

A look at Colorado's climate across time and space scales

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ATMOSPHERIC SCIENCE
COLORADO STATE UNIVERSITY



COLORADO CLIMATE CENTER

Providing information and expertise on Colorado's complex climate

Western Slope Horticultural Society Conference
17 January 2017



Our Mission

The Colorado Climate Center at CSU provides valuable weather and climate expertise to the residents of the state through its threefold program of:

- 1) *Climate Monitoring*** (data acquisition, analysis, and archiving),
- 2) *Climate Research***
- 3) *Climate Services*** (providing data, analysis, climate education and outreach)

When studying the atmosphere, we often refer to “scales” of motion...

earth.nullschool.net links:

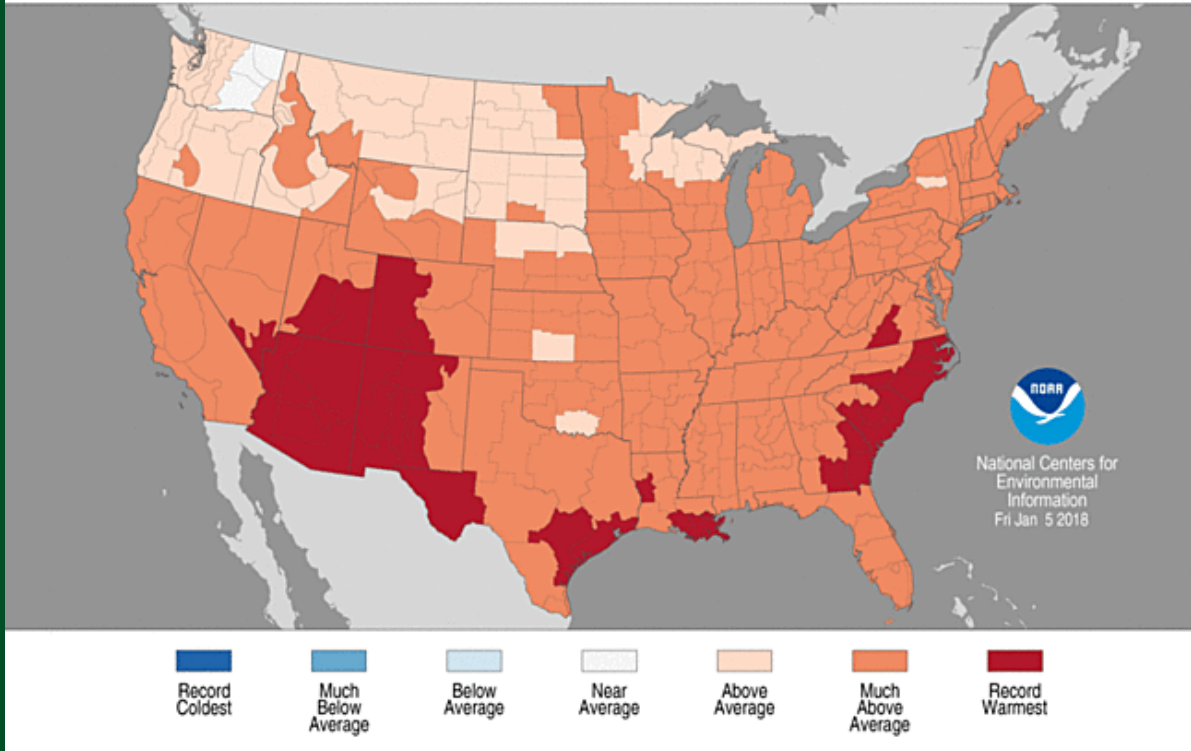
- [Global 250 mb](#)
- [Zoom](#)
- [Same zoom but surface](#)

(Note: this isn't actually how fast the air is flowing! But a nice visualization nonetheless)

The last year has been warm and dry, but why?

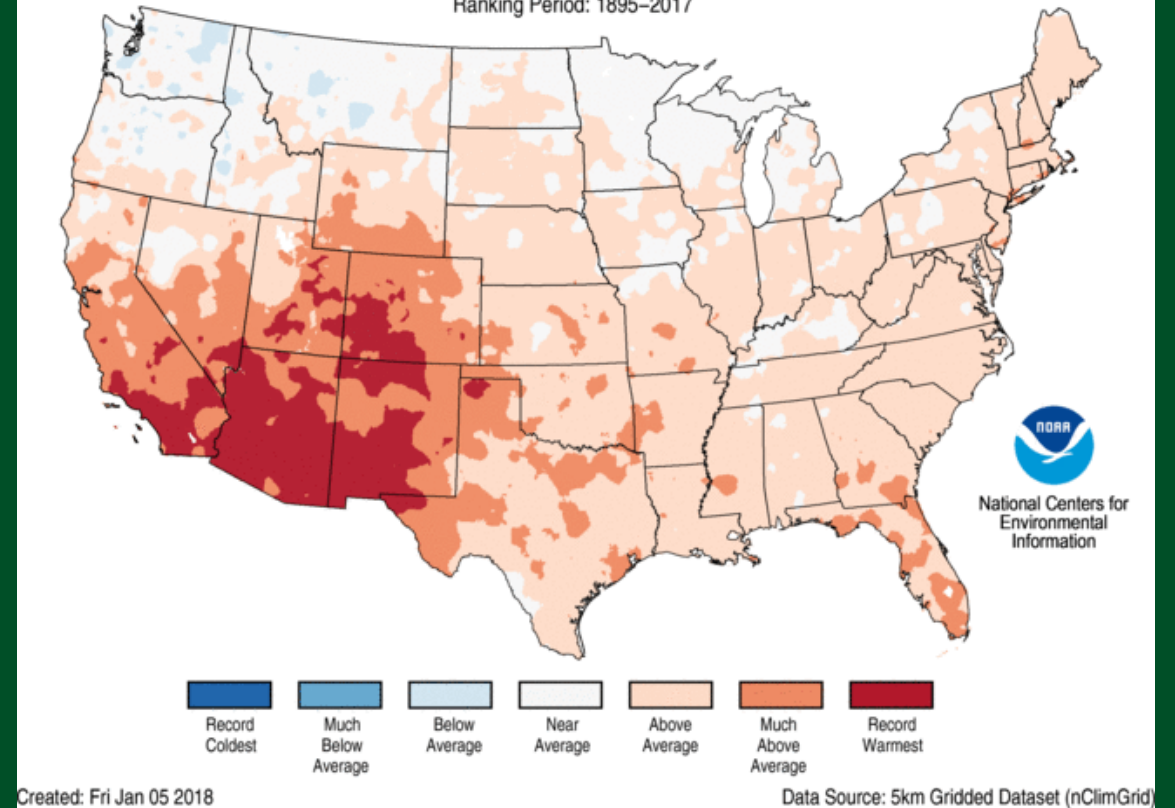
Entire year 2017

Divisional Average Temperature Ranks
January–December 2017
Period: 1895–2017



October-December 2017

Mean Temperature Percentiles
October–December 2017
Ranking Period: 1895–2017

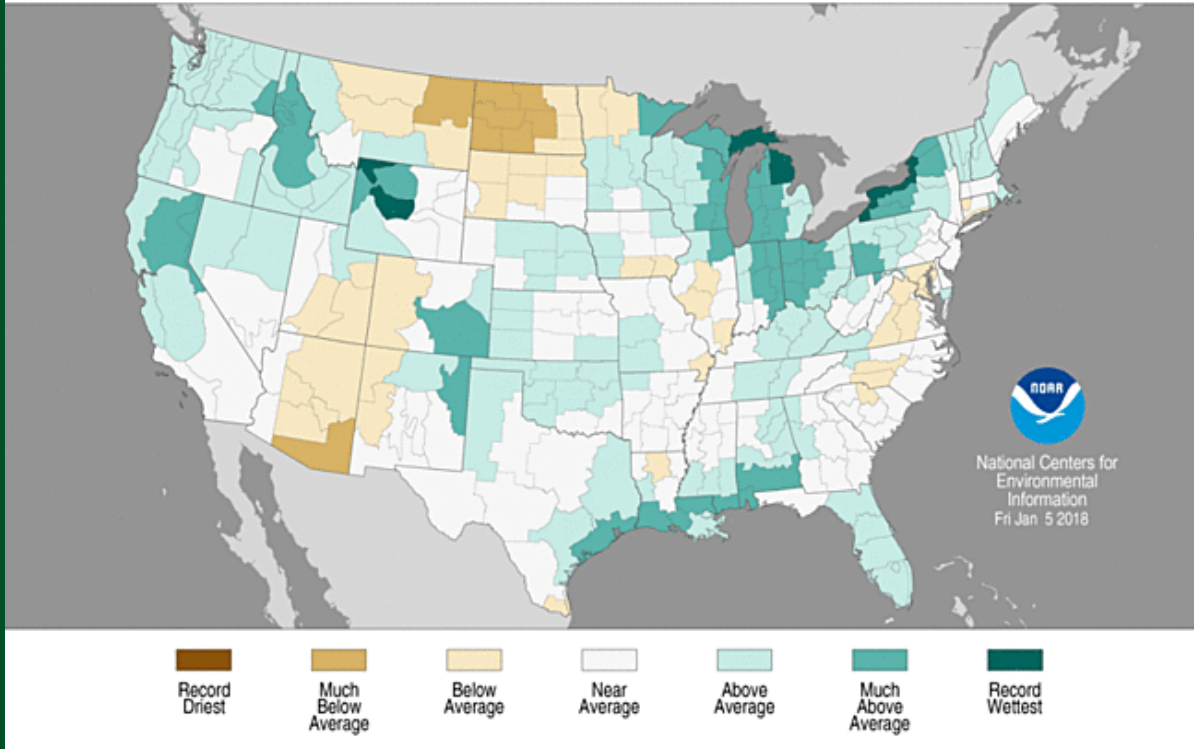


<https://www.ncdc.noaa.gov/temp-and-precip/us-maps/>

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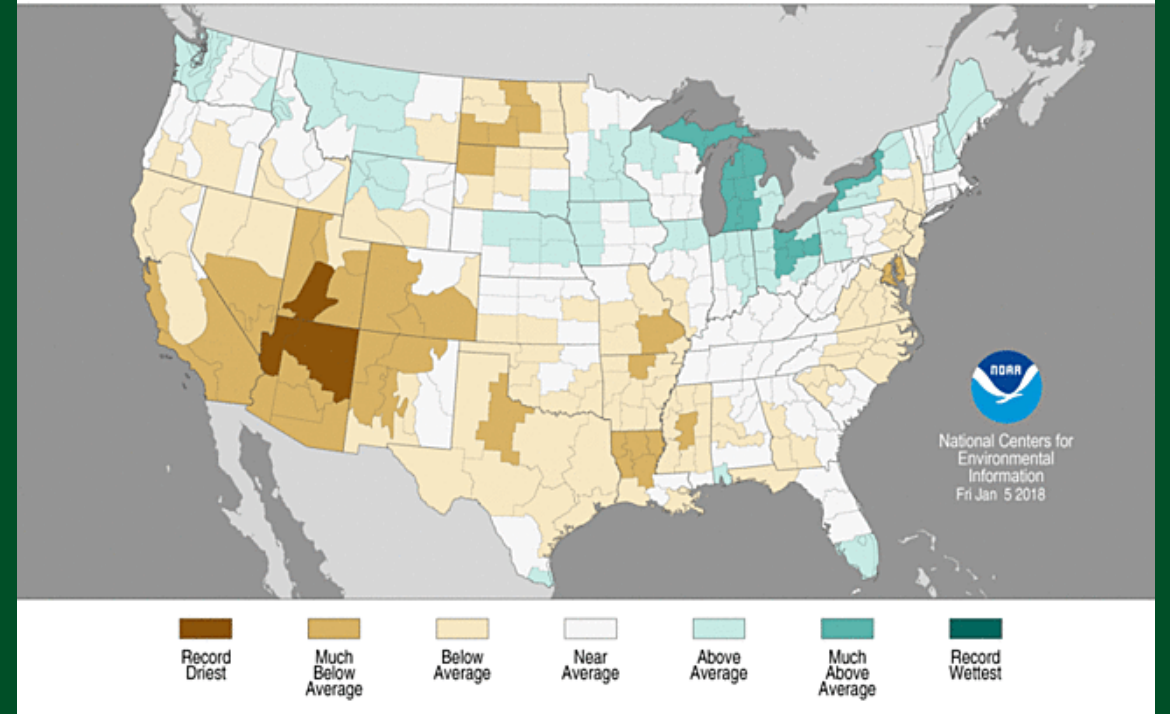
Entire year 2017

