Global Climate Change: Just the Facts

Nolan Doesken
State Climatologist, Colorado Climate Center
Atmospheric Science Department
Colorado State University

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Prepared by Odie Bliss

Colorado State University
Knowledge to Go Places

Fact 1:

- I am a Climatologist

Fact 2:

- I am NOT a Climate Change Scientist!

Fact 3:

- There is a lot of information out there about Climate Change
- If you want to get the latest scoop on the ***Global Scale***, read the

  Intergovernmental Panel on Climate Change (IPCC) 4th Assessment

http://www.ipcc.ch

WMO INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE UNEP

Summary for Policymakers

- If you want an abbreviated version, read:
  IPCC: Climate Change 2007: The Physical Basis (AR4)

http://www.ipcc.ch

Click on:

"Summary for Policymakers"

Fact 4:

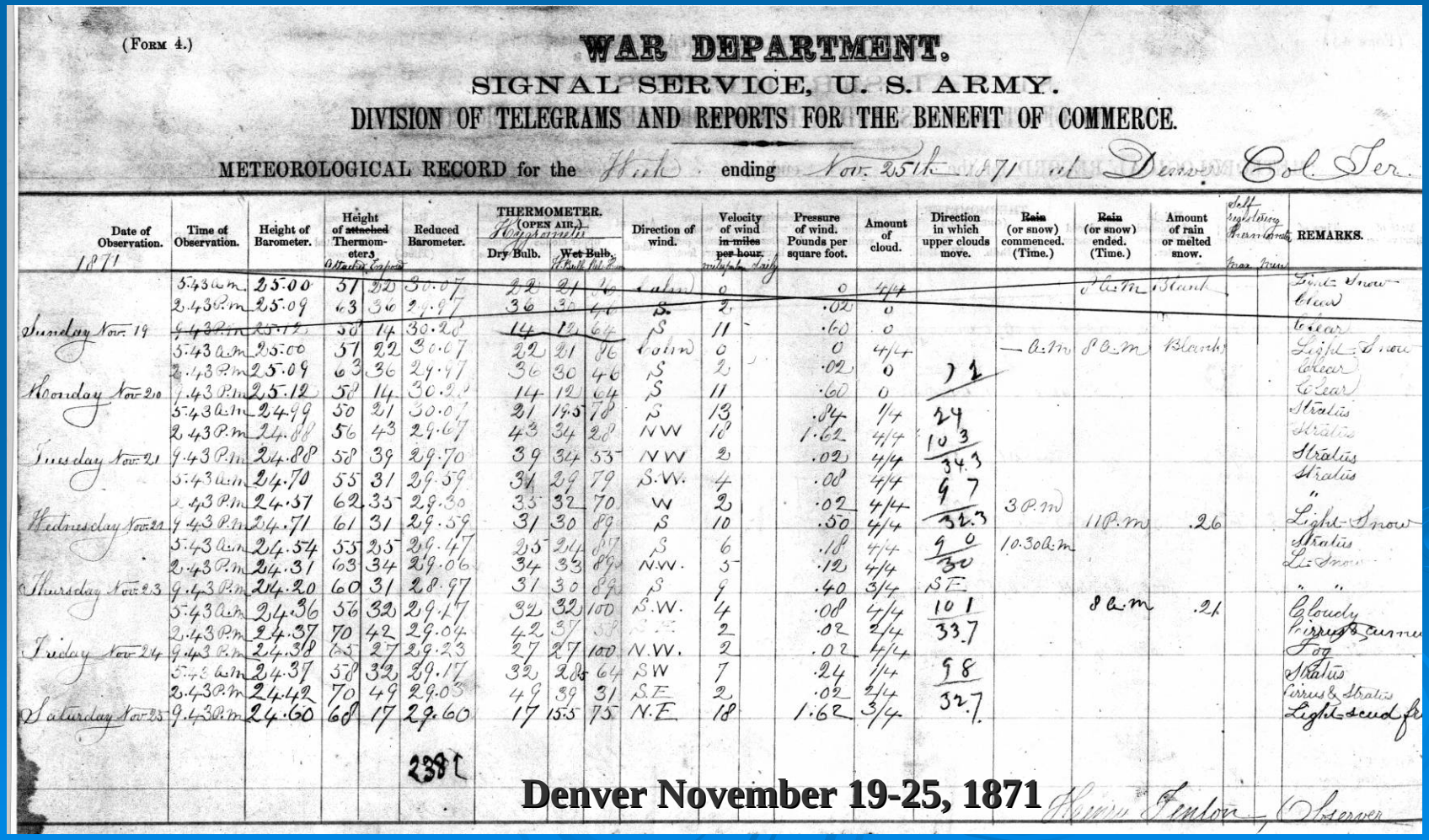
- Those results represent the global majority (consensus) scientific perspective
- There are also minority views

- There may be consensus regarding Global Climate Change
- Understanding local and regional climate change is much more difficult. *That is the challenge at hand.*

Should we be concerned about Climate Change here in Colorado?

Let’s first consider our climate history

Systematic weather data collection began in western Colorado in the 1890s



(Form 4.)

