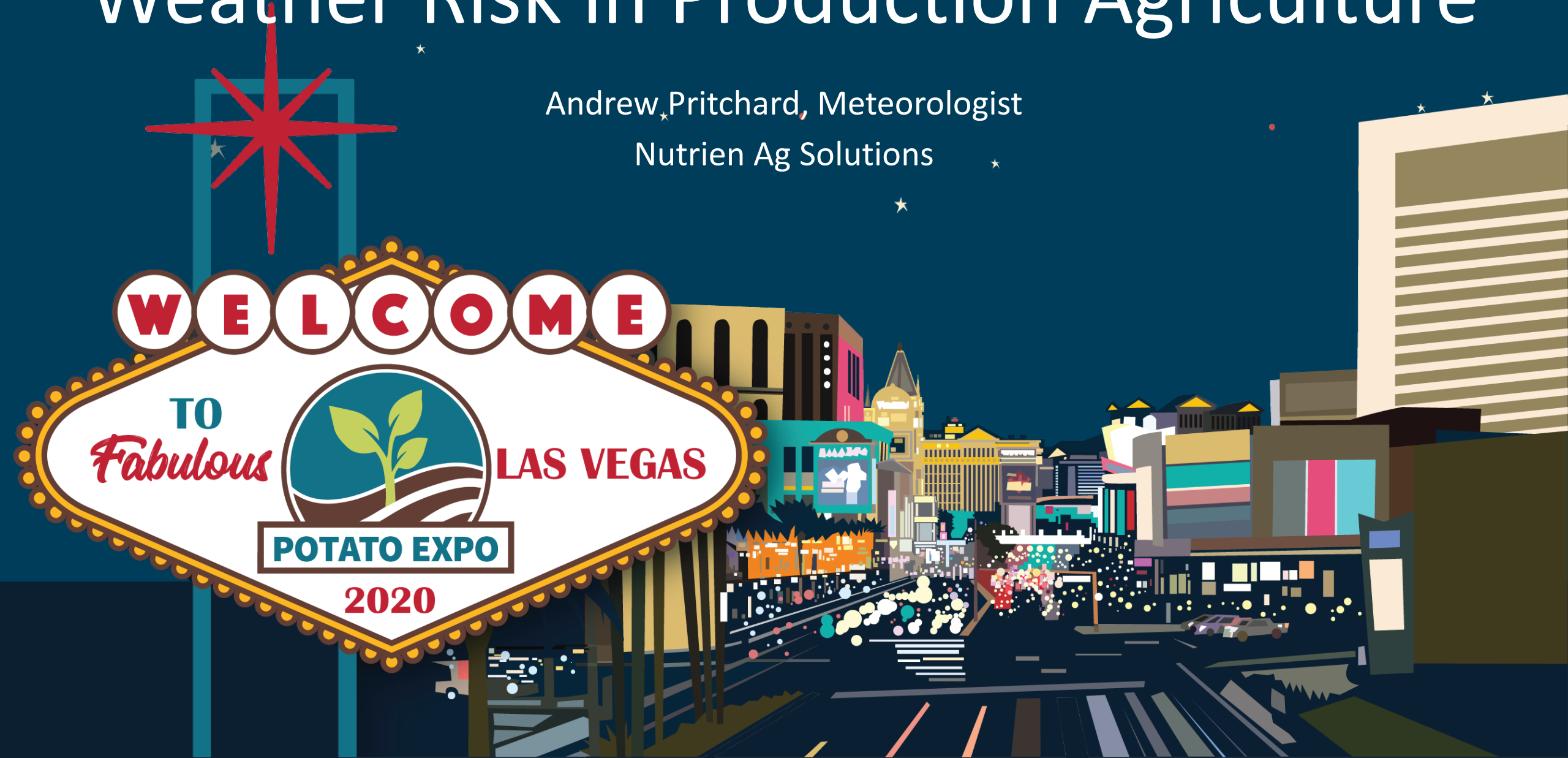


Weather Risk in Production Agriculture

Andrew Pritchard, Meteorologist
Nutrien Ag Solutions





Well that didn't work out...

36°

Clear

Wednesday · Las Vegas

37°

Fog

Wednesday · Urbana





Markets

America Braces for Possible French Fry Shortage After Poor Potato Harvest

By [Ashley Robinson](#)

December 2, 2019, 6:00 AM CST

- ▶ Wet, cold weather damaged crops in Idaho, Manitoba, Alberta
- ▶ Prices are likely to rise on tight supply, Rabobank says

Weather issues affect US potato crops

ON DECEMBER 12, 2019

NATIONAL

Bad Fall Weather Leaves U.S. Potato Farmers With Their Smallest Crop In Years

December 25, 2019 · 4:17 PM ET
Heard on [All Things Considered](#)

SASA WOODRUFF

FROM BOISE STATE PUBLIC RADIO



A Little Trouble For Everyone

Wisconsin – Average crop with below average size due to many weather-related conditions during growing season. Down 10-15%.

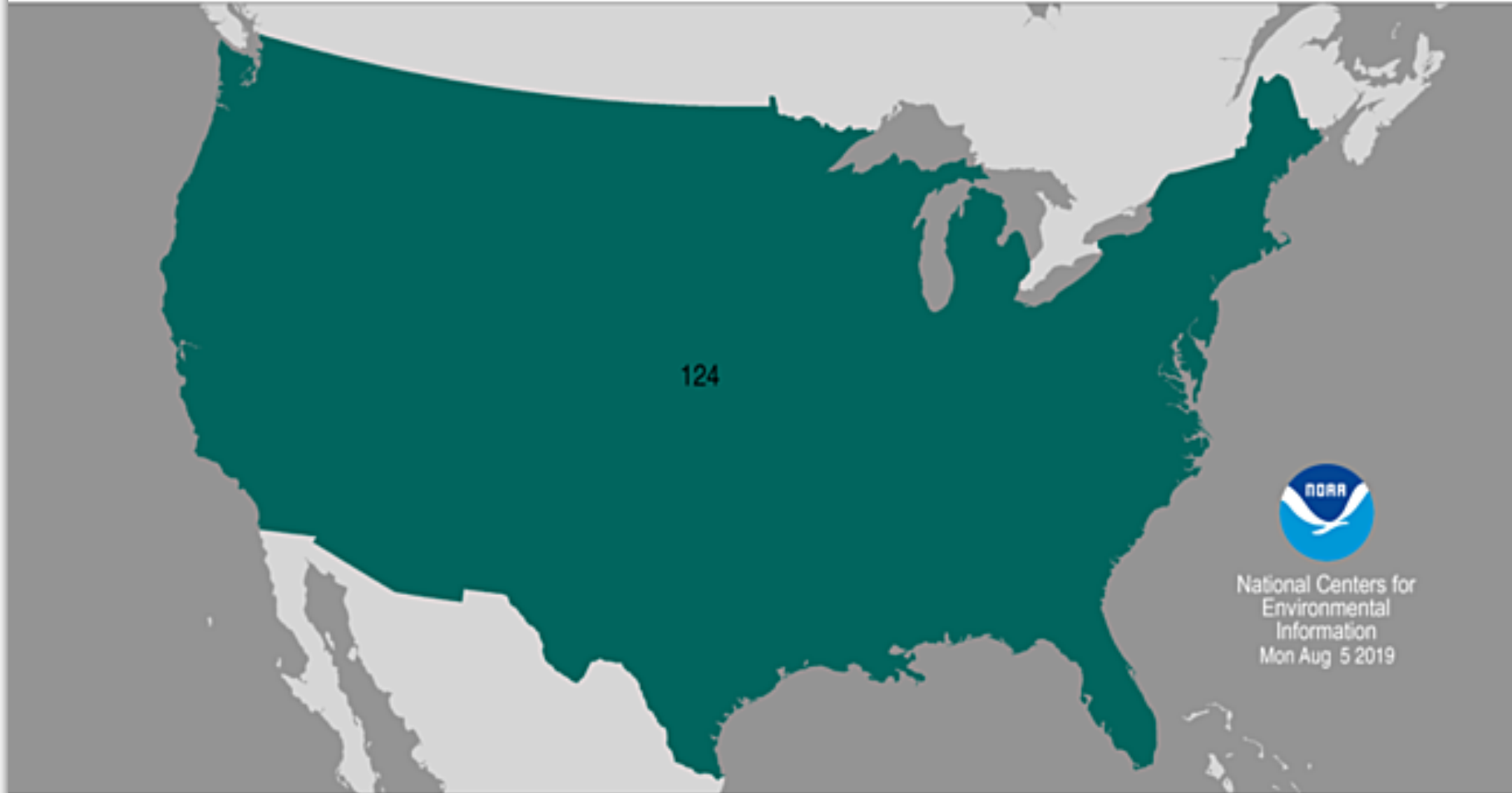
Idaho – Harvest issues with early cold – majority harvested before?



National Precipitation Rank

August 2018–July 2019

Period: 1895–2019



Record
Driest
(1)

Much
Below
Average

Below
Average

Near
Average

Above
Average

Much
Above
Average

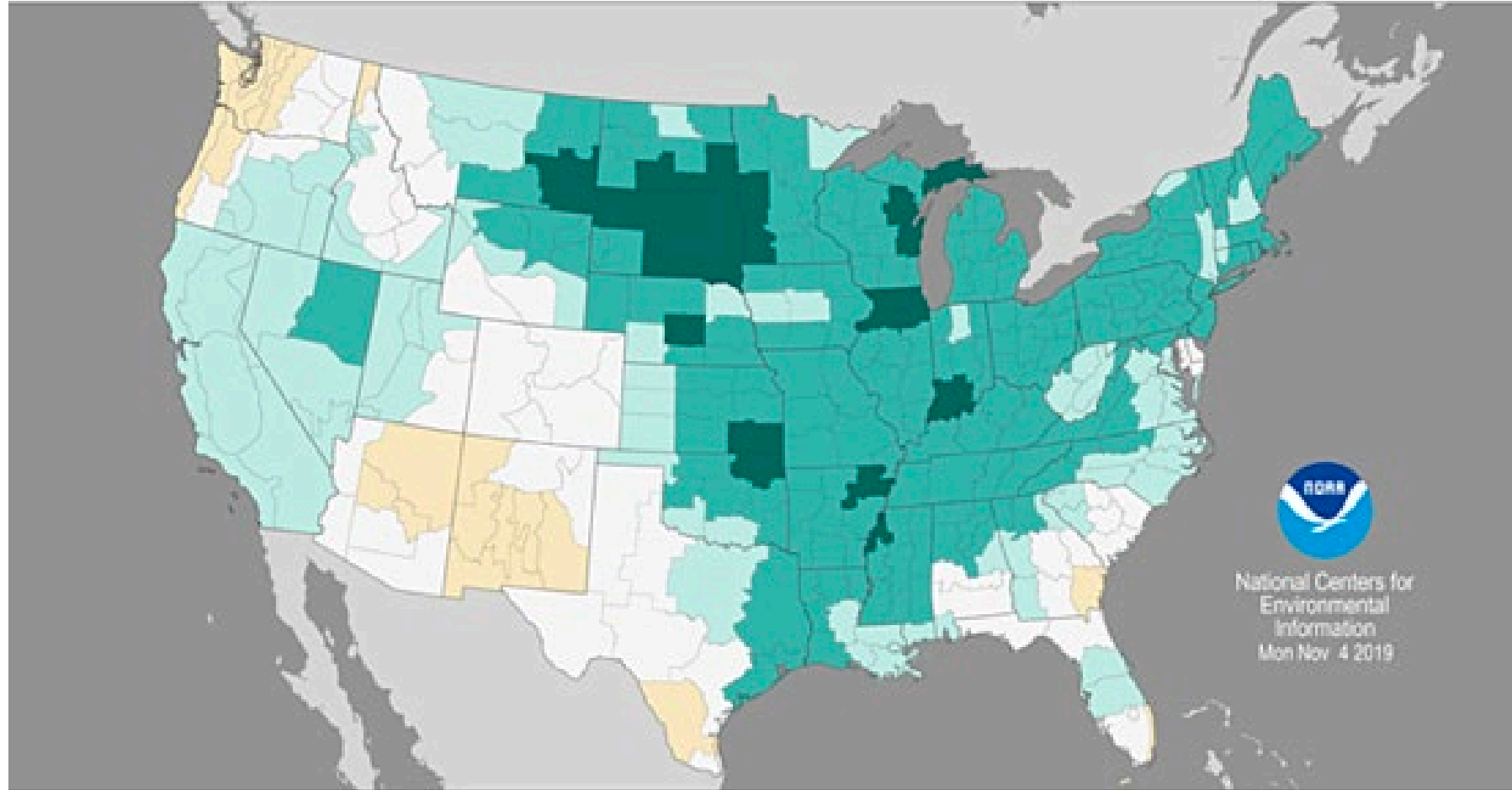
Record
Wettest
(124)



Divisional Precipitation Ranks

November 2018–October 2019

Period: 1895–2019



National Centers for
Environmental
Information
Mon Nov 4 2019



Record
Driest



Much
Below
Average



Below
Average



Near
Average



Above
Average



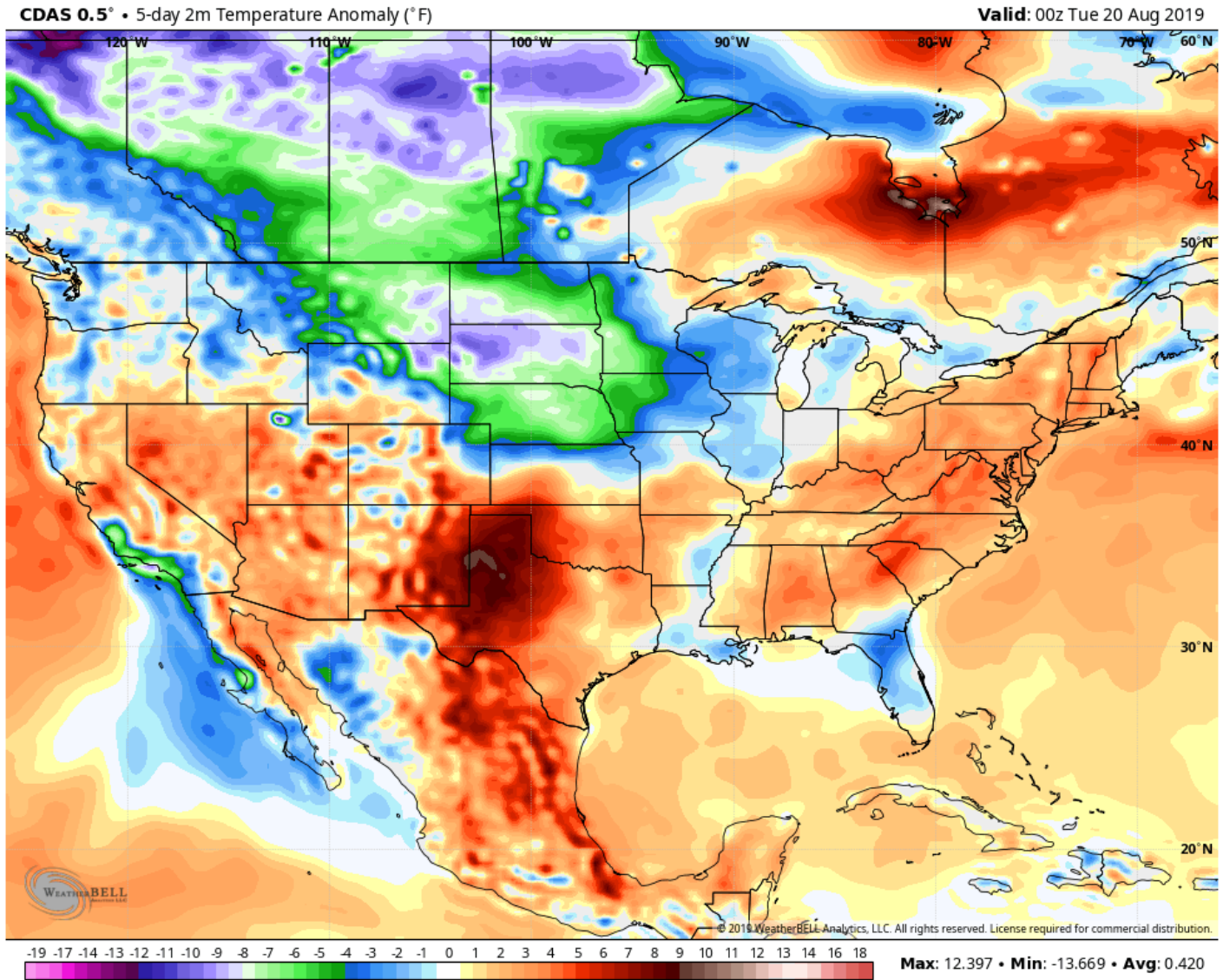
Much
Above
Average

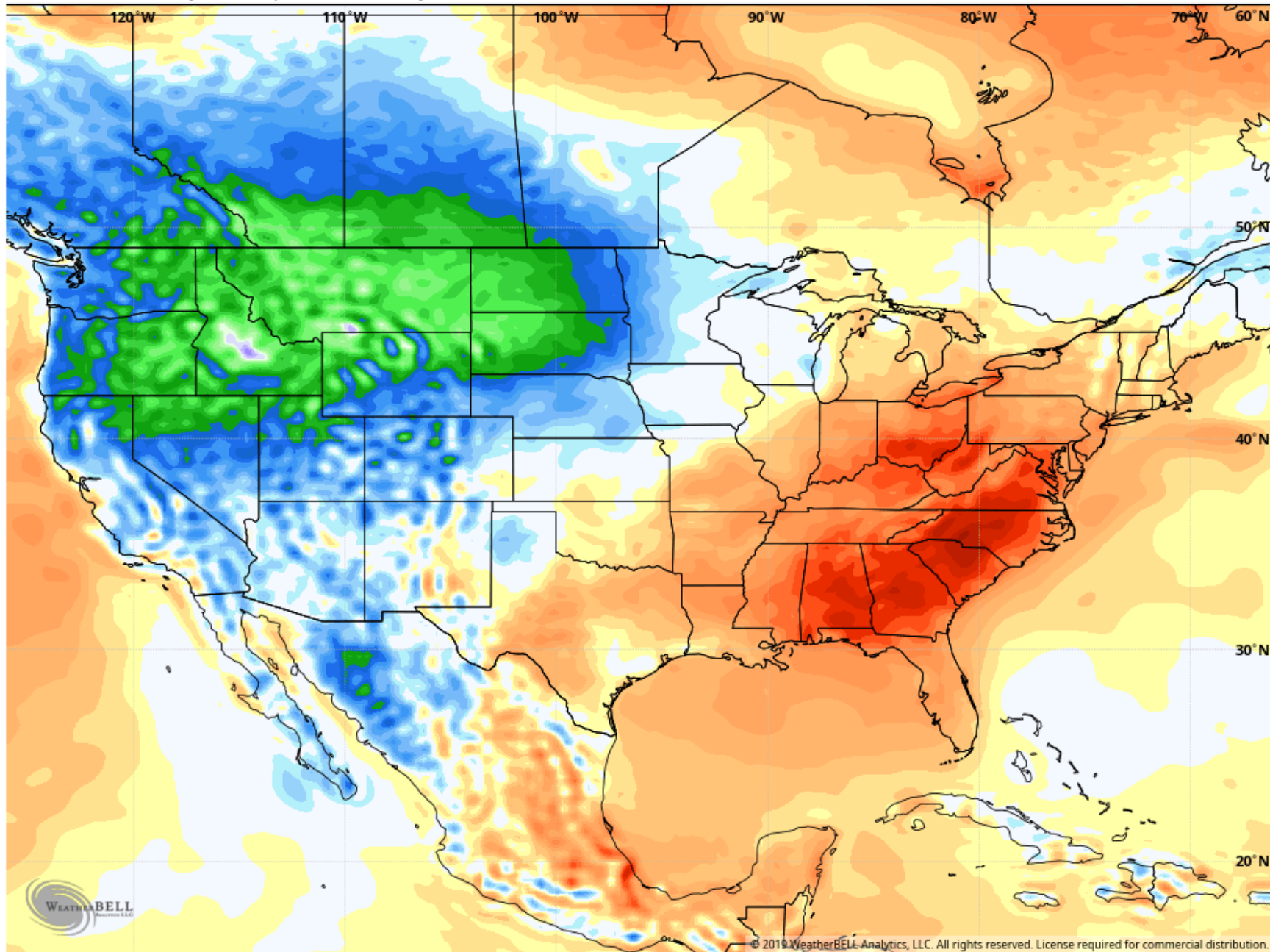


Record
Wettest

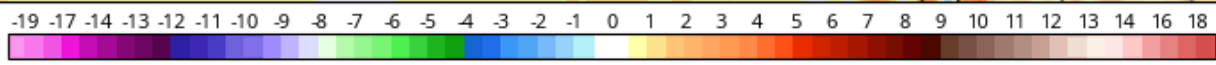


5-Day Averaged Temperature Anomaly – August 20th to November 1st 2020



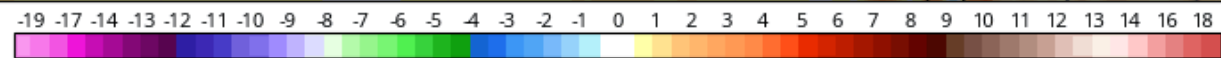
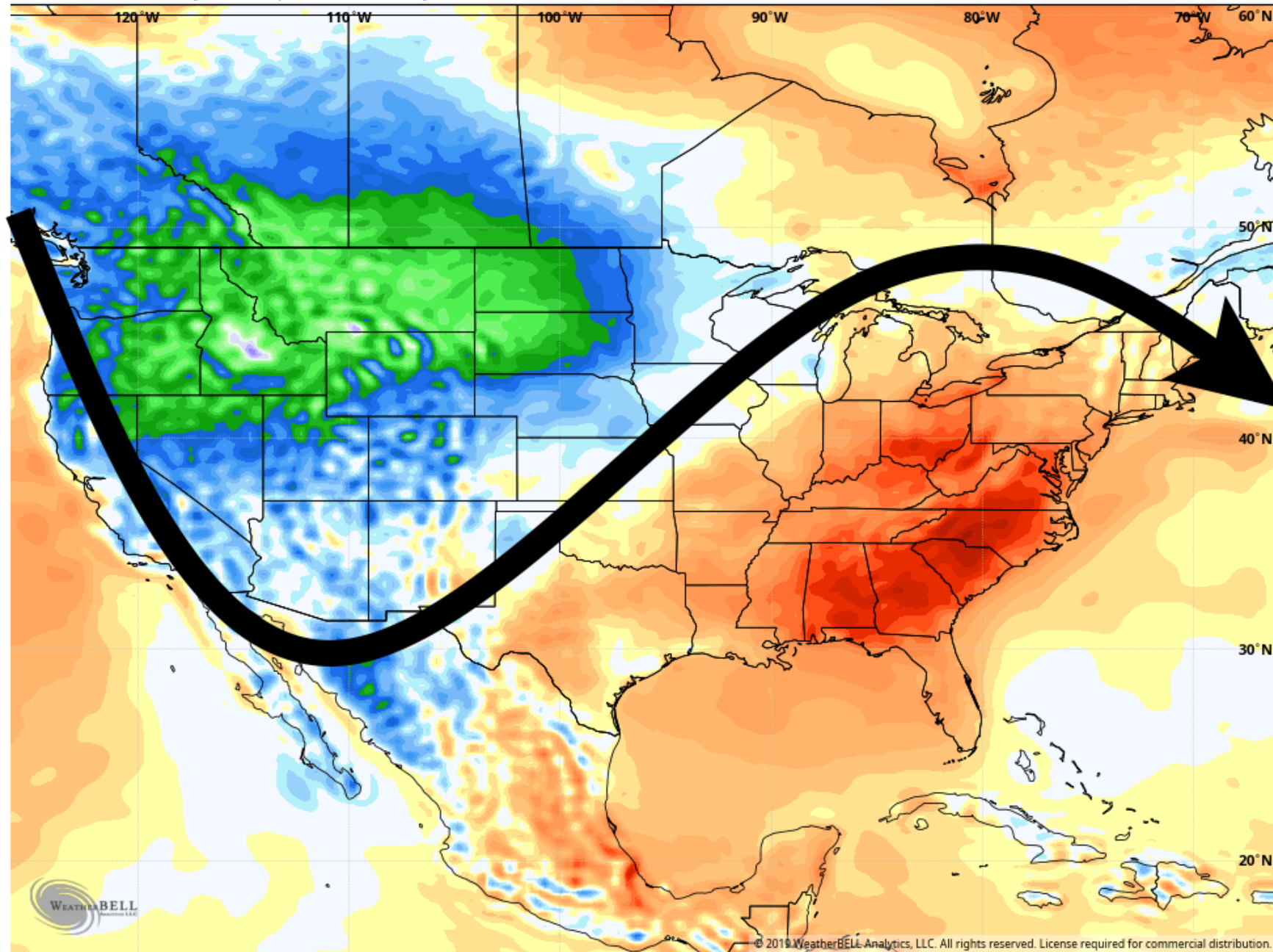


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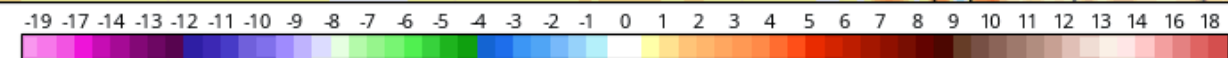
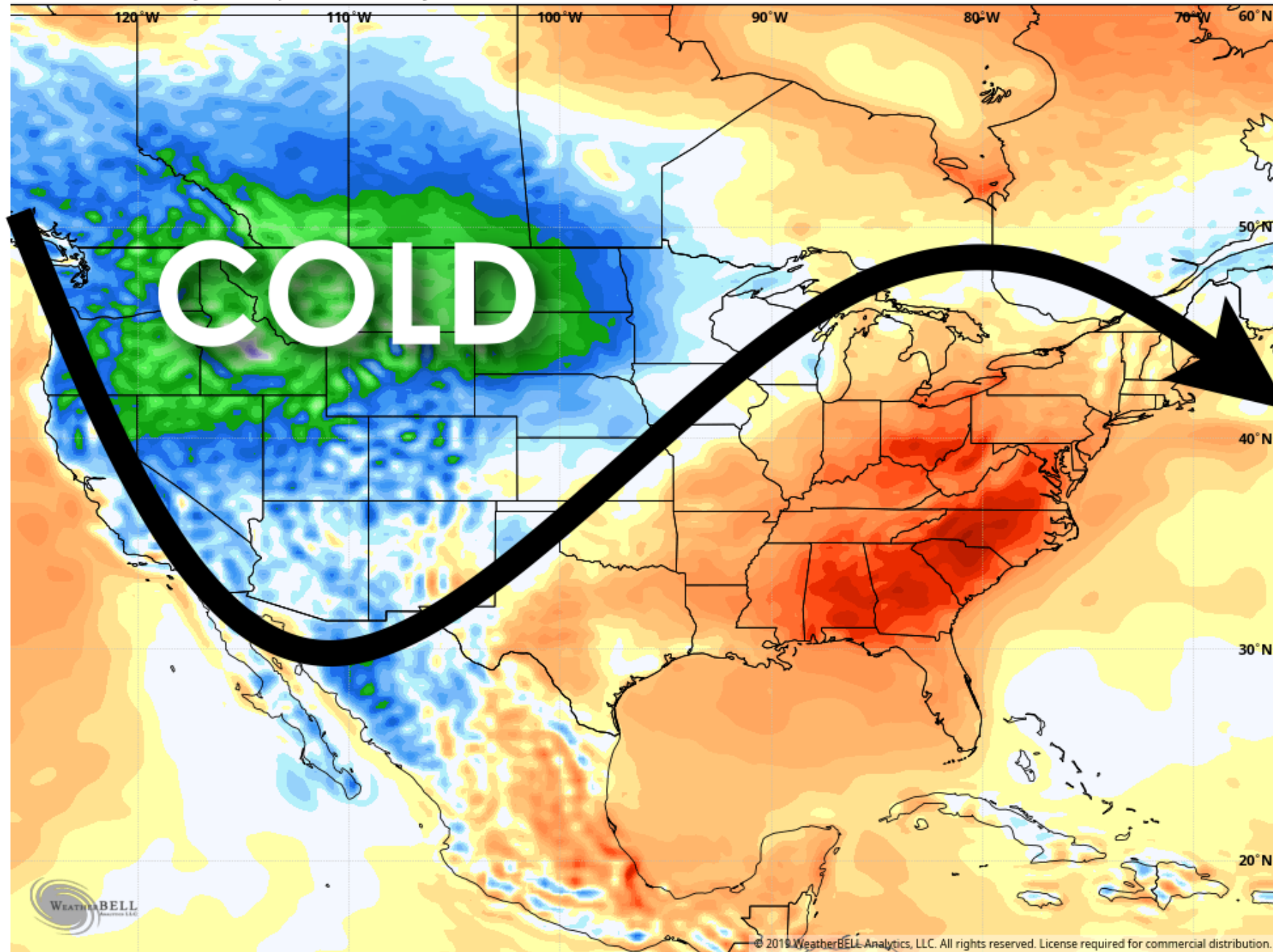
Max: 6.632 • Min: -9.340 • Avg: 0.412





