

# *Taking the Pulse of Colorado's Climate*

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Presented 5 May 2012  
Univ. of Colorado, Boulder, CO



# First -- A short background

- In 1973 the federal government abolished the “State Climatologist” program nationwide leaving Colorado without
- Later that same year, Colorado re-established the State Climate program with support through the Colorado Agricultural Experiment Station at Colorado State University.



# Our Mission

- The Colorado Climate Center at CSU provides valuable 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)

# Monitoring our Climate

- Elements: temperature, precipitation, snow, wind, solar, evaporation, soil temperatures, humidity, clouds, etc.



Fort Collins CSU Historic Weather Station  
Continuous monitoring since the 1880s

# Systematic weather data collection began in Colorado in the 1870s and 1880s

(Form 4.)

**WAR DEPARTMENT.**  
**SIGNAL SERVICE, U. S. ARMY.**  
**DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.**

METEOROLOGICAL RECORD for the *Month* ending *Nov. 25th 1871* at *Denver, Col. Ter.*

Date of Observation.	Time of Observation.	Height of Barometer.	Height of attached Thermometers <i>W. W. &amp; C. Co.</i>	Reduced Barometer.	THERMOMETER. (OPEN AIR.) <i>H. J. &amp; Co.</i>		Direction of wind.	Velocity of wind in miles per hour. <i>multiply by 1.47</i>	Pressure of wind. Pounds per square foot.	Amount of cloud.	Direction in which upper clouds move.	Rain (or snow) commenced. (Time.)	Rain (or snow) ended. (Time.)	Amount of rain or melted snow.	Soft registering thermometer <i>from time</i>	REMARKS.	
					Dry Bulb.	Wet Bulb.											
<i>1871</i>																	
<i>Sunday Nov 19</i>	<i>5:43 a.m.</i>	<i>25.00</i>	<i>57 22</i>	<i>30.07</i>	<i>22 21 46</i>	<i>46</i>	<i>E. by S.</i>	<i>0</i>	<i>0</i>	<i>4/4</i>		<i>8 a.m.</i>	<i>Blank</i>				<i>Fine Snow-blows</i>
	<i>2:43 p.m.</i>	<i>25.09</i>	<i>63 36</i>	<i>29.97</i>	<i>36 35 44</i>	<i>44</i>	<i>S.</i>	<i>2</i>	<i>.02</i>	<i>0</i>							
<i>Monday Nov 20</i>	<i>4:43 p.m.</i>	<i>25.12</i>	<i>58 14</i>	<i>30.20</i>	<i>14 13 64</i>	<i>64</i>	<i>S.</i>	<i>11</i>	<i>.60</i>	<i>0</i>		<i>8.20 a.m.</i>	<i>8.00 p.m.</i>	<i>Blank</i>			<i>Clear Light Snow</i>
	<i>2:43 p.m.</i>	<i>25.09</i>	<i>63 36</i>	<i>29.97</i>	<i>36 30 46</i>	<i>46</i>	<i>S.</i>	<i>2</i>	<i>.02</i>	<i>0</i>	<i>72</i>						<i>Clear</i>
<i>Tuesday Nov 21</i>	<i>4:43 p.m.</i>	<i>25.12</i>	<i>58 14</i>	<i>30.20</i>	<i>14 12 64</i>	<i>64</i>	<i>S.</i>	<i>11</i>	<i>.60</i>	<i>0</i>							<i>Stratus</i>
	<i>5:43 a.m.</i>	<i>24.99</i>	<i>50 21</i>	<i>30.07</i>	<i>21 19.5 78</i>	<i>78</i>	<i>S.</i>	<i>13</i>	<i>.84</i>	<i>1/4</i>	<i>24</i>						<i>Stratus</i>
<i>Wednesday Nov 22</i>	<i>2:43 p.m.</i>	<i>24.88</i>	<i>56 43</i>	<i>29.67</i>	<i>43 34 28</i>	<i>28</i>	<i>N.W.</i>	<i>18</i>	<i>1.62</i>	<i>4/4</i>	<i>103</i>						<i>Stratus</i>
	<i>4:43 p.m.</i>	<i>24.88</i>	<i>58 39</i>	<i>29.70</i>	<i>39 34 53</i>	<i>53</i>	<i>N.W.</i>	<i>2</i>	<i>.02</i>	<i>4/4</i>	<i>34.3</i>						<i>Stratus</i>
<i>Thursday Nov 23</i>	<i>5:43 a.m.</i>	<i>24.70</i>	<i>55 31</i>	<i>29.59</i>	<i>31 29 79</i>	<i>79</i>	<i>S.W.</i>	<i>4</i>	<i>.08</i>	<i>4/4</i>	<i>97</i>						<i>Stratus</i>
	<i>2:43 p.m.</i>	<i>24.37</i>	<i>62 35</i>	<i>29.50</i>	<i>35 32 70</i>	<i>70</i>	<i>W.</i>	<i>2</i>	<i>.02</i>	<i>4/4</i>	<i>97</i>						<i>"</i>
<i>Friday Nov 24</i>	<i>4:43 p.m.</i>	<i>24.71</i>	<i>61 31</i>	<i>29.59</i>	<i>31 30 89</i>	<i>89</i>	<i>S.</i>	<i>10</i>	<i>.50</i>	<i>4/4</i>	<i>52.3</i>	<i>3 p.m.</i>	<i>11 p.m.</i>	<i>.26</i>			<i>Light Snow</i>
	<i>5:43 a.m.</i>	<i>24.54</i>	<i>55 25</i>	<i>29.47</i>	<i>25 24 87</i>	<i>87</i>	<i>S.</i>	<i>6</i>	<i>.18</i>	<i>4/4</i>	<i>90</i>	<i>10.30 a.m.</i>					<i>Stratus</i>
<i>Saturday Nov 25</i>	<i>2:43 p.m.</i>	<i>24.31</i>	<i>63 34</i>	<i>29.06</i>	<i>34 33 89</i>	<i>89</i>	<i>N.W.</i>	<i>5</i>	<i>.12</i>	<i>4/4</i>	<i>30</i>						<i>Light Snow</i>
	<i>9:43 p.m.</i>	<i>24.20</i>	<i>60 31</i>	<i>28.97</i>	<i>31 30 89</i>	<i>89</i>	<i>S.</i>	<i>9</i>	<i>.40</i>	<i>3/4</i>	<i>SF</i>						<i>"</i>
<i>Sunday Nov 26</i>	<i>5:43 a.m.</i>	<i>24.36</i>	<i>56 32</i>	<i>29.17</i>	<i>32 32 100</i>	<i>100</i>	<i>S.W.</i>	<i>4</i>	<i>.08</i>	<i>4/4</i>	<i>101</i>		<i>8 a.m.</i>	<i>.21</i>			<i>Cloudy</i>
	<i>2:43 p.m.</i>	<i>24.37</i>	<i>70 42</i>	<i>29.04</i>	<i>42 37 58</i>	<i>58</i>	<i>S.E.</i>	<i>2</i>	<i>.02</i>	<i>2/4</i>	<i>33.7</i>						<i>Light Snow</i>
<i>Monday Nov 27</i>	<i>4:43 p.m.</i>	<i>24.38</i>	<i>65 27</i>	<i>29.23</i>	<i>27 27 100</i>	<i>100</i>	<i>N.W.</i>	<i>2</i>	<i>.02</i>	<i>4/4</i>							<i>Fog</i>
	<i>5:43 a.m.</i>	<i>24.37</i>	<i>58 32</i>	<i>29.17</i>	<i>32 28 64</i>	<i>64</i>	<i>S.W.</i>	<i>7</i>	<i>.24</i>	<i>1/4</i>	<i>98</i>						<i>Stratus</i>
<i>Tuesday Nov 28</i>	<i>2:43 p.m.</i>	<i>24.42</i>	<i>70 49</i>	<i>29.03</i>	<i>49 39 31</i>	<i>31</i>	<i>S.E.</i>	<i>2</i>	<i>.02</i>	<i>2/4</i>							<i>Stratus</i>
	<i>9:43 p.m.</i>	<i>24.60</i>	<i>68 17</i>	<i>29.60</i>	<i>17 15.5 75</i>	<i>75</i>	<i>N.E.</i>	<i>18</i>	<i>1.62</i>	<i>3/4</i>	<i>32.7</i>						<i>Light snow fl</i>

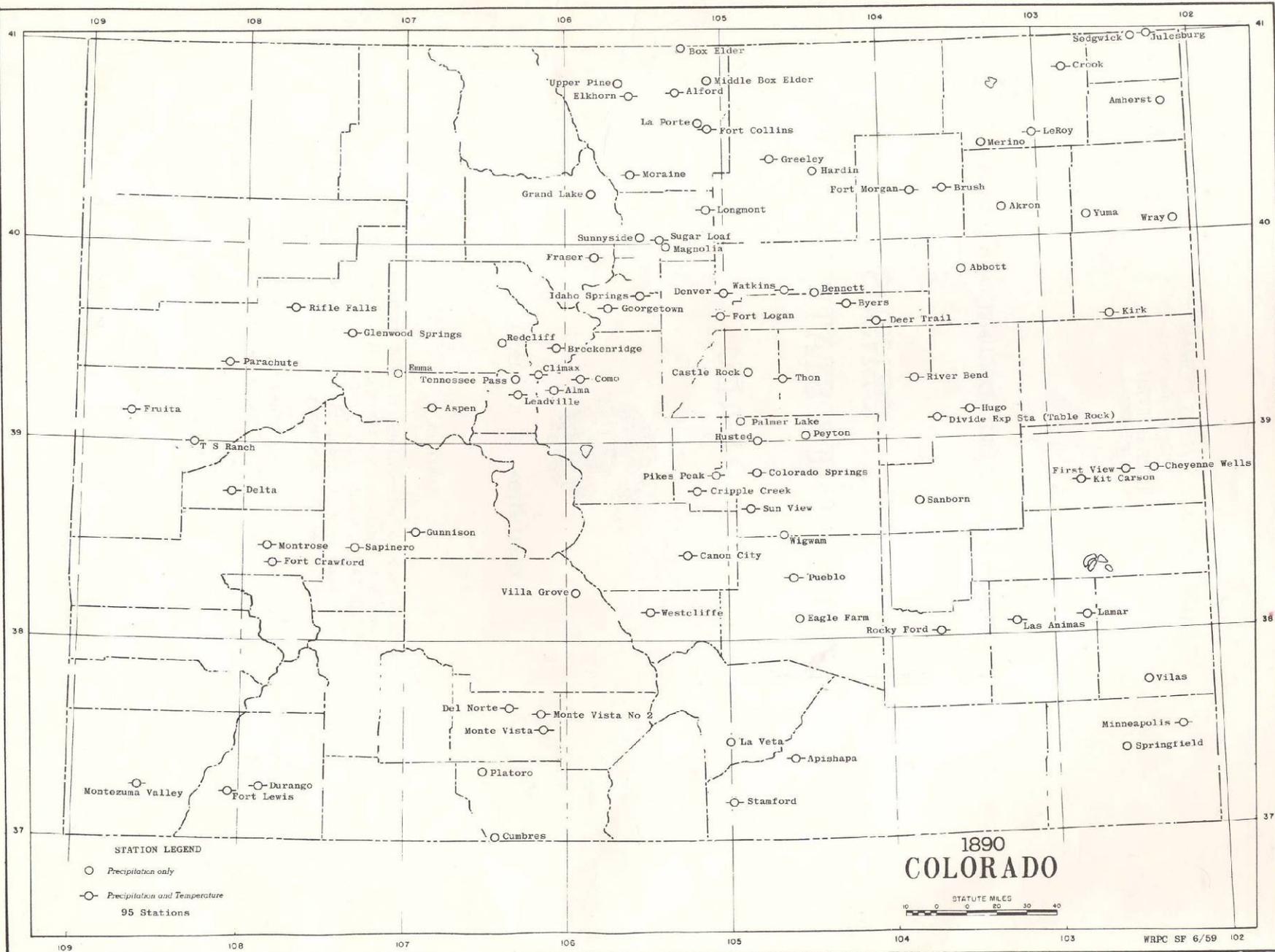
**2391**

**Denver November 19-25, 1871** *Henry J. Foster, Observer*

In 1890 the USDA took over the responsibilities of climate monitoring on a national level, and the first civilian weather service was formed – the U.S. Weather Bureau



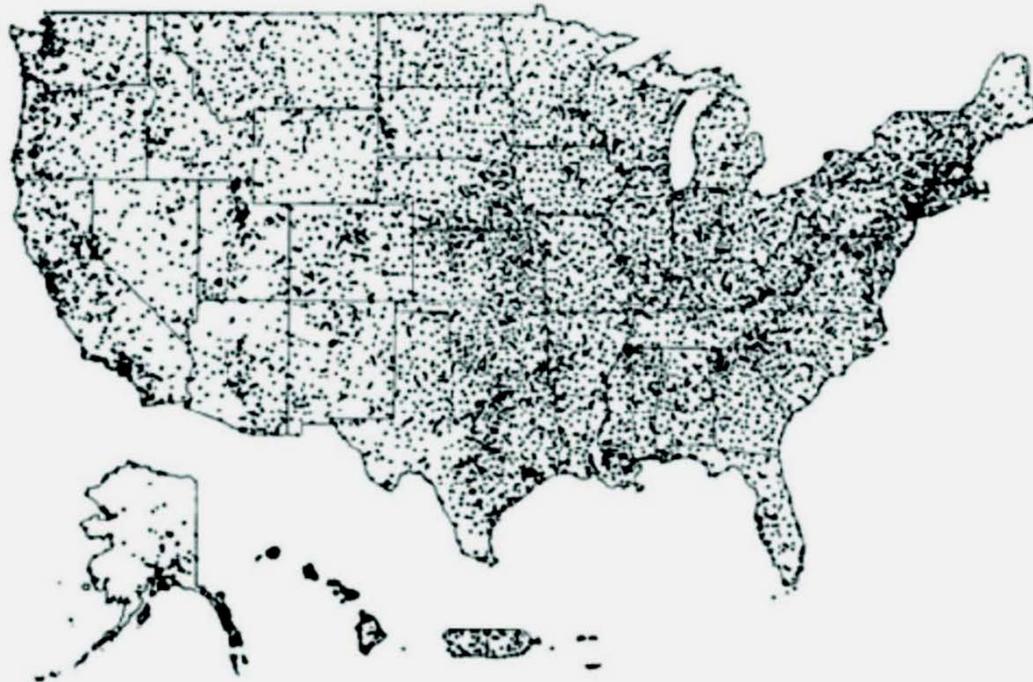
# Colorado Weather Stations in 1890





Since then, the U.S. Weather Bureau/National Weather Service has faithfully maintained an oft taken for granted network of weather stations in Colorado and across the country – the Cooperative Observer Network

# The NWS stations remain the backbone network for long-term climate monitoring



From Kelly Redmond, WRCC

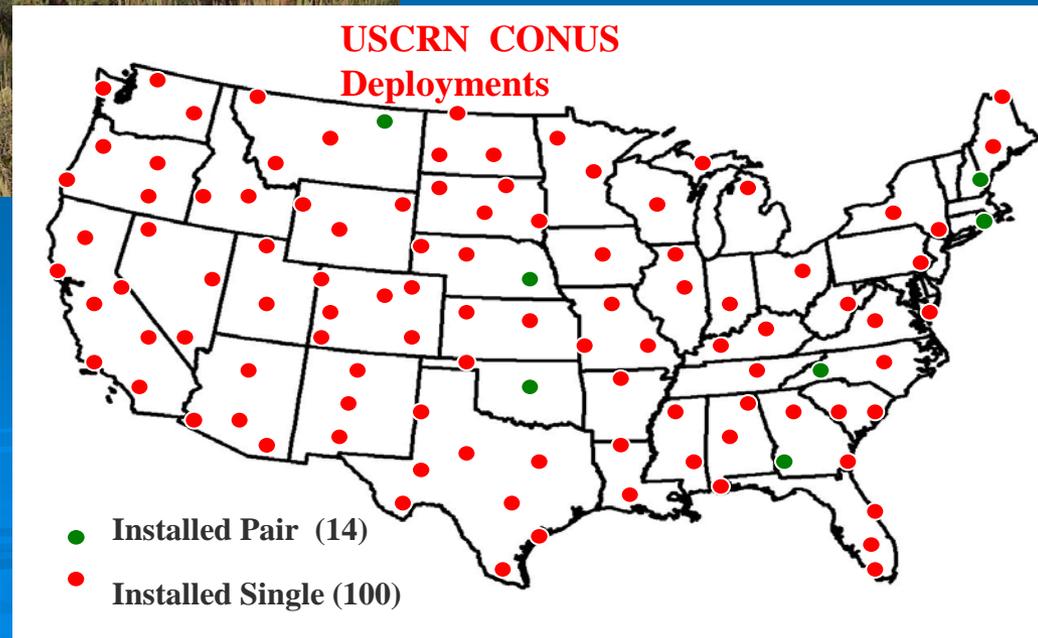
Approximately 5000 daily max/min temperature stations, 8000 daily precipitation stations, 3000 automated hourly precipitation stations.

# U.S. Climate Reference Network (CRN)

➤ New observing networks have been added specifically to help track national climate trends



Montrose, Colorado



**What have we learned  
from over 120 years of  
continuous climate  
monitoring?**



# We Have a Fascinating Climate

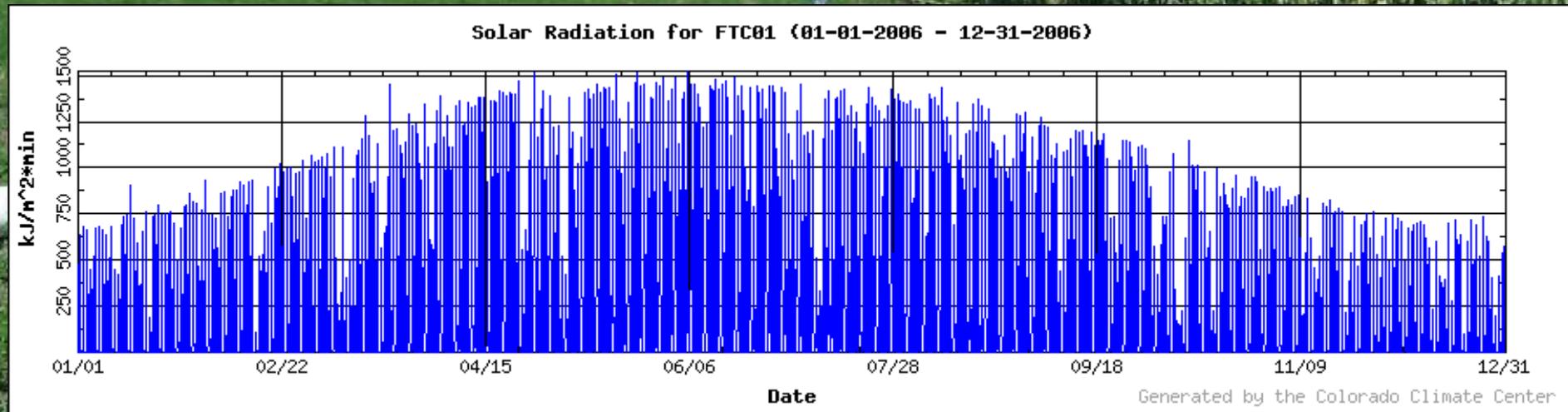
- High elevation (highest state in the Union – by far)
- Mid-Latitude location (lively seasonal changes)
- Interior Continental Location far from atmospheric moisture sources
- Complex Mountain topography

# The Result?



# Generous sunshine and low humidity much of the time

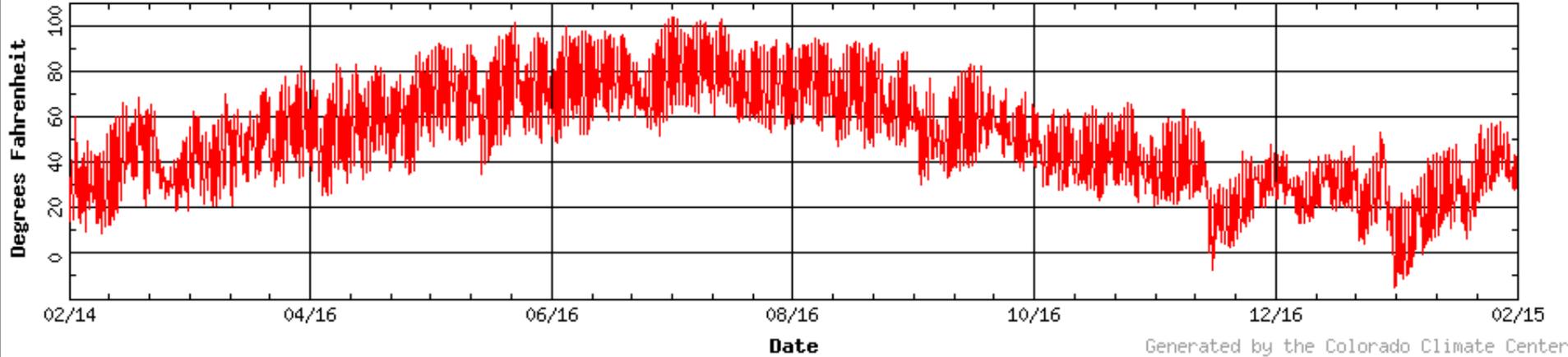
## people like it here



# Large Seasonal Temperature Variations

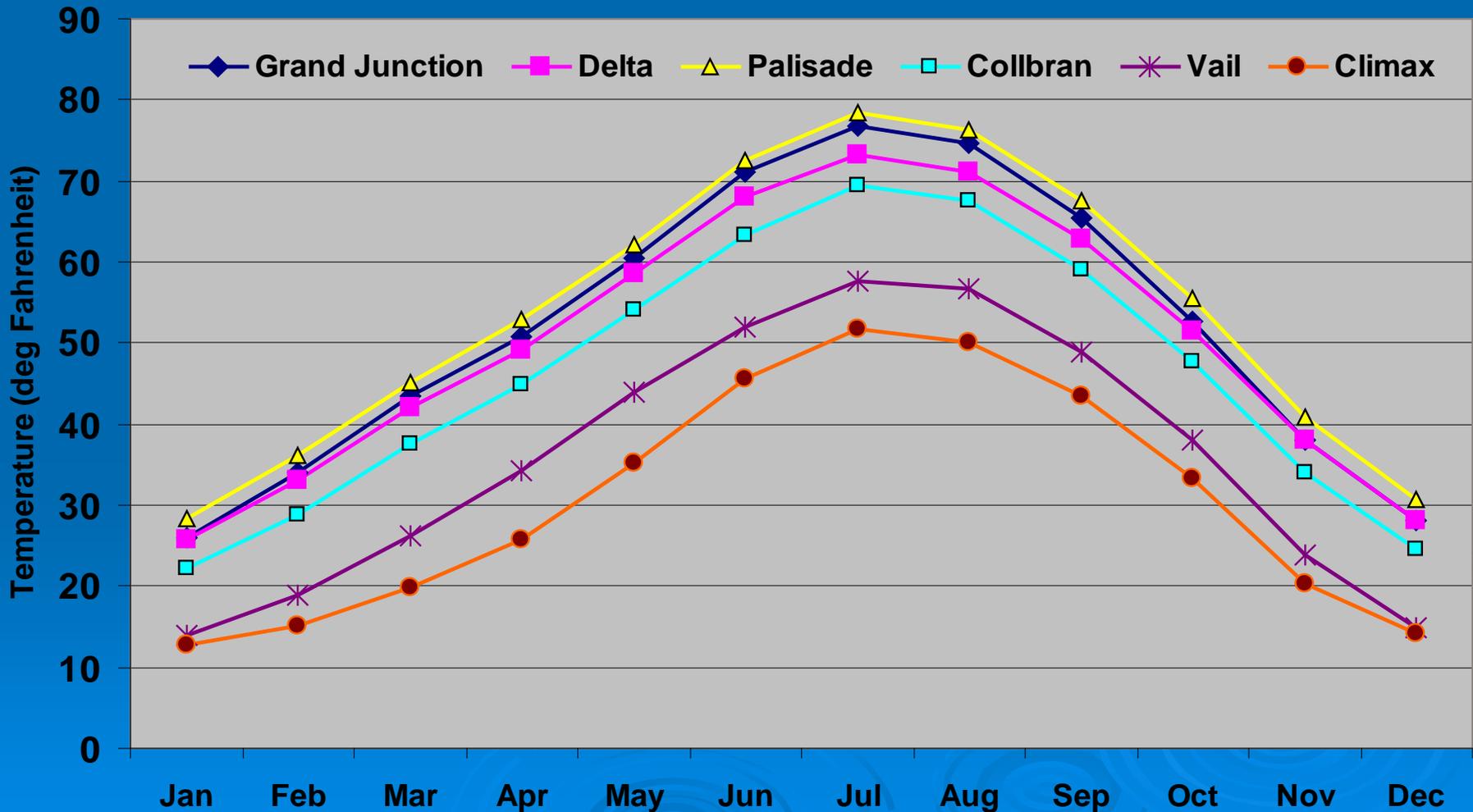
Fruita, Colo.