WAR DEPARTMENT.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

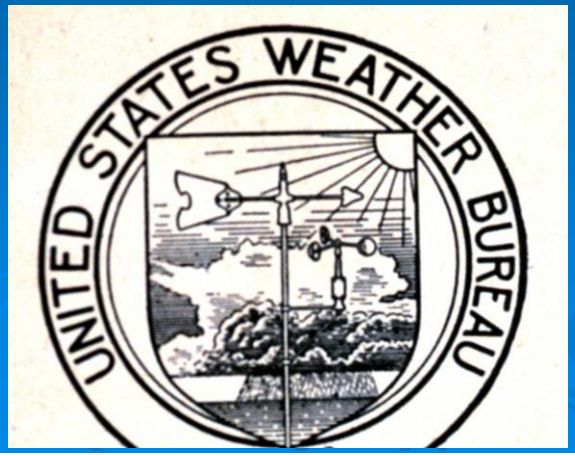
METEOROLOGICAL RECORD for the Week ending Nov. 25th 1871 at Denver Col. Ter.

Date of Observation. 1871	Time of Observation.	Height of Barometer.	Height of attached Thermometers. Attached. Detached.	Reduced Barometer.	THERMOMETER. (OPEN AIR.) Dry Bulb.	Wet Bulb.	Direction of wind.	Velocity of wind in miles per hour.	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.	Self registering Mean Temp. Max. Min.	REMARKS.
	5.43 a.m.	25.00	37 22	30.07	22	21	Calm	0	0	4/4			Just M	Blank		Fine Snow
	2.43 P.m.	25.09	63 36	29.97	36	30	S.	2	.02	0						Clear
Sunday Nov. 19	9.43 P.m.	25.12	58 14	30.28	14	12	S	11	.60	0						Clear
	5.43 a.m.	25.00	37 22	30.07	22	21	Calm	0	0	4/4		— a.m.	8 a.m.	Blank		Light Snow
	2.43 P.m.	25.09	63 36	29.97	36	30	S	2	.02	0	11					Clear
Monday Nov. 20	9.43 P.m.	25.12	58 14	30.28	14	12	S	11	.60	0						Clear
	5.43 a.m.	24.99	50 21	30.07	21	19.5	S	13	.94	1/4	24					Stratus
	2.43 P.m.	24.88	56 43	29.67	43	34	NW	10	1.62	4/4	10 3					Stratus
Tuesday Nov. 21	9.43 P.m.	24.88	58 39	29.70	39	34	NW	2	.02	4/4	34.3					Stratus
	5.43 a.m.	24.70	55 31	29.59	34	29	S.W.	4	.08	4/4	9 7					Stratus
	2.43 P.m.	24.37	62 35	29.30	33	32	W	2	.02	4/4		3 P.m				"
Wednesday Nov. 22	9.43 P.m.	24.71	61 31	29.59	31	30	S	10	.50	4/4	32.3		11 P.m.	.26		Light Snow
	5.43 a.m.	24.54	55 25	29.47	25	24	S	6	.18	4/4	9 0	10.30 a.m.				Stratus
	2.43 P.m.	24.31	63 34	29.06	34	33	N.W.	5	.12	4/4	30					Li Snow
Thursday Nov. 23	9.43 P.m.	24.20	60 31	28.97	31	30	S	9	.40	3/4	SE					" "
	5.43 a.m.	24.36	56 32	29.17	32	32	S.W.	4	.08	4/4	10 1		8 a.m.	.21		Cloudy
	2.43 P.m.	24.37	70 42	29.04	42	37	SE	2	.02	2/4	33.7					Drizzling Sunset
Friday Nov. 24	9.43 P.m.	24.38	65 27	29.23	27	27	N.W.	2	.02	4/4						Fog
	5.43 a.m.	24.37	58 32	29.17	32	28	SW	7	.24	1/4	9 8					Stratus
	2.43 P.m.	24.42	70 49	29.03	49	39	SE	2	.02	2/4	32.7					Cirrus & Stratus
Saturday Nov. 25	9.43 P.m.	24.60	68 17	29.60	17	15.5	N.E	18	1.62	3/4						Light scud fr
				238												