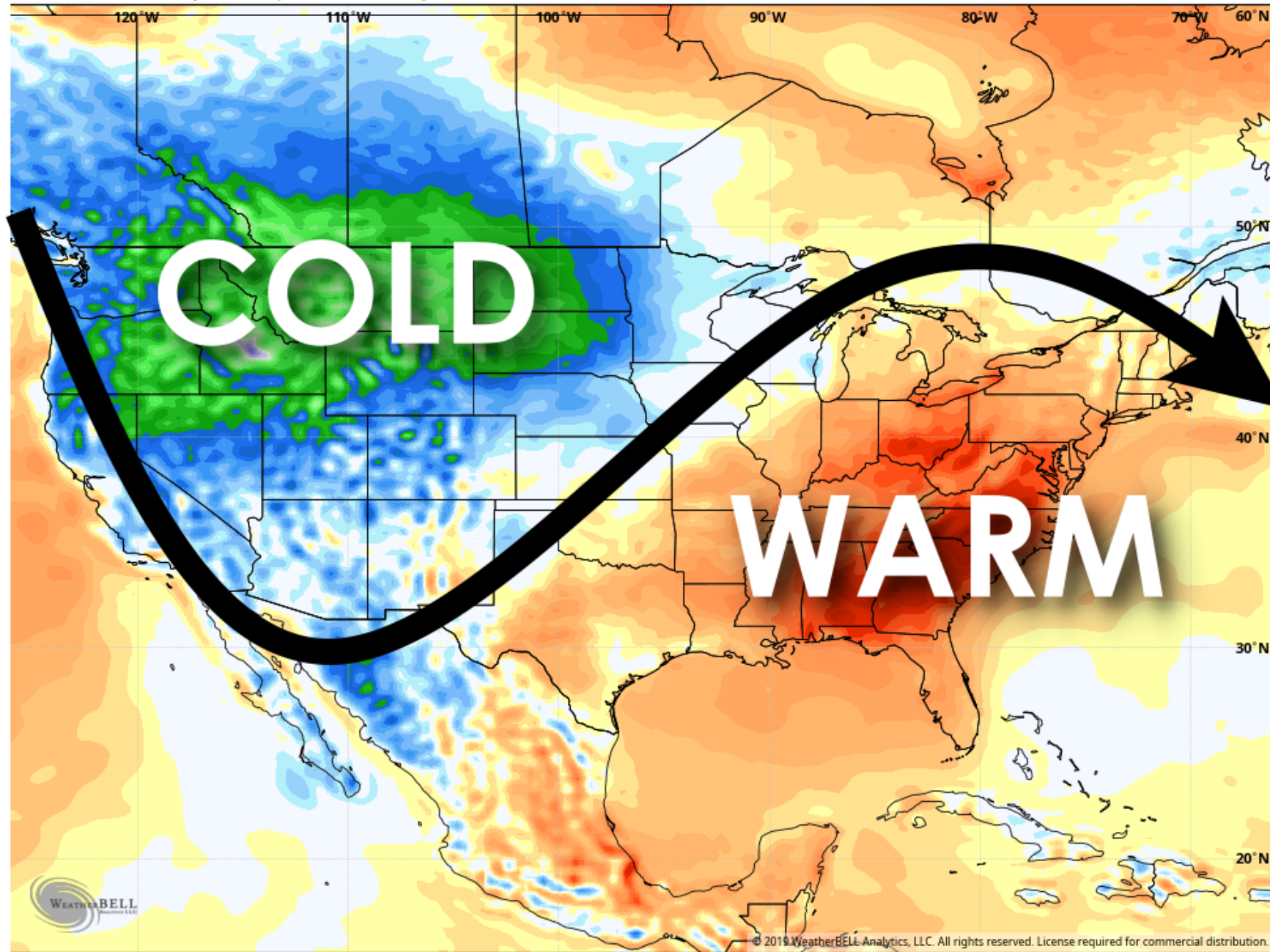
Max: 6.632 • Min: -9.340 • Avg: 0.412





Max: 6.632 • Min: -9.340 • Avg: 0.412



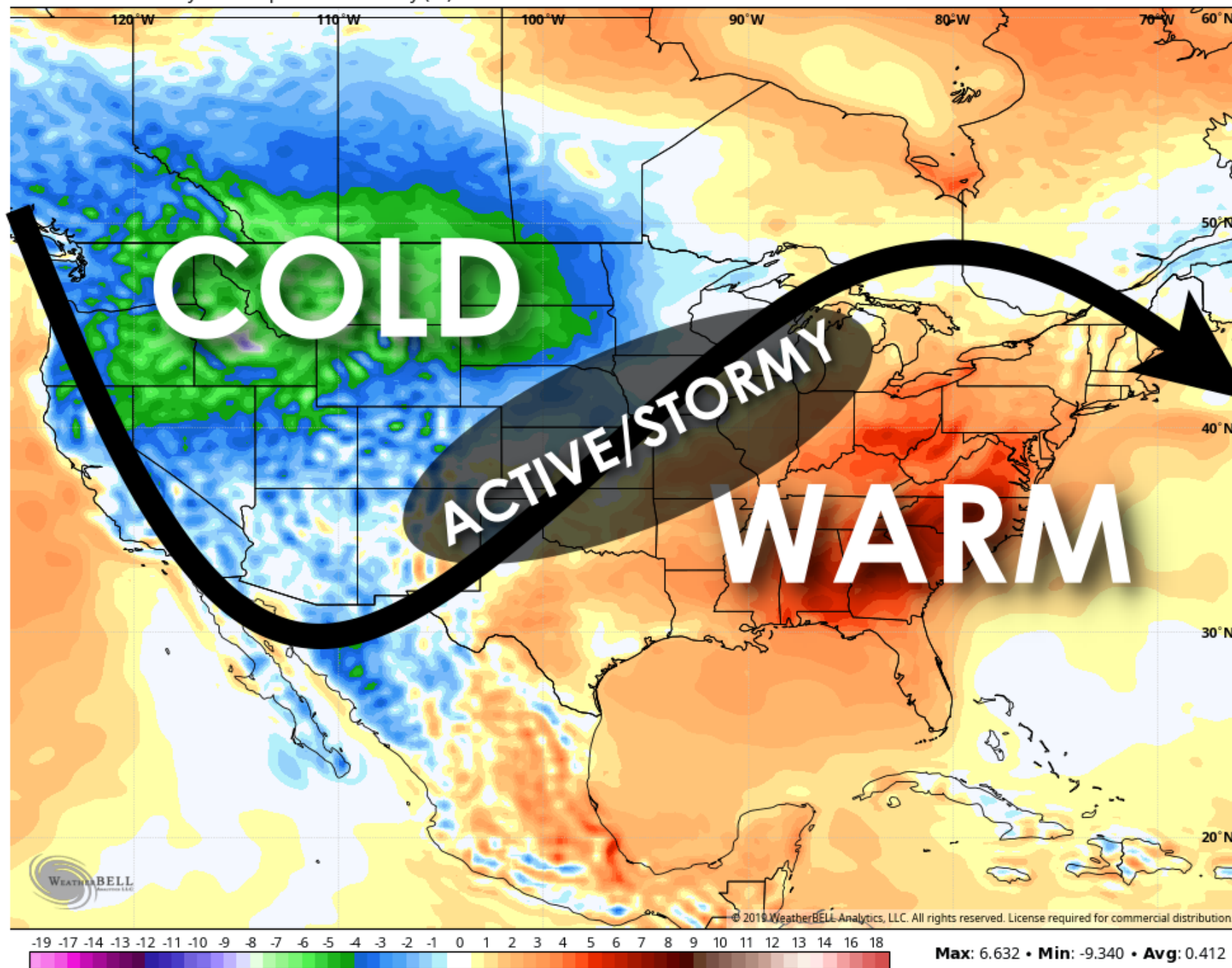


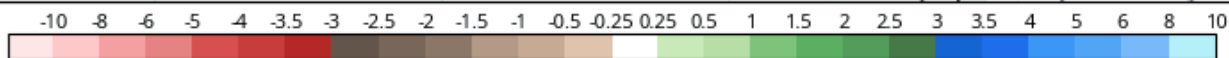
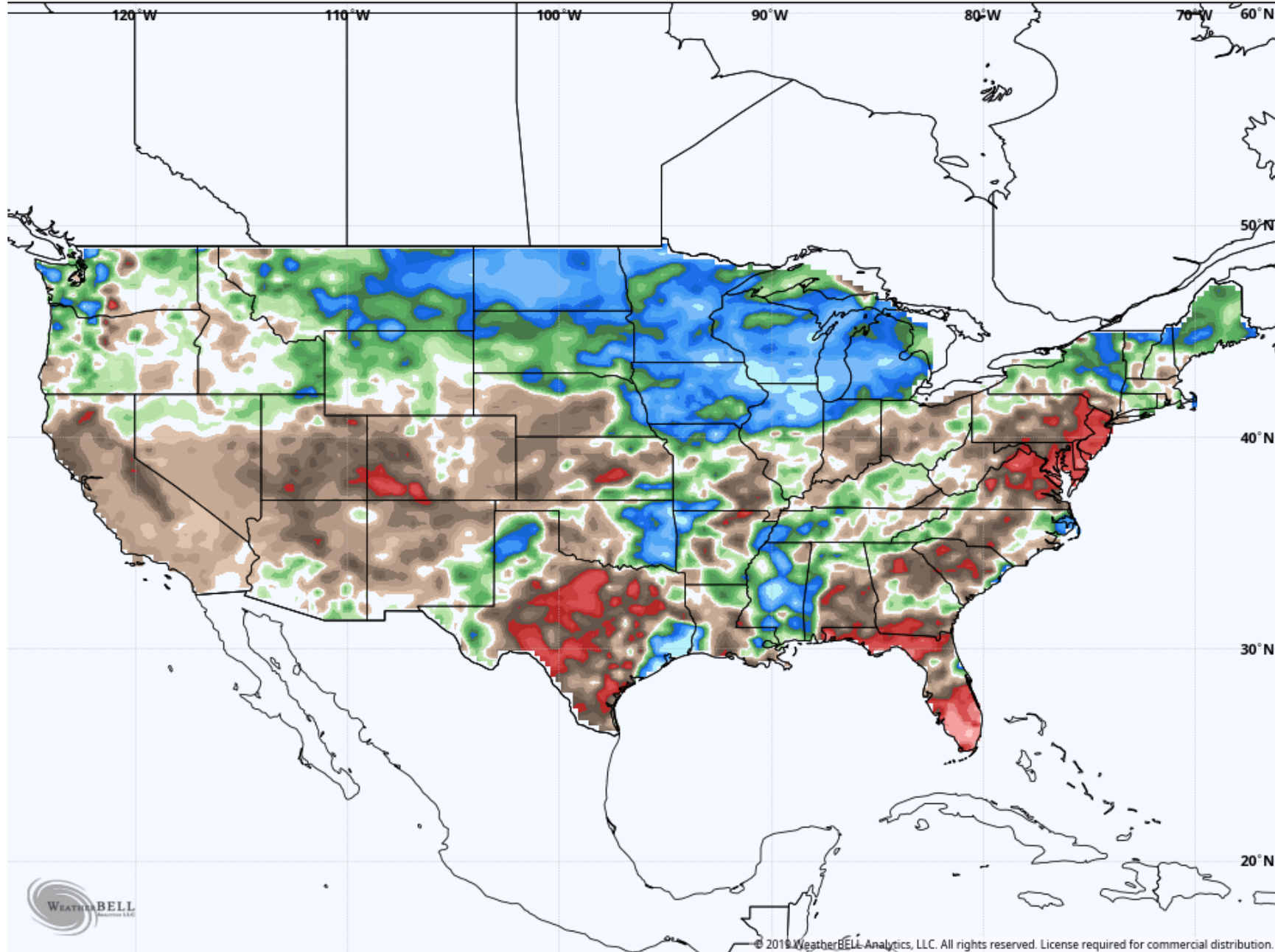
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-19 -17 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 18

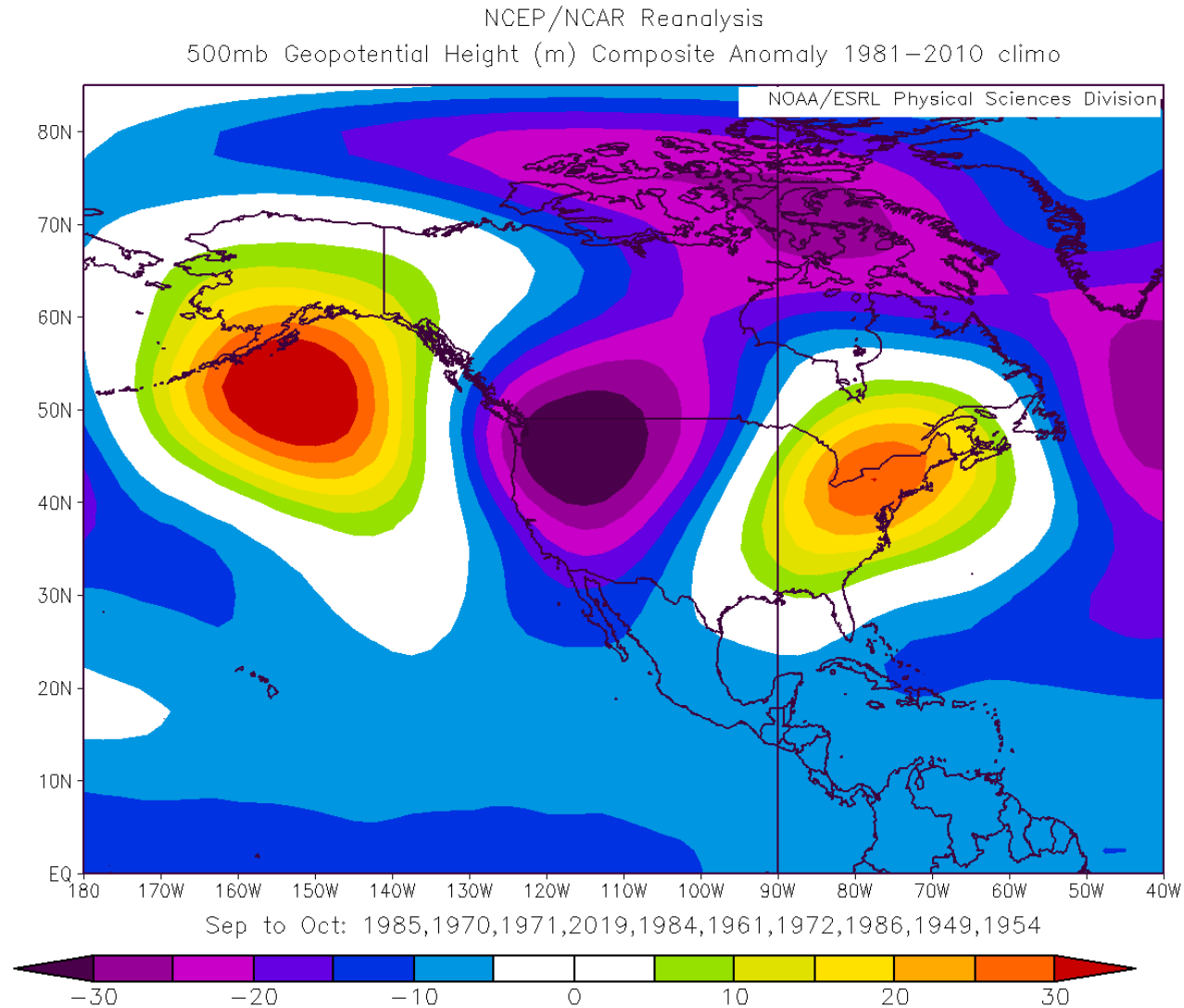
Max: 6.632 • Min: -9.340 • Avg: 0.412



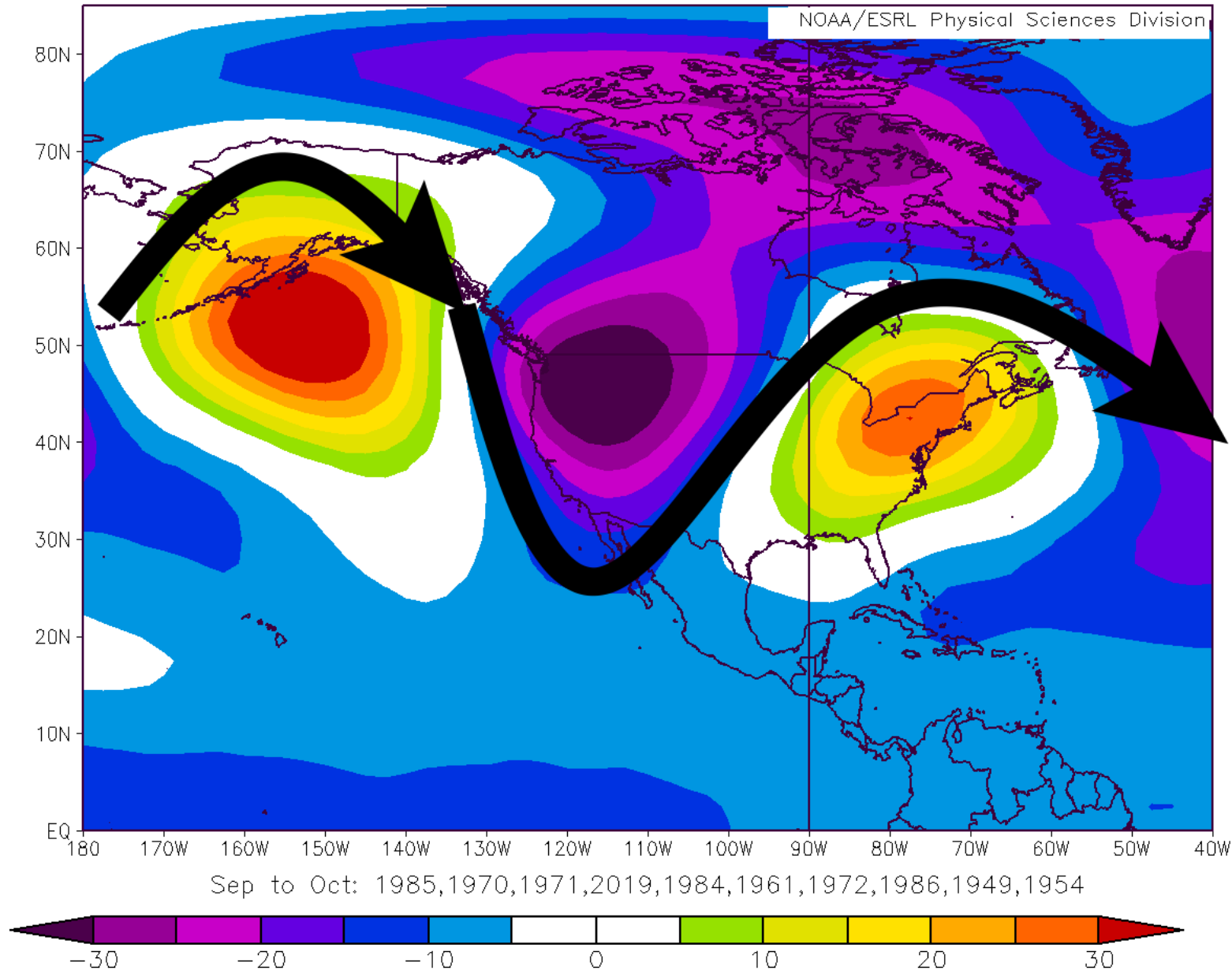




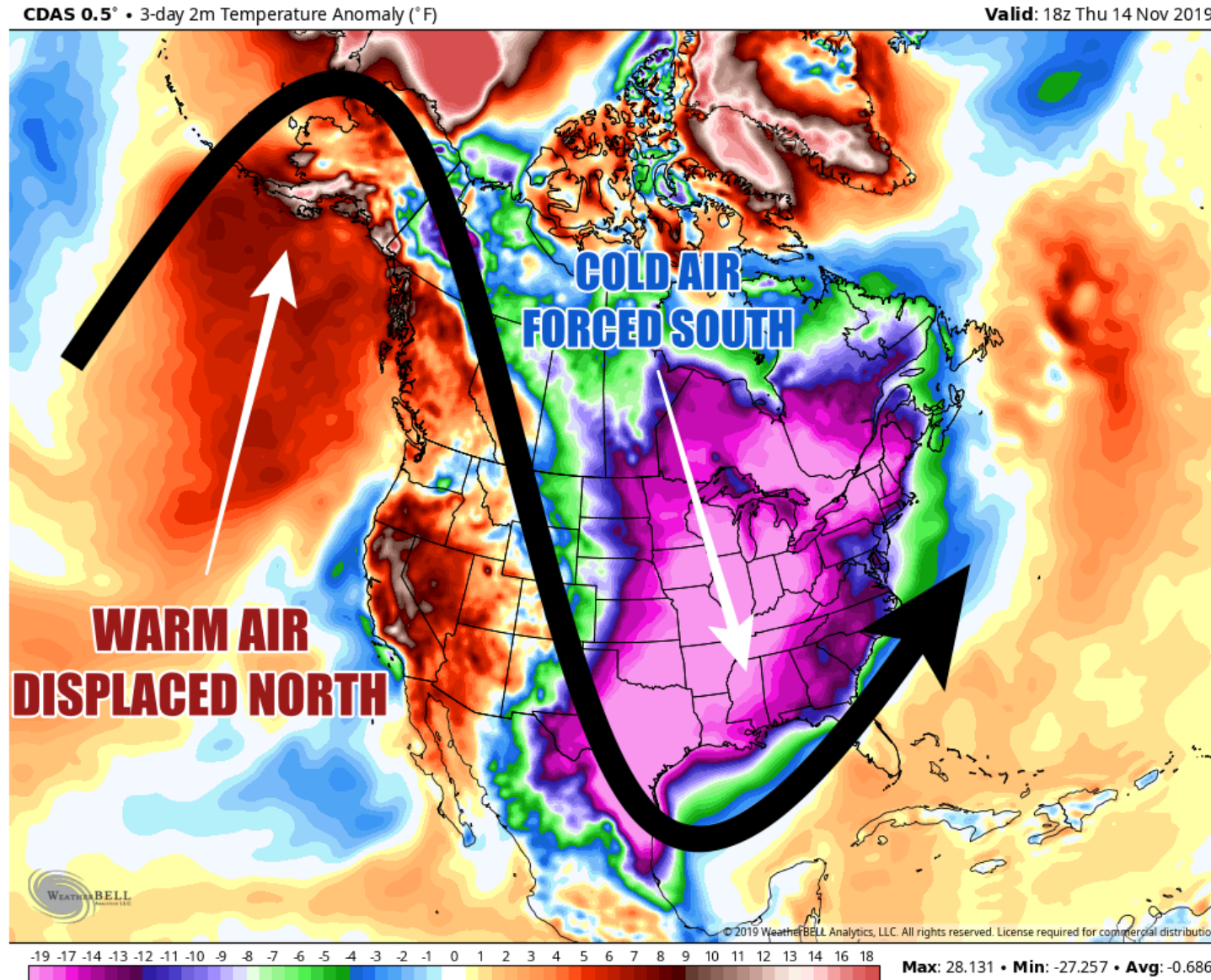
2019 – Sept/Oct the 4th coolest on record



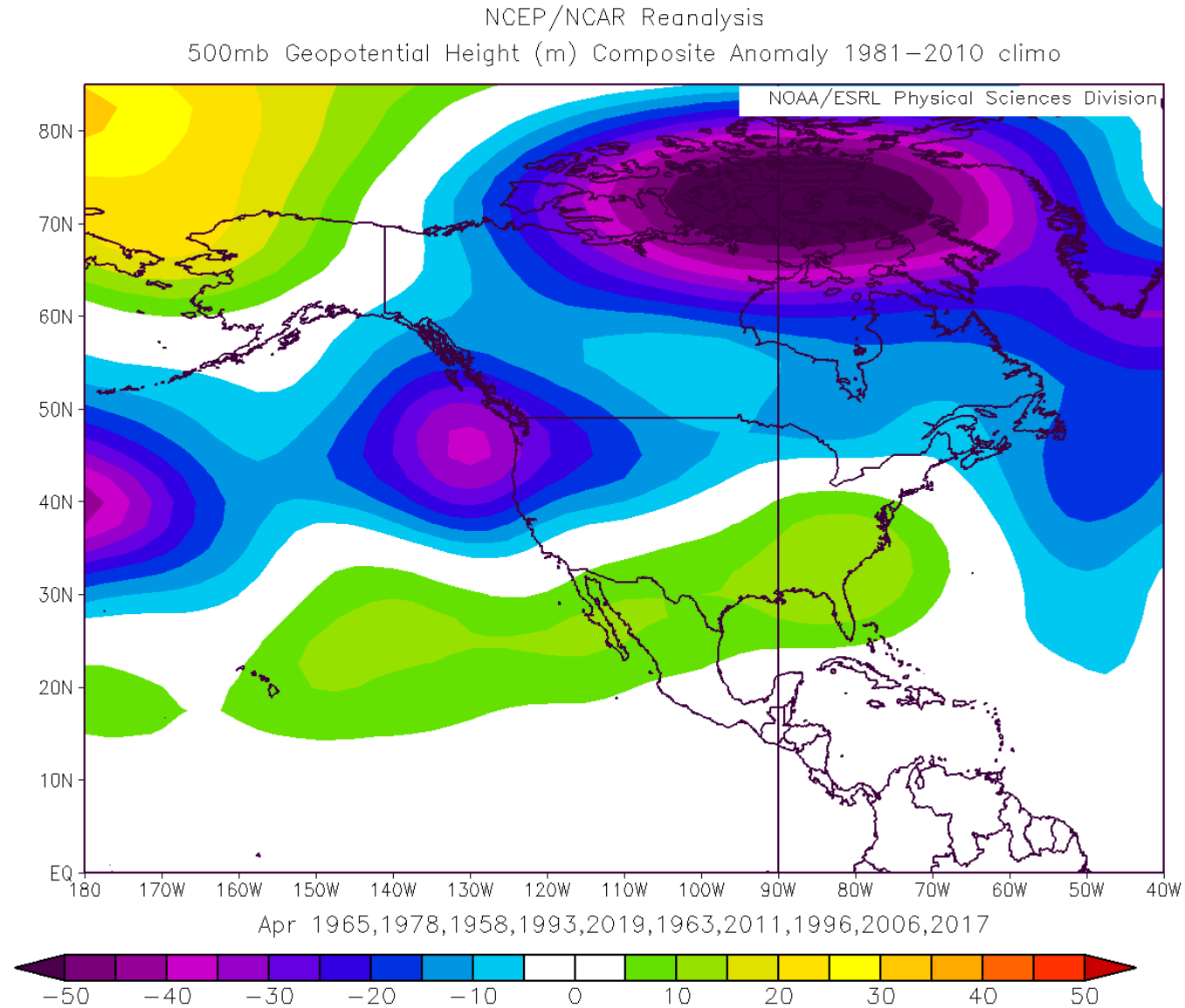
NCEP/NCAR Reanalysis
500mb Geopotential Height (m) Composite Anomaly 1981–2010 climo



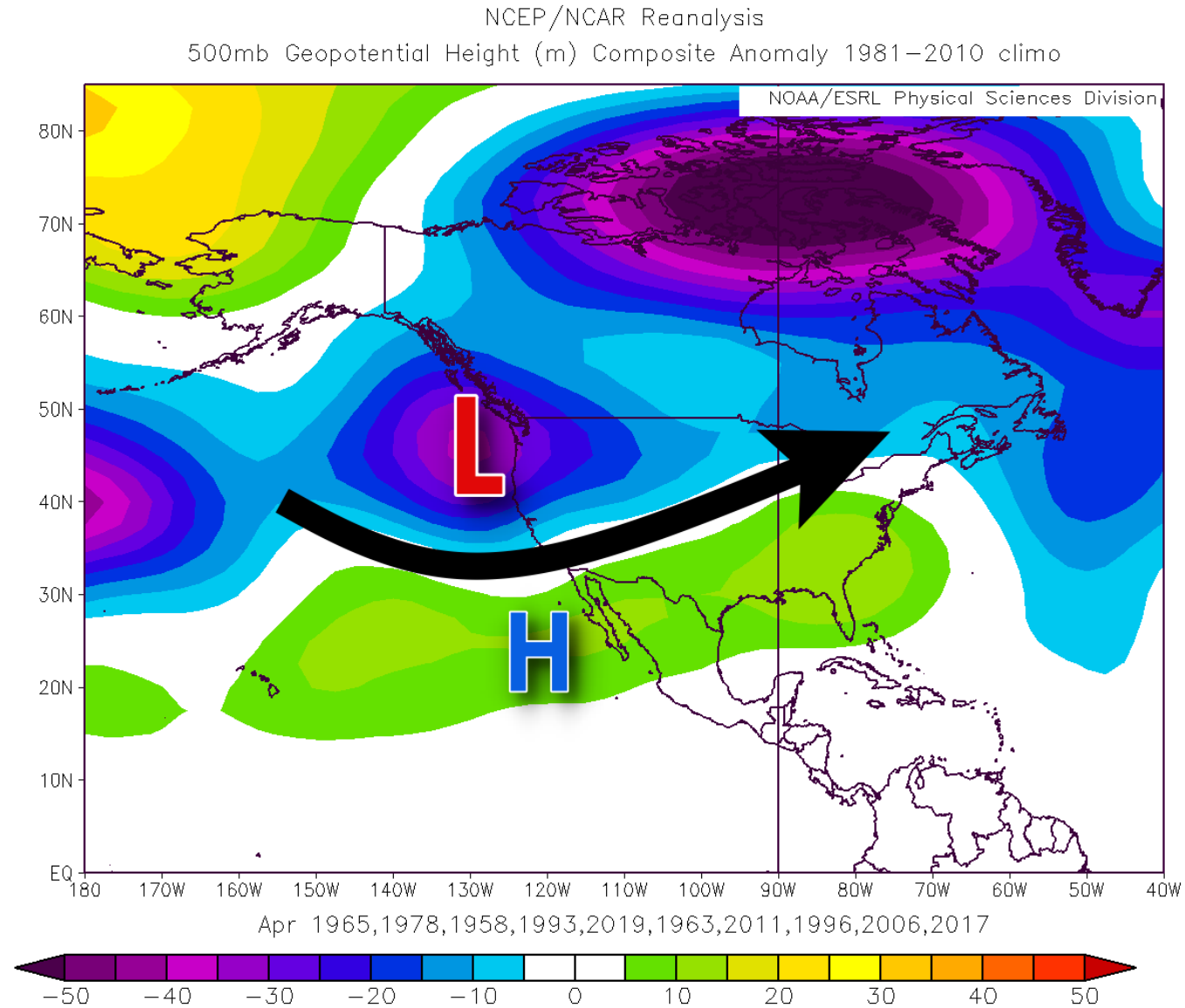
“It’s warmer in Anchorage, Alaska than XYZ, Illinois today!