Temperature for FRT02 (02-14-2006 - 02-15-2007)



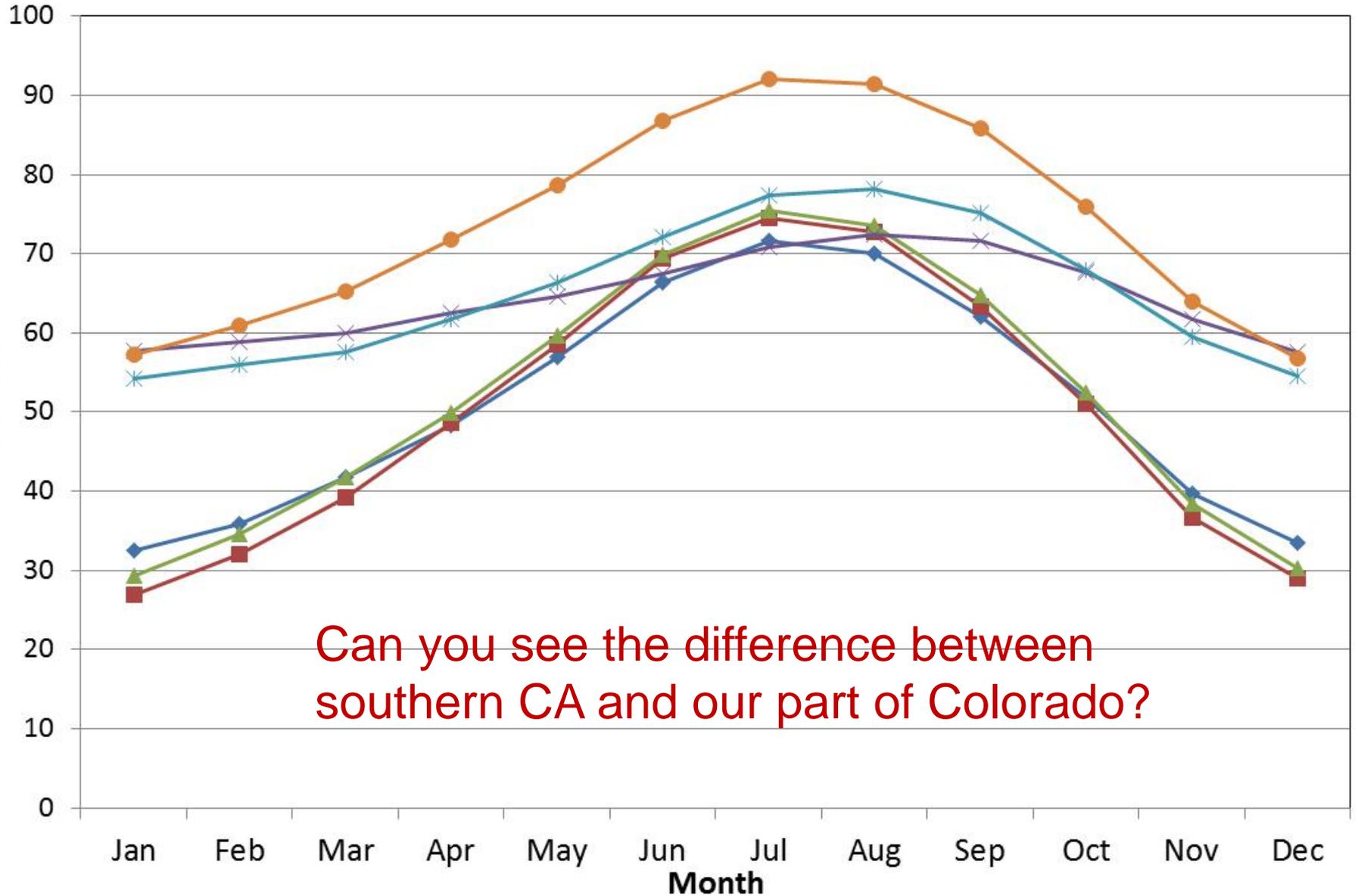
# Winters are consistently colder than summers – ☺

Average Monthly Temperature (9171-2000) for Selected Station



# Average Monthly Temperatures (F) for selected sites in CO and CA

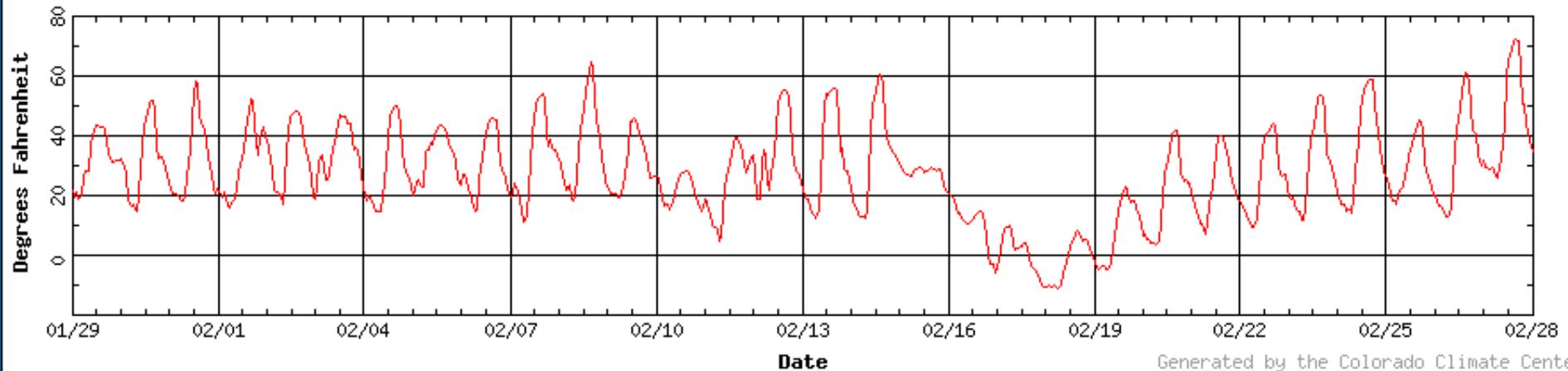
BOULDER HOLYOKE PUEBLO AP SAN DIEGO LINDBERGH AP RIVERSIDE CITRUS EXP ST PALM SPRINGS



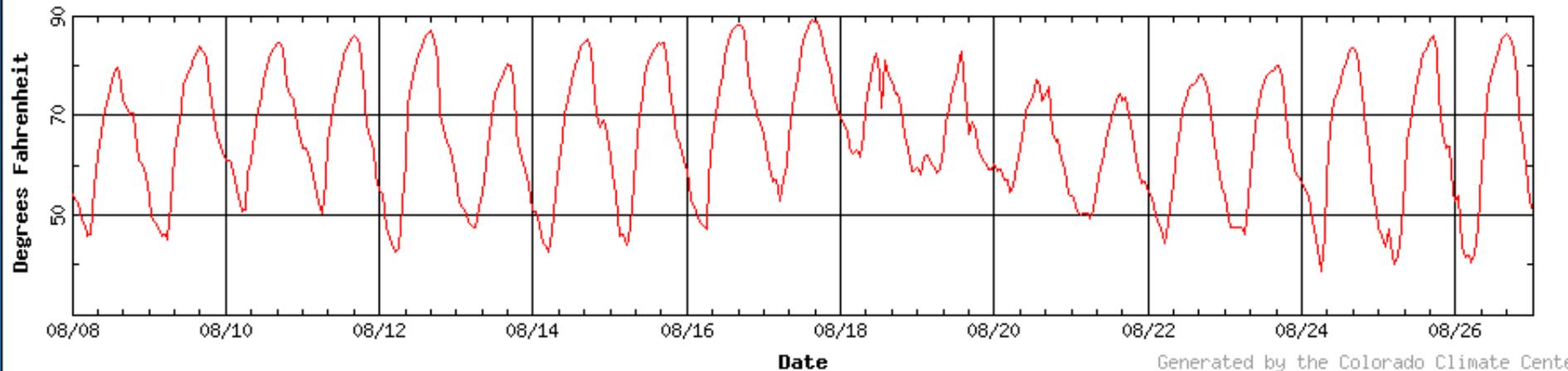
Can you see the difference between southern CA and our part of Colorado?

# Large diurnal temperature ranges and rapid changes

Temperature for KSY01 (01-29-2006 - 02-28-2006)

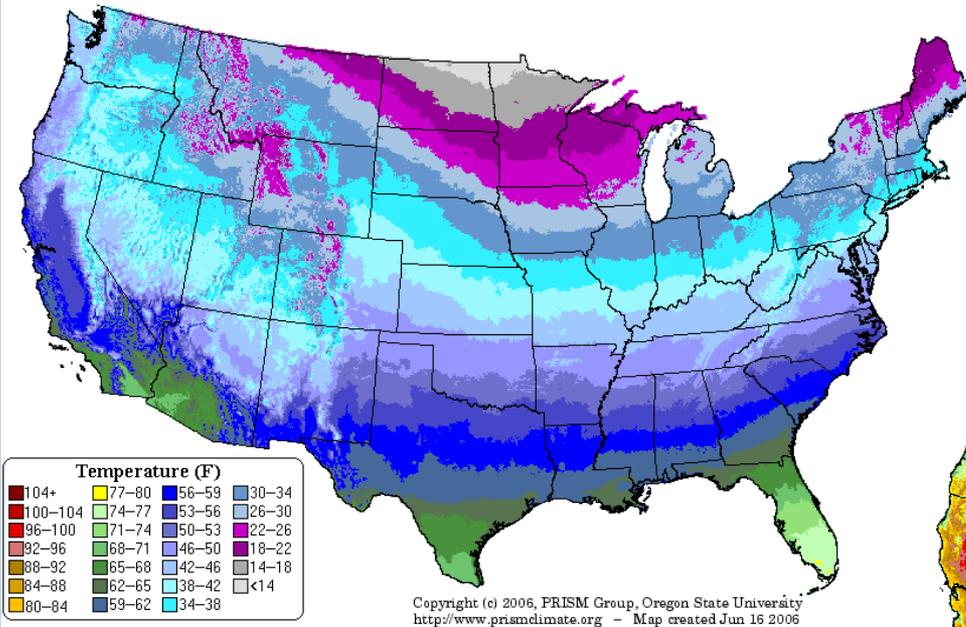


Temperature for BLA01 (08-08-2002 - 08-27-2002)

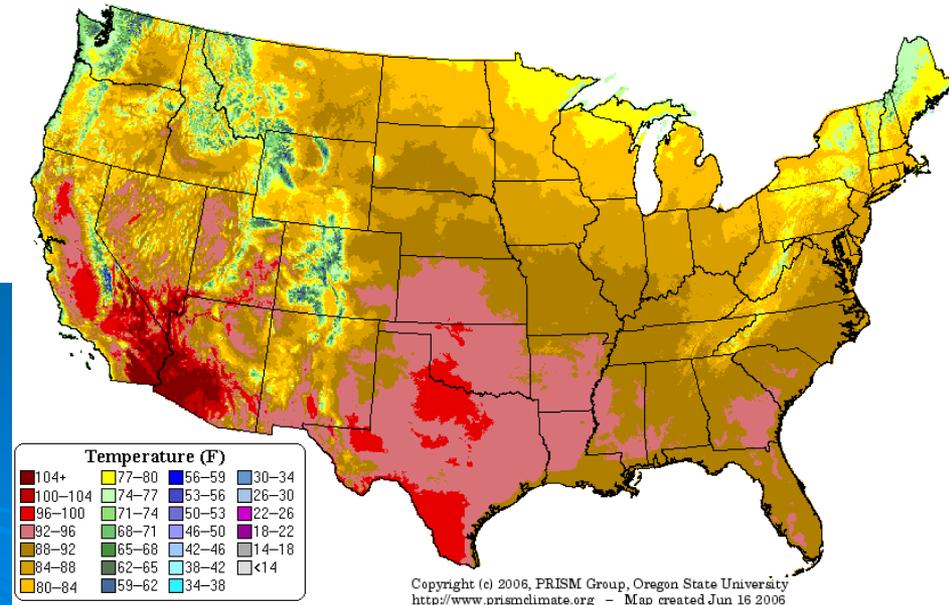


# Complex local variations due to elevation and topography

Maximum Temperature: January Climatology (1971–2000)



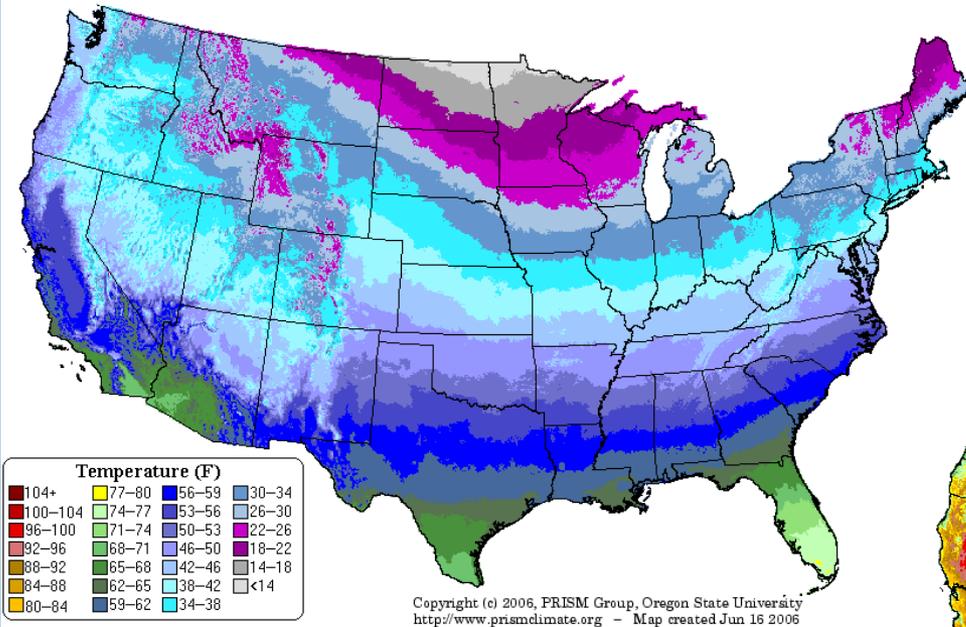
Maximum Temperature: July Climatology (1971–2000)



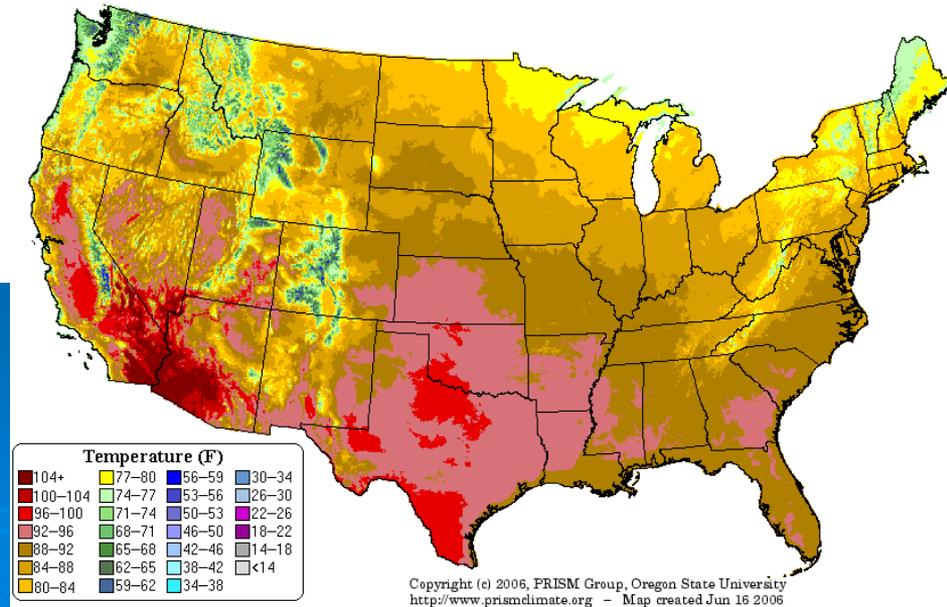
For example, variations within Rocky Mountain National Park – Totally different climate west of the Continental Divide than east even at the same elevation

# Average Maximum Temperature

Maximum Temperature: January Climatology (1971-2000)

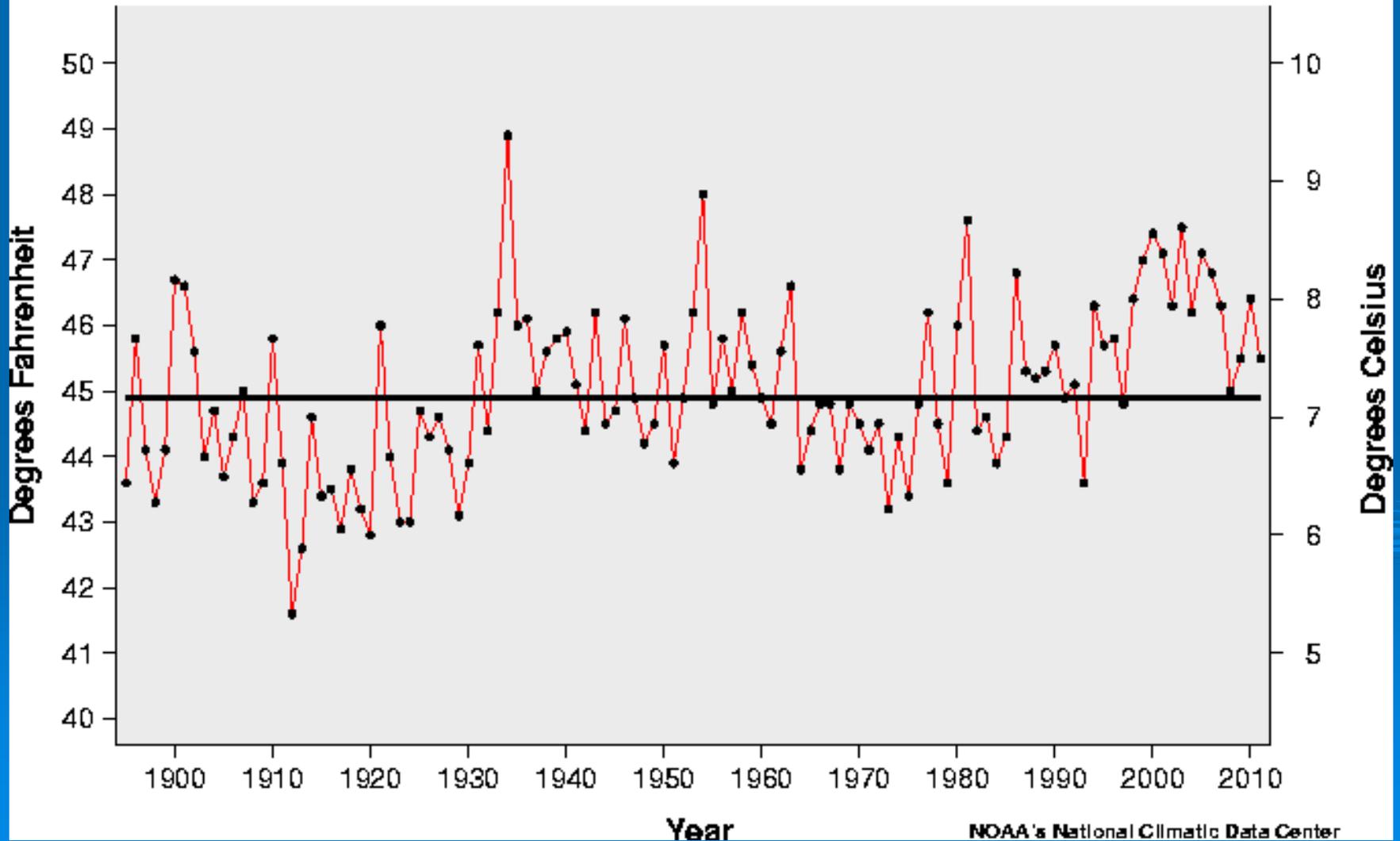


Maximum Temperature: July Climatology (1971-2000)



# Relatively Large Year to Year Variations (“Interannual Variability”)

Colorado Statewide Mean Annual Temperature (1895-2011)



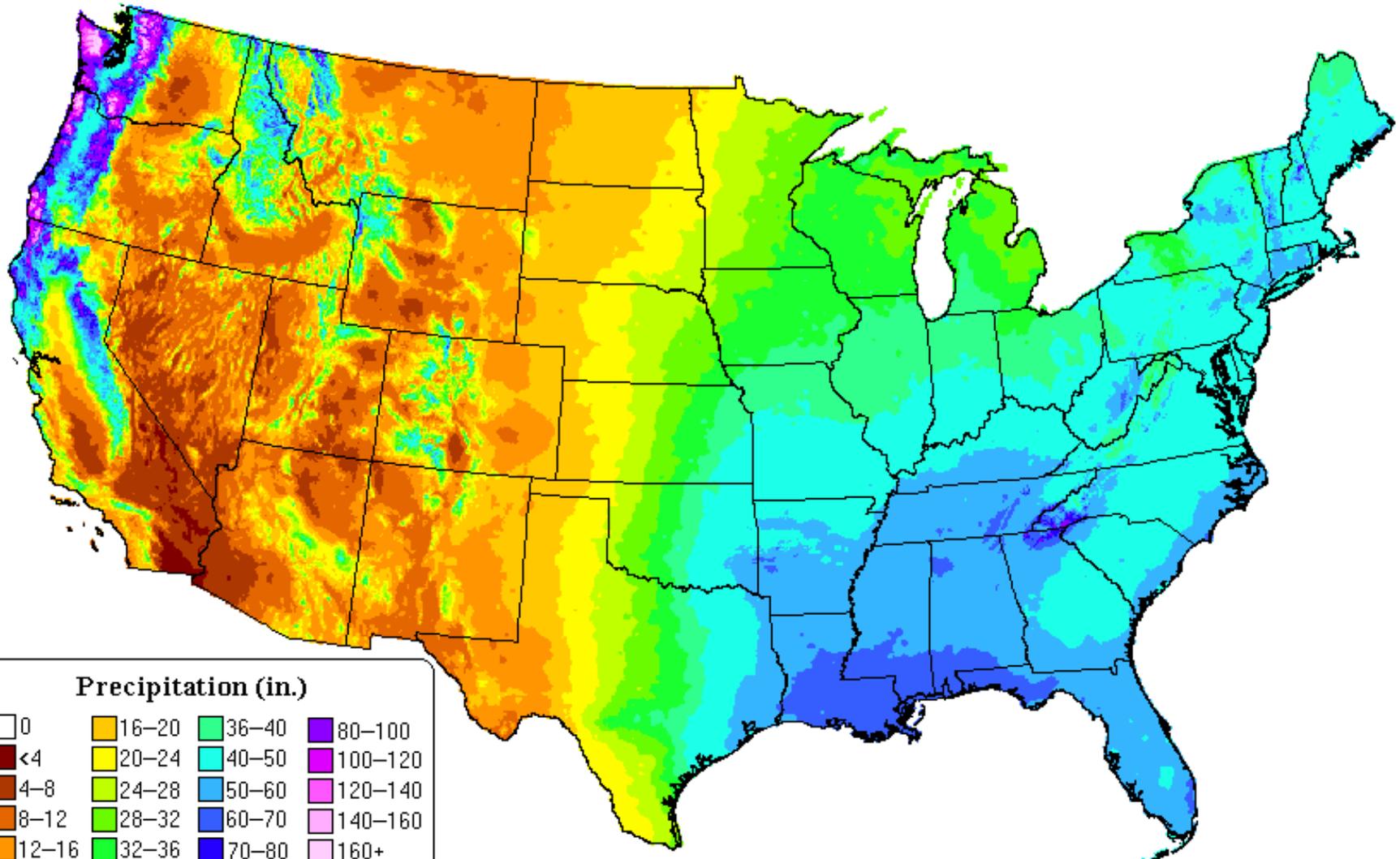
**Frequent but highly variable  
precipitation  
(for every “upslope,”  
there’s a “downslope”)**