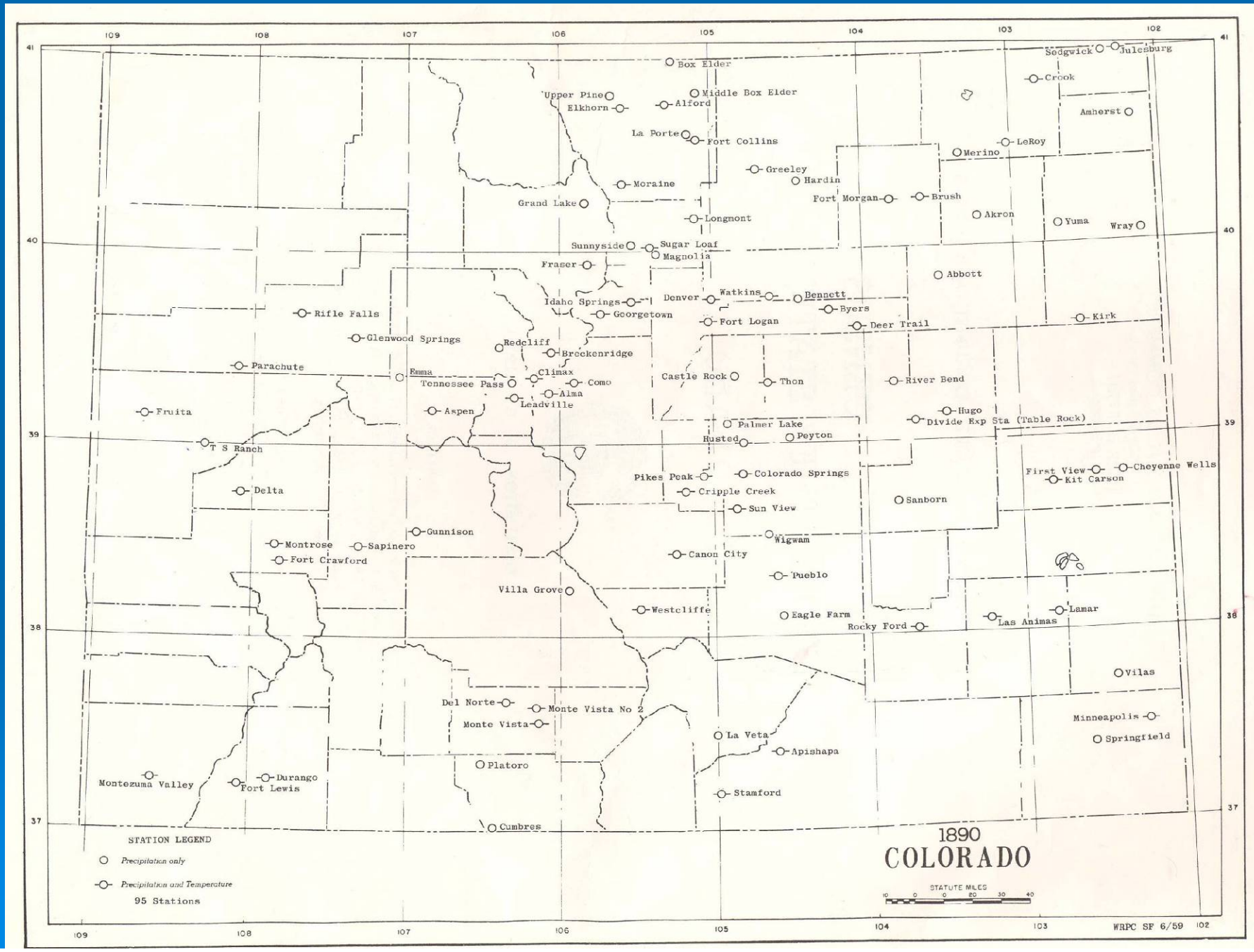
Denver November 19-25, 1871

Signal Service, 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
Photo by Christopher Davey

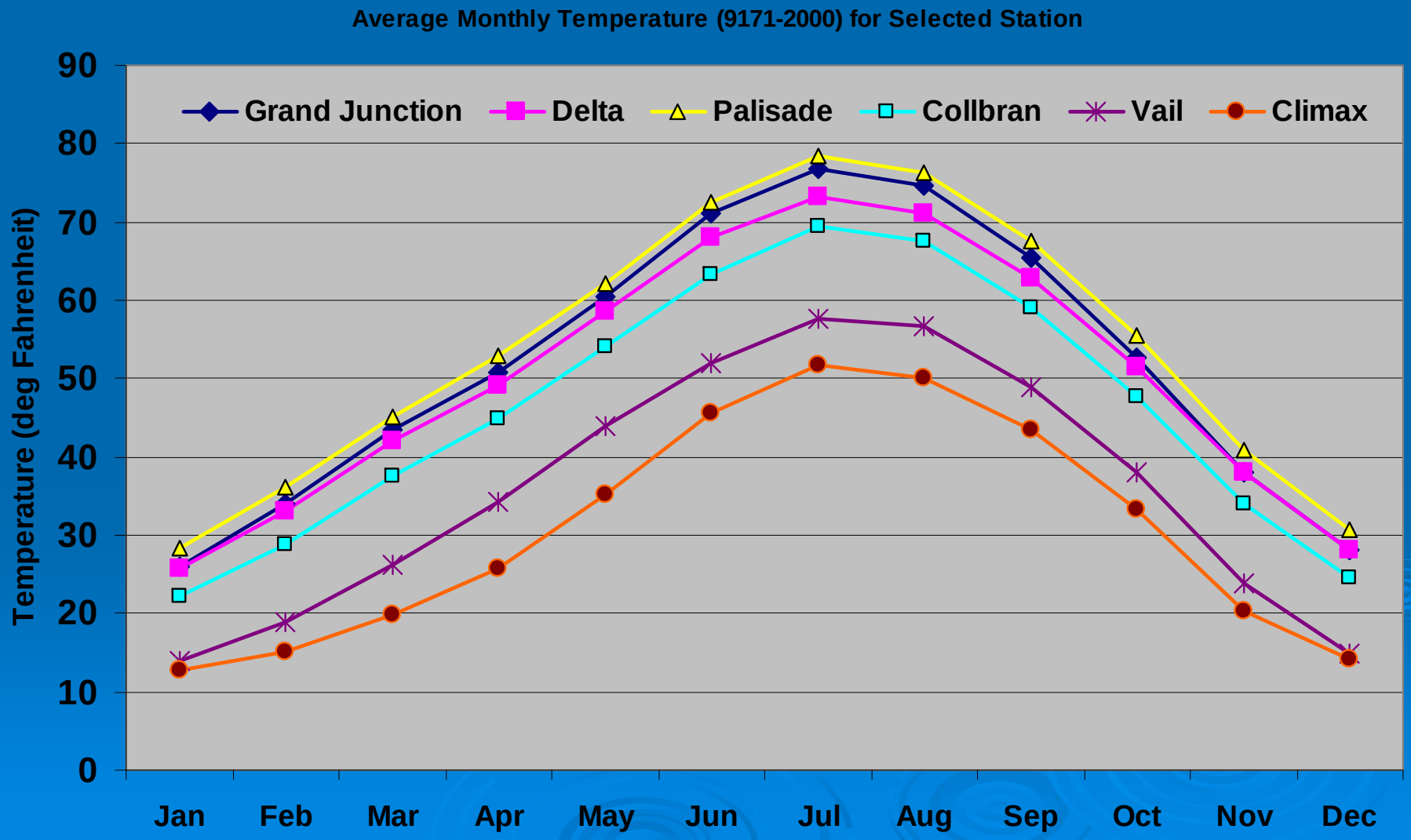
The NWS stations remain the backbone network for long-term climate monitoring