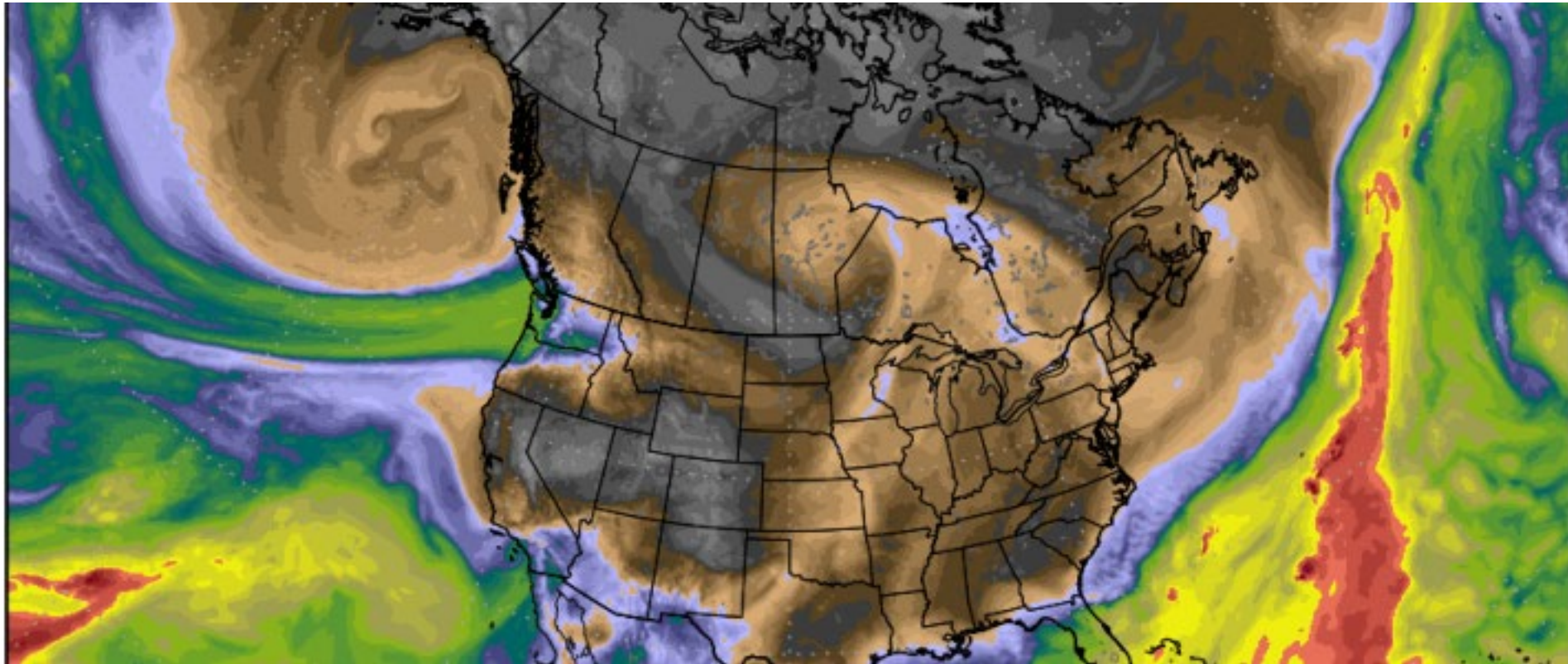
Spring Jet Stream Pattern to Avoid



Spring Jet Stream Pattern to Avoid

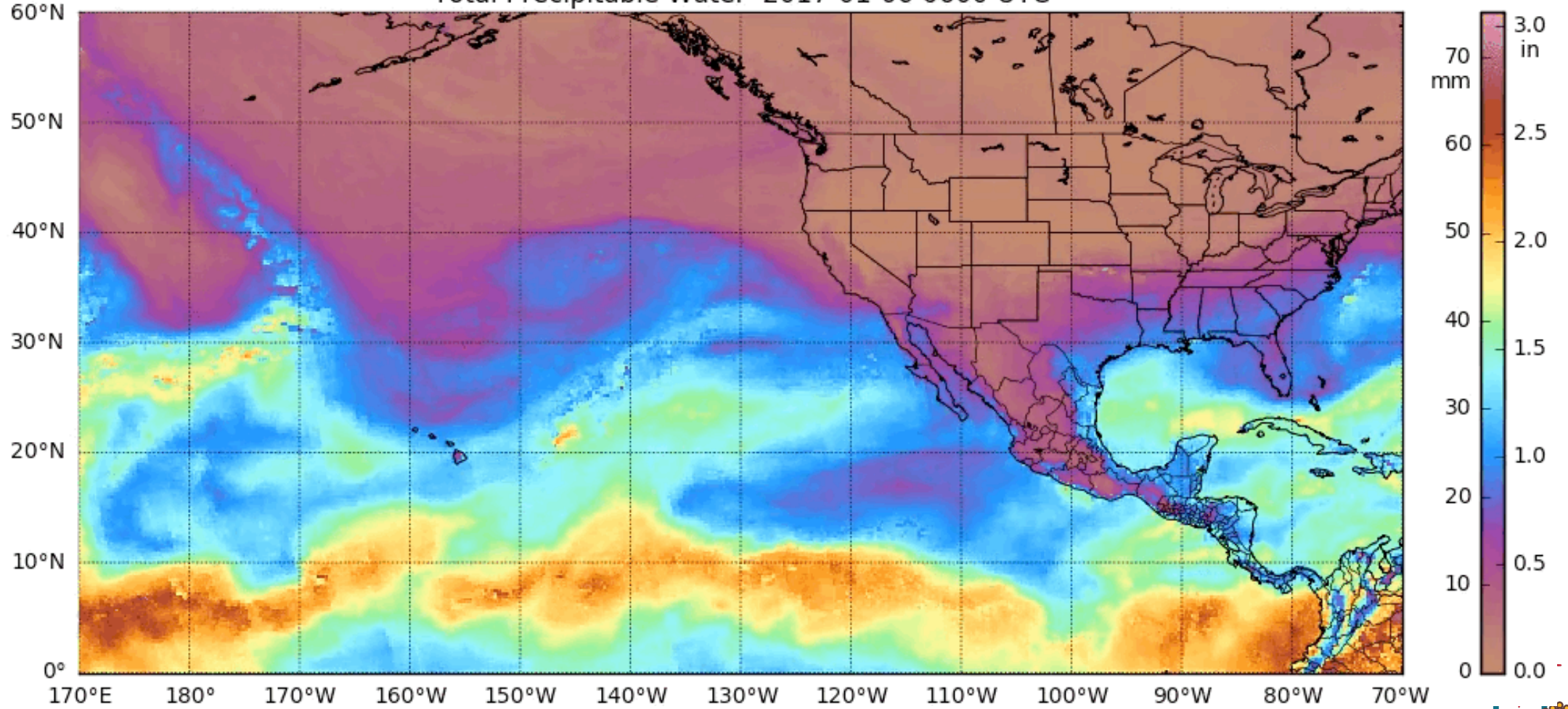


Spring Jet Stream Pattern to Avoid



Atmospheric River

Total Precipitable Water 2017-01-06 0600 UTC



ATMOSPHERIC RIVER

TRANSPORT OF WATER VAPOR

SUPPLIED BY TROPICAL MOISTURE

LARGEST RIVERS OF FRESH WATER



KOIN 6 WEATHER

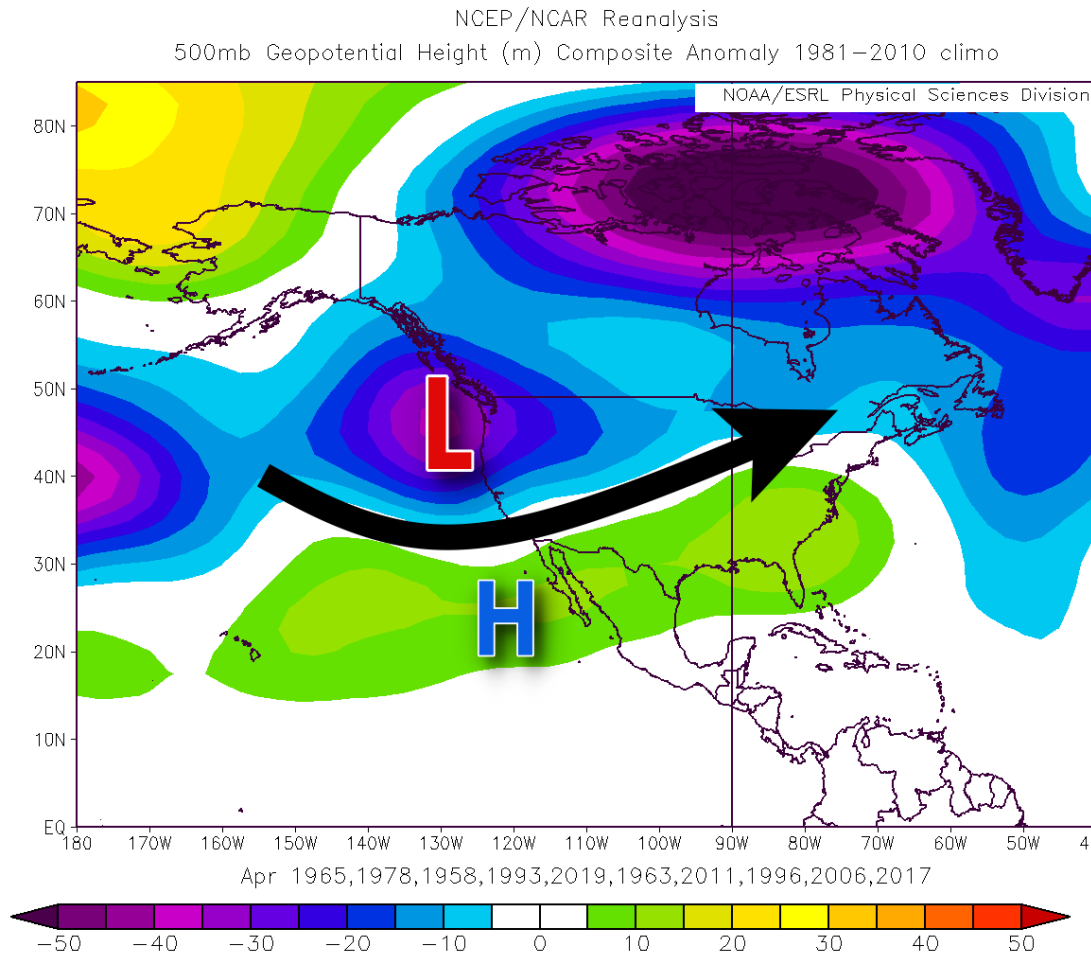
ATMOSPHERIC RIVER

250 - 375 MILES WIDE

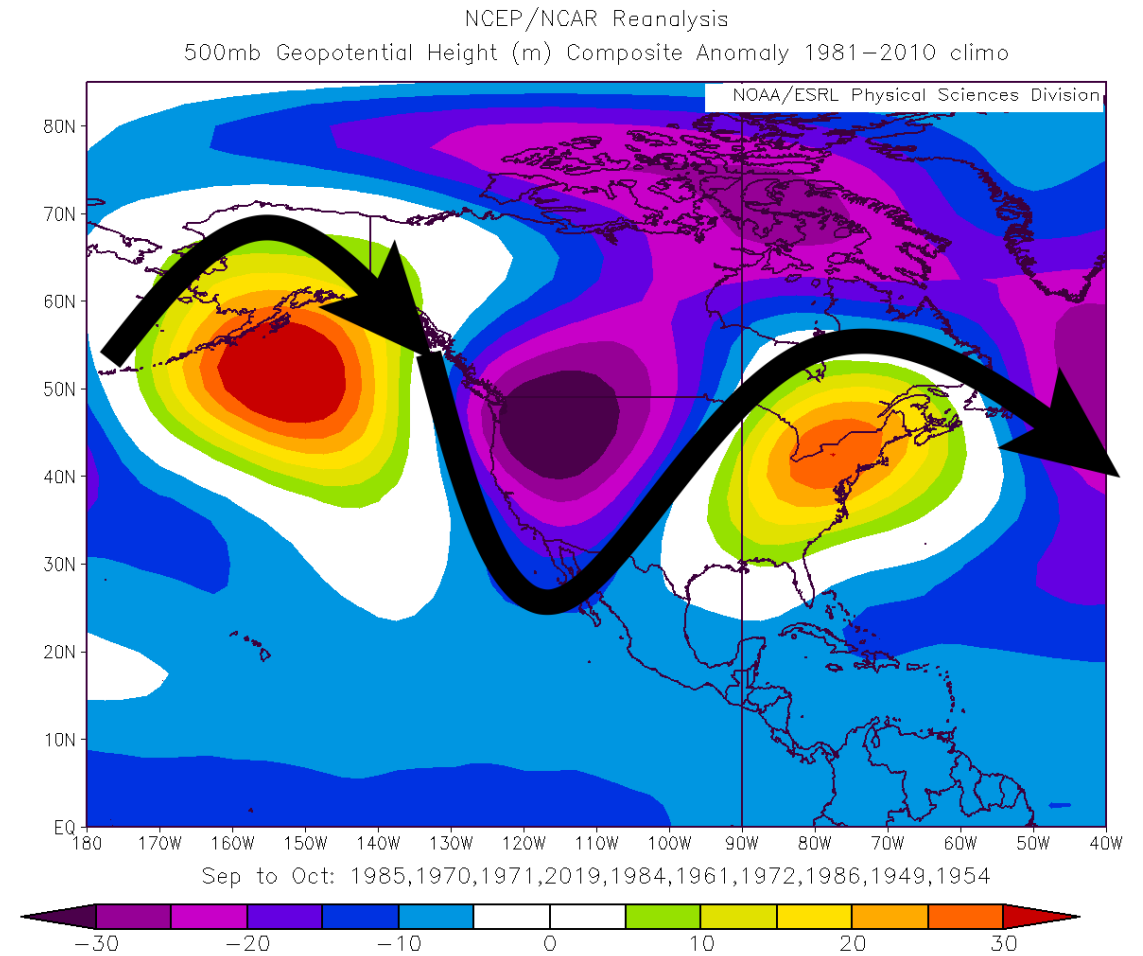
"PINEAPPLE EXPRESS"

30-50% WEST COAST PRECIP.

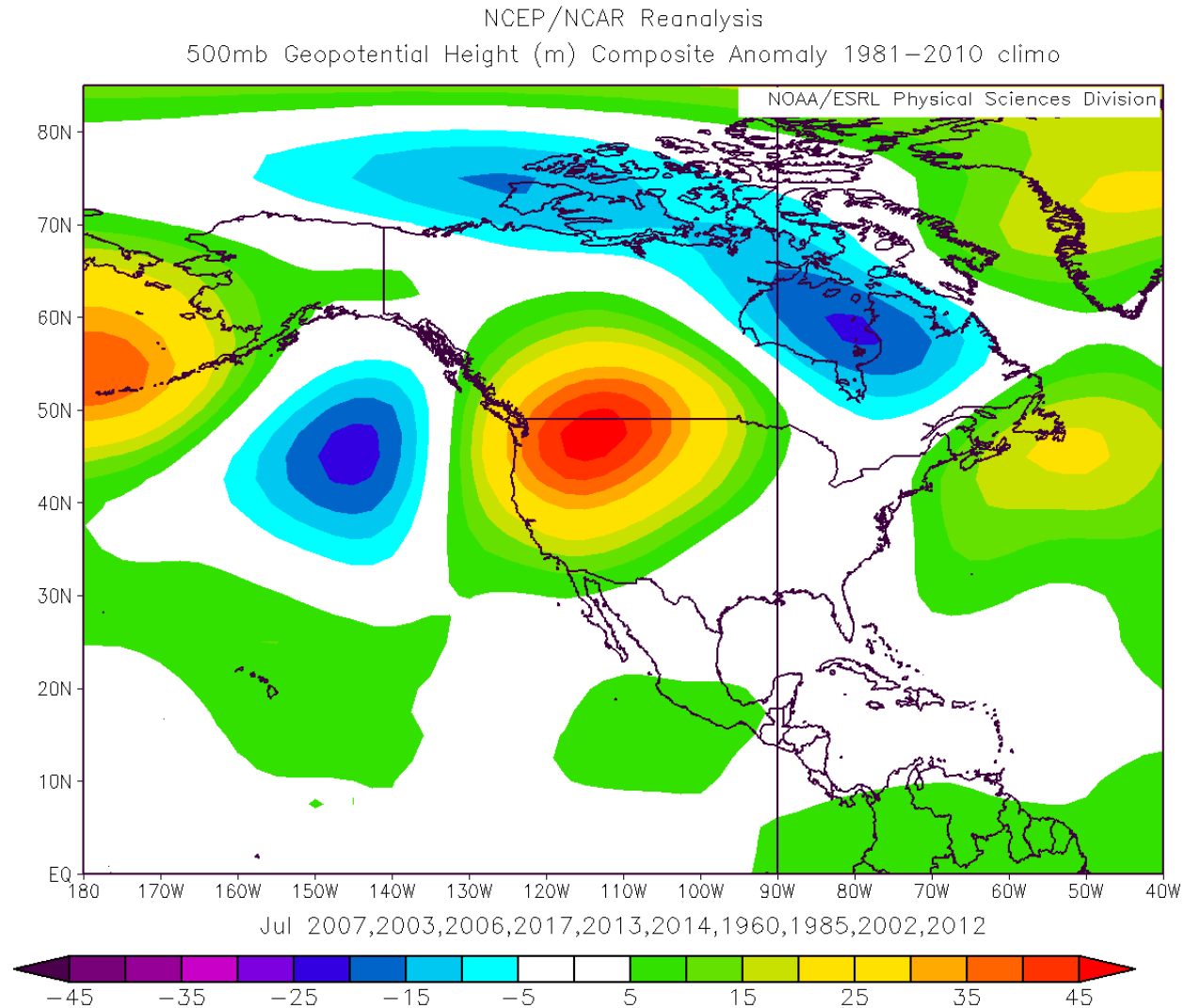
Cold / Rainy Spring



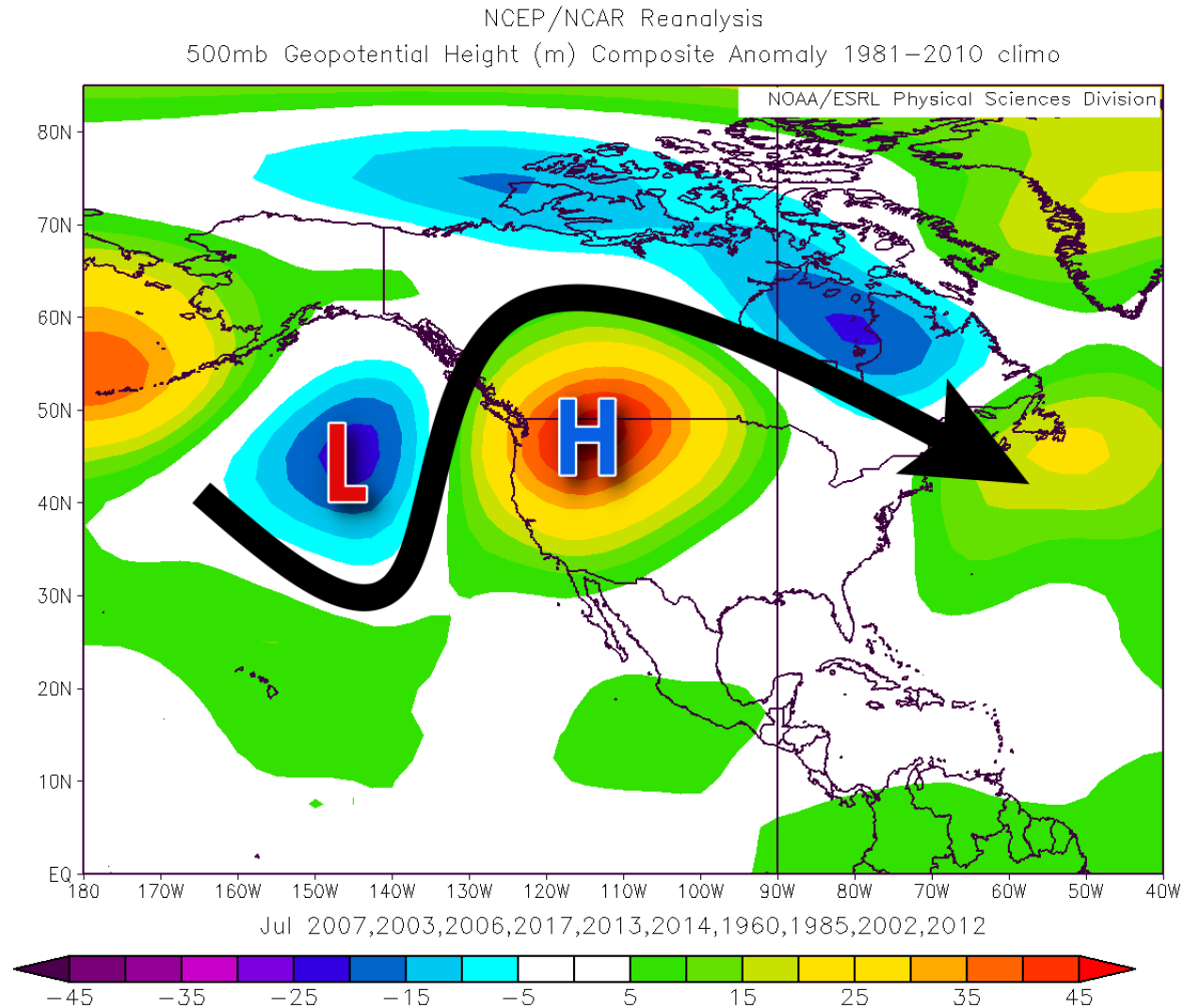
Cold Fall / Early Frost



Summer Heat – Where is the ridge?

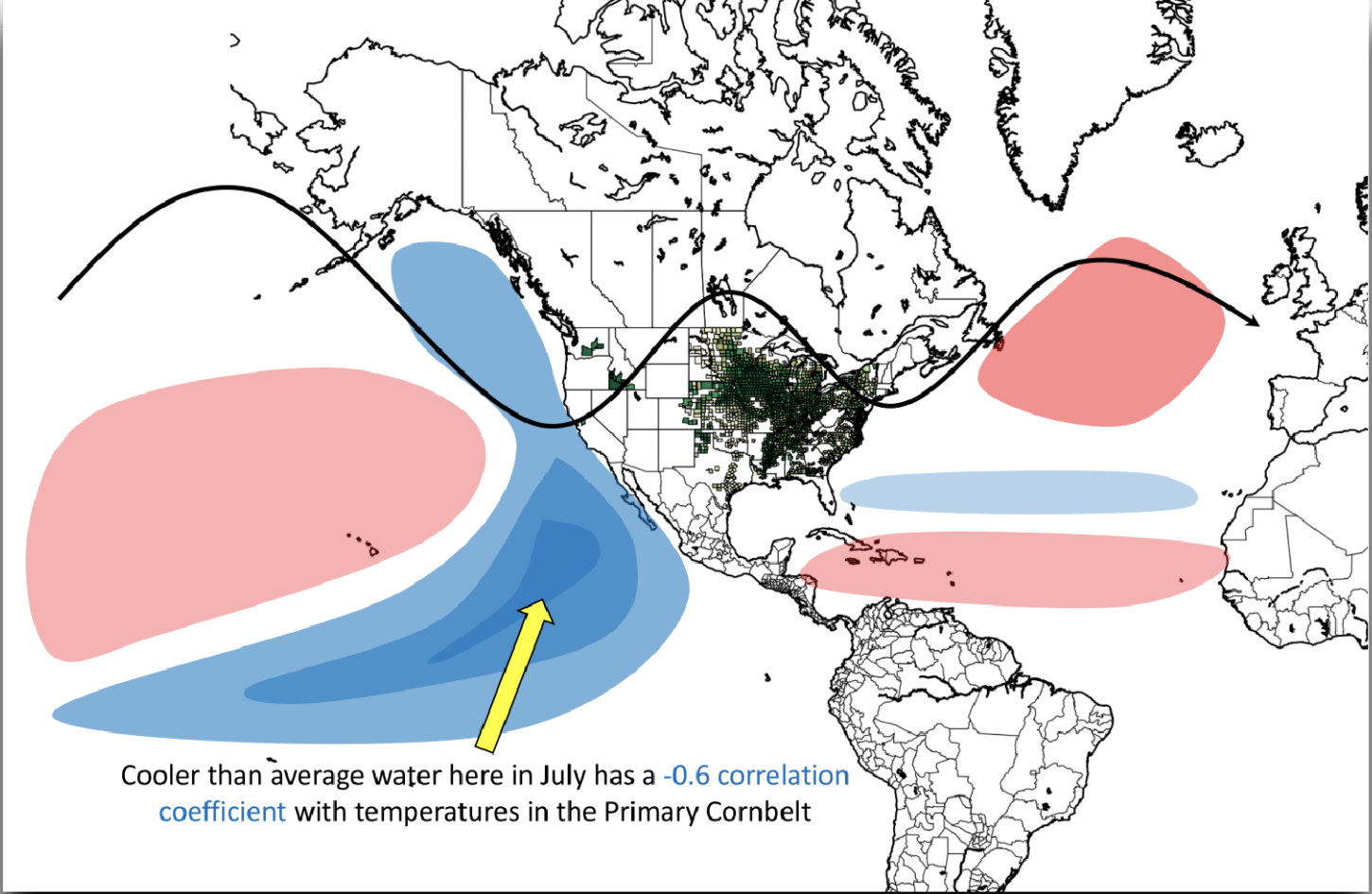


Summer Heat – Where is the ridge?



Are their long term predictors for hot/dry July weather?

70-year analysis

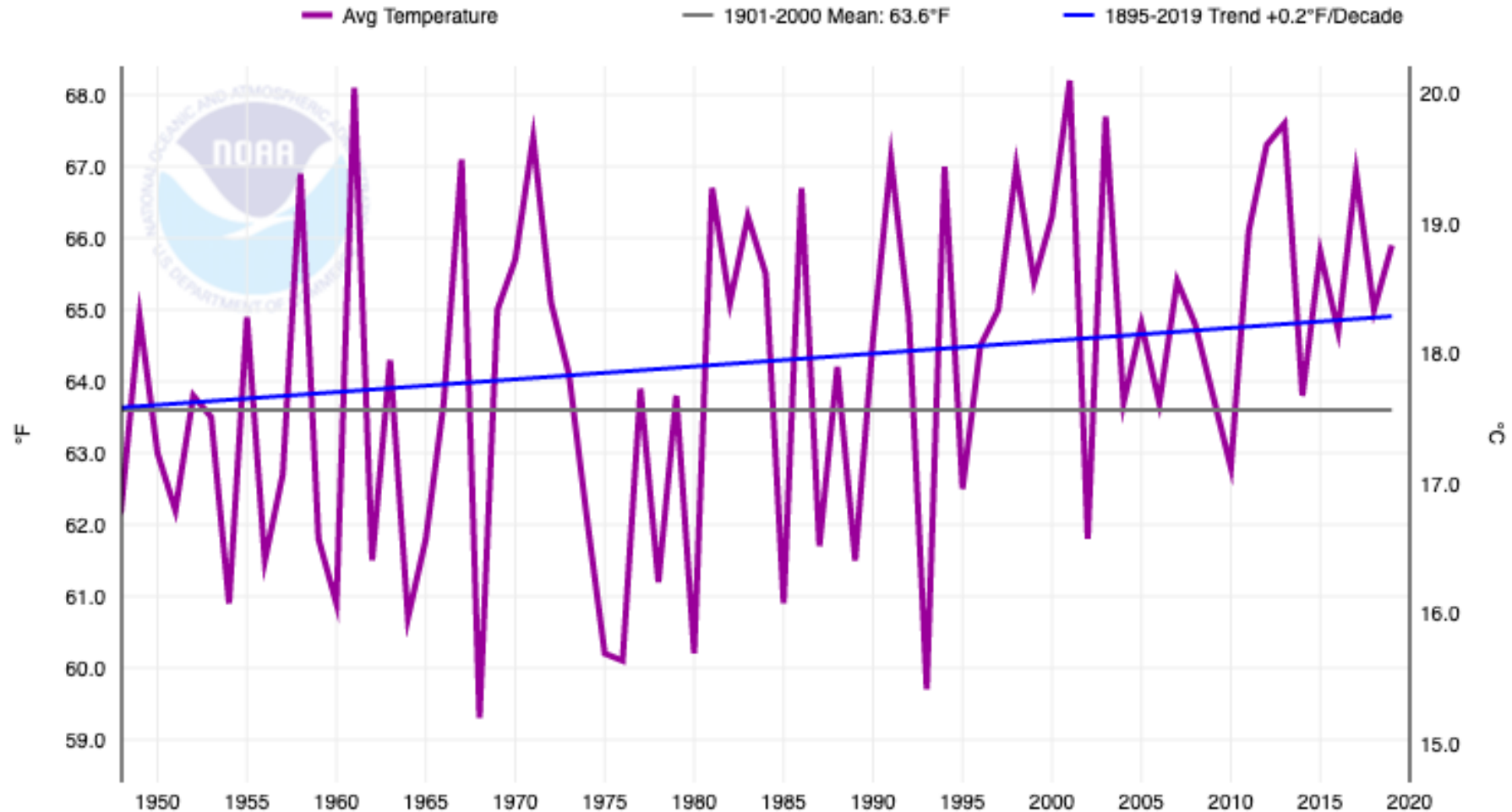


X



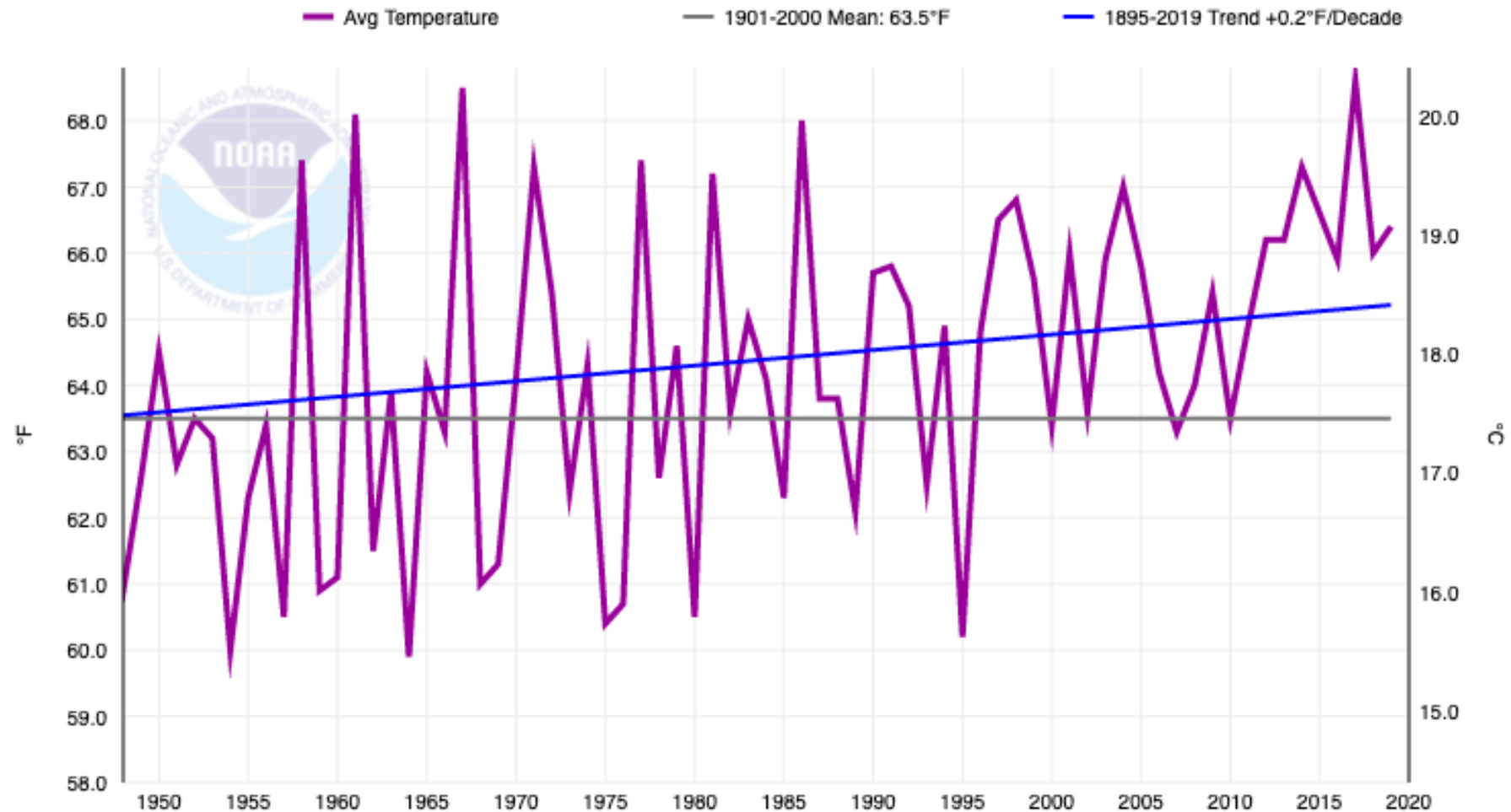
What's the trend? Warmer summers.