Divisional Precipitation Ranks January–December 2017 Period: 1895–2017



October–December 2017

Divisional Precipitation Ranks October–December 2017 Period: 1895–2017

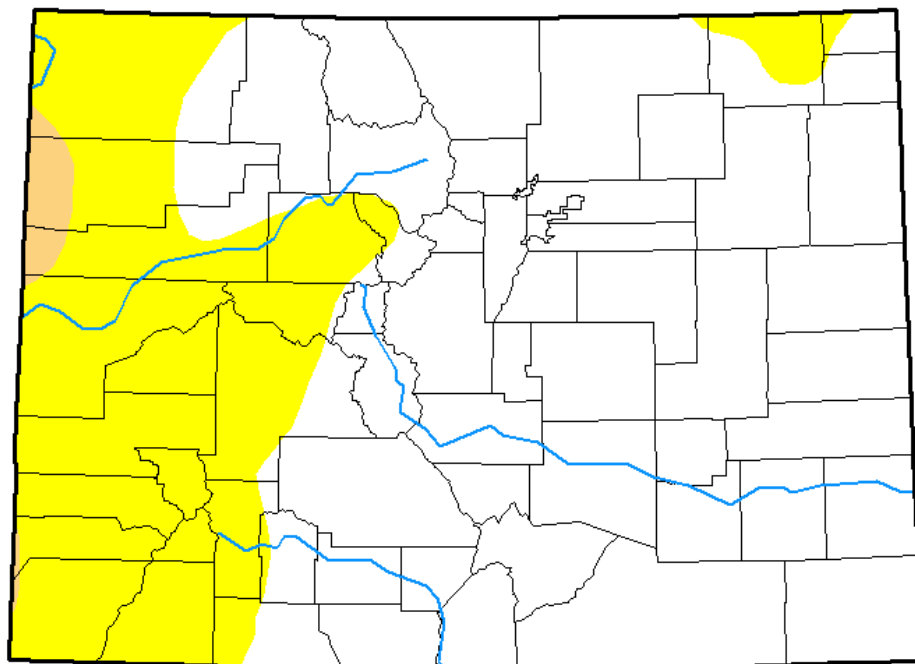


<https://www.ncdc.noaa.gov/temp-and-precip/us-maps/>

Drought monitor, 7 November 2017

U.S. Drought Monitor Colorado

November 7, 2017
(Released Thursday, Nov. 9, 2017)
Valid 7 a.m. EST



Intensity:

-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

David Miskus
NOAA/NWS/NCEP/CPC

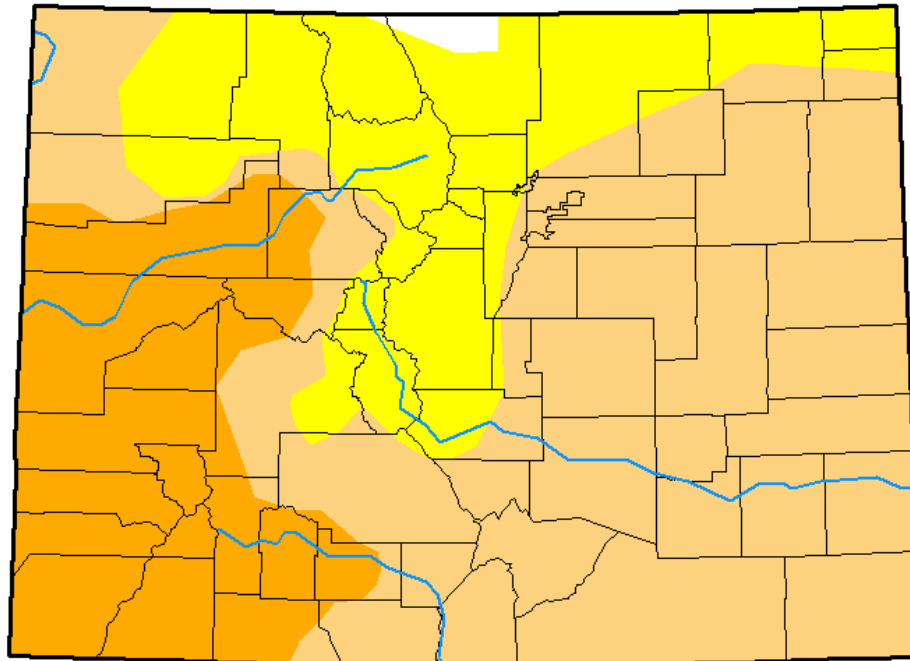


<http://droughtmonitor.unl.edu/>



Drought monitor, 9 January 2018

U.S. Drought Monitor Colorado

January 9, 2018
(Released Thursday, Jan. 11, 2018)
Valid 7 a.m. EST



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Author:

Brian Fuchs
National Drought Mitigation Center



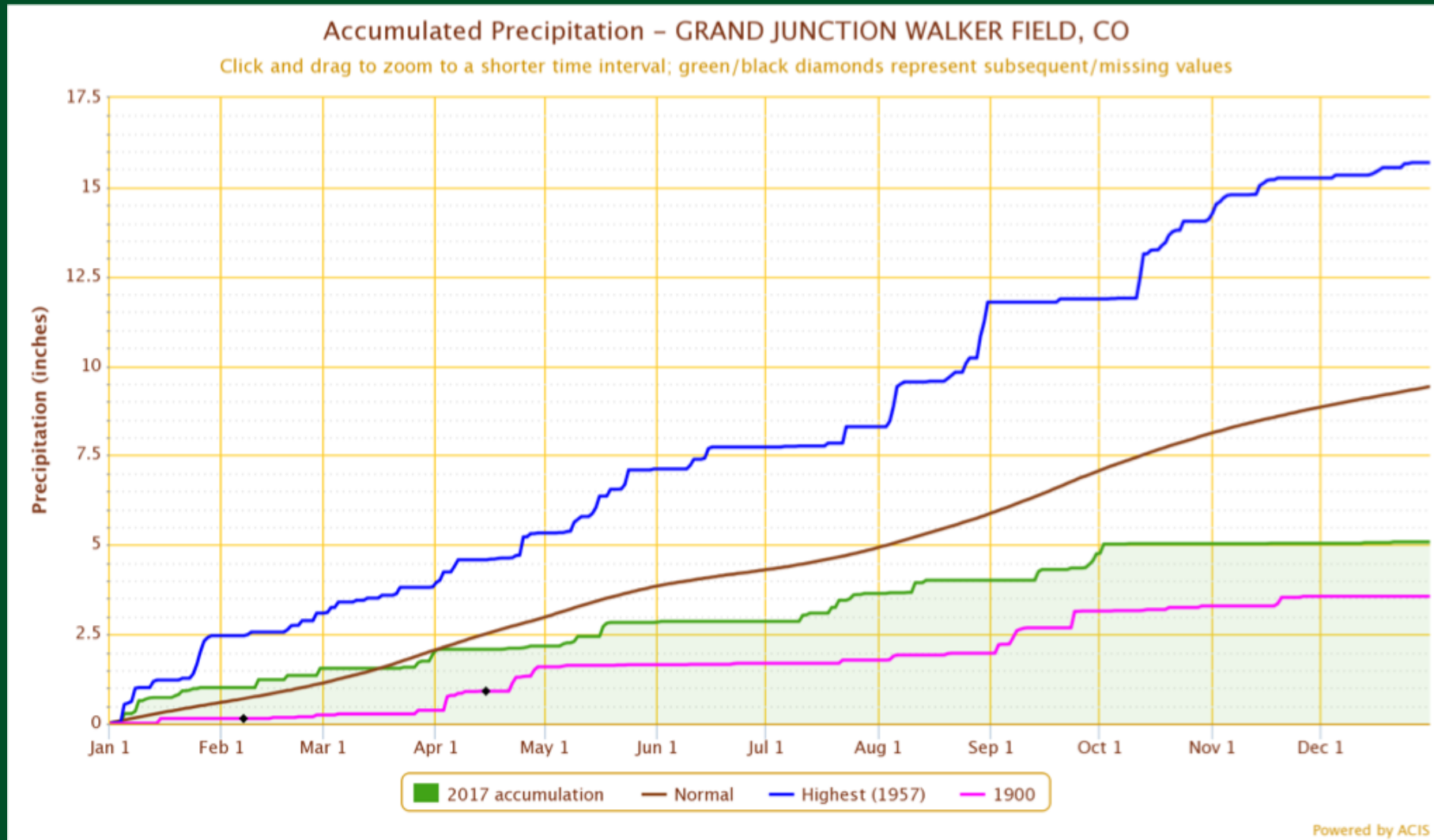
<http://droughtmonitor.unl.edu/>

70% increase in area from November to January in Colorado

99.4% of the state now in at least D0

22% in D2 (severe)

The last year has been warm and dry, but why?