From Kelly Redmond, WRCC

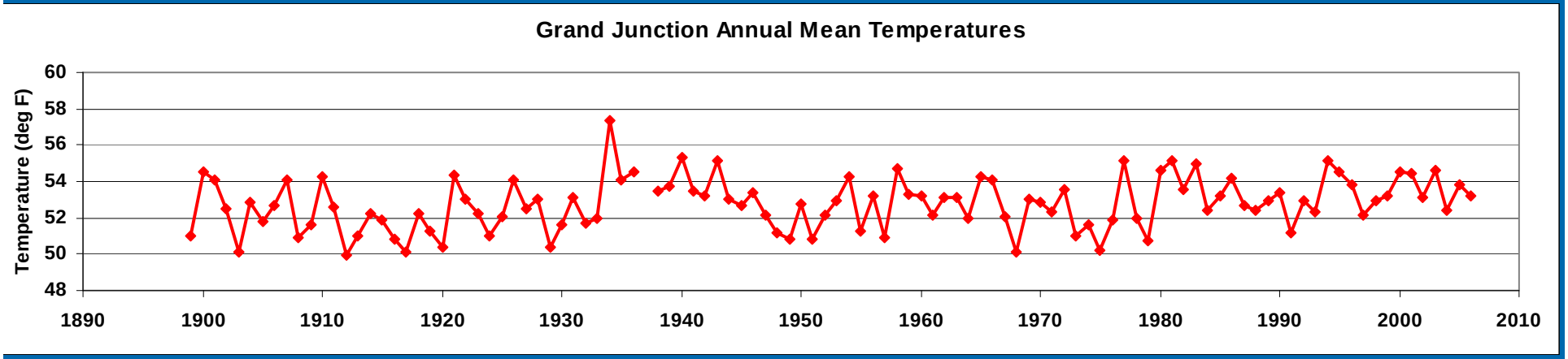
Approximately 5000 daily max/min temperature stations, 8000 daily precipitation stations, 3000 automated hourly precipitation stations.

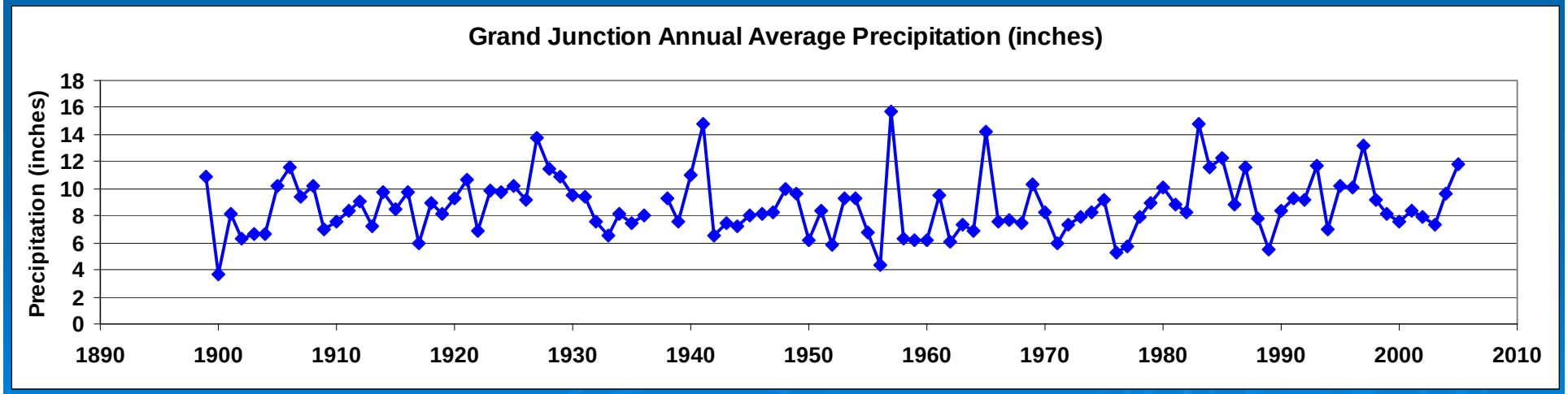

What have we learned from nearly 120 years of continuous climate monitoring?

