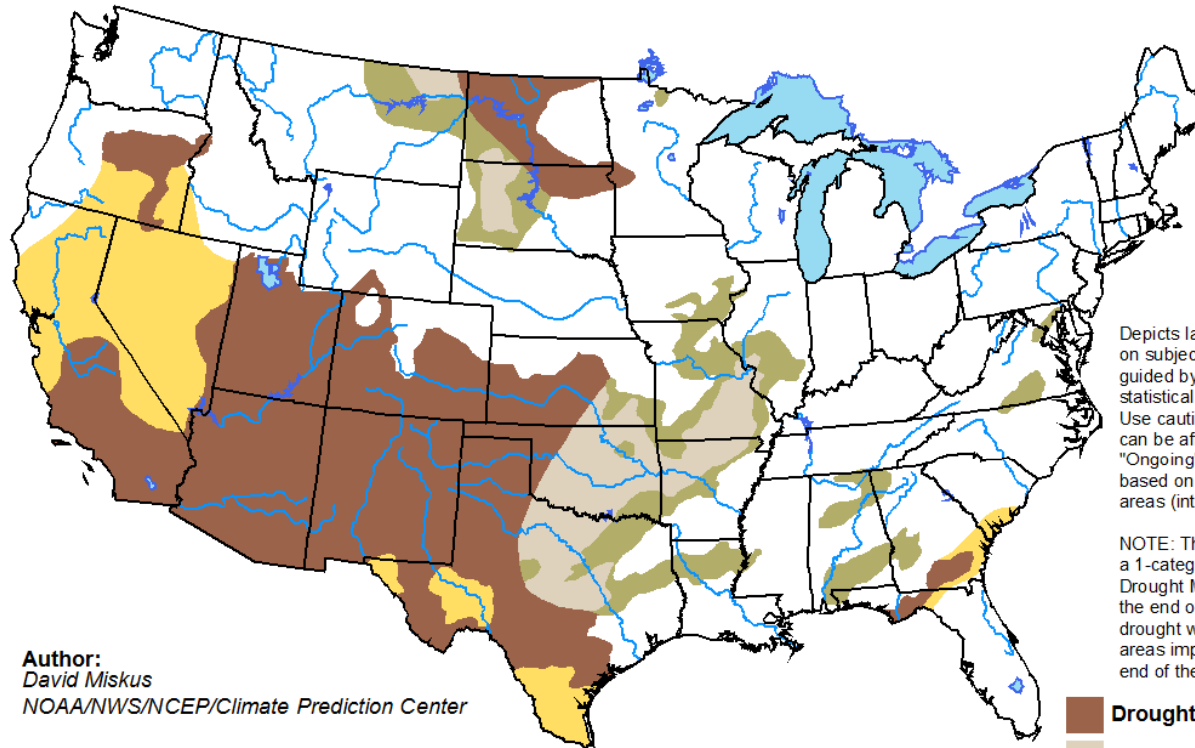




# U.S. Seasonal Drought Outlook

## Drought Tendency During the Valid Period





Valid for February 15 - May 31, 2018  
Released February 15, 2018



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).

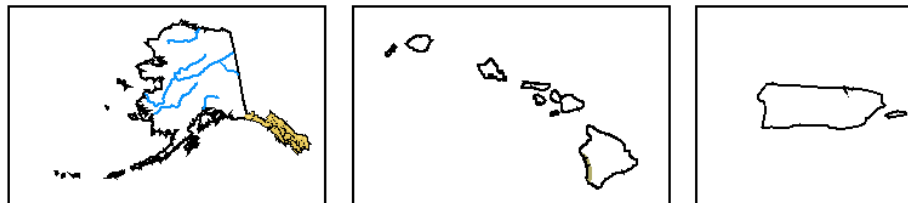
NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

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>





# Thanks!

mbrusberg@oce.usda.gov



<https://www.markethallfoods.com/products/anchovy-fillets-iasa>