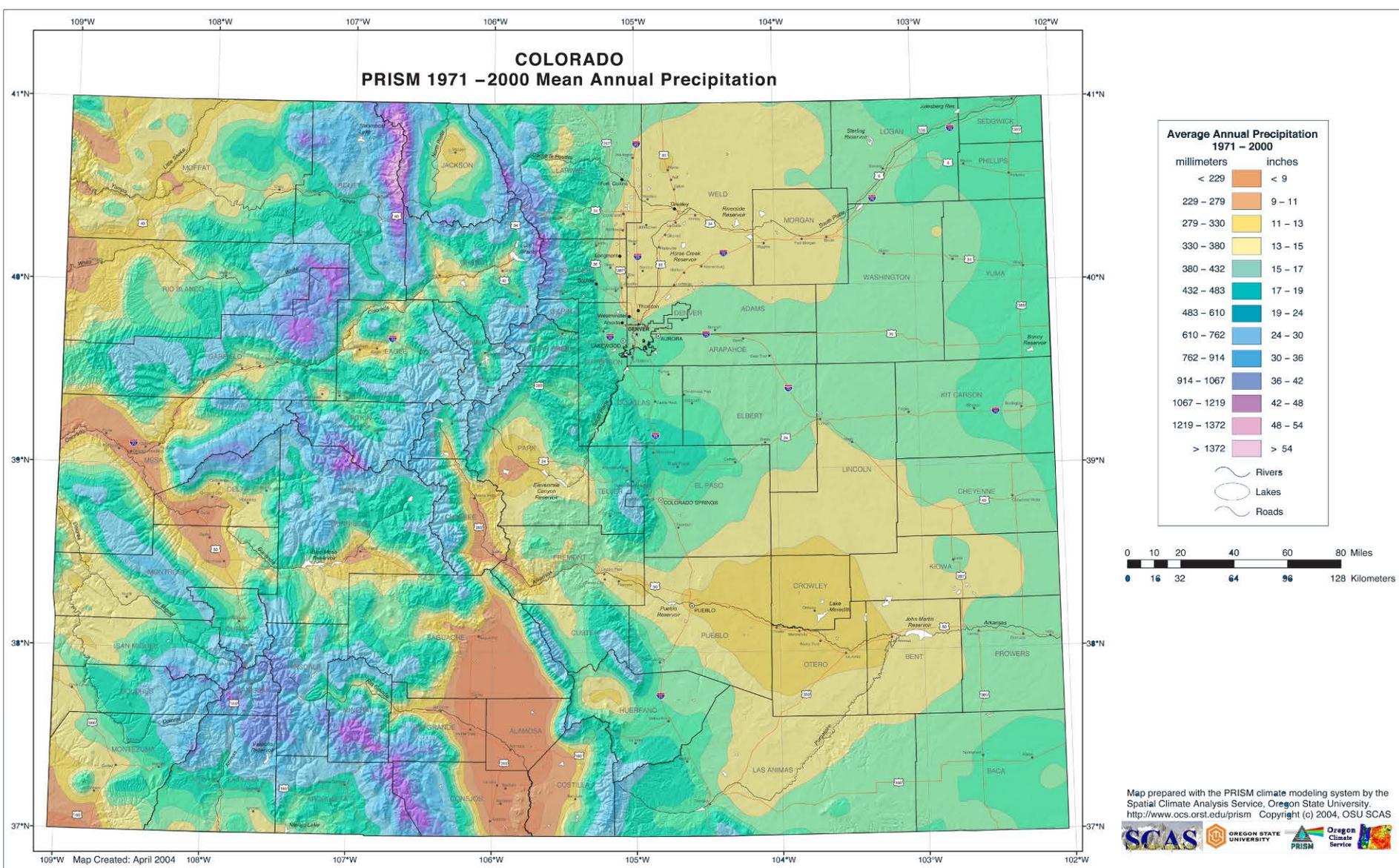
Photo by Wendy Ryan

# Where we fit in the national picture

## Precipitation: Annual Climatology (1971–2000)

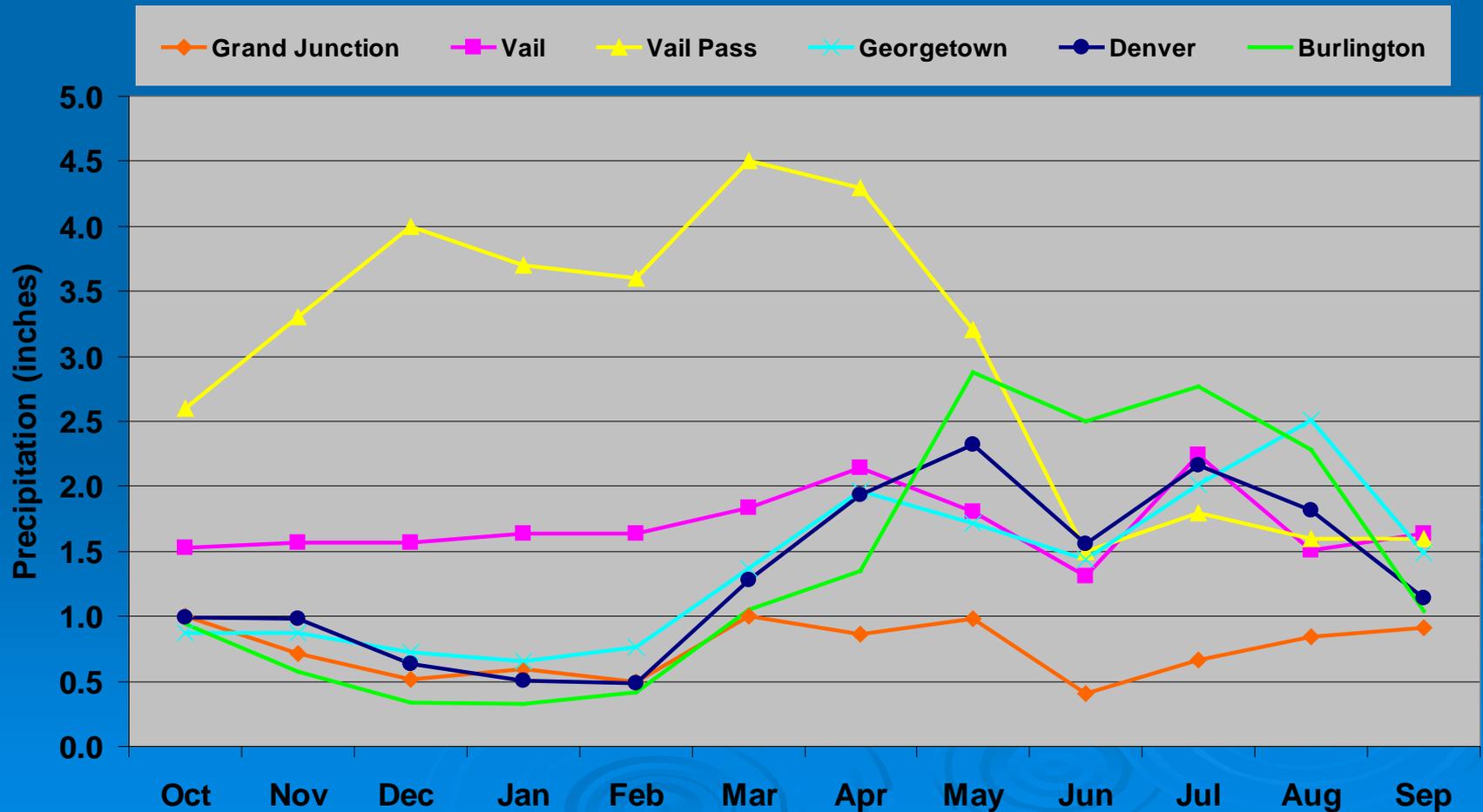


# Colorado Average Annual Precipitation



# Highly seasonal precipitation patterns with considerable geographic diversity in “seasonality”

Water Year Average Precipitation for Selected Stations

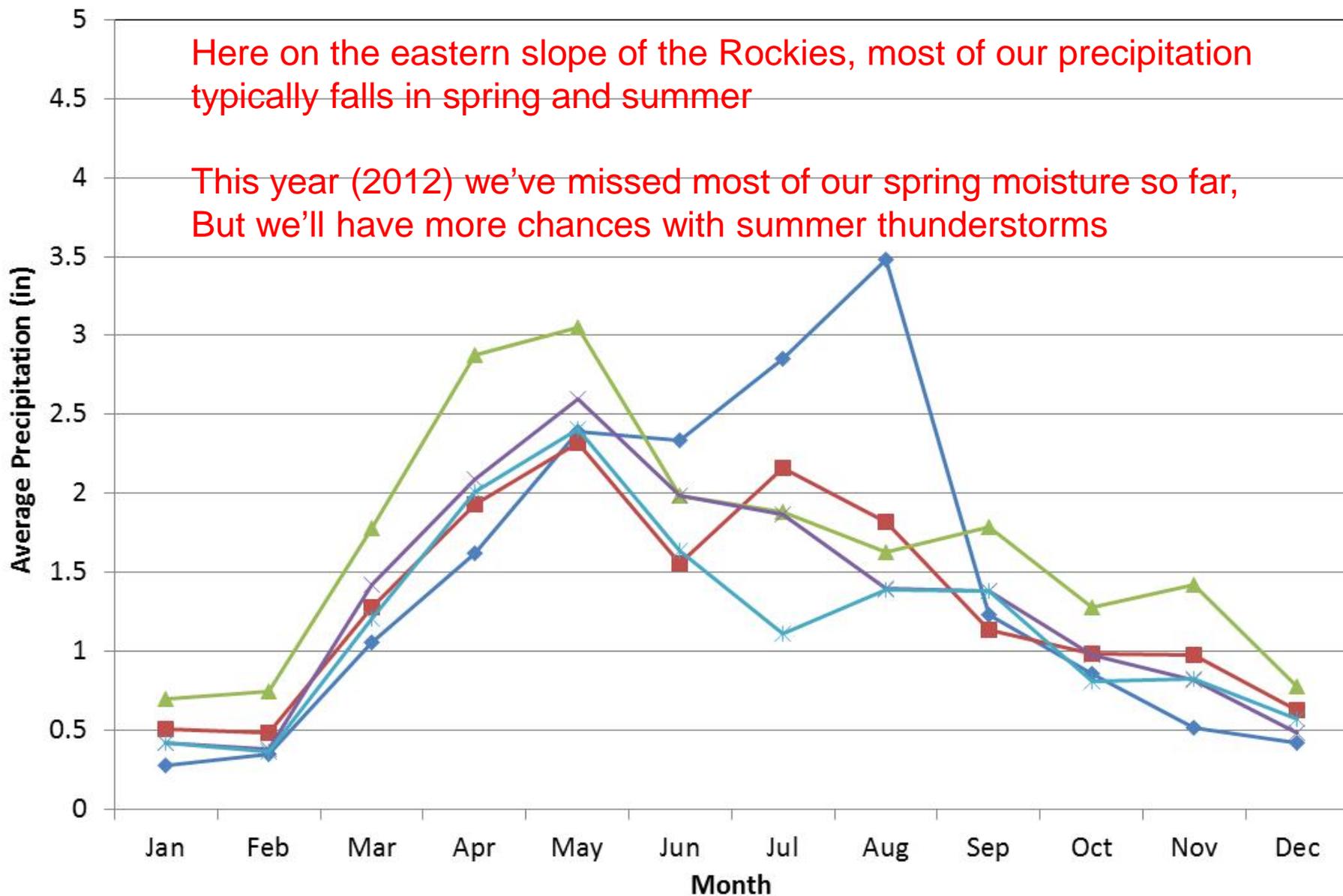


# Average Monthly Precipitation (in) for selected Colorado Stations

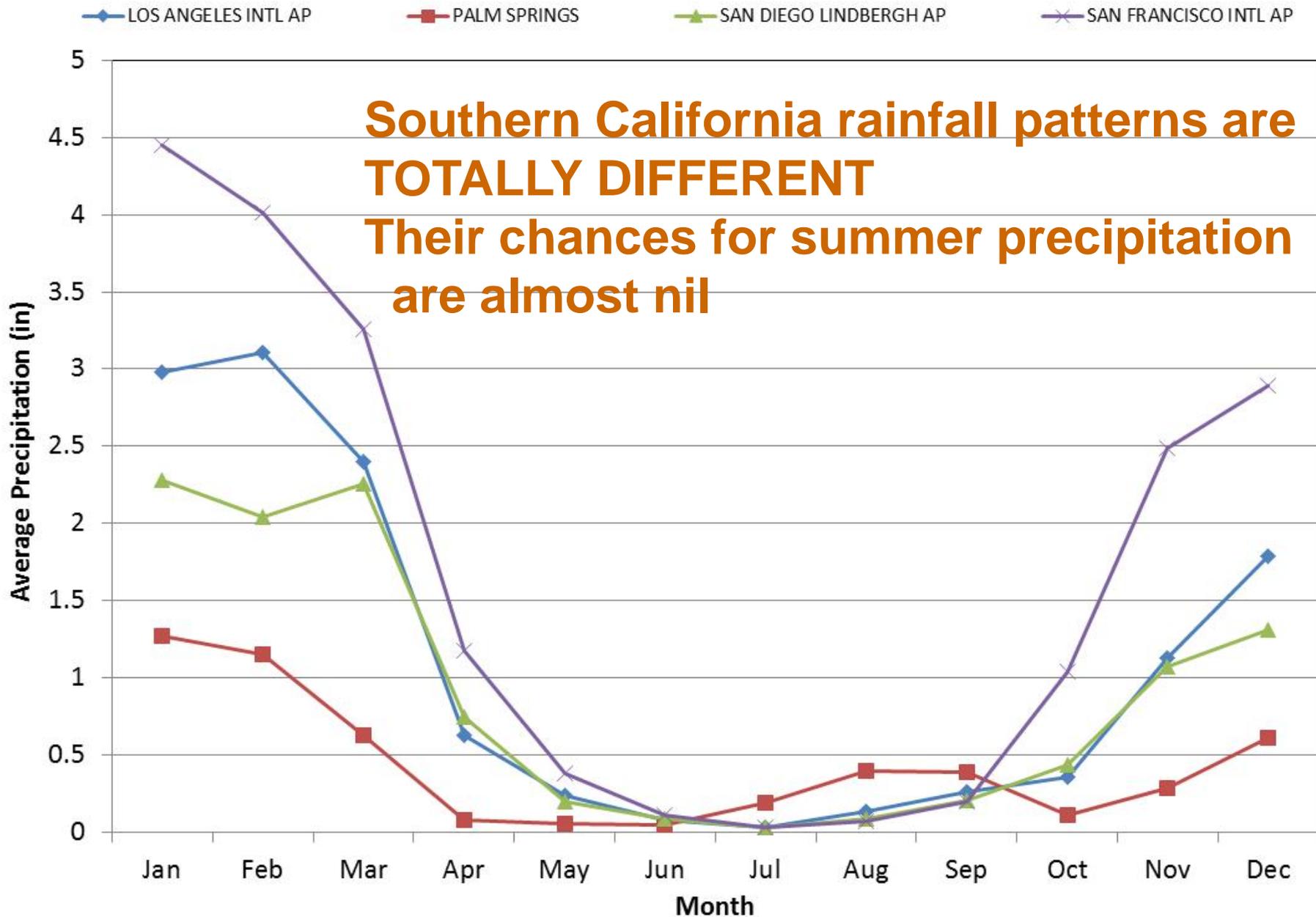
◆ COLORADO SPRINGS MNPLA    ■ DENVER STAPELTON    ▲ BOULDER    ✕ FORT COLLINS    \* LONGMONT 2 ESE

Here on the eastern slope of the Rockies, most of our precipitation typically falls in spring and summer

This year (2012) we've missed most of our spring moisture so far, But we'll have more chances with summer thunderstorms



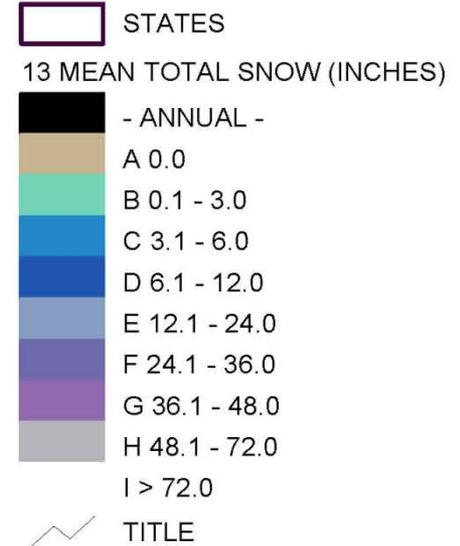
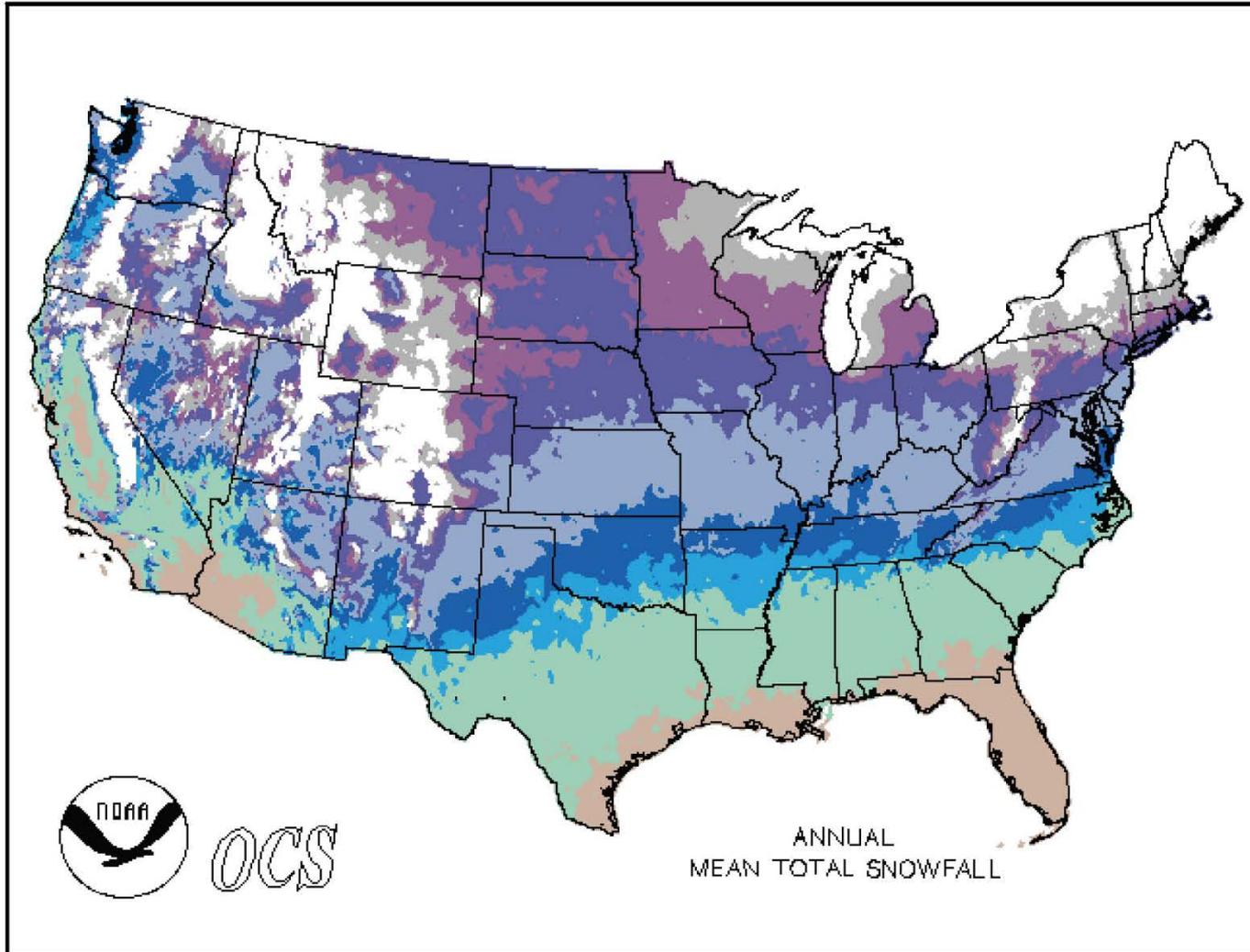
# Average Monthly Precipitation (in) for selected California Stations



**Lots of Snow,  
sometimes and some places**



# National Annual Average Snowfall



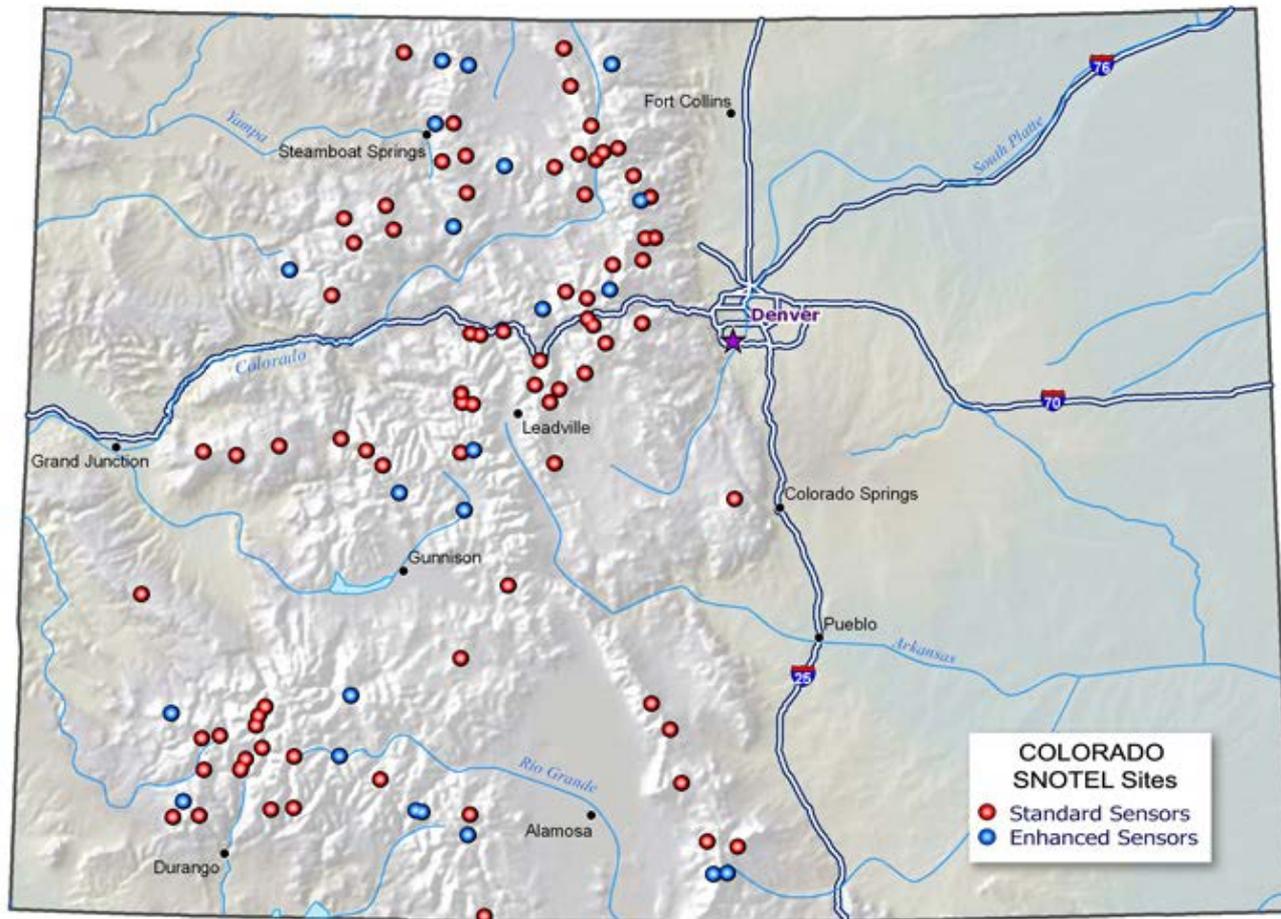
**Considering our  
Latitude (40 N)  
Colorado is one  
of the snowiest  
areas of the  
world --  
because of our  
high elevation**



# SNOTEL -- Tracking Colorado's High-elevation Snowpack

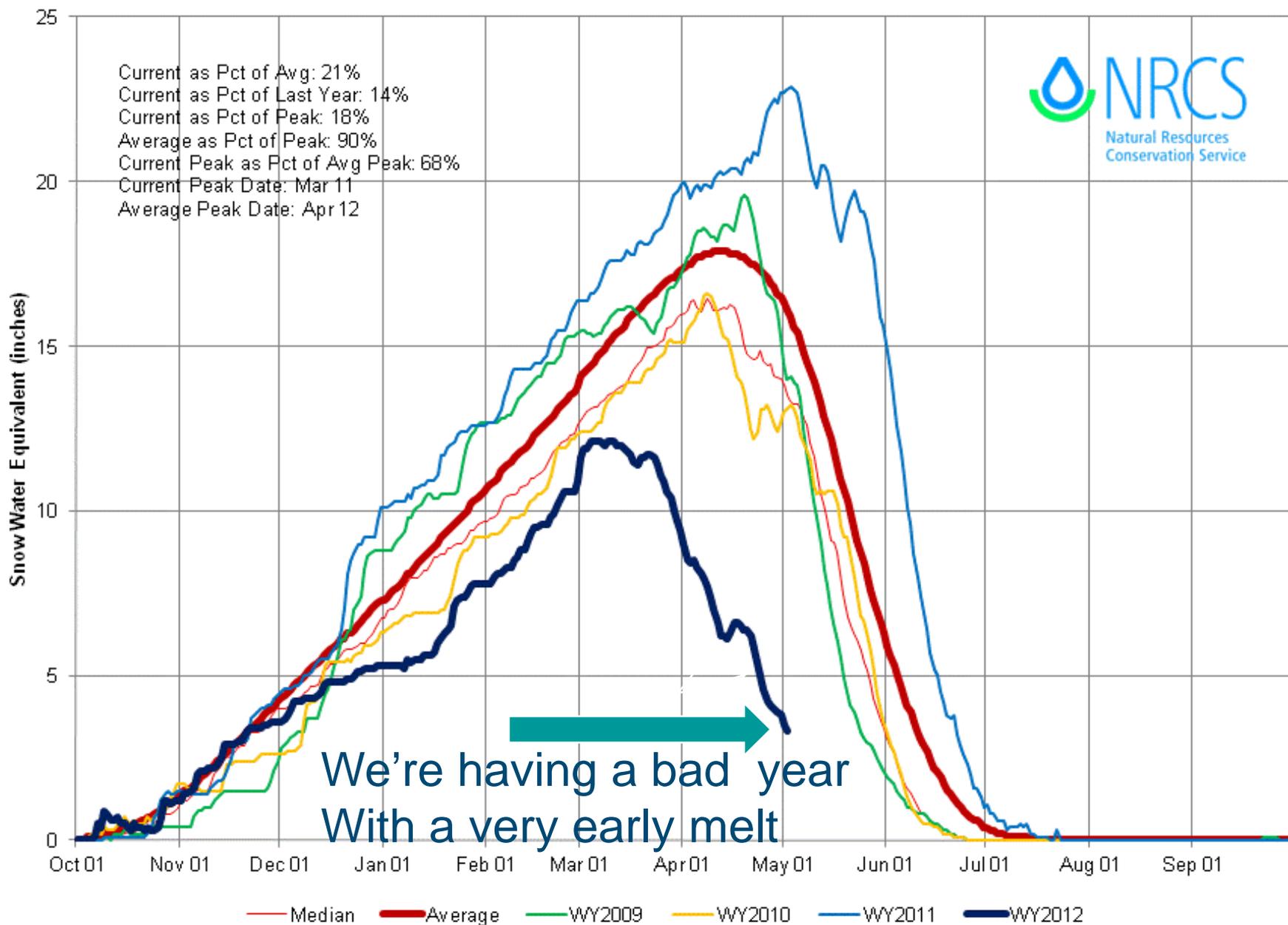
USDA – Natural Resources Conservation Service Snow Survey

<http://www.co.nrcs.usda.gov/snow/>



# Colorado Statewide Time Series Snowpack Summary

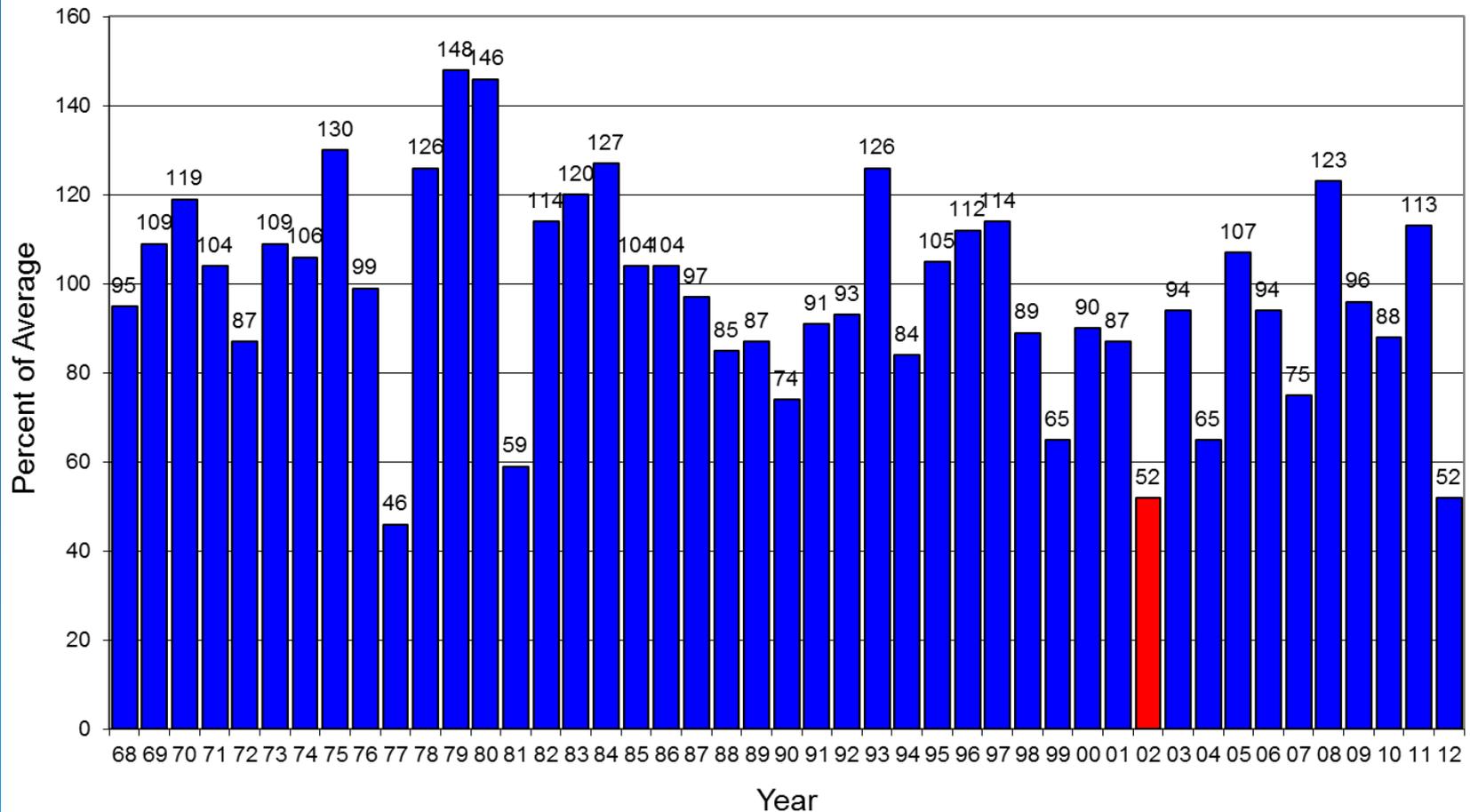
Based on Provisional SNOTEL data as of May 02, 2012