Winters are consistently colder than summers – ☺

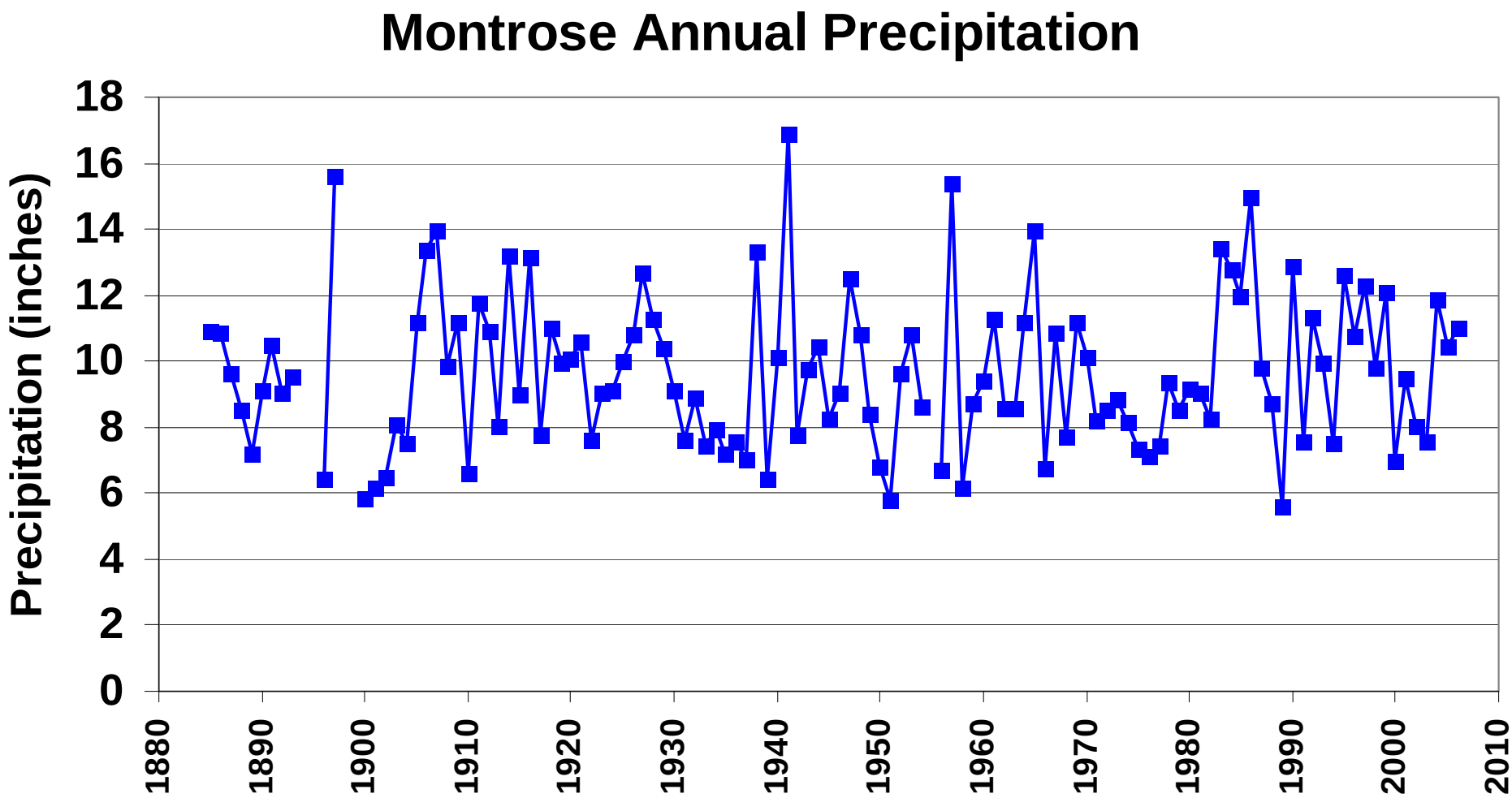


Temperatures are far more stable than precipitation. In fact most other climatic elements (humidity, wind, sunshine and cloudiness, evaporation, etc.) are much more consistent from one year to the next than precipitation