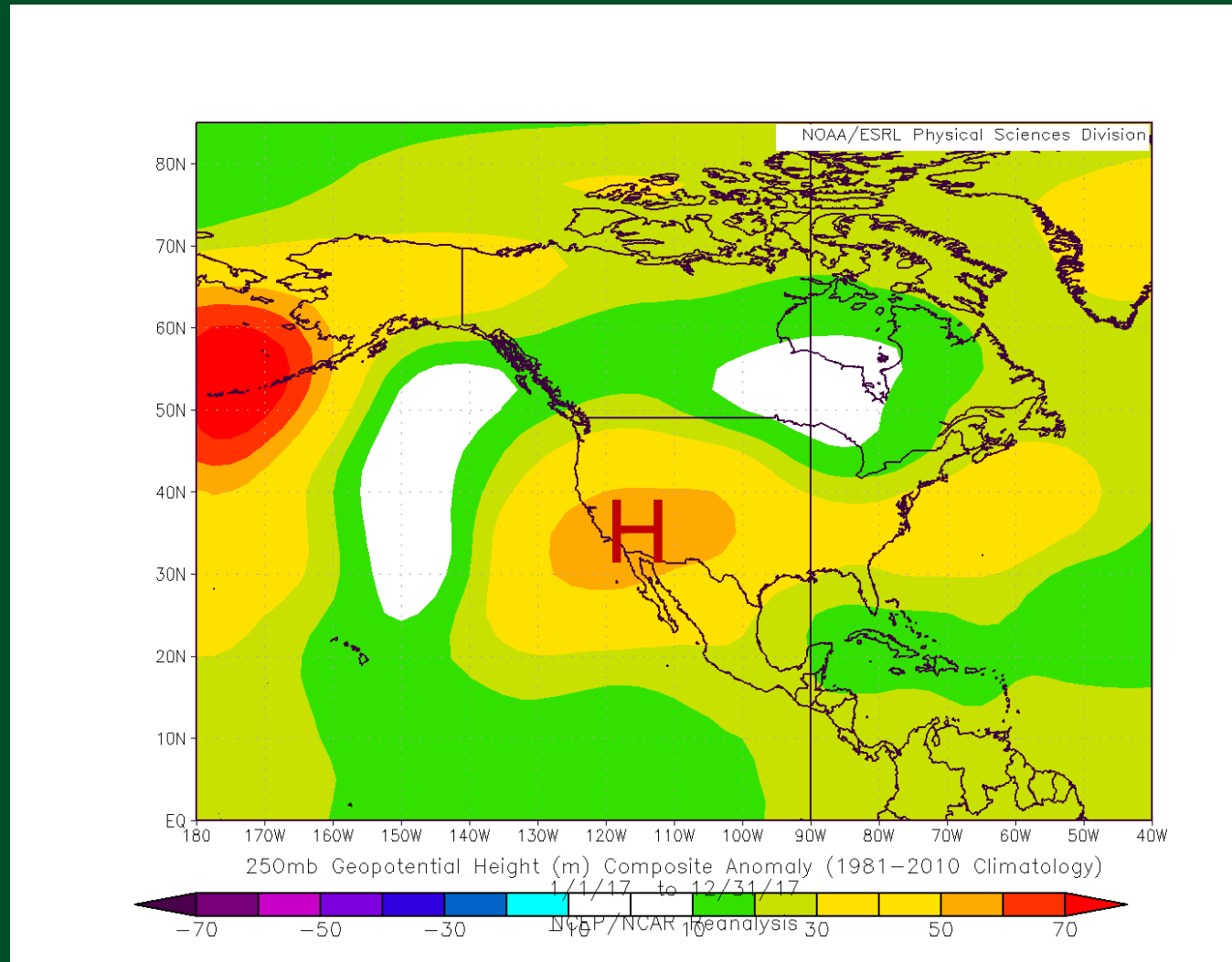
1957 (wettest)

Average

2017 (3rd driest)

1900 (driest)

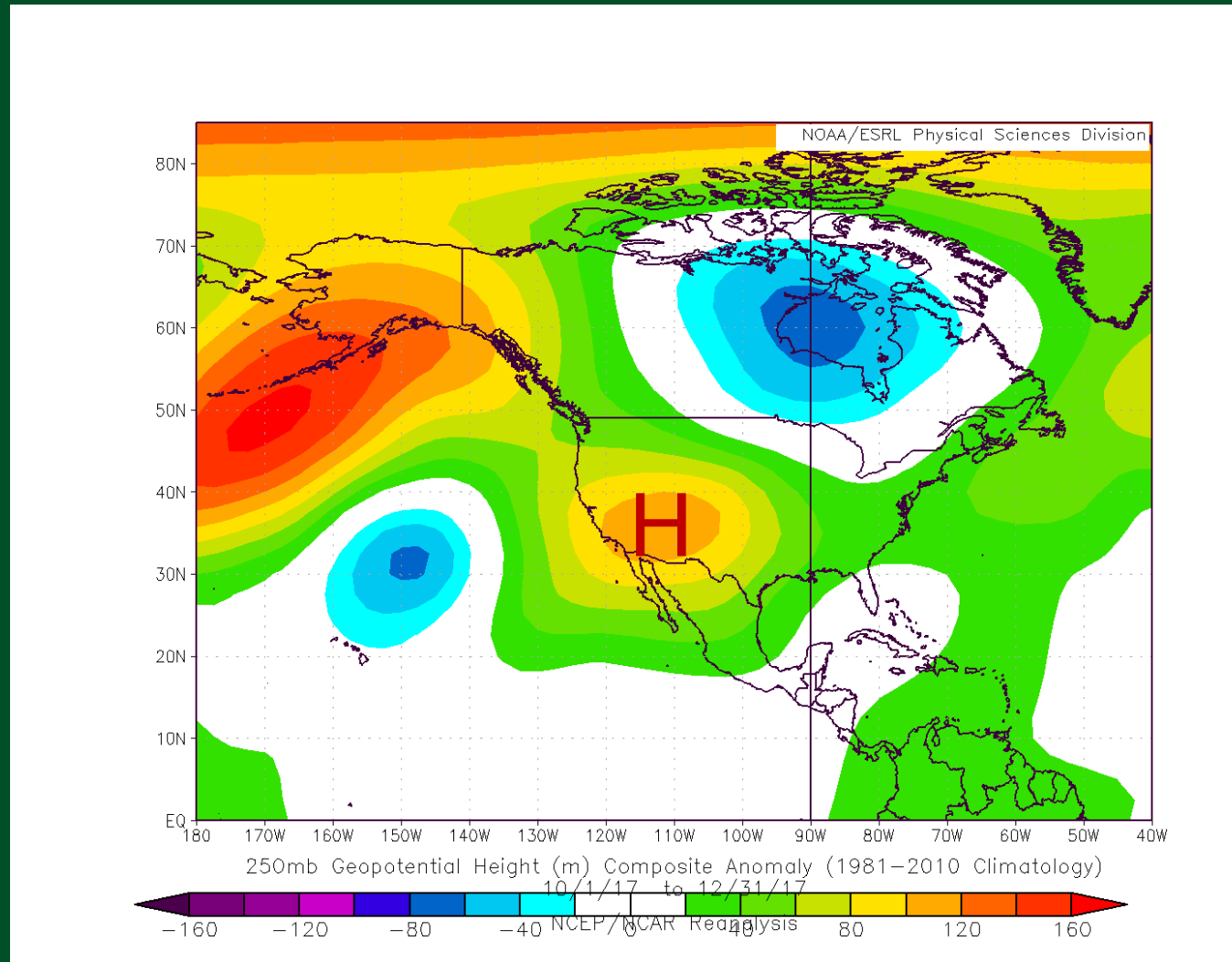
The last year has been warm and dry, but why?



Think of this as the pressure at jet-stream level, difference between 2017 and the long-term average

Persistent upper-level high pressure over the southwest (sinking motion); jet stream weaker and deflected northward

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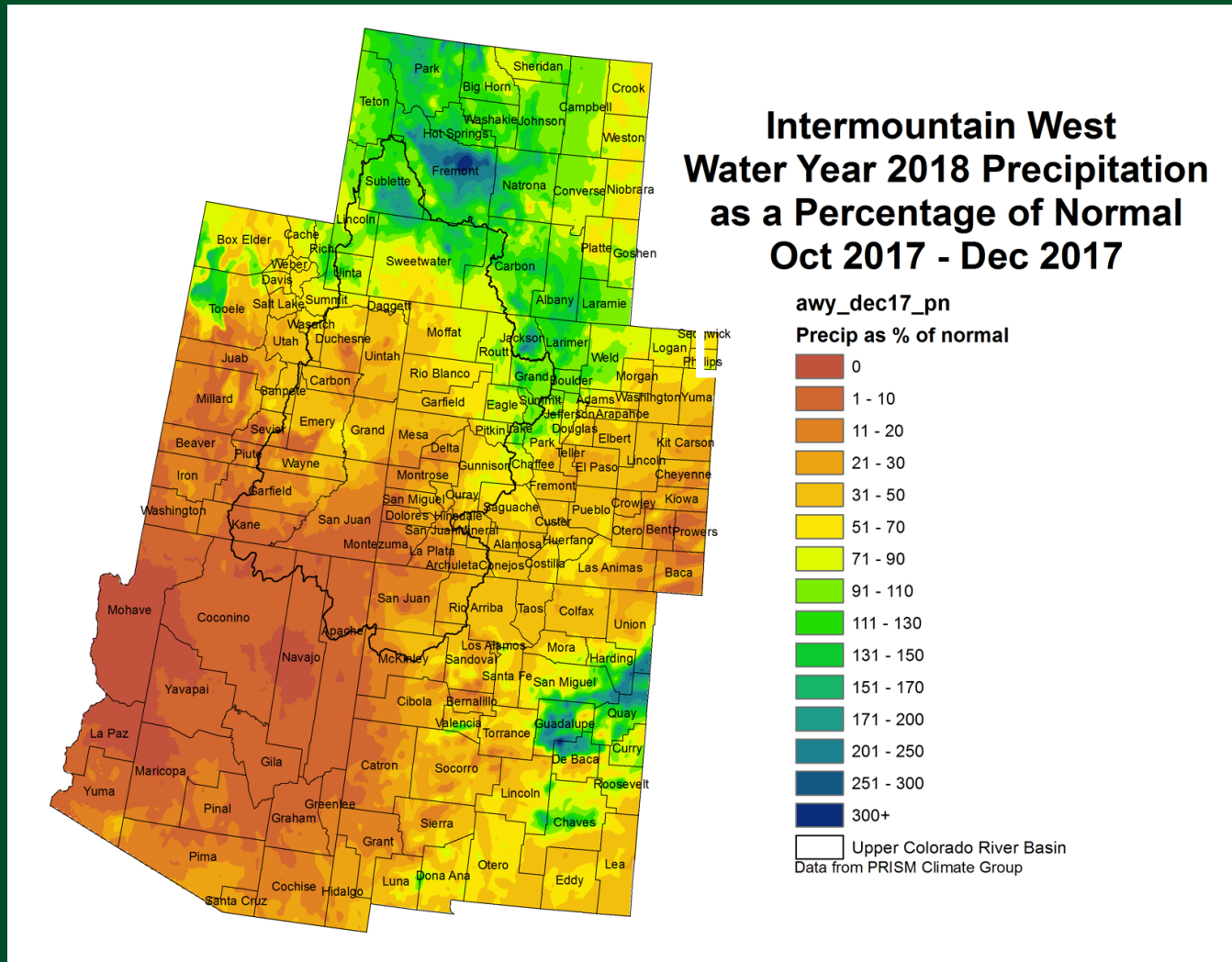
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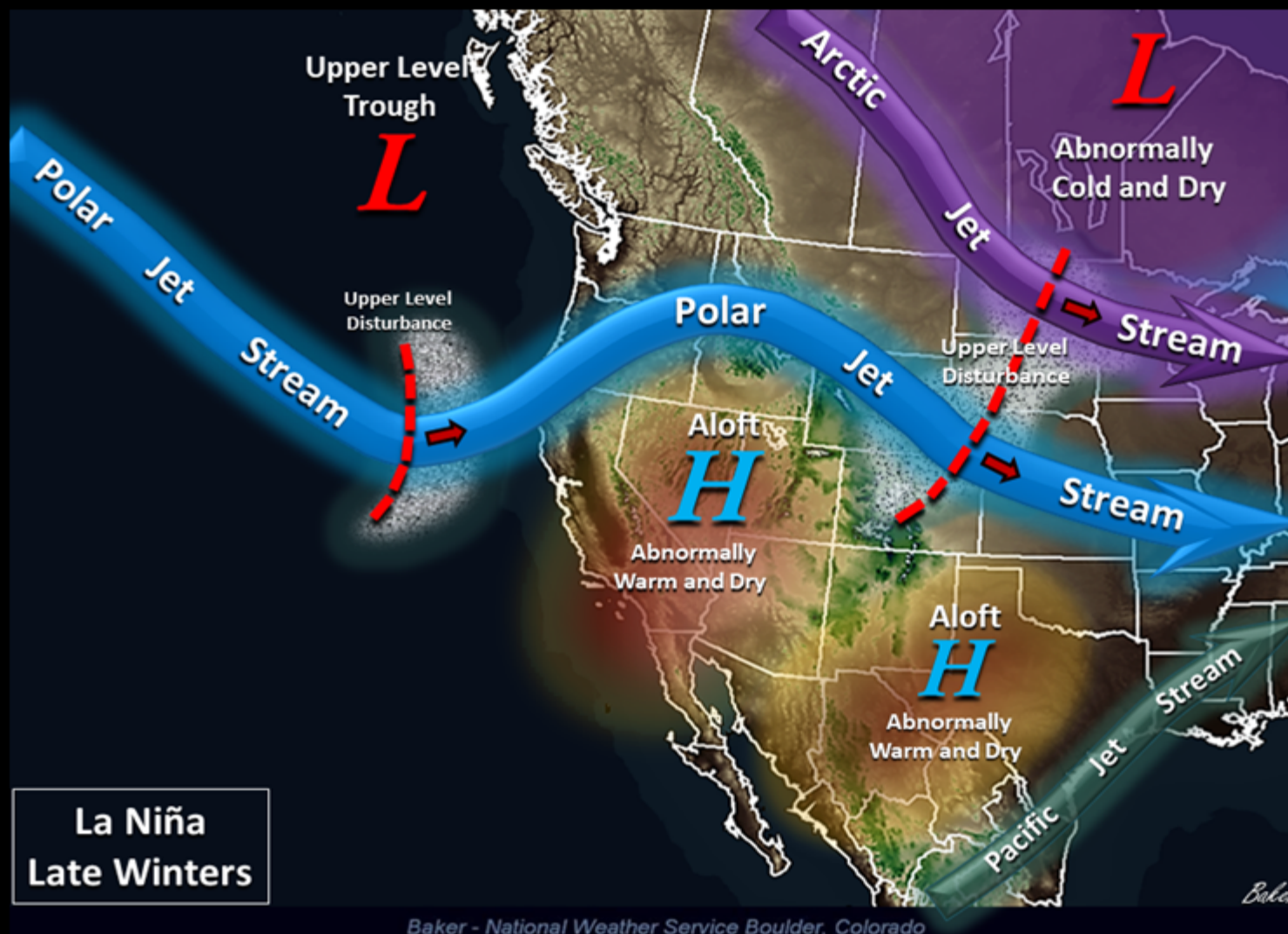
ENSO (El Niño / Southern Oscillation)

