




*Weather Risk in Production  
Agriculture: 2020 Growing Season  
with Guest Eric Snodgrass*

**FARMER  AC**


*June 10, 2020*

1



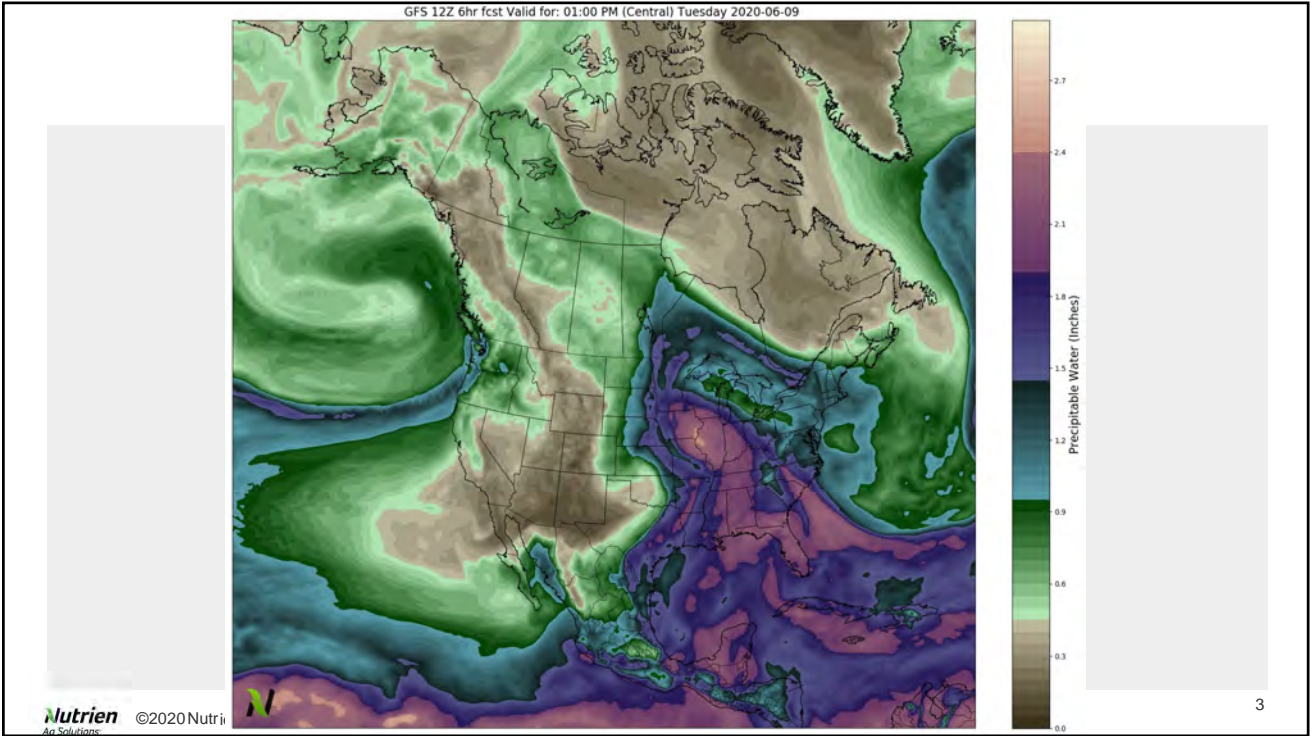
**Weather/Climate  
Risk in Production  
Agriculture**

June 10, 2020  
Eric Snodgrass  
[eric.snodgrass@nutrien.com](mailto:eric.snodgrass@nutrien.com)  
Principal Atmospheric Scientist  
Nutrien Ag Solutions

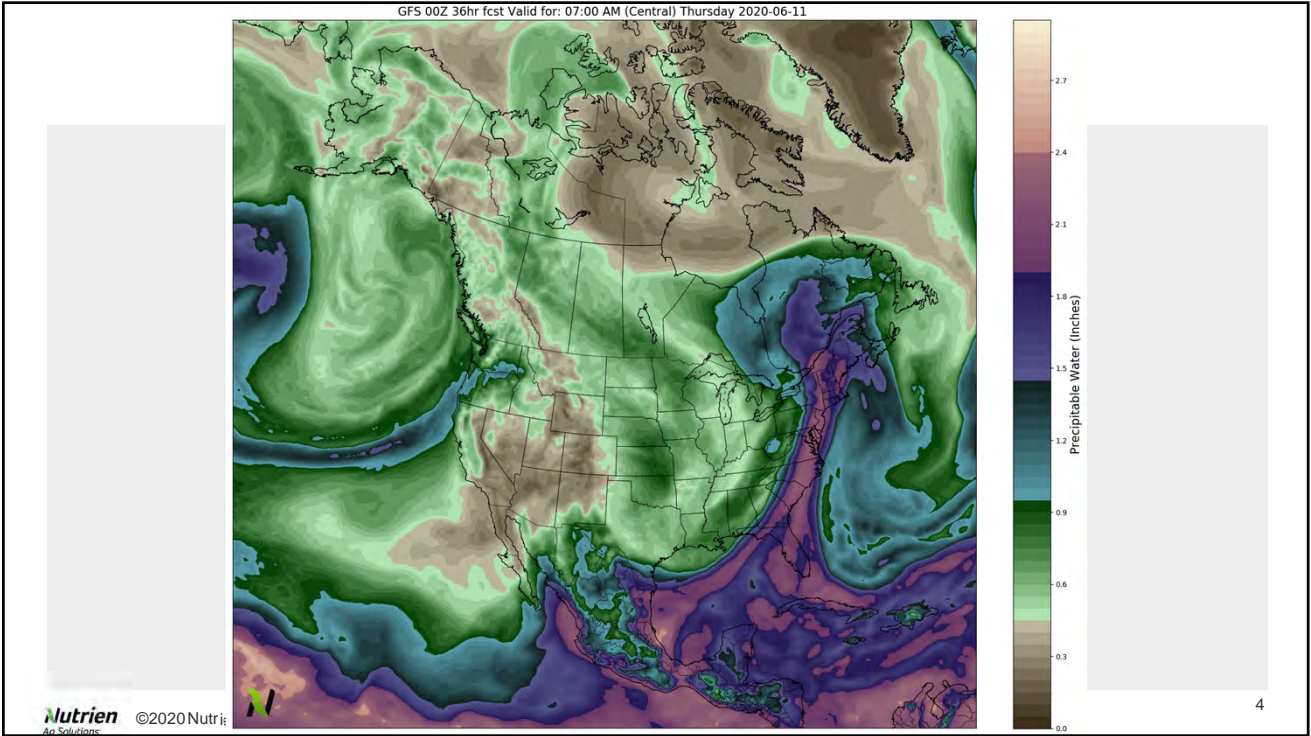


One package of **ground beef** can contain meat from more than 50 cows from several countries

2

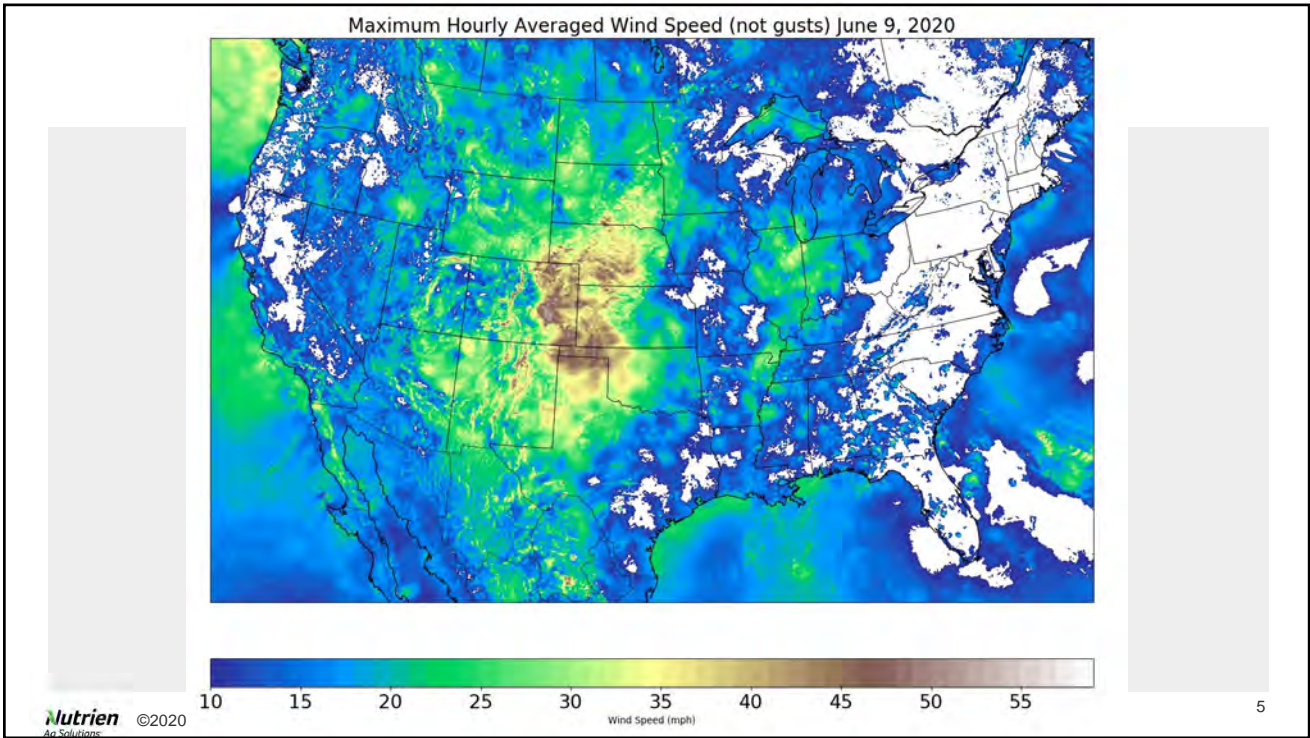


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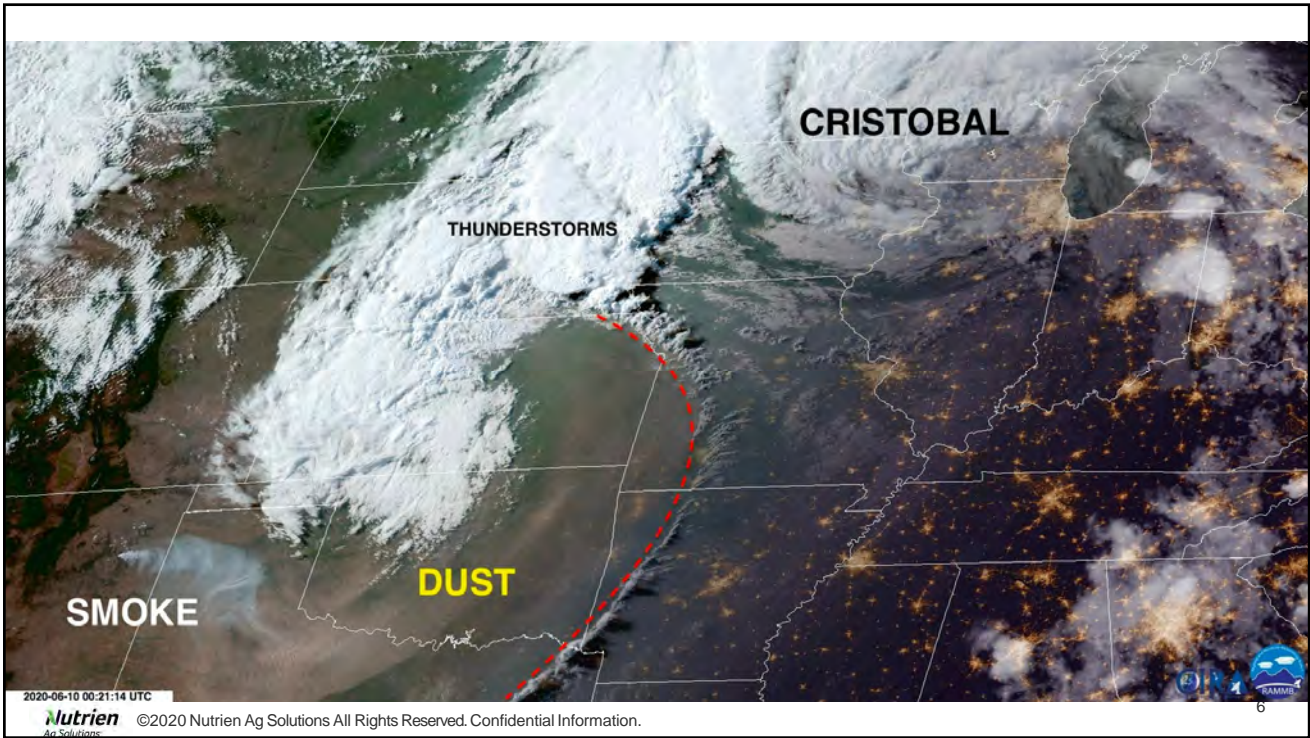


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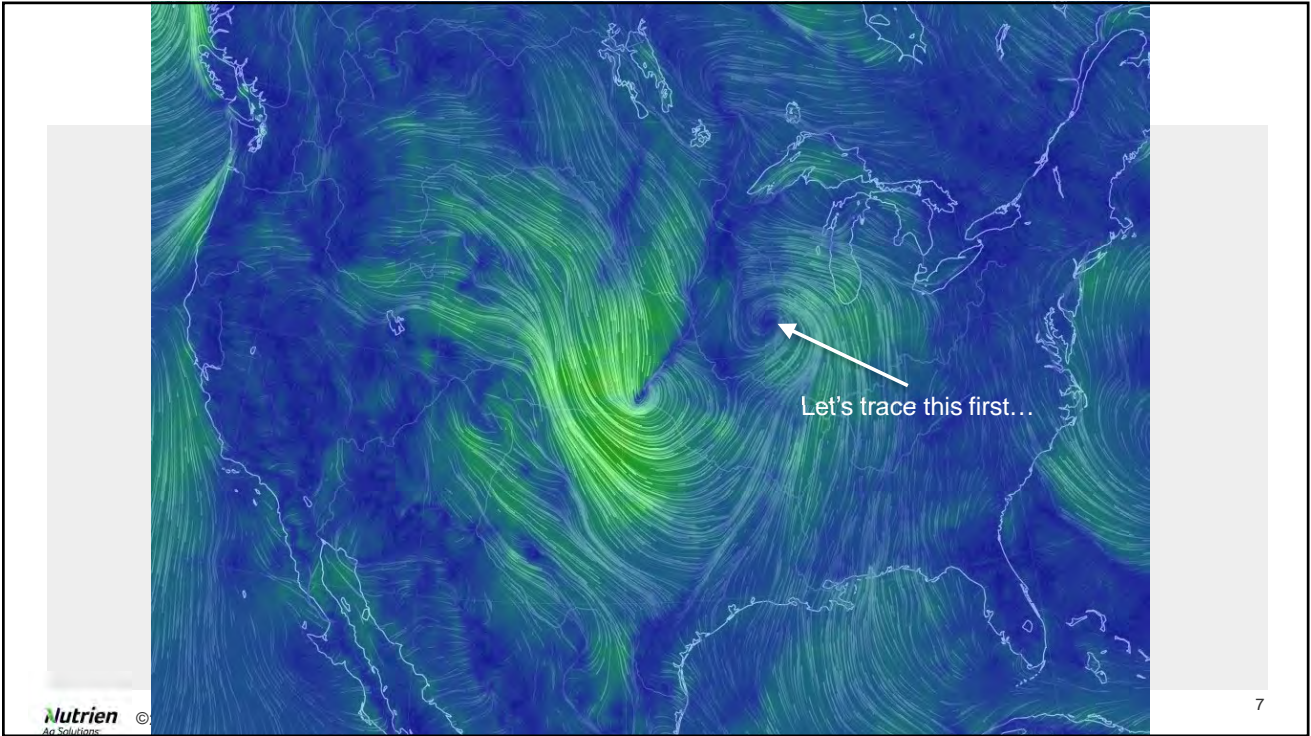


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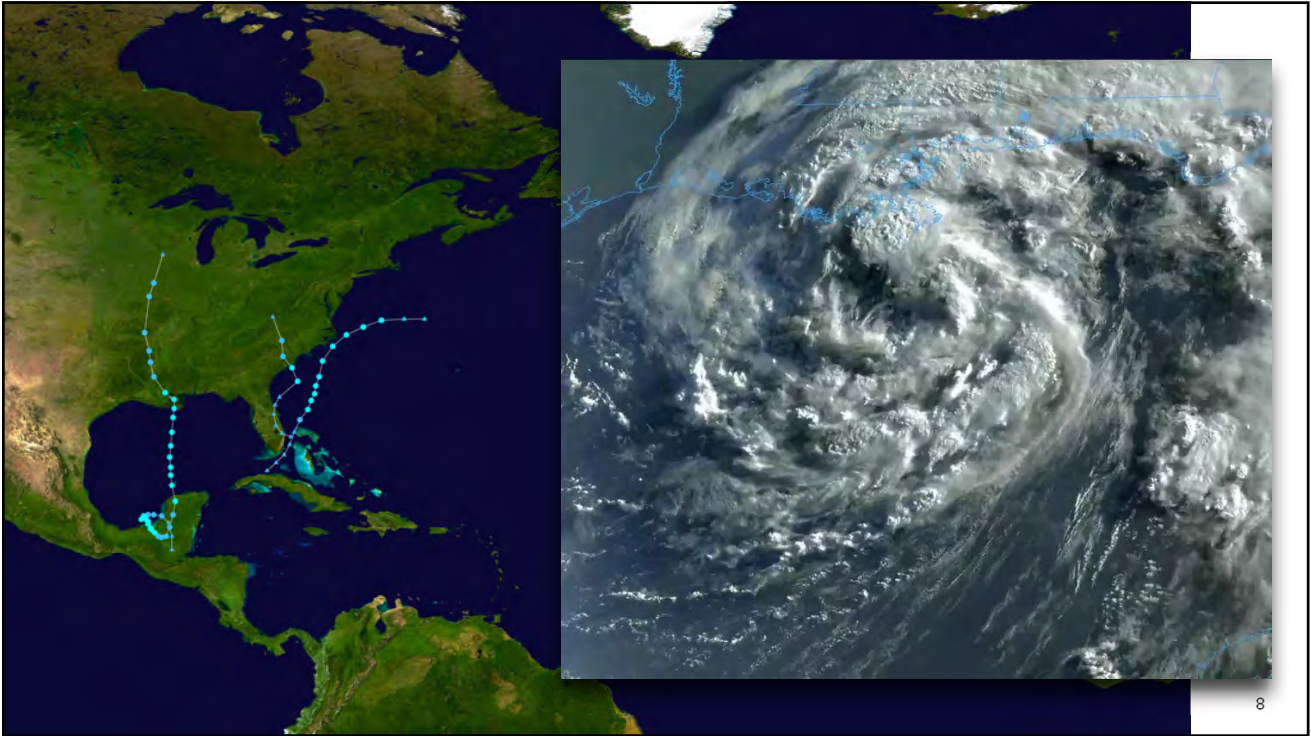


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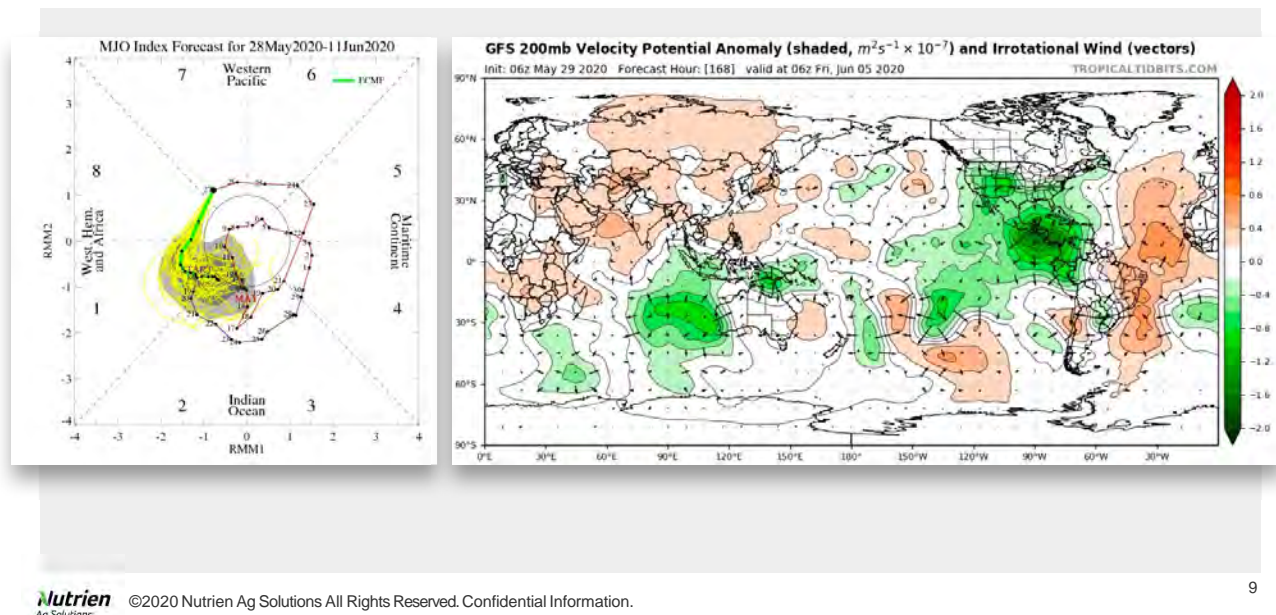


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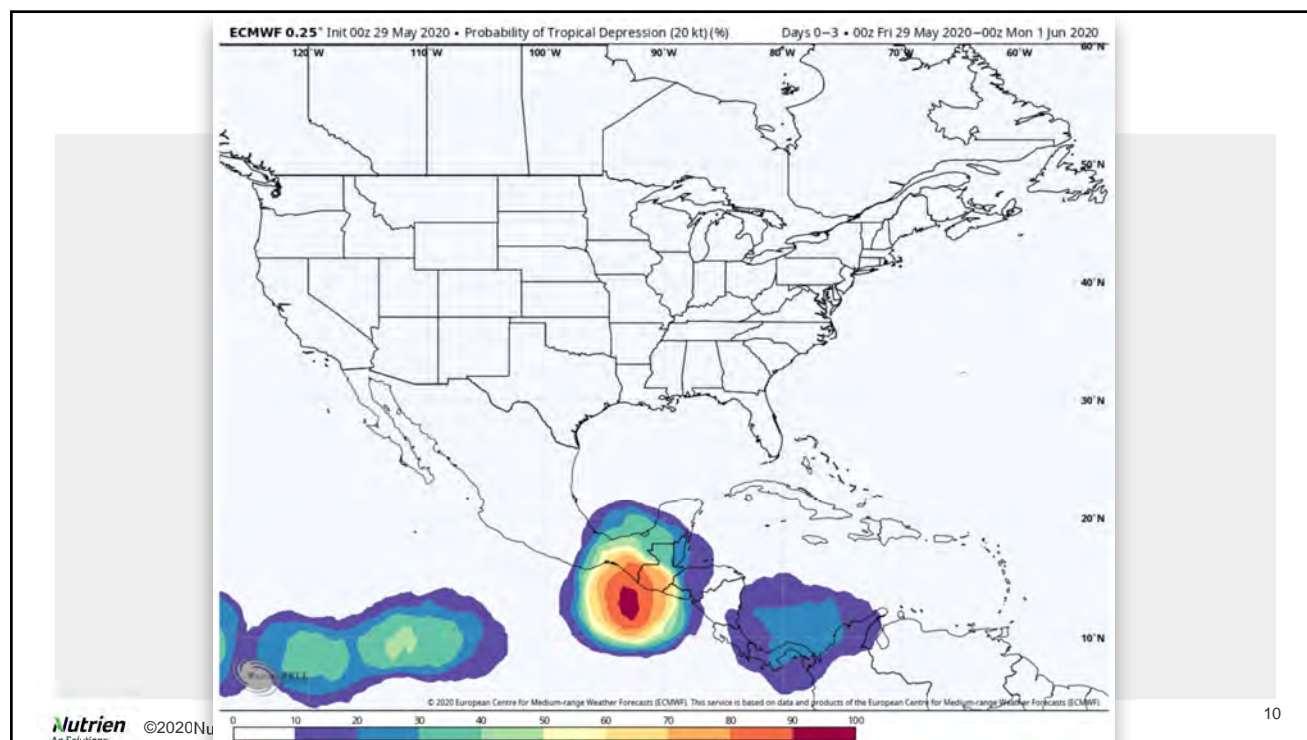


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Back on May 29, 2020



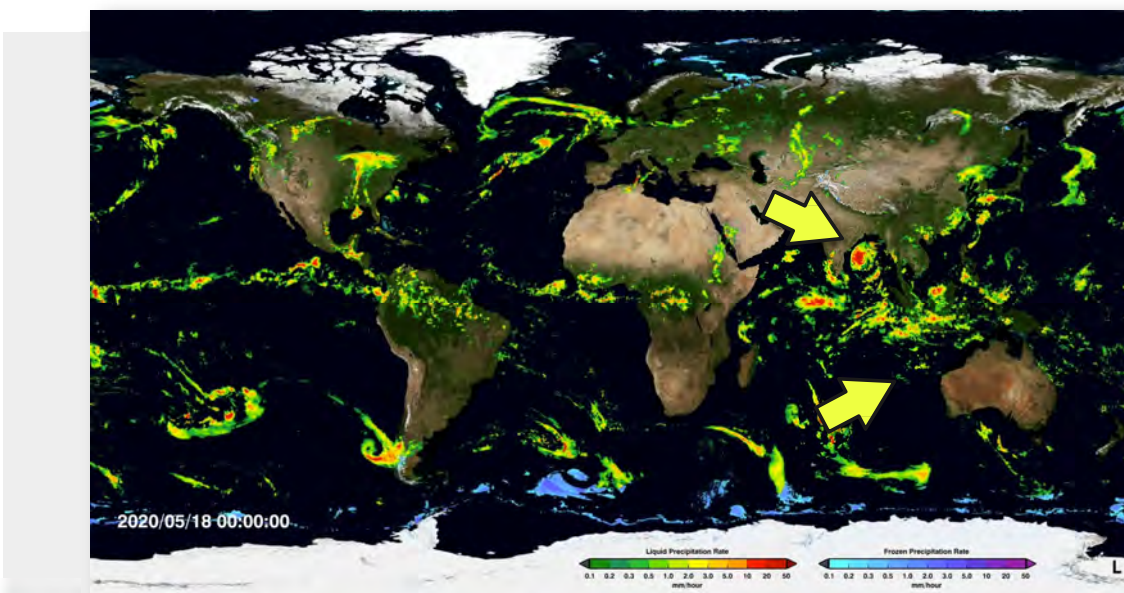
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Before that - let's go back to the week ending on May 25, 2020

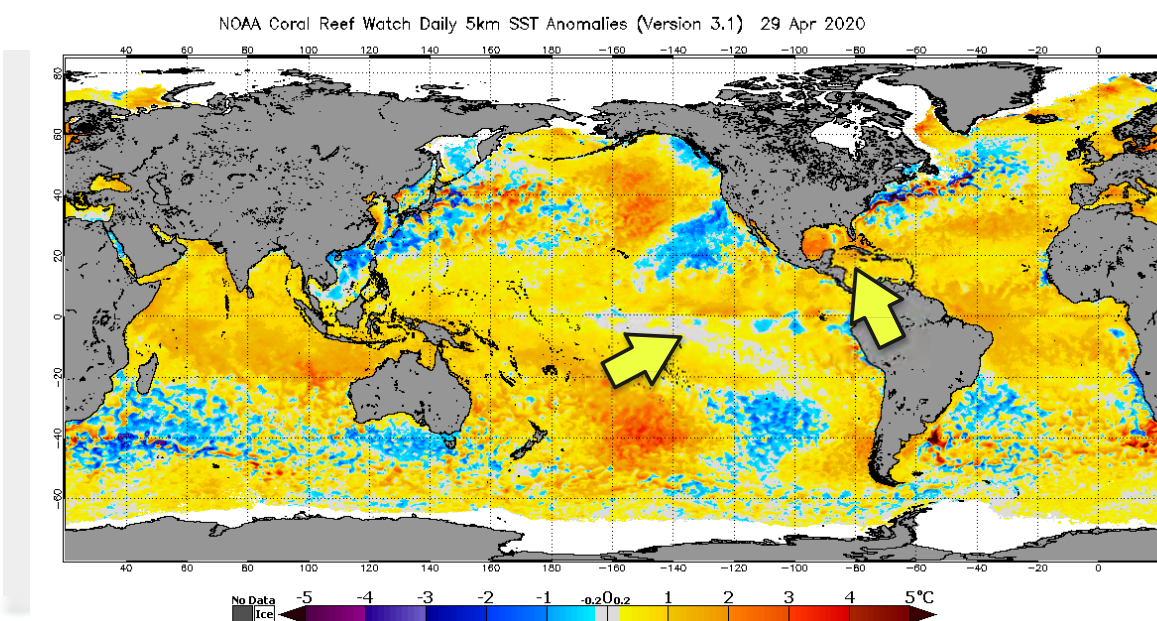


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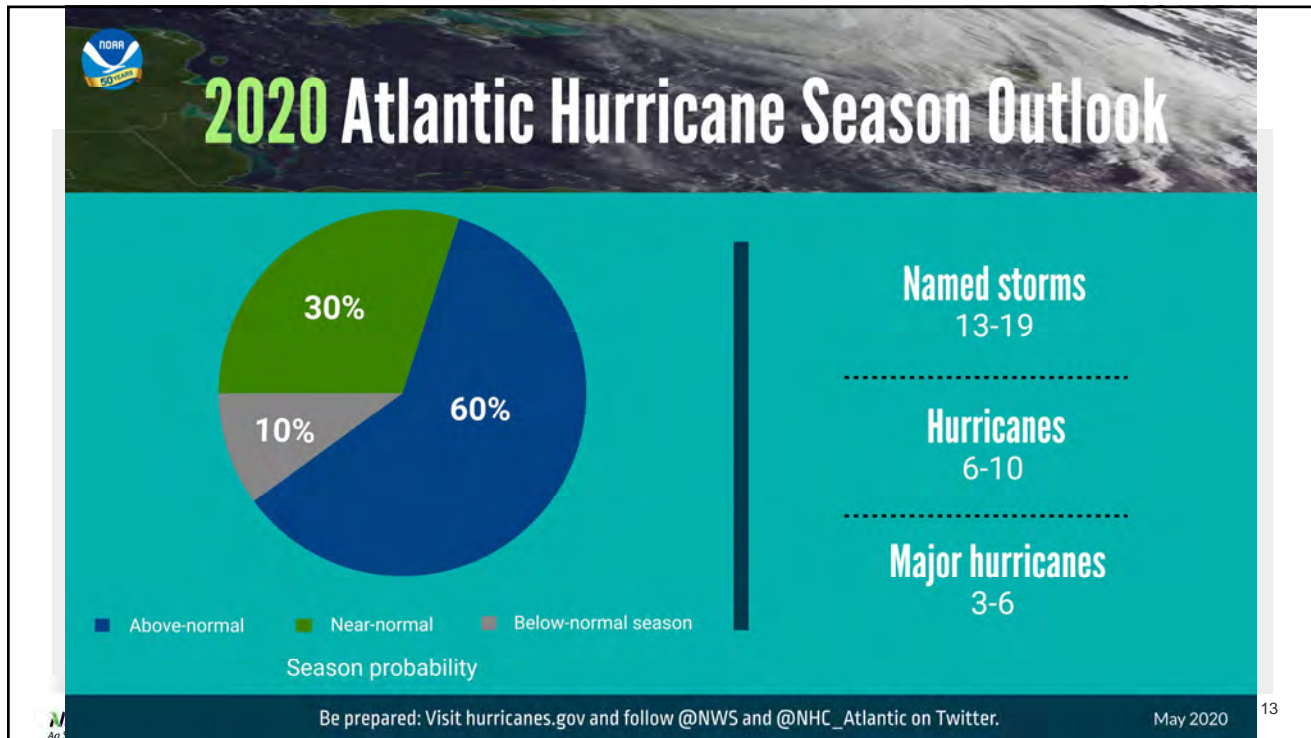
Before I lost the trace, I still had information to make these predictions