# Colorado Statewide April 1 Snowpack

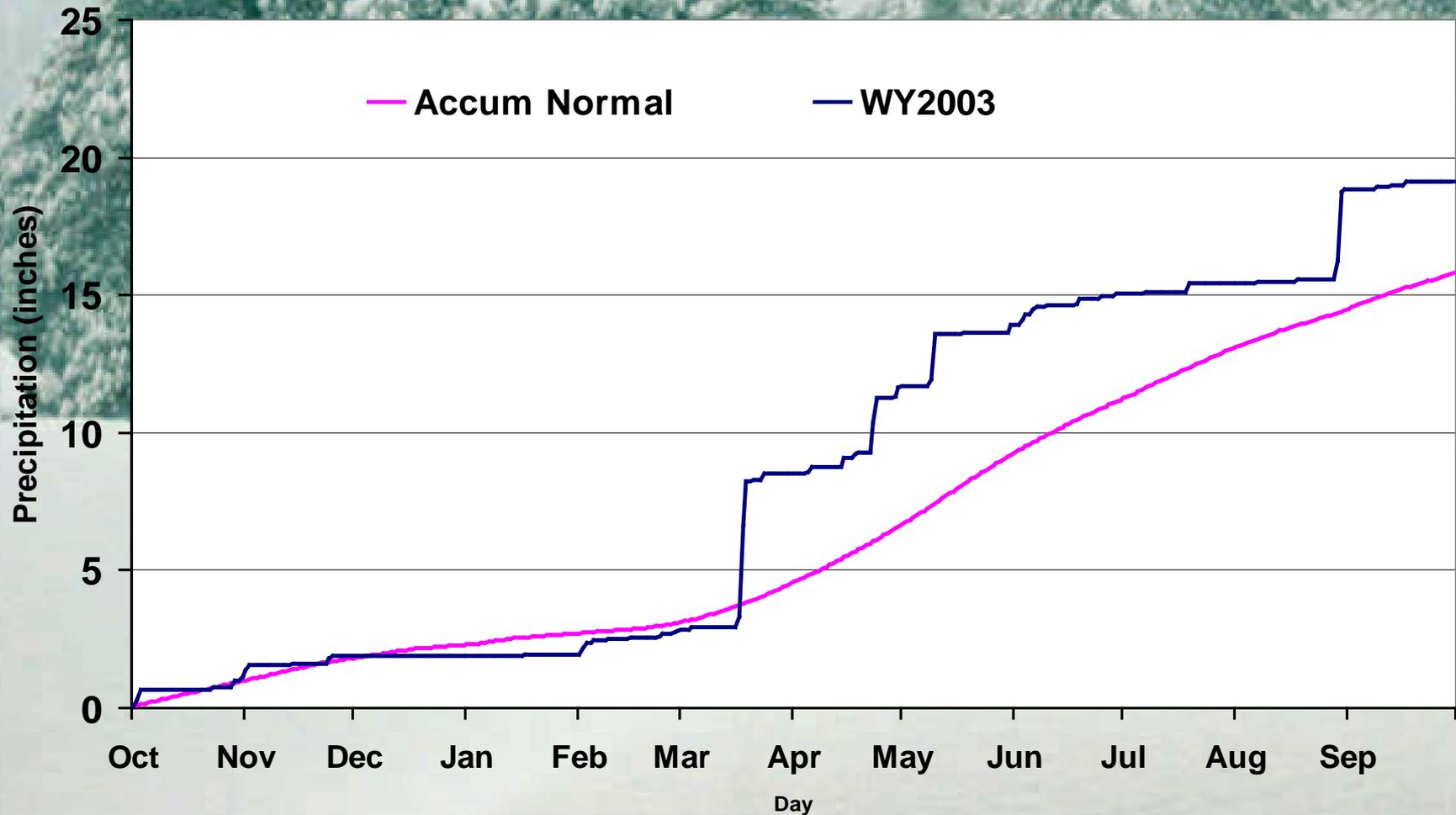
Time Series of April 1 Snowpack – Tracking Variability and Trends

APRIL 1 SNOWPACK  
COLORADO STATEWIDE



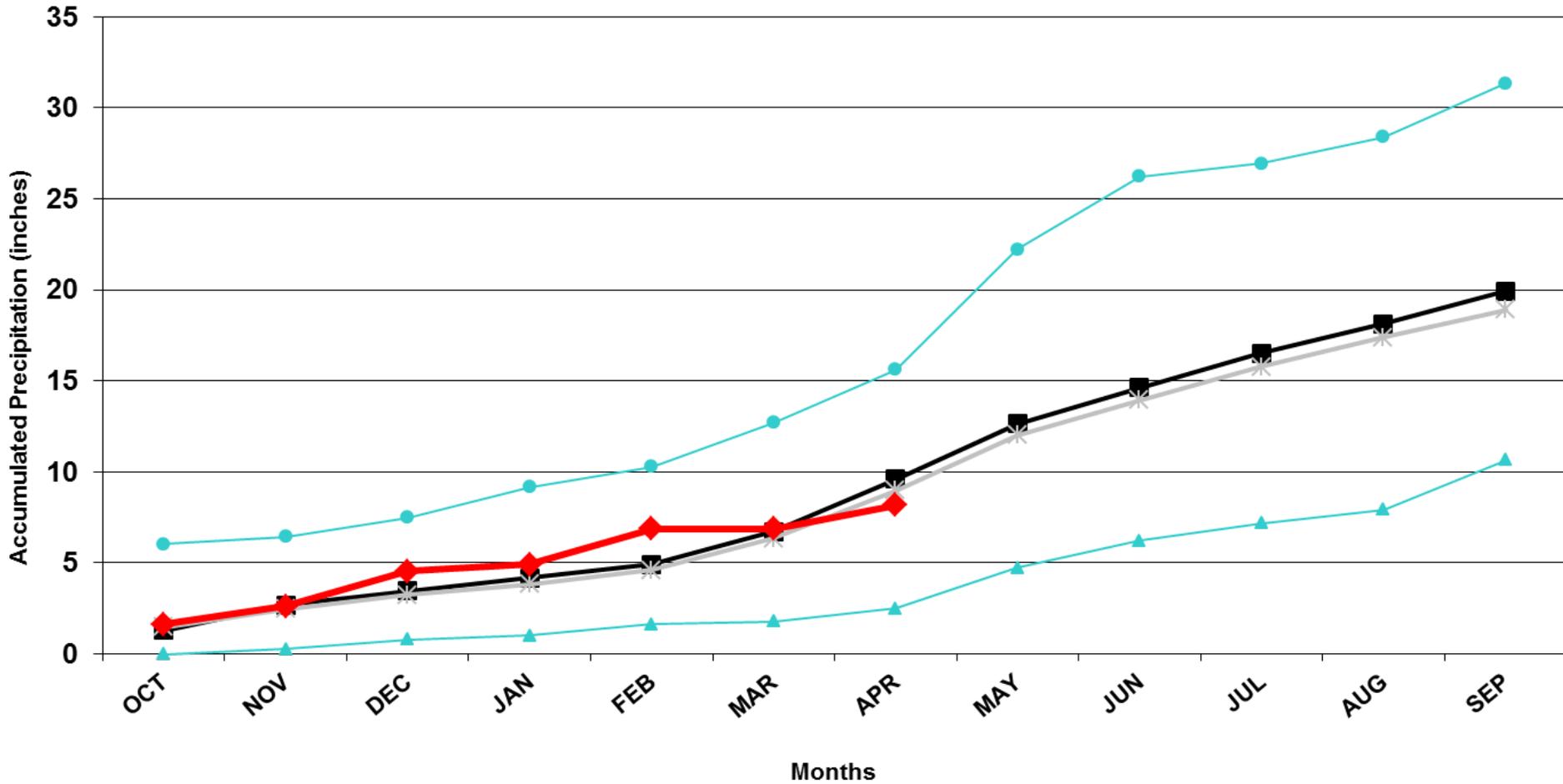
# A few storms contribute a large fraction of the annual precipitation in many years

Fort Collins Daily Accumulated Precipitation



# Boulder 2012 Water Year

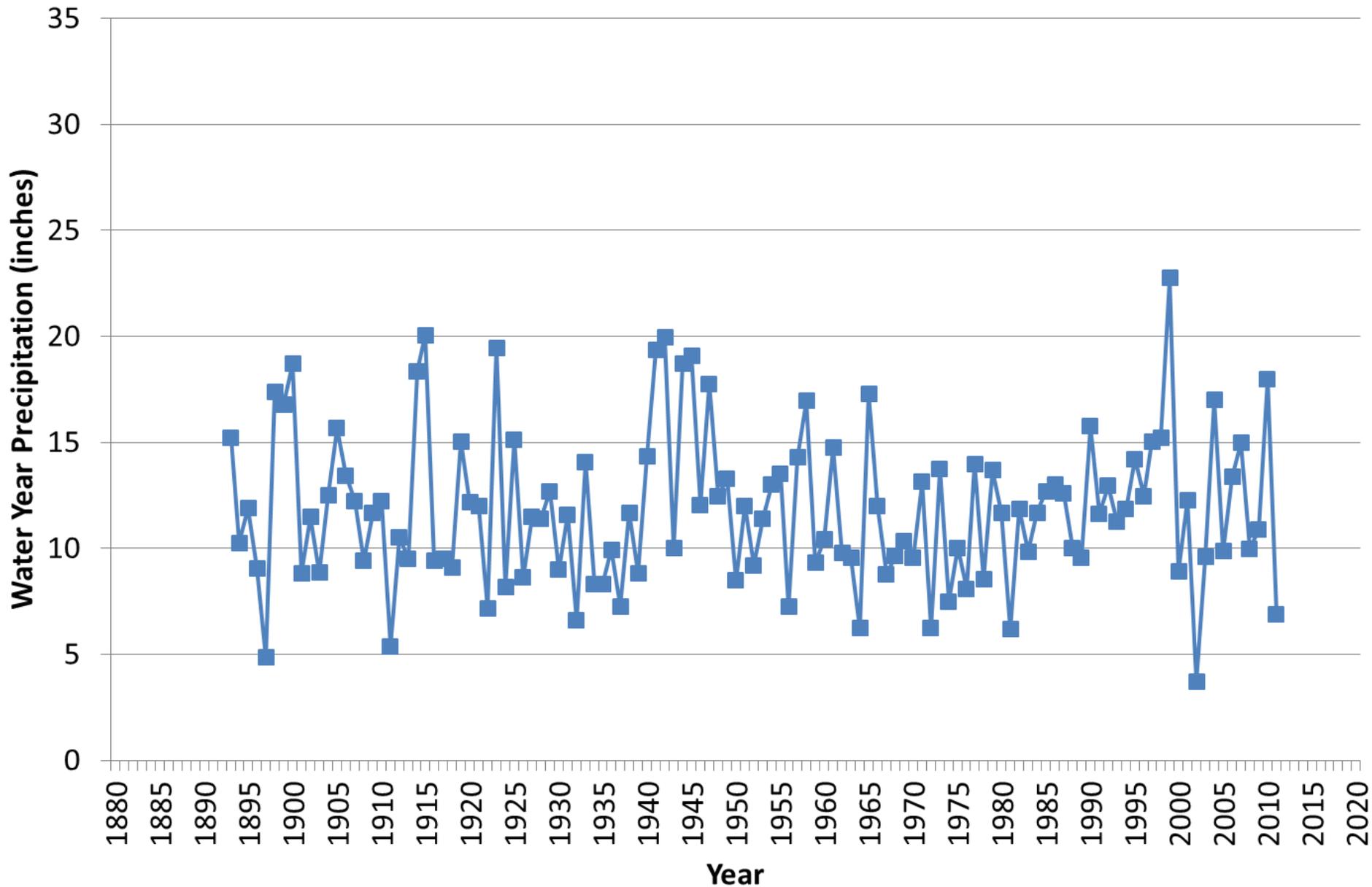
30 Year Averages-1971-2000    Period of Record Average - 1894-2009    2012 Water Year    Max Precip    Min Precip



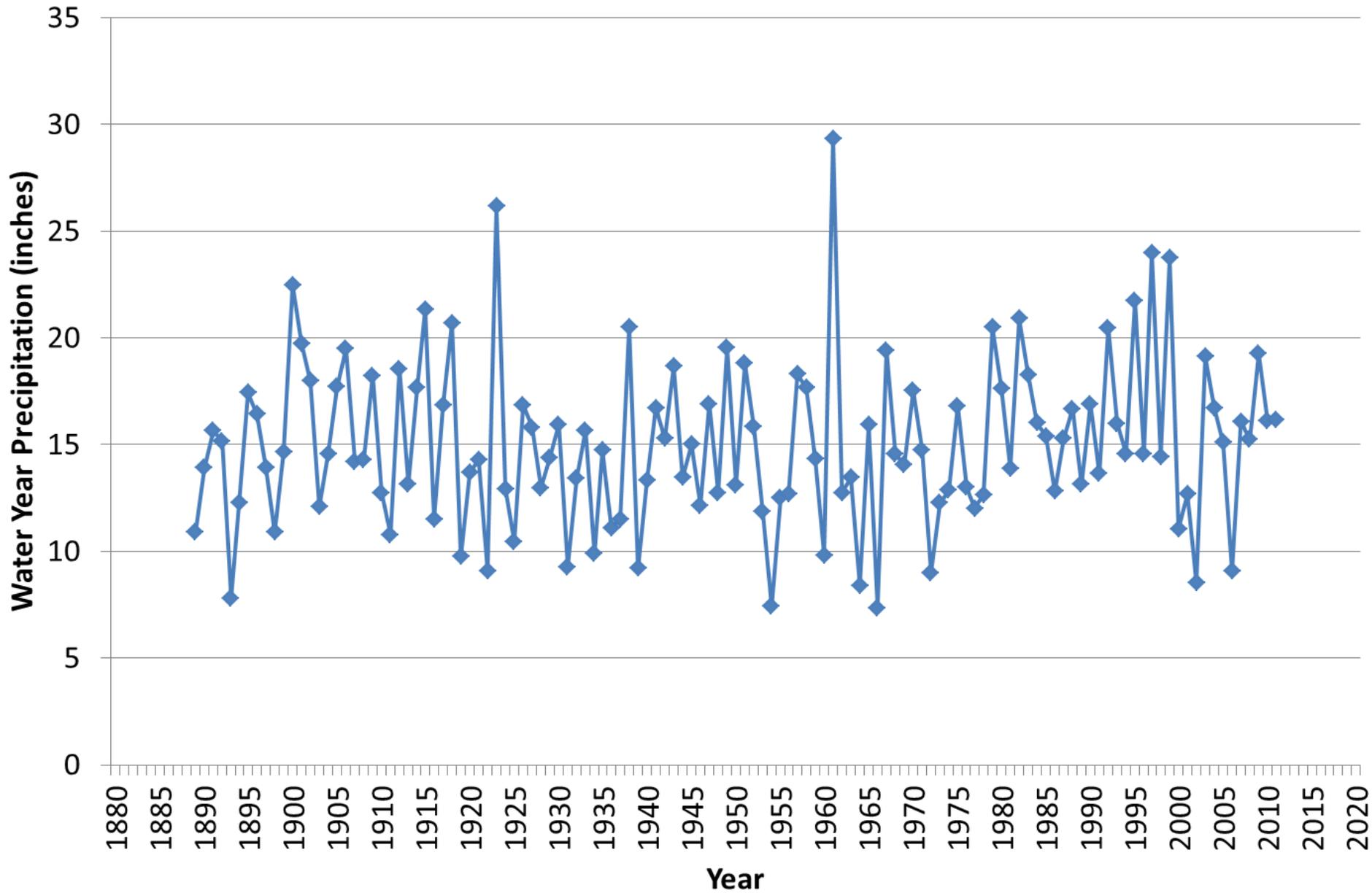
# Large Year-to-Year Variations in Precipitation



# Rocky Ford Water Year Precipitation (1894 - 2011)

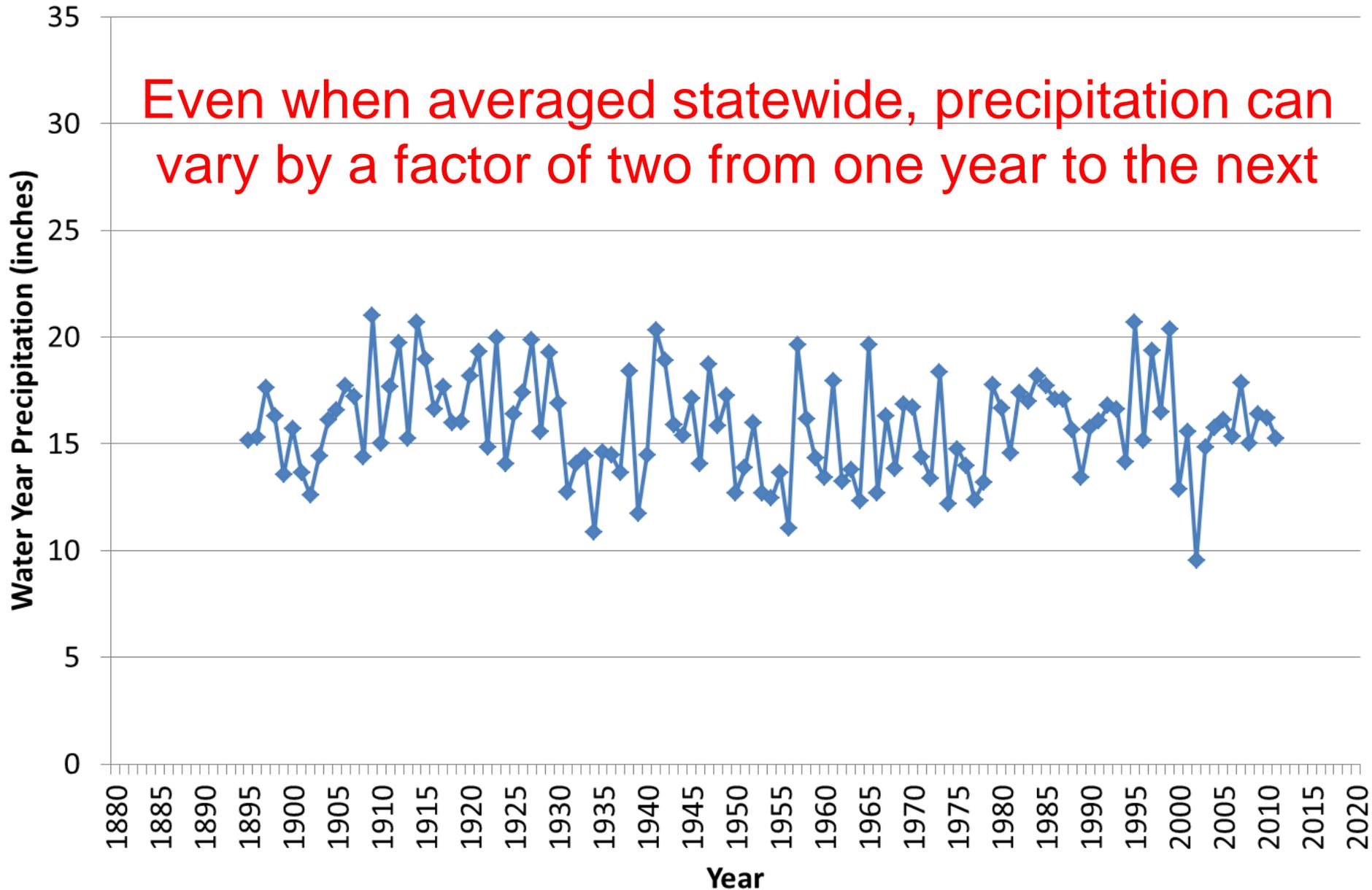


# Fort Collins Water Year Precipitation (1894 - 2011)



# Colorado Statewide Water Year Precipitation (1895 - 2011)

Even when averaged statewide, precipitation can vary by a factor of two from one year to the next



# Drought Visits Our Area Regularly

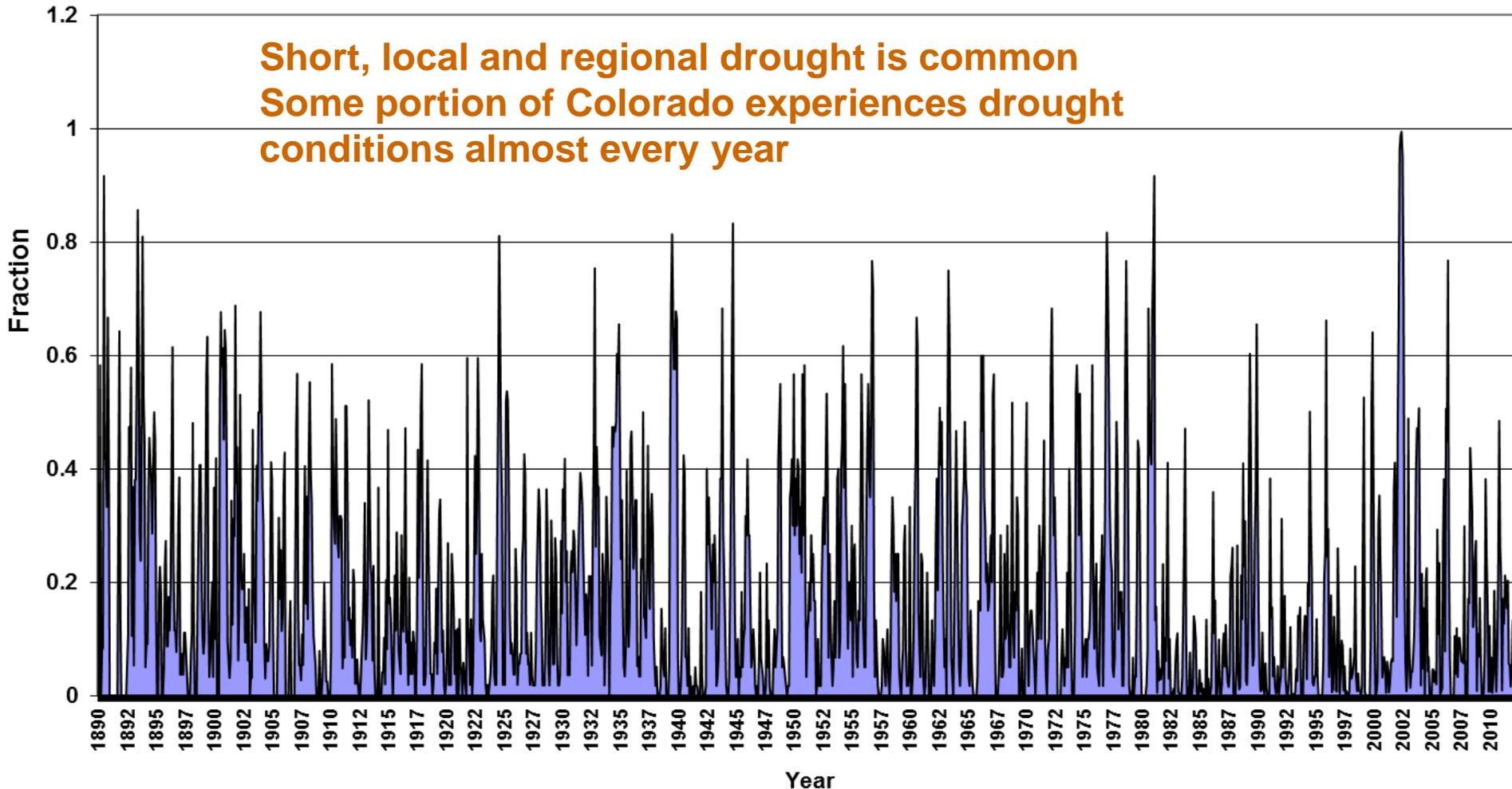


Photo by NRCS

# Fraction of Colorado in Drought

## Based on 3 month SPI

(1890 - March 2012)

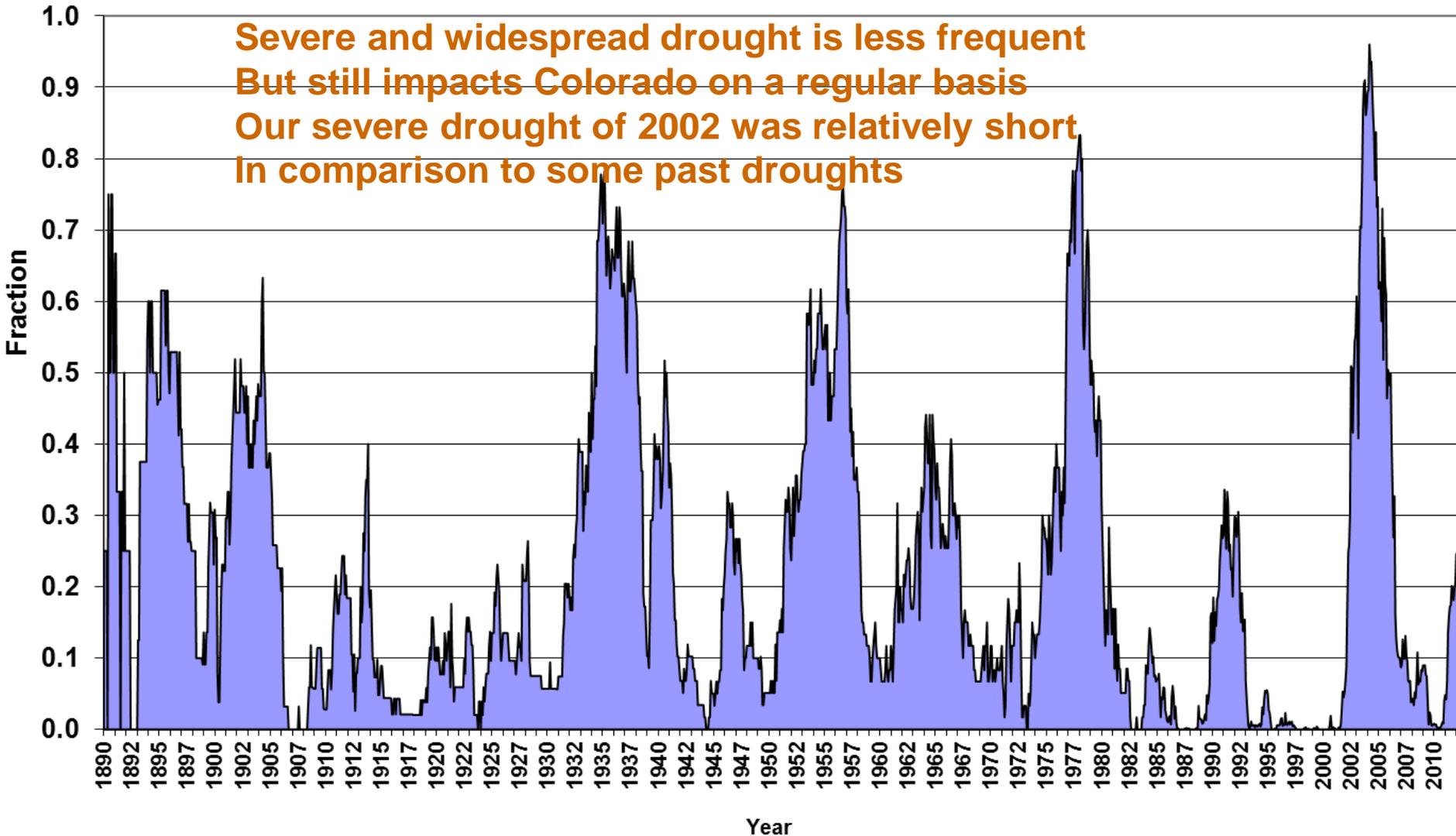


# Fraction of Colorado in Drought

## Based on 48 month SPI (SPI <-1)

(1890 - March 2012)

Severe and widespread drought is less frequent  
But still impacts Colorado on a regular basis  
Our severe drought of 2002 was relatively short  
In comparison to some past droughts



Confidently detecting climatic trends is much more challenging and difficult than determining spatial patterns, seasonal cycles, or year-to-year variations