- One of the biggest drivers of seasonal climate over North America is ENSO, the periodic variation of ocean temperatures in the Pacific Ocean
- This year, we are in **La Niña** conditions: cool ocean near South America, warm in the western Pacific
- La Niña conditions expected to continue through the winter, then returning to neutral in the spring
- But...
 - ENSO influences on Colorado aren't as consistent as they are to our north and south
 - ENSO is only one driver of our winter conditions...and they've only partially explained our conditions this winter

Water year precipitation thus far



Predominant Late Winter Jet Stream Patterns During La Niñas



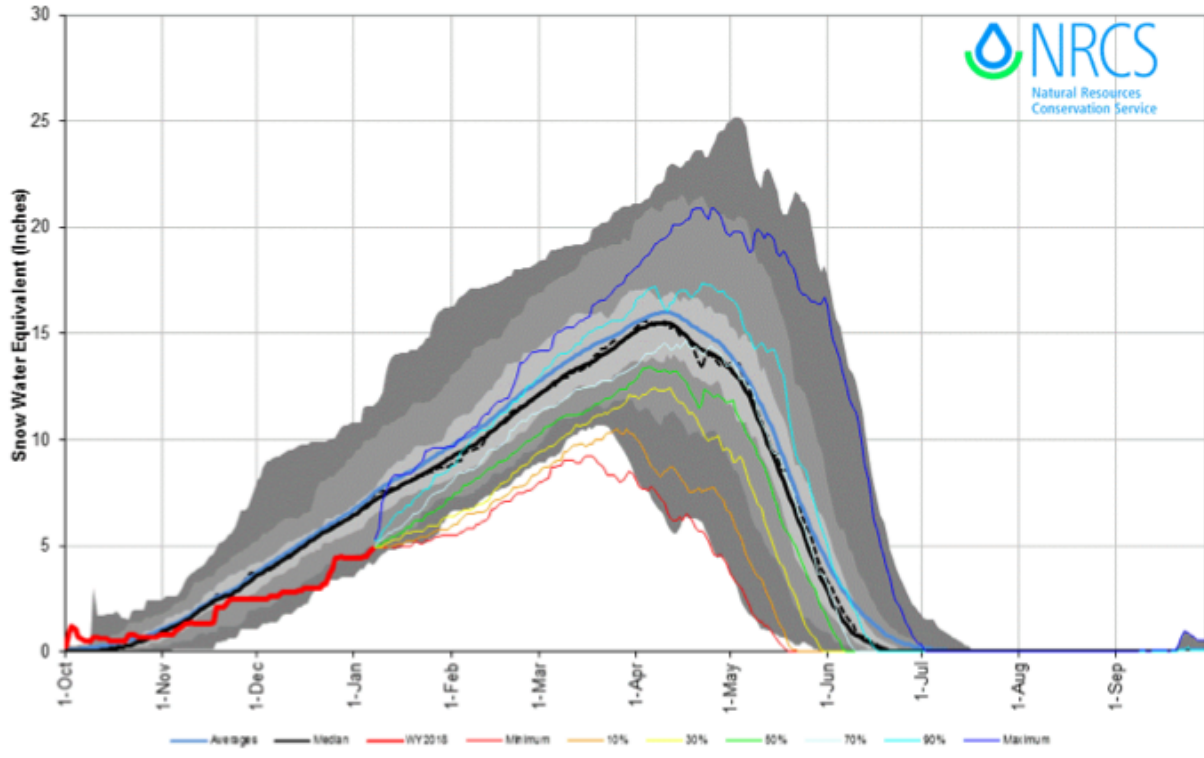
By late February and early March, the Great Basin high pressure ridge regains its strength, returning the West Coast and Intermountain West to a drier and warmer weather regime. The wildfire danger may increase again across southern California under these conditions. Meanwhile, the Arctic and Polar Jet Streams begin their northward migration, causing temperatures to moderate across the country. Meanwhile, the southeast U.S. usually stays stormy and abnormally wet as the region remains under the influence of a very moist subtropical flow.

For north central and northeast Colorado, the northward shift of the Polar Jet Stream (i.e., storm track) causes a reduction in high country snowfall. However, the occasional passage of a weather disturbance moved along by strong northwest flow aloft can still contribute to the late season snowpack in the northern mountains. East of the mountains, conditions usually turn warmer and drier, enhanced by warming and drying effects of gusty Chinook winds periodically downsloping off the Front Range.

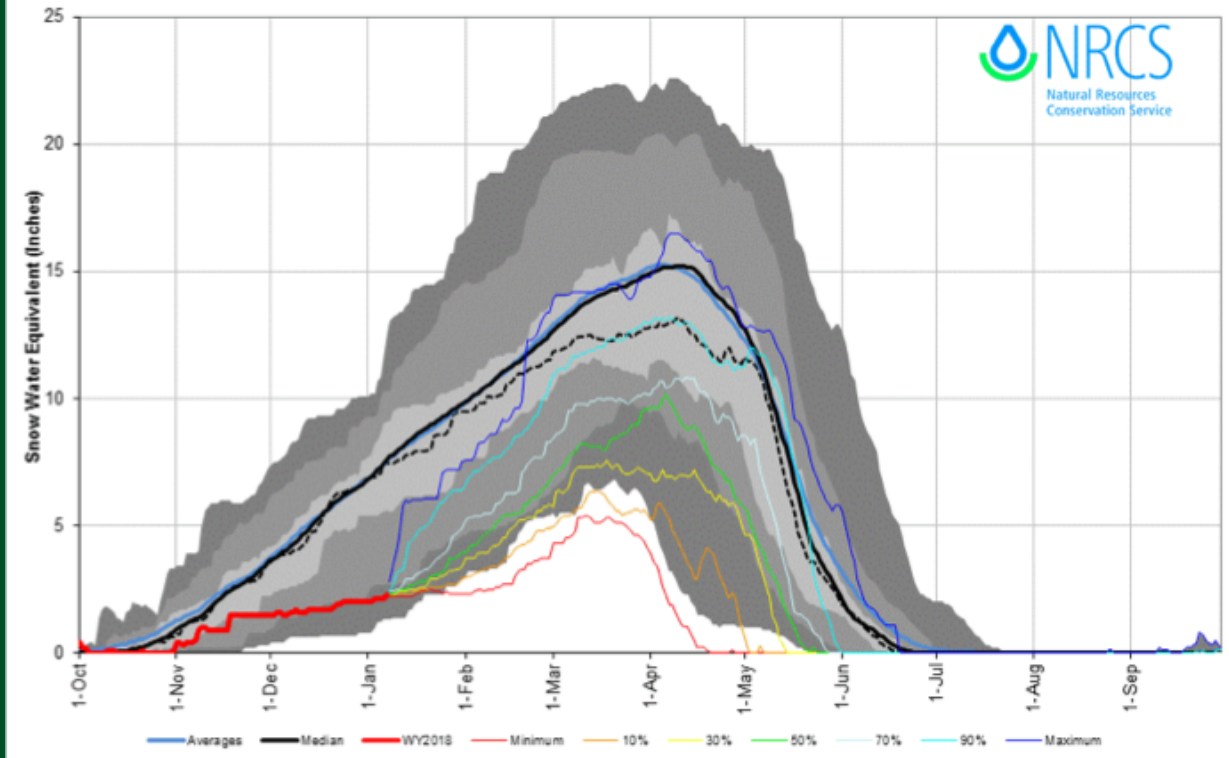
Upper Colorado River basin

Upper Rio Grande River basin

Upper Colorado River Basin with Non-Exceedence Projections
Based on Provisional SNOTEL Data as of Jan 07, 2018