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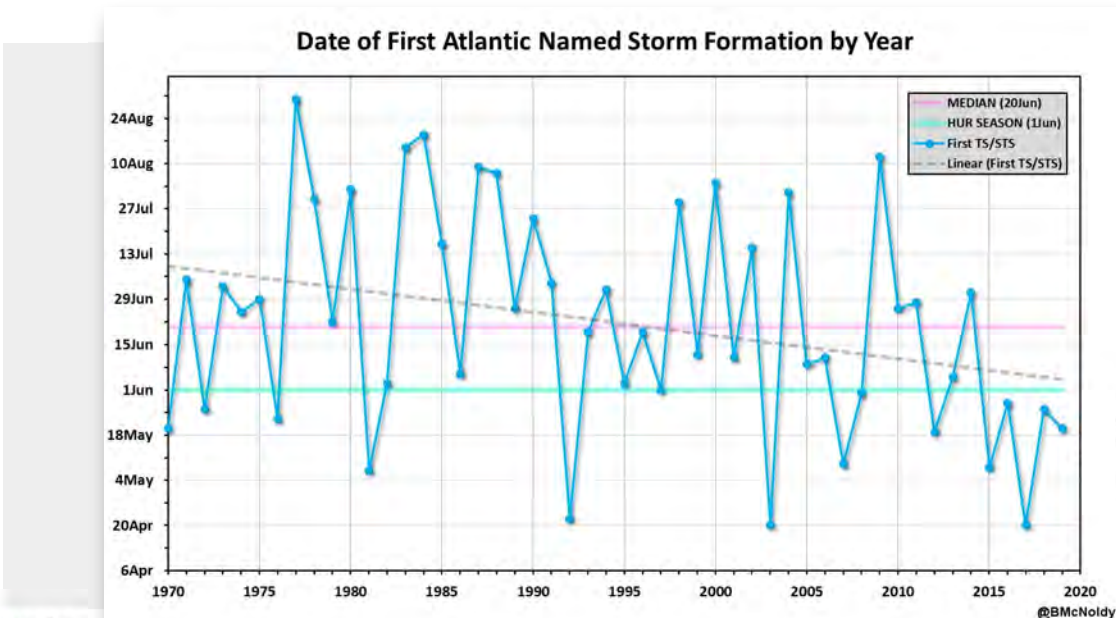
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And before that, we had been analyzing trends for 50+ years.



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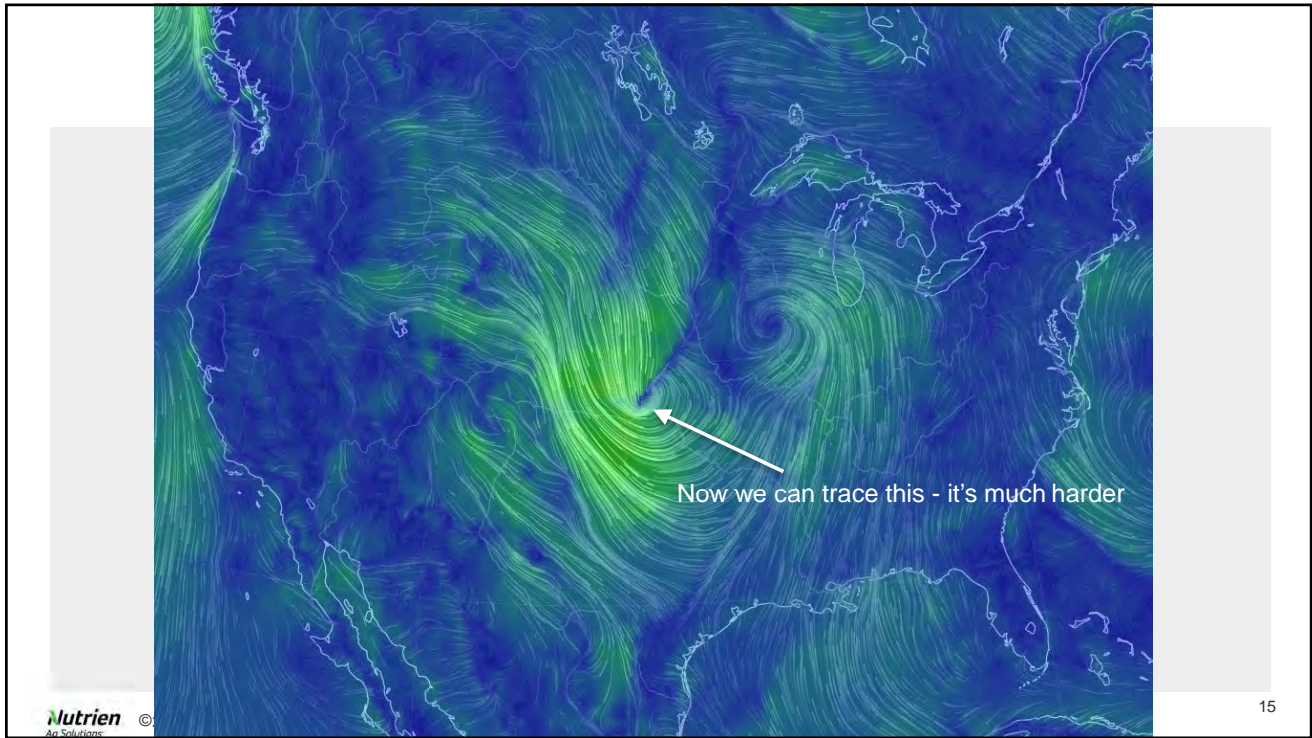
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@BMcNoldy

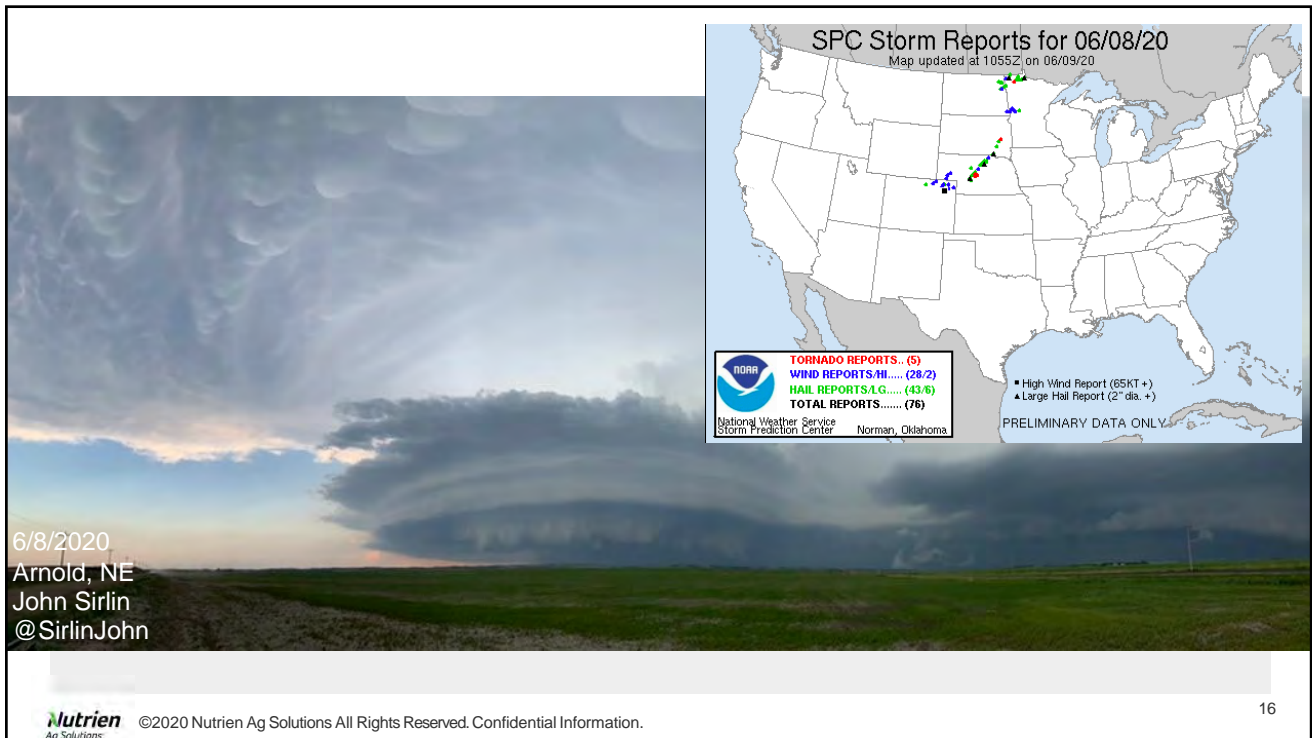
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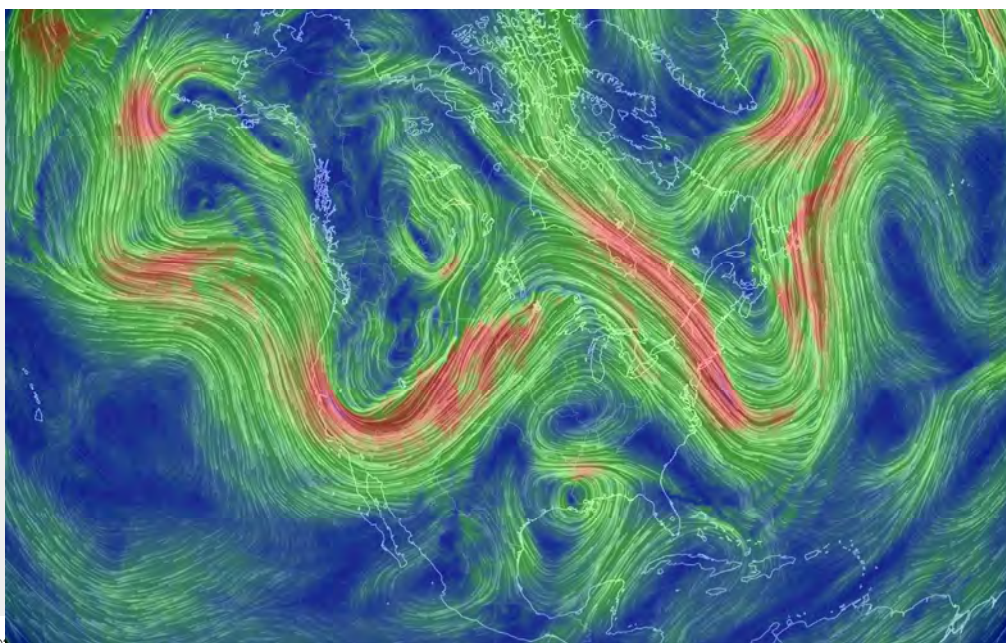
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On Monday June 8, the Jet Stream Flow dug into a deep western US trough



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It was cold west...



Bruce  
@brucejslayer  
Butte, MT

Brady Brewster  
@BradyNBCMT  
Walkerville, MT



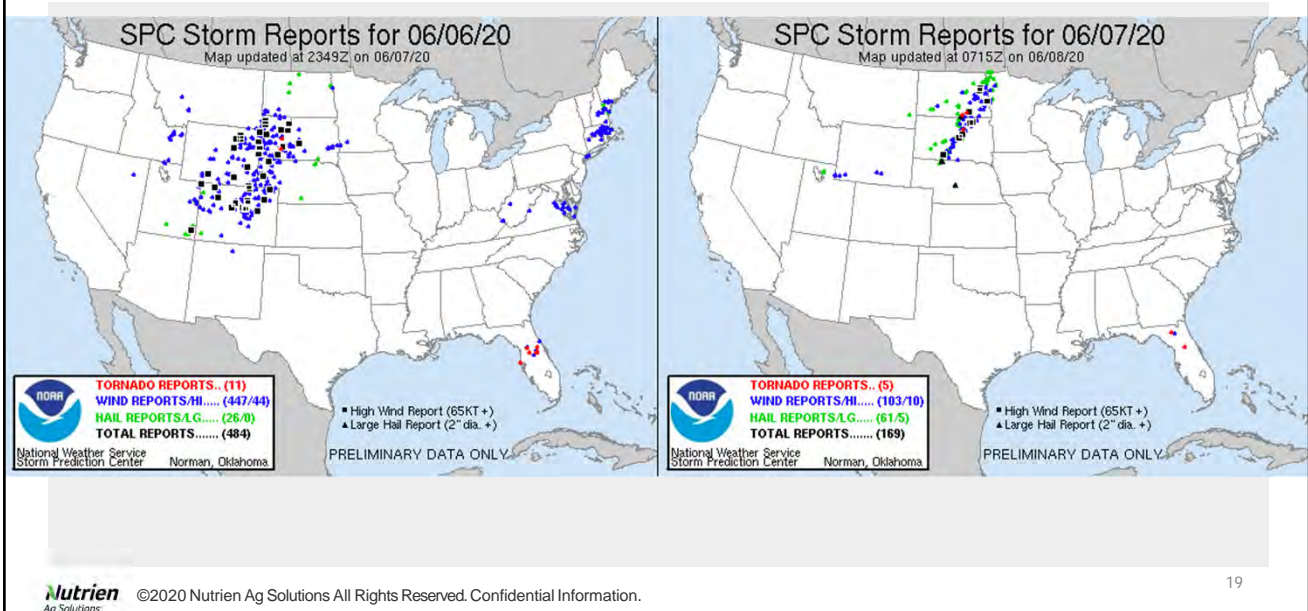
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## Severe Storm Reports from last weekend



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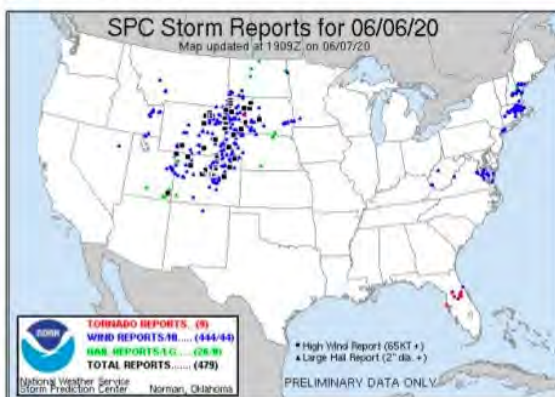




## Most Significant (75+mph) Wind Gusts in a Day since at least 2004



Top 5 Days by Number of Significant Wind Gusts	
Date	# of 75+ mph wind gusts
<b>6/06/2020</b>	<b>44</b>
6/29/2012	37
6/14/2014	30
6/30/2014	23
6/16/2017	23



\*Data from 2004-present. Using past preliminary (storm report) counts for comparison.



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Marcus Diaz  
@TheTXWXchaser  
Western South Dakota



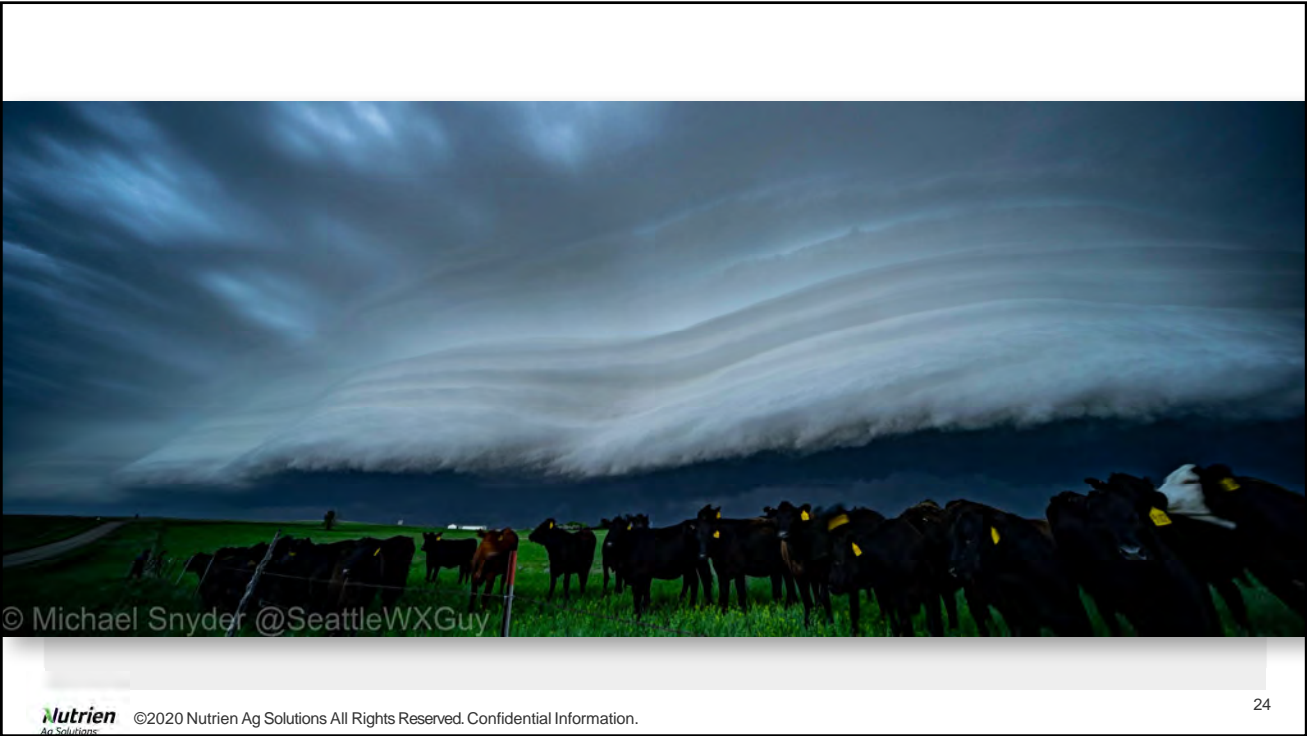
©20

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23



24



Marcus Diaz  
@TheTXWXchaser  
Lusk, WY  
6/6/2020



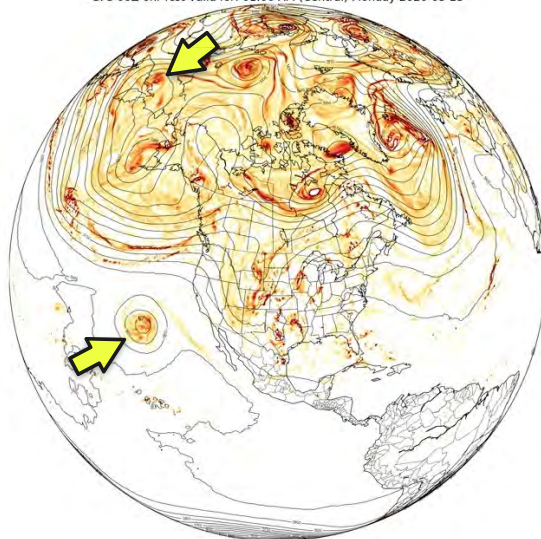
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## Tracing the Trough - when did the models start to have a clue about this?

GFS 00Z 6hr fcst Valid for: 01:00 AM (Central) Monday 2020-05-25



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10 13 16 19 22 25 28 31 34 37  
500mb Height and Vorticity

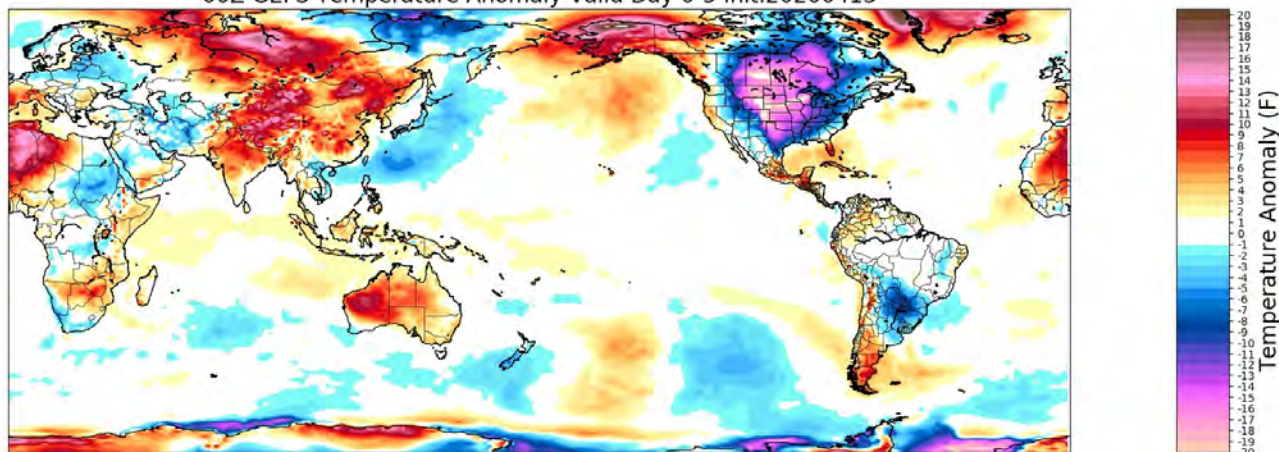
26

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Before that, it's not traceable - but there were clues

Mid April - highly amplified flow Hot in Siberia and Alaska and Greenland

00Z GEFS Temperature Anomaly Valid Day 0-5 Init.20200413



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Latest 365 Day Global  $M_R$  Standardized Anomaly



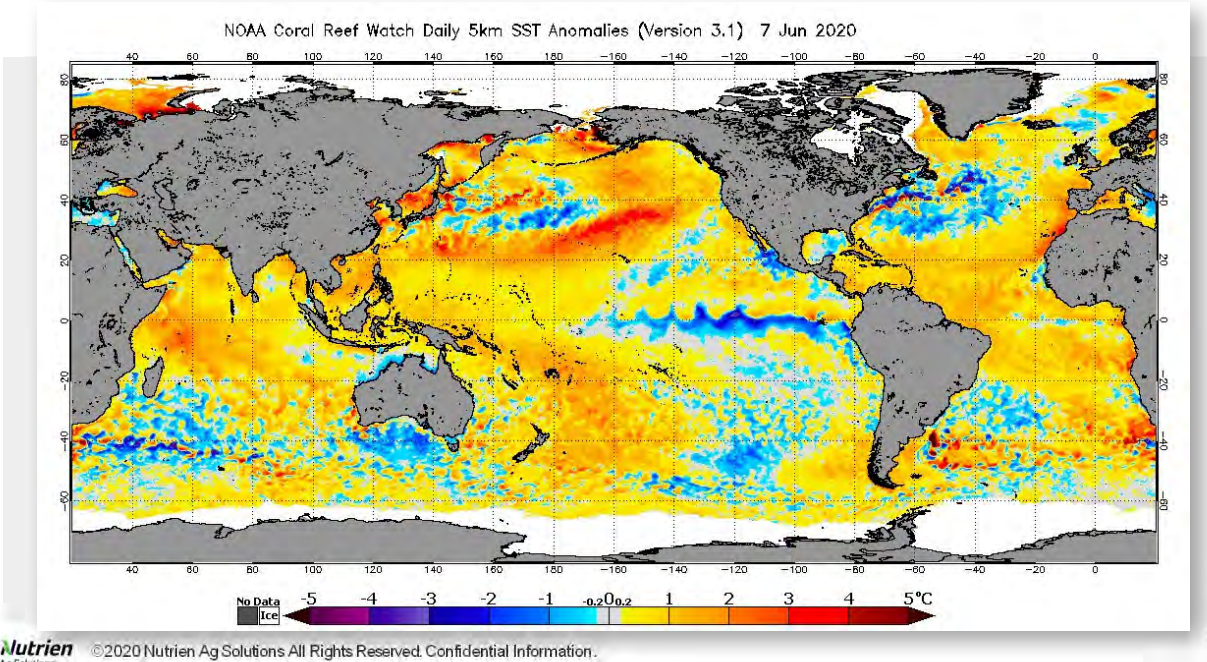
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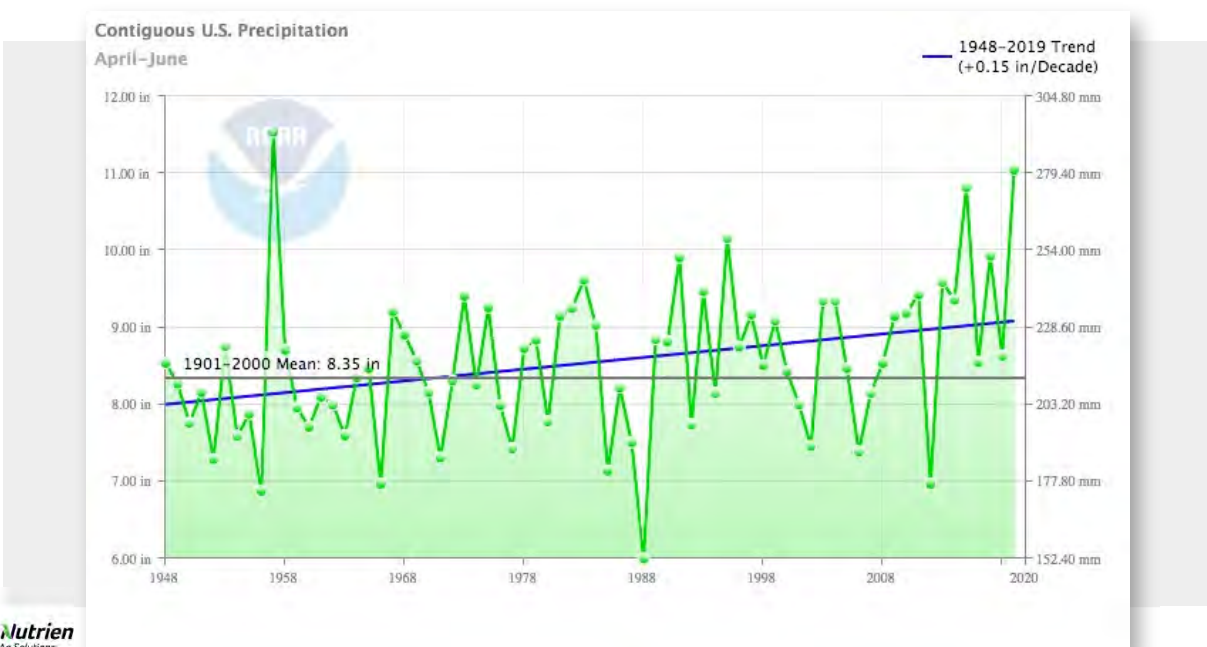
## We've had a warm North Pacific + developing La Nina