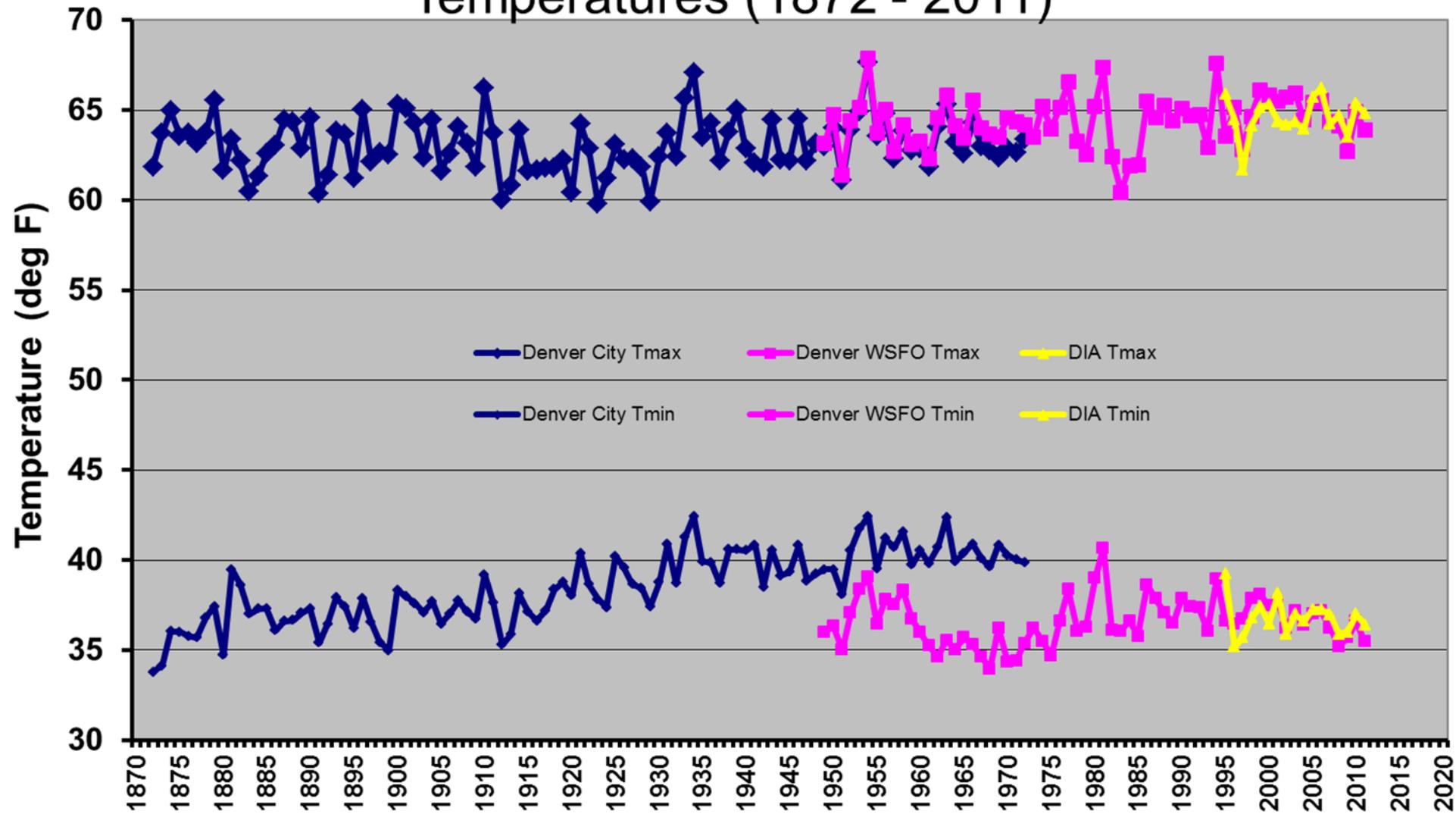


# **We can find many frustrating limitations to our climate records:**

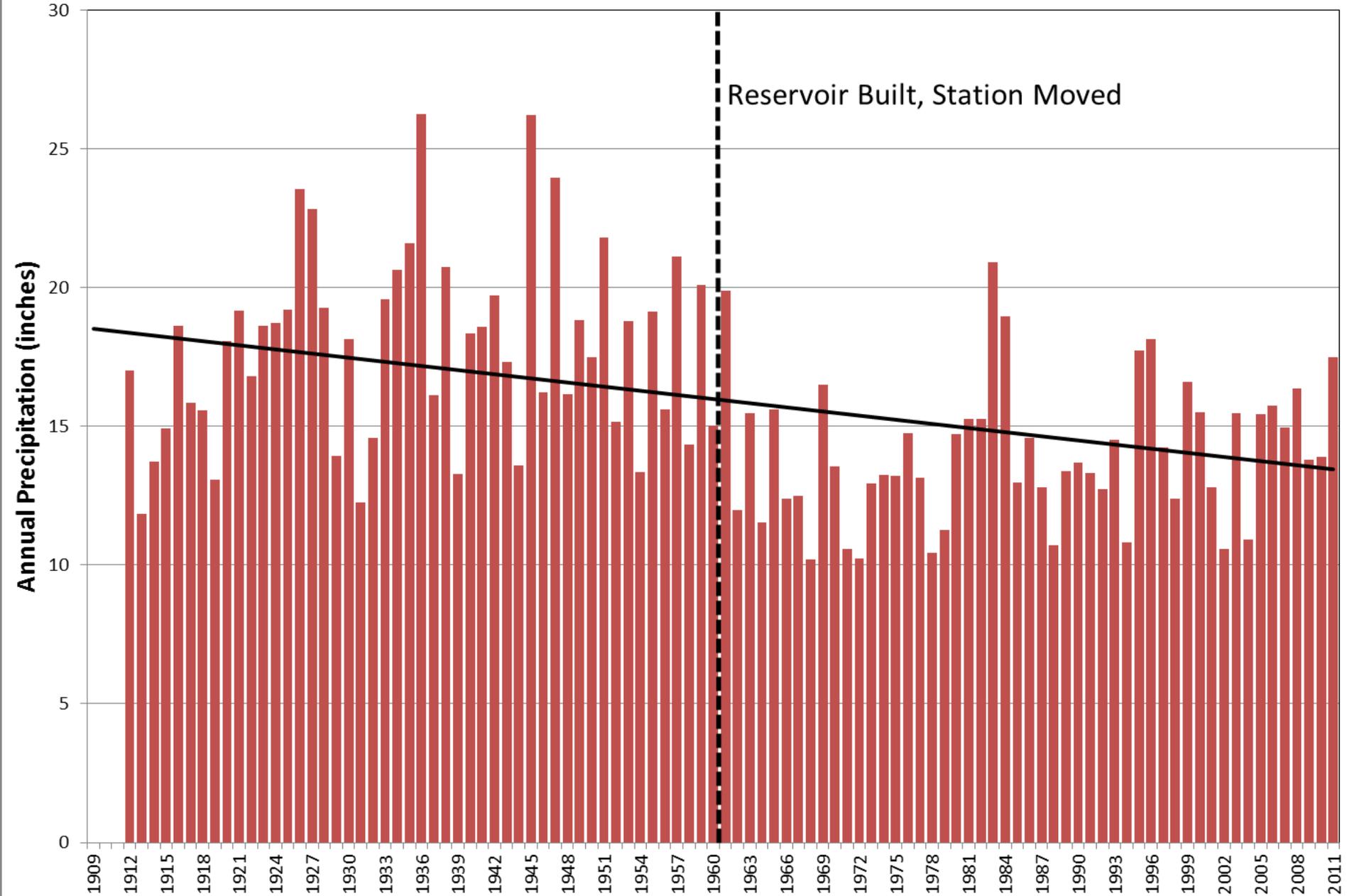
- Changing instrumentation
  - Changing environments around our weather stations
  - Changing weather station locations and observation times
  - Automation, etc.
- 

# Denver – Station Keeps Changing

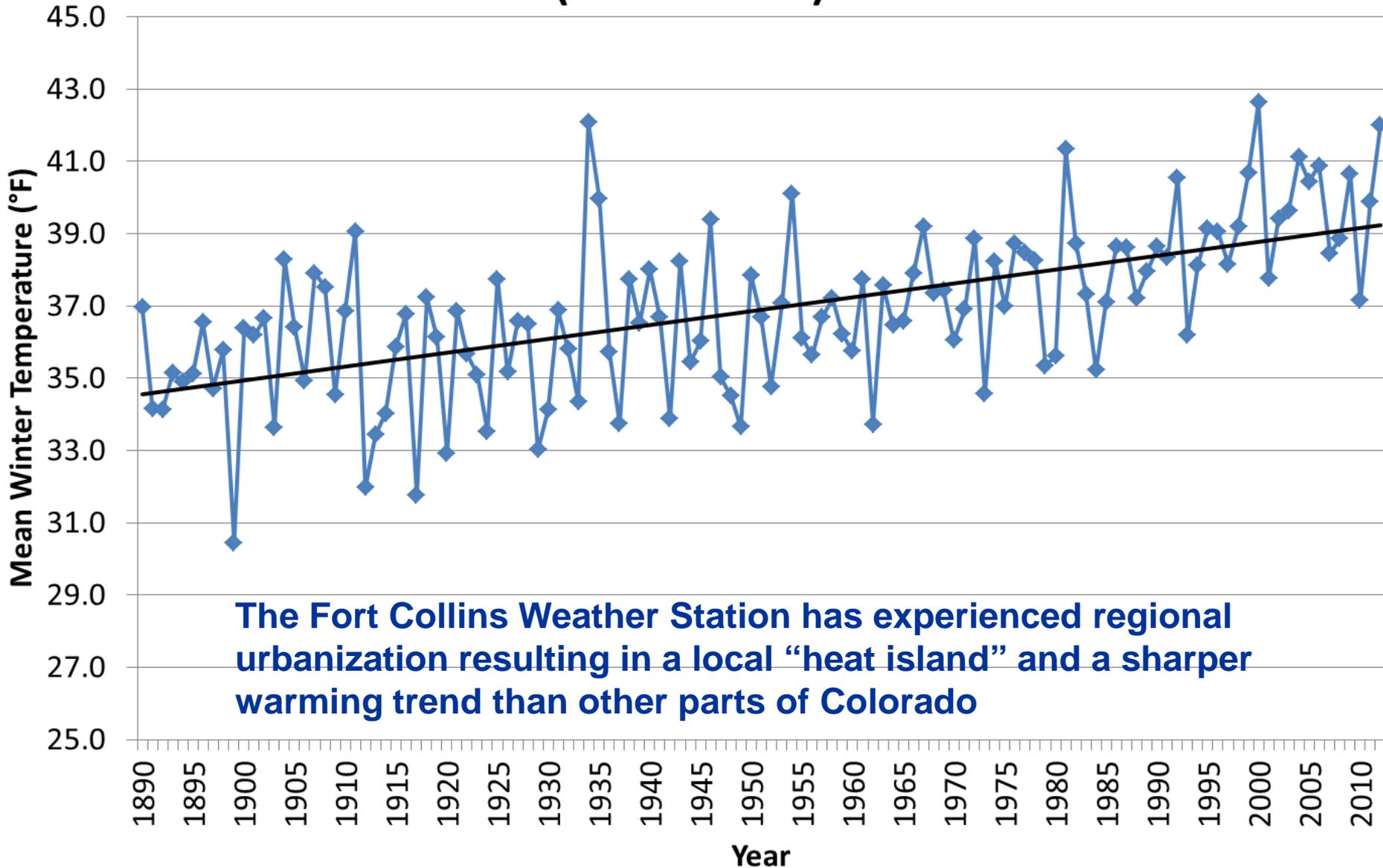
## Denver Annual Average Maximum and Minimum Temperatures (1872 - 2011)



# Dillon Annual Precipitation (in) 1912 - 2011



# Fort Collins Average Winter (Oct - Apr) Temperature (1889 - 2012)

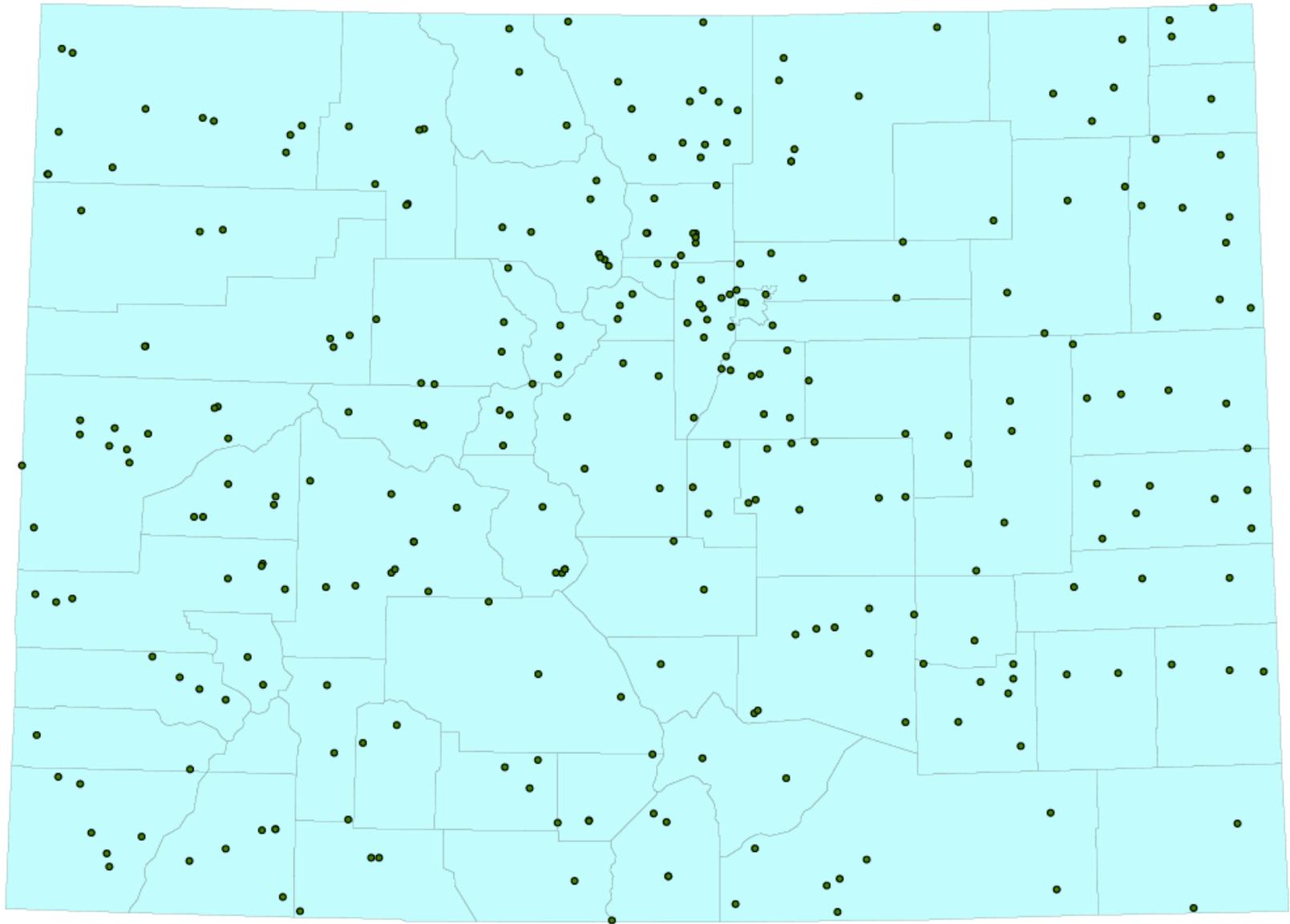


Still, our climate records are more complete, consistent, and widespread than nearly all other forms of long-term environmental monitoring (i.e. we shouldn't whine).



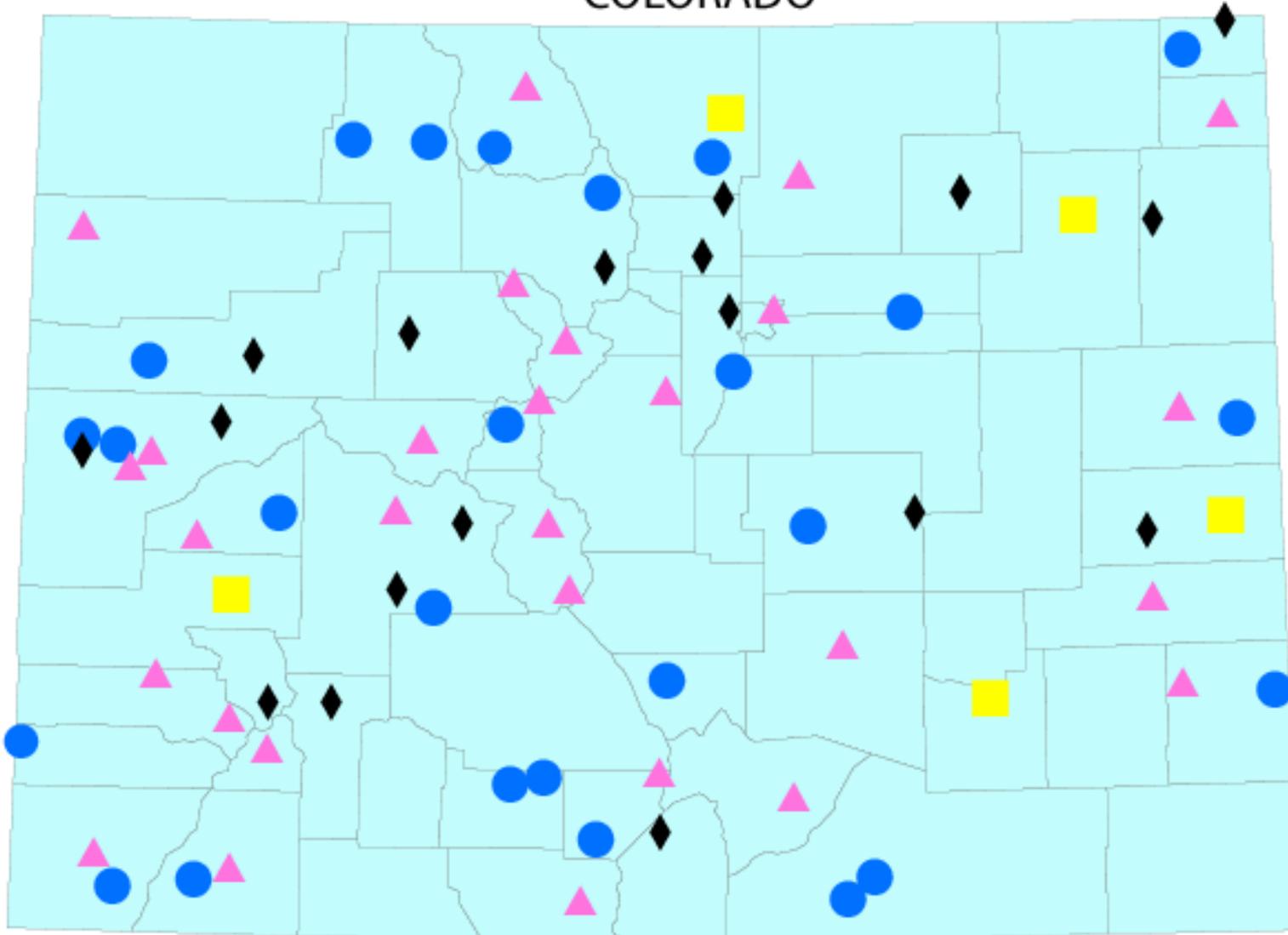
# Colorado Cooperative Stations

COLORADO



# Long-Term Analysis Stations

COLORADO



## Legend

- ▲ Good
- ◆ Useful
- Better
- Best

# Colorado Climate Trends Website

Colorado State University

## Colorado Climate Trends

Climate Trends Home | Colorado Climate Center | CIRA | Atmospheric Science

[Colorado Climate Center](#) » [Climate Trends](#) » [Home](#)

Search by Google

## Welcome to the Colorado Climate Trends Website

[Climate Trends](#) | [Station Map](#) | [Station Info](#) | [Data Access](#) | [Links + Resources](#) | [About](#)

### Climate Trends of Colorado



Welcome! The climate of Colorado is a valued natural resource affecting our lives and livelihoods. By nature, climate is variable. No two years are ever exactly alike. Instrumental observations of our climate dating back to the late 1800s give a sense of our average climate, typical variations, extremes and long-term trends. (For a description of historic weather observations in Colorado, [click here](#)). Tracking temperatures and precipitation through history reveal seasonal patterns, cold and warm periods, and episodes of drought and abundant water.

Today there is great interest in climate change. If our state is warming, these data will show it. This Website lets you view, graph and download historic temperature and precipitation data for selected weather stations in Colorado having the longest and most consistent historical data. Historic consistency is critical for accurately assessing climate trends. There have been hundreds of weather stations operated in Colorado since the 1890s, but very few have data that are complete and consistent. Even the best stations selected for this site are imperfect.

For each station shown here, a description of the history of the station is provided so that data users will know what factors may have affected the long-term time series. To learn more

### National Weather Service Co-op Program

Weather observations in Colorado using thermometers and rain gauges date back to the late 1800s. Some of the earliest weather stations were established in the



National Weather Service  
Cooperative Observer Program

largest cities during the 1870s by the U.S. Signal Service. In the 1880s Colorado formed a "State Weather Service" and began setting up more basic weather stations in smaller towns and rural areas. By 1890, the first nationwide civilian weather service was formed within the U.S. Department of Agriculture. State networks, such as Colorado's were combined to form a single nationwide volunteer weather observing network. This same network continues today managed by the National Weather Service. What began as a few dozen stations in the 1880s grew to over 200 in the 1940s and 50s and continues today.

<http://climatetrends.colostate.edu>

This website is a resource that anyone can use to keep tabs on Colorado's observed climate – its variations and trends.

<http://climatetrends.colostate.edu>

The background of the slide is a solid blue color. In the lower half, there are several faint, concentric circular ripples that resemble water droplets hitting a surface, creating a subtle pattern.



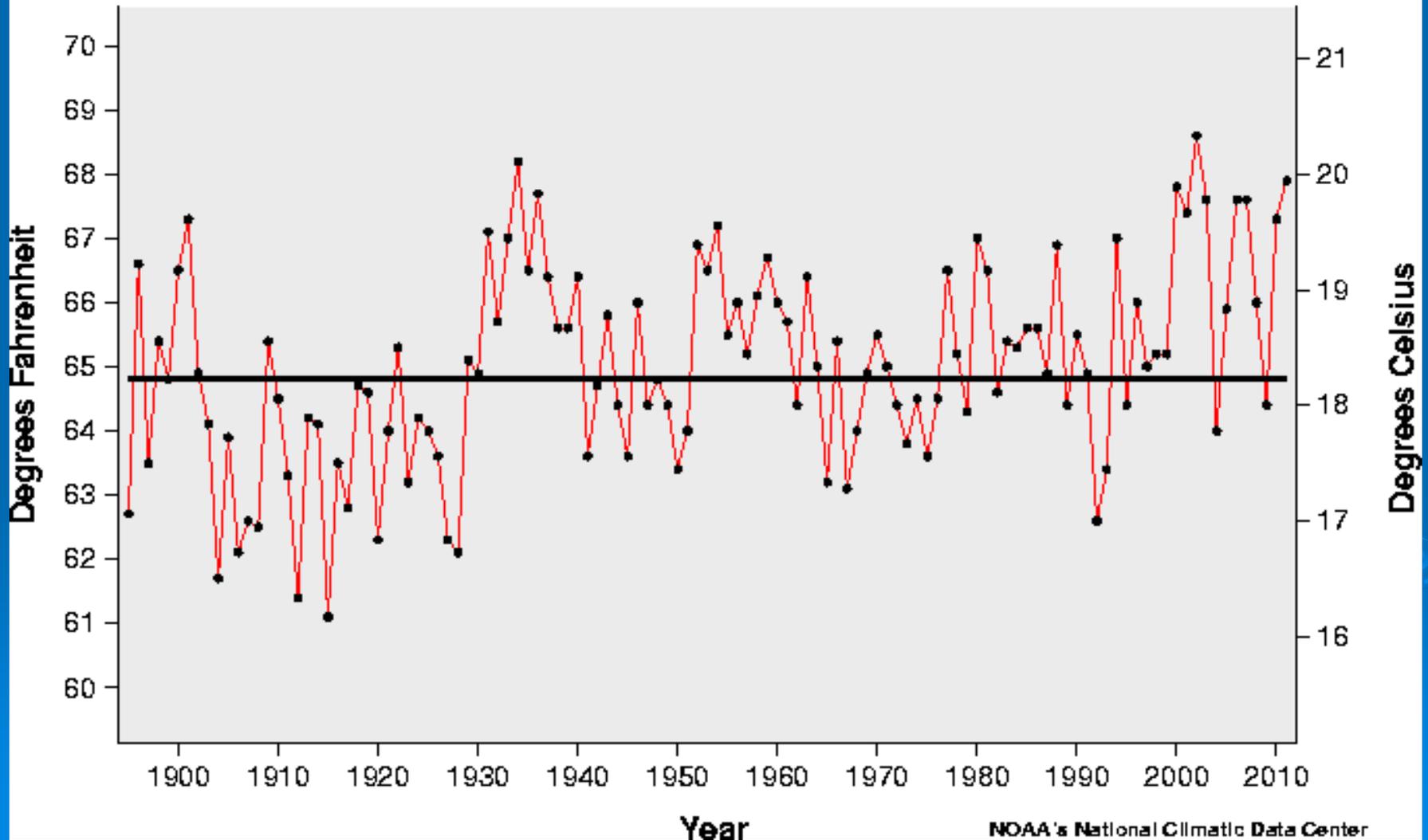
For much of Colorado, upward trends in seasonal temperatures are being observed and analyzed.