Idaho, Average Temperature, August

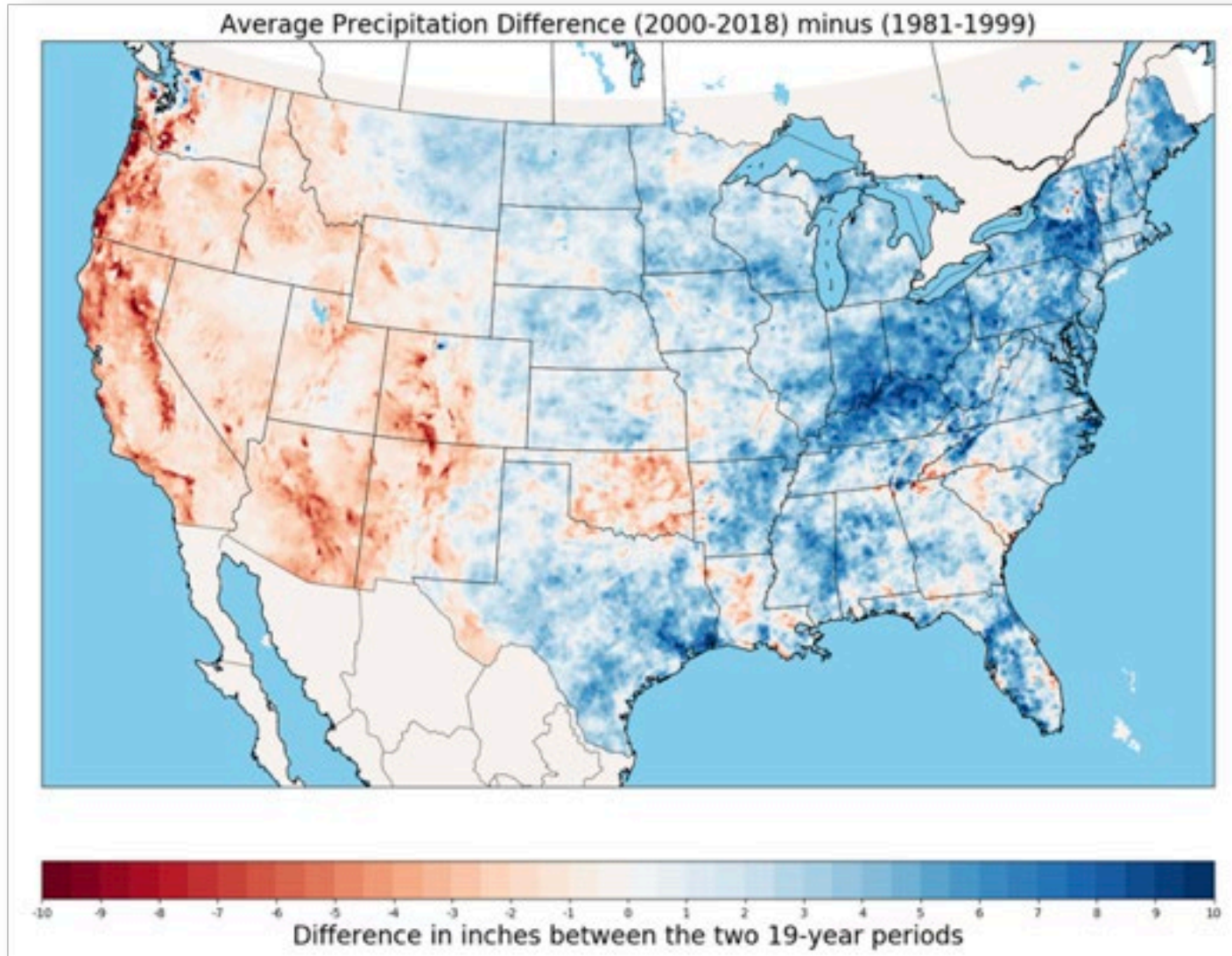


What's the trend? Warmer summers.

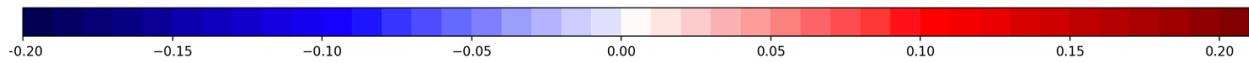
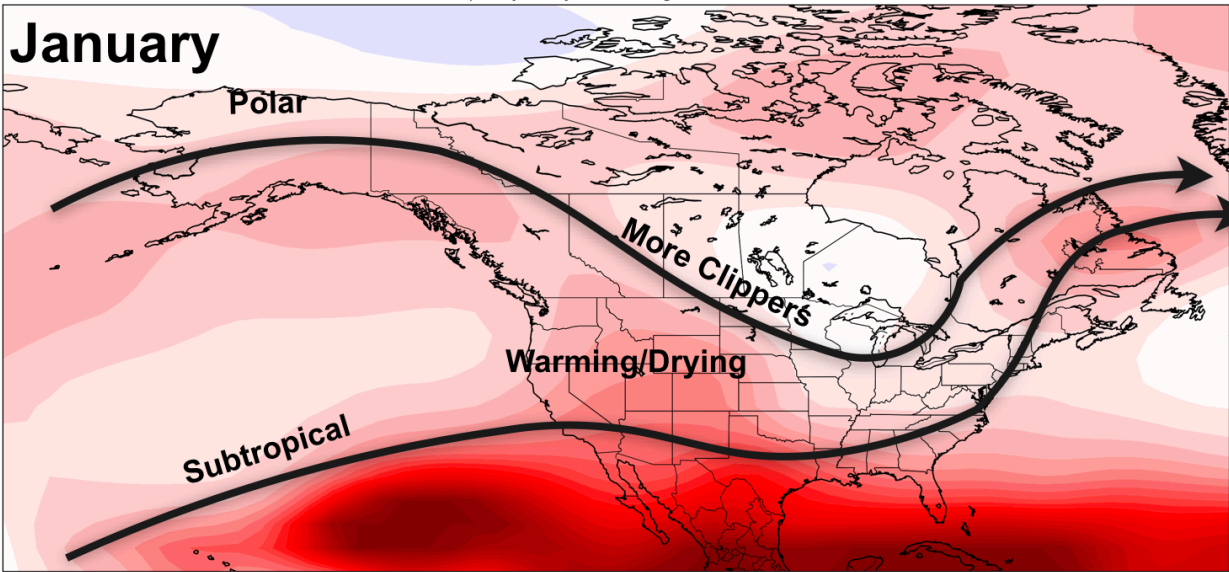
Washington, Average Temperature, August



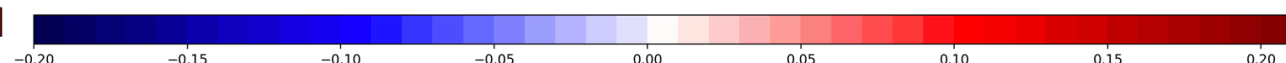
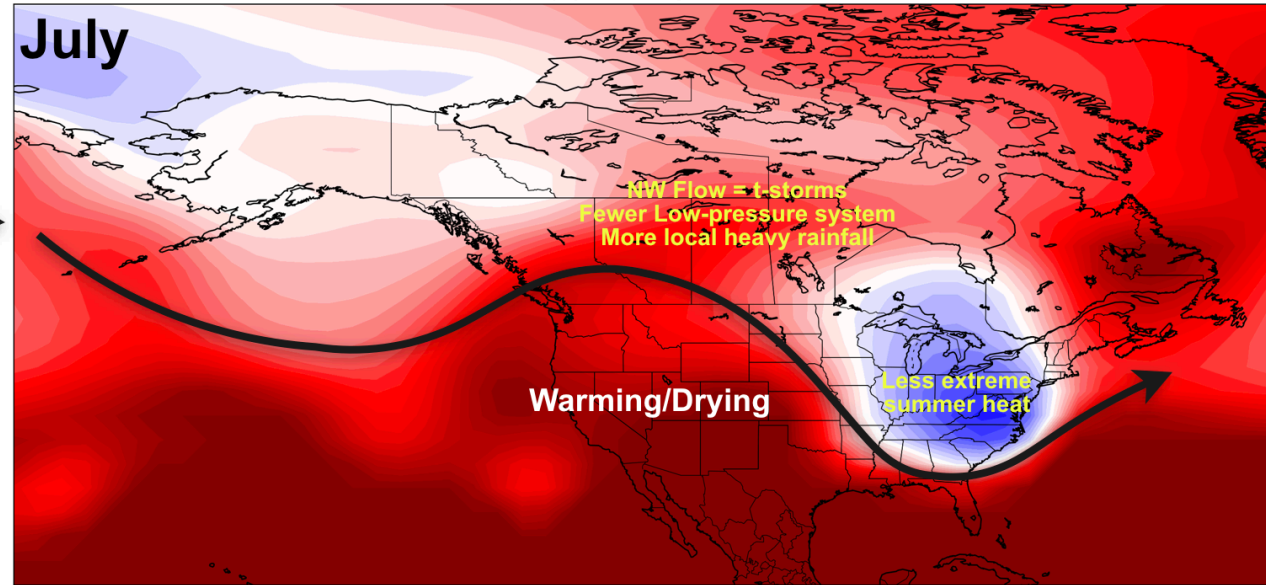
What's the trend? Dry west, rainy midwest



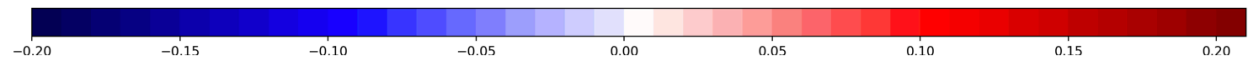
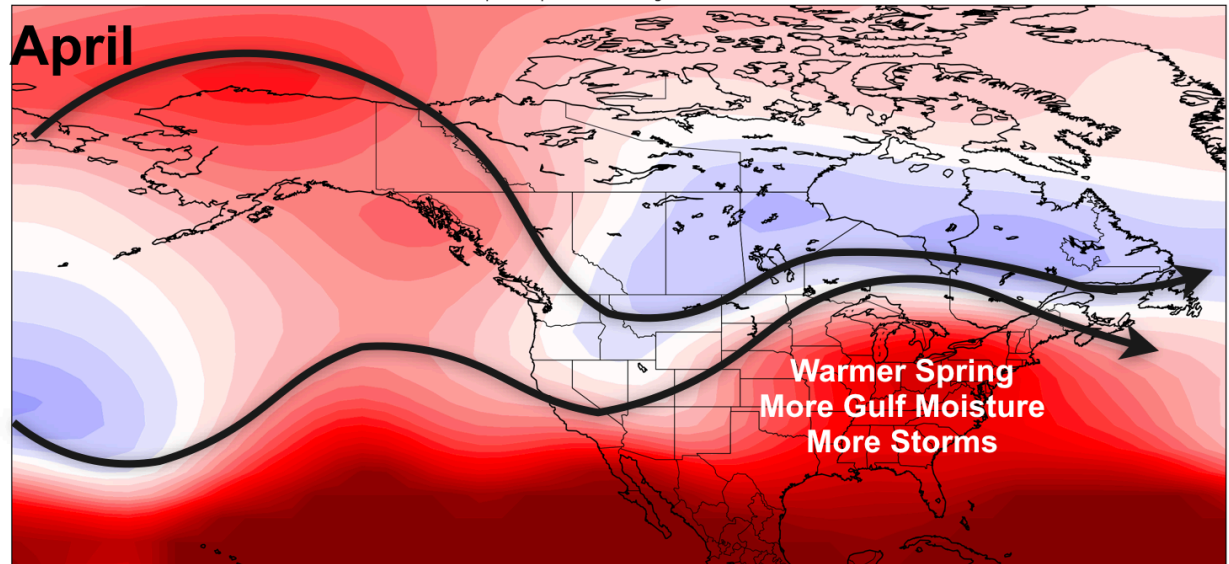
Slope of January 500mb heights 1980-2017



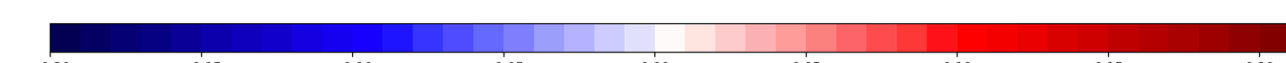
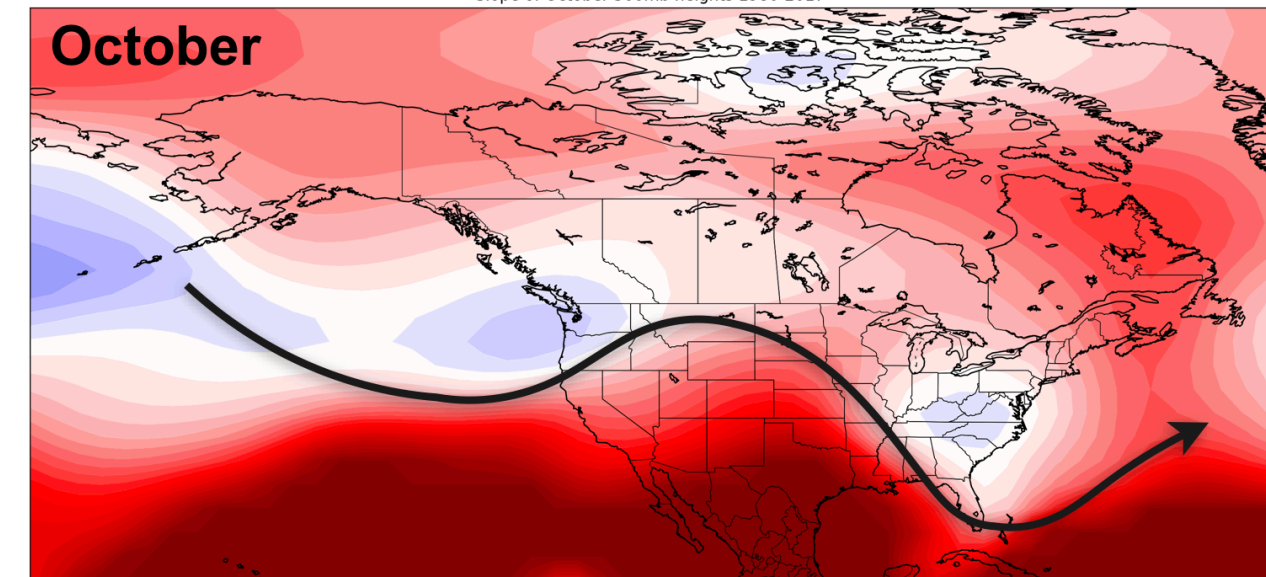
Slope of July 500mb heights 1980-2017



Slope of April 500mb heights 1980-2017

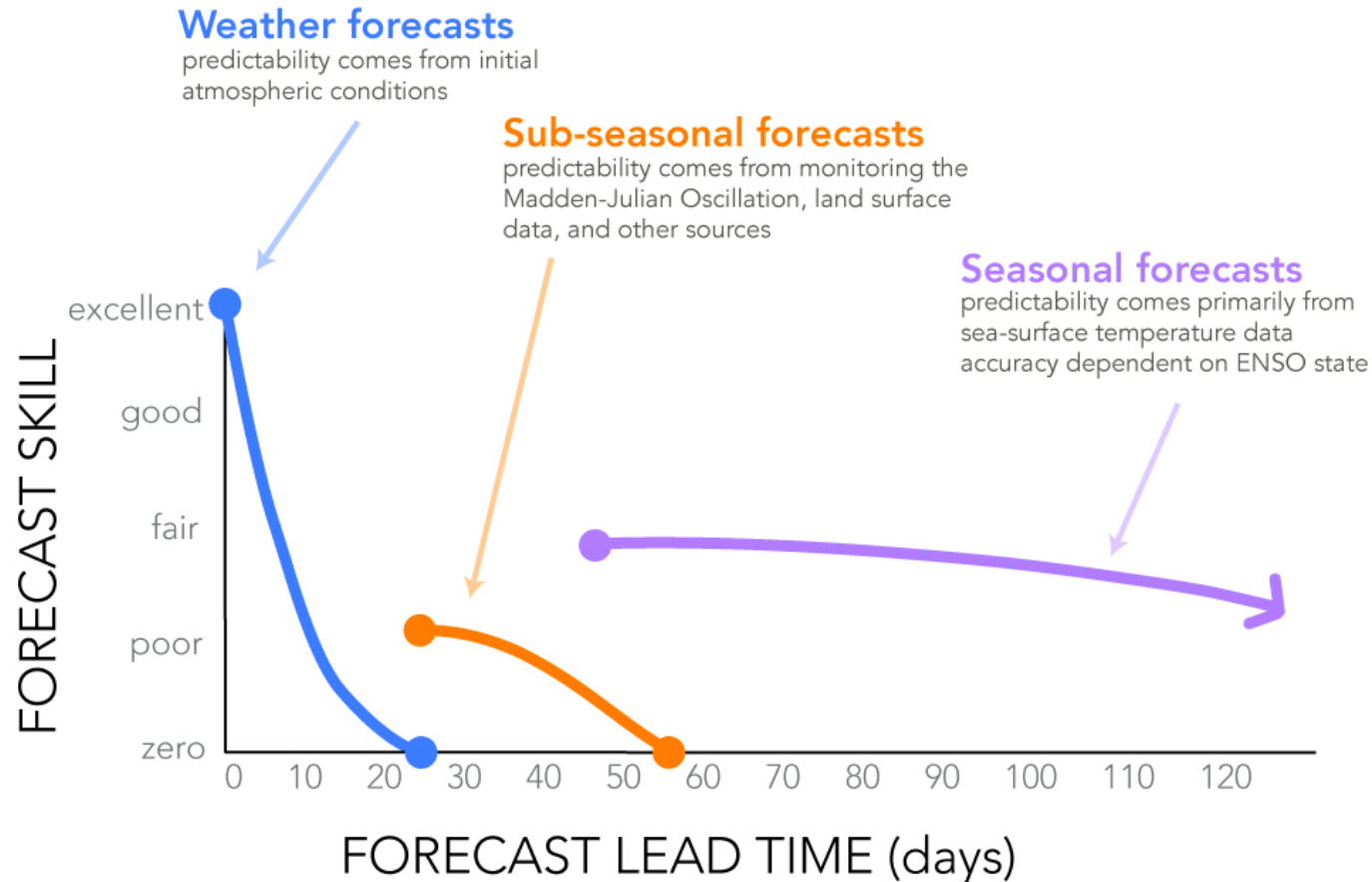


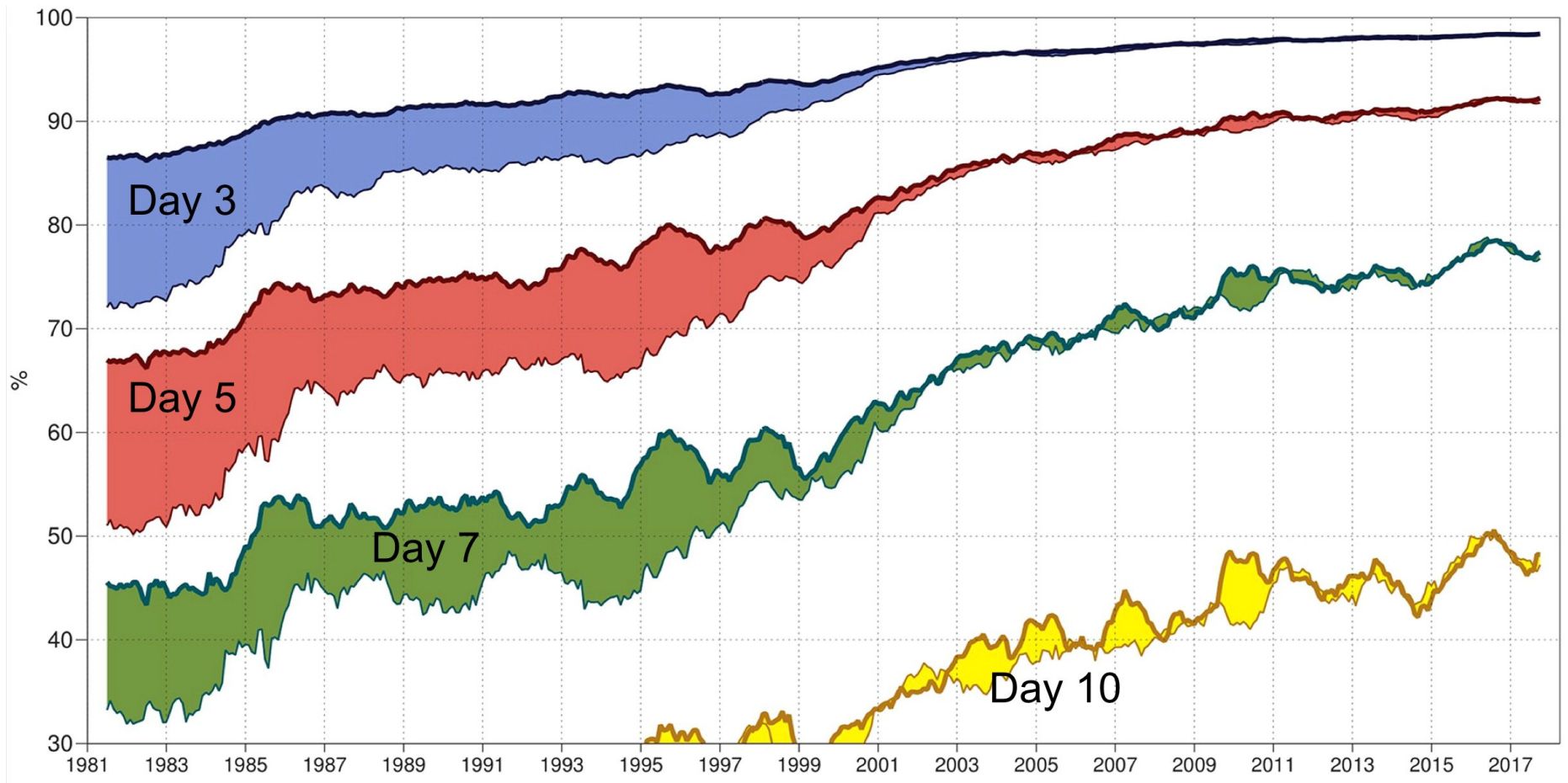
Slope of October 500mb heights 1980-2017



Long Range Prediction – non-linearity and chaos

How I forecast – Know where you have been and constantly monitor the 2-week forecast





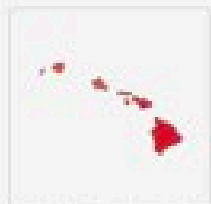
| | | | |
|--|--|--|---|
|  Day 3 NHem |  Day 5 NHem |  Day 7 NHem |  Day 10 NHem |
|  Day 3 SHem |  Day 5 SHem |  Day 7 SHem |  Day 10 SHem |



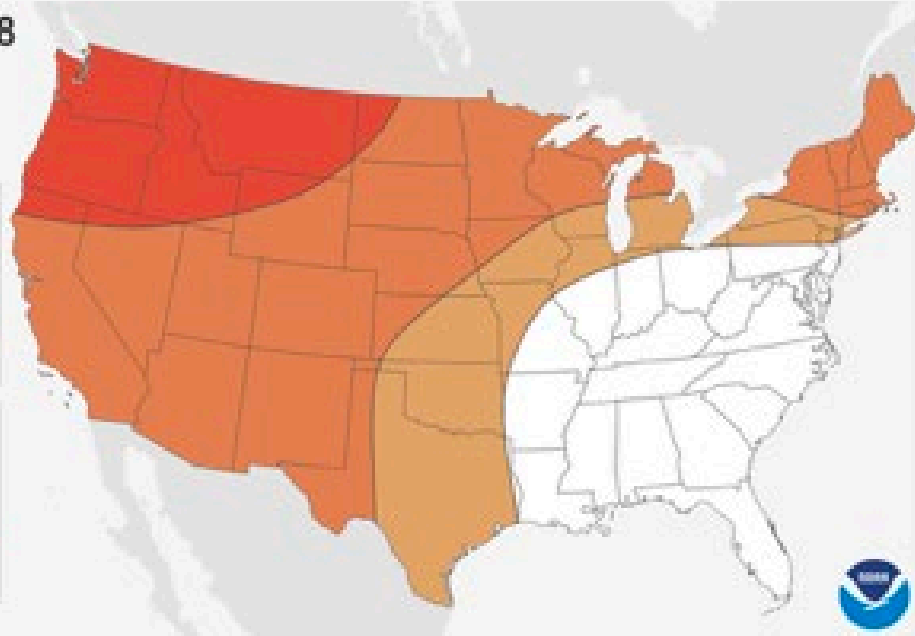
Winter 2018-19

NOAA 1-year ago...

Winter 2018 U.S. Temperature Outlook



AK and HI not to scale



Temperature Outlook
for Dec 2018 - Feb 2019
Issued 18 October 2018

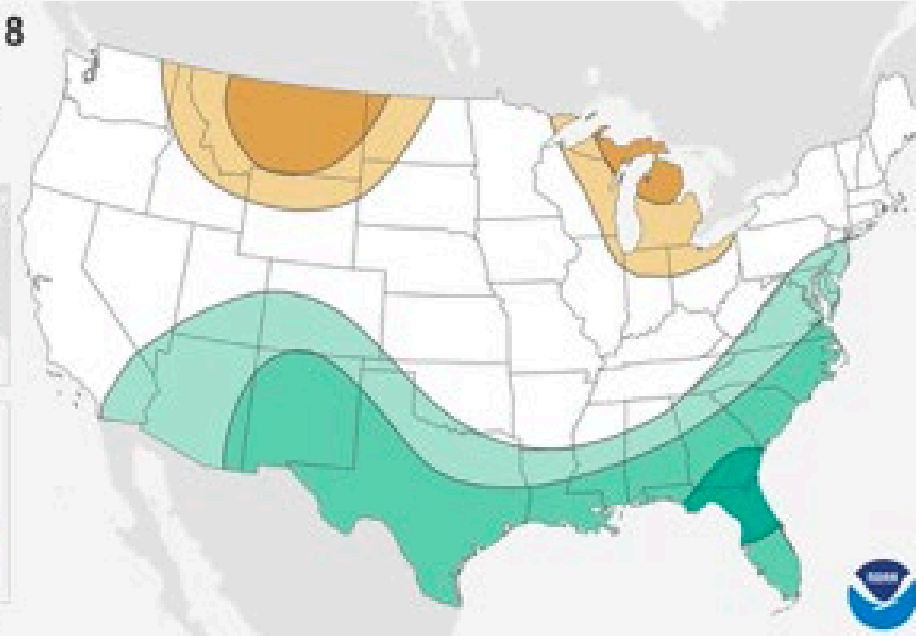


NWS Climate Prediction Center
Map by NOAA Climate.gov

Winter 2018 U.S. Precipitation Outlook



AK and HI not to scale



Precipitation Outlook
for Dec 2018 - Feb 2019
Issued 18 October 2018

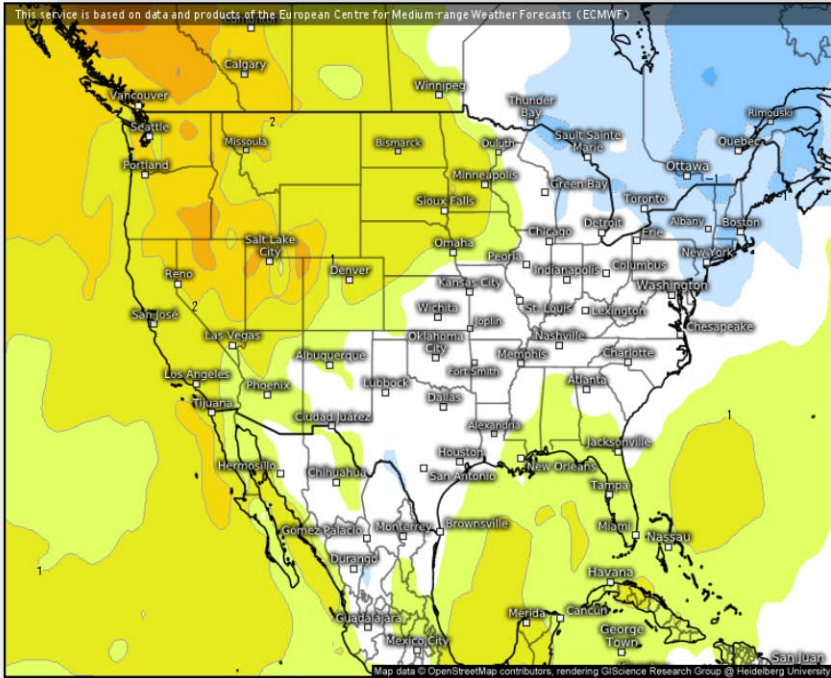


NWS Climate Prediction Center
Map by NOAA Climate.gov



Winter 2018-19

ECMWF 1-year ago...