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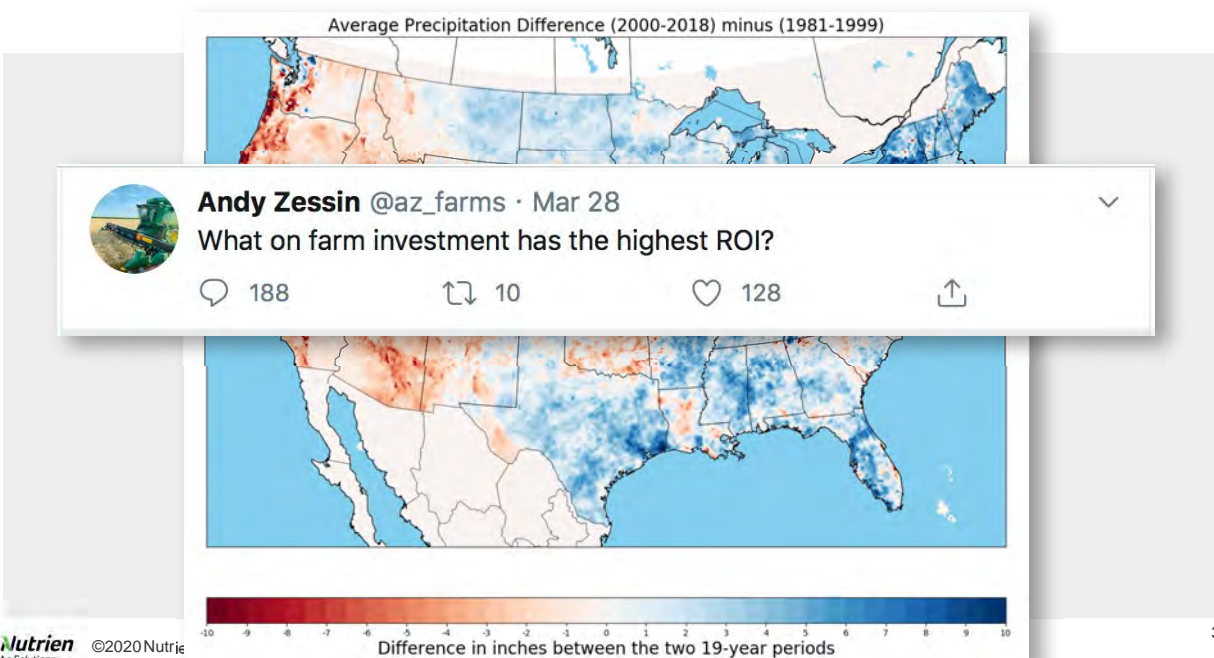
## Long Term Trends - wetter, more active spring storm systems (trend = +1")



30

30

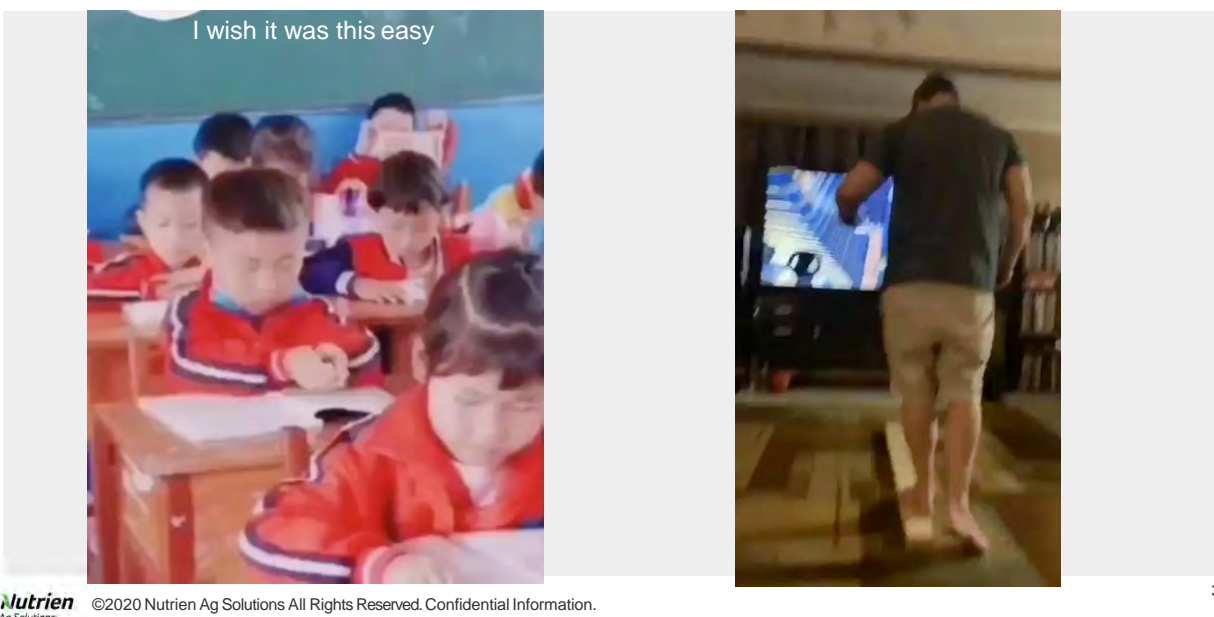
## Long Term Trends - wetter, more active **annual** storm systems



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But as you can see, forecasting is difficult...

But seeing things as they really are is very difficult



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## 2019 vs.2020



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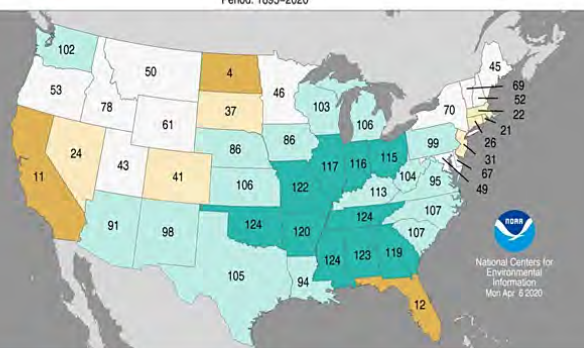
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## Winter 2019-20: 7th warmest, 13th wettest

Statewide Average Temperature Ranks  
January–March 2020  
Period: 1895–2020



Statewide Precipitation Ranks  
January–March 2020  
Period: 1895–2020



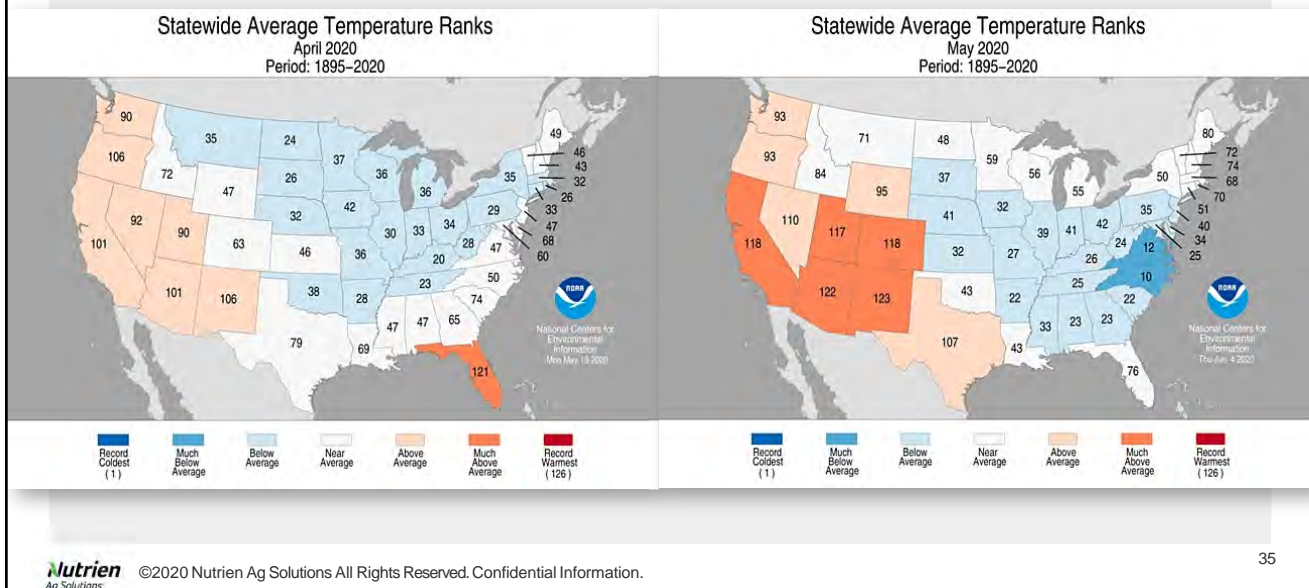
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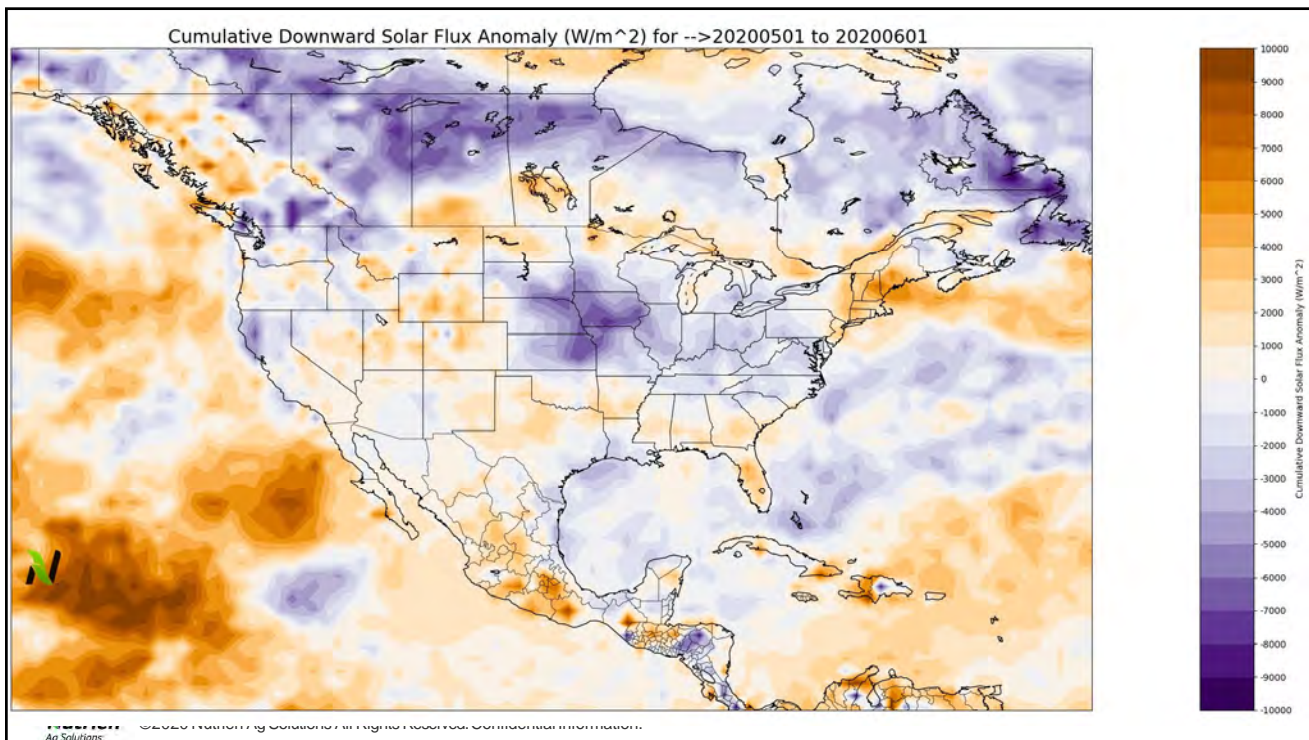
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## Cold April and May

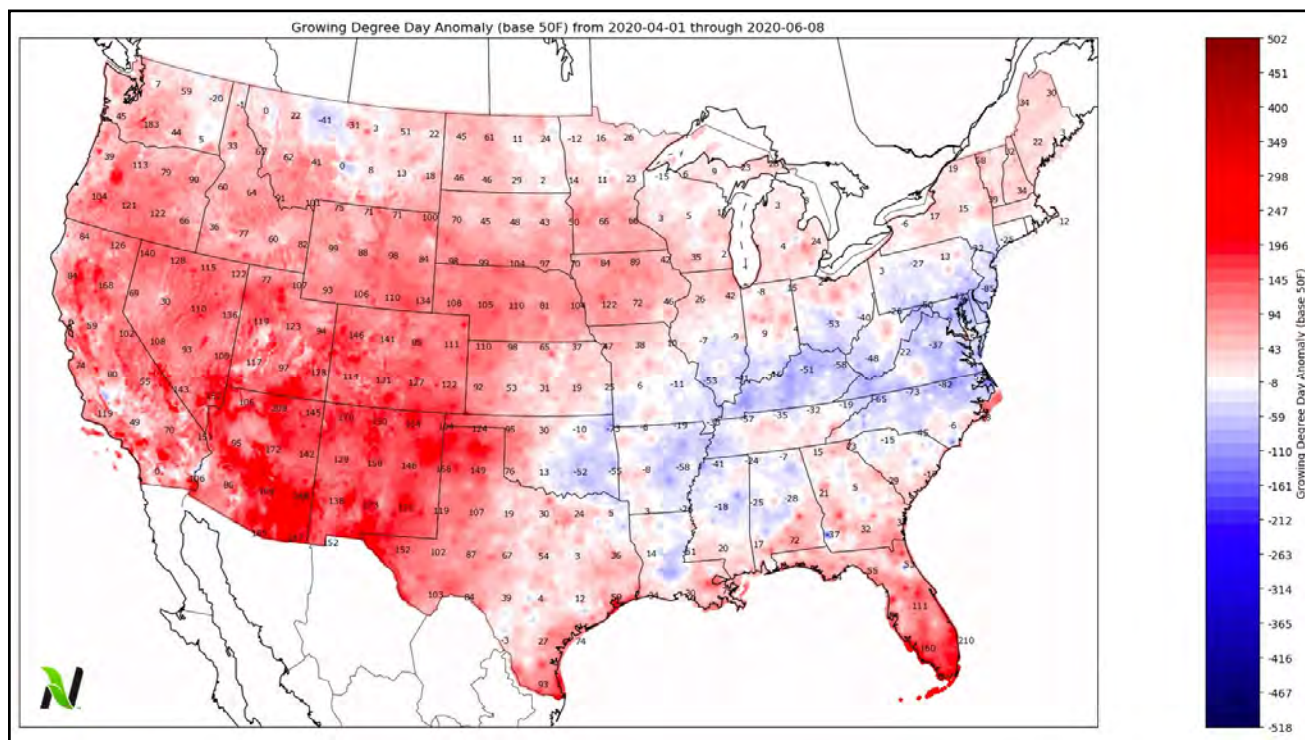


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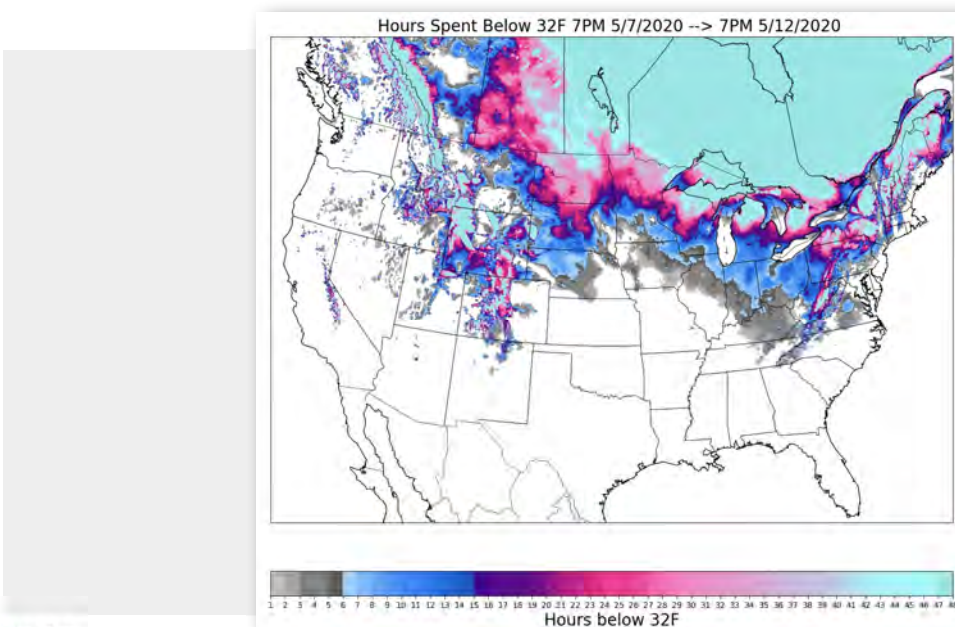
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## Record Late Freeze - May 9-11, 2020

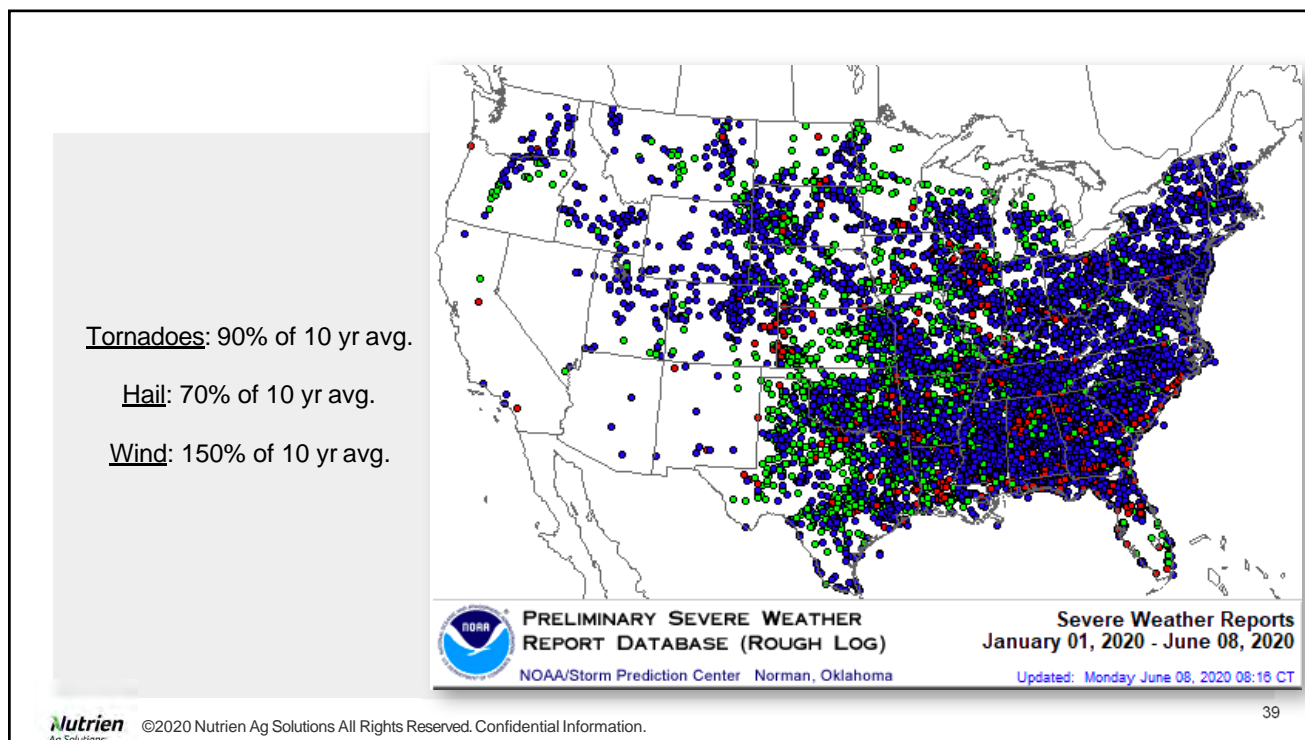


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But, April 2020 was the second most active April on record for tornadoes.

## April U.S. Tornadoes

1950-2019

200+ Tornadoes

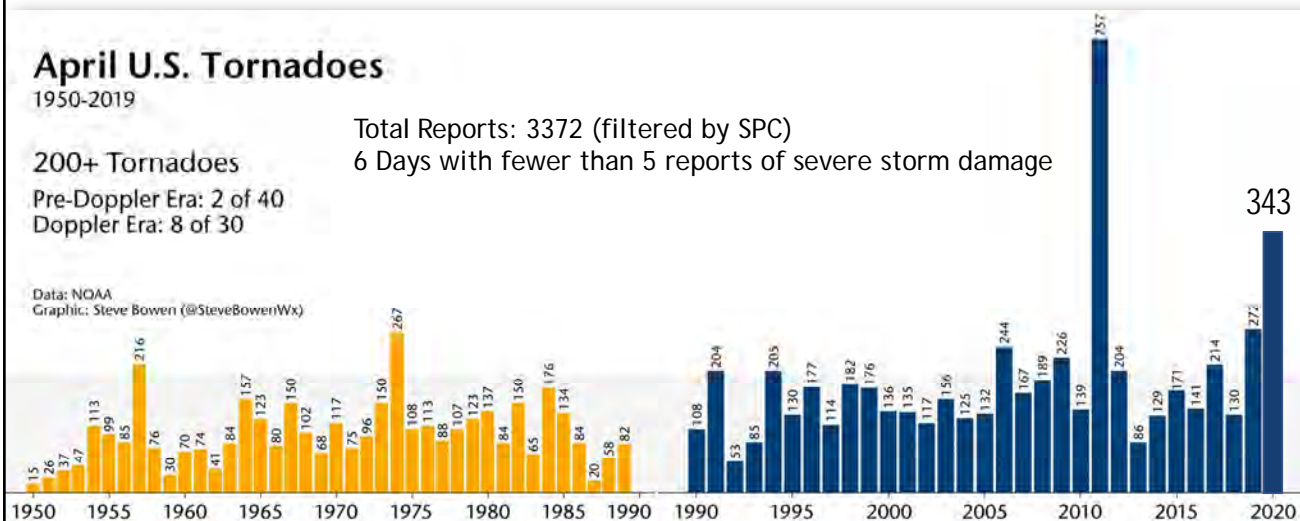
Pre-Doppler Era: 2 of 40  
 Doppler Era: 8 of 30

Total Reports: 3372 (filtered by SPC)

6 Days with fewer than 5 reports of severe storm damage

Data: NOAA

Graphic: Steve Bowen (@SteveBowenWx)



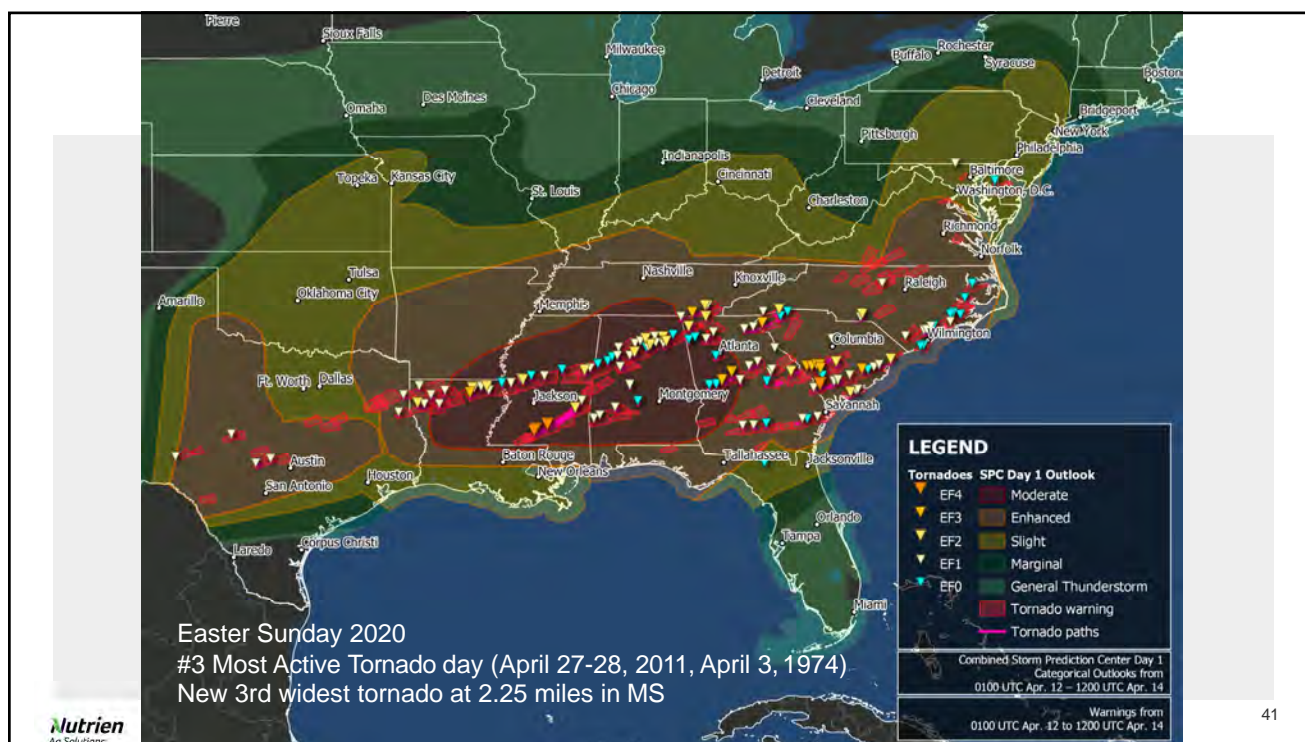
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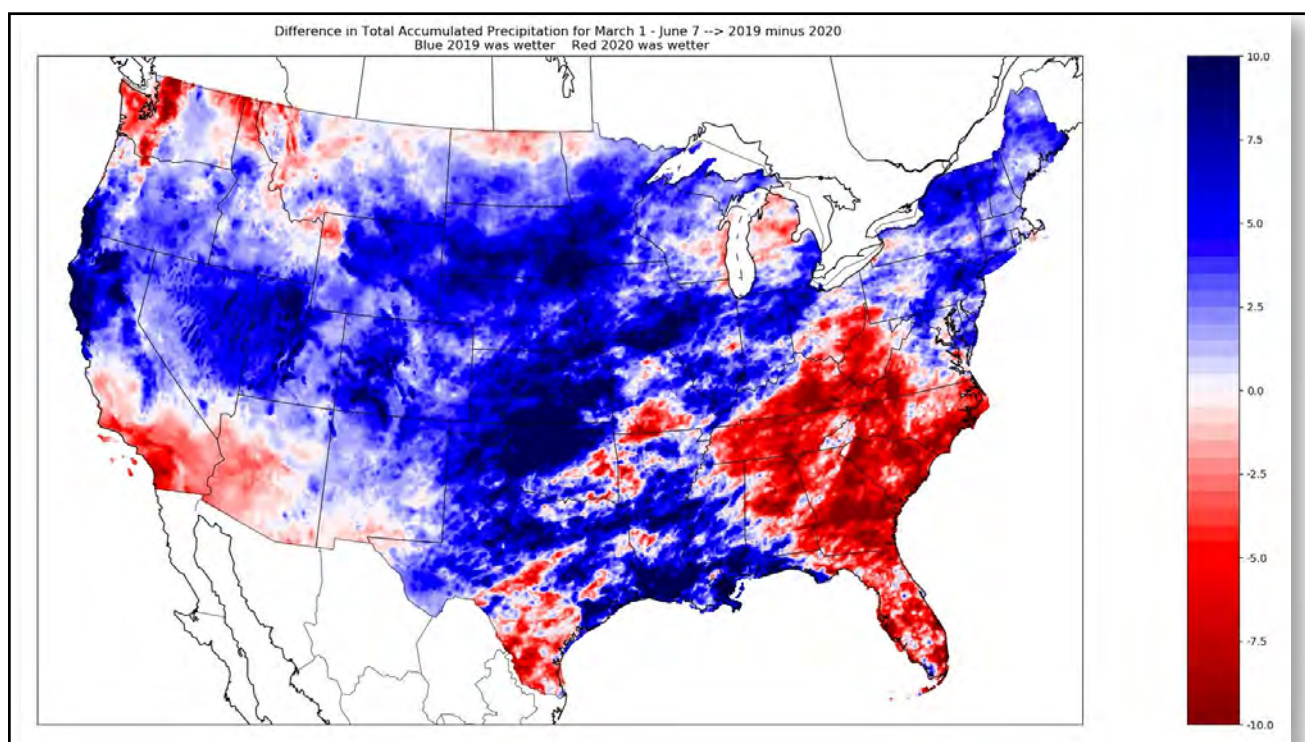
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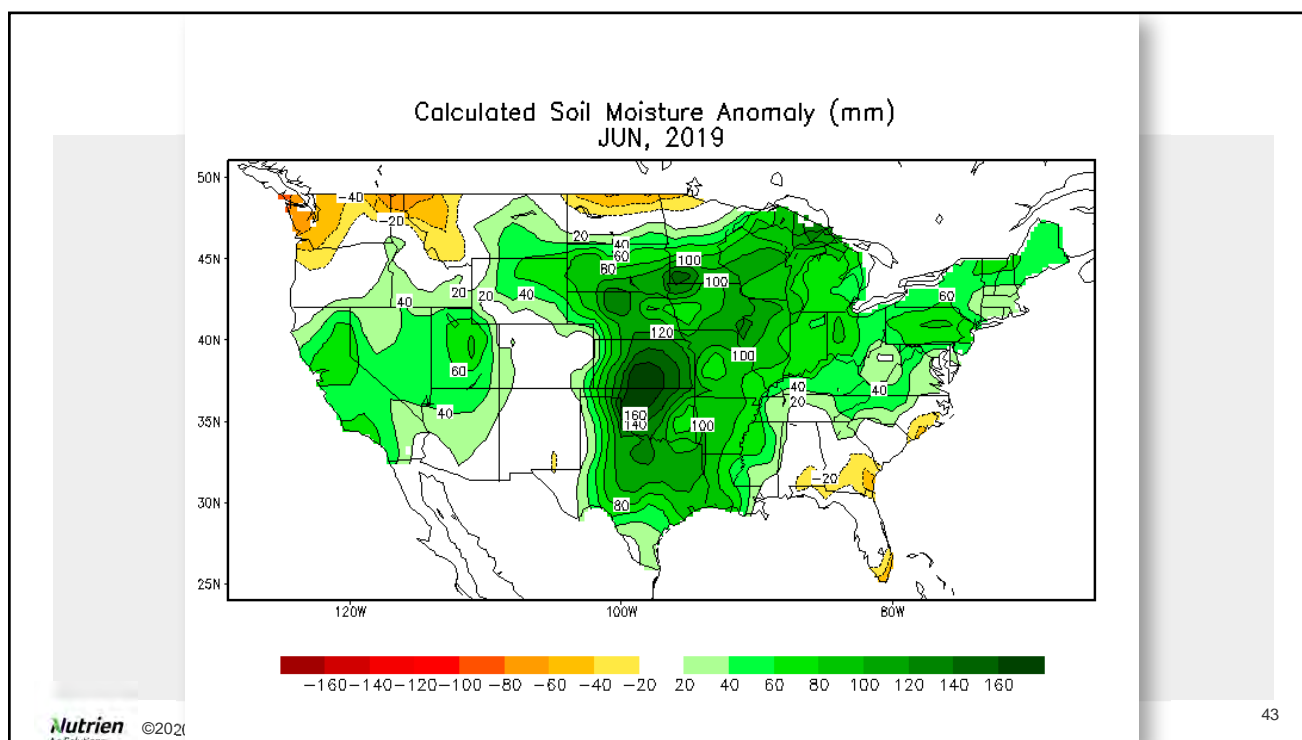