However, precipitation continues to vary greatly and no discernable long-term trends have yet been detected

# Colorado Statewide Summer Temperatures (JJA) Averages 1895-2011

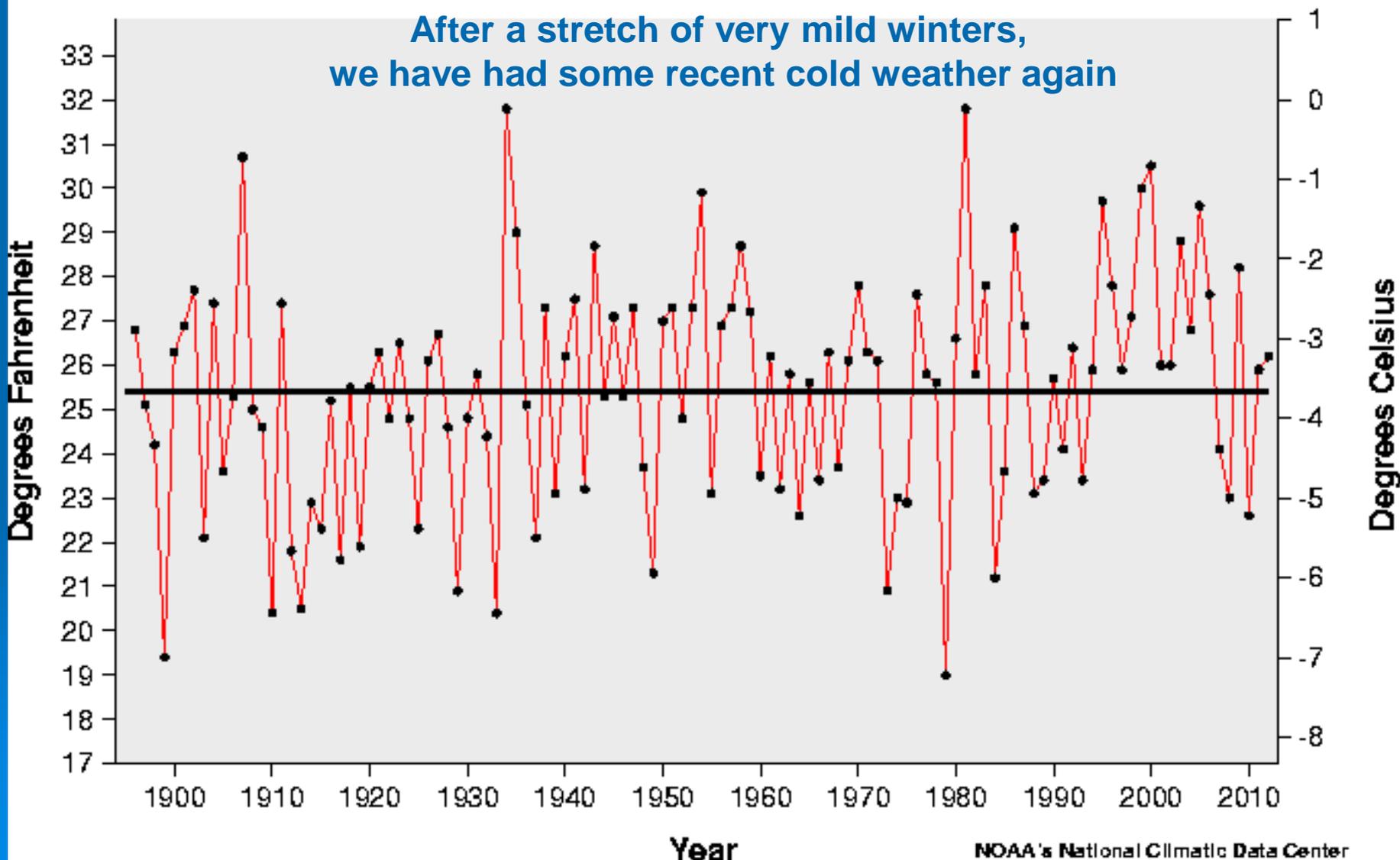
— Actual Temperature  
— Average Temperature

2010 and 2011 were hot ones

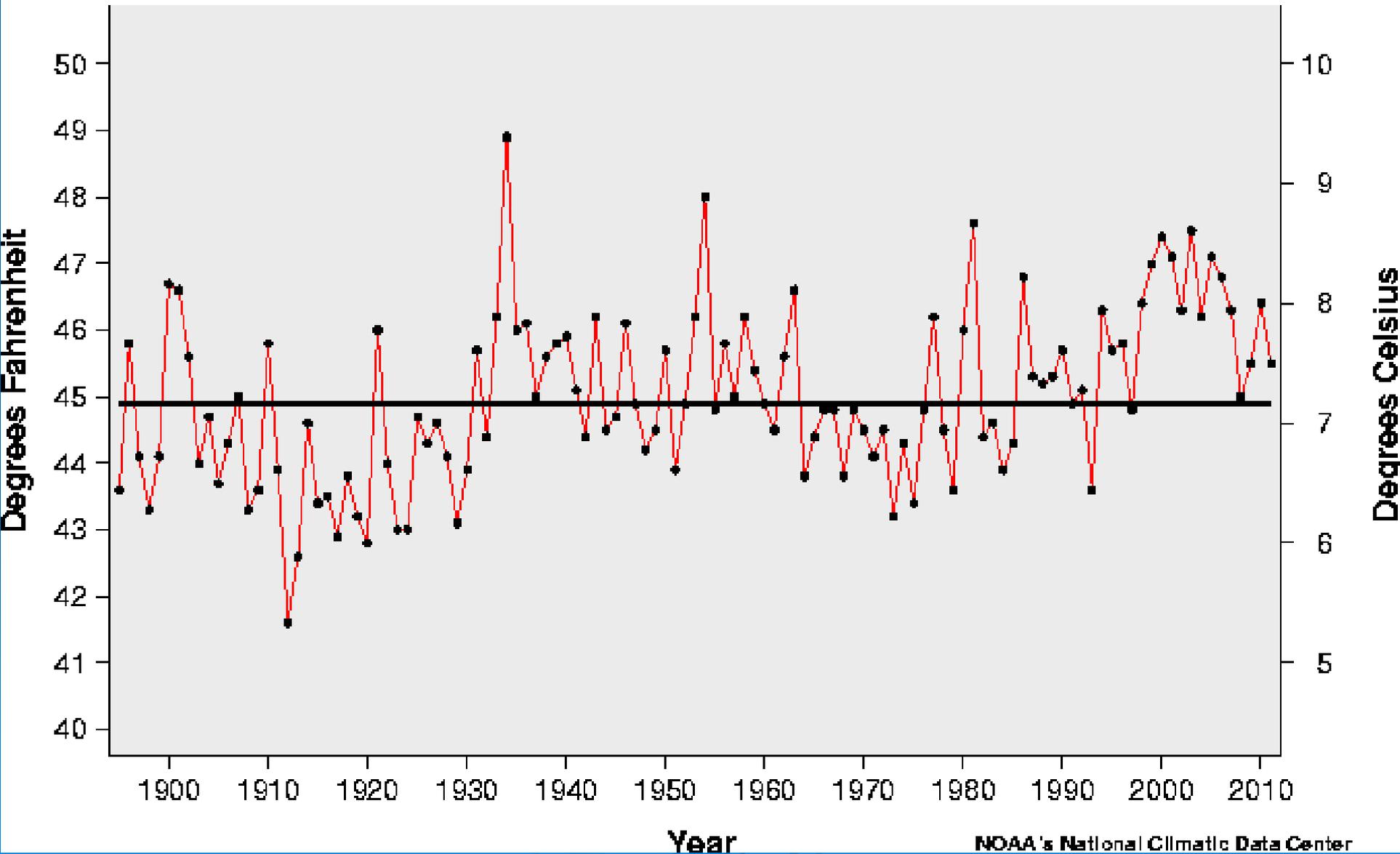


# Colorado Average Winter (DJF) Temperatures 1895-2011

- Actual Temperature
- Average Temperature

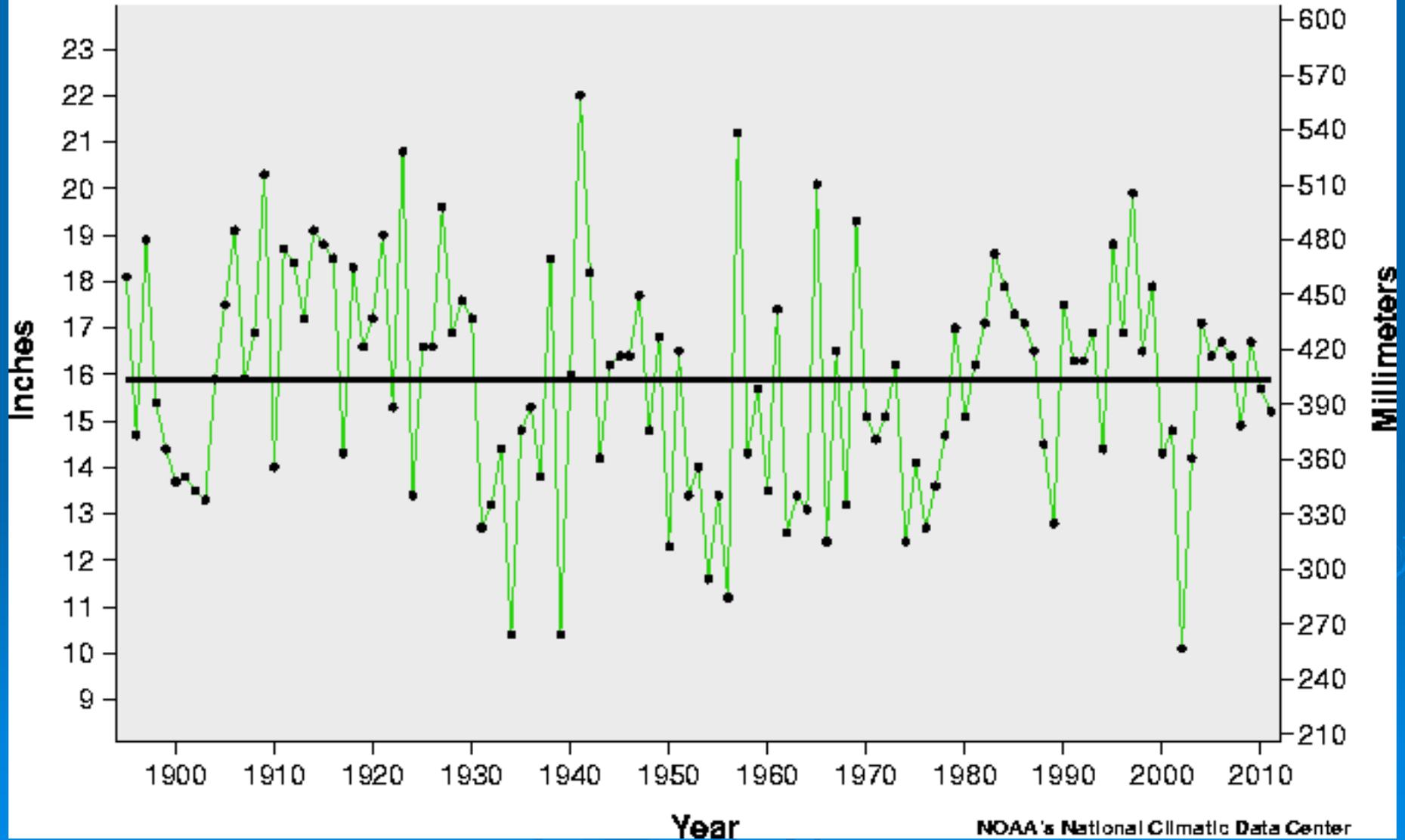


# Statewide Mean Annual Temperature 1895 - 2010

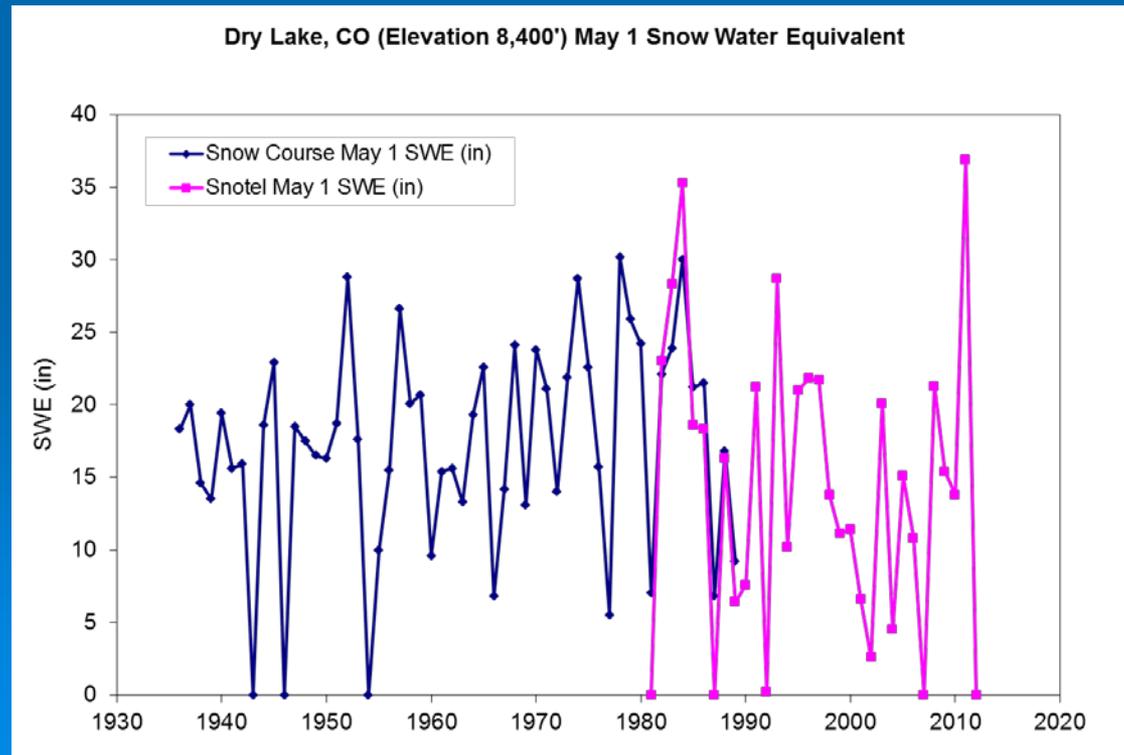


# Colorado statewide annual precipitation 1895- 2011

— Actual Precipitation  
— Average Precipitation



There is evidence of earlier snowmelt in Colorado, but it is less evident here than in other Western States, probably because of our very high elevation



**So . . . . . Do we need to be concerned about climate change when we have so many other challenges to deal with?**

- Any recent (past 120 years) climate trends are still rather subtle - - - but that may not always be the case

# Has our Climate Always Been the Same

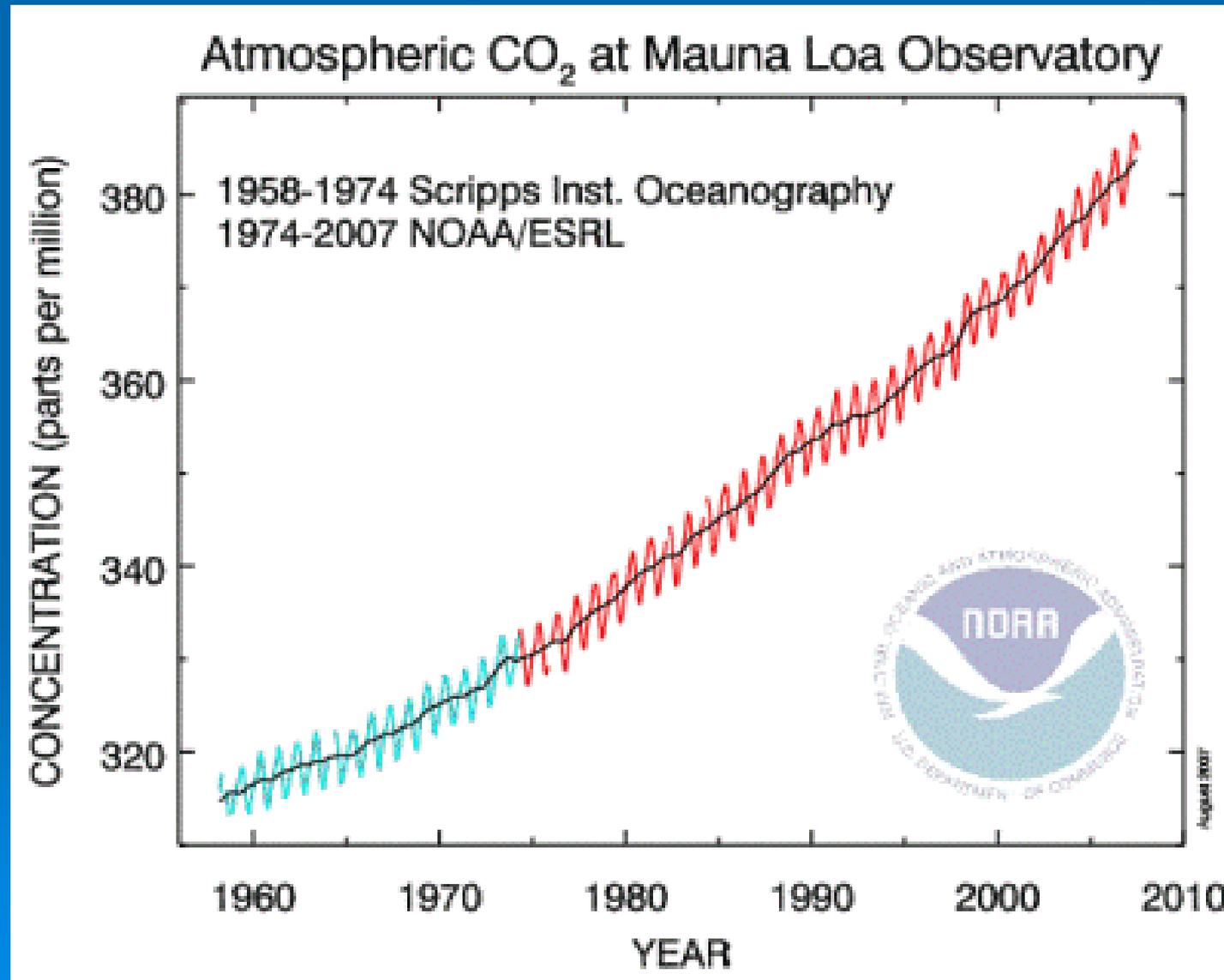
- No, climate is always a changing, dynamic equilibrium



But it looks like we're headed  
somewhere we've never been  
before – or at least not for a long,  
long time



# Increases in greenhouse gases are real, large and continuing



# The Greenhouse Effect

Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and lower atmosphere.

Solar radiation powers the climate system.



Some solar radiation is reflected by the Earth and the atmosphere.



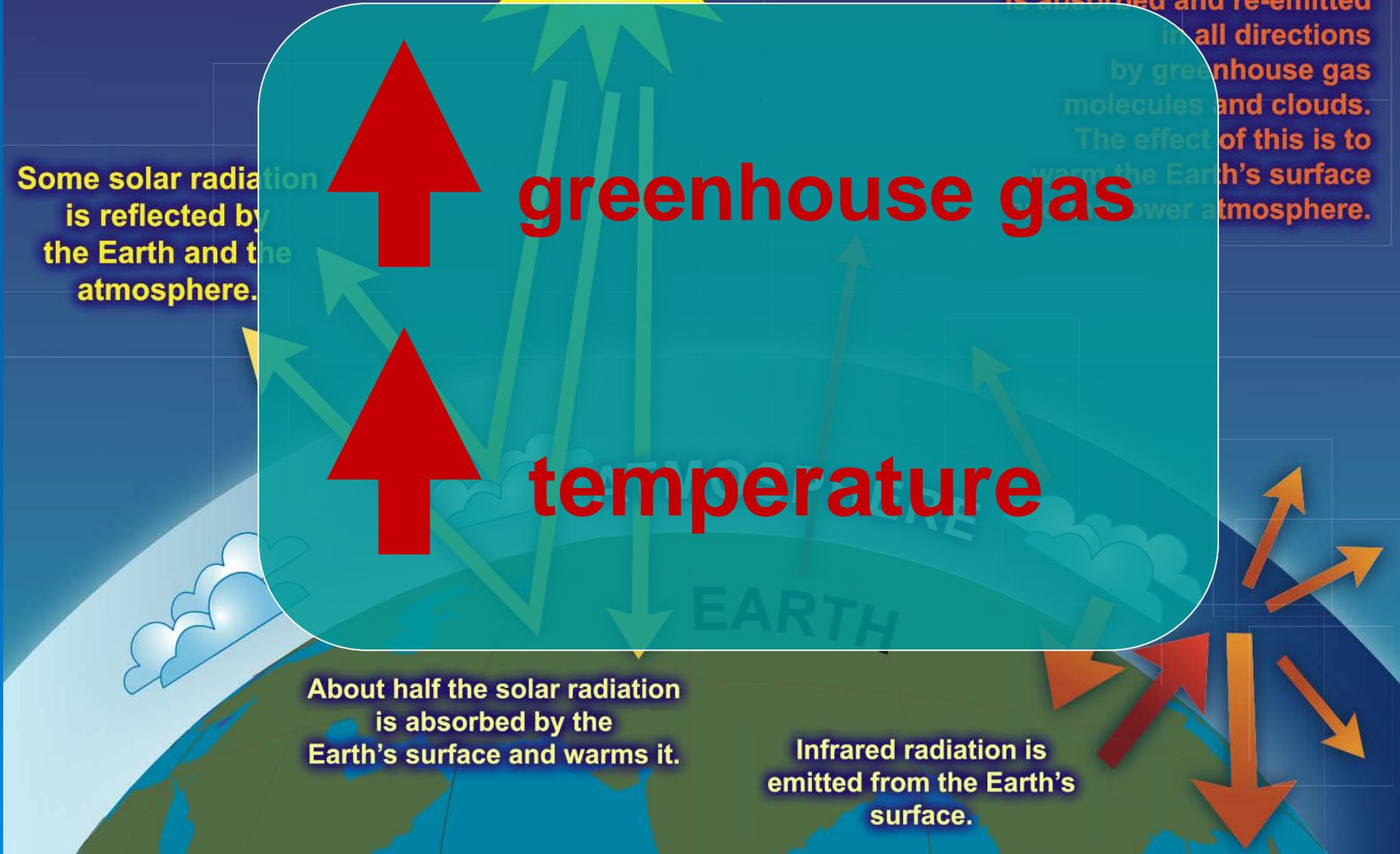
greenhouse gas



temperature

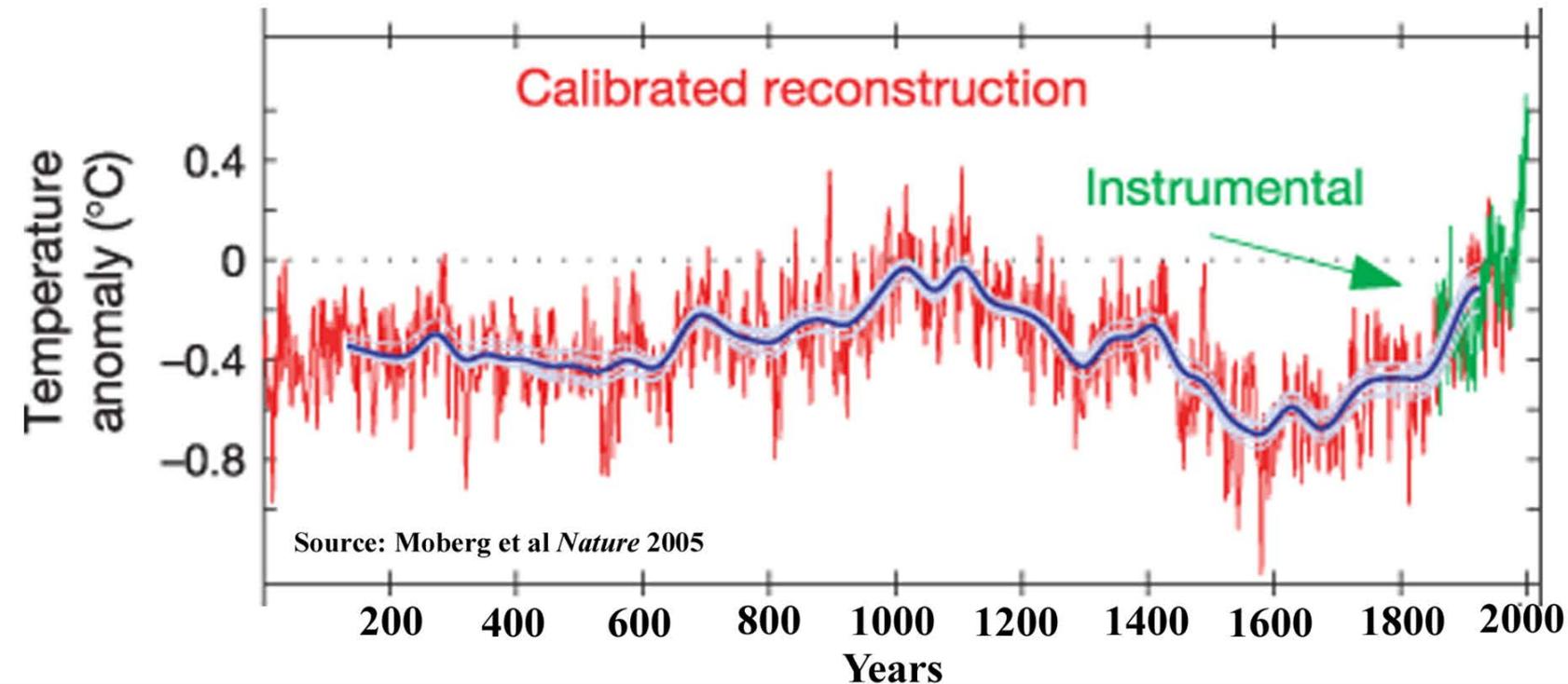
About half the solar radiation is absorbed by the Earth's surface and warms it.

Infrared radiation is emitted from the Earth's surface.

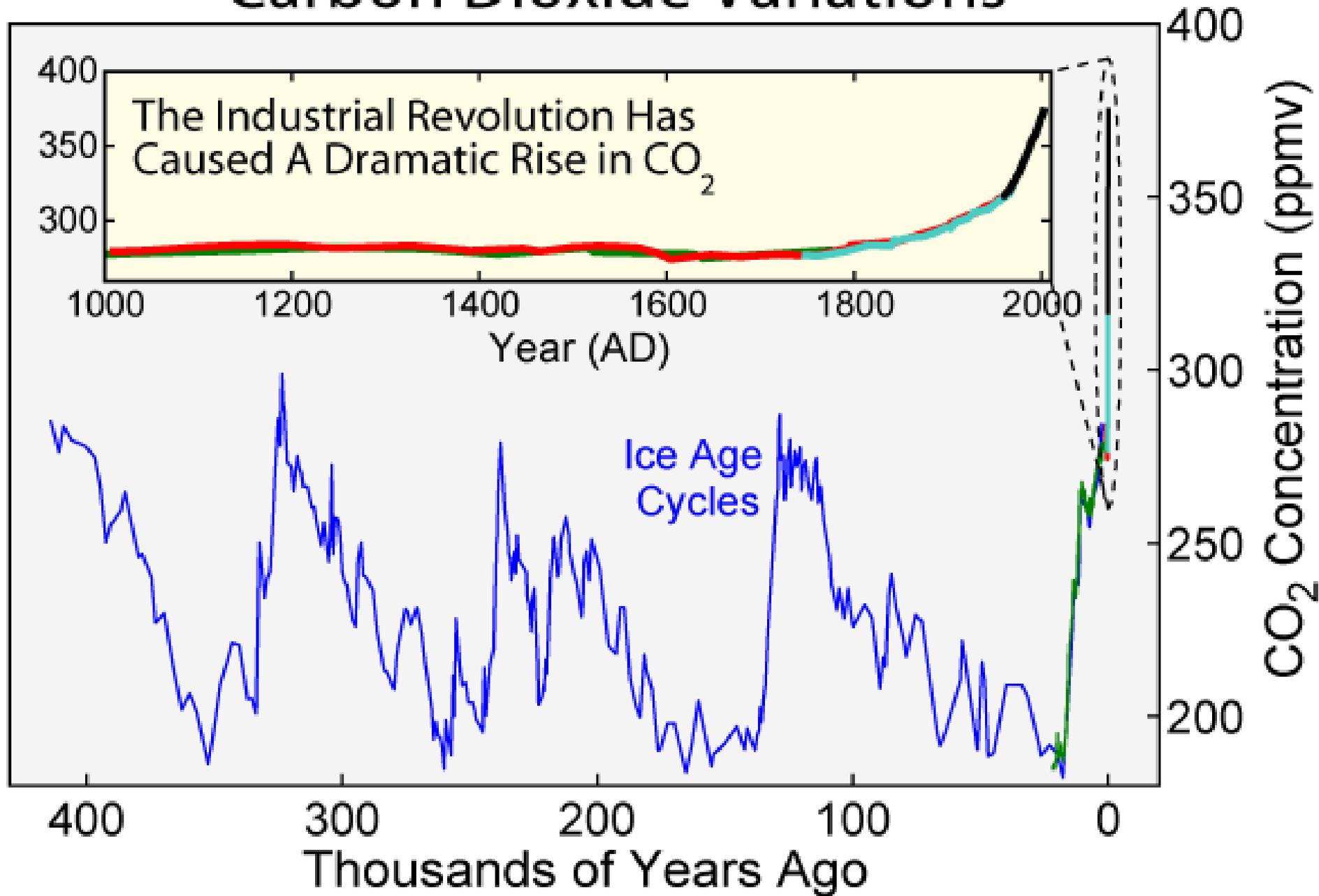


# The recent warming is unusual...

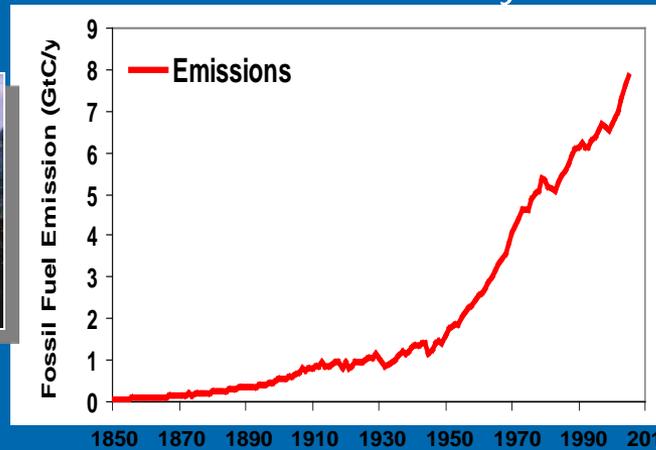
2000 Year Northern Hemisphere Reconstruction of Surface Air Temperatures