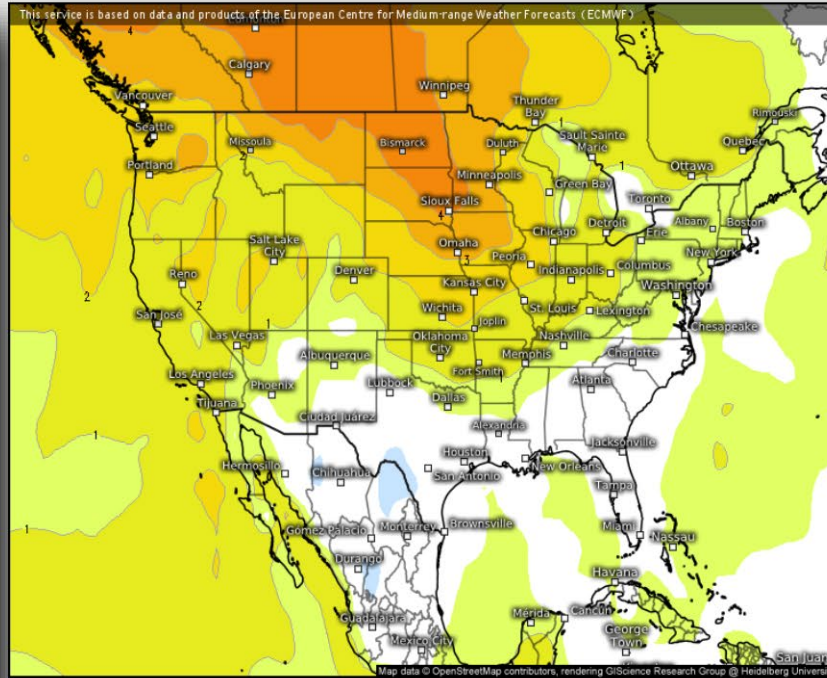
Anomaly temperature (°F)

Valid for December 2018



USA
ECMWF/Global Euro HD (10 days) from 11/01/2018/00z

Model:



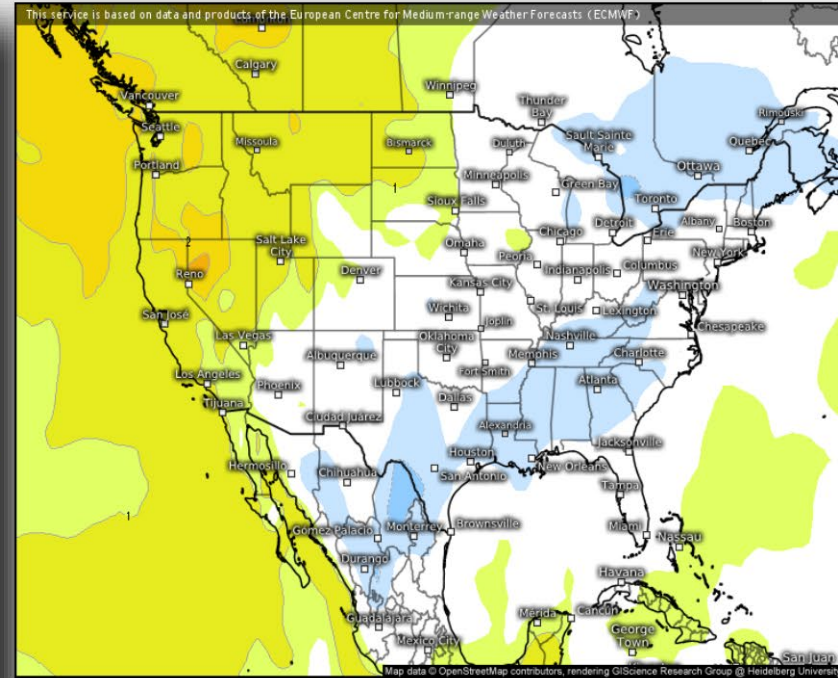
Anomaly temperature (°F)

Valid for January 2019



USA
ECMWF/Global Euro HD (10 days) from 11/01/2018/00z

Model:



Anomaly temperature (°F)

Valid for February 2019

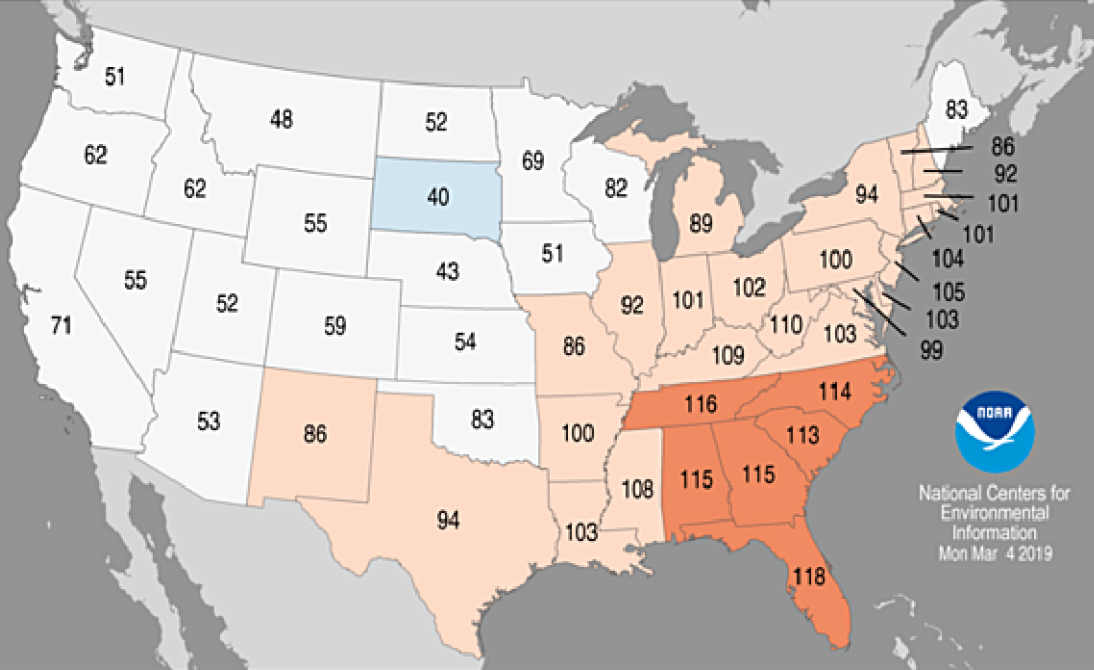


USA
ECMWF/Global Euro HD (10 days) from 11/01/2018/00z

Model:

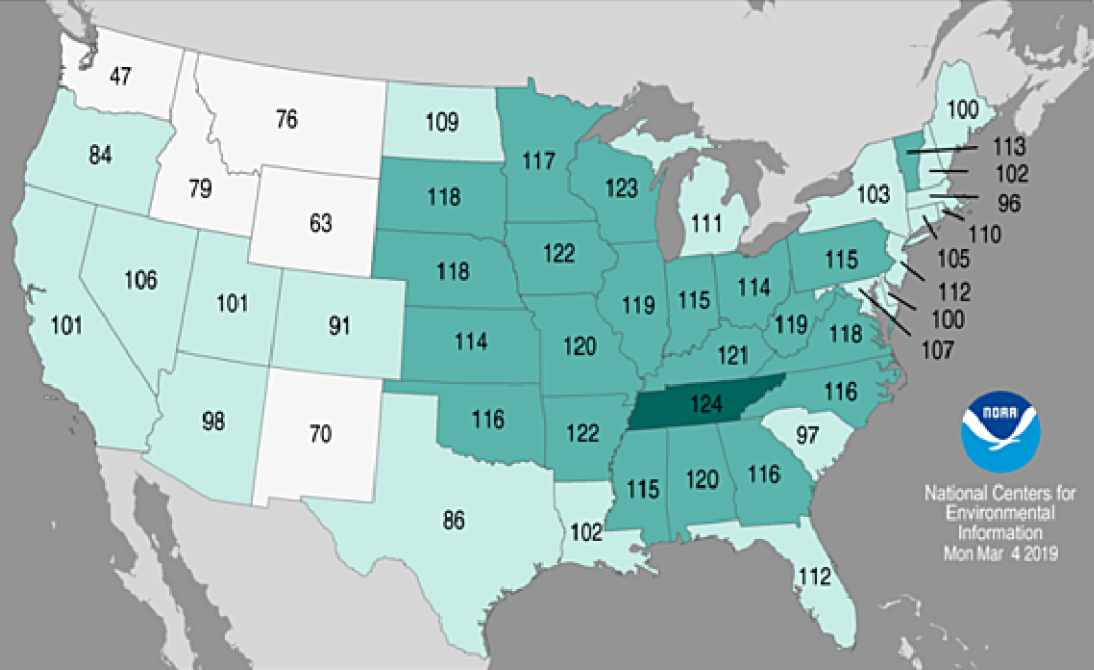
And here is what happened...

Statewide Average Temperature Ranks
 December 2018–February 2019
 Period: 1895–2019



National Centers for Environmental Information
 Mon Mar 4 2019

Statewide Precipitation Ranks
 December 2018–February 2019
 Period: 1895–2019

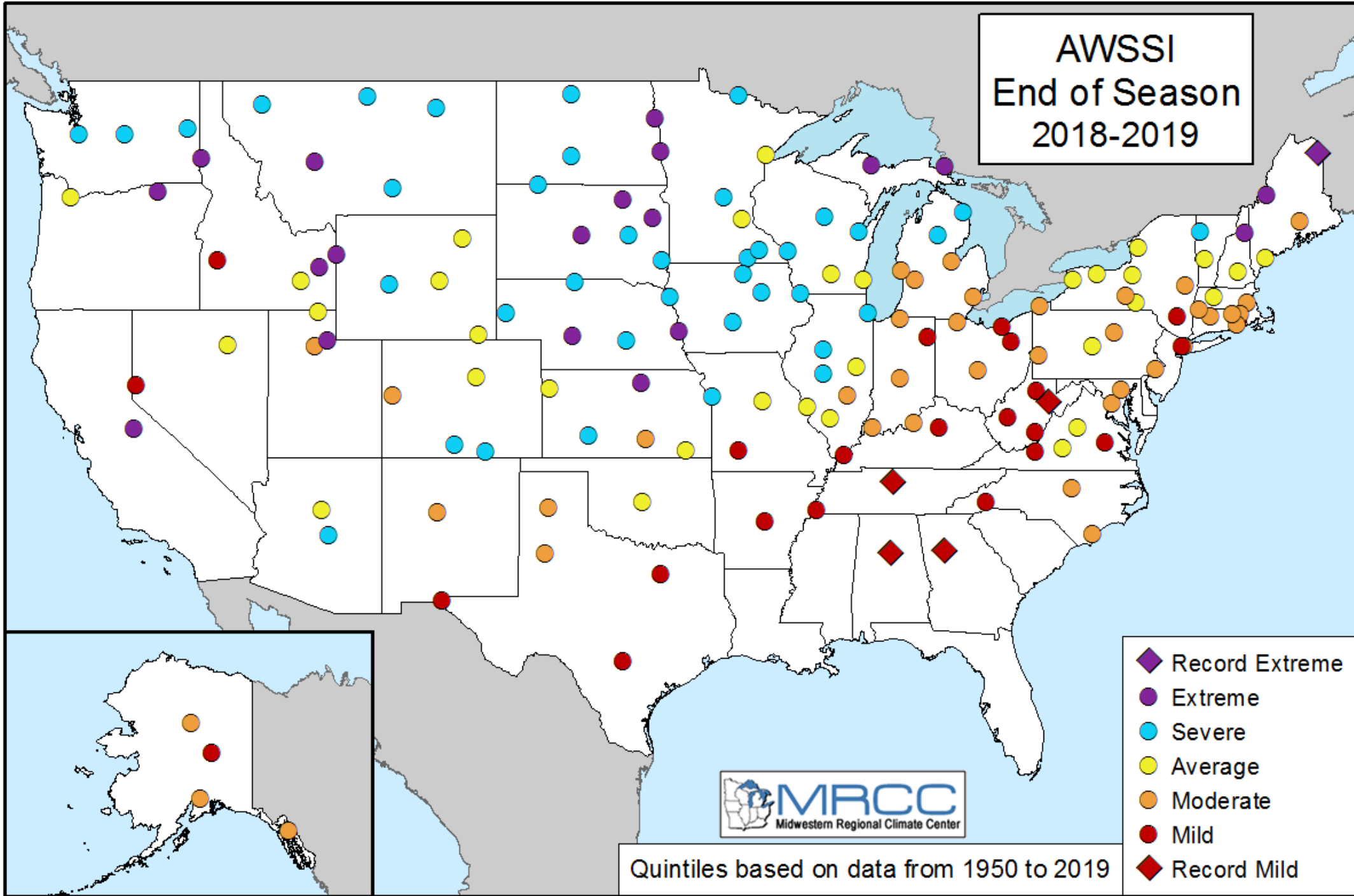


National Centers for Environmental Information
 Mon Mar 4 2019

Record Coldest (1) Much Below Average Below Average Near Average Above Average Much Above Average Record Warmest (124)

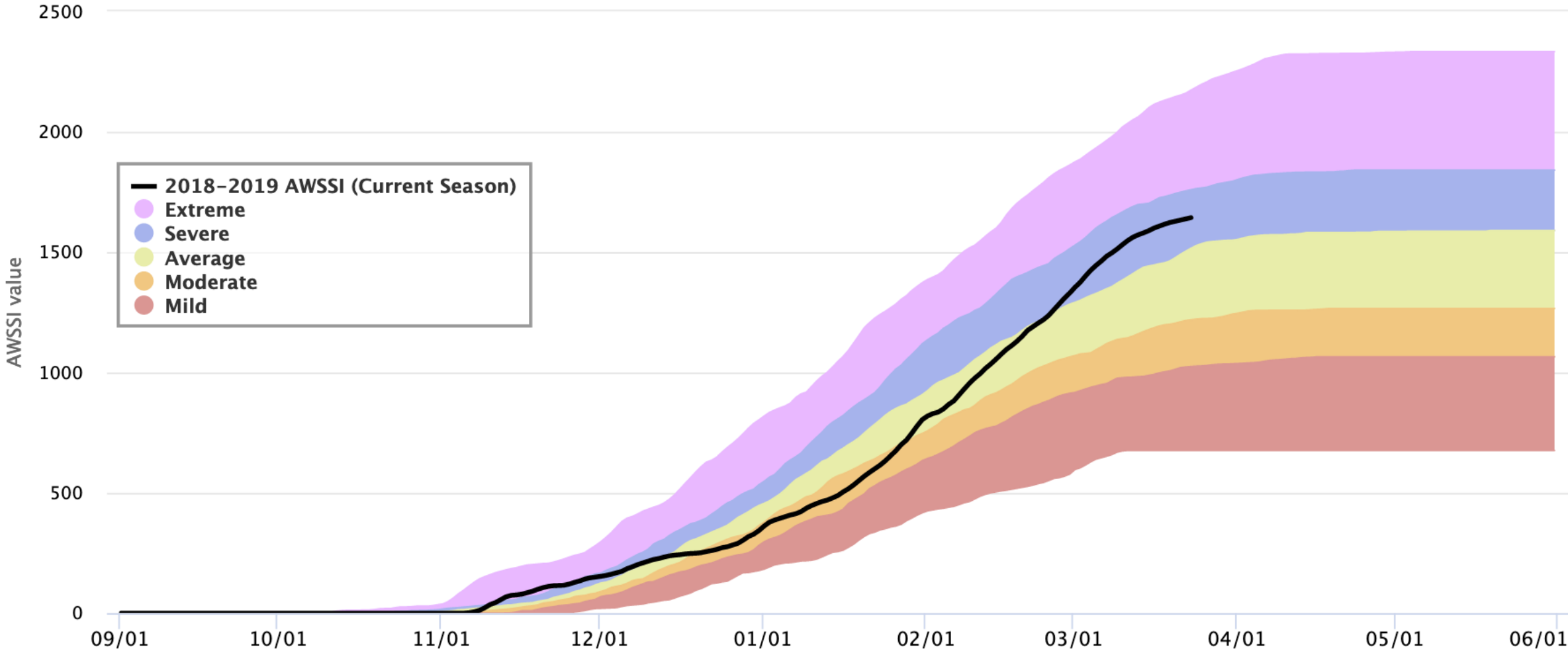
Record Driest (1) Much Below Average Below Average Near Average Above Average Much Above Average Record Wettest (124)

AWSSI
End of Season
2018-2019



2018-2019 AWSSI: "MN - St Cloud"

Season: 2018-11-06 to 2019-03-23, 138 days



2018-2019 AWSSI (Current Season)

- Extreme
- Severe
- Average
- Moderate
- Mild

© Midwestern Regional Climate Center

Quintiles based on data from 1950 to 2019

- Mild
- Record Mild



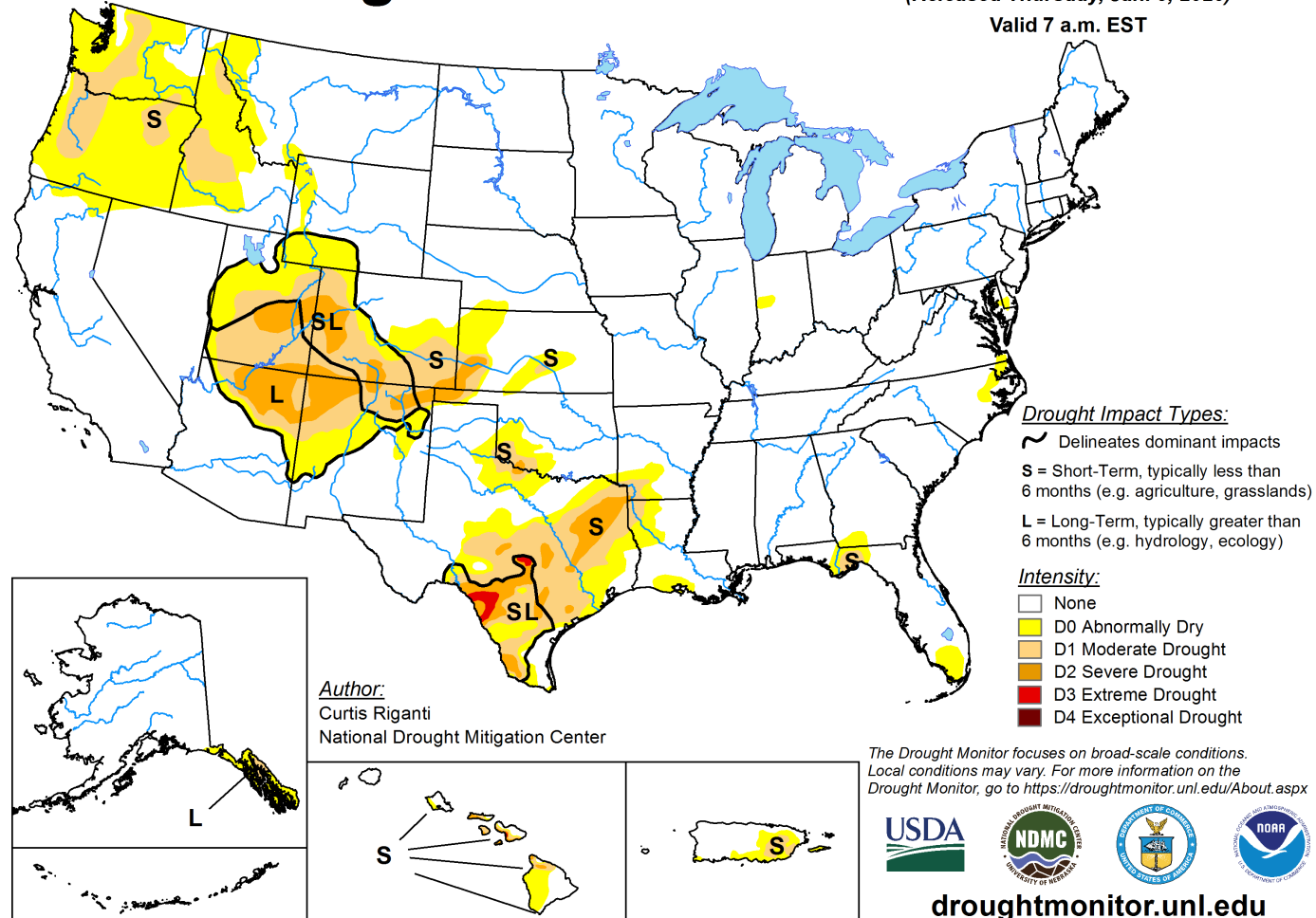
By Mid-January, this is how I felt



Where are we headed?

U.S. Drought Monitor

January 7, 2020
(Released Thursday, Jan. 9, 2020)
Valid 7 a.m. EST



droughtmonitor.unl.edu

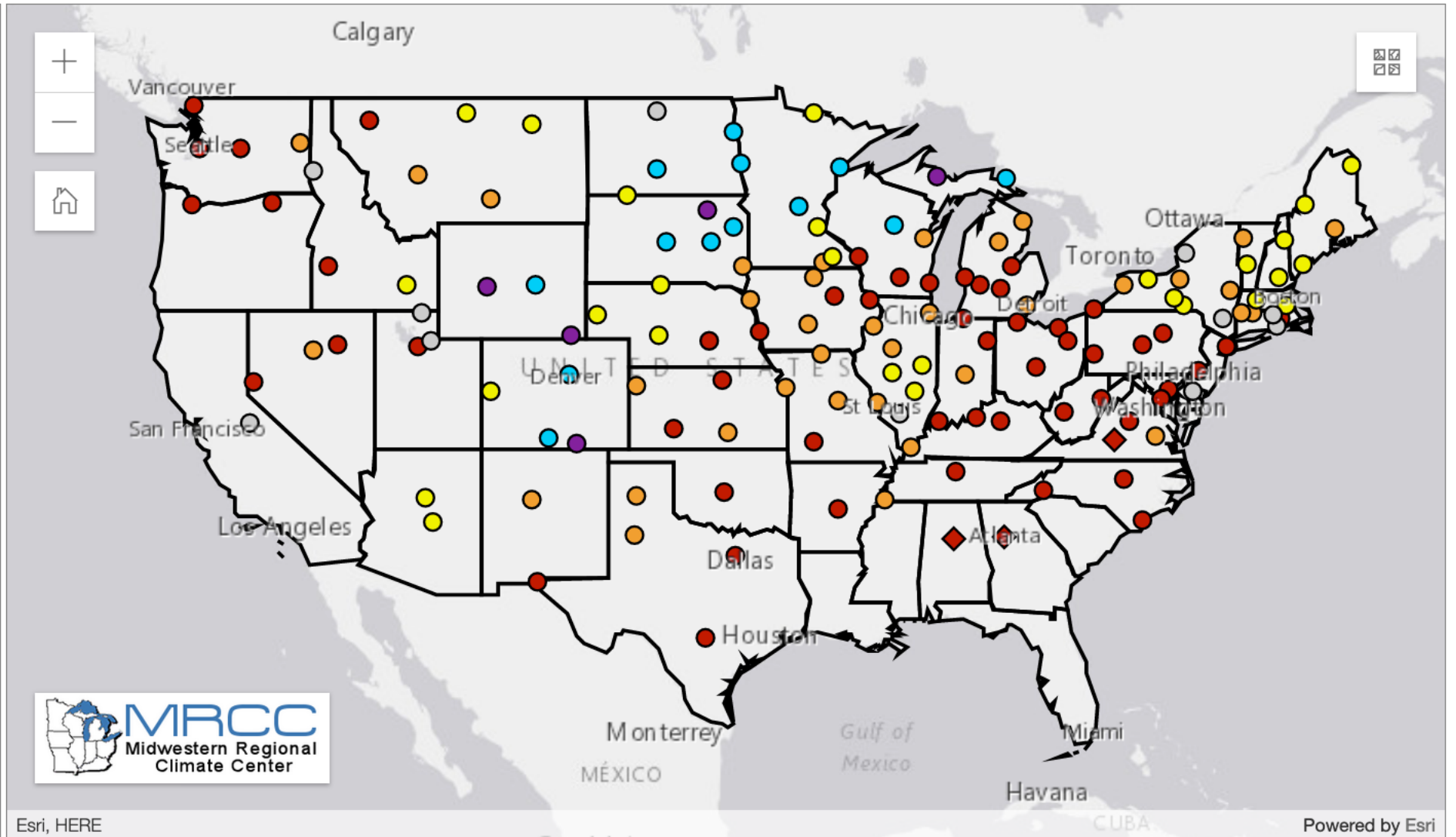


Current Season

AWSSI Category

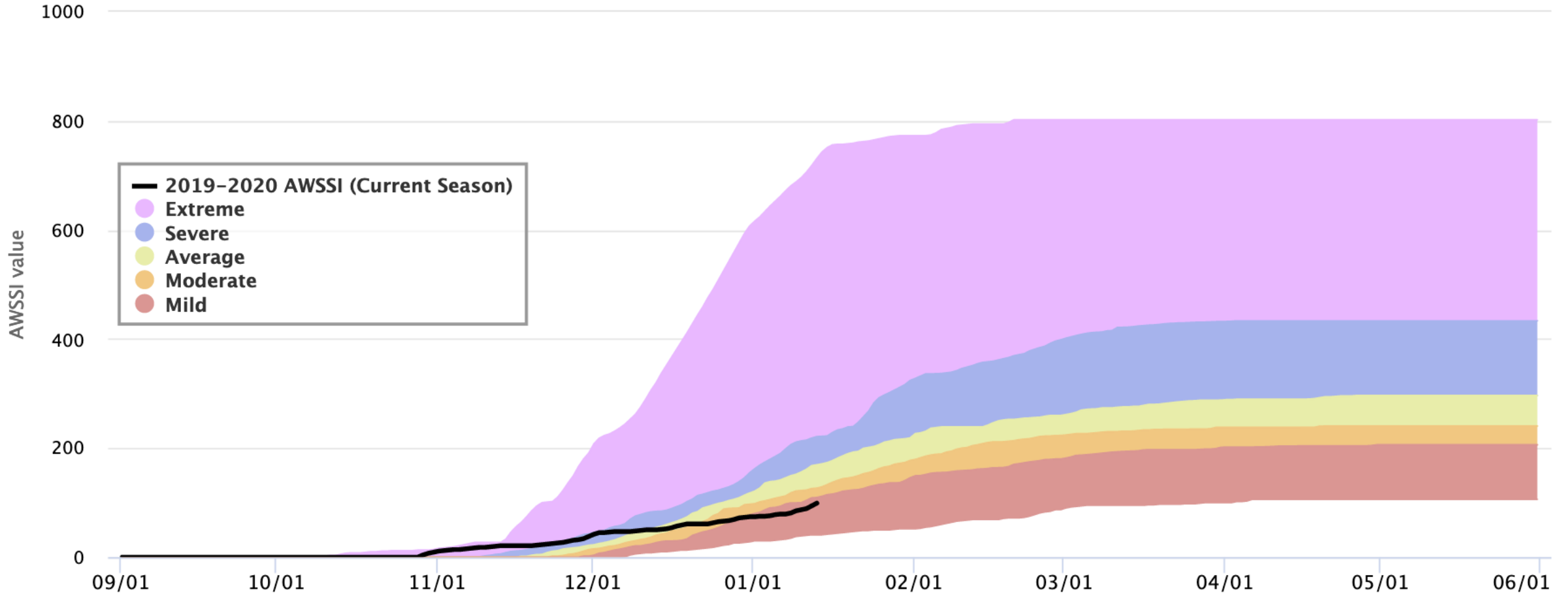
- Extreme
- Severe
- Average
- Moderate
- Mild
- Not current
- Record

Data Last Updated:
1/14/2020 15:20 CST



2019-2020 AWSSI: "ID - Boise"

Season: 2019-10-29 to 2020-01-13, 77 days



2019-2020 AWSSI (Current Season)

- Extreme
- Severe
- Average
- Moderate
- Mild



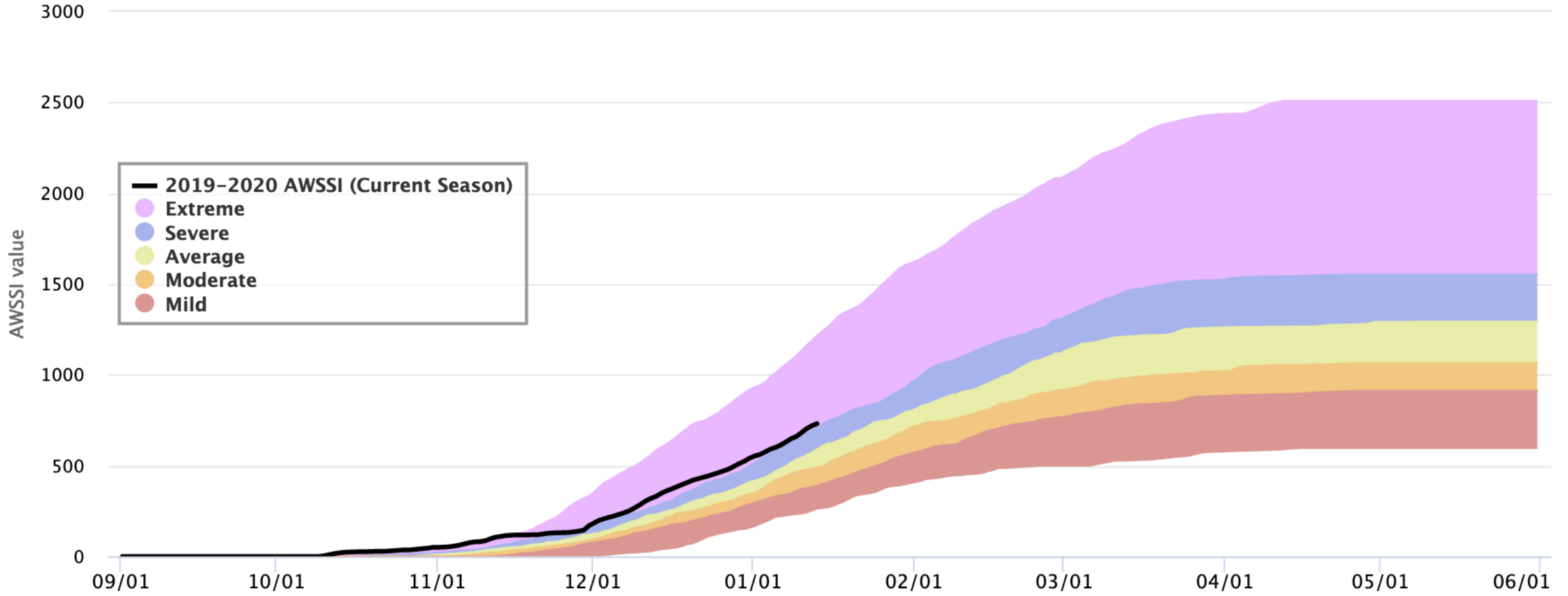
© Midwestern Regional Climate Center

Click and drag to zoom



2019-2020 AWSSI: "SD - Aberdeen"

Season: 2019-10-10 to 2020-01-13, 96 days



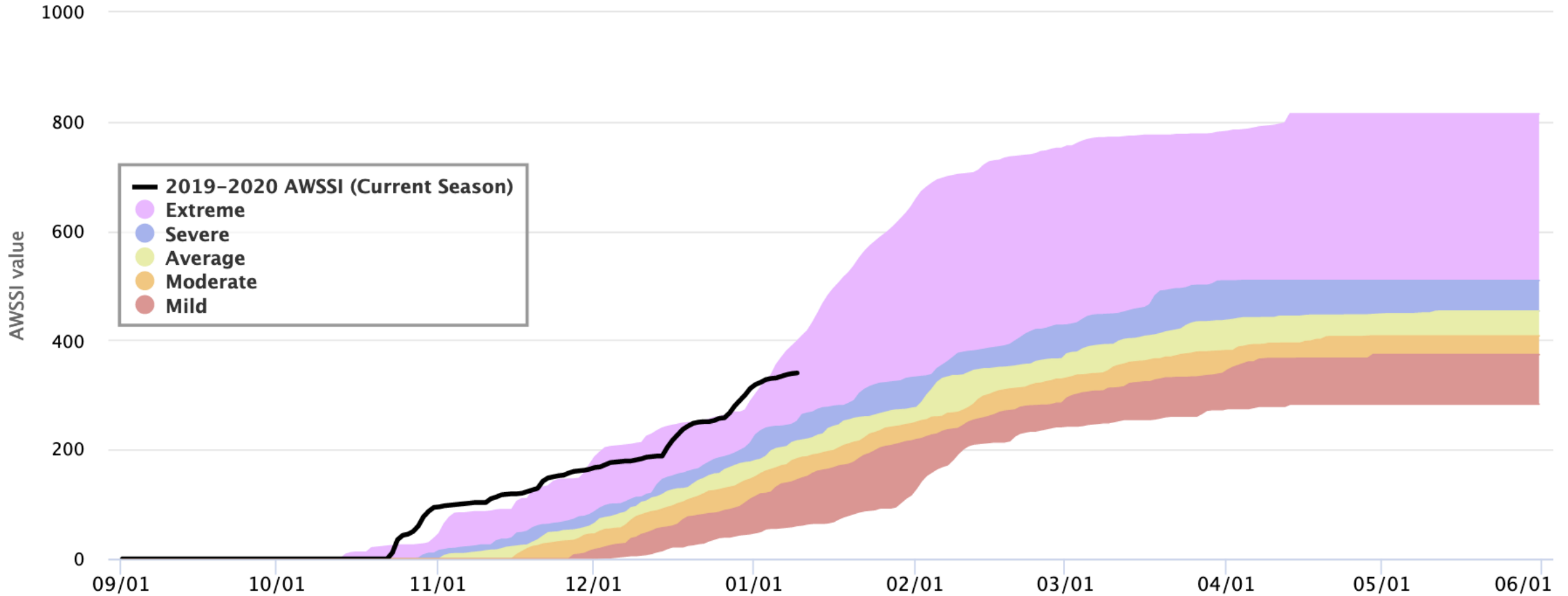
© Midwestern Regional Climate Center

Click and drag to zoom



2019-2020 AWSSI: "CO - Trinidad"