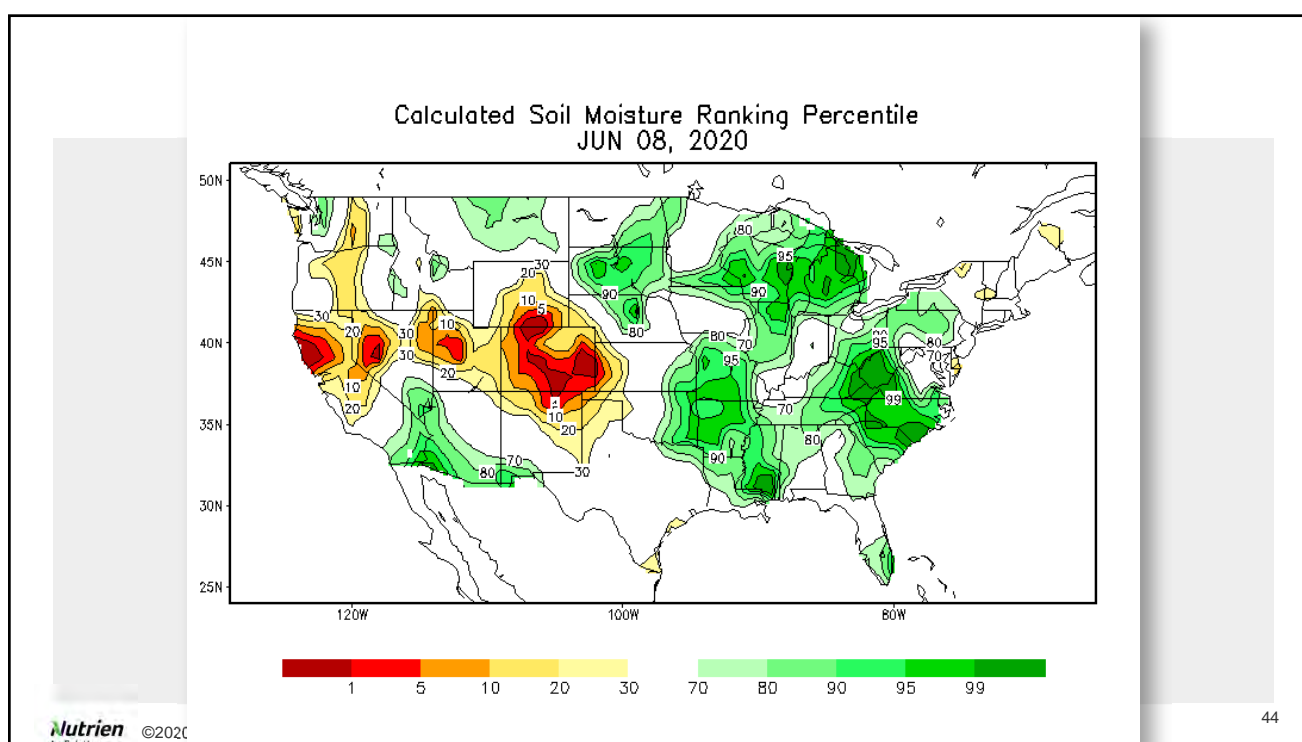
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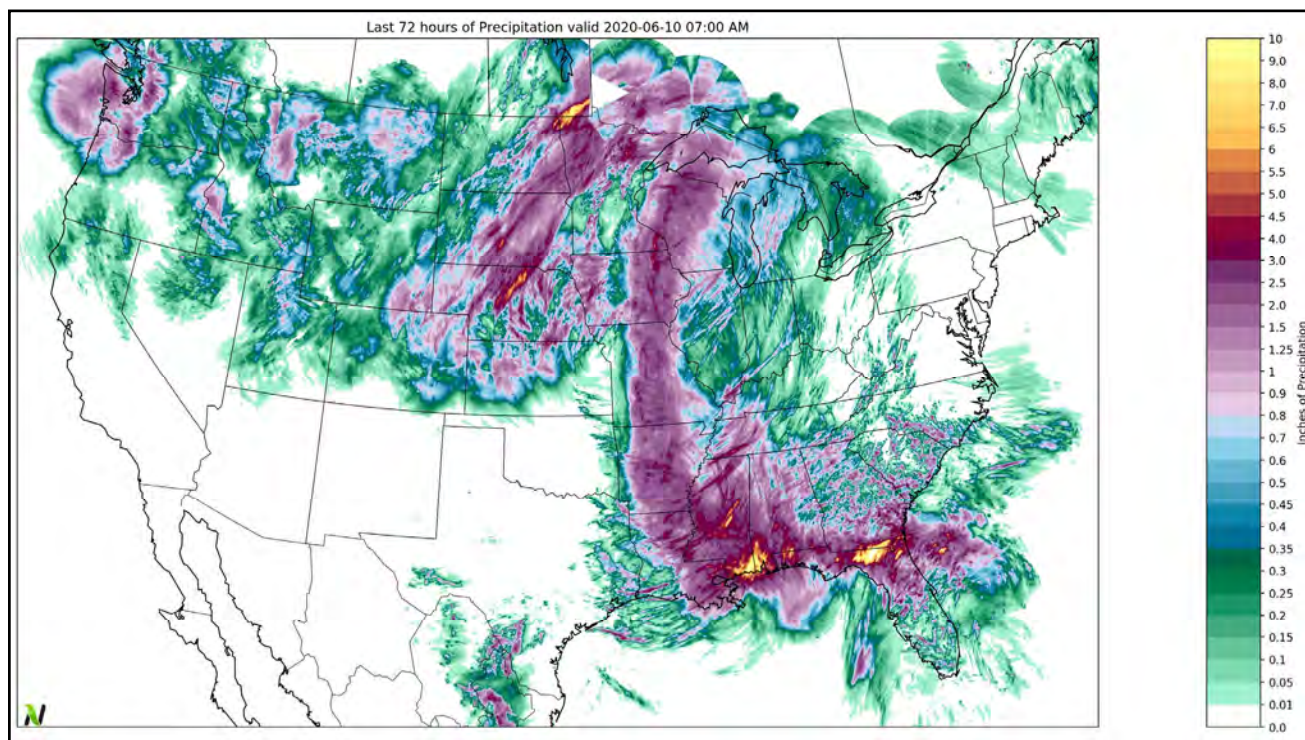


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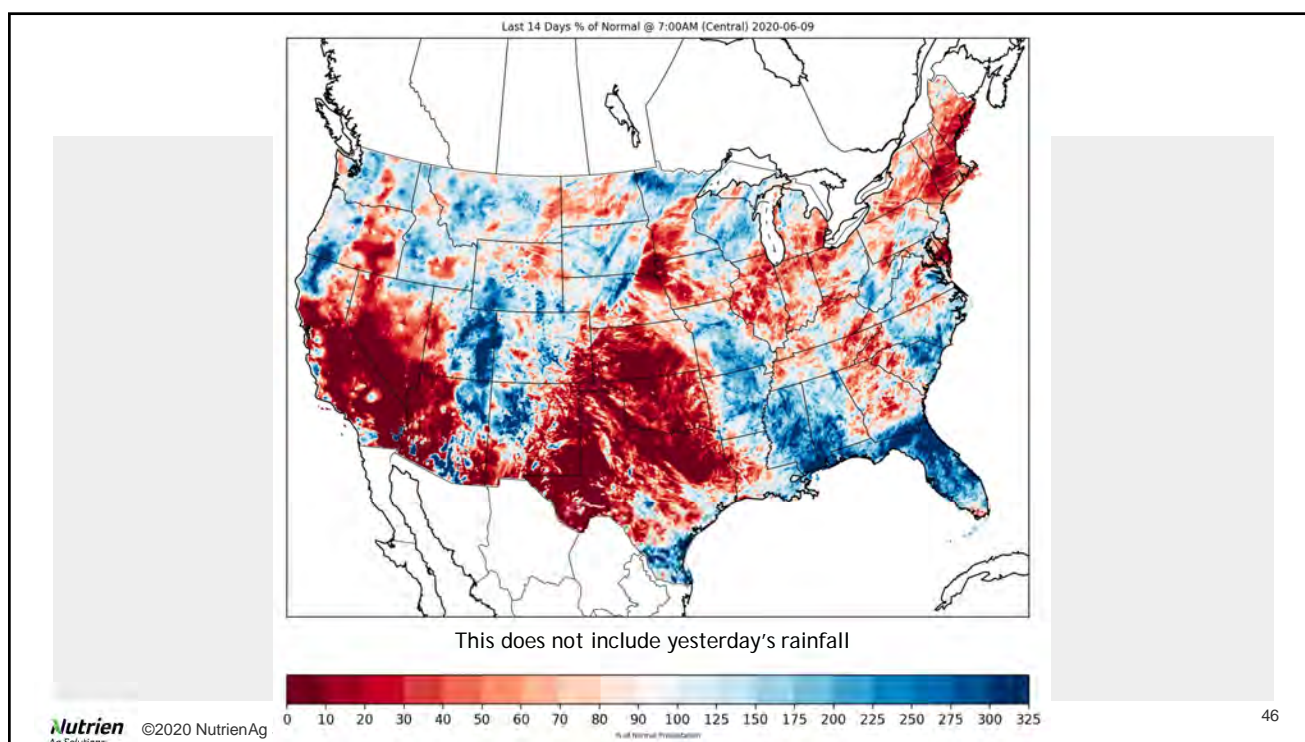


44





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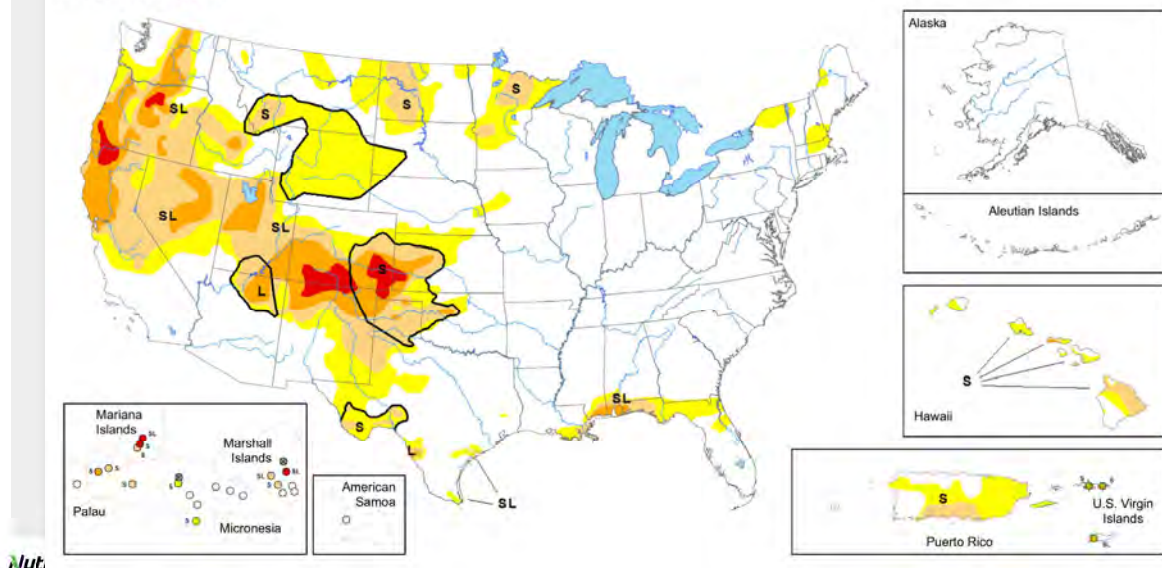


46

Let's get into a forecast.

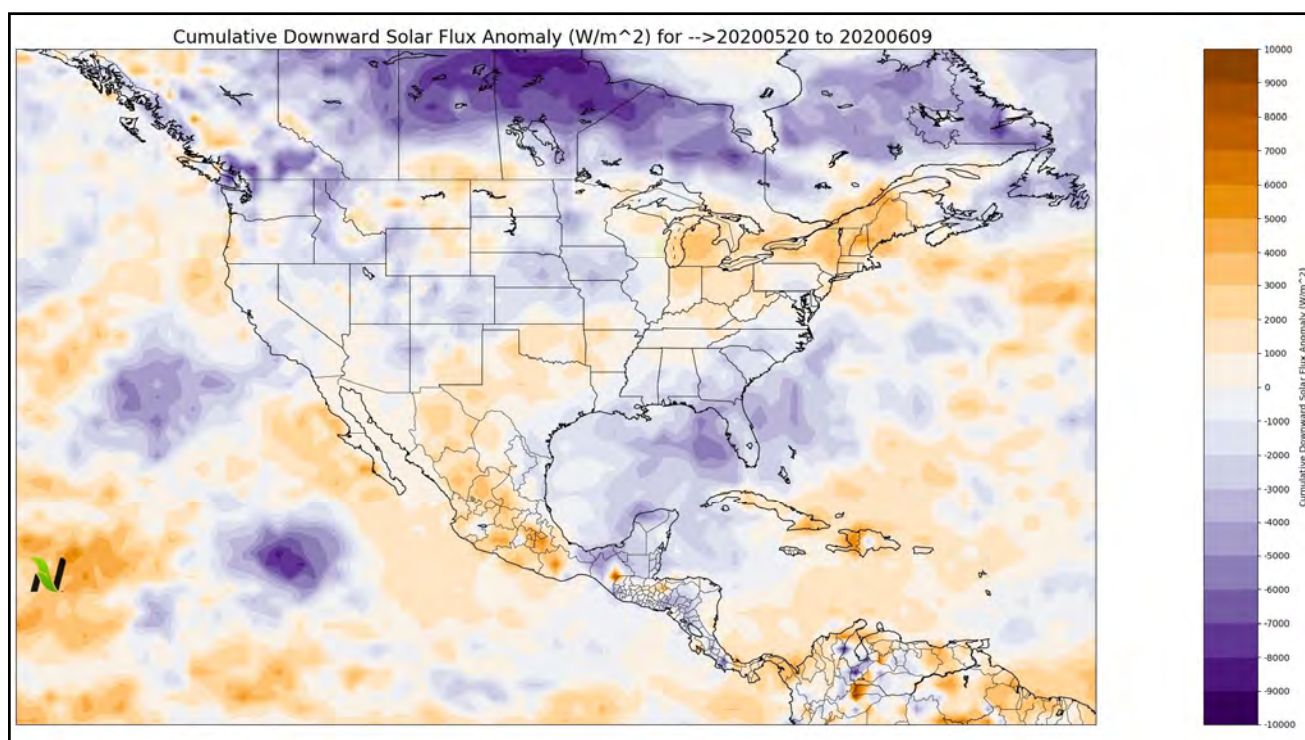
Map released: June 4, 2020

Data valid: June 2, 2020



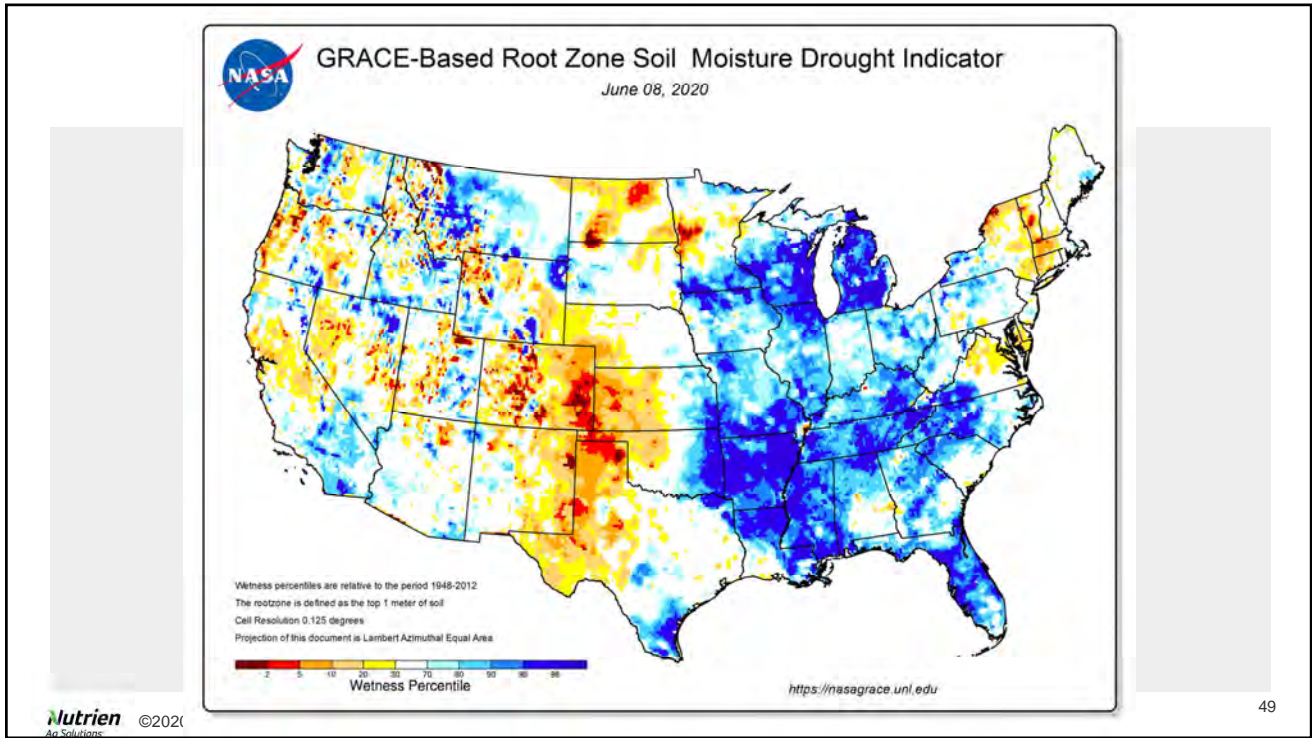
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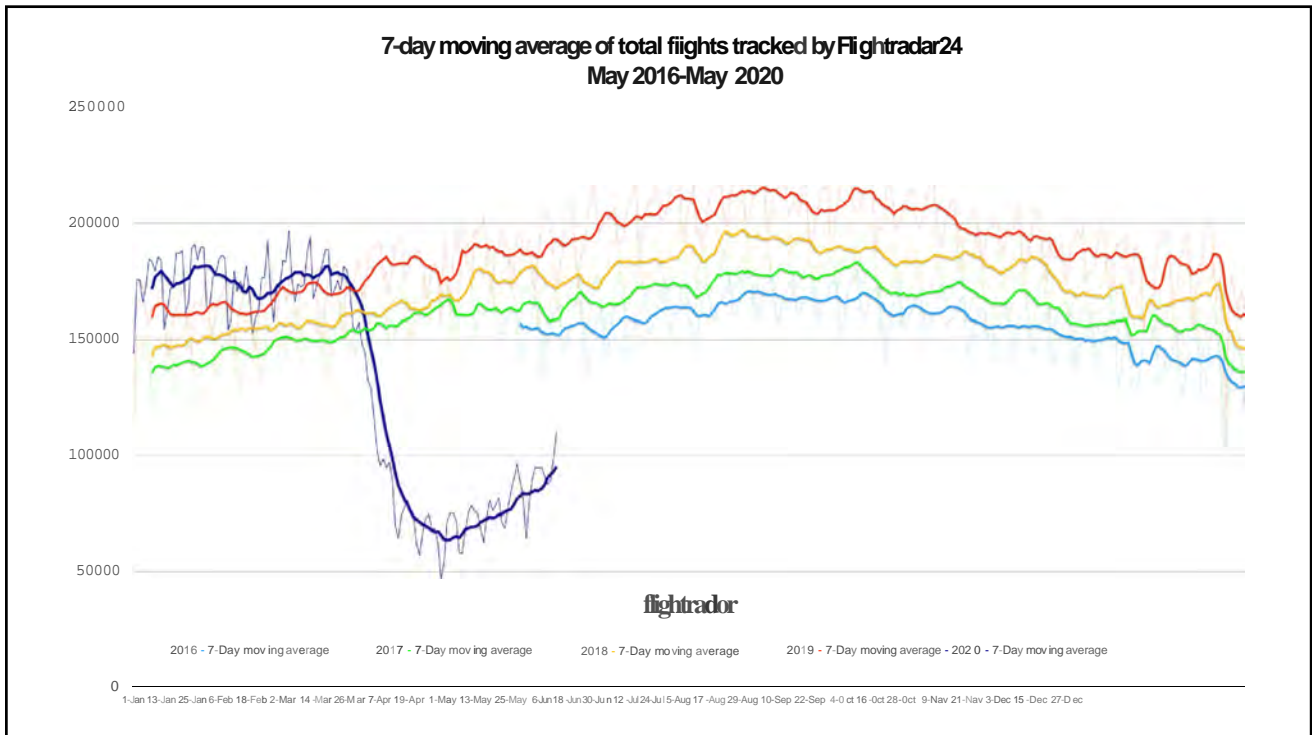


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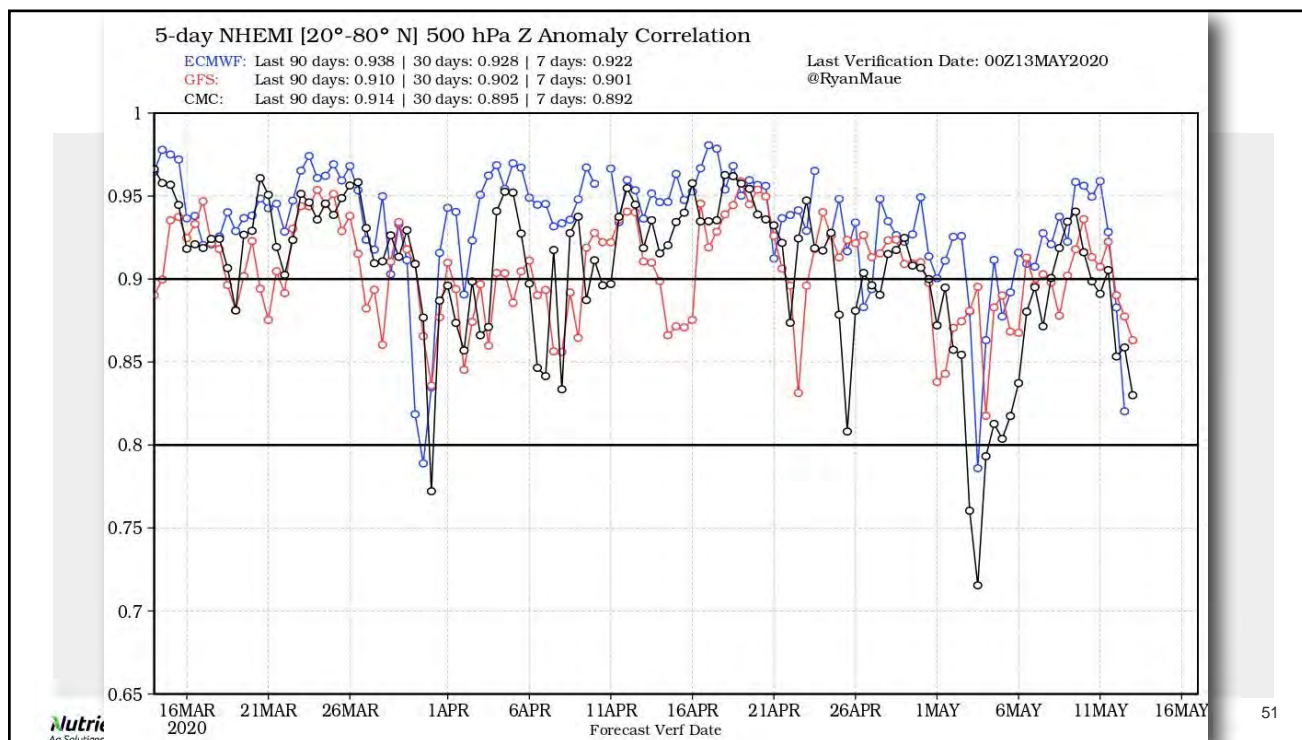




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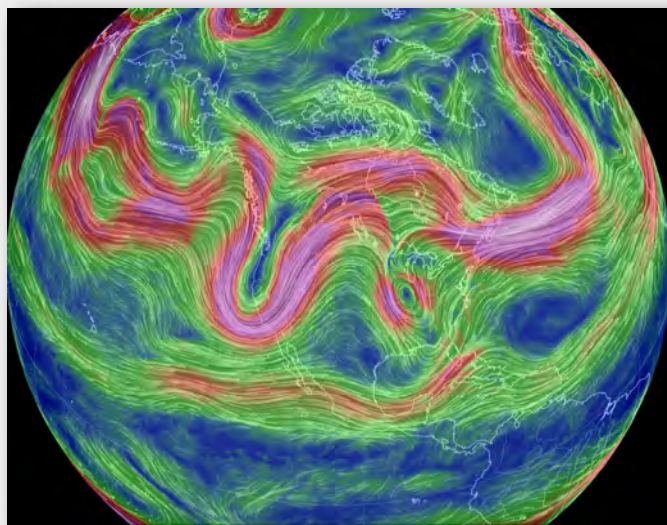


50



51

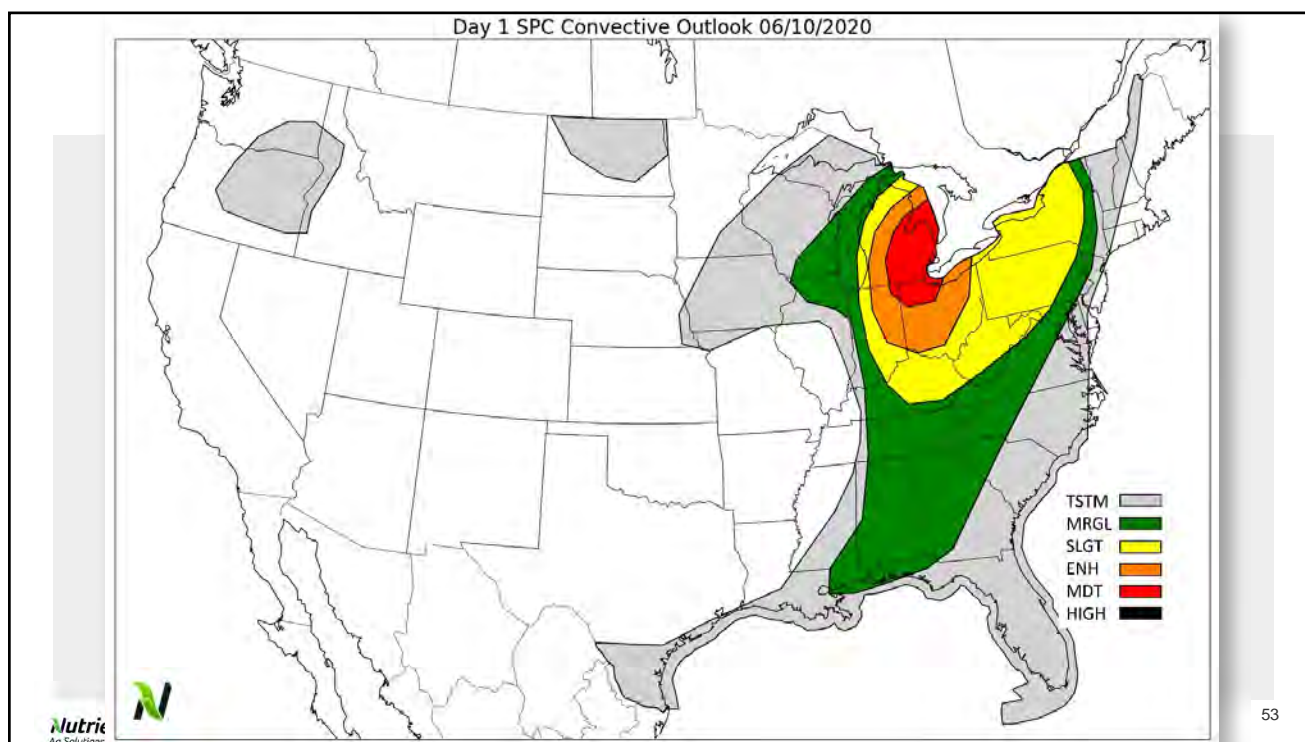
The lack of data distorts our view of the upstream/downstream jet stream flow