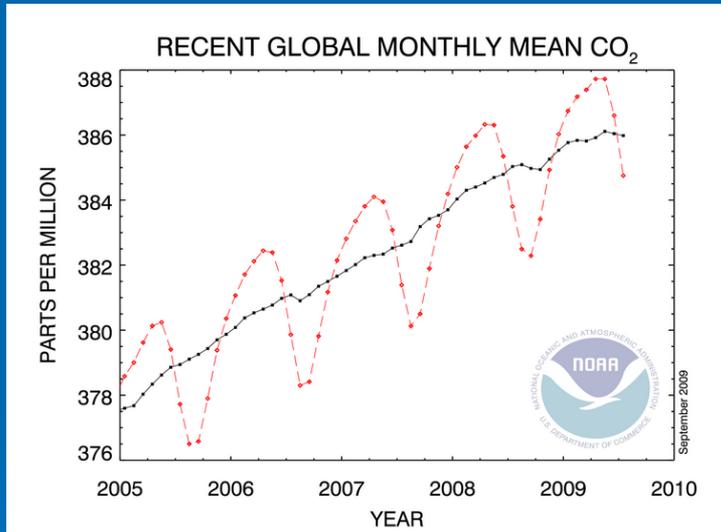
# Carbon Dioxide Variations



# Climate Change: Emissions

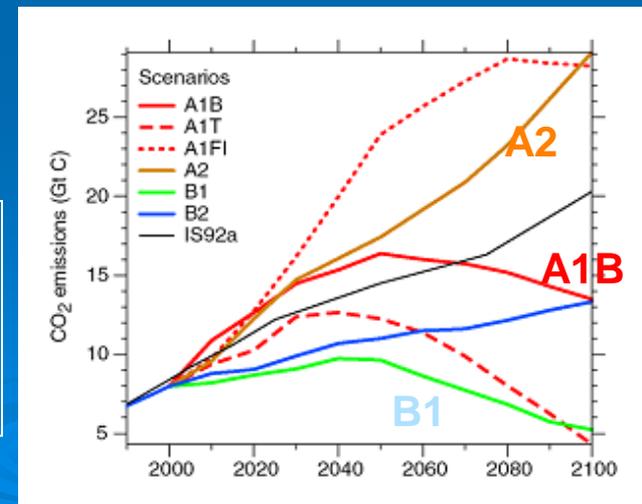


2009: projected  
2-3% drop from  
2008 (recession)



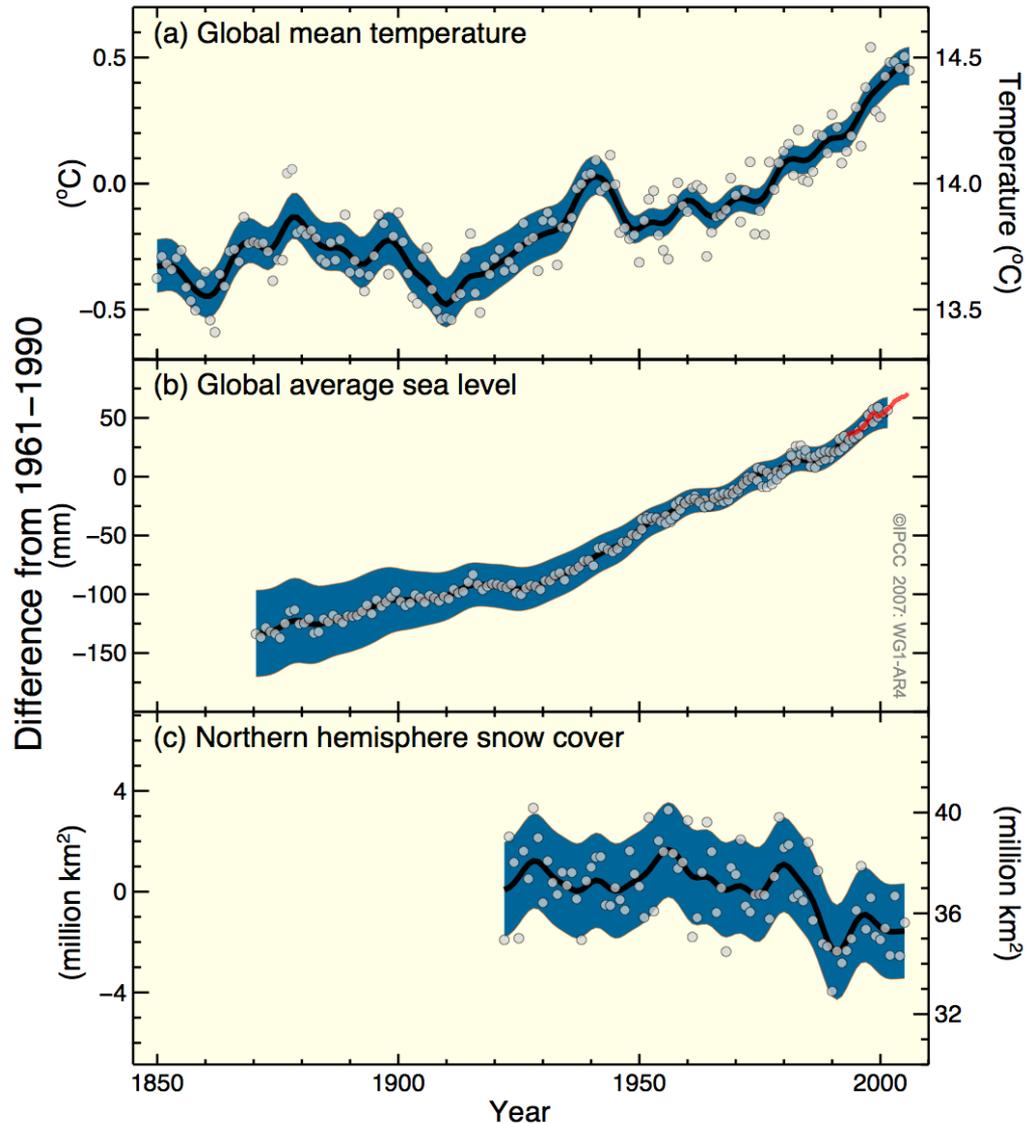
Pre-Industrial: 270 ppm  
2009: 386 ppm

Future Emissions Scenarios: B1 (low);  
A1B (mid) ; A2(high); A1FI (higher)



# Global Indicators of Warming

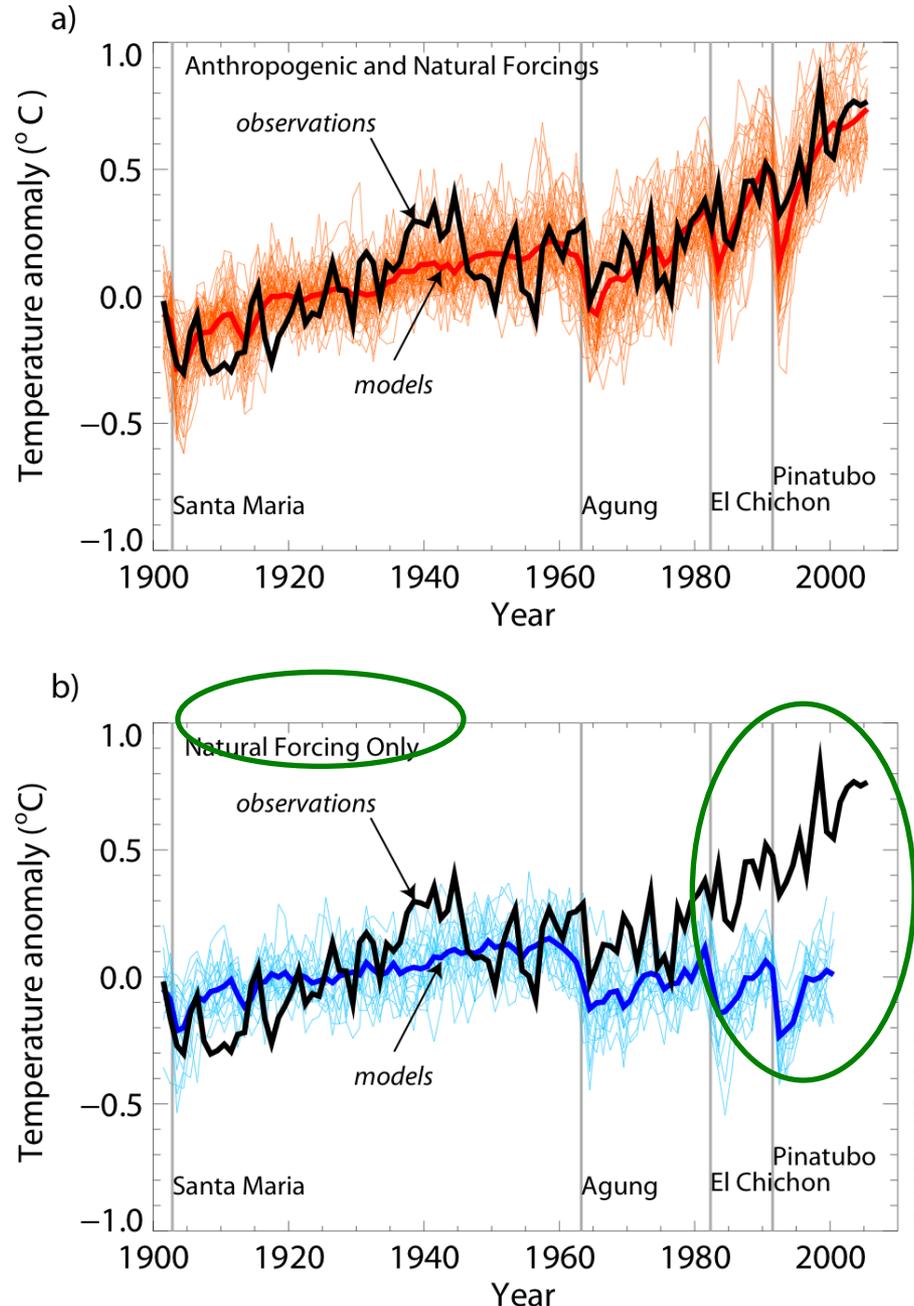
## Changes in Temperature, Sea Level and Northern Hemisphere Snow Cover



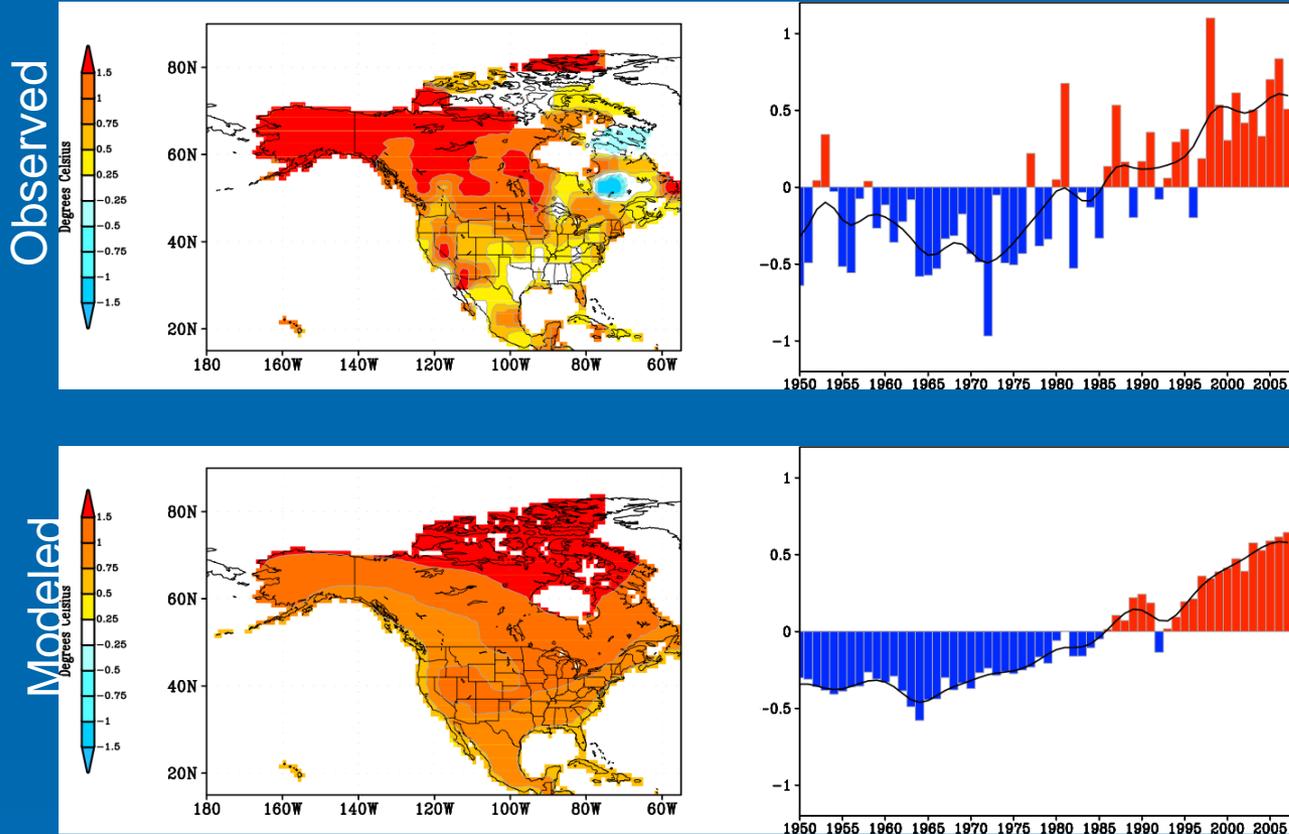
# Attribution

- Observed changes are **consistent** with expected responses to forcings as well as **inconsistent** with alternative explanations
- **Most of the observed increase in globally averaged temperatures since the 1970s is very likely (>90%) due to the observed increase in anthropogenic greenhouse gas concentrations**

## Global Mean Surface Temperature Anomalies



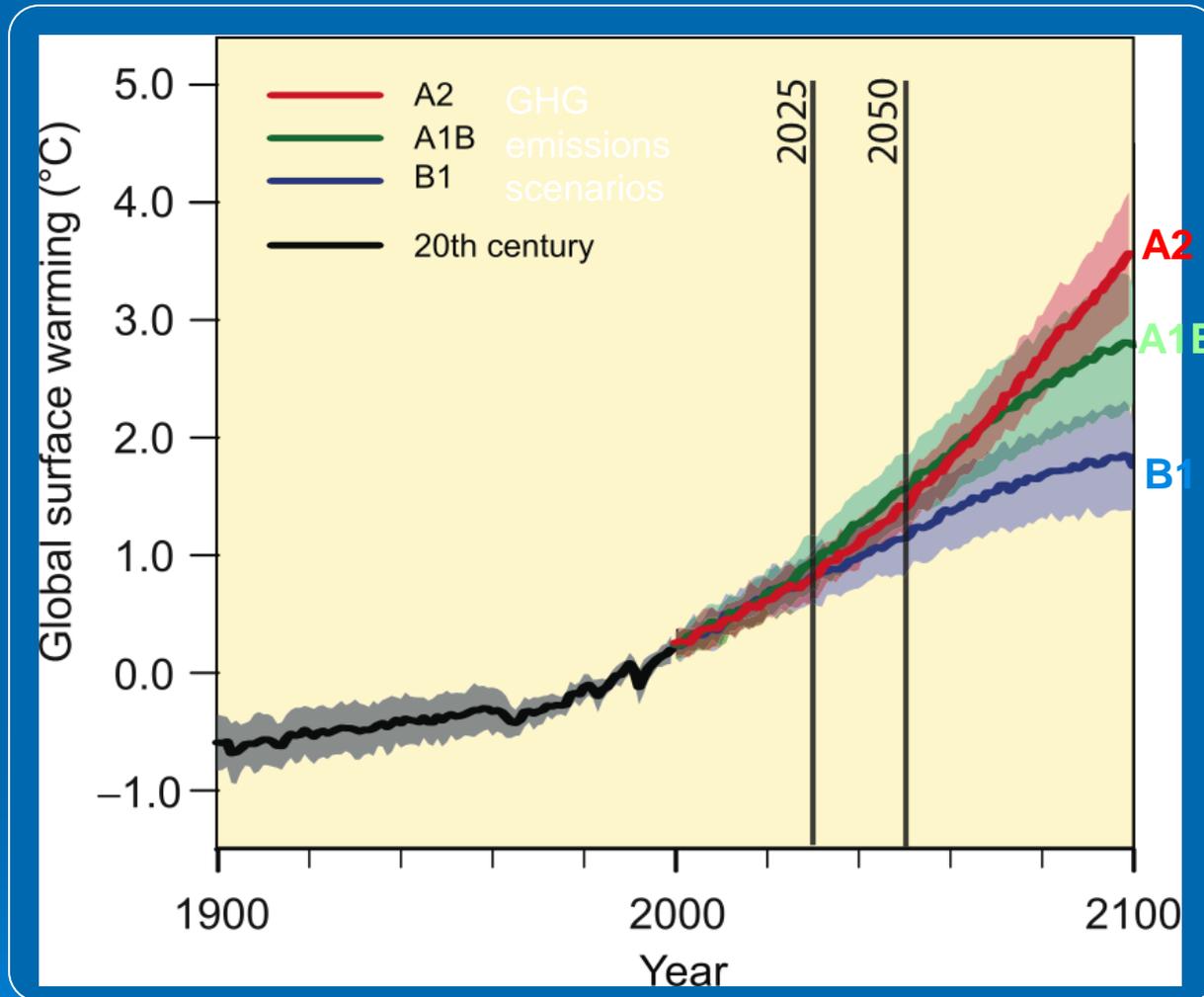
# Attribution: Observed v. Modeled Temperature (1950–2007)



Attribution of observed temperature changes to greenhouse gas emissions is more difficult at smaller spatial scales because climate variability is larger at these scales.

- The accumulation of greenhouse gases in the atmosphere is *very likely* the cause of most of the increase in global average temperature (IPCC).
- In North America, “human-induced warming has *likely* caused much of the average temperature increase over the past 50 years” (CCSP 3.3).
- Climate models show a 1F warming in the West in the last 30 years in response to greenhouse gas emissions.

# Global Temperature Projections

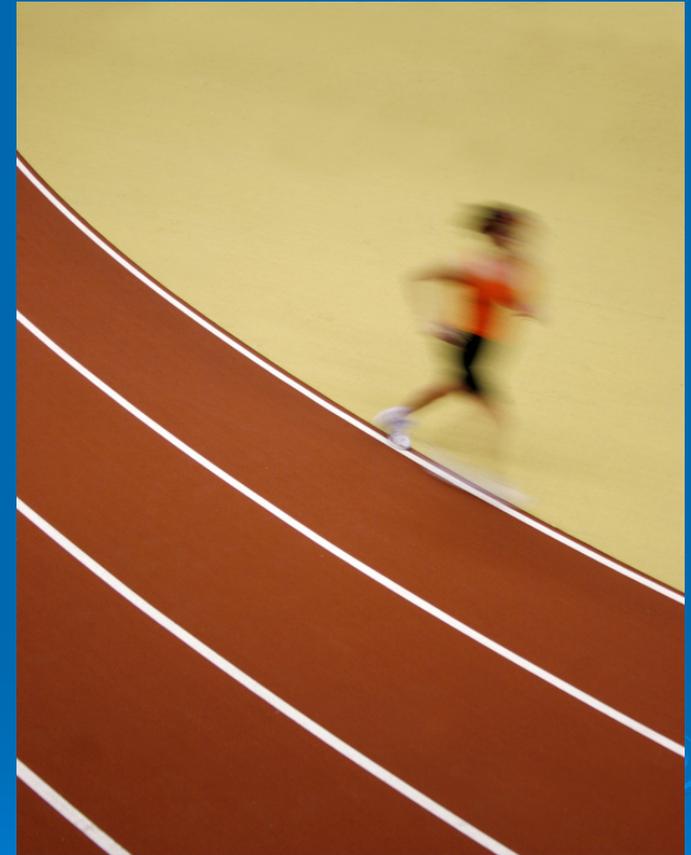
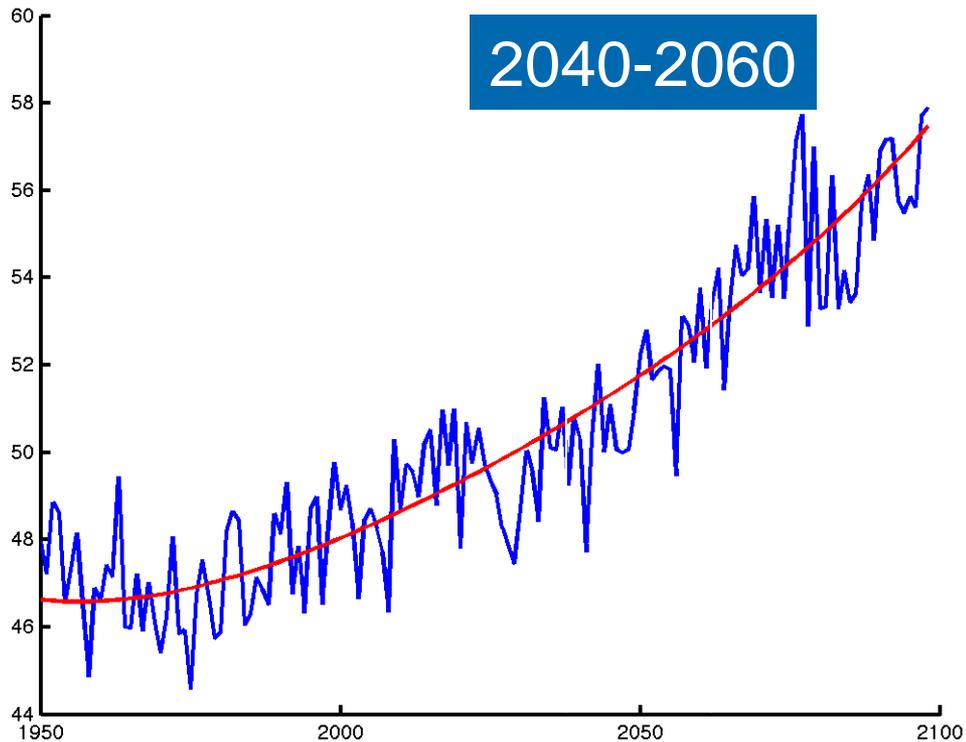


Source: IPCC AR4 WGI, 2007

***Regardless of GHG emissions, temperature increases by 2025 and 2050 will be about the same***

# Projections: Time-evolving vs. "snapshots"

## Annual average temperature



A climatological average in the future will be like taking a snapshot of moving object...

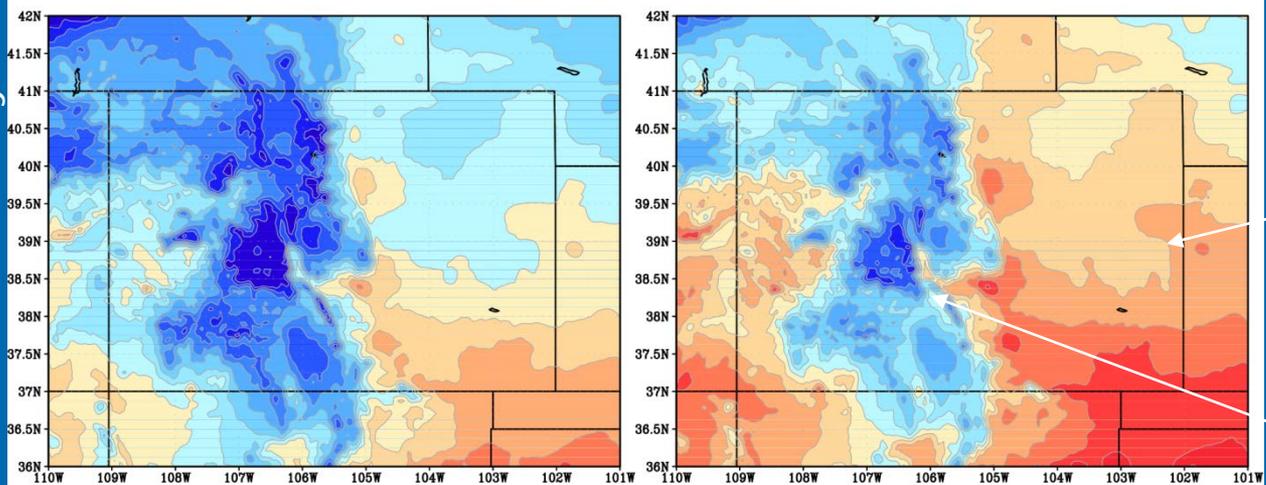
# Projections: Temperature

Temperatures  
(1950–1999)

Temperatures  
(Projected 2050)

What would the projected changes mean for Colorado's varied climate?