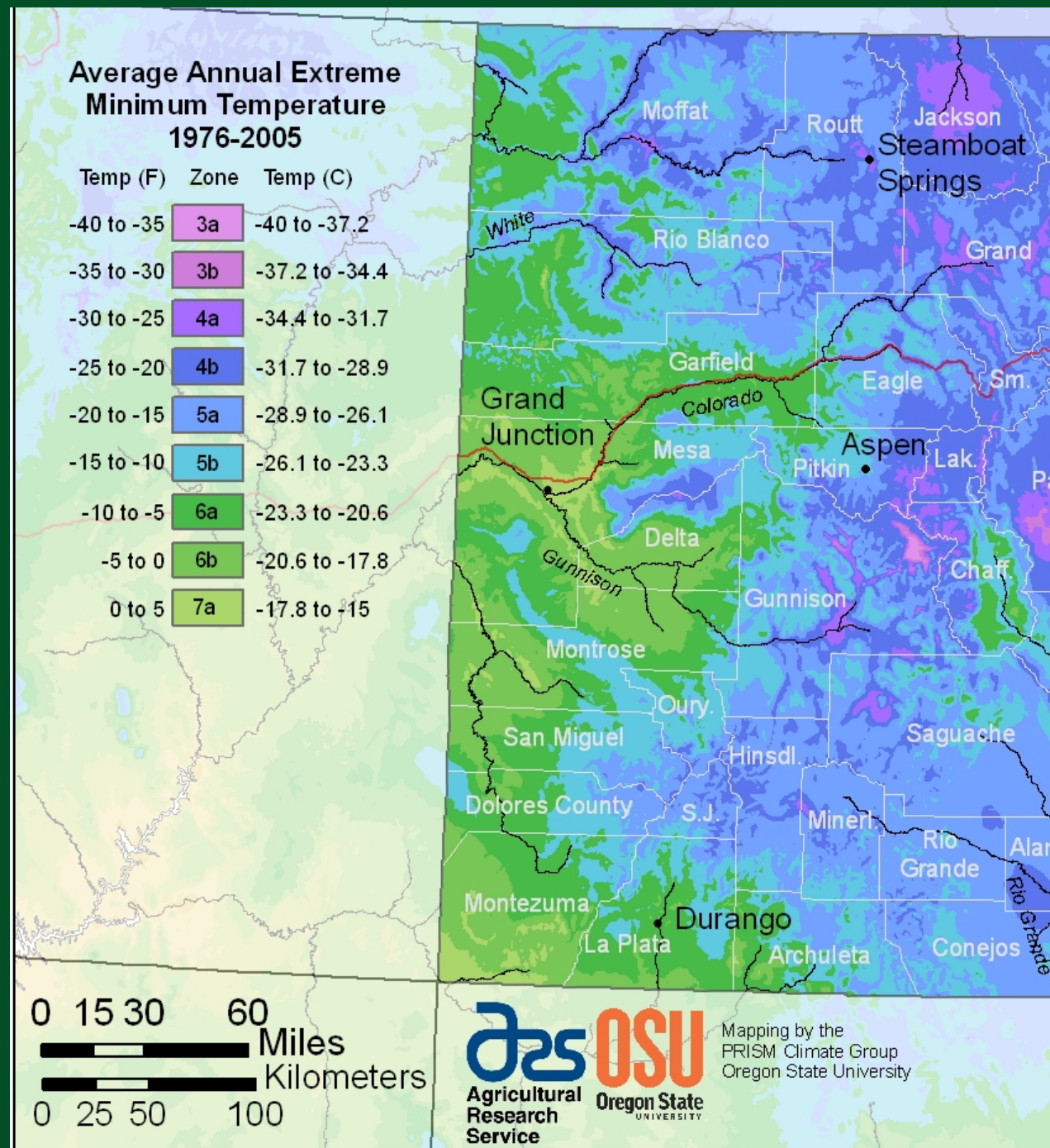


Upper Rio Grande River Basin with Non-Exceedence Projections
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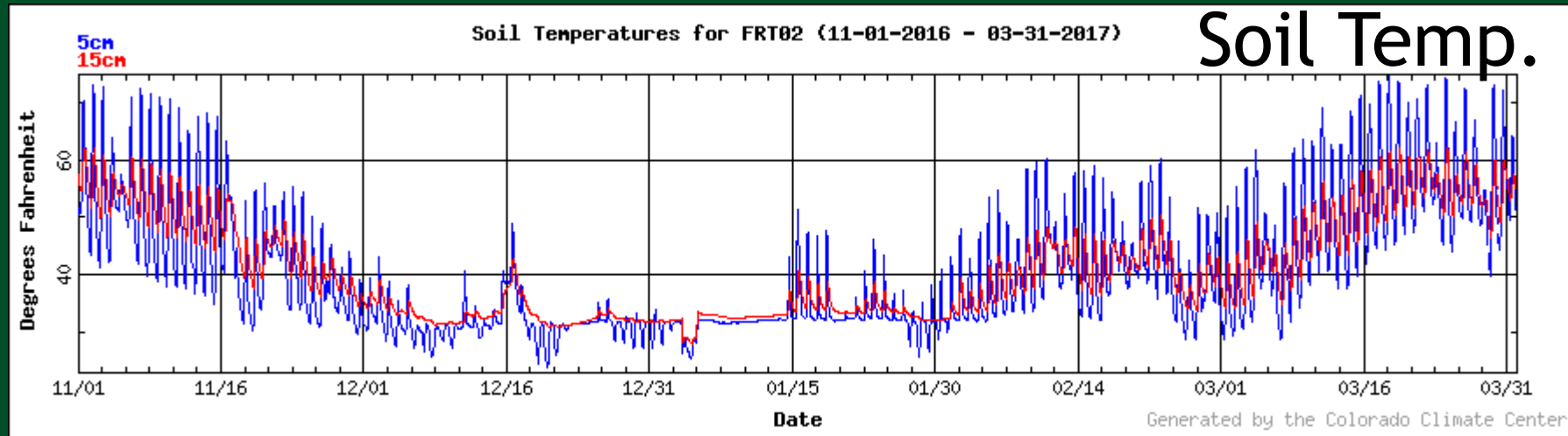
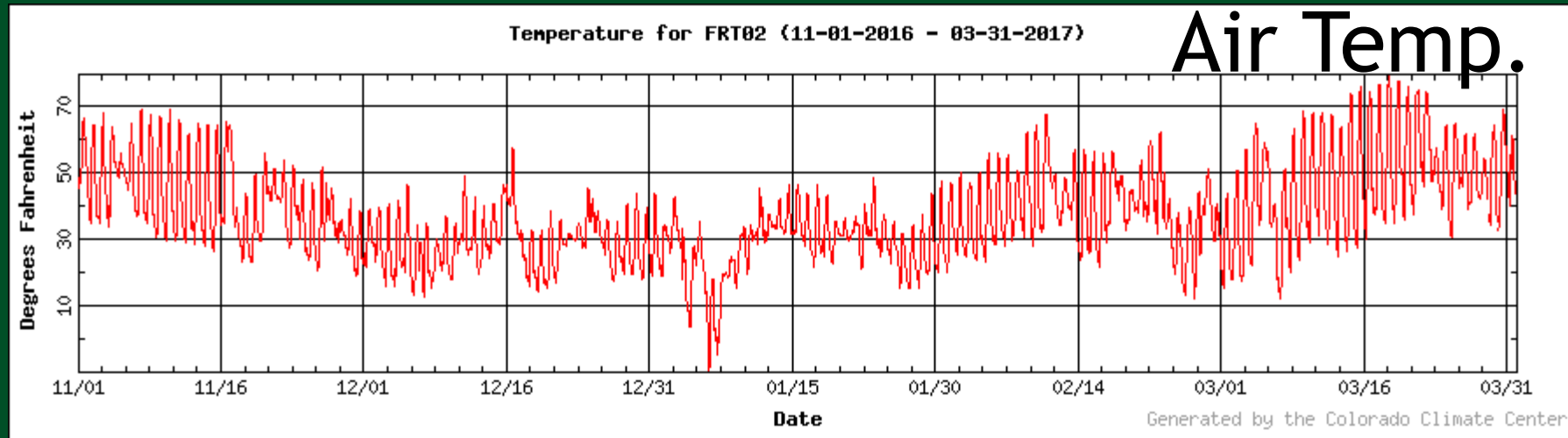
From NRCS

But these are large-scale factors...in horticulture,
it's often the (very) small scales that matter most!



You have the “mildest” climate of anywhere in Colorado here on the Western Slope...but the influences of the mesa and mountains and valleys are evident

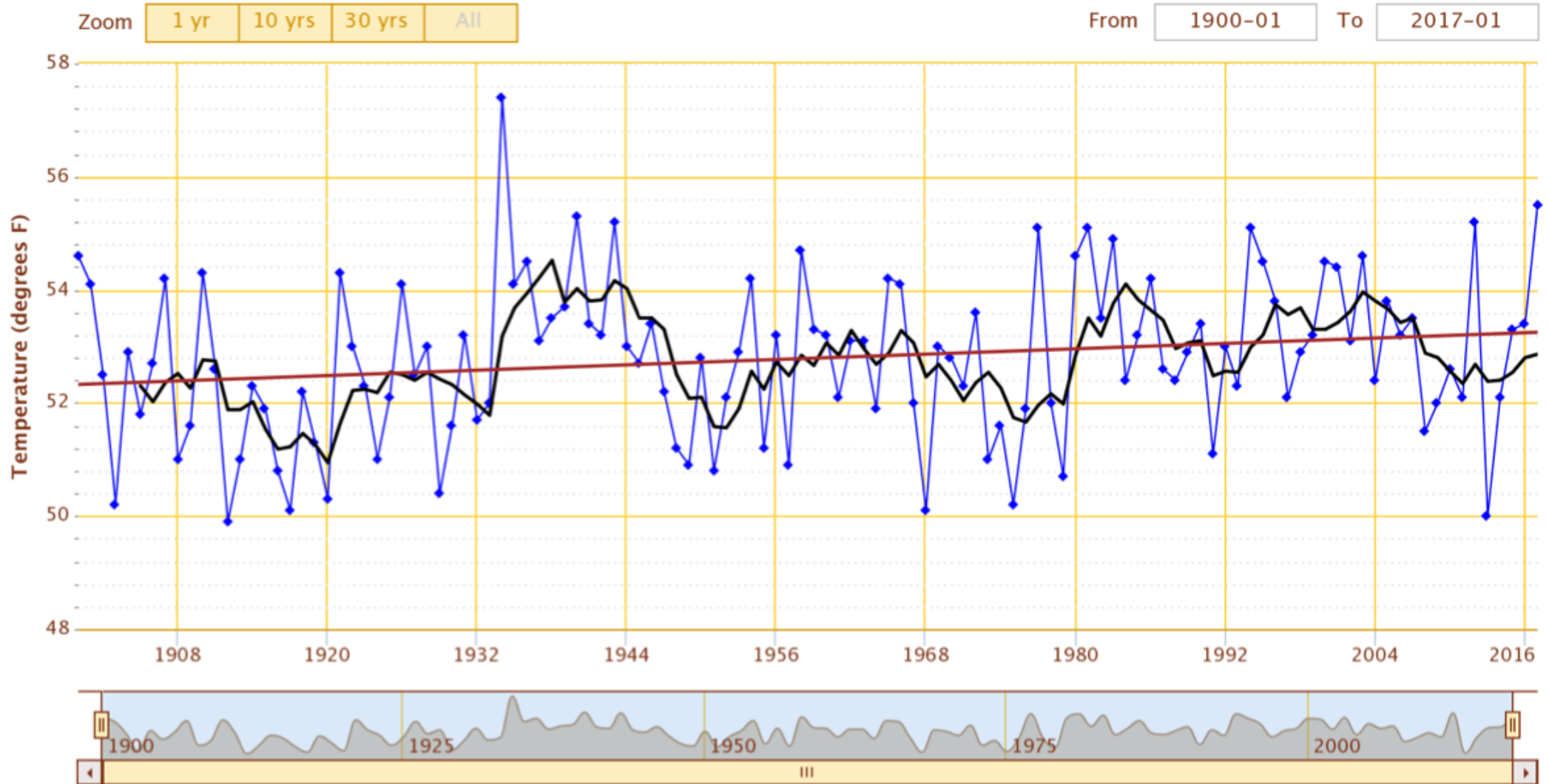
Fruita CoAgMet Temperature Data, last winter