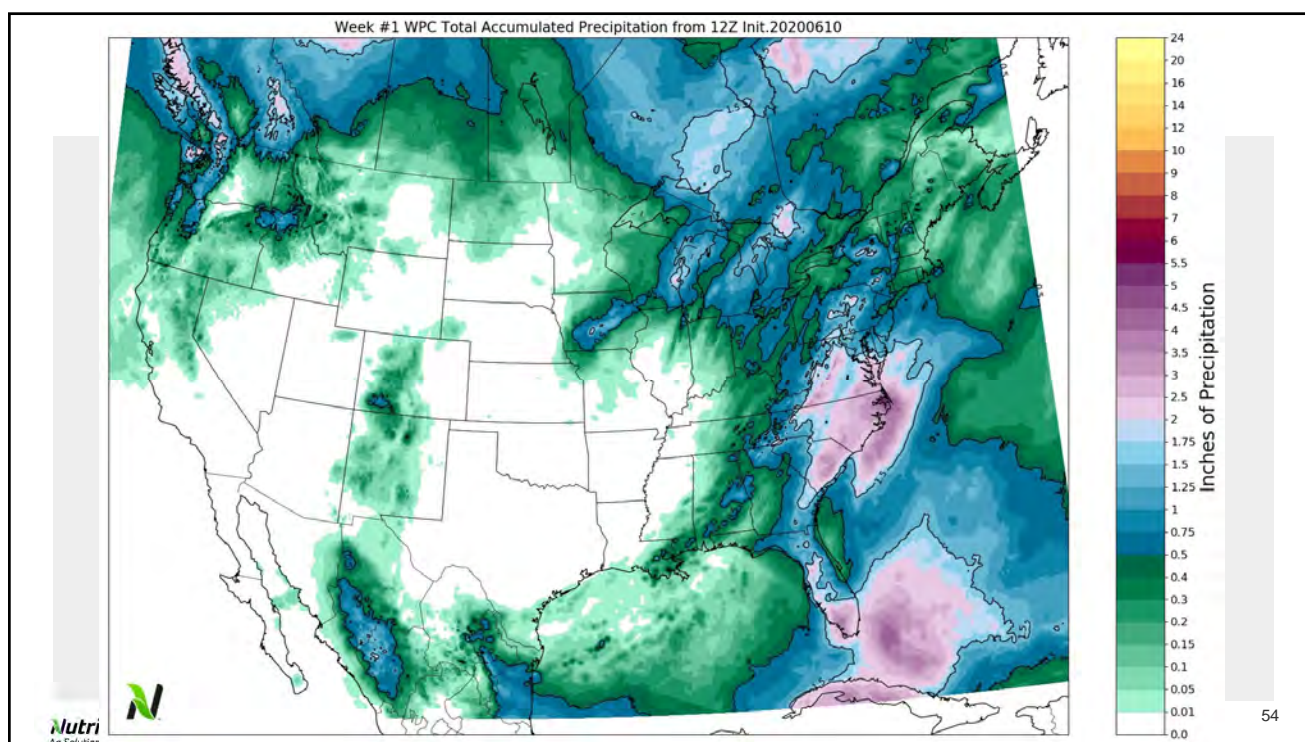
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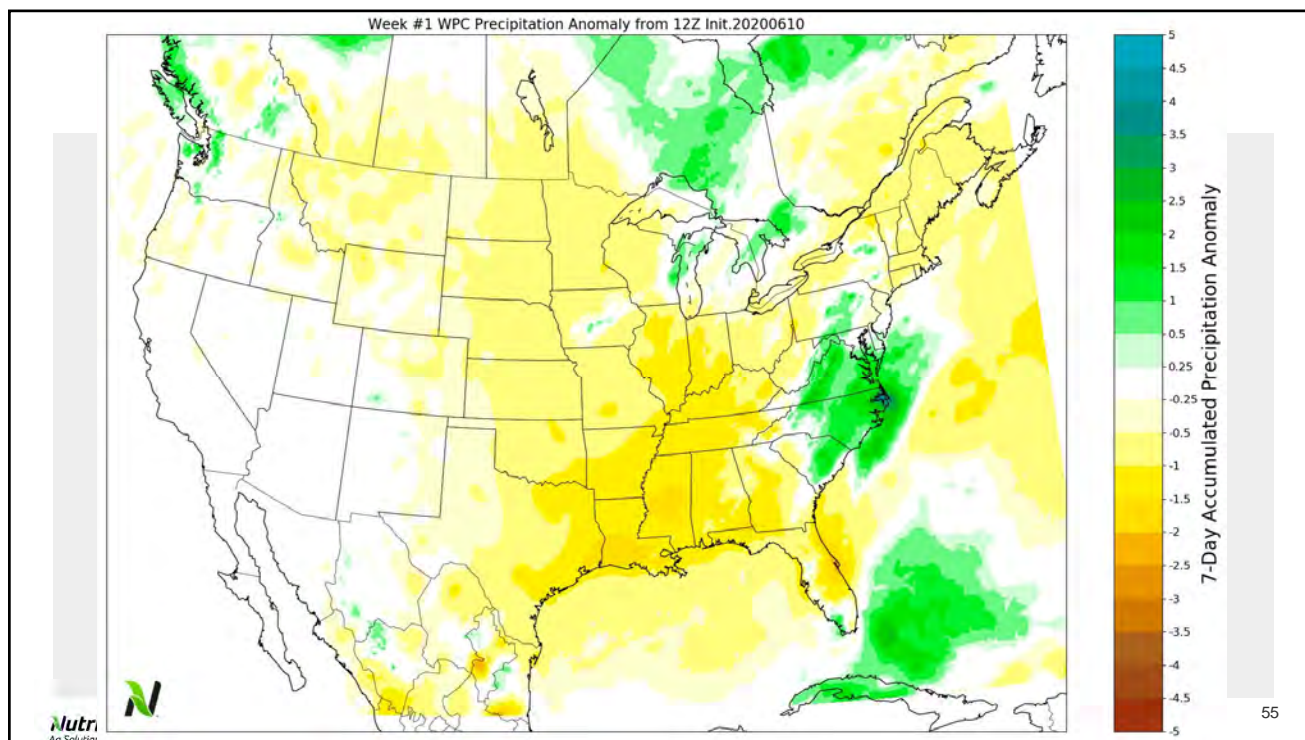




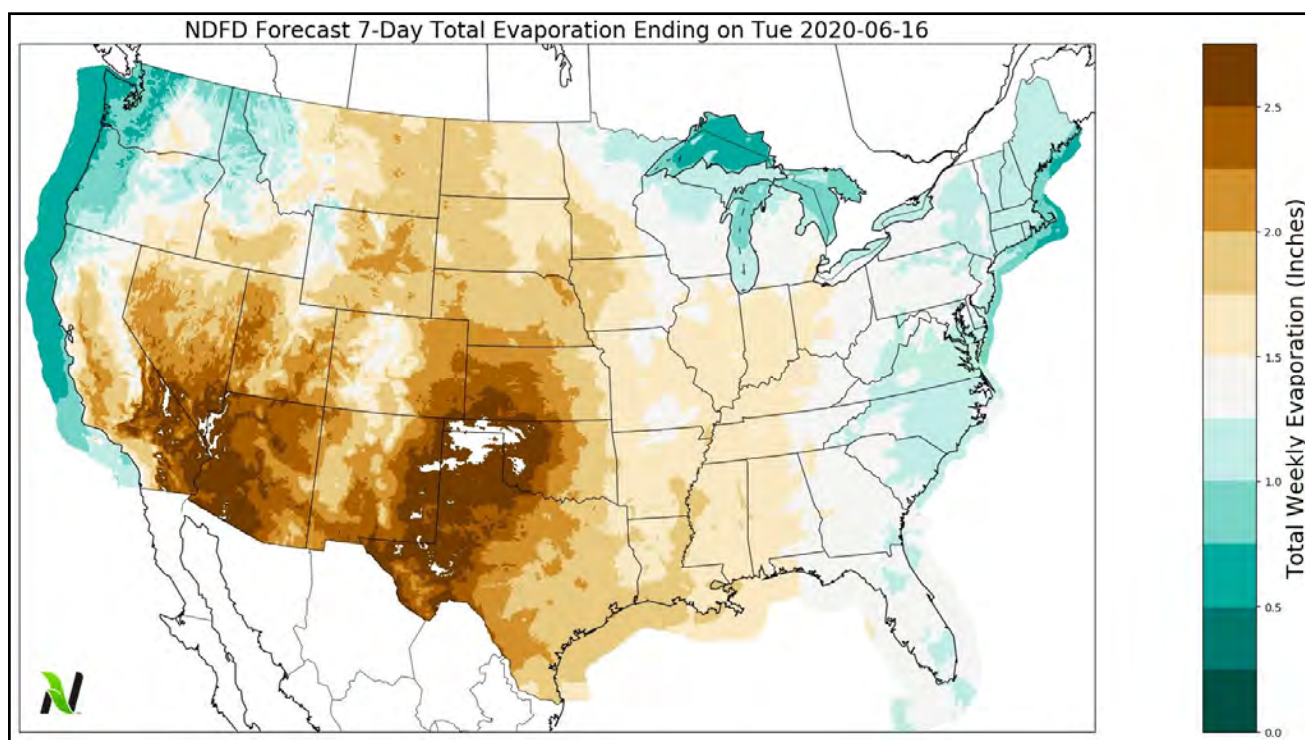
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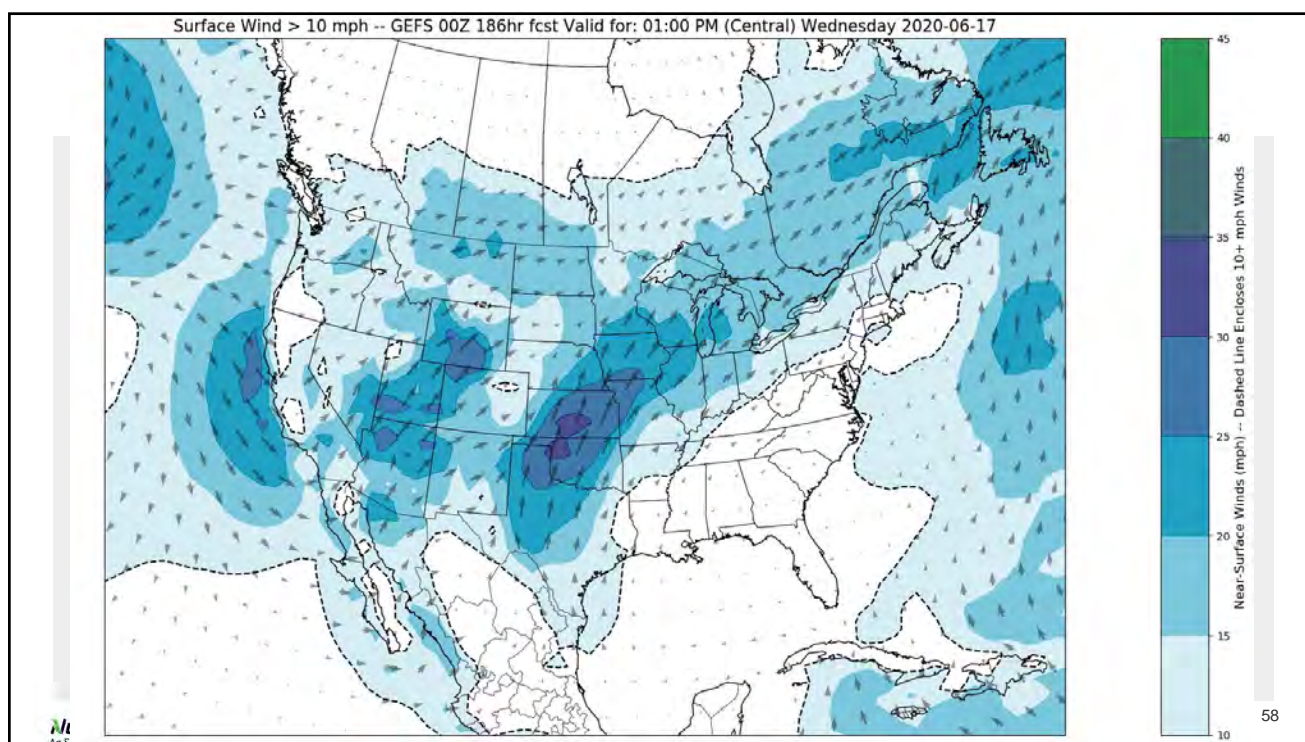
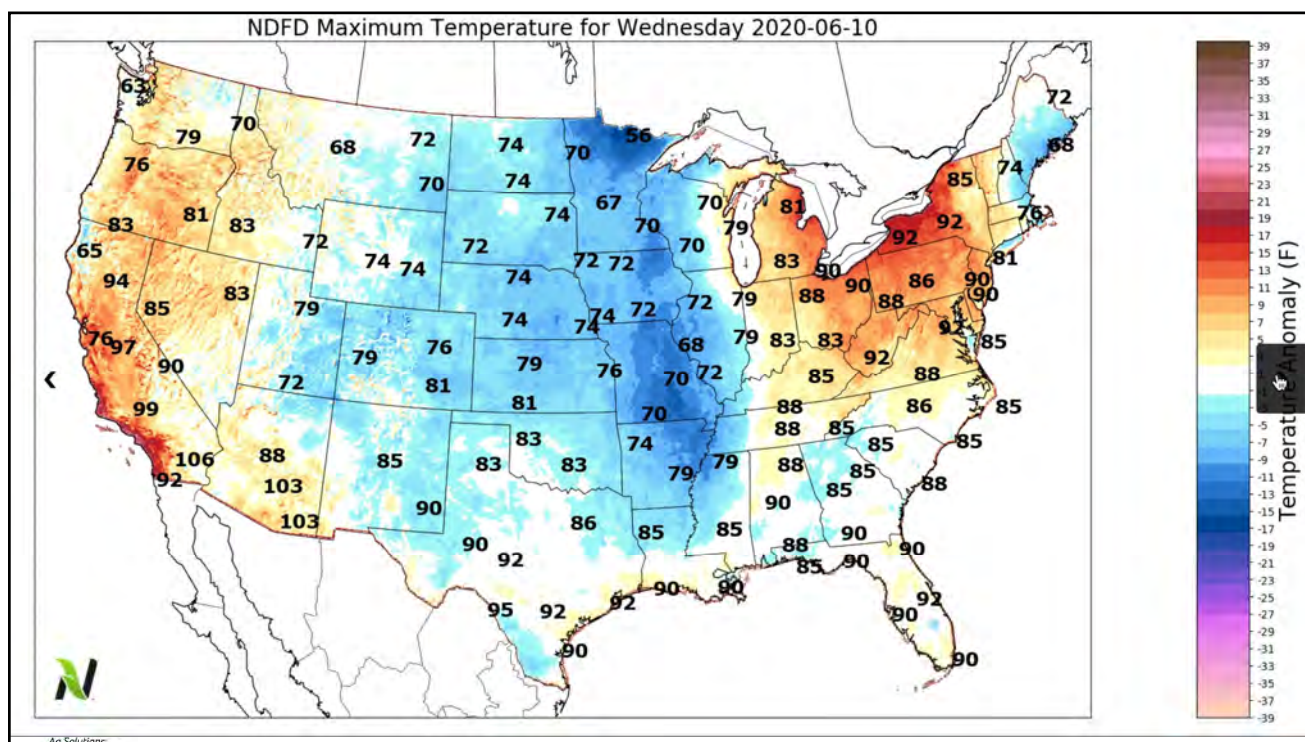


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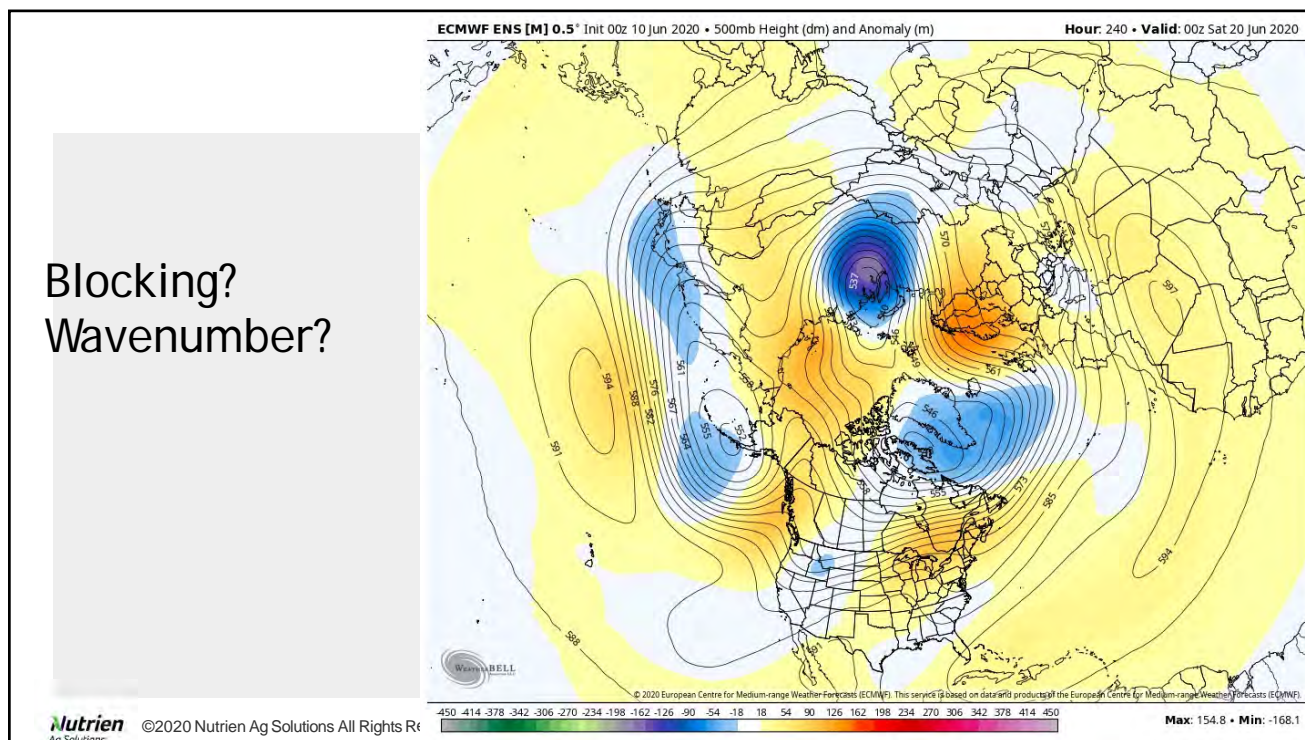
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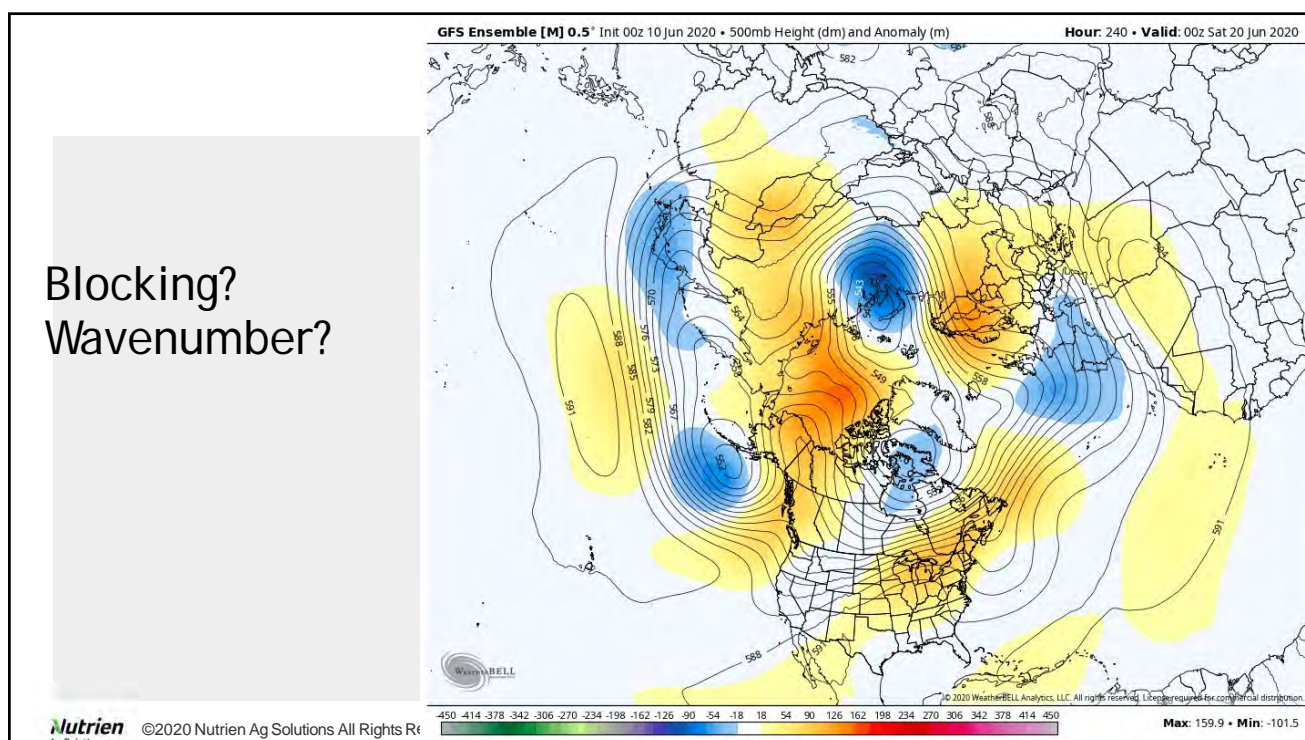


Blocking?  
Wavenumber?



59

Blocking?  
Wavenumber?

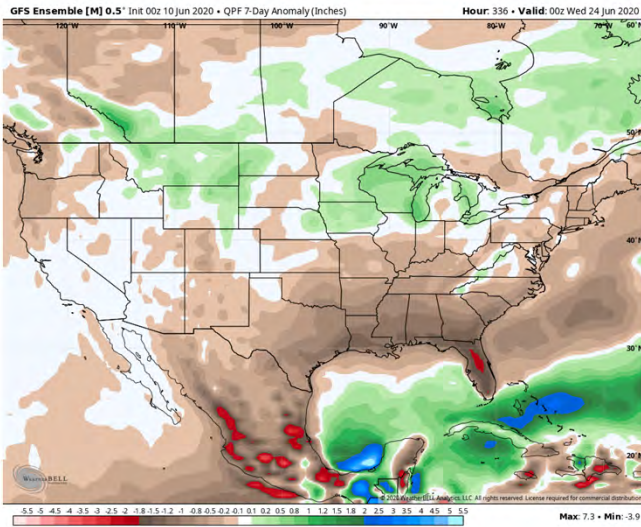


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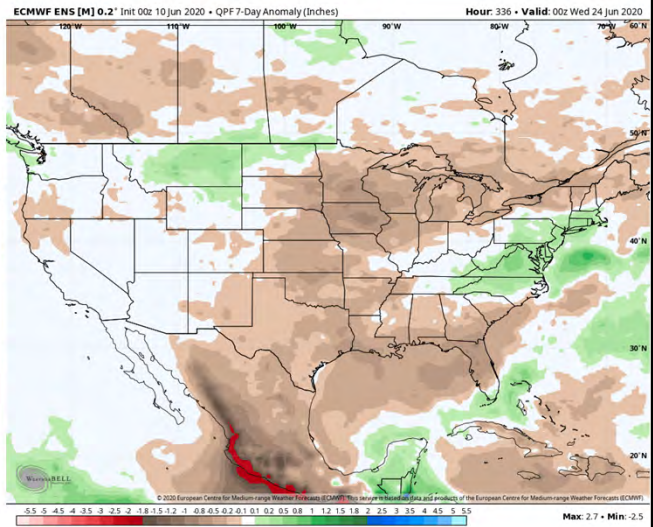


## Week #2 Precipitation Anomalies June 17-24

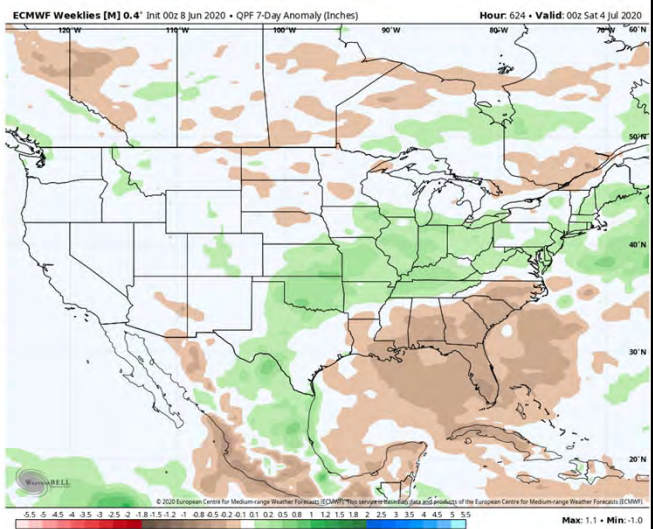
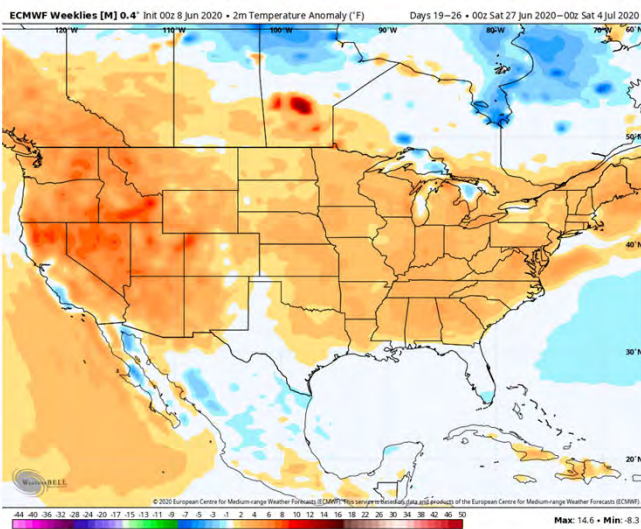
GFS Ensemble (20 Member)



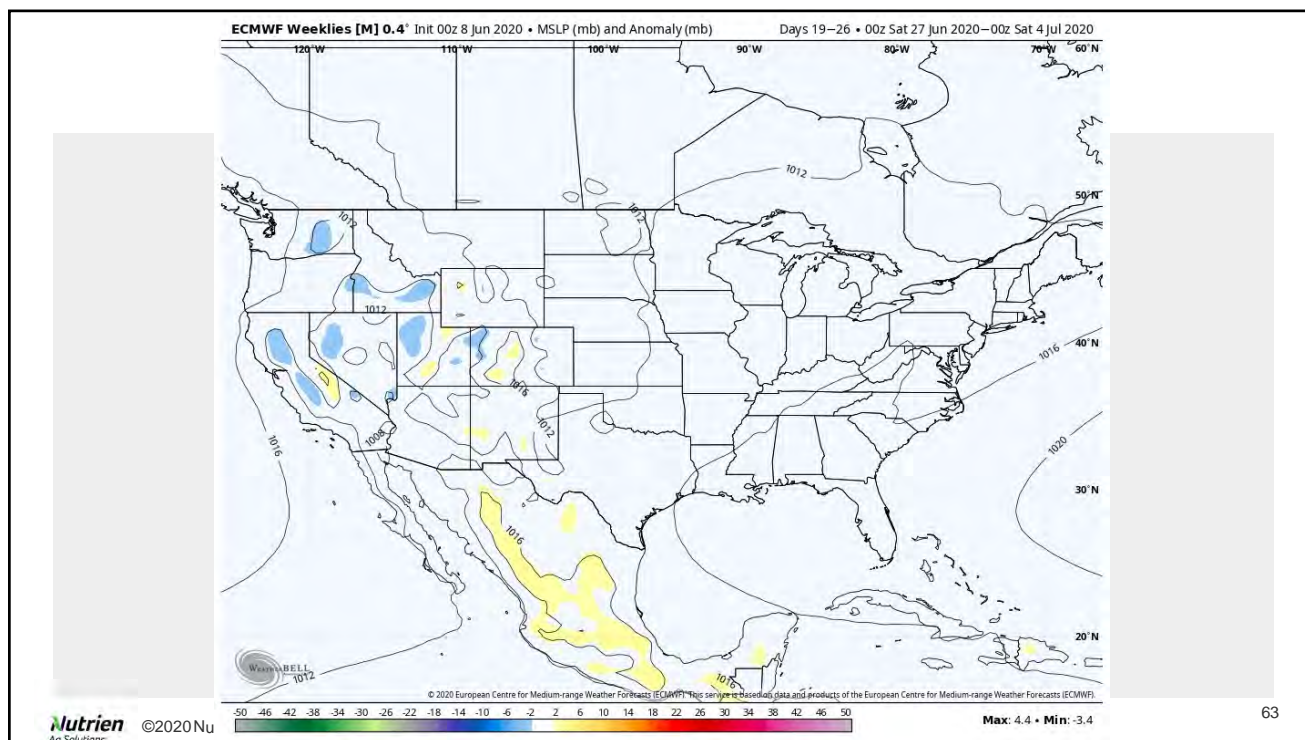
ECMWF Ensemble (50 Member)