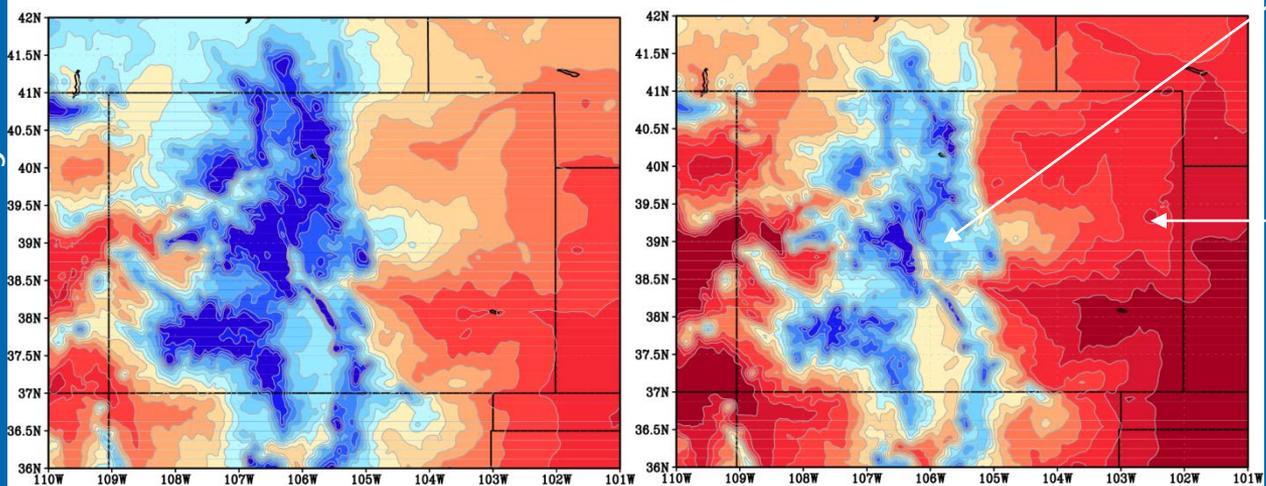
January



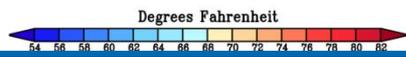
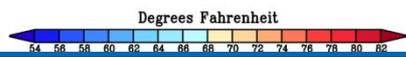
Winter temperatures shift northward on the plains

Temperatures creep upwards in the mountains in all seasons

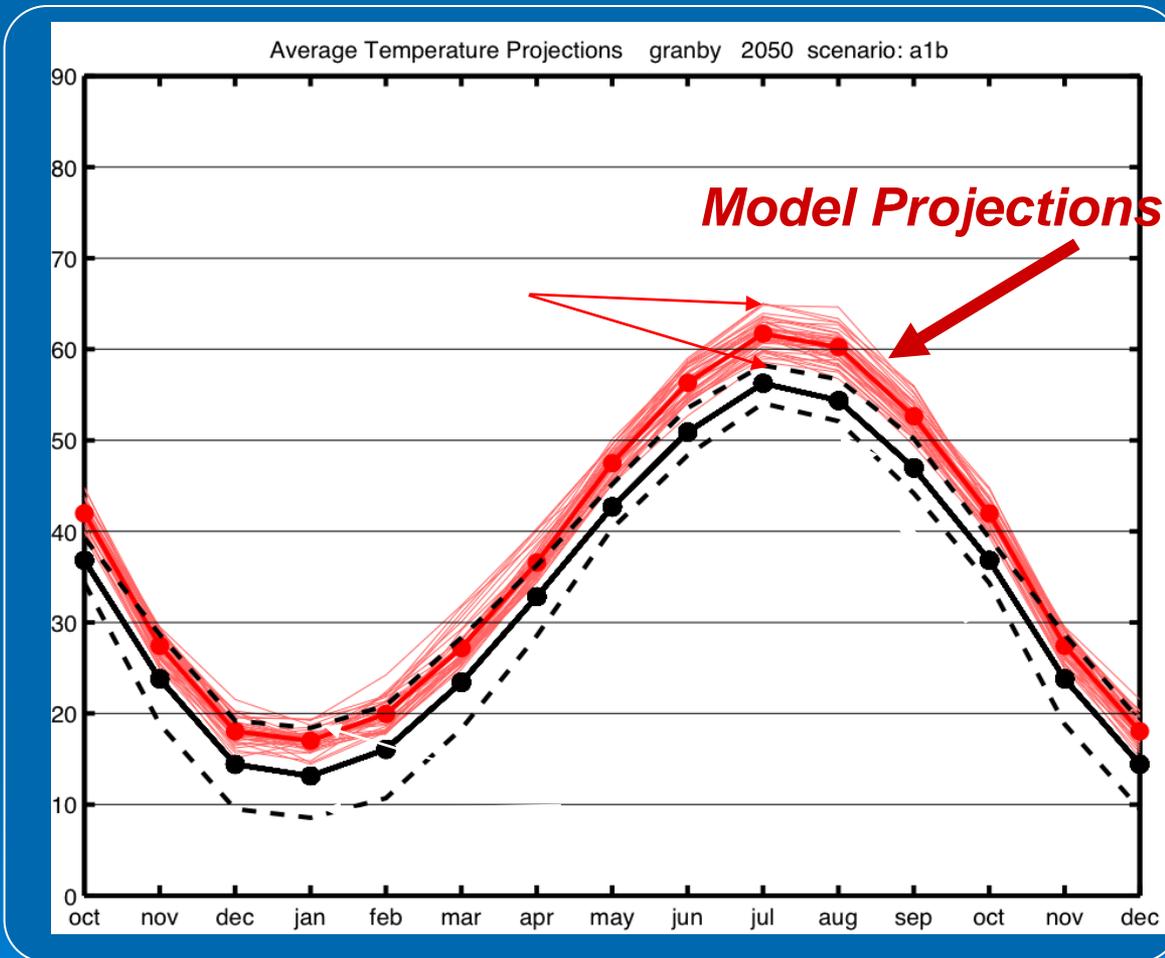
July



Summer temperatures shift westward on the plains bringing the temperatures of the Kansas border to the Front Range.



# Projections: Temperature



Summers warm  
more than winters

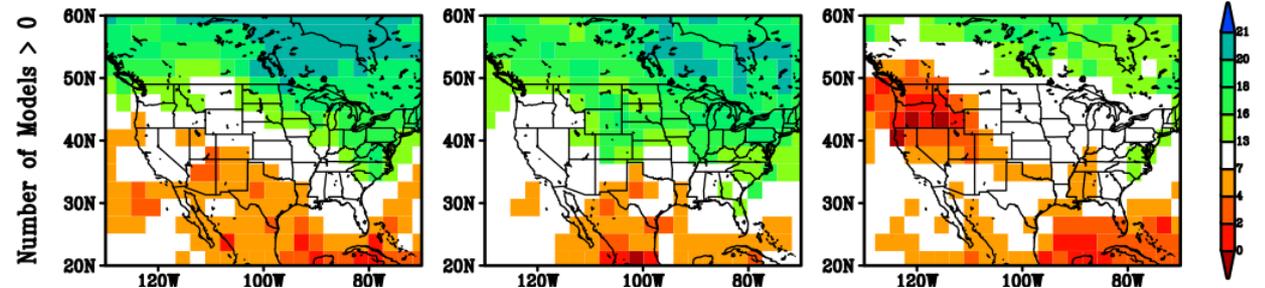
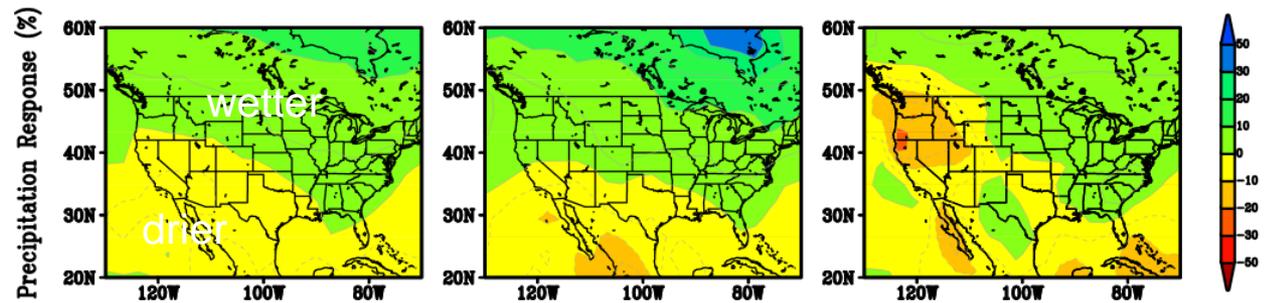
Average summer  
temps similar to  
hottest days in the  
past few years

Earlier spring

# Projections: Precipitation

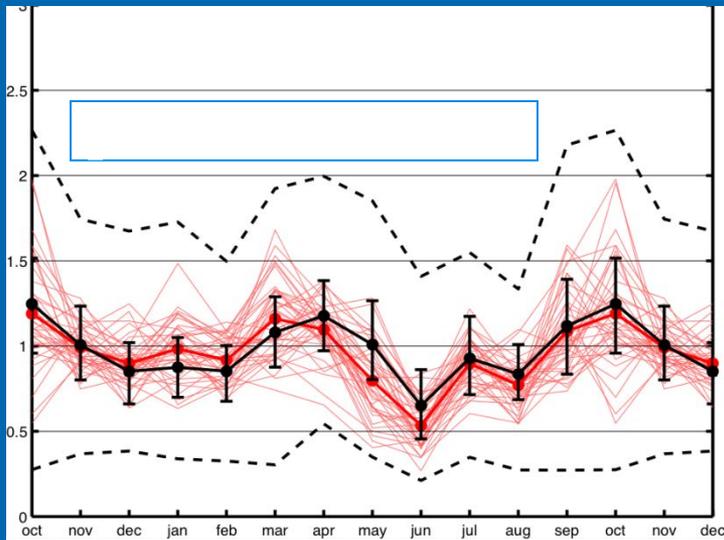
Source: CO Climate Report, 2008

Climate model projections do not agree whether annual mean precipitation will increase or decrease in Colorado by 2050. The multi-model average projection shows little change in annual mean precipitation...



# Projections: Precipitation

Grand Junction

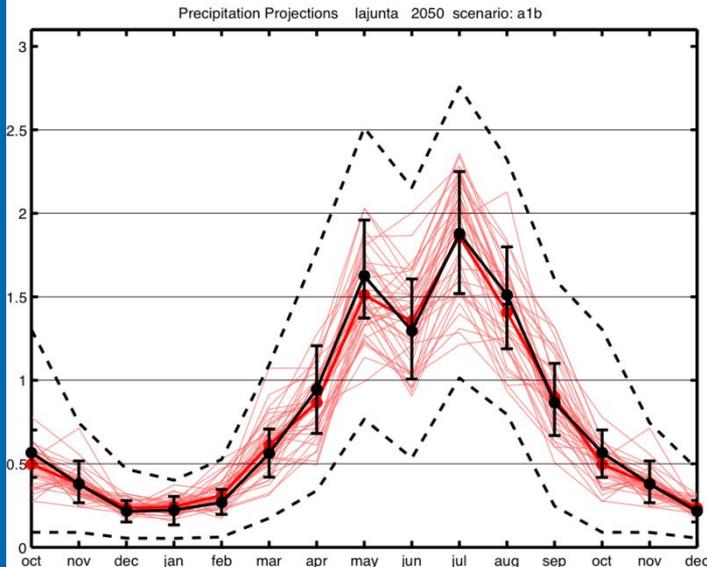


Precipitation will continue to be variable

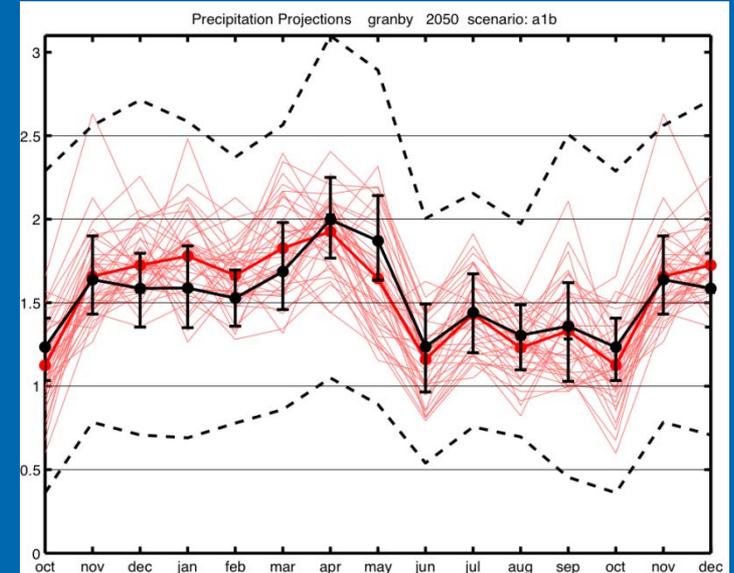
More mid-winter precipitation and less in late spring and summer

Extremes?? Worse floods and drought seems likely

La Junta



Granby



## Recap

- Temperature projections (relative to 1950-1999)
  - + 2.5 °F by 2025
  - + 4 °F by 2050
- Precipitation projections
  - Annual precipitation trends uncertain
  - Some agreement on more mid-winter precipitation and less in late spring and summer
- Both temperature and precipitation trends have implications for the hydrologic cycle.



# What shall we do?

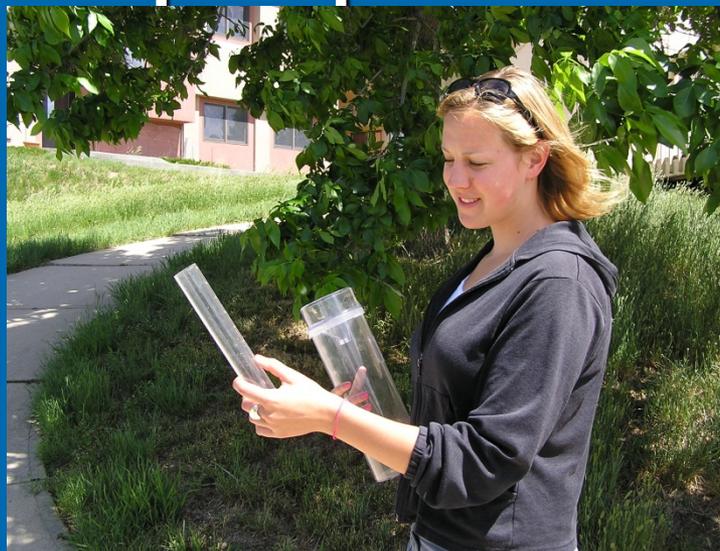
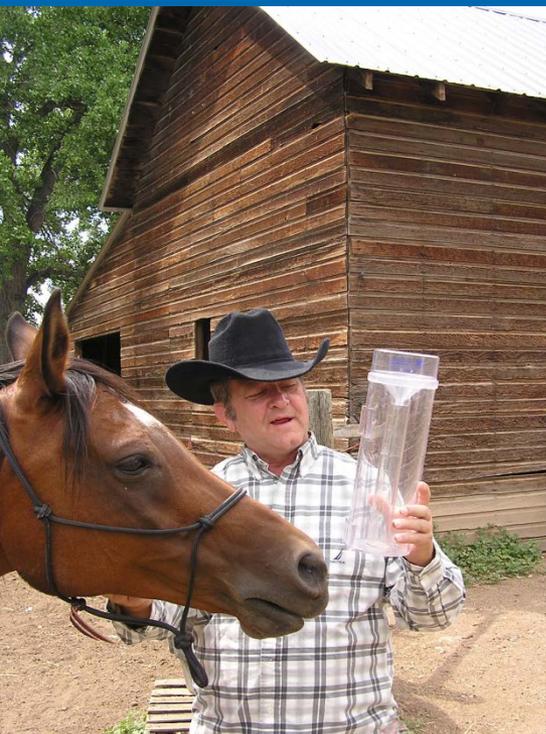
- Changes observed so far have not been dramatic and are similar to other observed climate changes in recent centuries,
- However, we may not be able to stop the momentum from already rapidly increasing greenhouse gases
- Hang on == because we're all a part of a crazy global climate experiment

-- - and in the meantime –

We could use your help



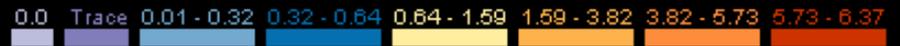
# We are encouraging citizens across the State and Nation to help us measure local precipitation



Photos by H. Reges

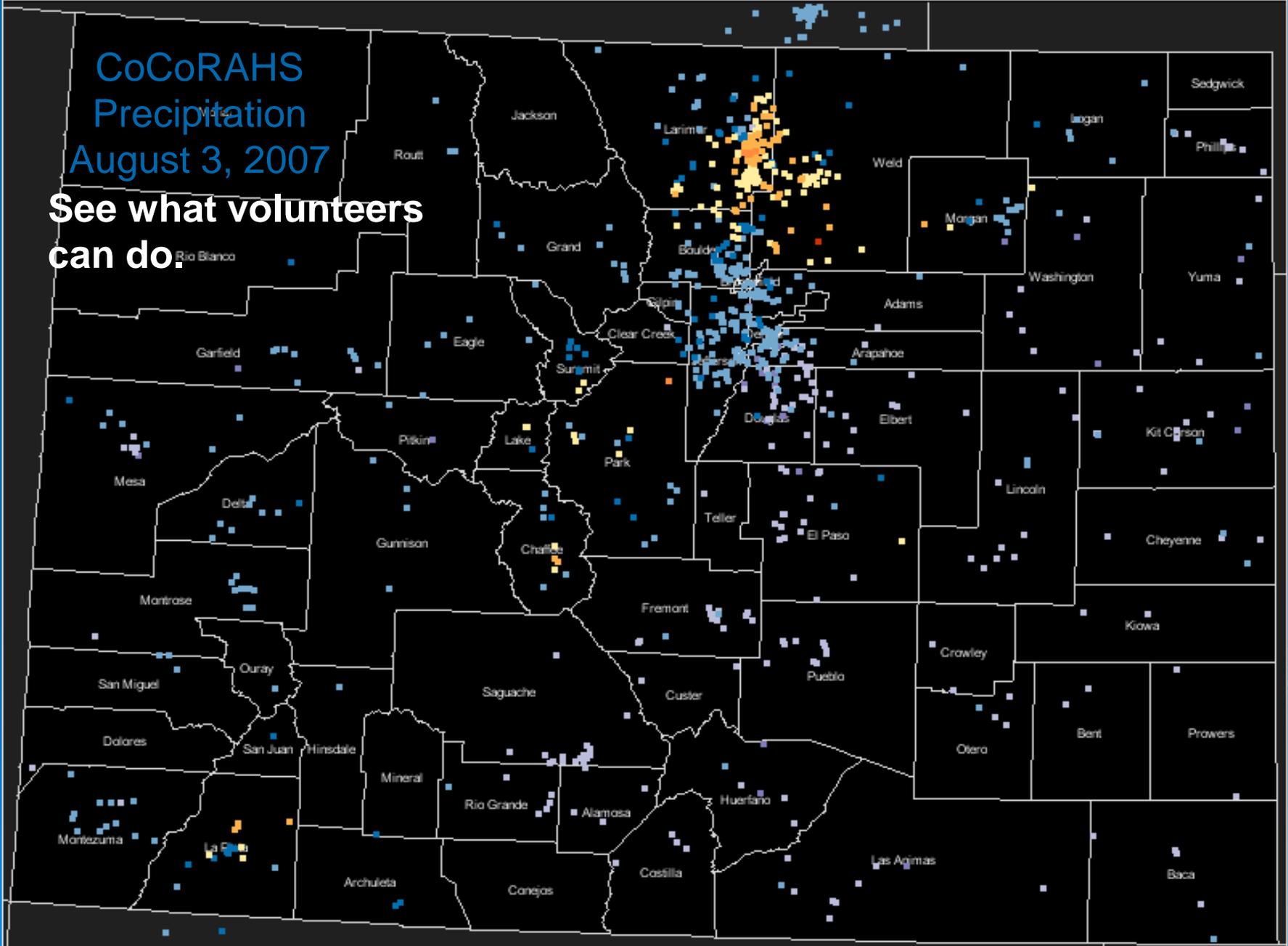
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

Colorado 8/3/2007



CoCoRAHS  
Precipitation  
August 3, 2007

See what volunteers  
can do.

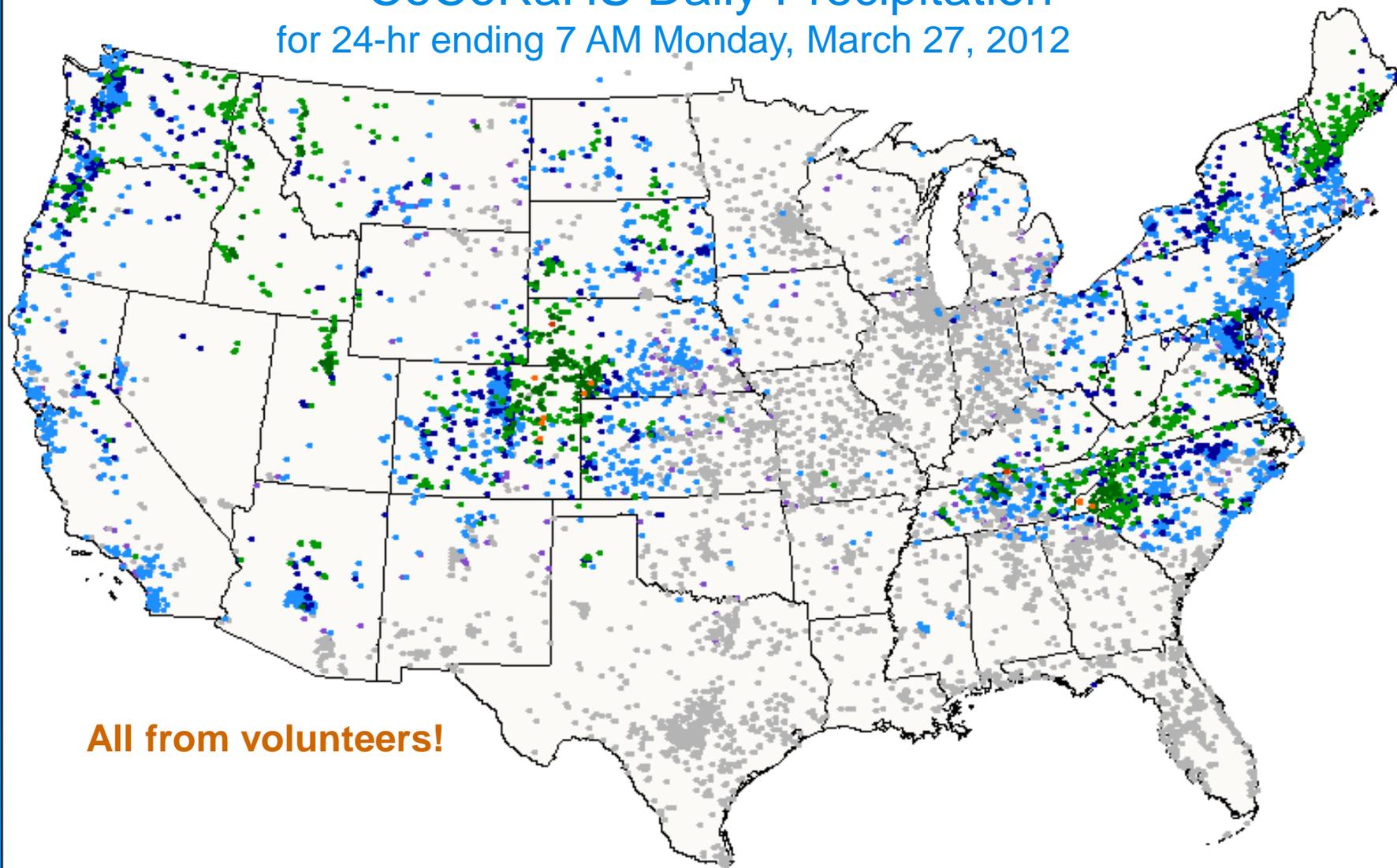


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 4/27/2012

0.0 Trace 0.01 - 0.16 0.17 - 0.32 0.33 - 0.79 0.80 - 1.89 1.90 - 2.84 2.85 - 3.15

## CoCoRaHS Daily Precipitation for 24-hr ending 7 AM Monday, March 27, 2012



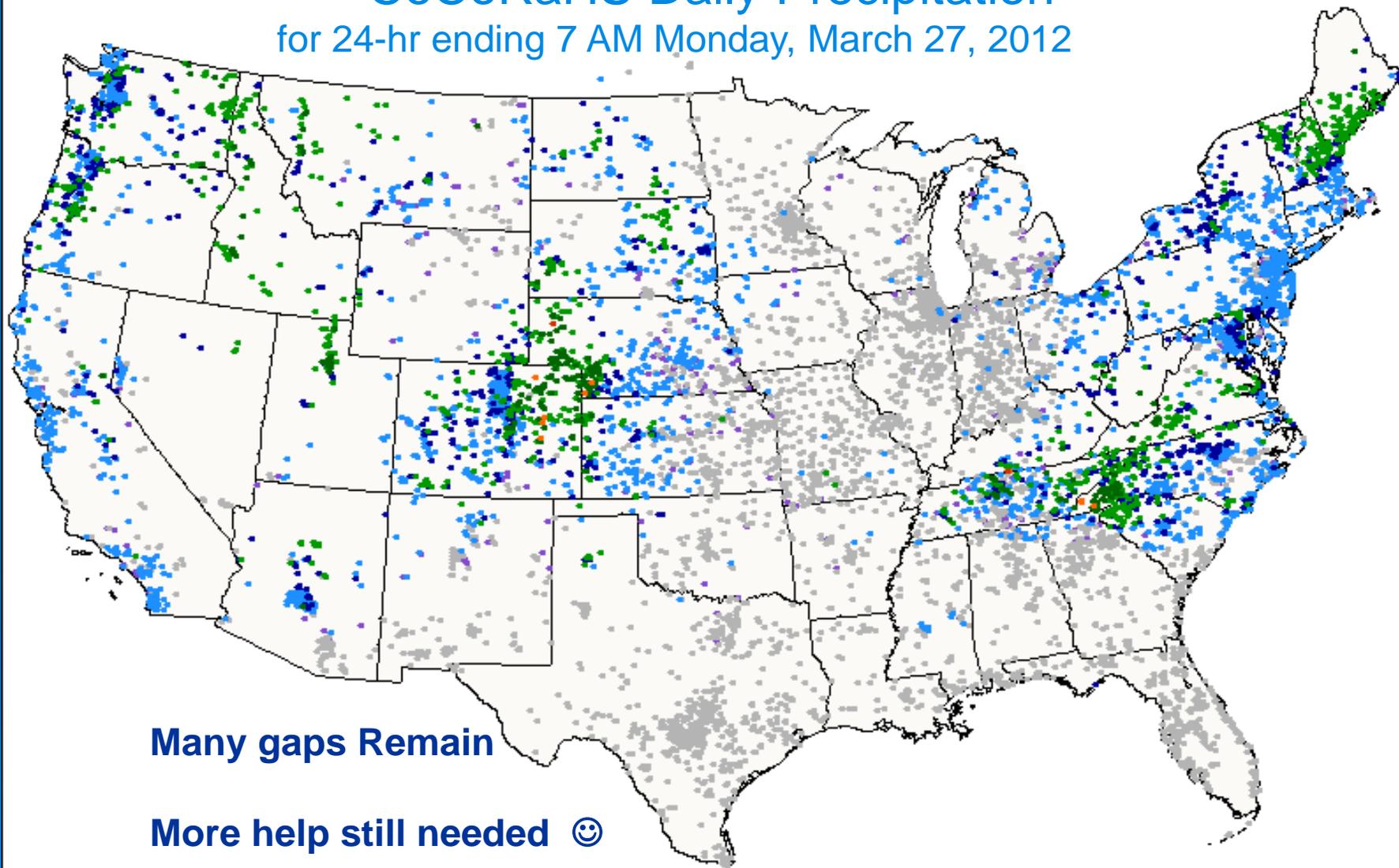
**All from volunteers!**

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

USA 4/27/2012

0.0 Trace 0.01 - 0.16 0.17 - 0.32 0.33 - 0.79 0.80 - 1.89 1.90 - 2.84 2.85 - 3.15

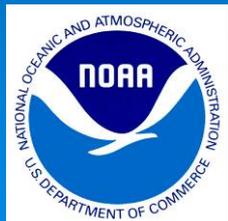
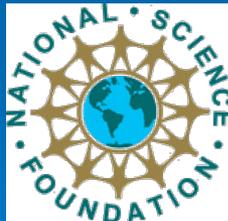
## CoCoRaHS Daily Precipitation for 24-hr ending 7 AM Monday, March 27, 2012



# For information and to volunteer, visit the CoCoRaHS Web Site



<http://www.cocorahs.org>



Support for this project provided by  
NSF Informal Science Education Program,  
NOAA Environmental Literacy Program  
and  
many local charter sponsors.

# 2012 Water Celebration

- **Colorado is celebrating water in 2012**
- As a part of this statewide “2012 -- Year of Water” celebration, we are encouraging every school in Colorado to help us measure and track precipitation. Because “the weather is our source of water”
- **Please help us find schools, teachers and classes willing to help!!**

We are already finding sponsors  
for Colorado's ~1800 Schools

Now we need teachers or  
volunteer leaders to serve as  
contacts for each participating  
school

# Colorado Climate Center

Data and Power Point Presentations available for downloading

<http://ccc.atmos.colostate.edu>

Nolan.Doesken@Colostate.edu

Colorado  
State  
University  
*Knowledge to Go Places*



**Colorado: It's a great place  
but we have to be ready**



Photo by Lynn Kral, Loveland, January 2006