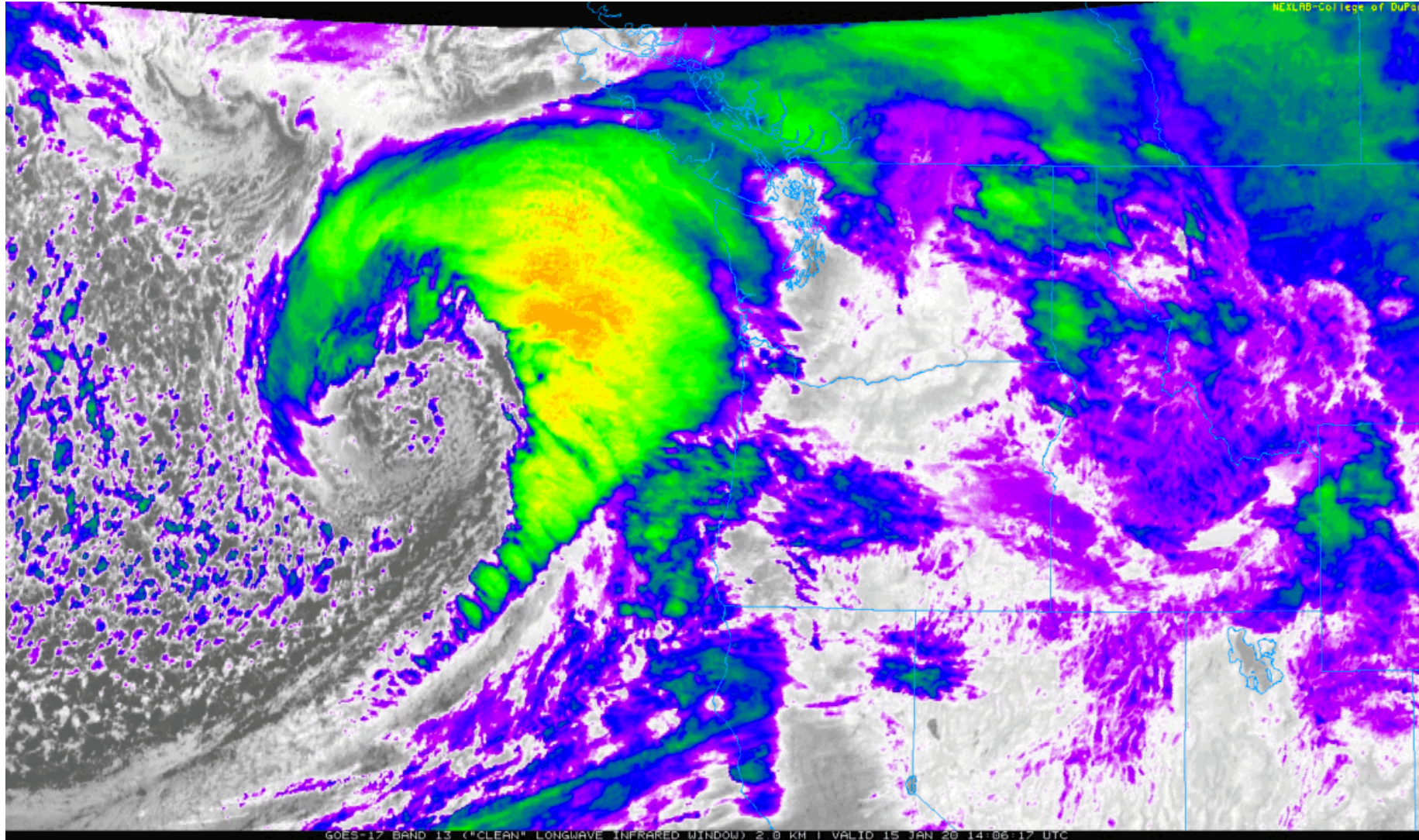
Season: 2019-10-23 to 2020-01-09, 79 days



© Midwestern Regional Climate Center

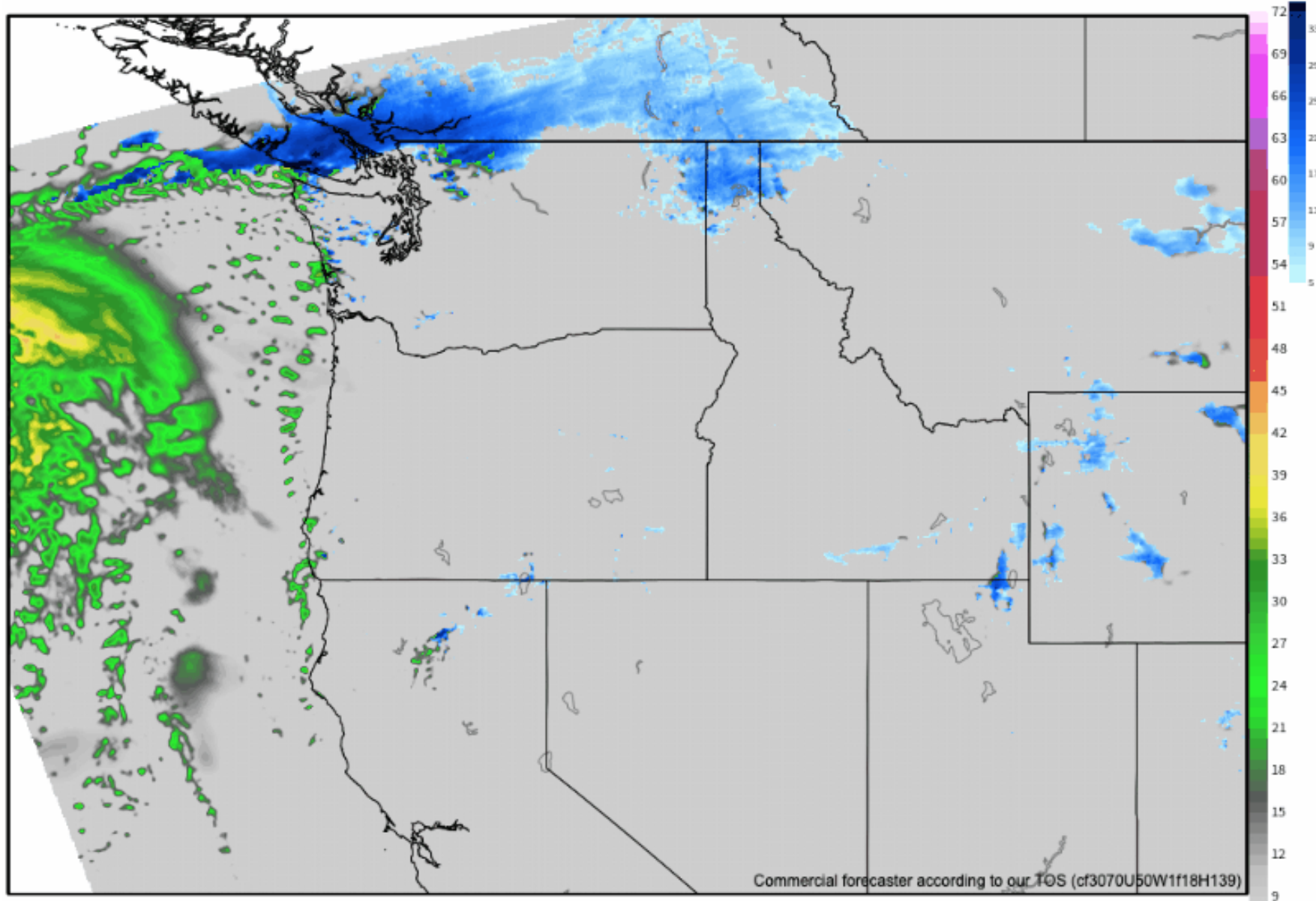


Coast to coast storm system this week



NCEP NAM-WRF-3km Composite Reflectivity [dBZ] | Rain+Snow Type
Init: 06Z15JAN2020 -- [6] hr --> Valid Wed 12Z15JAN2020

weathermodels.com
Wed 07:00 EST 15JAN2020



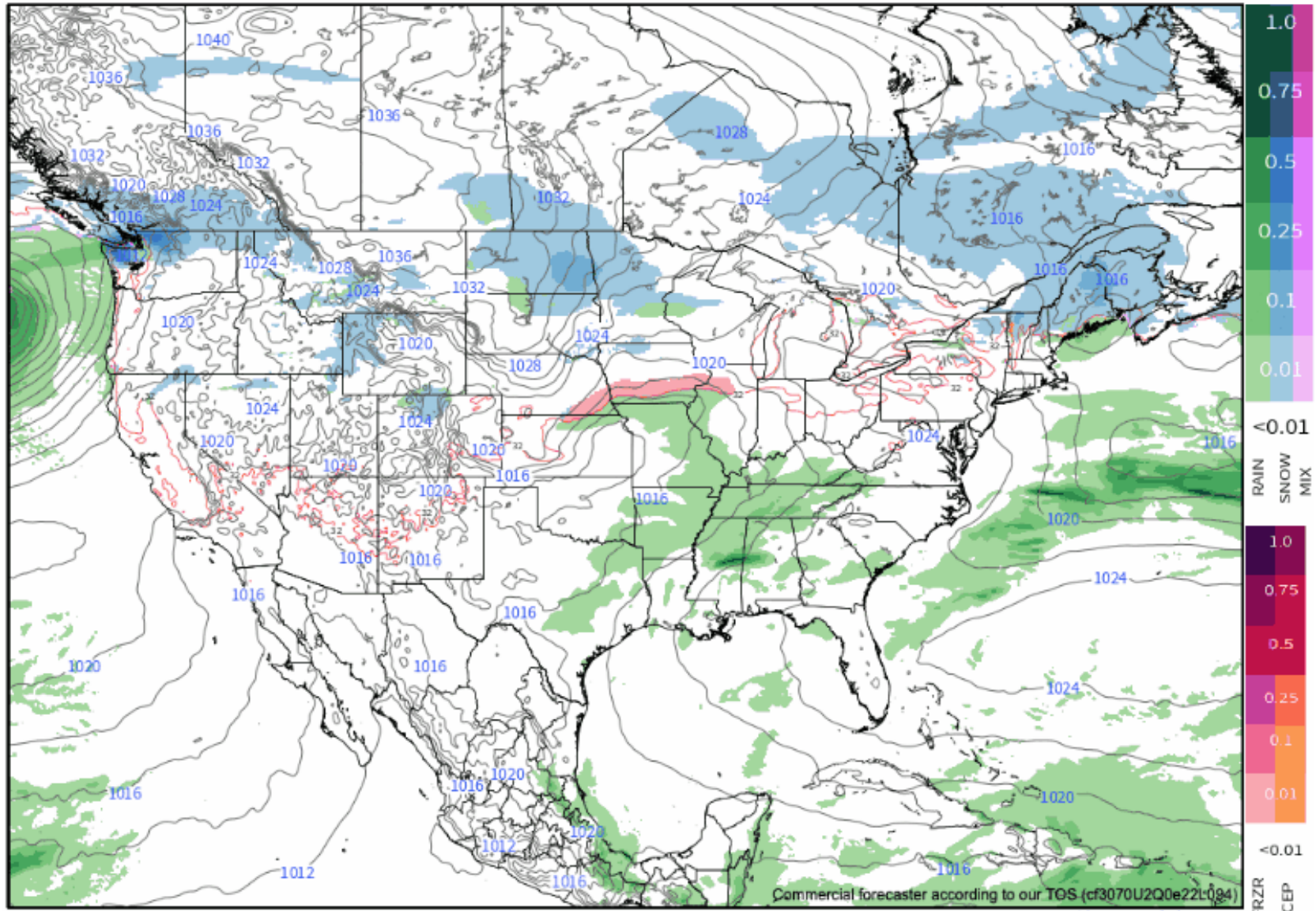
Commercial forecaster according to our TOS (cf3070U50W1f18H139)



ECMWF 6-HR PRECIP [Liquid Equiv | inch] & Dominant TYPE between 06Z15JAN2020 -- 12Z15JAN2020 + MSLP [hPa]

Init: 00Z15JAN2020 -- [12] hr --> Valid Wed 12Z15JAN2020

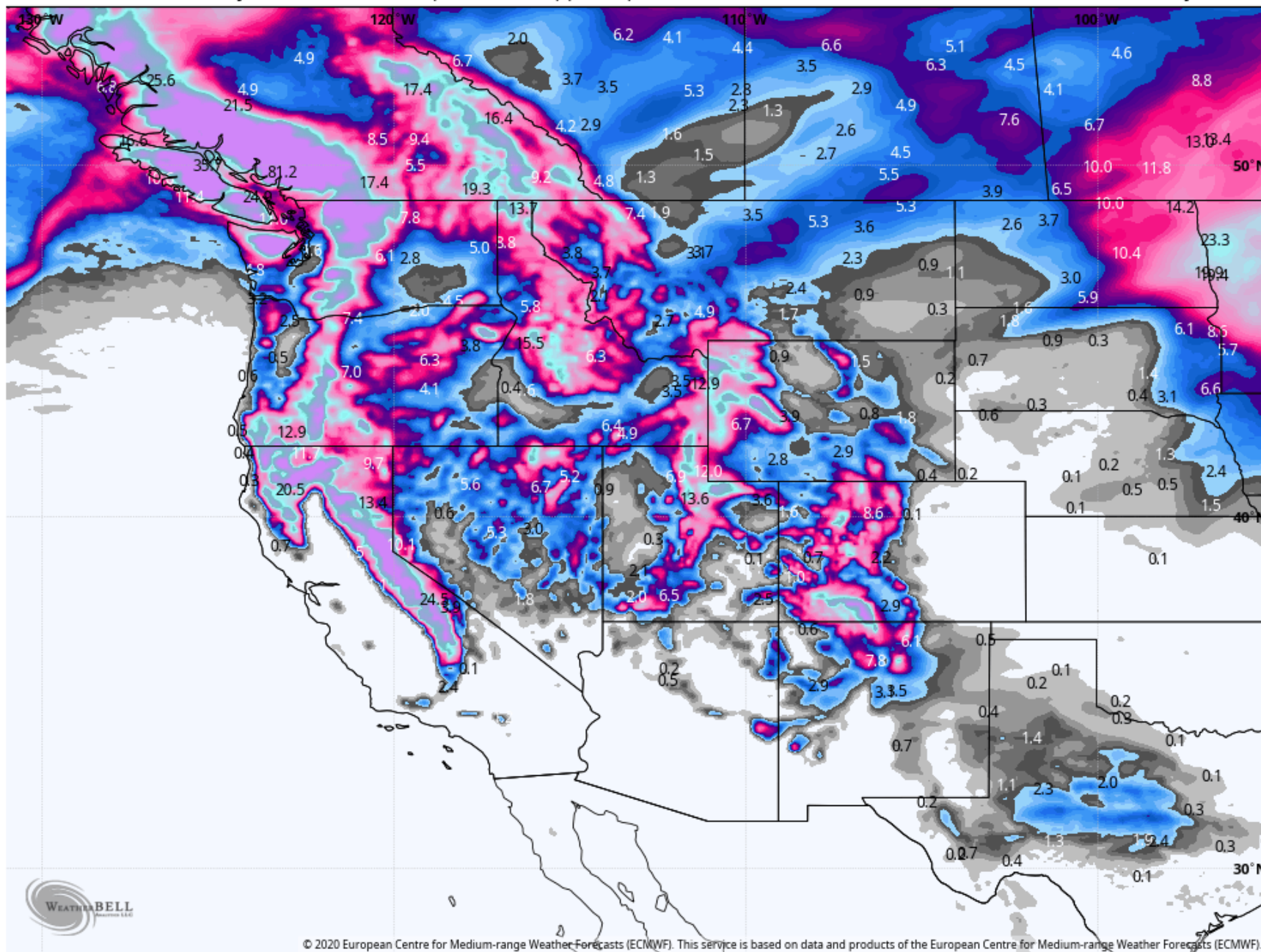
MIN|MAX 992.1 | 1048.1 hPa



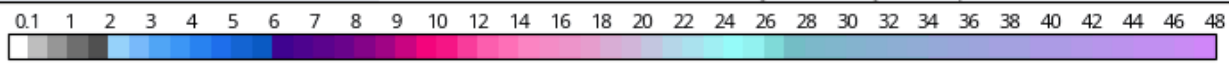
This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF)

weathermodels.com



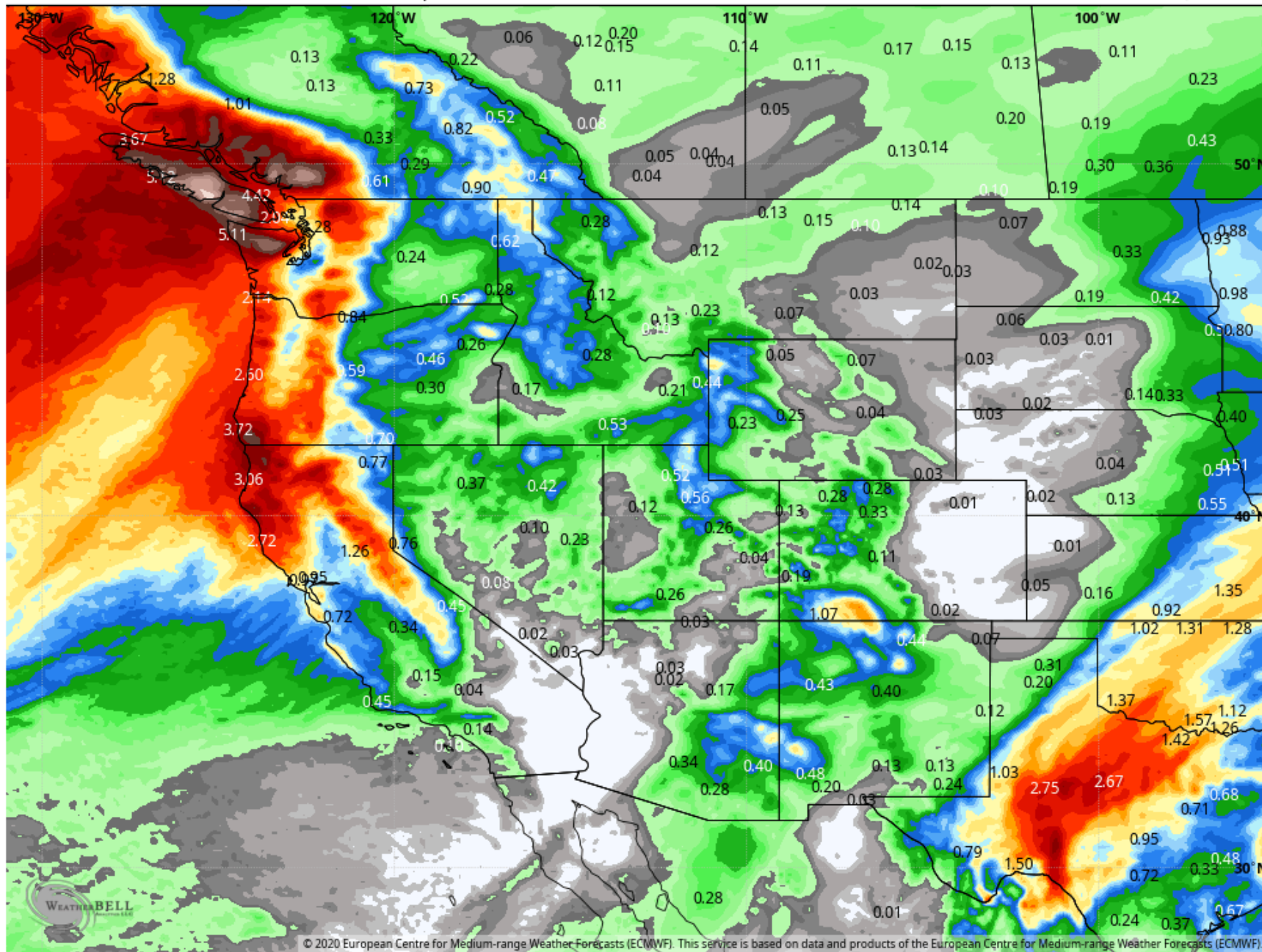


© 2020 European Centre for Medium-range Weather Forecasts (ECMWF). This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF).



Max: 192.2



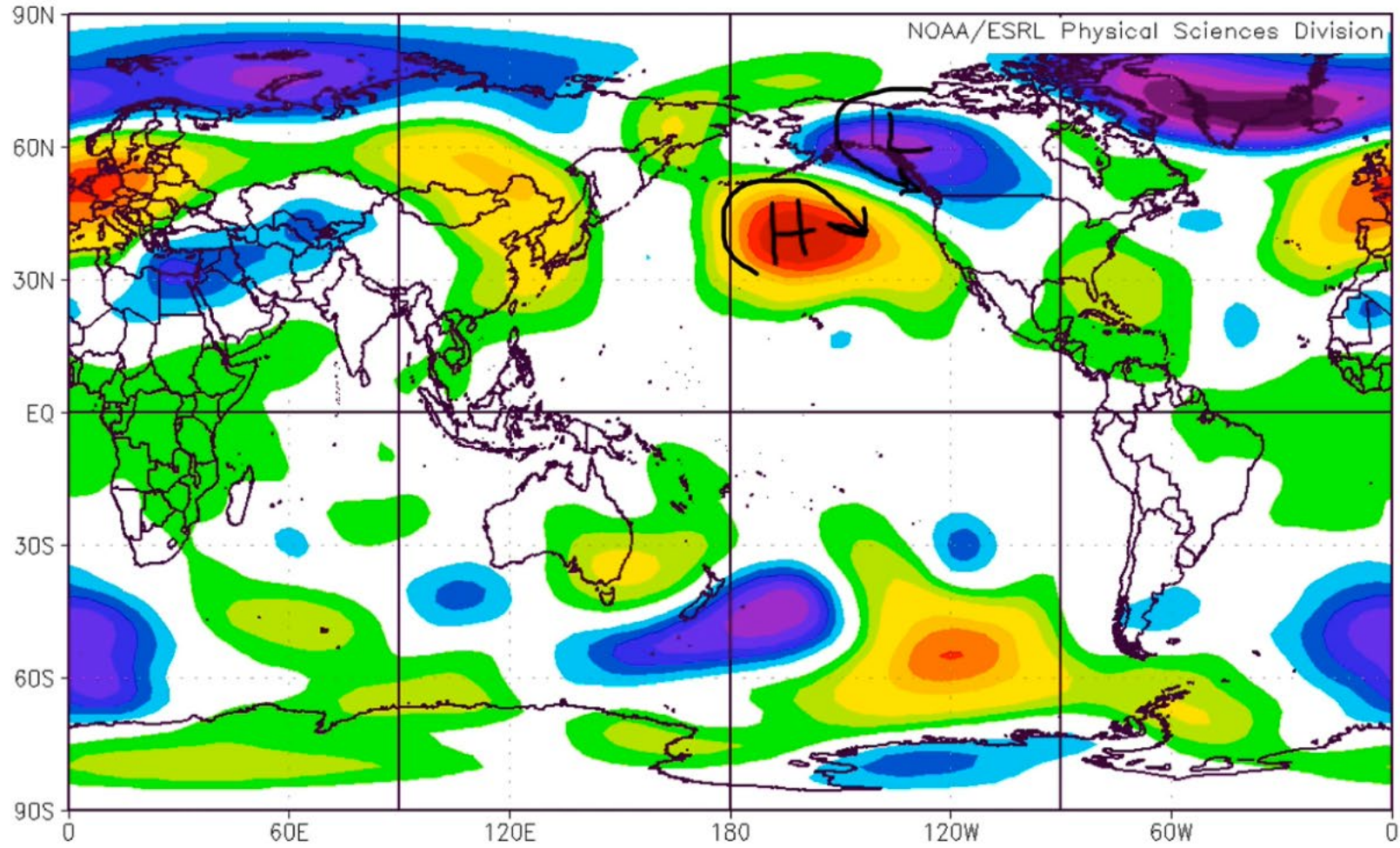


Max: 9.55

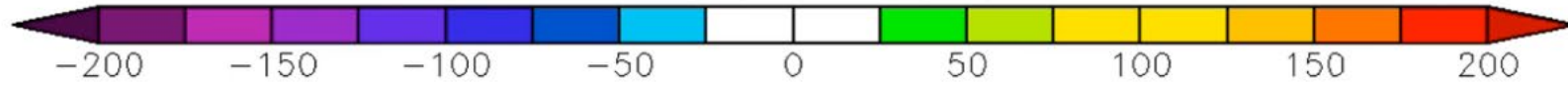
© 2020 European Centre for Medium-range Weather Forecasts (ECMWF). This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF).



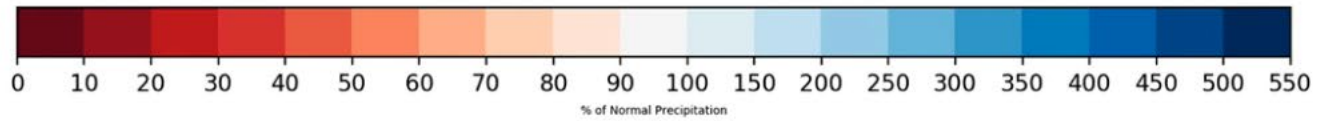
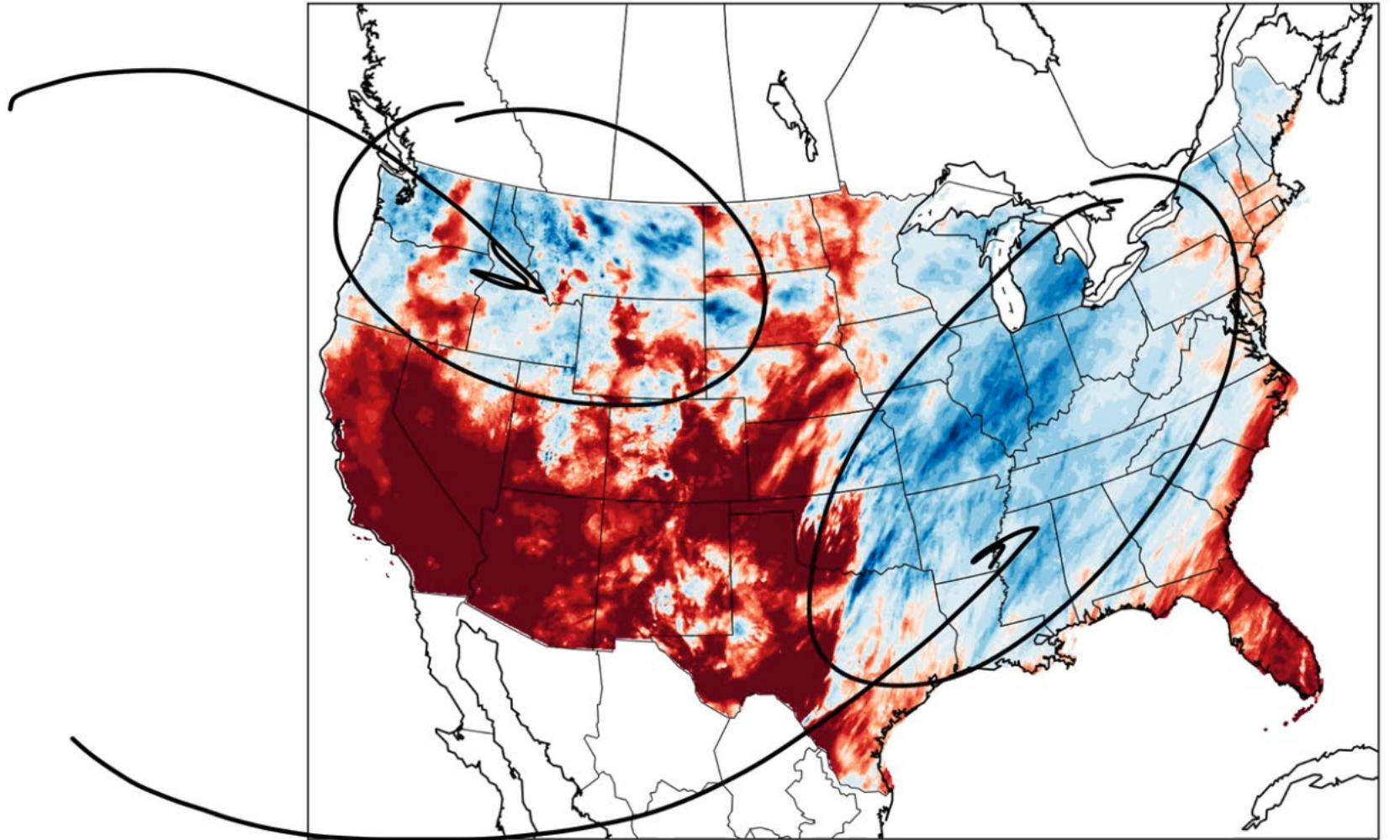
NCEP/NCAR Reanalysis



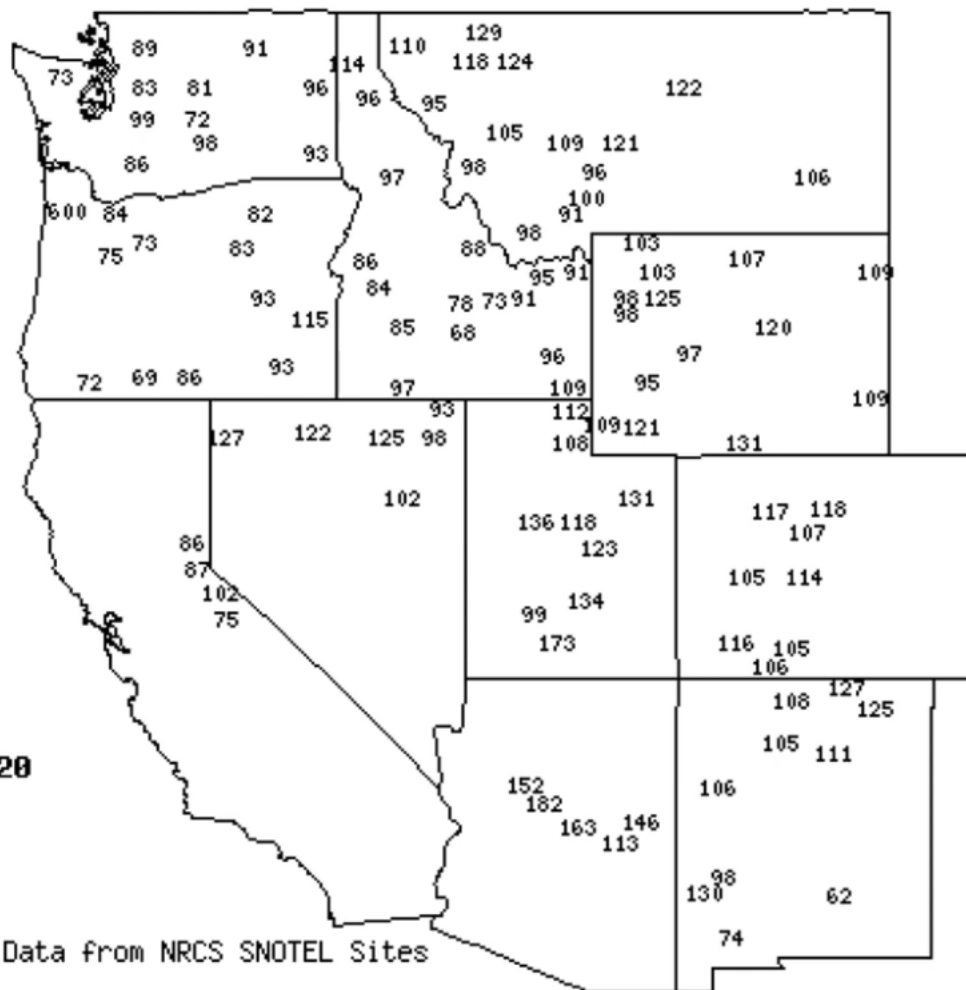
500mb Geopotential Height (m) Composite Anomaly (1981-2010 Climatology)
1/1/20 to 1/11/20



Last 14 Days % of Normal @ 7:00AM (Central) 2020-01-13



Basin Average Snow Water Content. (% of Average.)