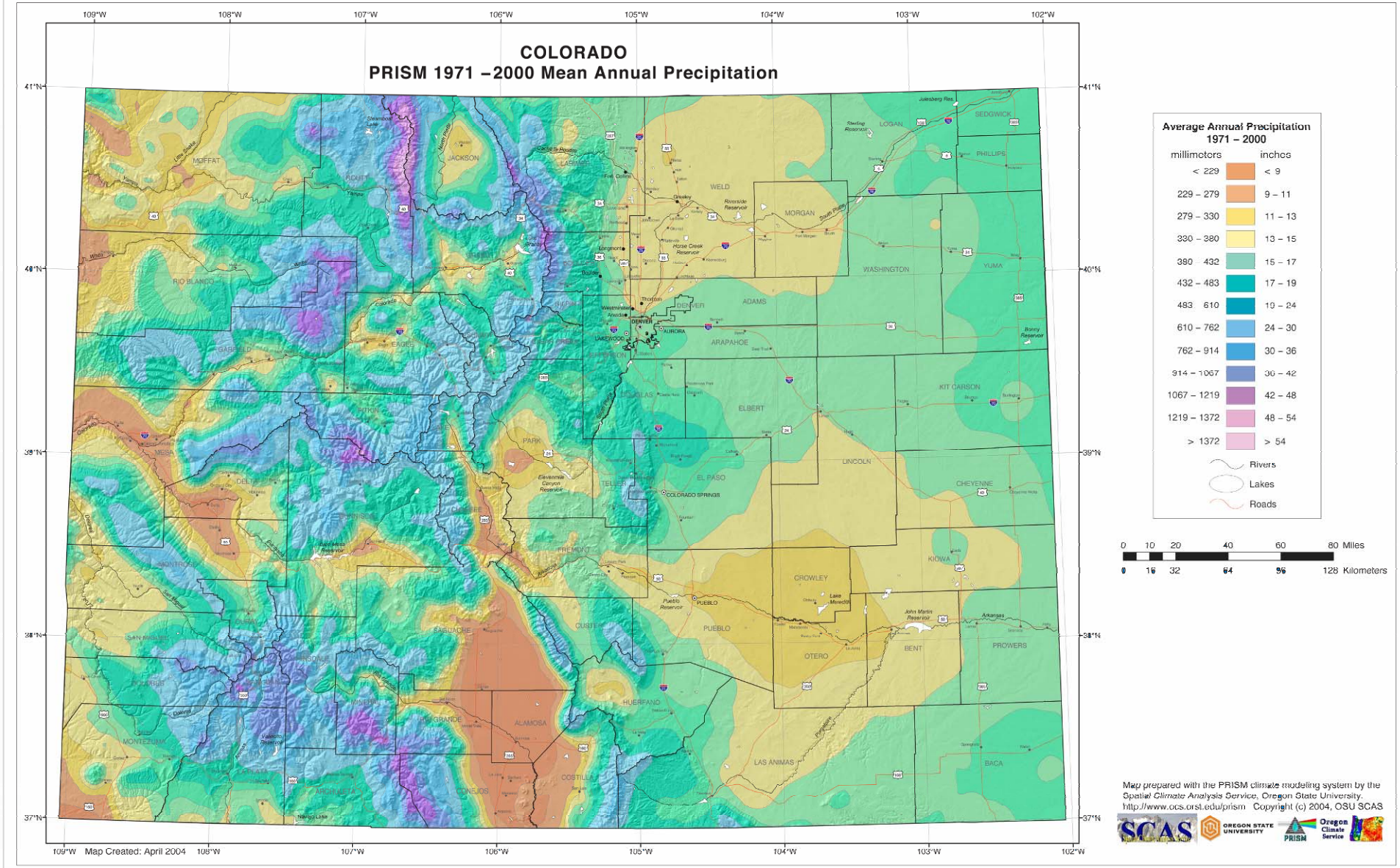

Grand Junction Annual Mean Temperatures
Temperature (deg F)
60
58
56
54
52
50
48
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Grand Junction Annual Average Precipitation (inches)
Precipitation (inches)
18
16
14
12
10
8
6
4
2
0
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