1 November 2016 to 31 March 2017

Mean Avg Temperature – GRAND JUNCTION WALKER FIELD, CO

Use navigation tools above and below chart to change displayed range



Powered by ACIS

Winter minimum temperature extremes

While averages are going up a bit, the extremes seem to be staying plenty cold

Lowest Min Temperature – Dec through Feb – GRAND JUNCTION WALKER FIELD, CO

Use navigation tools above and below chart to change displayed range

Zoom

1 yr

10 yrs

30 yrs

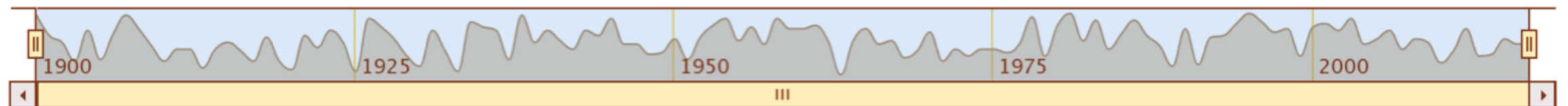
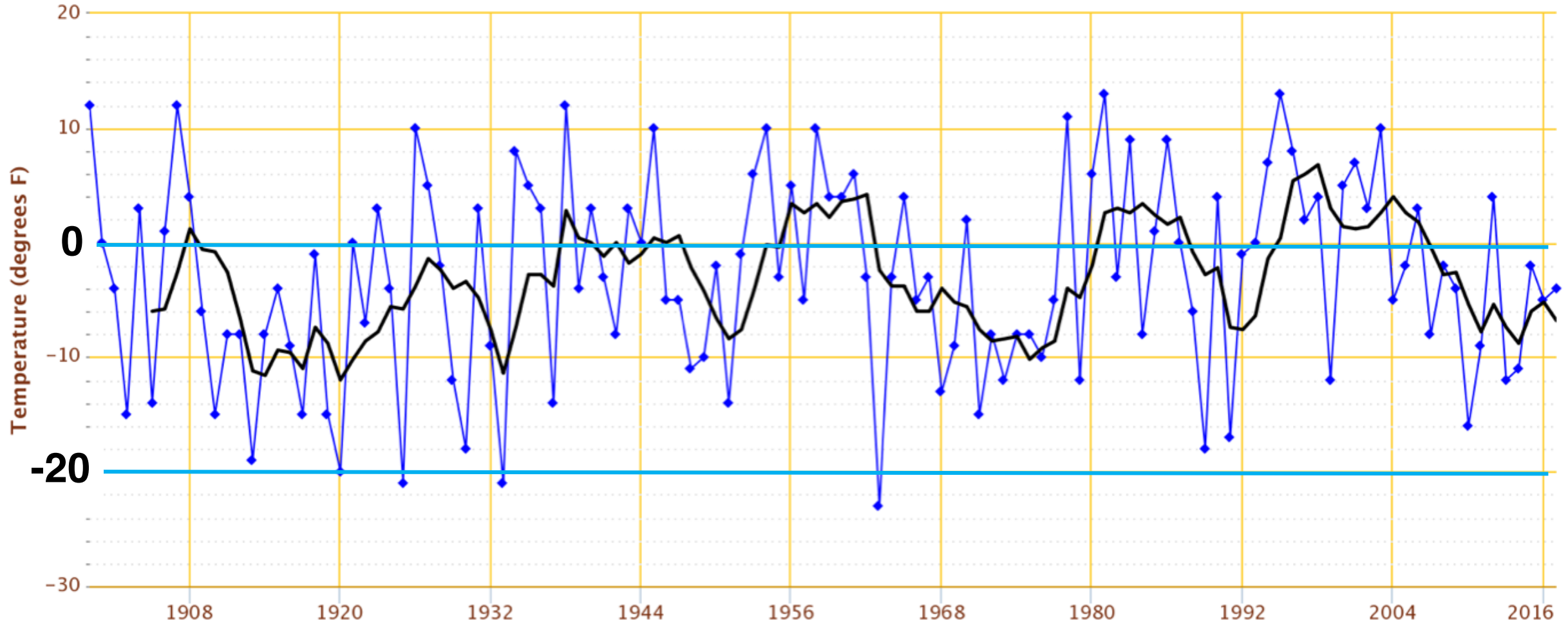
All

From

1900

To

2017

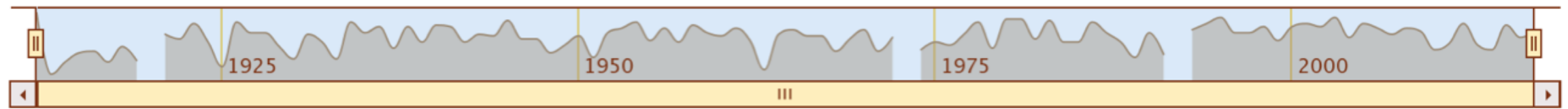
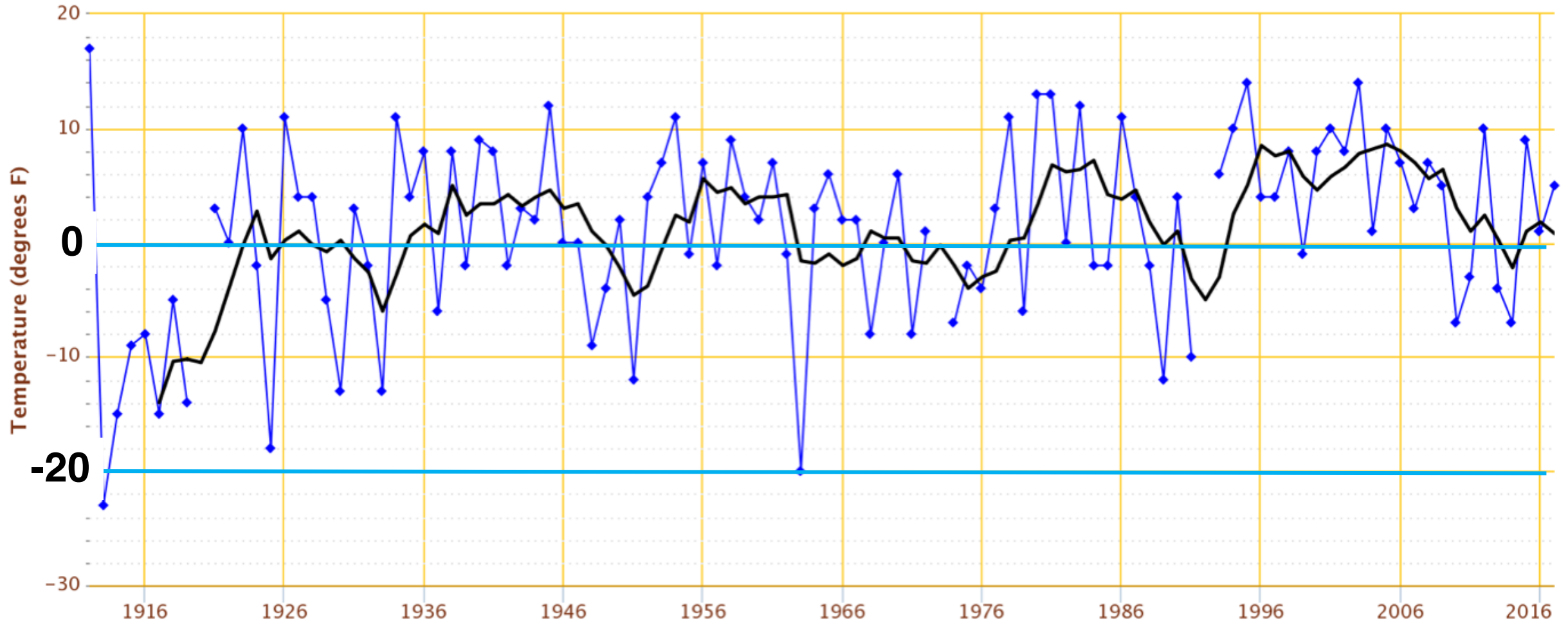


Lowest Min Temperature – Dec through Feb – PALISADE, CO

Use navigation tools above and below chart to change displayed range

Zoom 1 yr 10 yrs 30 yrs All

From 1912 To 2017



Lowest Min Temperature – Dec through Feb – MONTROSE NO 2, CO

Use navigation tools above and below chart to change displayed range

Zoom

1 yr

10 yrs

30 yrs

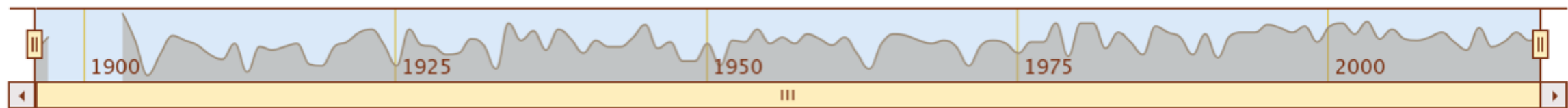
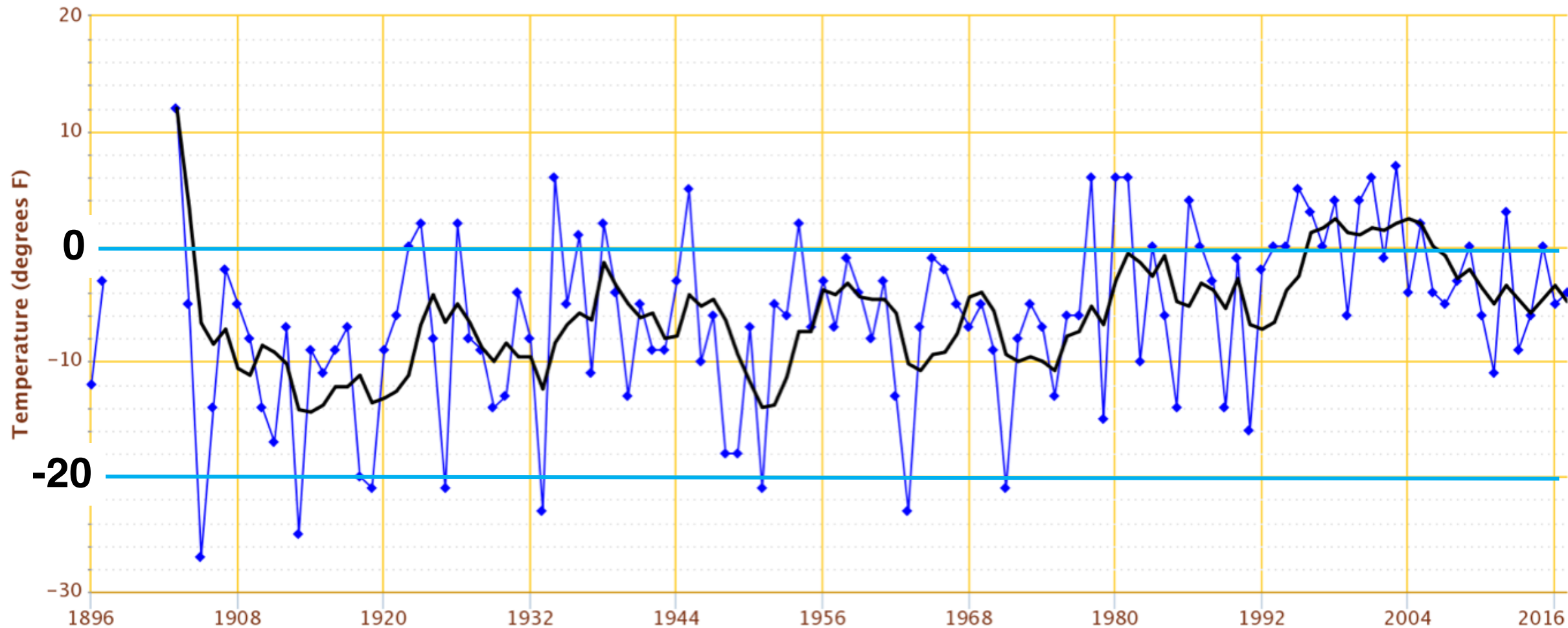
All