Report Date:

JANUARY 13 , 2020

Provisional Data
Based on Mountain Data from NRCS SNOTEL Sites

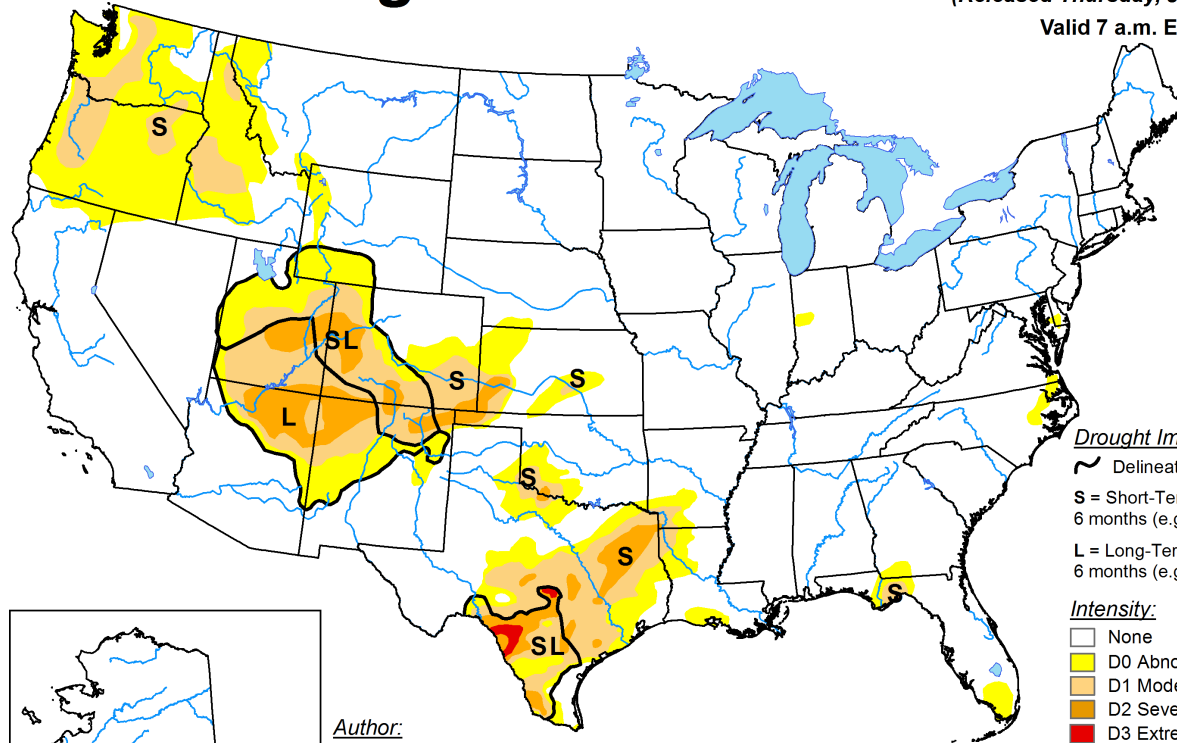
Data provided by
Water and Climate Center
Natural Resources Conservation Service
Portland, Oregon

Western Regional Climate Center
Desert Research Institute
Reno, Nevada



U.S. Drought Monitor

January 7, 2020
 (Released Thursday, Jan. 9, 2020)
 Valid 7 a.m. EST

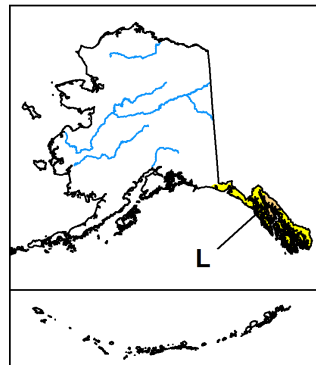


Drought Impact Types:

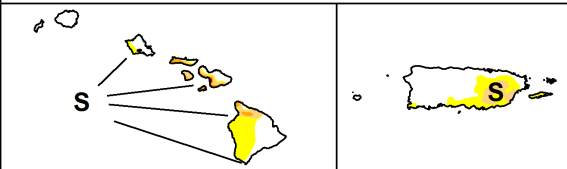
- ⌞ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought



Author:
 Curtis Riganti
 National Drought Mitigation Center

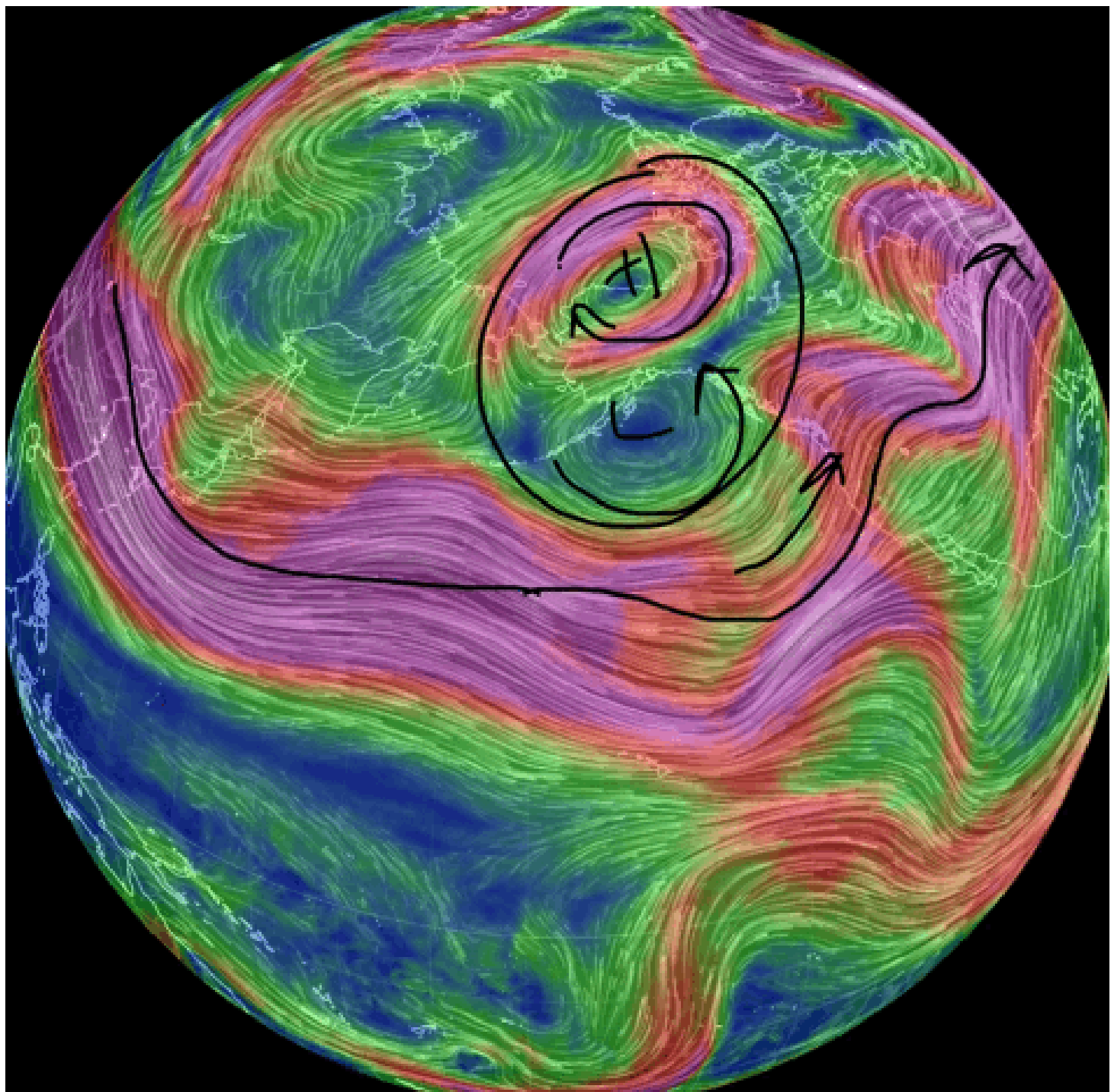


The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



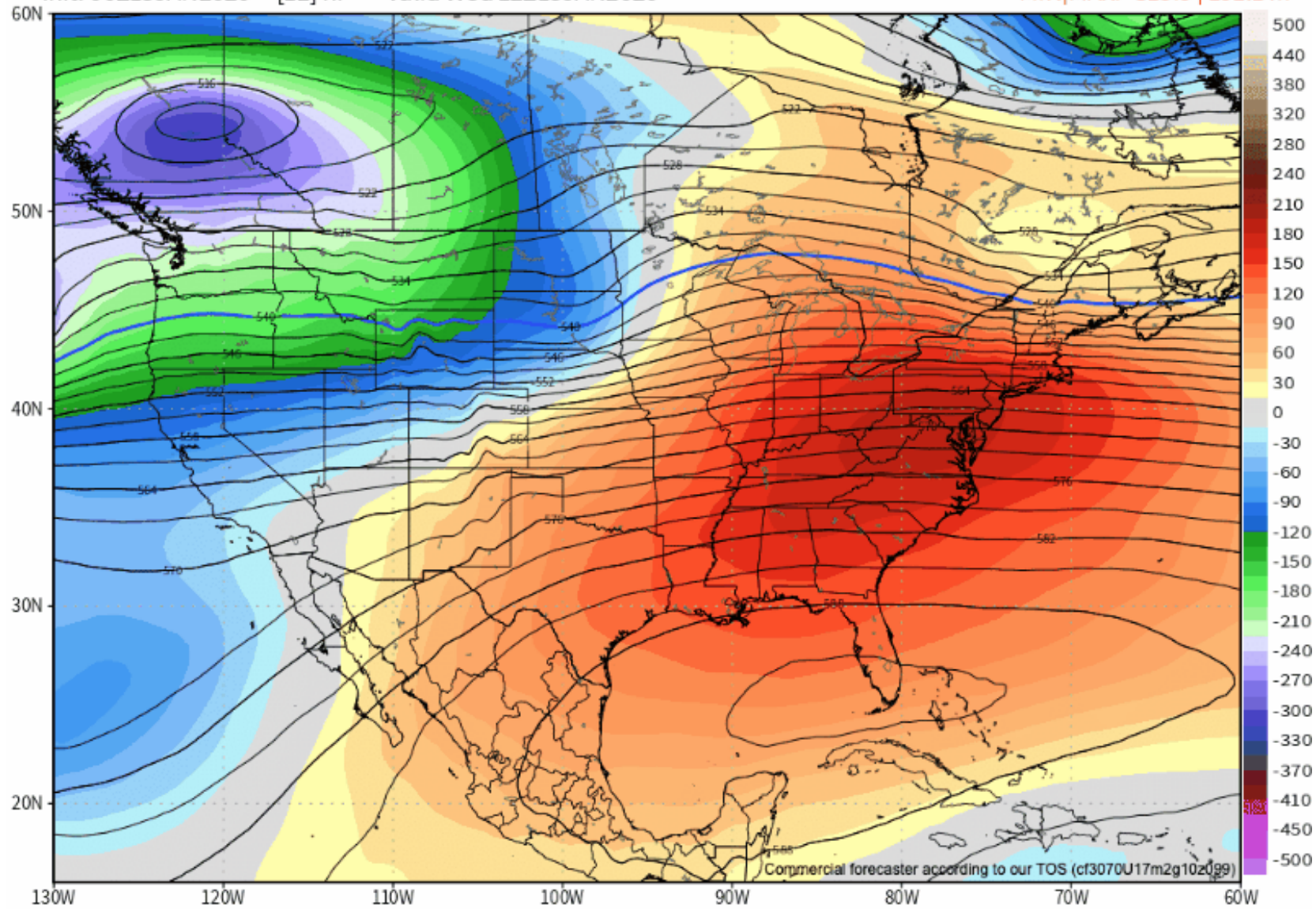
droughtmonitor.unl.edu





ECMWF EPS 500 hPa Geopotential Height [dm] & Anomaly [m] | Ensemble Mean | 2000-2019 M-Climate
Init: 00Z15JAN2020 -- [12] hr --> Valid Wed 12Z15JAN2020

MIN|MAX: -315.9 | 191.1 m



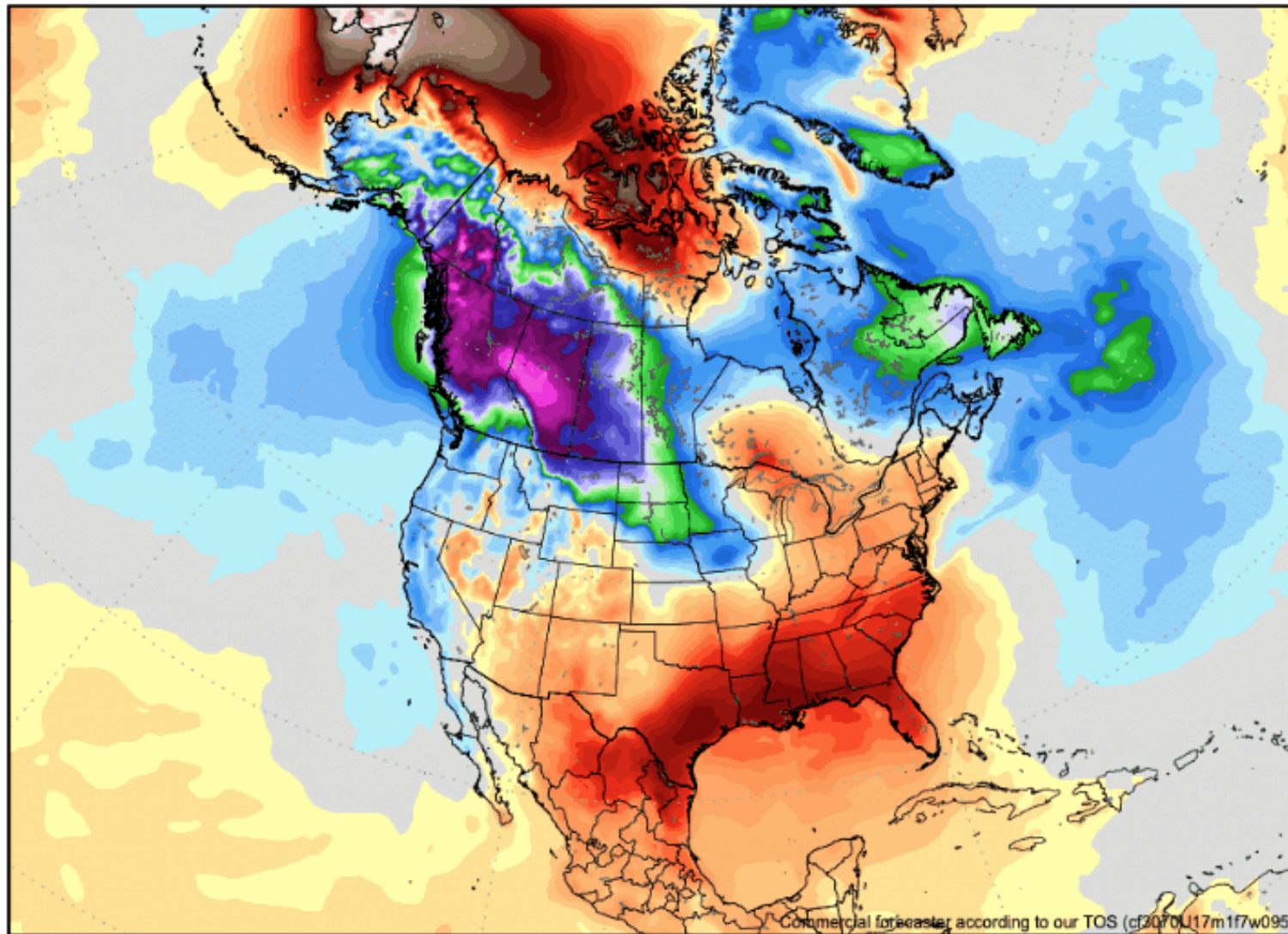
This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF)

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ECMWF EPS 2-meter Temperature Anomaly [°C] | 5-day Ensemble Mean --> 00Z15JAN2020 & 00Z20JAN2020 Day 0 - Day 5
Init: 00Z15JAN2020 -- [120] hr --> Valid Mon 00Z20JAN2020

MIN|MAX -23.8° | 20.2°C



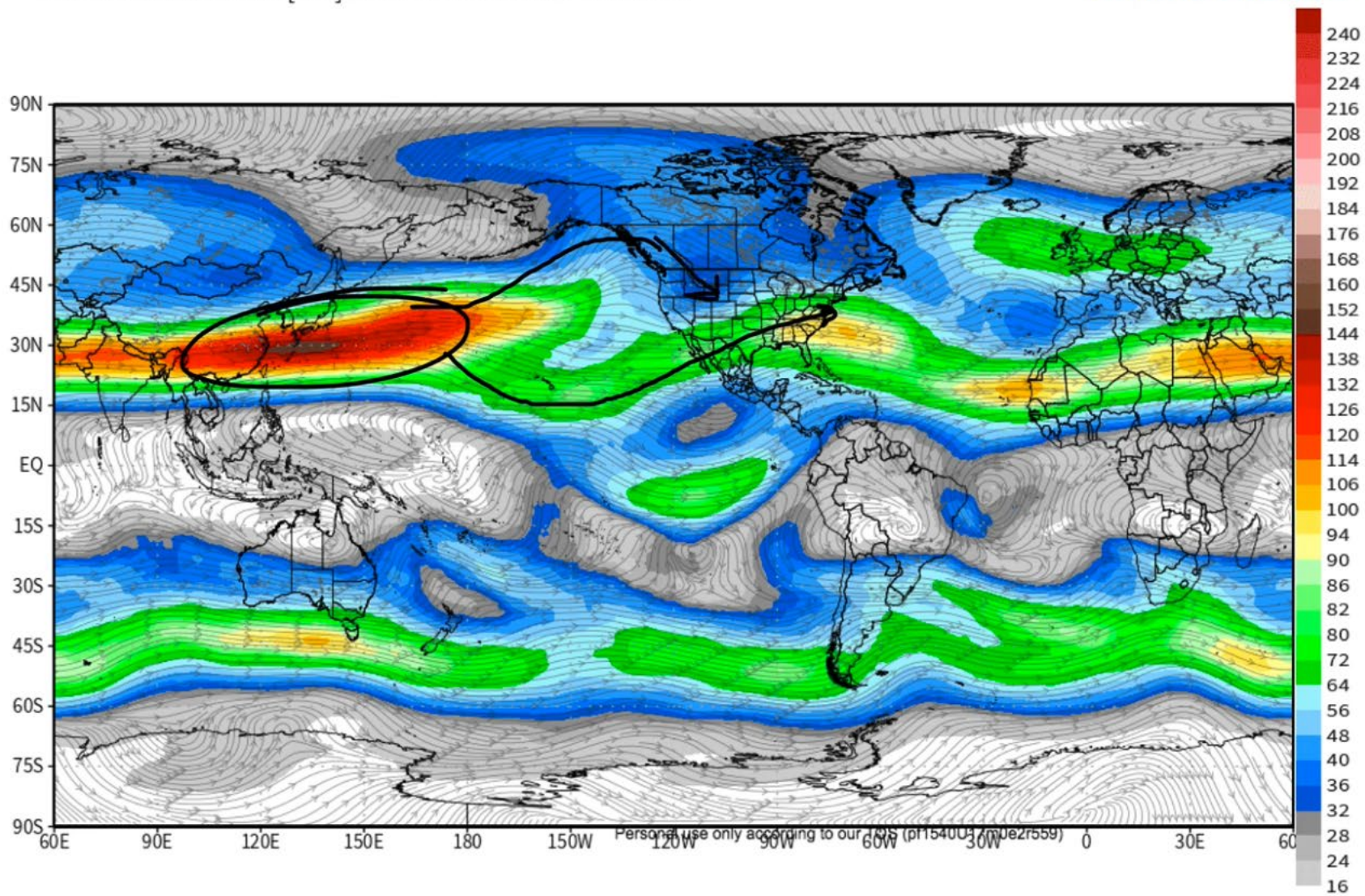
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ECMWF EPS 200 hPa Wind [knots] | Ensemble Mean
Init: 00Z15JAN2020 -- [312] hr --> Valid Tue 00Z28JAN2020

MAX-WIND: 149.1 knots

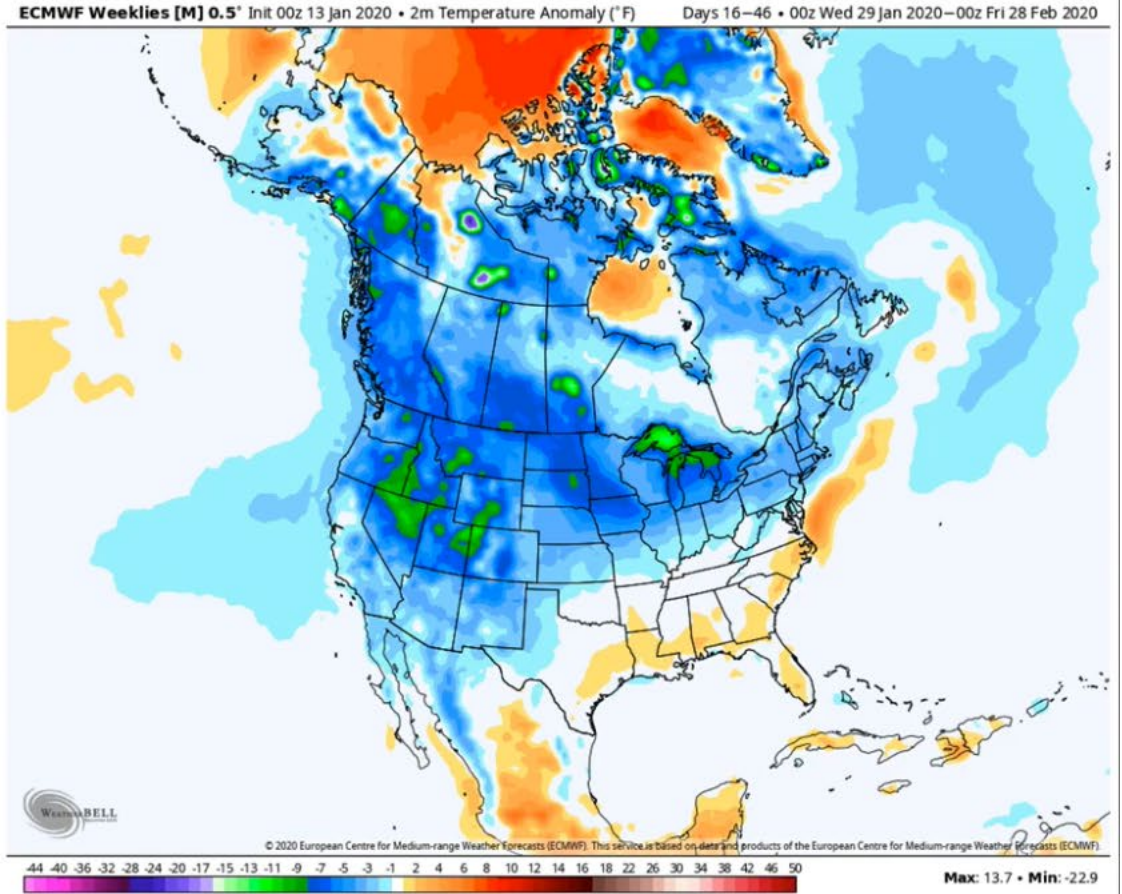
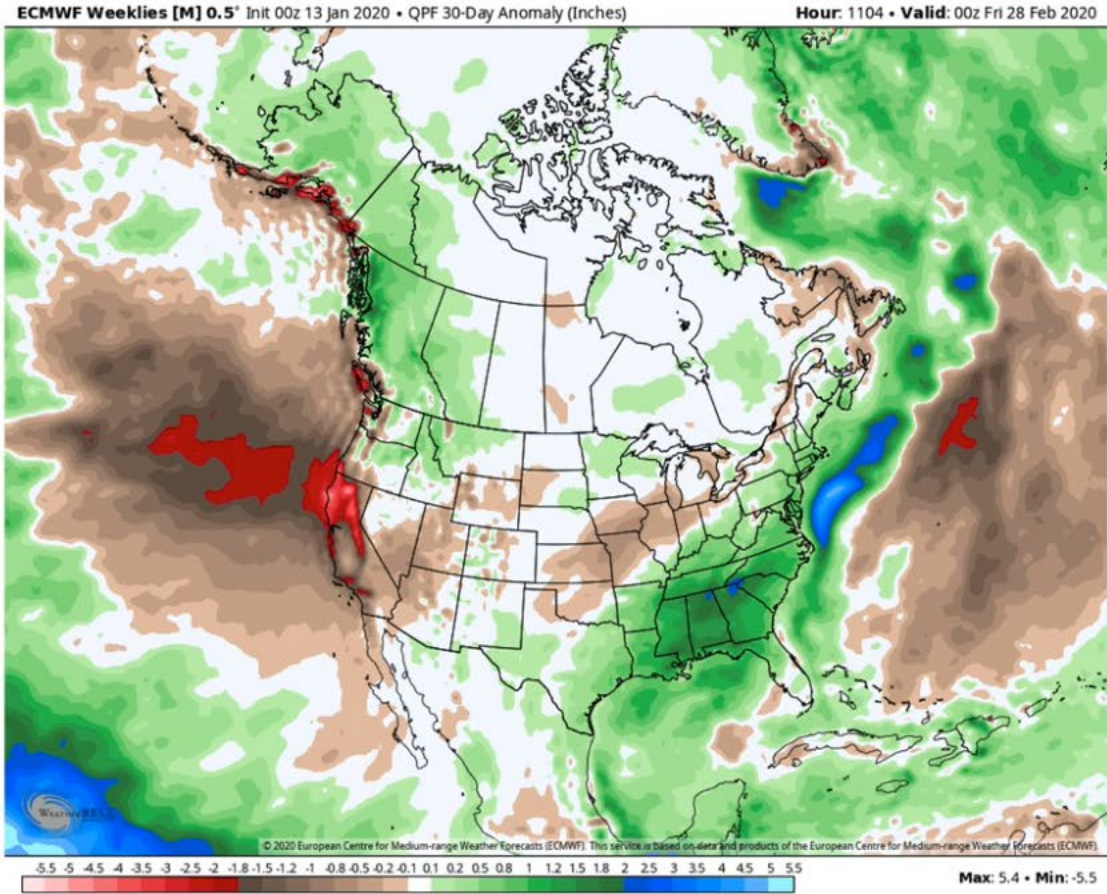


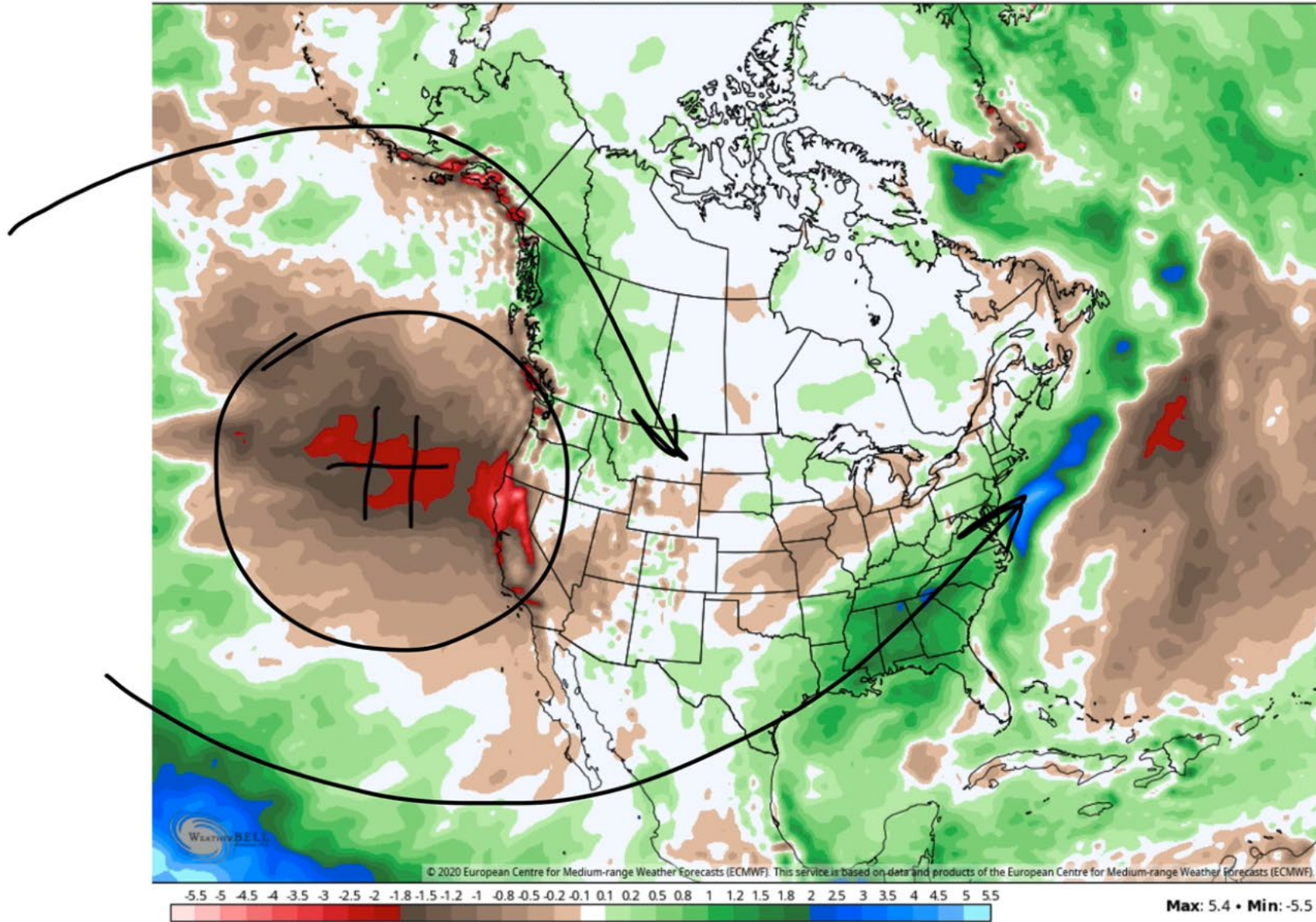
This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF)