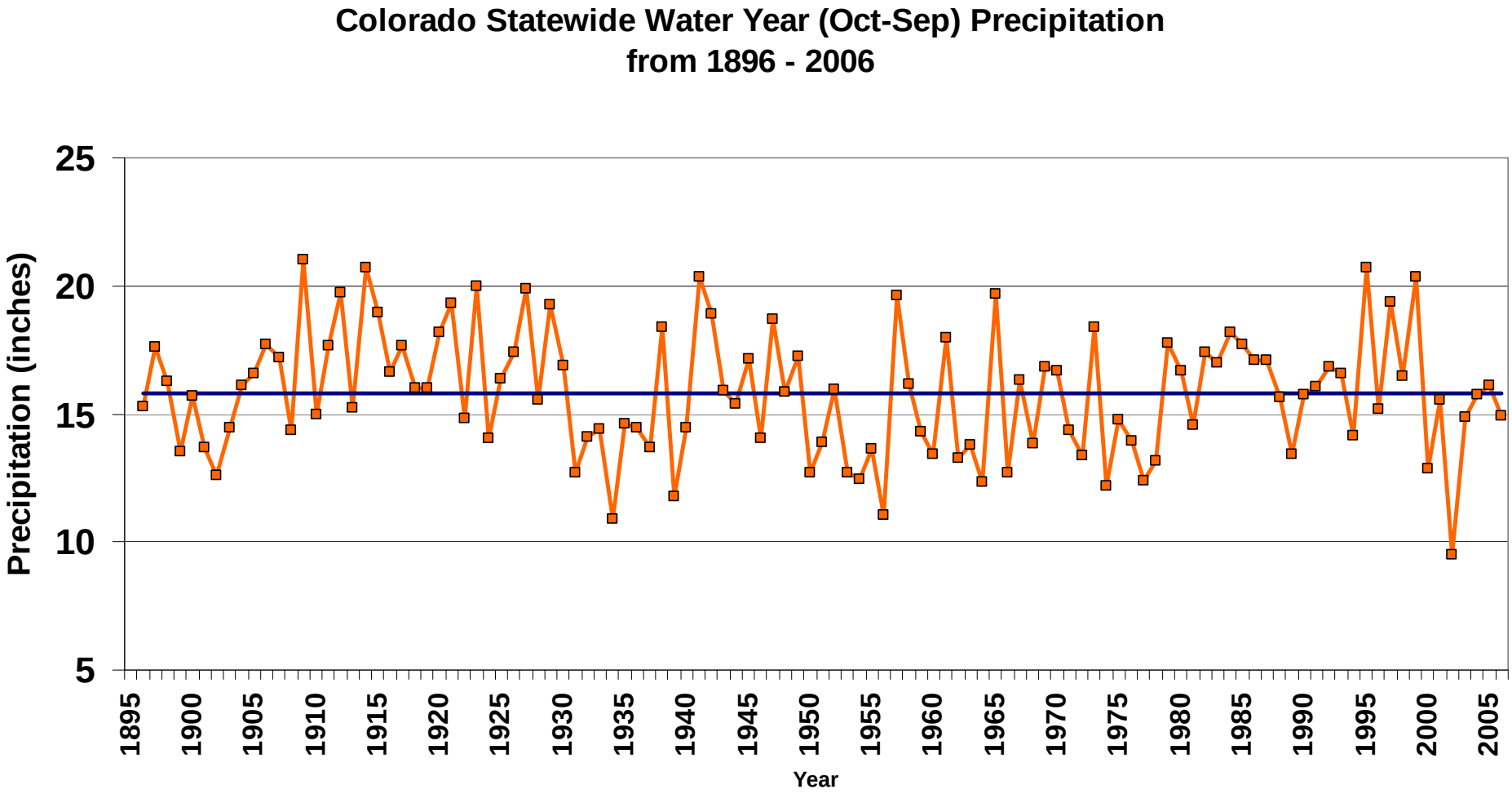
Precipitation varies by as much as 400% from a very dry year to a very wet year