From

1896

To

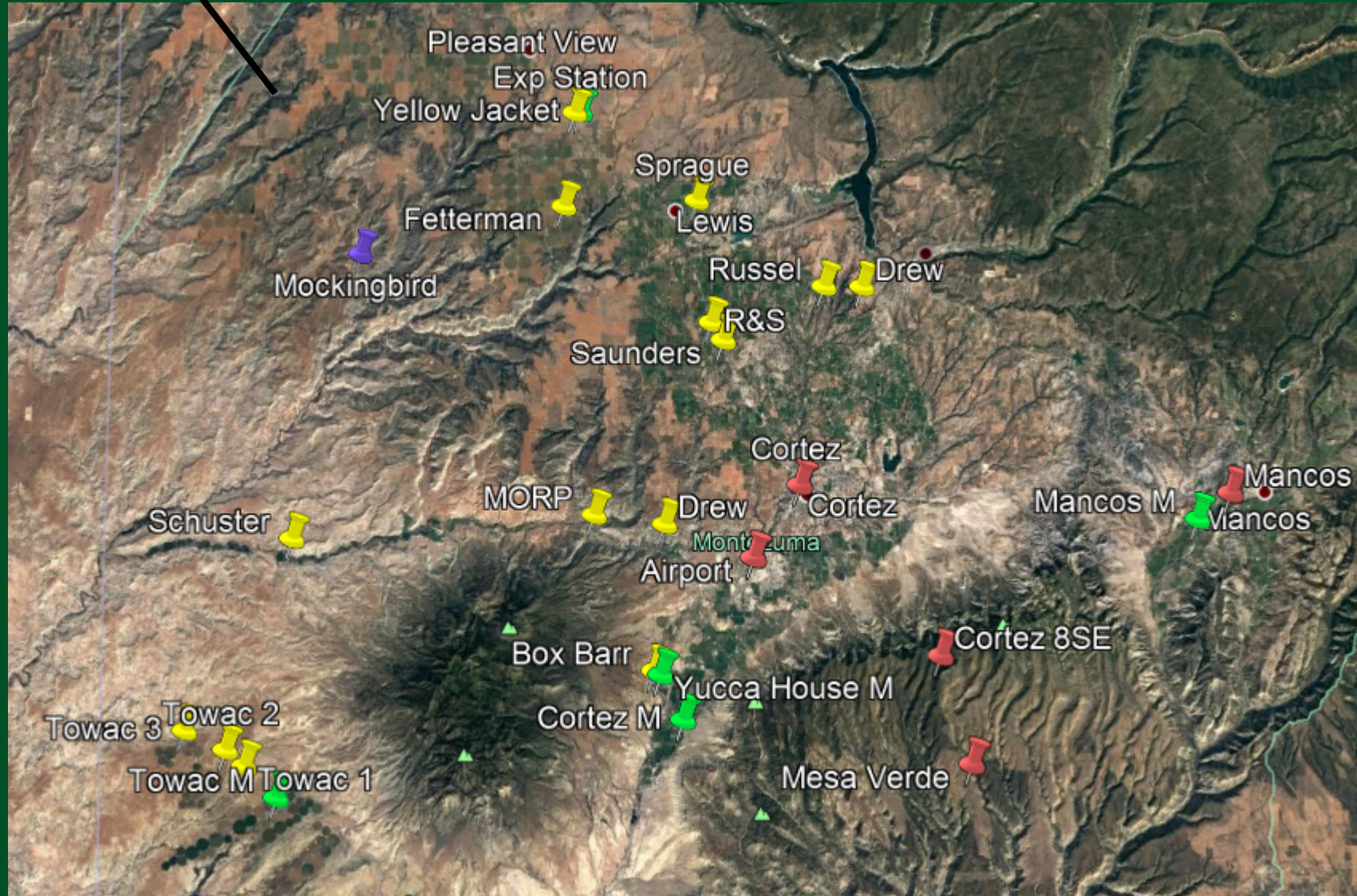
2017



And for even smaller-scale differences...



The CCC (led by Peter Goble) has deployed thermometers in many areas of Montezuma County to explore microclimates favorable for wine grapes



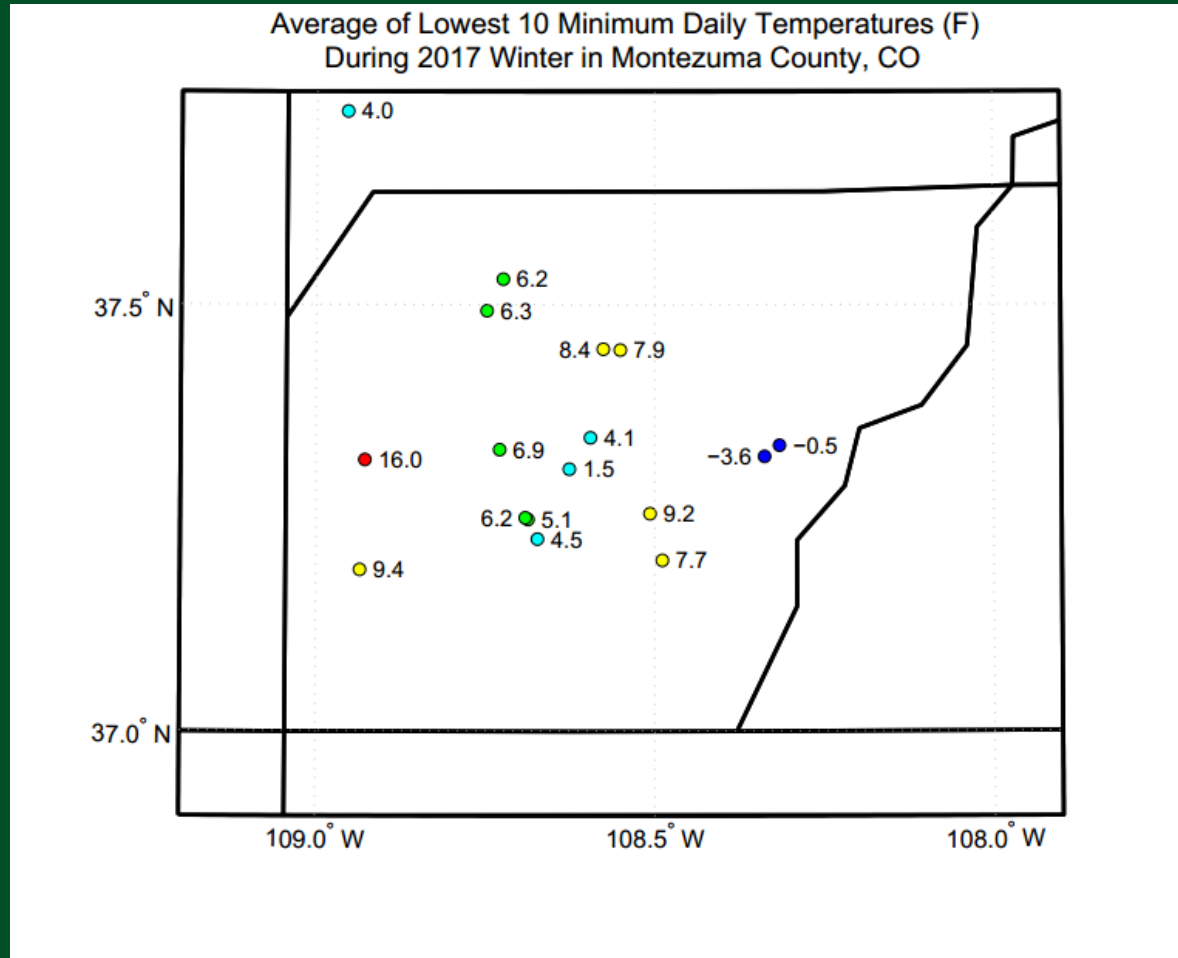
Yellow: new thermometers for this project

Green: CoAgMET

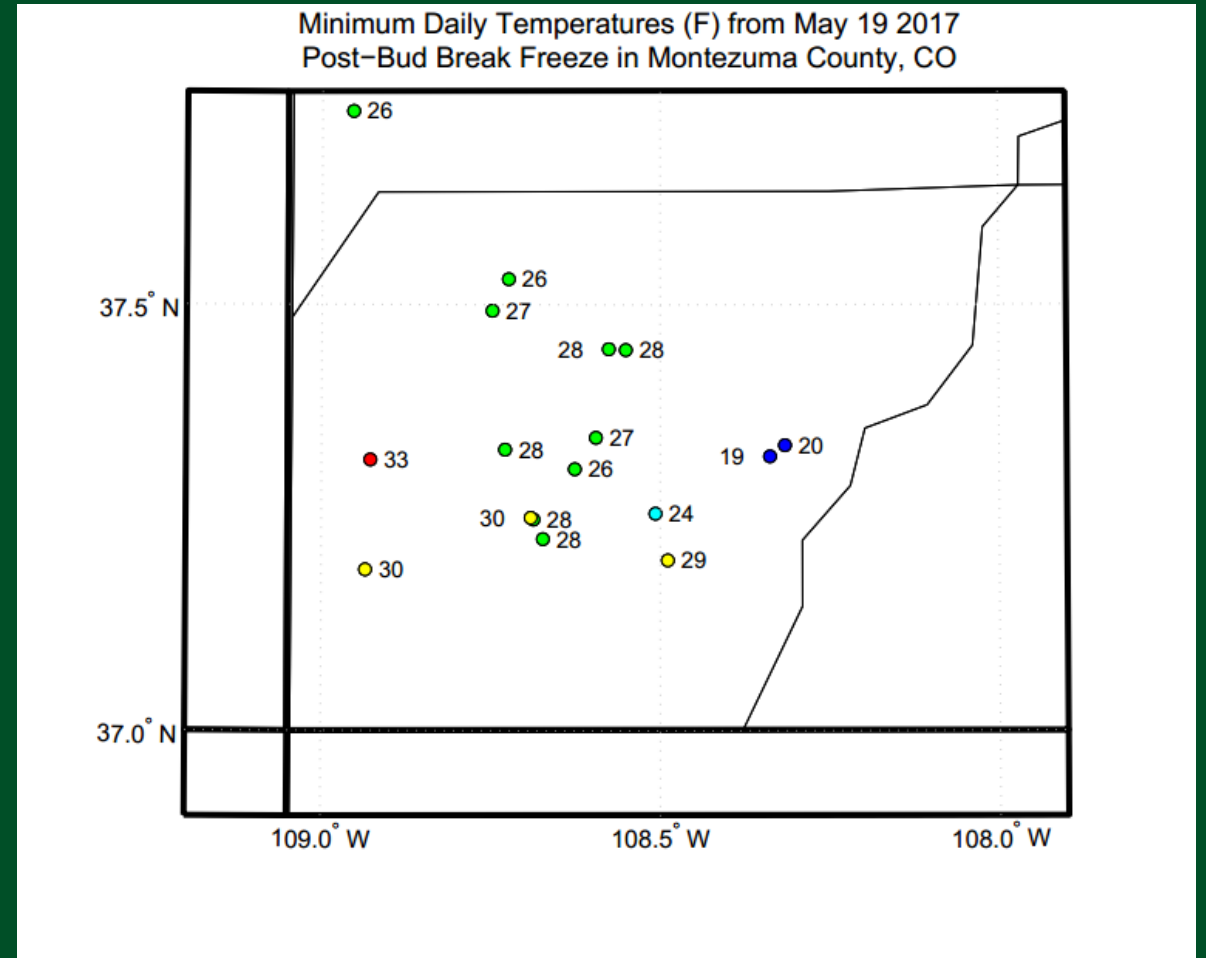
Red: COOP

Purple: RAWS

Average of 10 Coldest Winter Days



Spring freeze (May 19)



West end of McElmo Canyon is promising and needs more data and analysis
See Peter Goble's poster this afternoon!