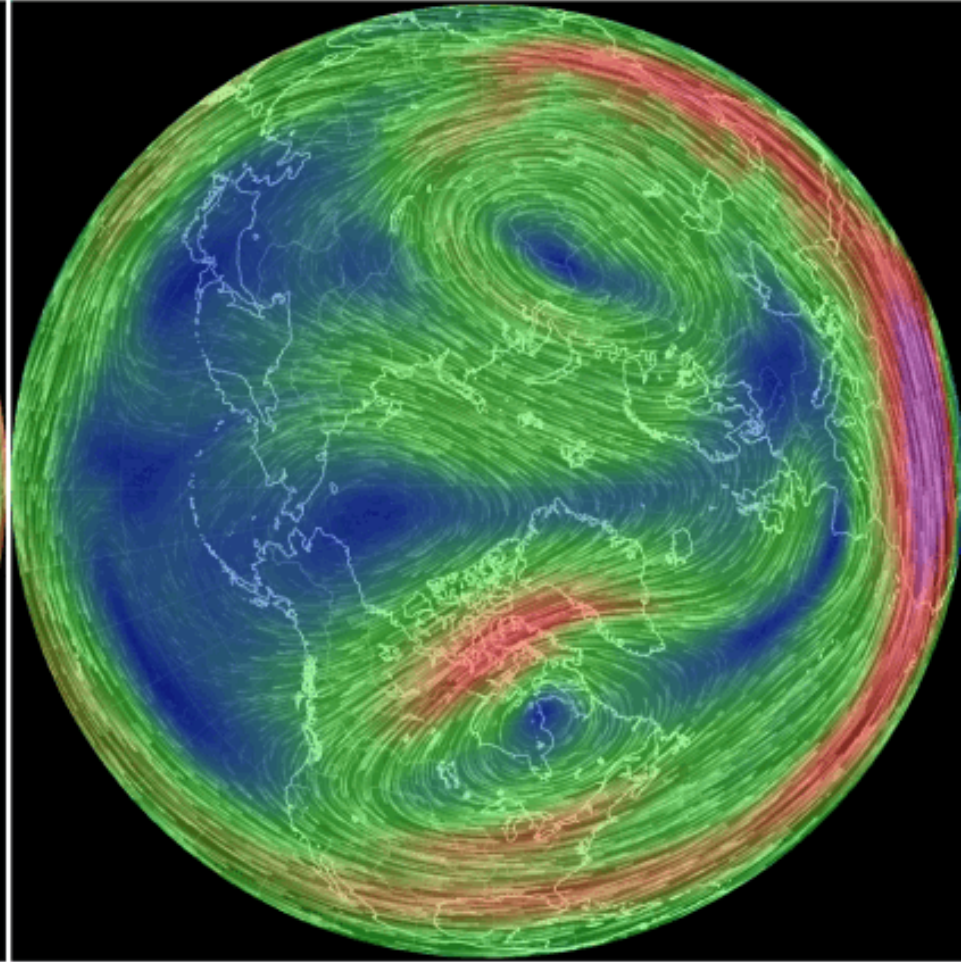
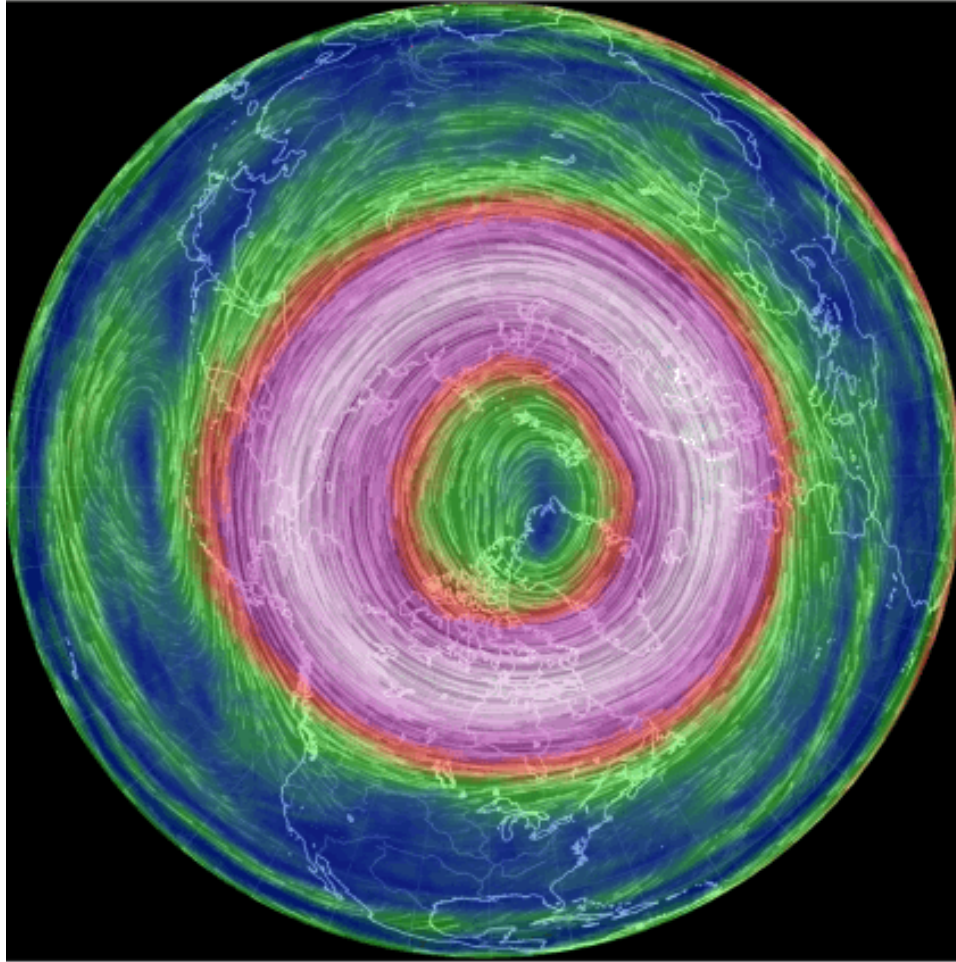
weathermodels.com



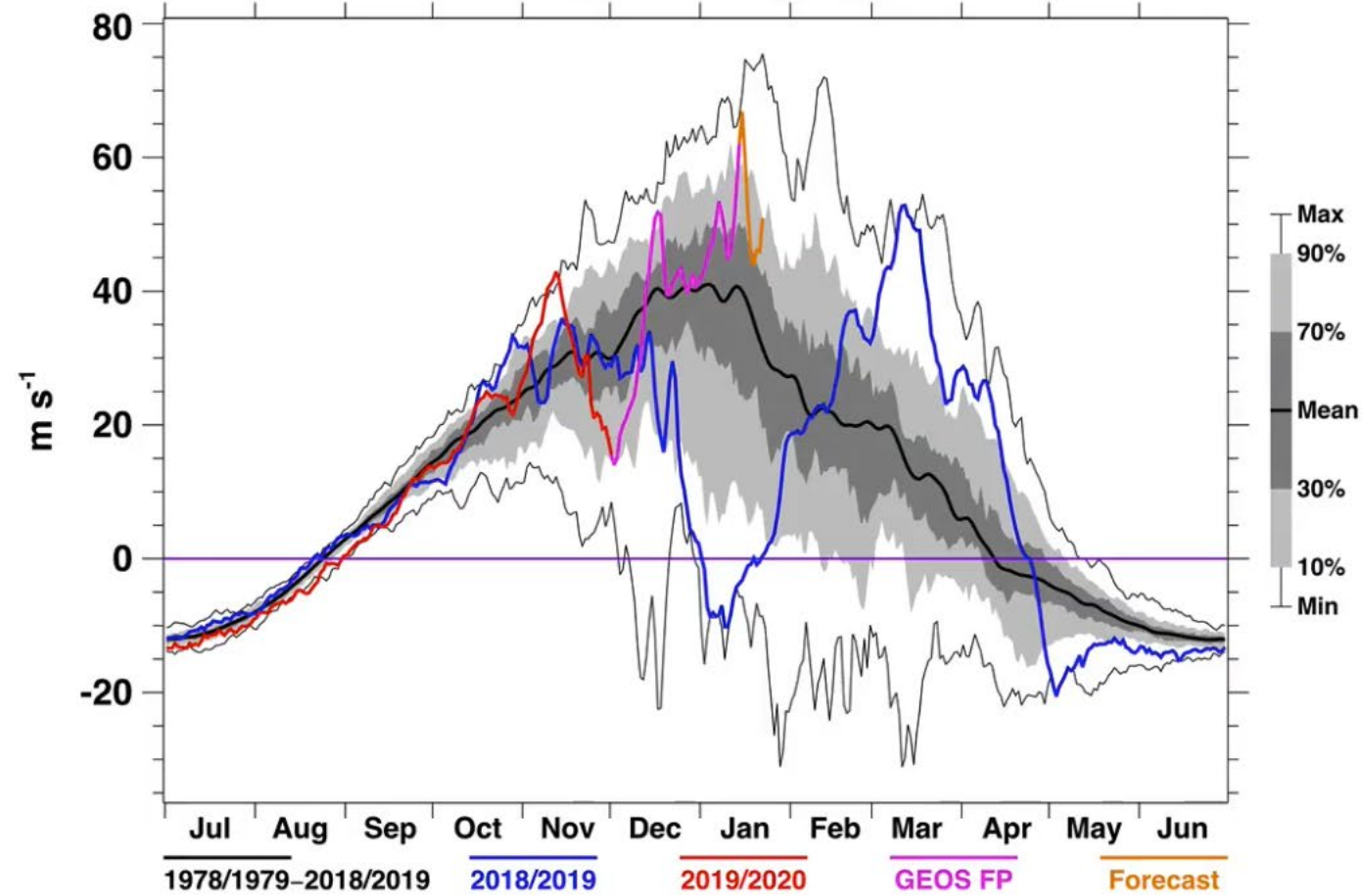
Jan 28, 2020 - Feb 28, 2020





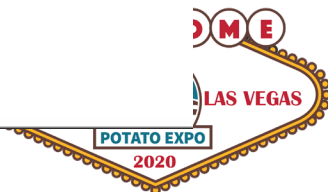


60°N Zonal Mean Zonal Wind 10 hPa MERRA2



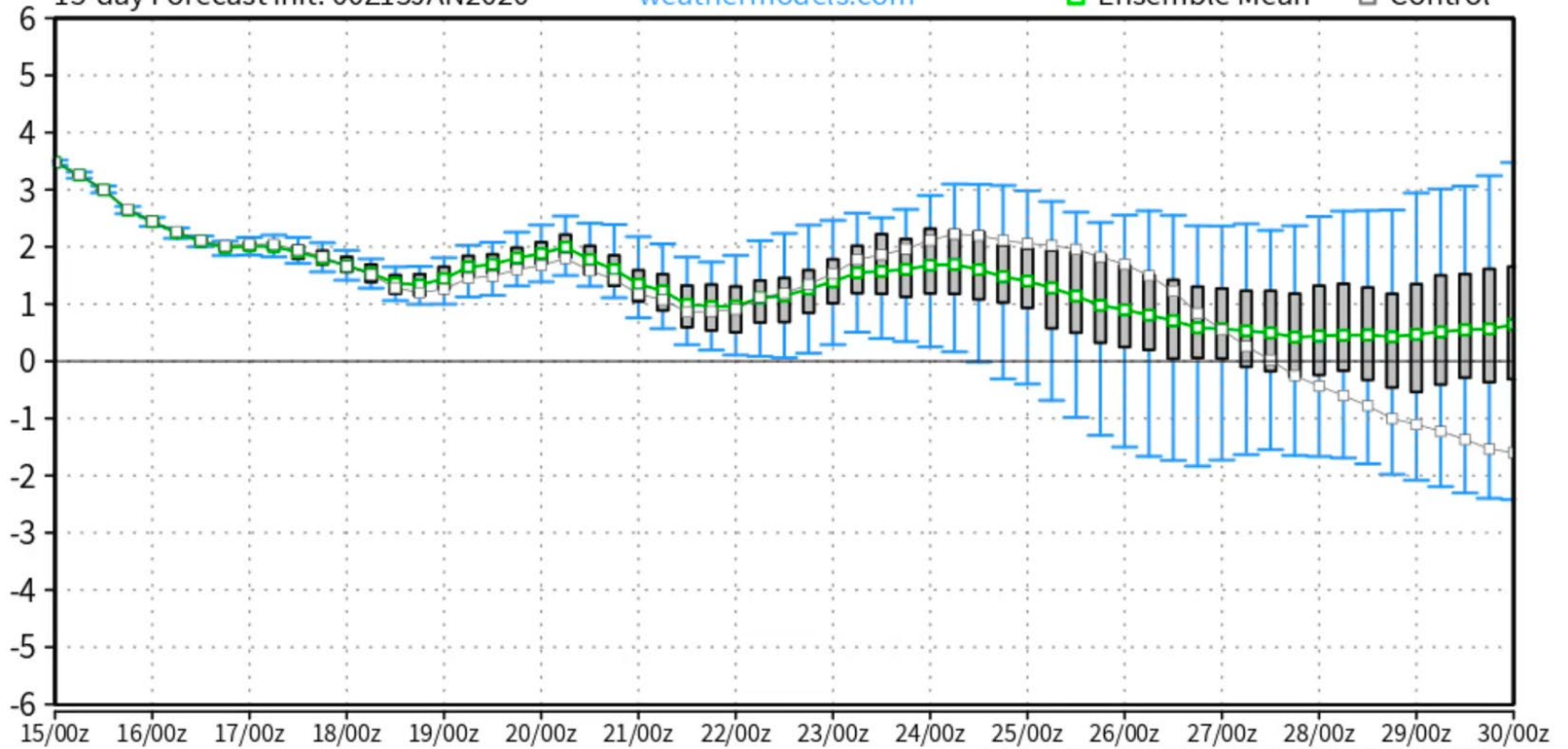
P. Newman (NASA), E. Nash (SSAI), S. Pawson (NASA)

2020-01-14T14:16:51Z



ECMWF EPS Arctic Oscillation [AO] 50-perturbed members
15-day Forecast Init: 00Z15JAN2020 weathermodels.com

■ 25-75% I 5-95%
■ Ensemble Mean □ Control

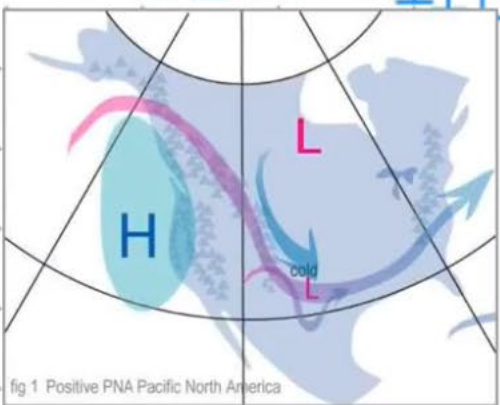
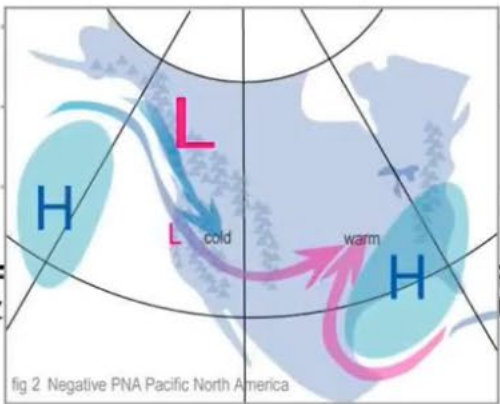
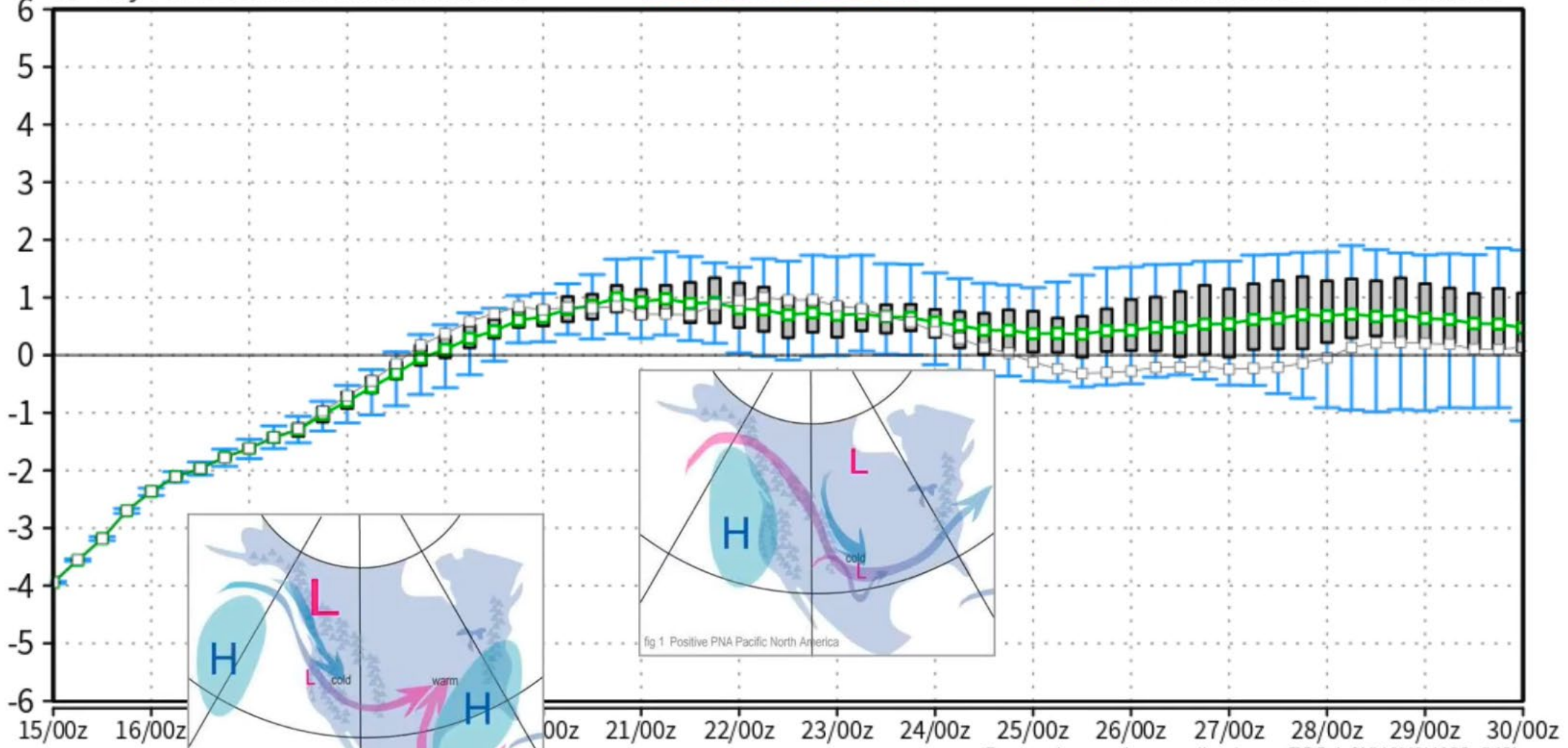


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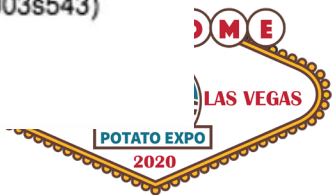


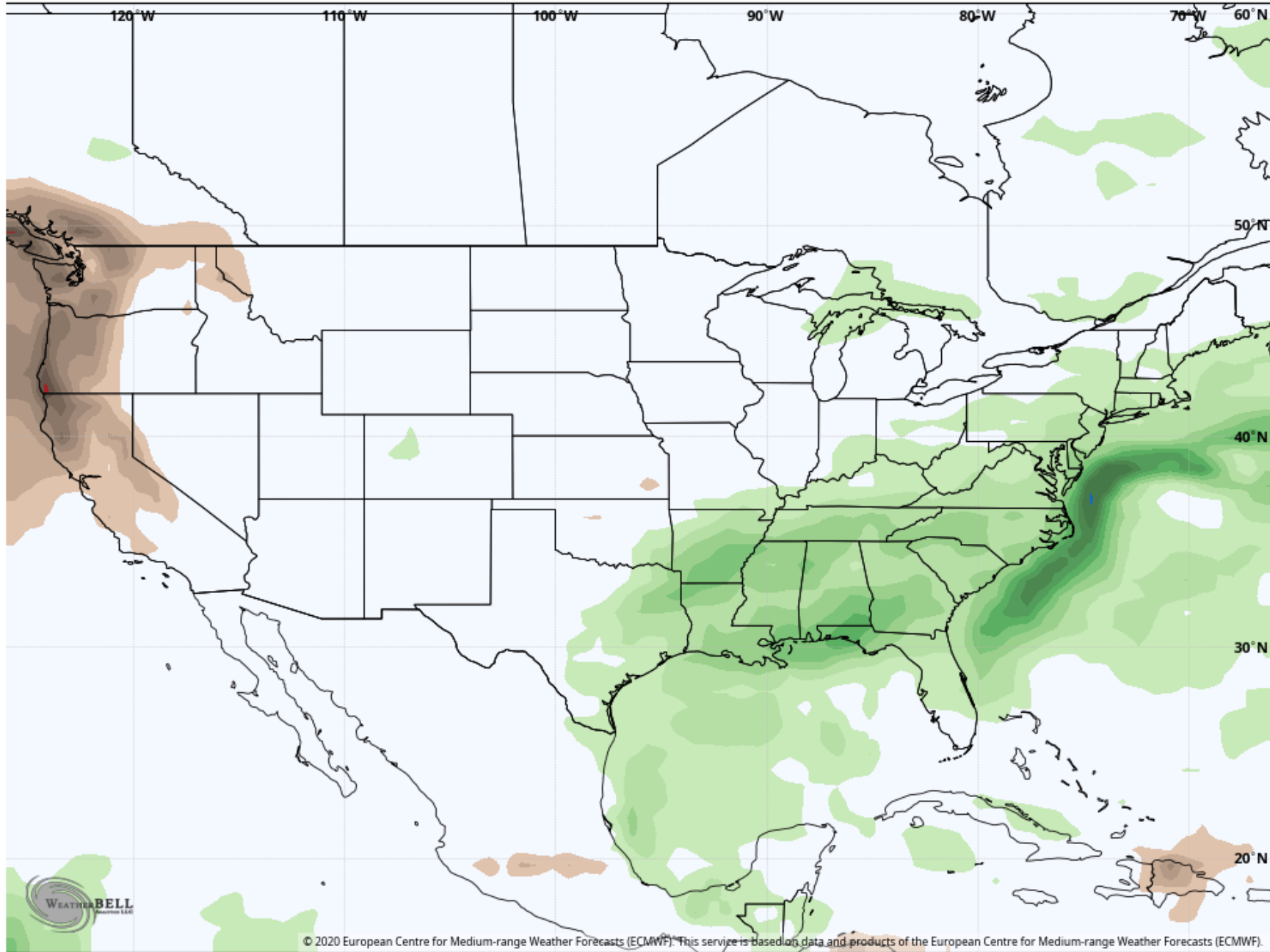
ECMWF EPS Pacific North American Pattern [PNA] 50-perturbed members
 15-day Forecast Init: 00Z15JAN2020 weathermodels.com

25-75%
 Ensemble Mean
 5-95%
 Control

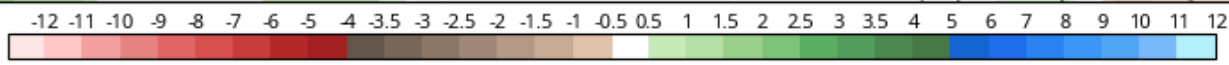


Personal use only according to our TOS (pf1540U0U003s543)



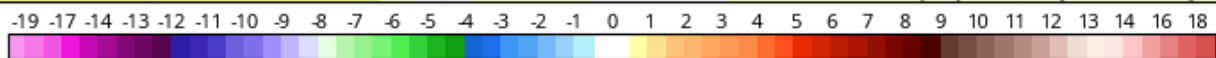
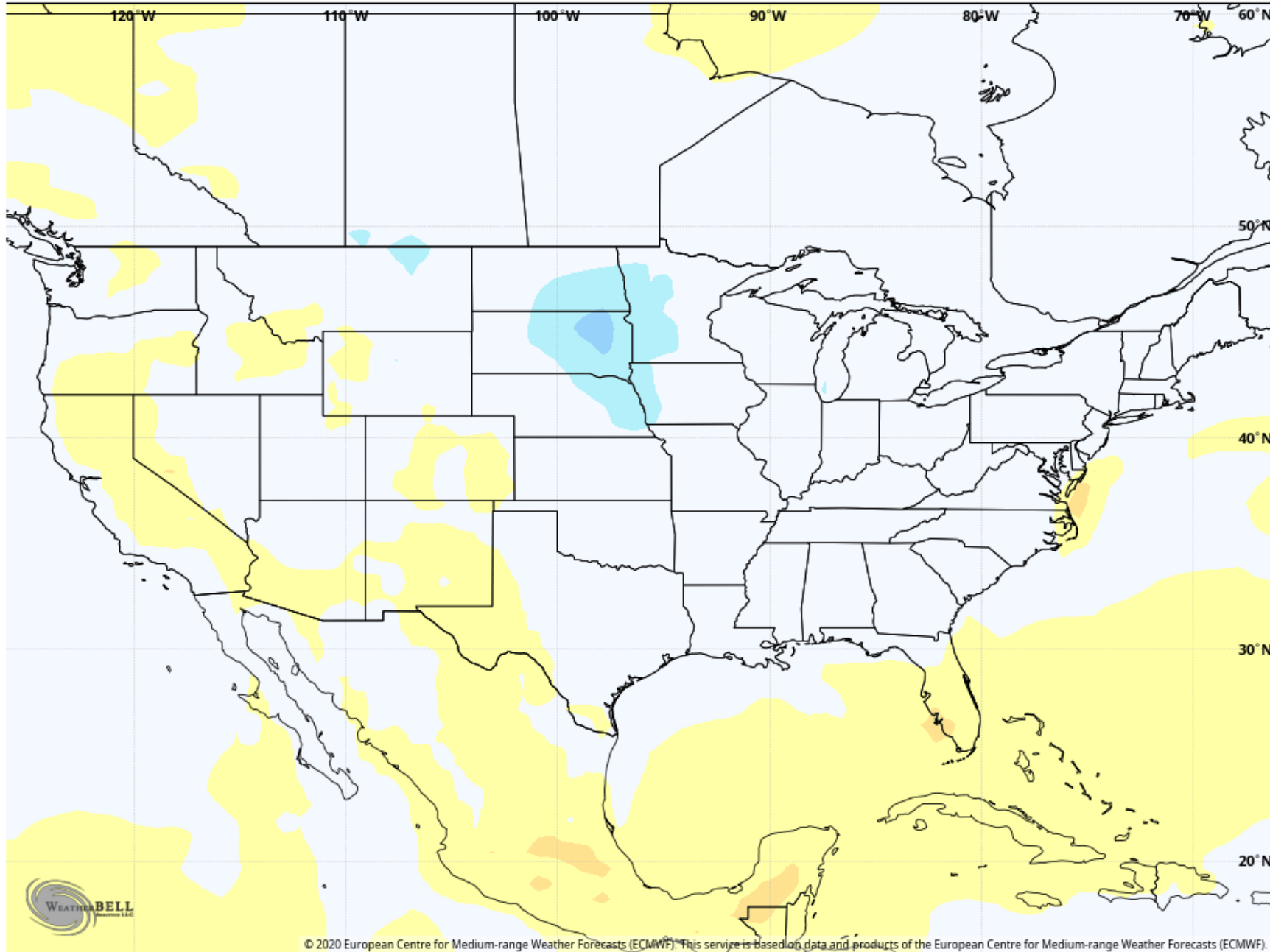


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Max: 5.21 • Min: -4.29





Max: 1.3 • Min: -1.1



<https://my.nutrienagsolutions.com>

Welcome, Andrew Pritchard

Weather Story

Local Weather

Markets

Add Account

Benefits

Enjoy these benefits by adding one or more retail accounts.



Account Activity

Make quick and easy online payments, with the option to create crop plans to inform agronomic decisions that maximize field performance.



Agronomy



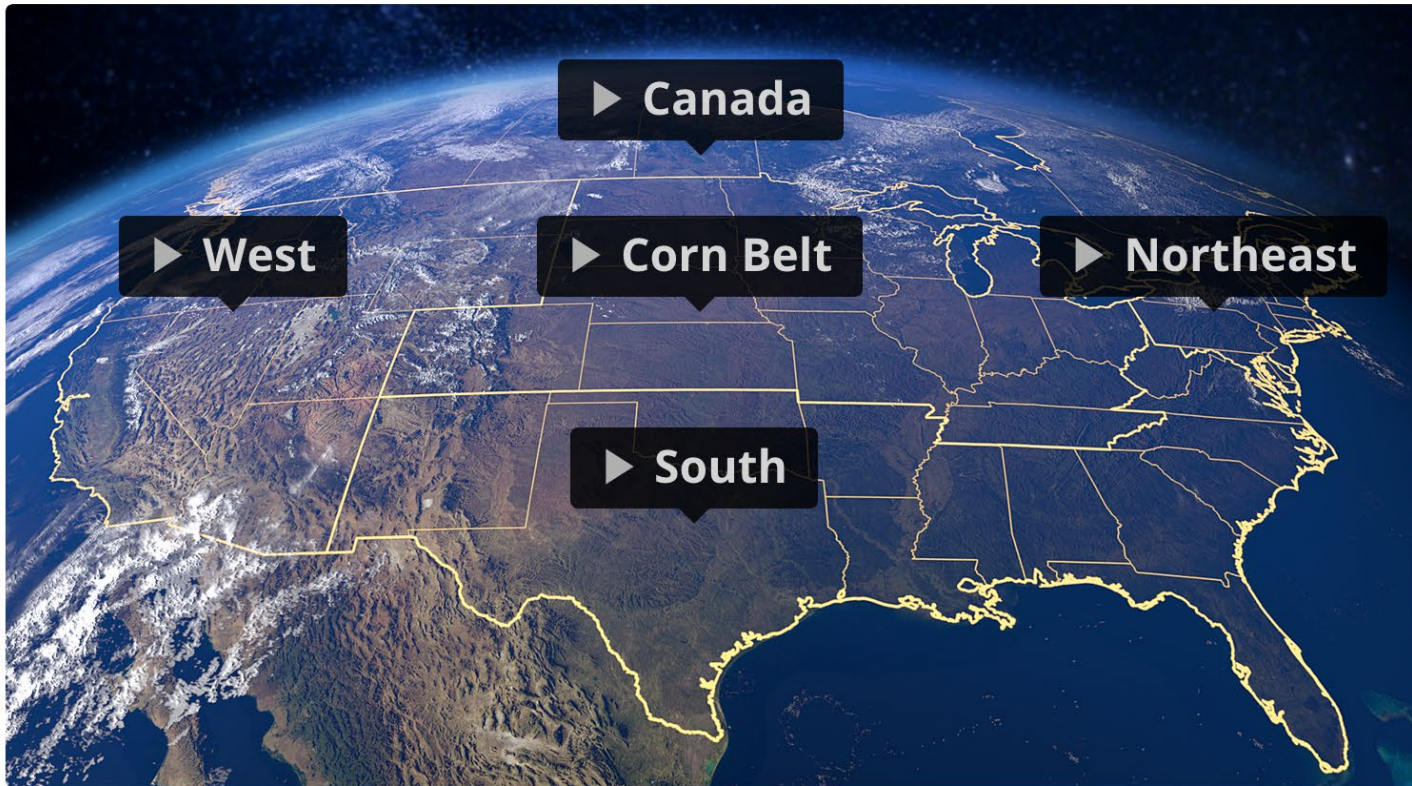
Product Usage

Review product purchase history and help take the guesswork out of planning decisions.

Weather Story

Regional Forecasts

US updated January 7. Canada updated January 8. Click on an area in the map below to view the latest forecast for that region.



Big Picture Forecasts

Overall US and Global forecasts.



Thank you!

- Andrew.Pritchard@Nutrien.Com
- Twitter - [@skydrama](https://twitter.com/skydrama)