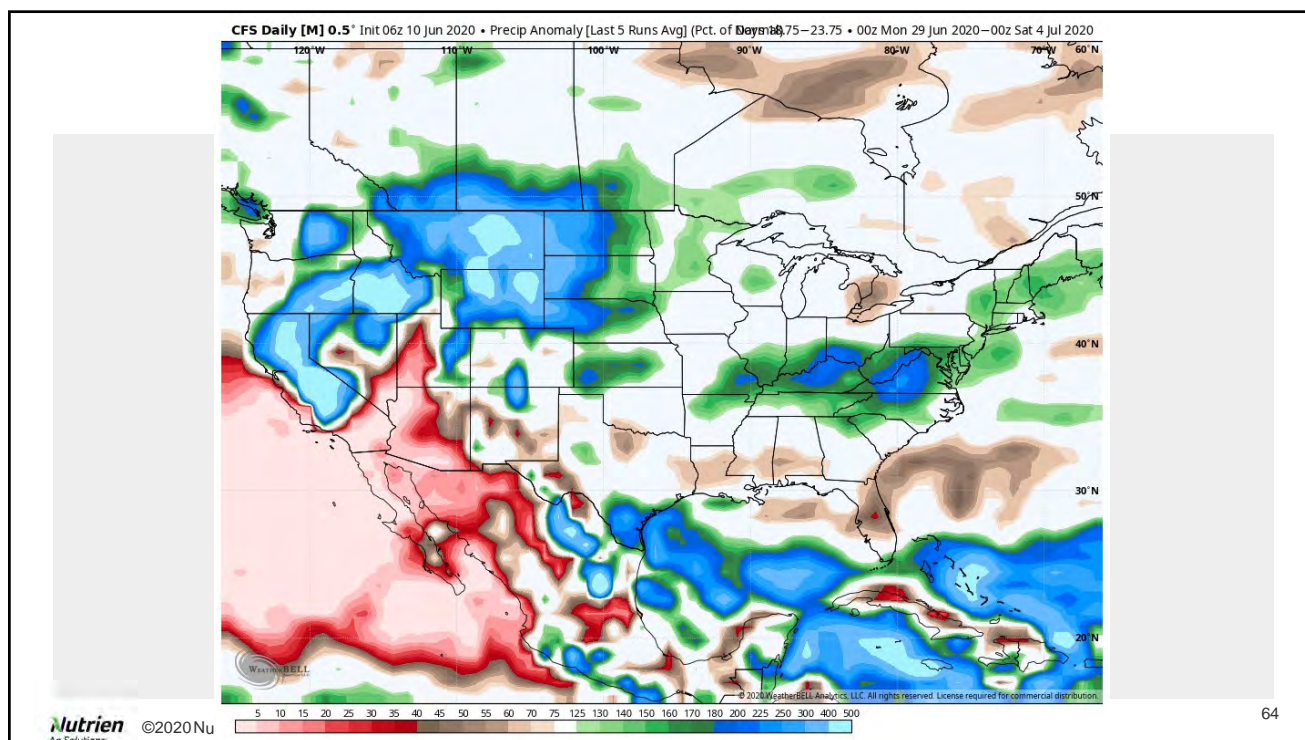
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62

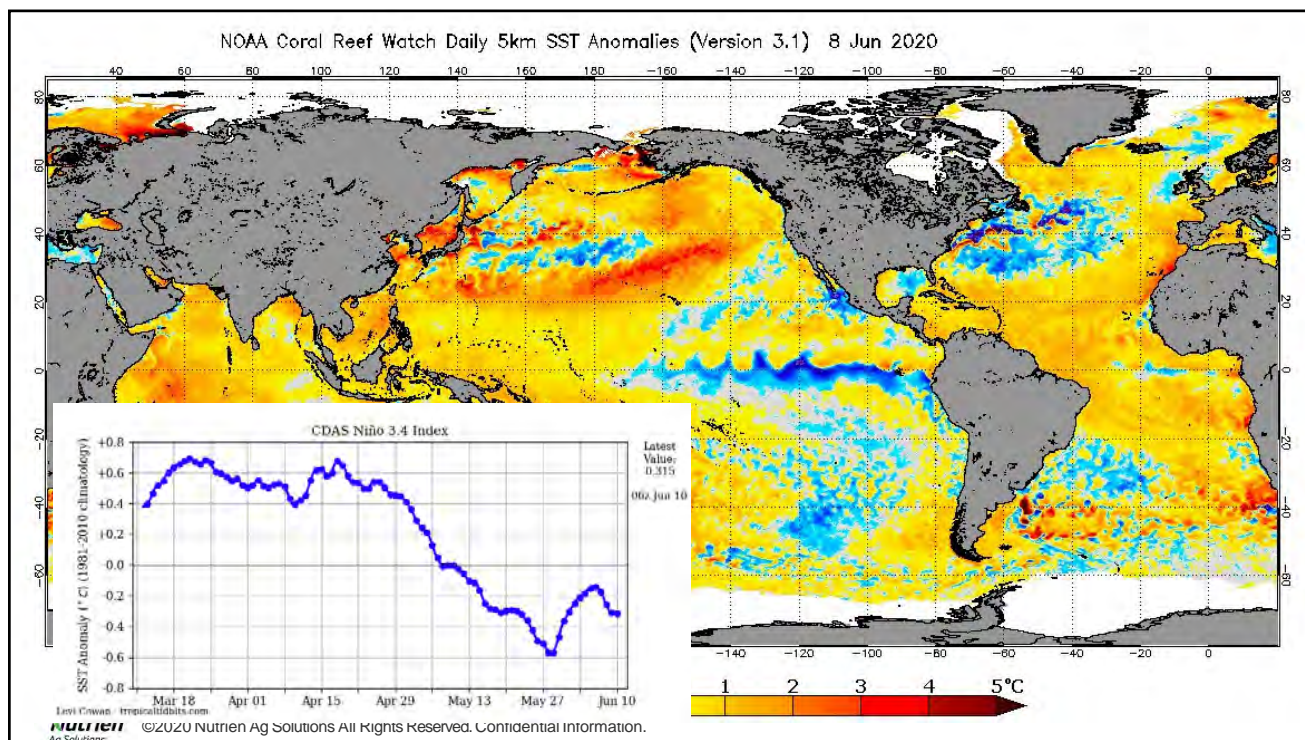


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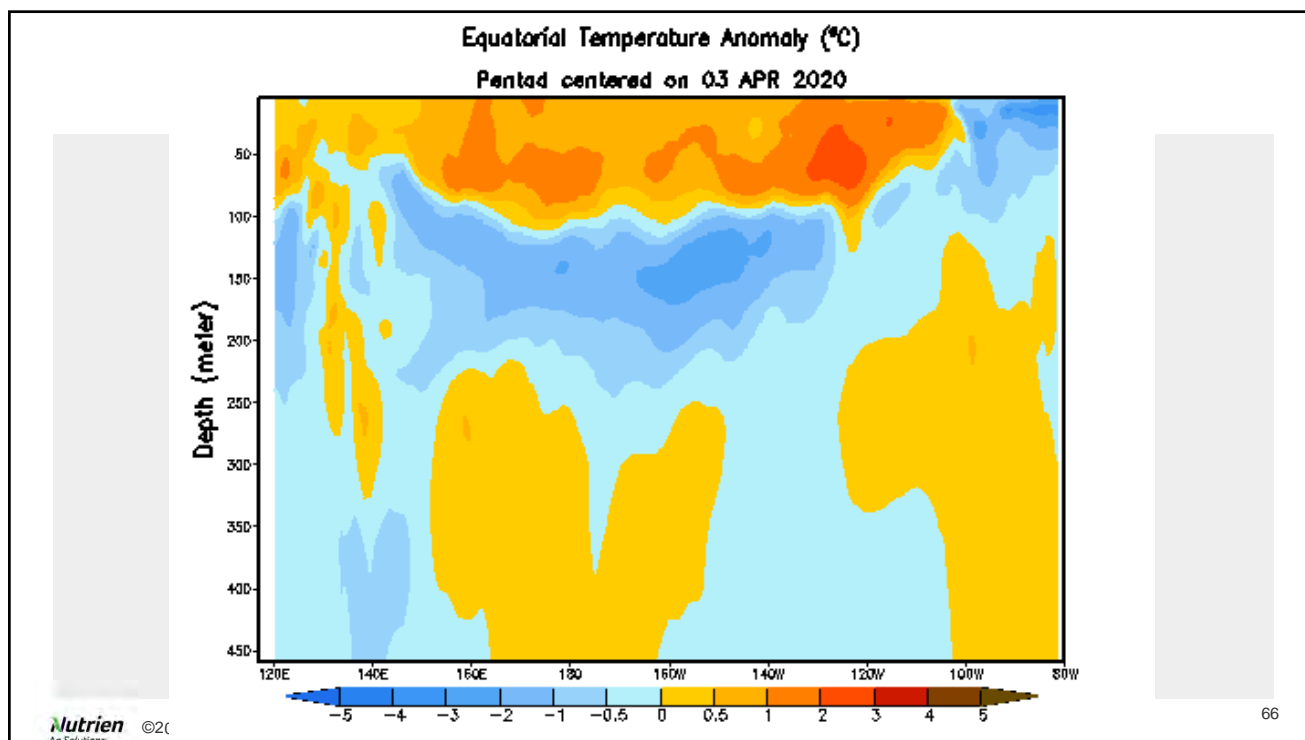


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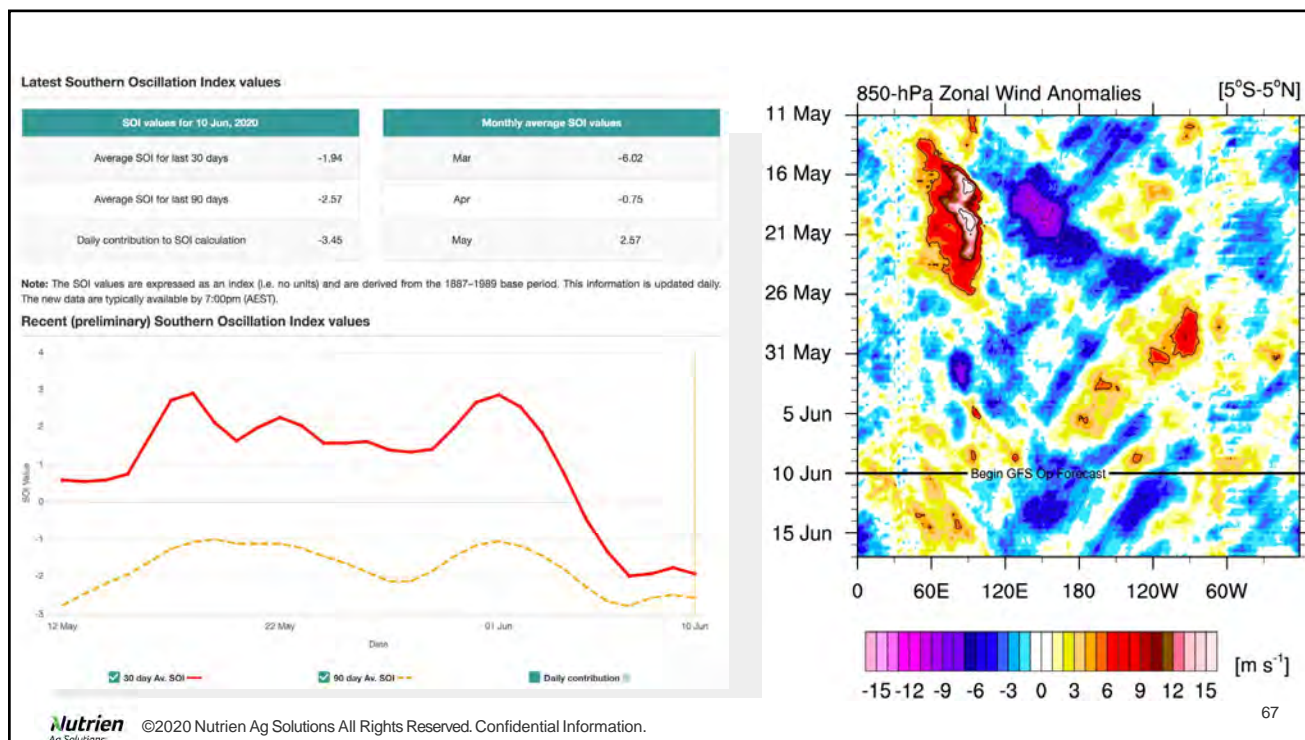




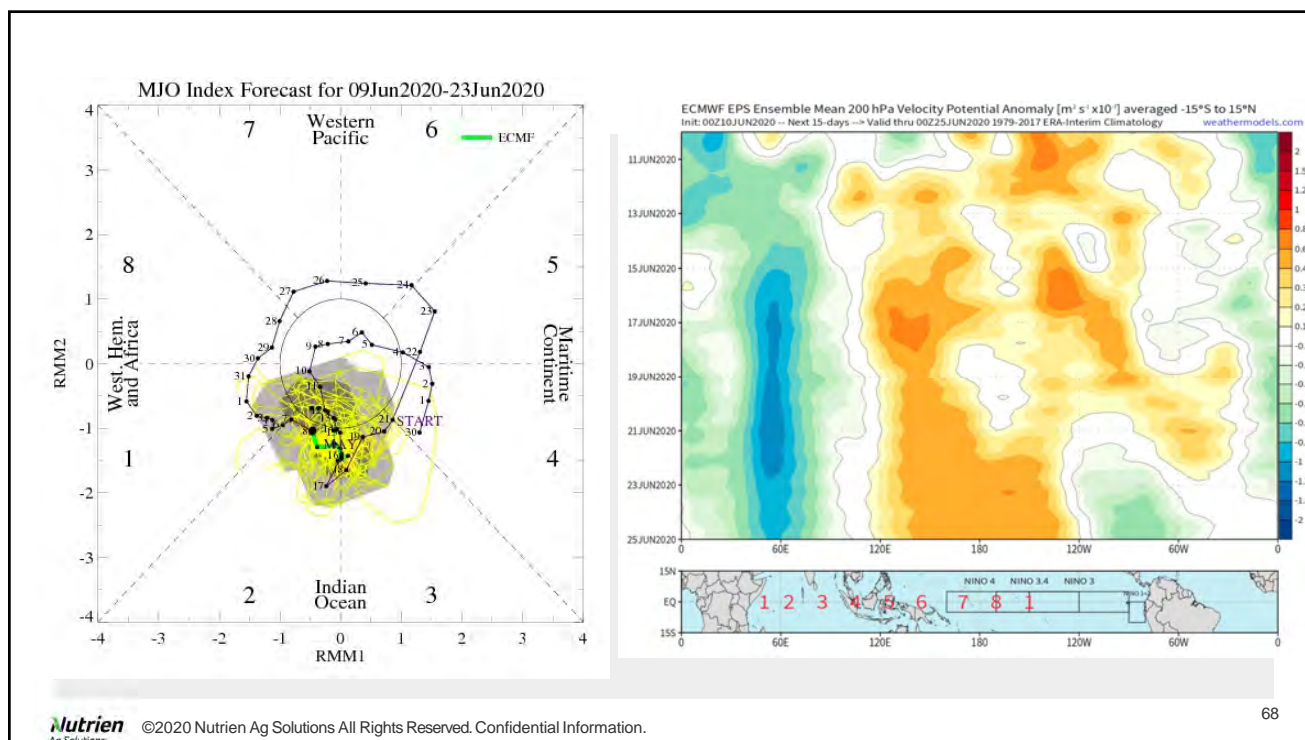
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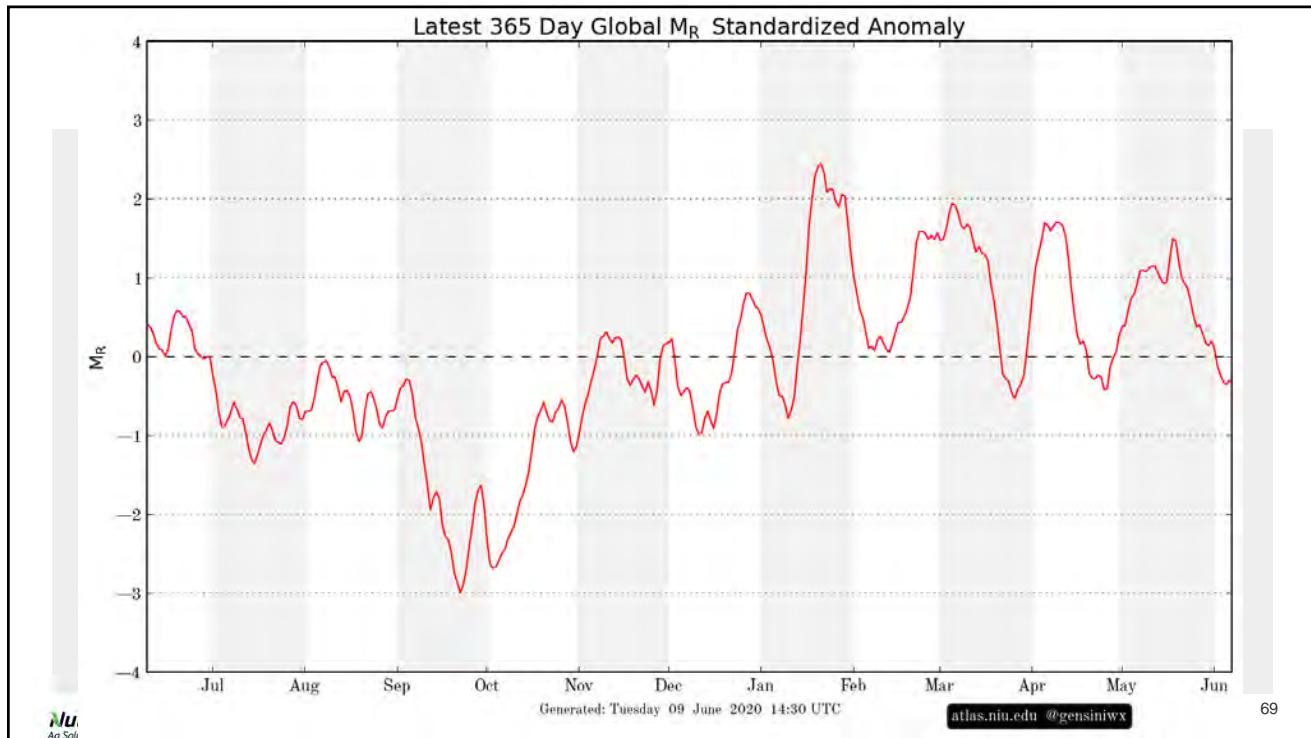


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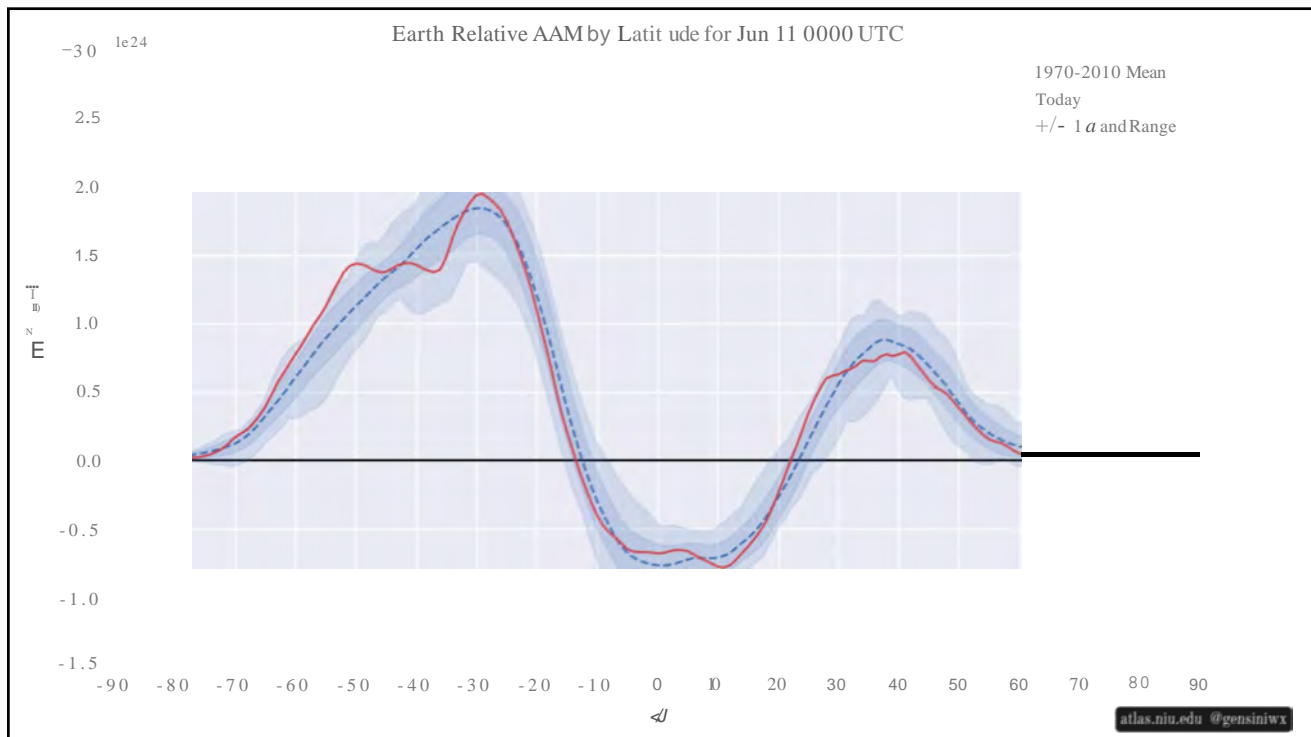


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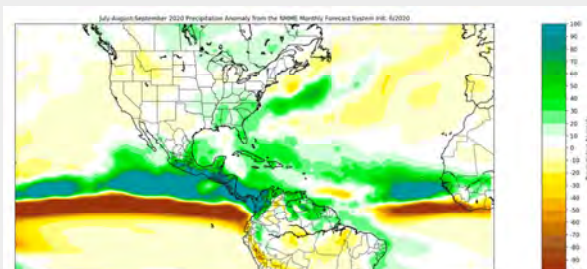
**Conclusions:**

1. Normal summer jet stream patterns are weak and north. That is why t-storms dominate the precipitation regime.
2. I don't have a reason to be overly concerned about a block setting up in the north Pacific or Atlantic, but we must always watch Greenland and Alaska for early clues on highly amplified patterns

**Where I could be wrong:**

1. Global Angular Momentum plummets (repeat of 2019 for IA and IL)
2. MJO continues in standing east African wave.
3. Expanding drought in southern Plains causes a positive feedback loop and limits moisture return to WCB
4. Bermuda High slides east and sends SE into drought. Ring of Fire set up for mid-summer.

Unknowns/Wild Cards  Tropical Cyclone Activity



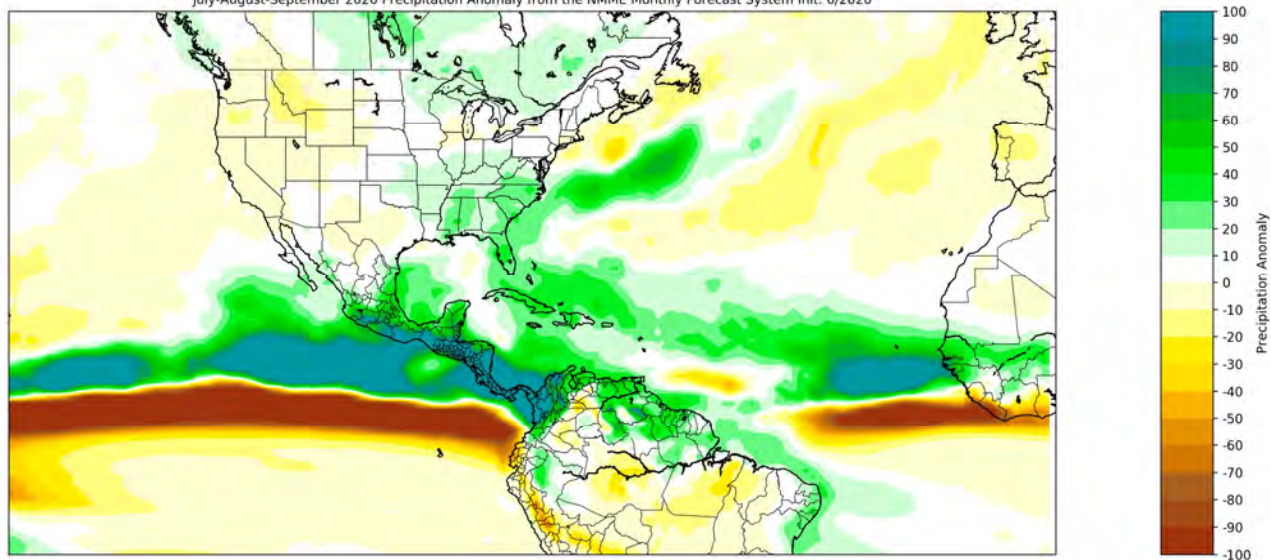
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July-August-September 2020 Precipitation Anomaly from the NMME Monthly Forecast System Init. 6/2020



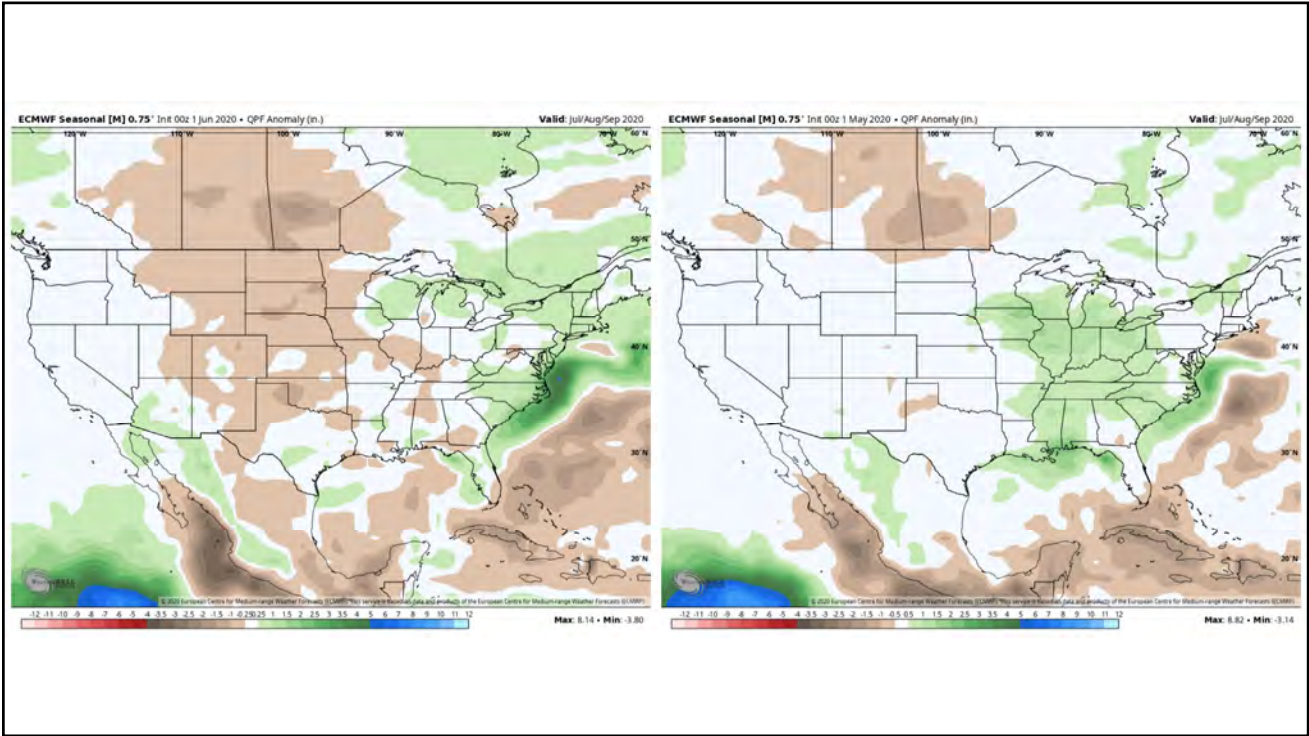
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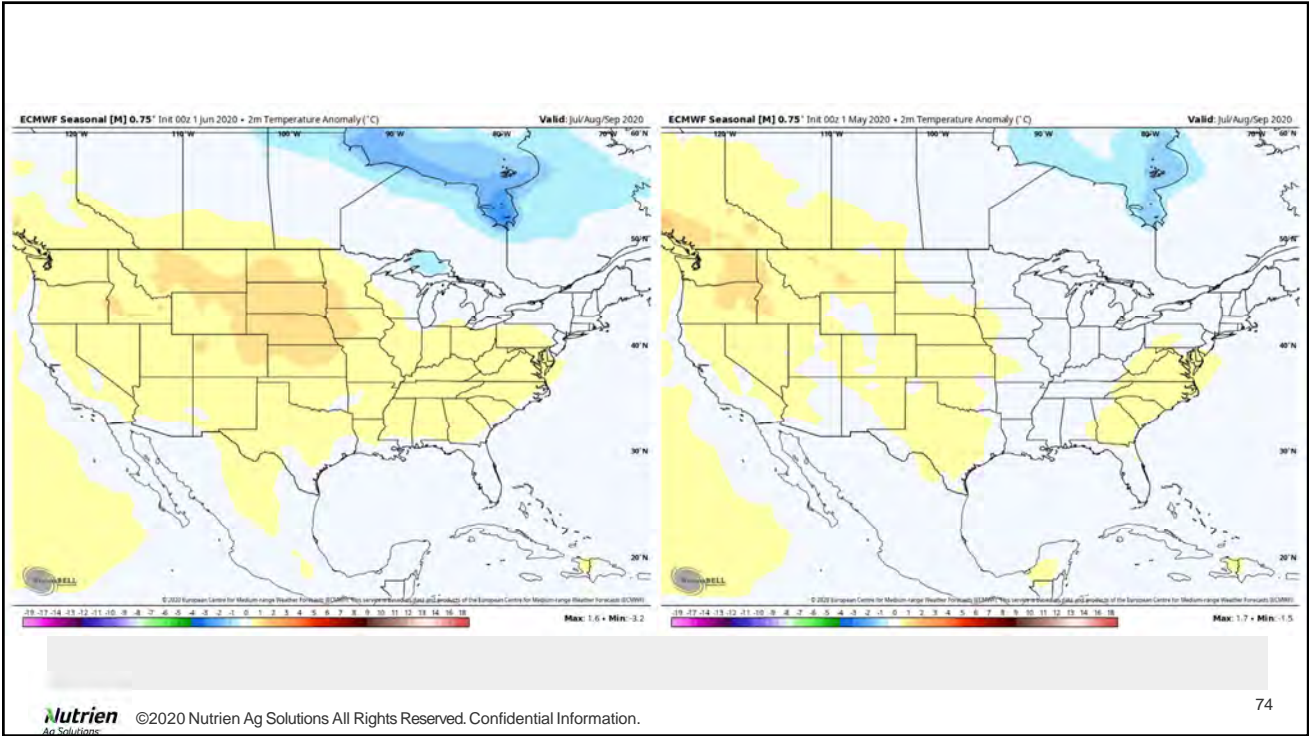
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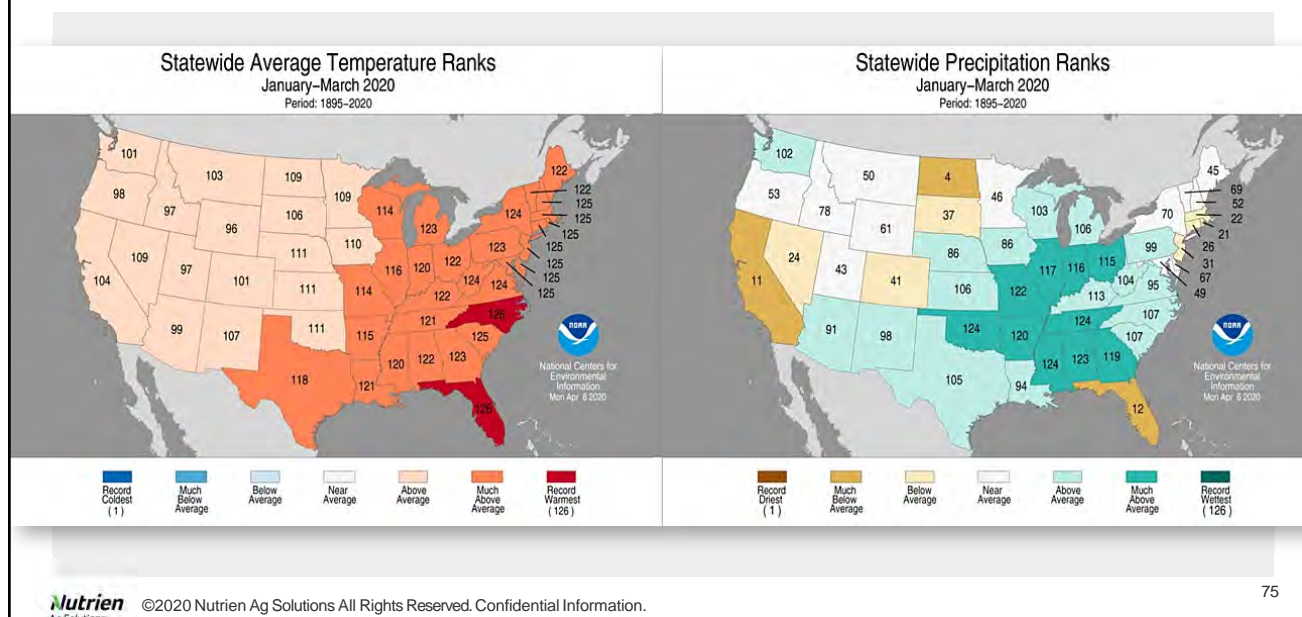