Orchard Mesa meta

Station ID: ORM01 Lat: 39.0420 Lon: -108.4600 Elev: 4600 ft

Latest

Historical

Photos

26°F

0.00 in

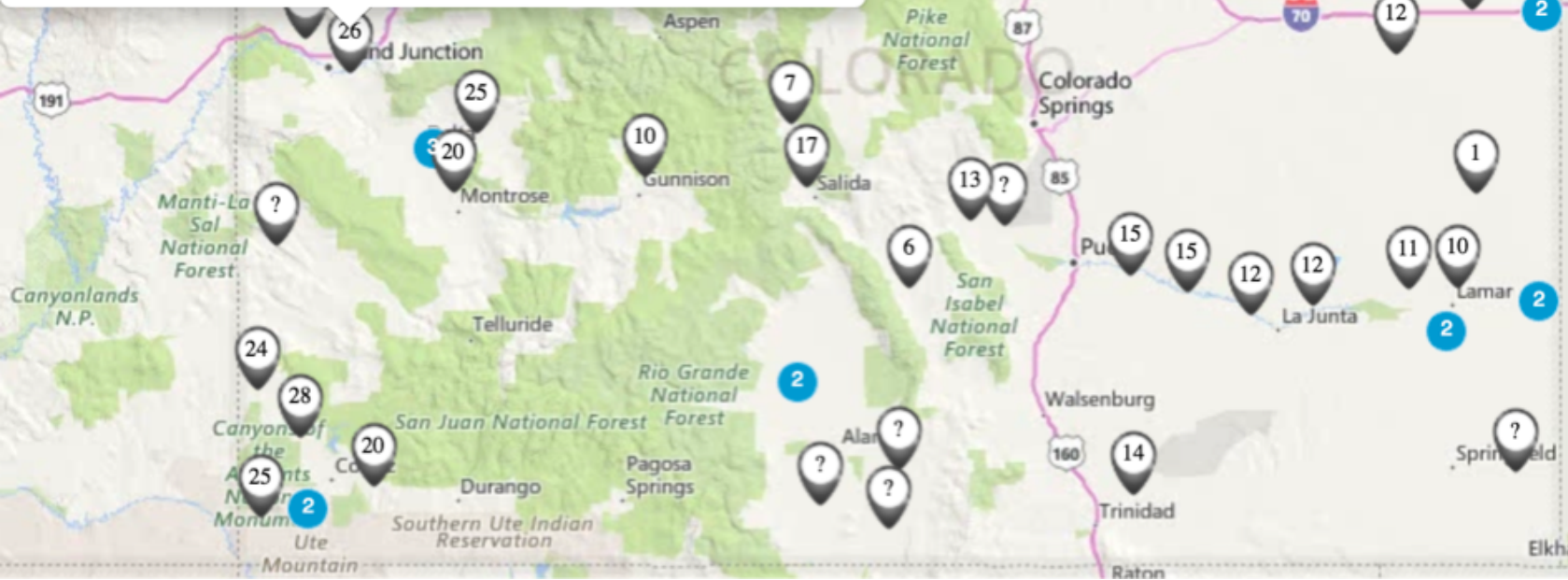
63%

1.7 mph

Vapor Pressure: 0.30 kPa

Solar Radiation: 0.0 kJ/m²·min

Updated January 16th 2018, 9:00 pm

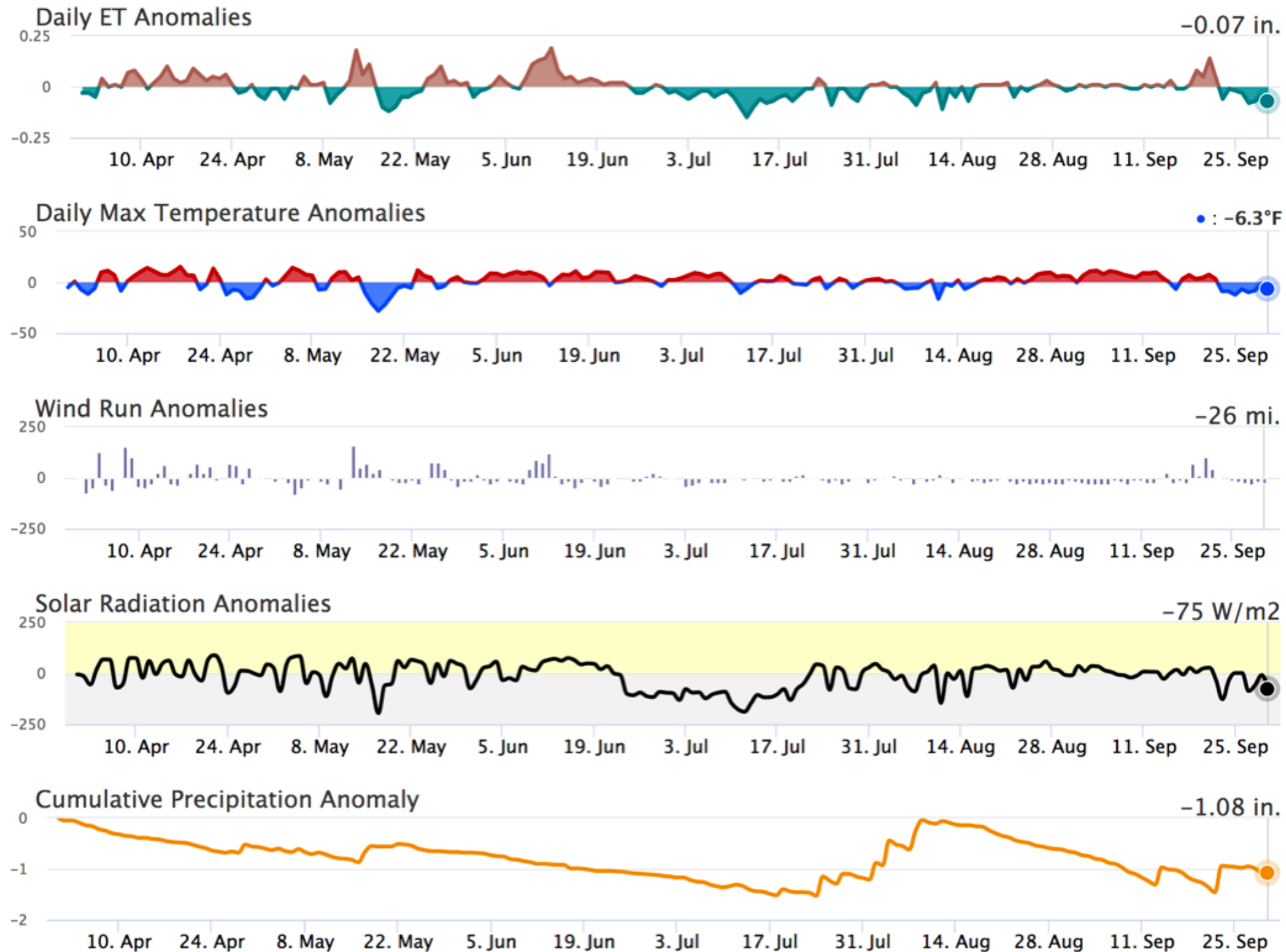


CoAgMET

- ❑ 75 stations
- ❑ 10 proposed for west slope
- ❑ 44 5-minute stations
- ❑ interactive mapping through eRAMS
- ❑ includes
 - ❑ time series charts
 - ❑ site photos

coagmet.colostate.edu

Growing season summaries at long-term stations: Olathe (2017)



http://climate.colostate.edu/2017ET/et_summary_oth_anom.html

- General Info ▾
- Colorado's Climate ▾
- Data Access
- Climate Maps
- Normals and Extremes ▾
- Drought ▾
- Tools ▾



Check out our Water Year summary (Oct 2016 - Sep 2017) for Colorado. We've compiled a list of significant events and water year records. Also learn how our water year temperature and precipitation ranks in the historic record.

Get the 2017 Water Year Report!

Previous | Next

Current Conditions

Fort Collins, CO

33.8°F

Last Updated on November 8, 5:25 PM MST

Wind: Calm
Dewpoint: 33°F
Humidity: 98%

Zip Code Local Conditions

News Feeds

Colorado Climate Ce...
Liked 738 likes

Colorado Climate Center 7 hours ago

Fog along the Front Range this morning - check out this magical time-lapse looking south over Lyons. Colorado:

new website features at climate.colostate.edu

- Data Access
- Climate Maps (coming soon)
- Climate Normals
- Climate Extremes
- Tools

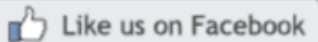




INTERMOUNTAIN WEST DROUGHT EARLY WARNING SYSTEM



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[US Drought Monitor](#)

Greetings,

Please join us tomorrow morning, **Tuesday, January 16th at 10:00AM MST** for our monthly "Climate, Water and Drought Assessment" Webinar.

To register go to the Colorado Climate Center website at: http://climate.colostate.edu/webinar_registration.html.

A toll-free 800 number is provided for calling-in. Our webinars are brief (usually less than 30 minutes) and provide updated information assessing climate, water and drought for the Intermountain West.

Intermountain West Drought Early Warning System Webinars are being brought to you by the Colorado Climate Center at Colorado State University with support from the National Integrated Drought Information System (NIDIS). For more information on NIDIS please visit: <https://www.drought.gov/drought/what-nidis>

Sincerely,

The Colorado Climate Center Team

Intermountain West drought early warning system

We lead monthly webinars on the drought situation in the intermountain west (might become every 2 weeks if drought worsens)

Register at http://climate.colostate.edu/webinar_registration.html

See graphics at <http://climate.colostate.edu/~drought/>

**And finally, the all-important
question:
“Do you have a rain gauge?”**



A large, round snowball is the central focus of the image. The word "COCORAHHS" is written across its middle in a simple, hand-drawn font. The letters are slightly recessed into the snow. The background shows a snowy landscape with some dry grass and bare branches visible at the top and right edges.

COCORAHHS

If you are interested in weather and the variations in precipitation, please join the Community Collaborative Rain, Hail and Snow Network

<http://www.cocorahhs.org>

or see me today

Thank you for the opportunity to be here!

<http://climate.colostate.edu/>

russ.schumacher@colostate.edu



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