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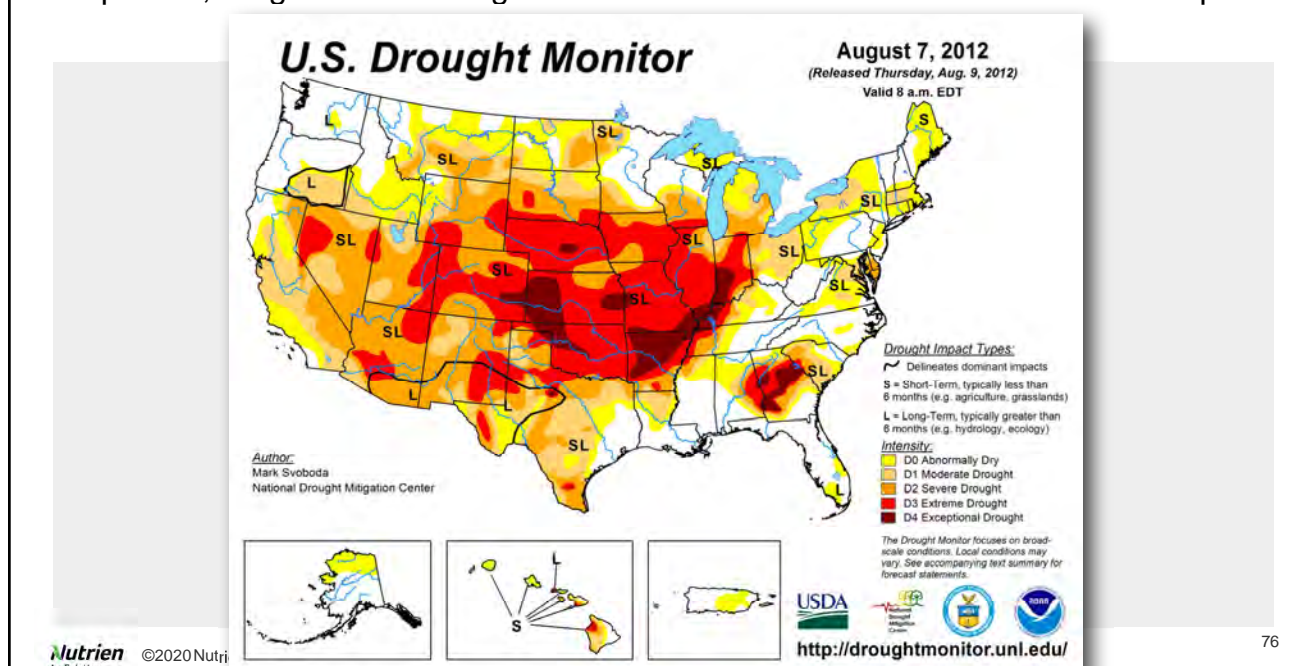
74

## Winter 2019-20: 7th warmest, 13th wettest



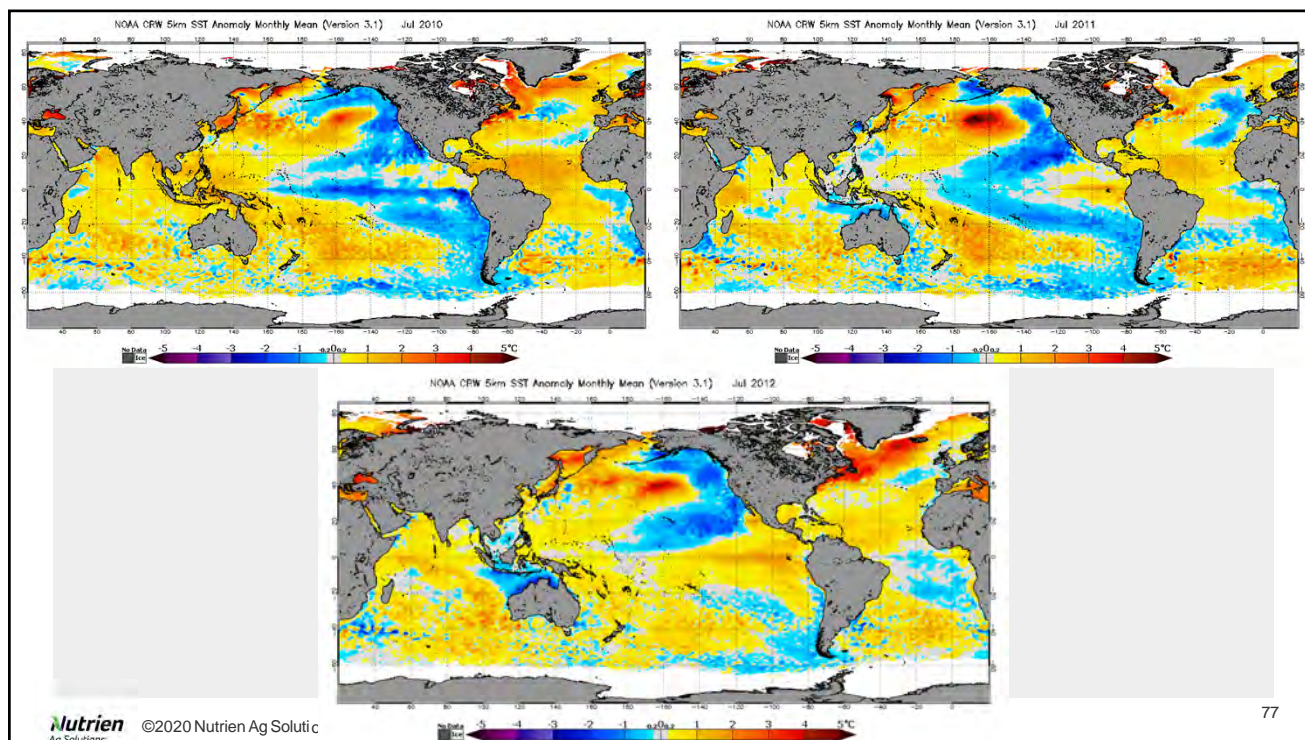
75

## Expansive, Long Duration Drought: Multi-seasonal and Correlated with Ocean Temps



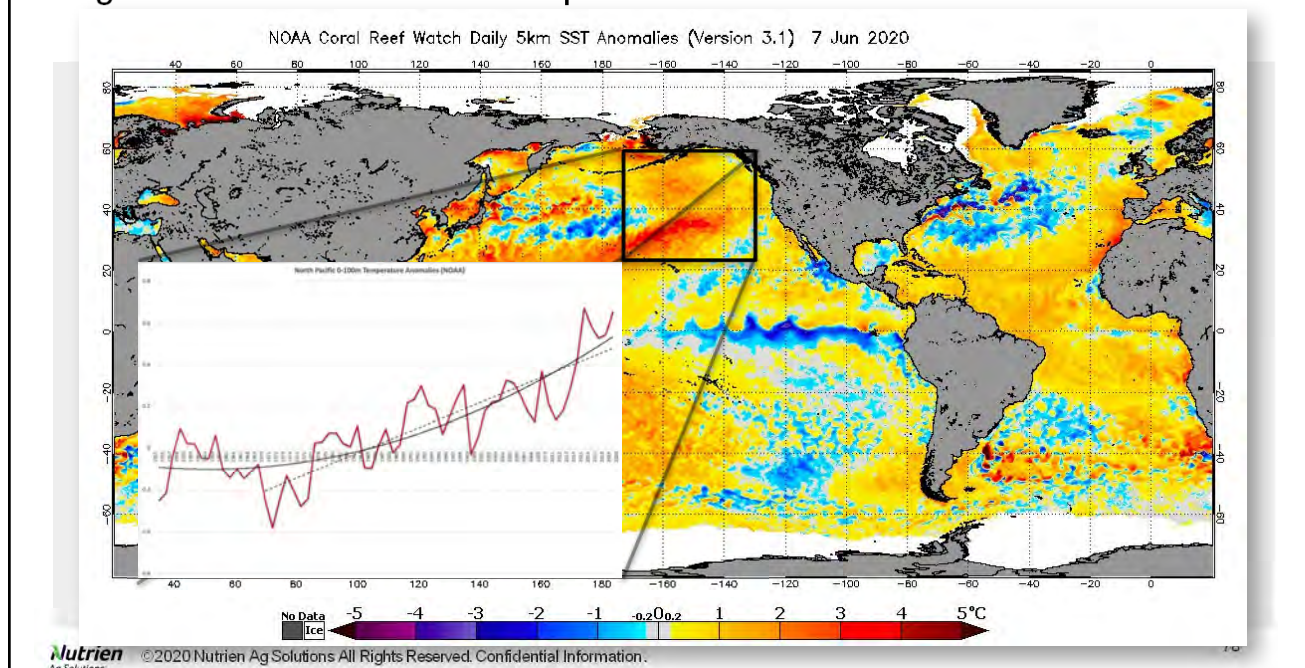
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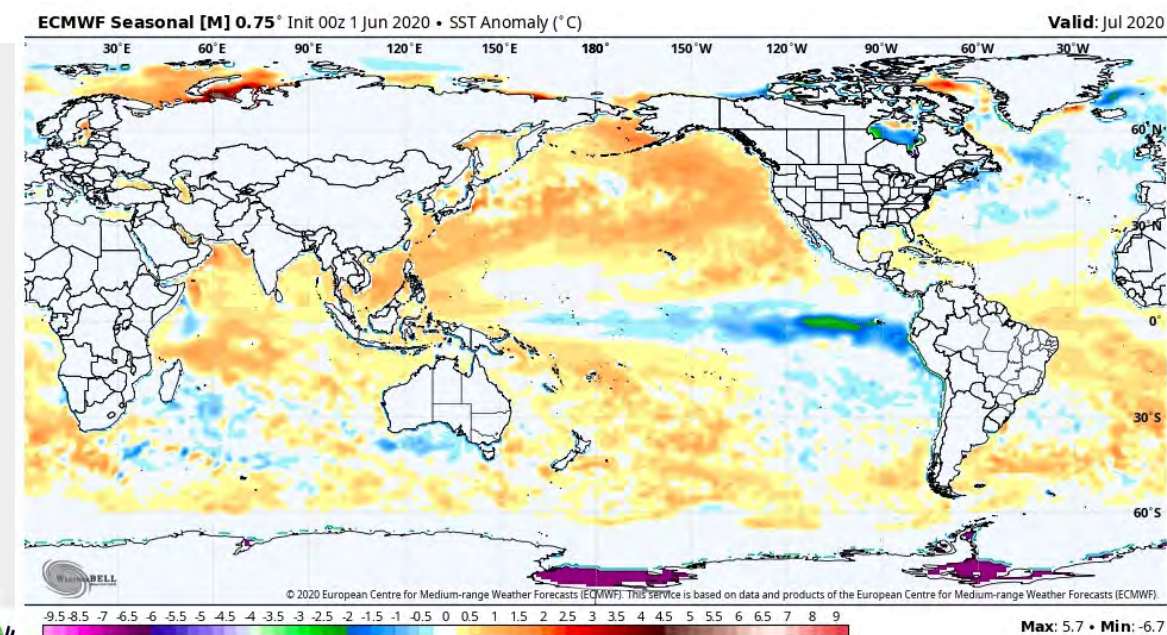
## Big Features - Pacific Ocean Temps and La Nina



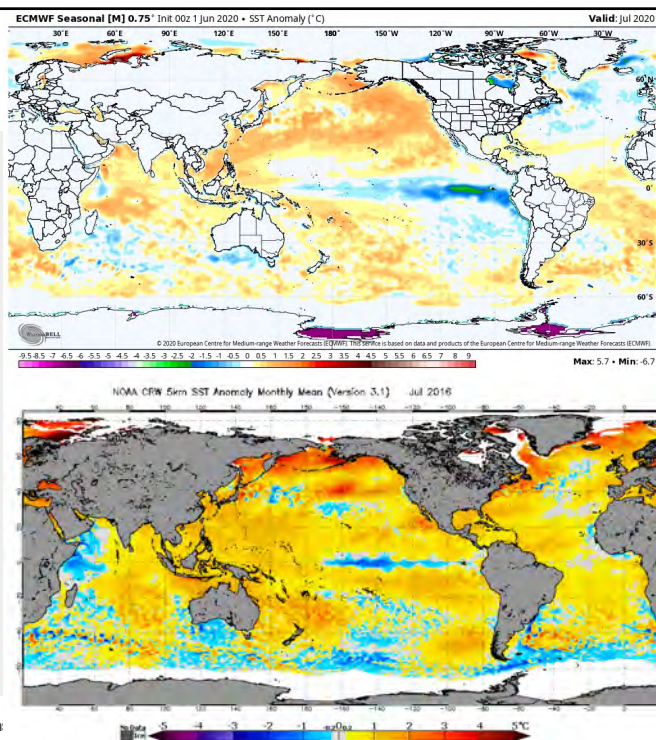
78



## Is there a good analog year?



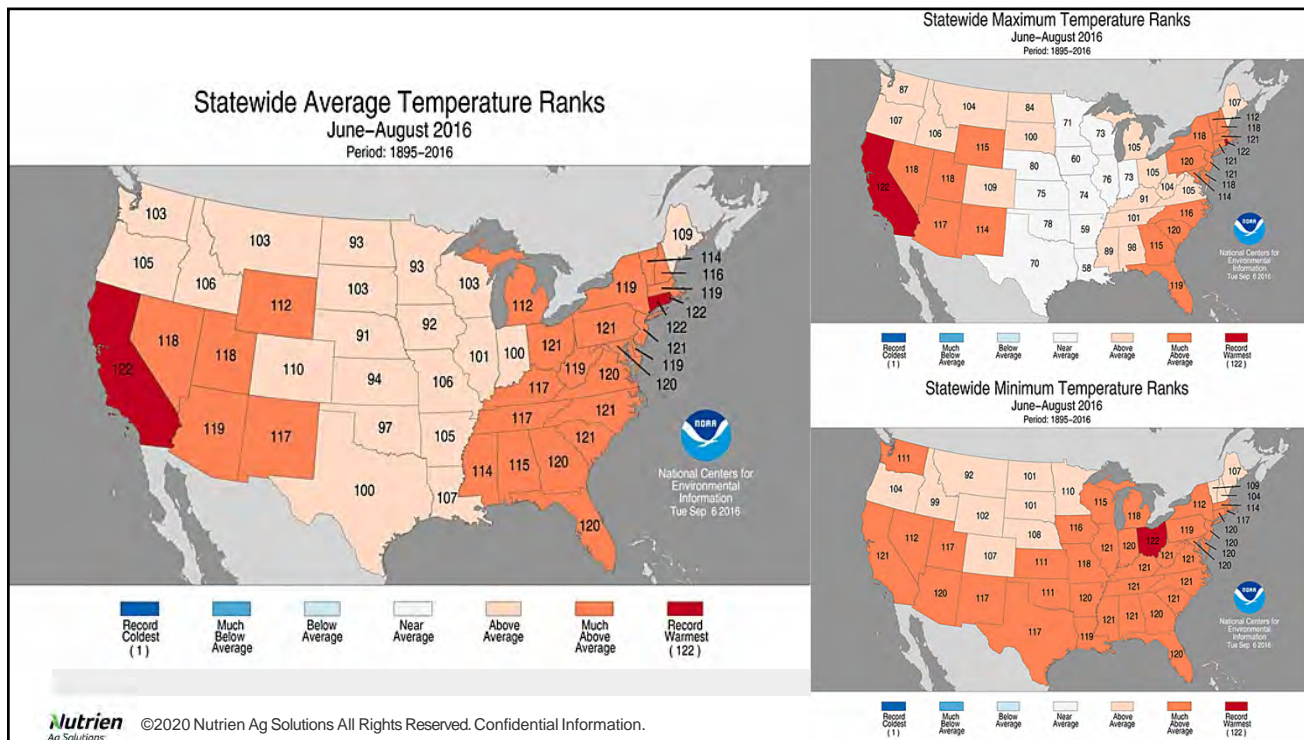
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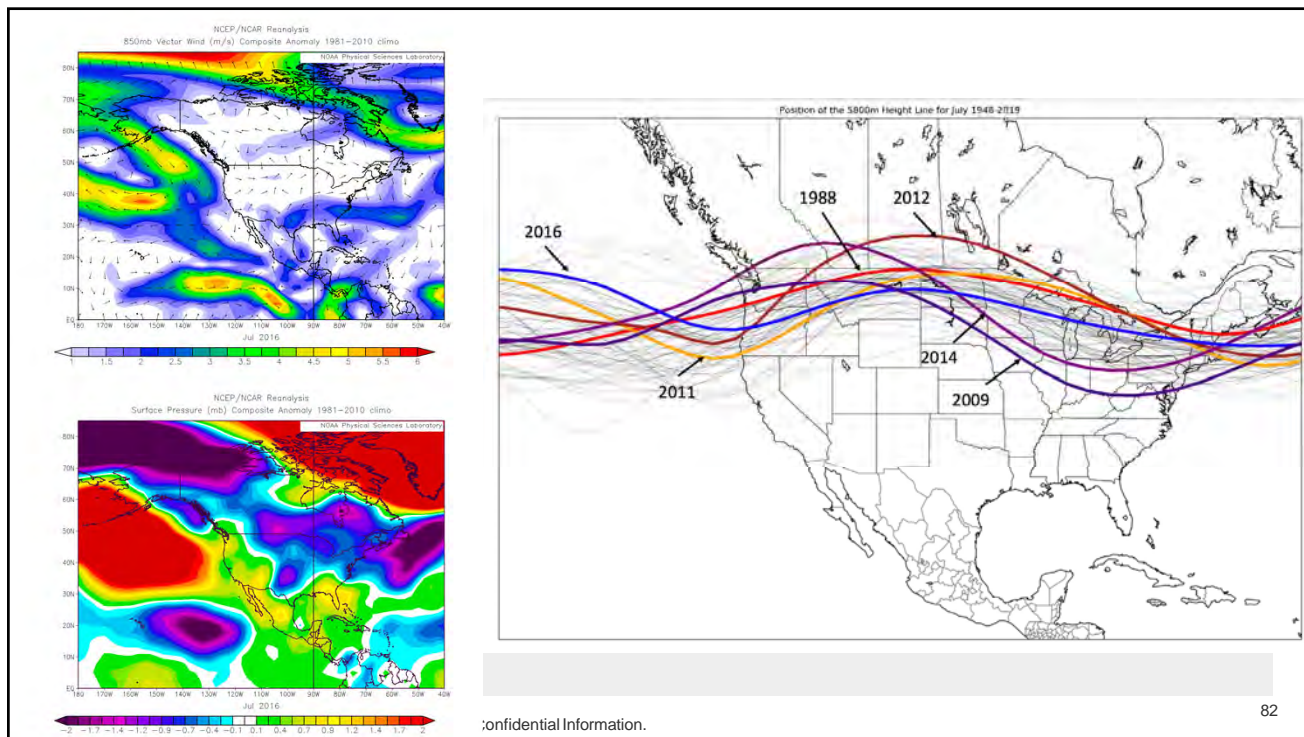
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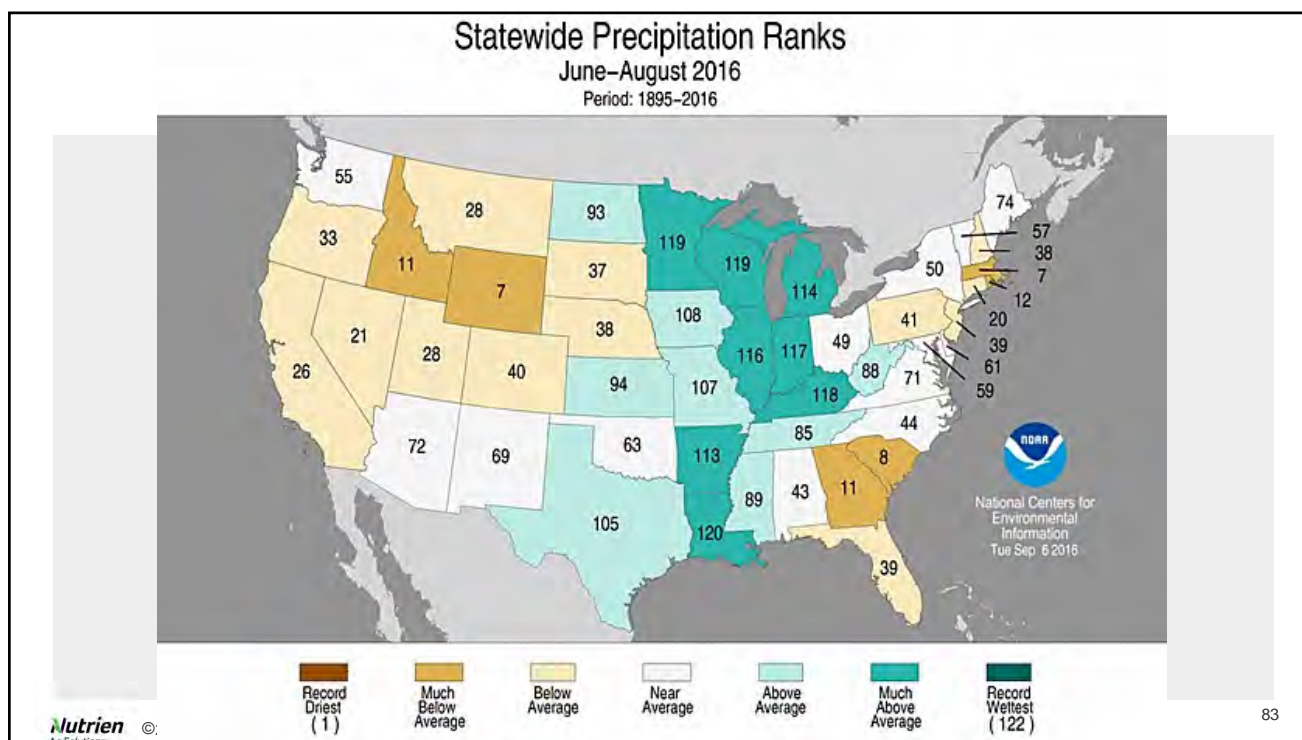


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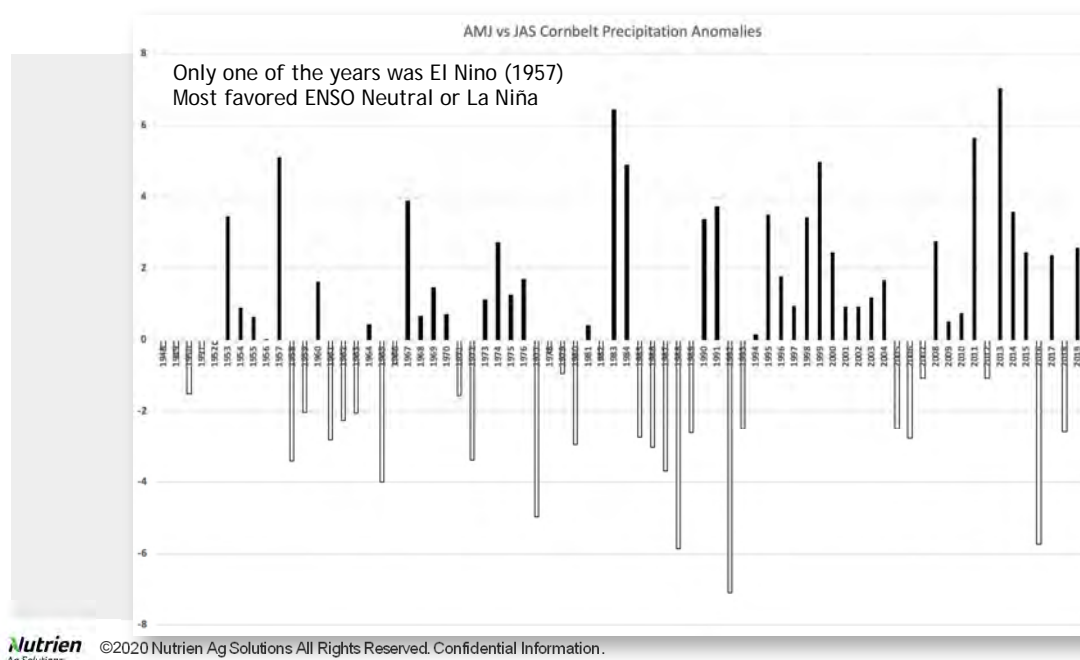
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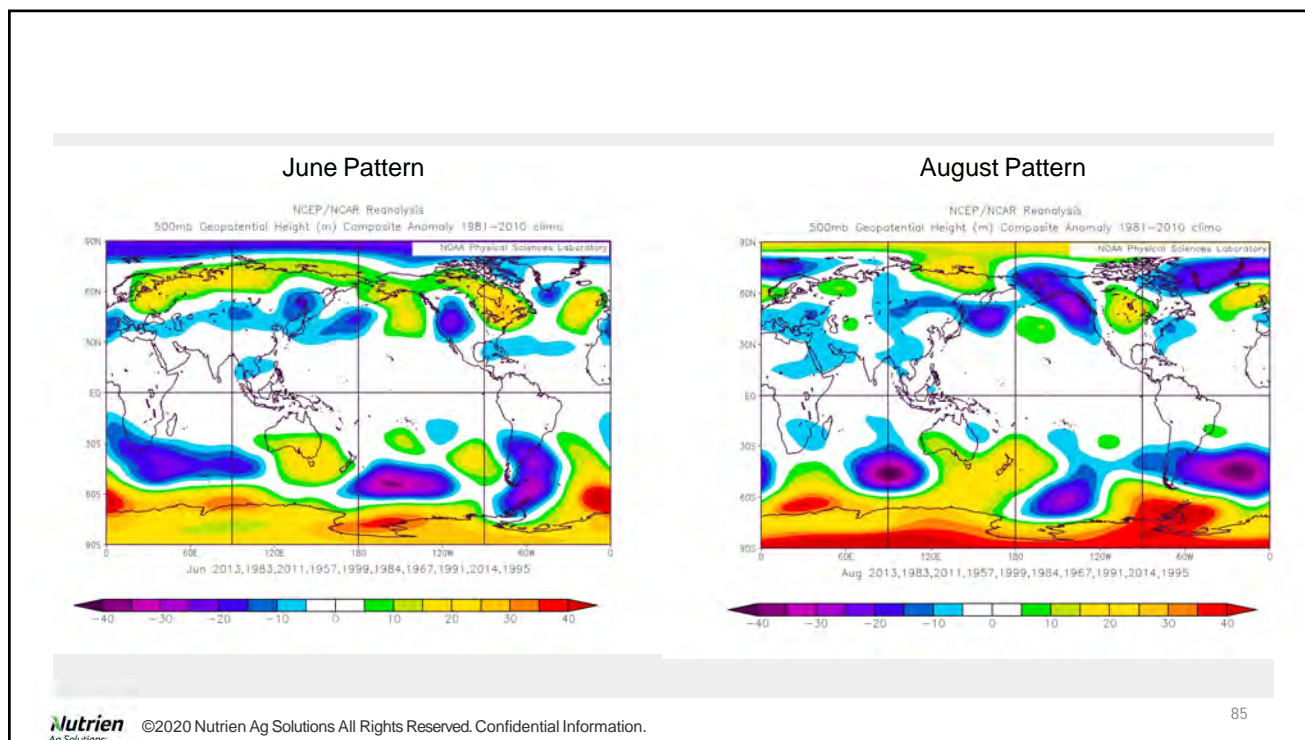
83

What to watch out for - wet springs that became hot/dry summers

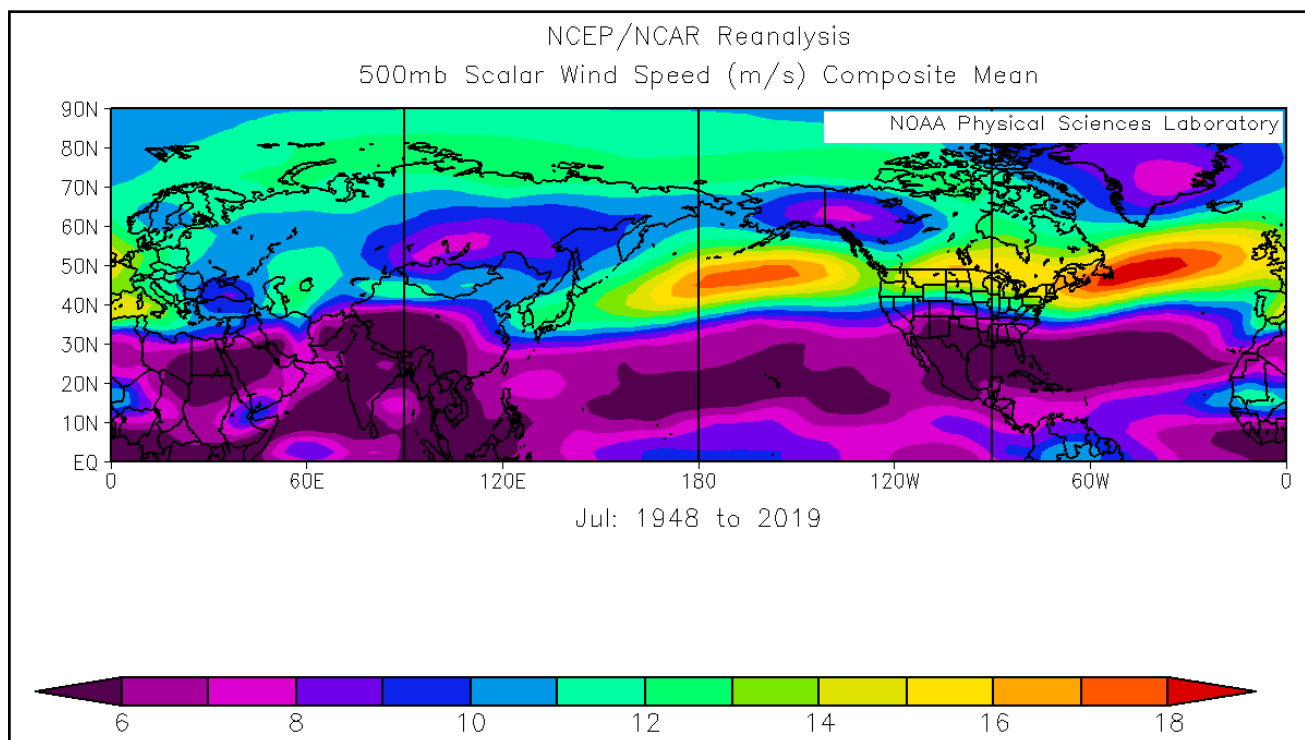


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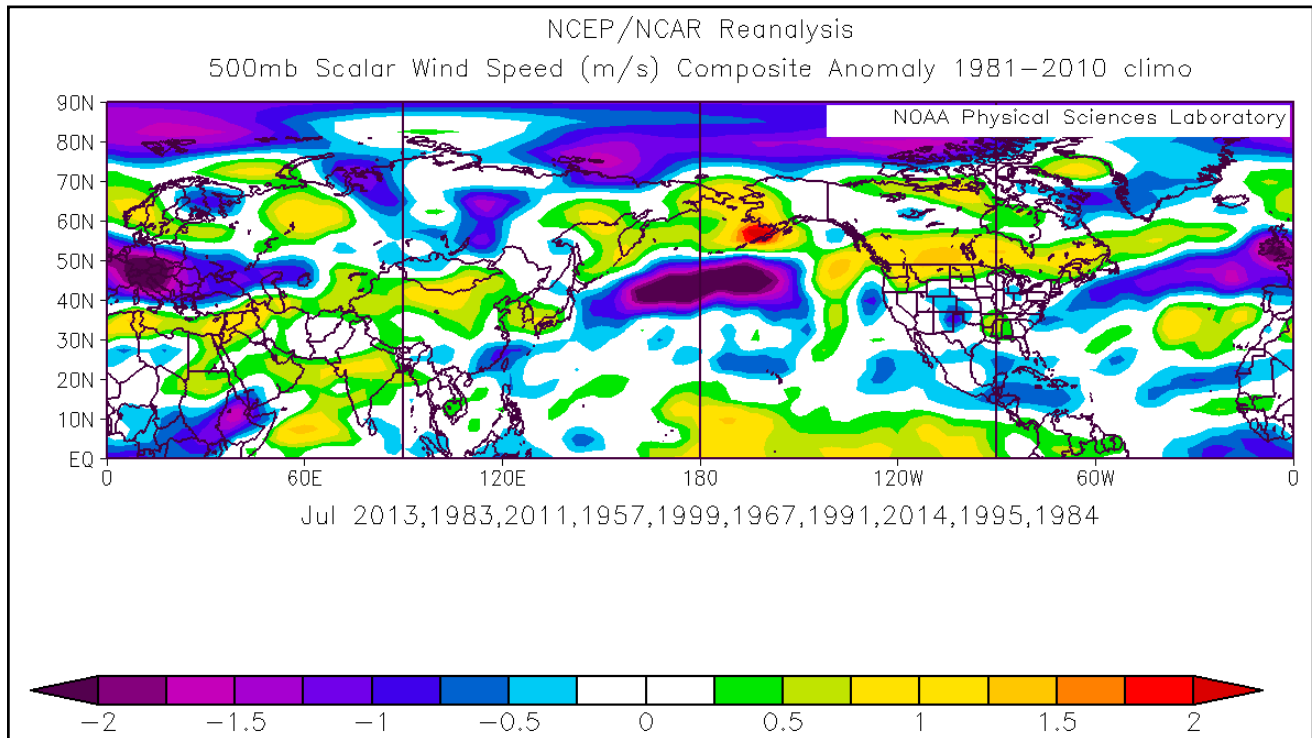




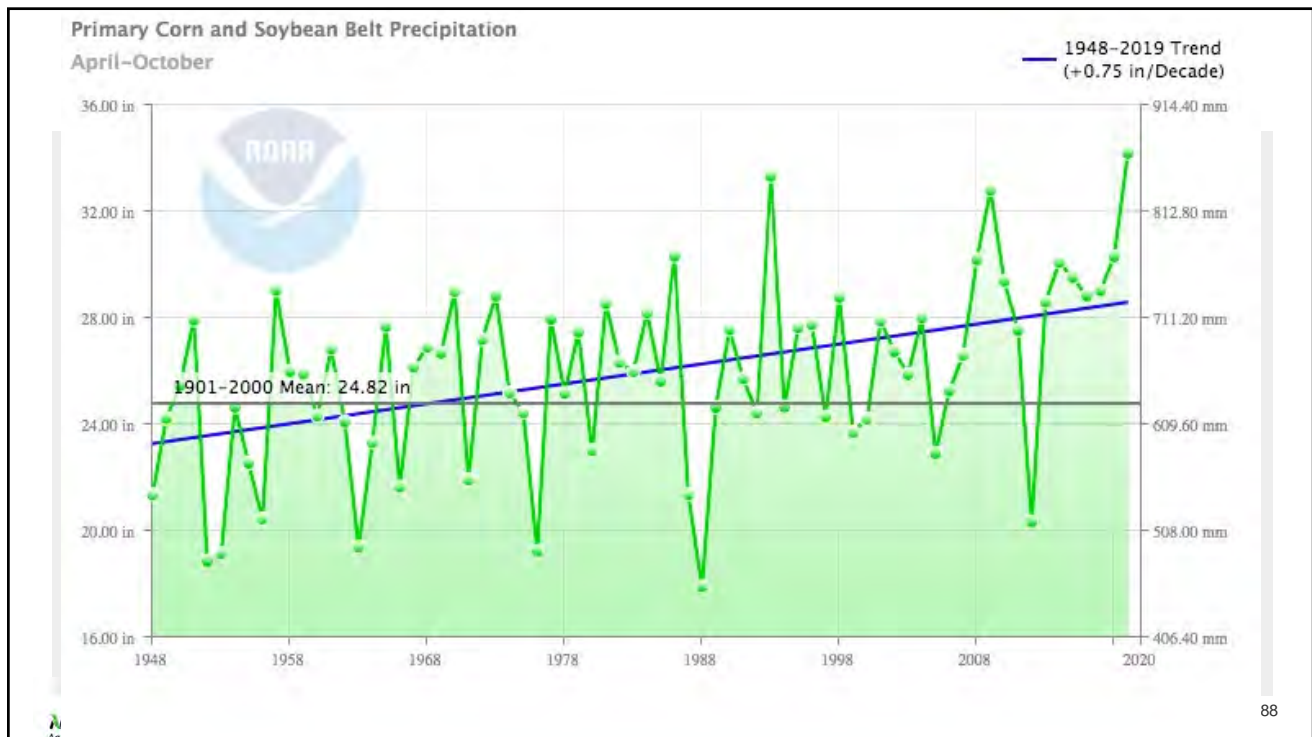
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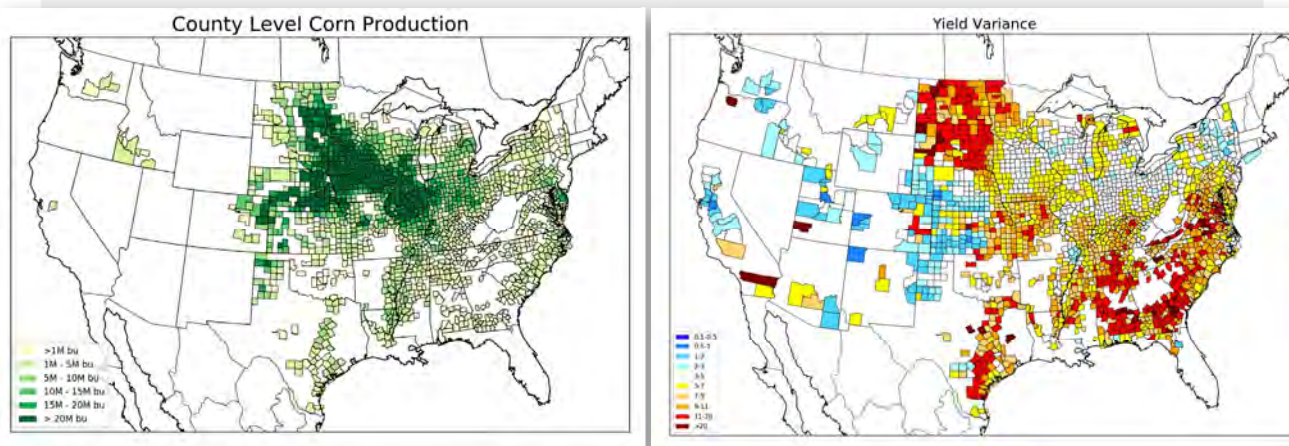
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## Corn Production and Variance

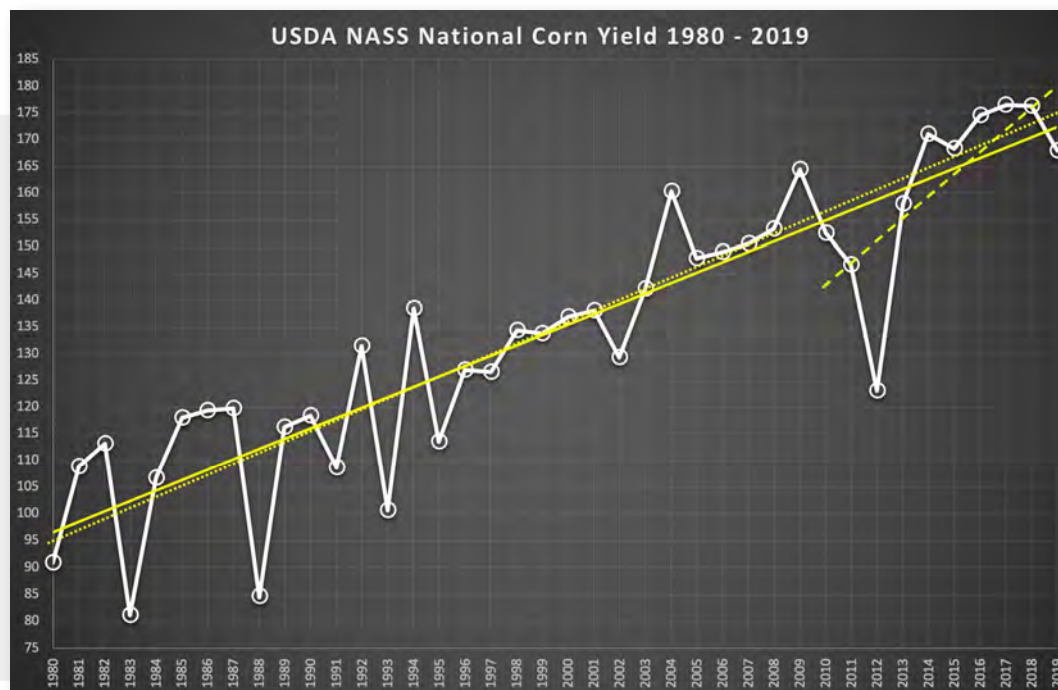


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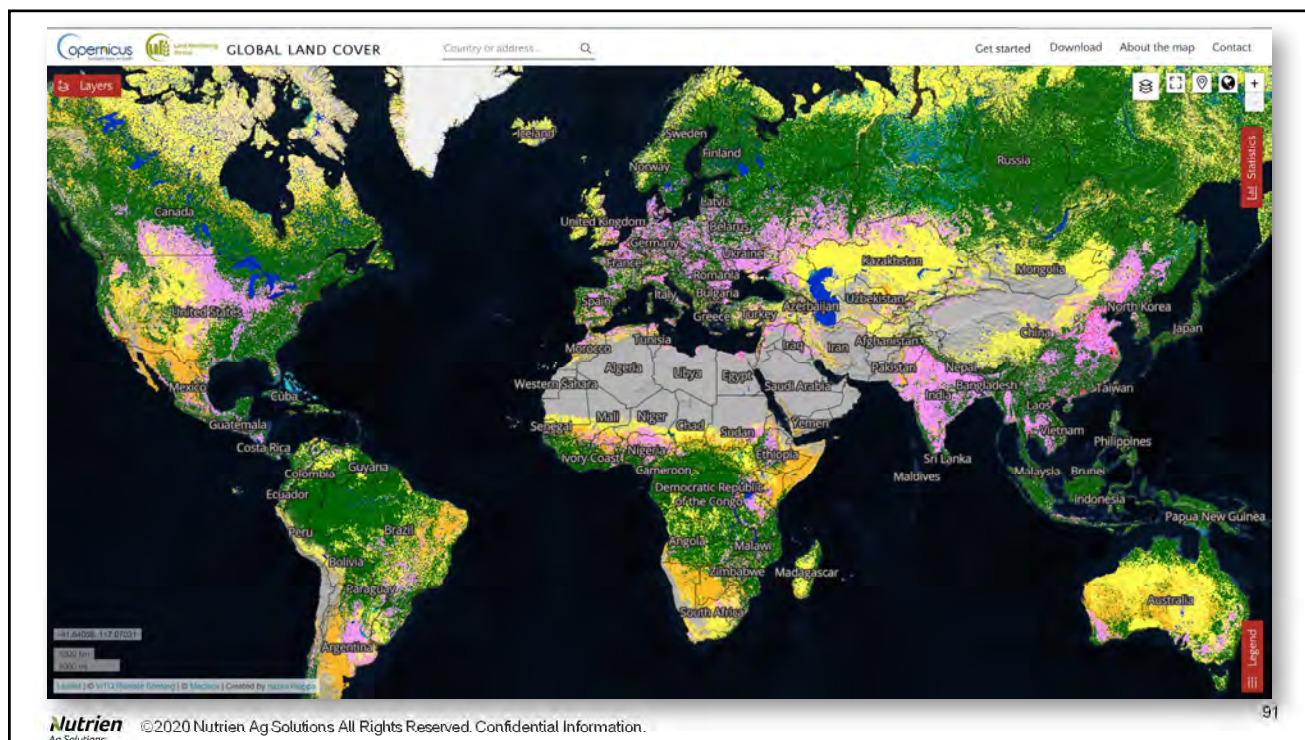


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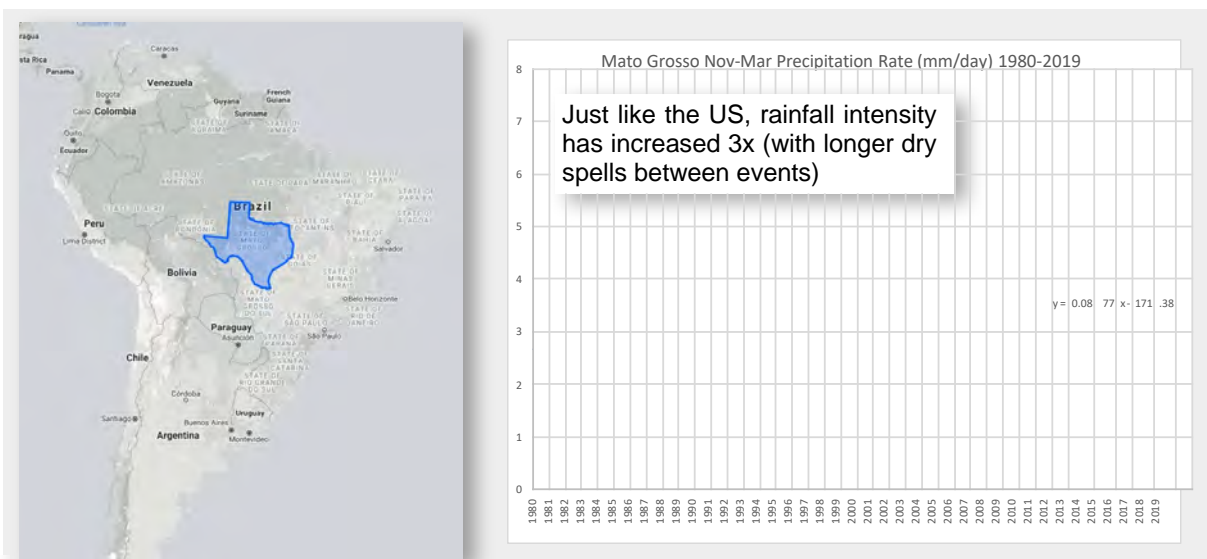
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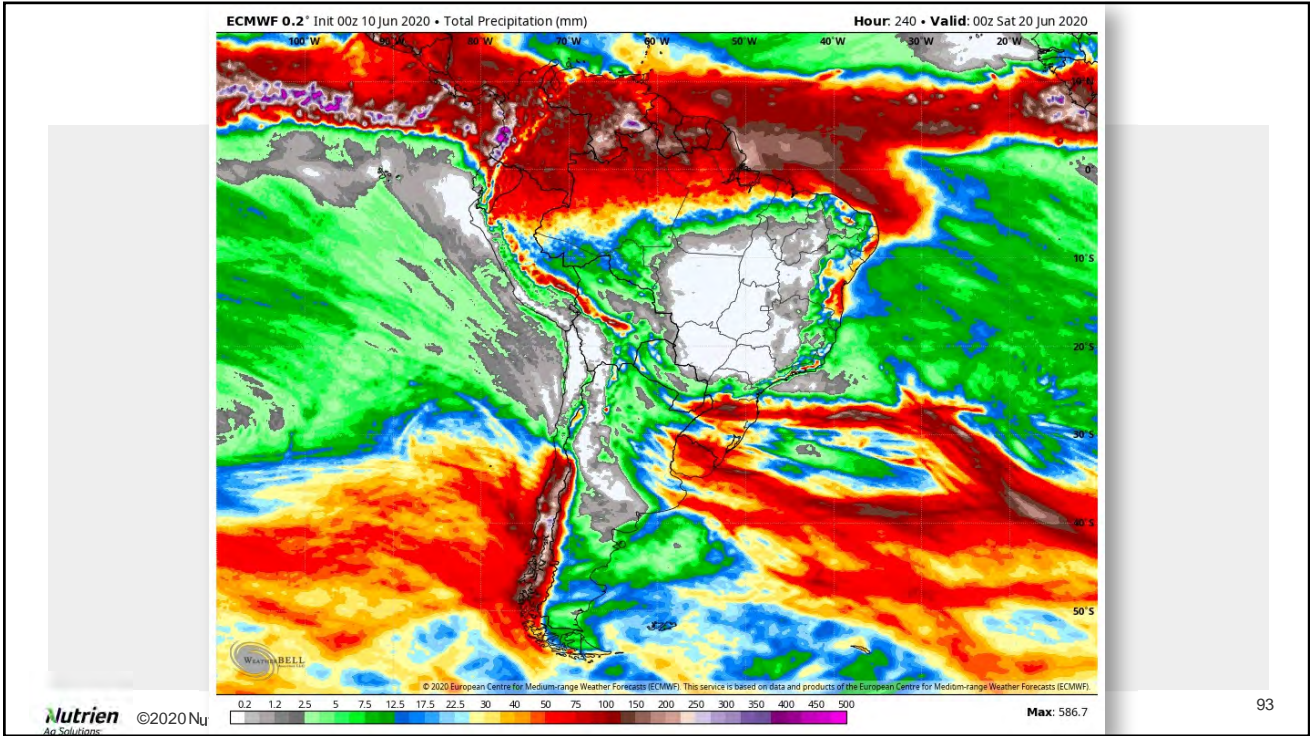
## Brazil farms 8% of its arable land

Will the strength of the monsoon maintain increased productivity and land use change

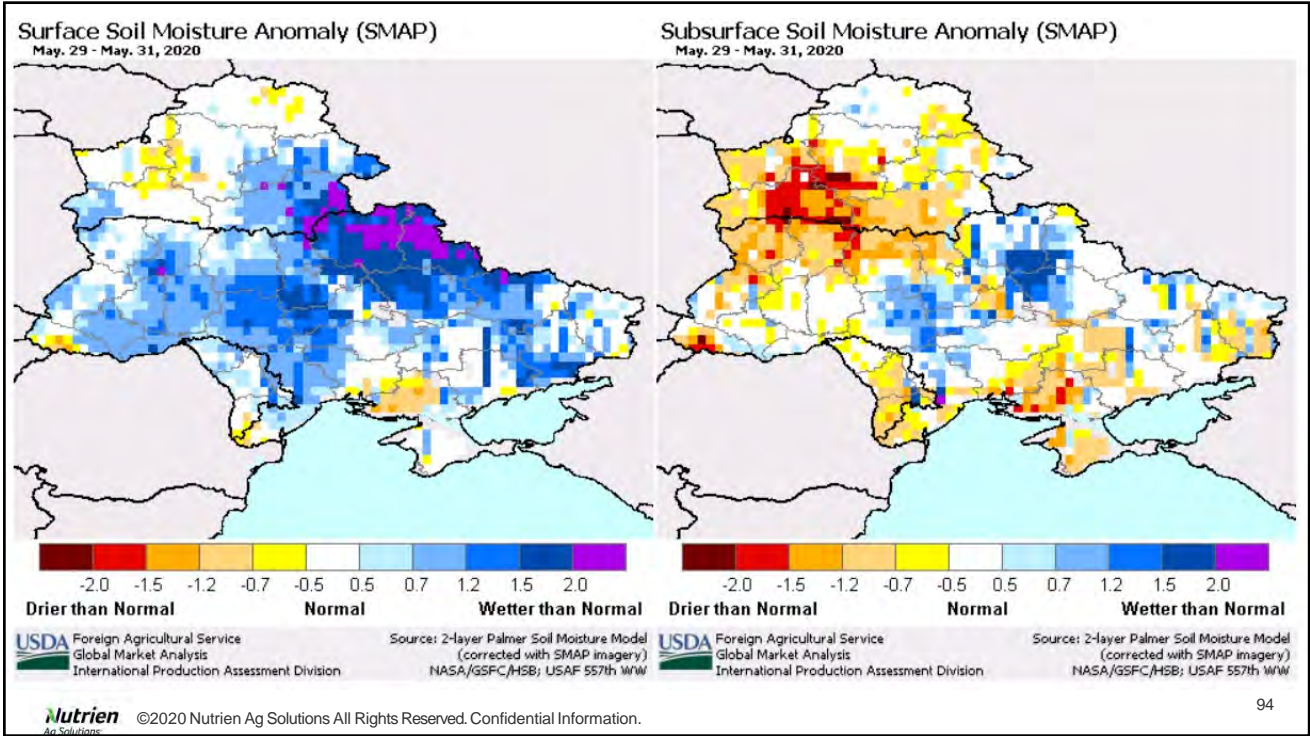


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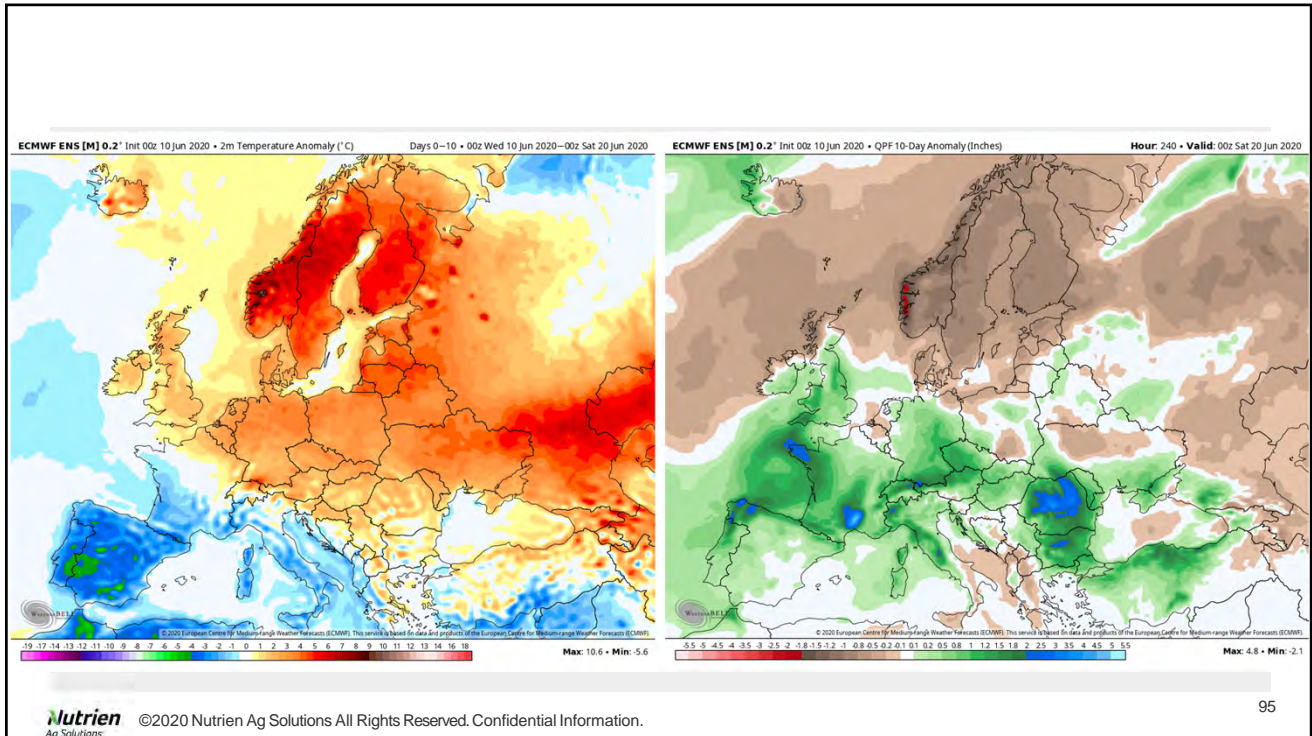




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