Colorado Average Annual Precipitation



Colorado Statewide Water Year Precipitation



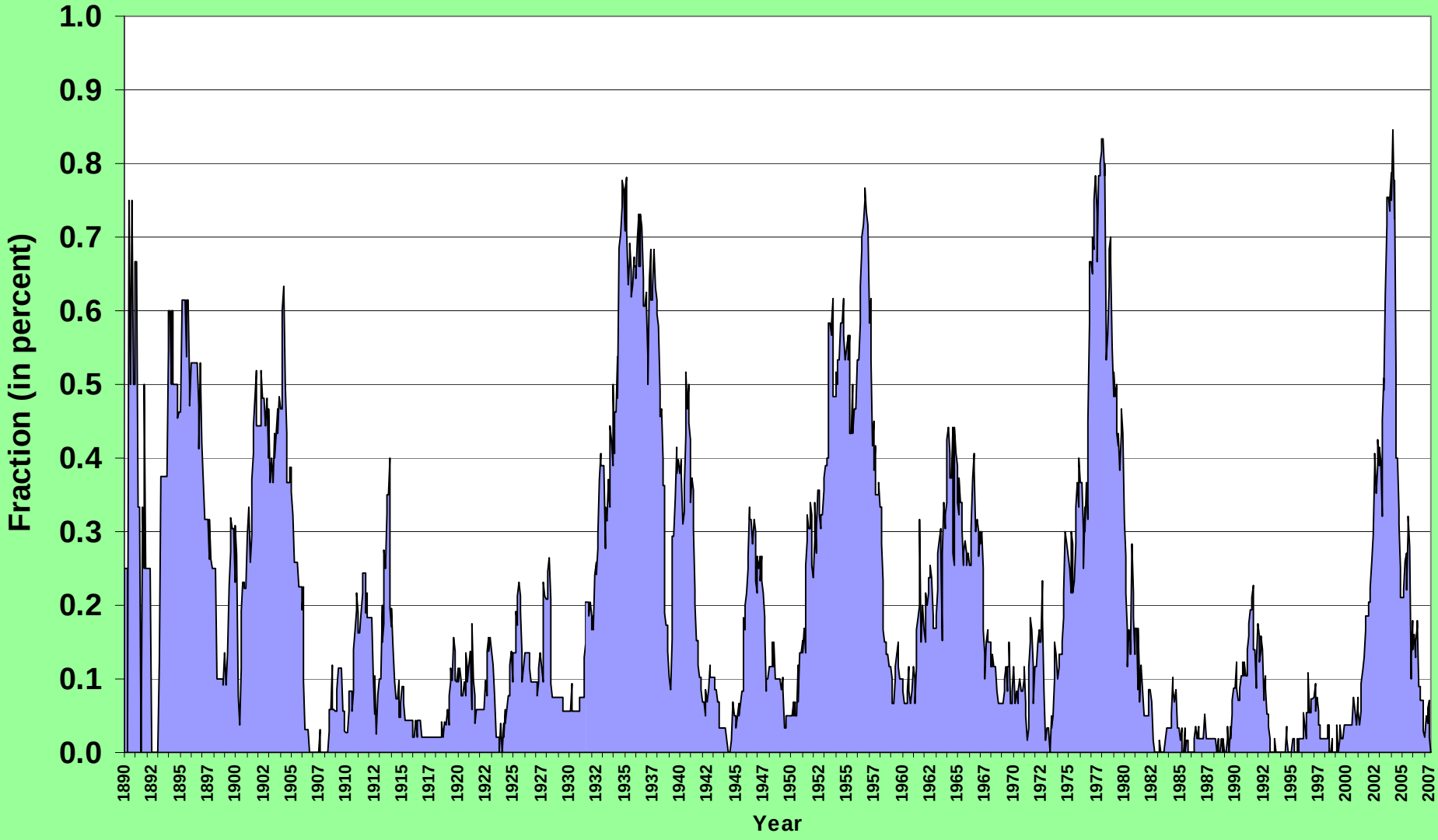
Drought Visits Our Area Regularly

Photo by NRCS

Fraction of Colorado in Drought

Based on 48 month SPI

(1890 - July 2007)

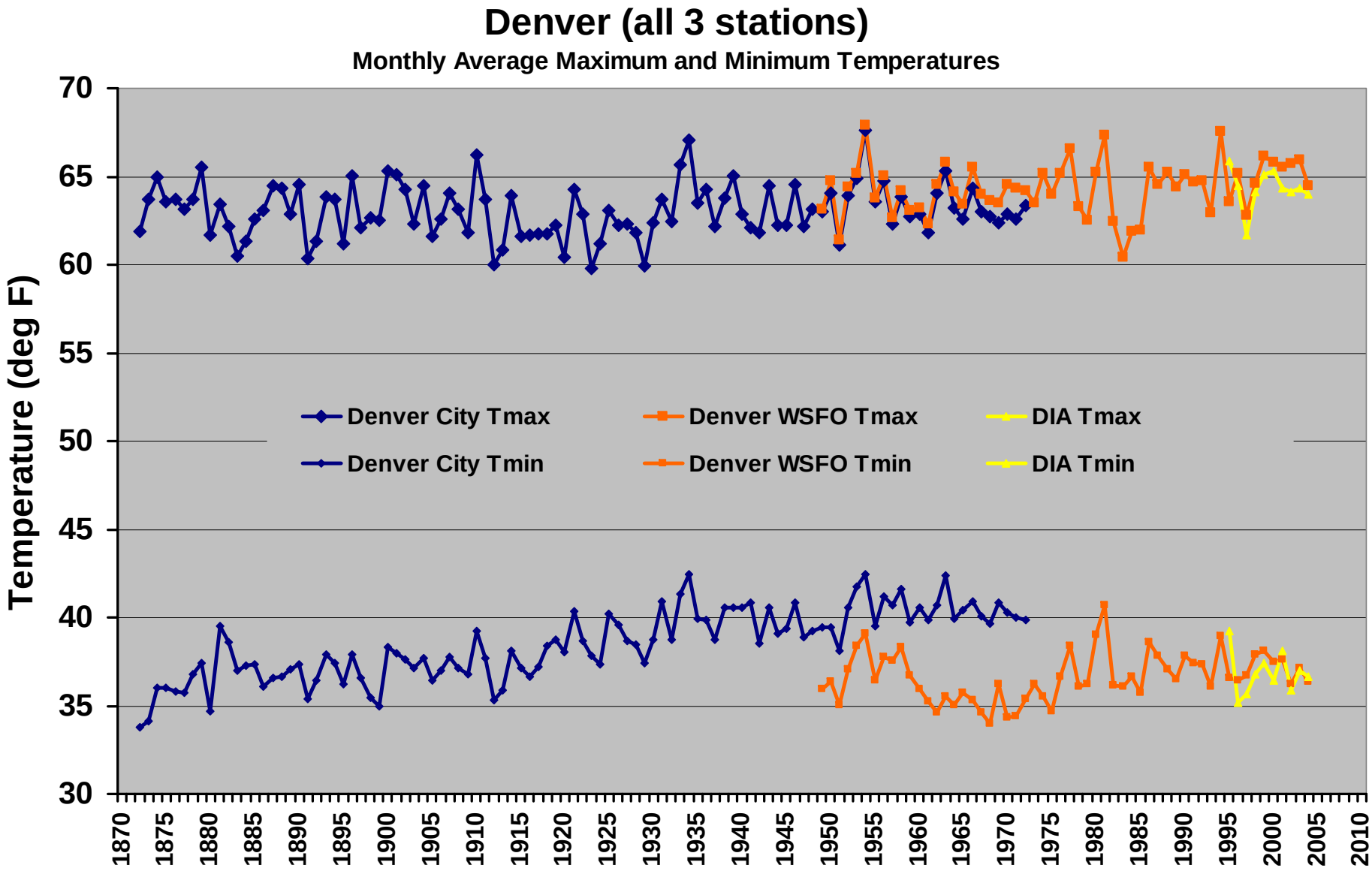


Confidently detecting climatic trends is much more challenging and difficult than determining spatial patterns, seasonal cycles, or year-to-year variations

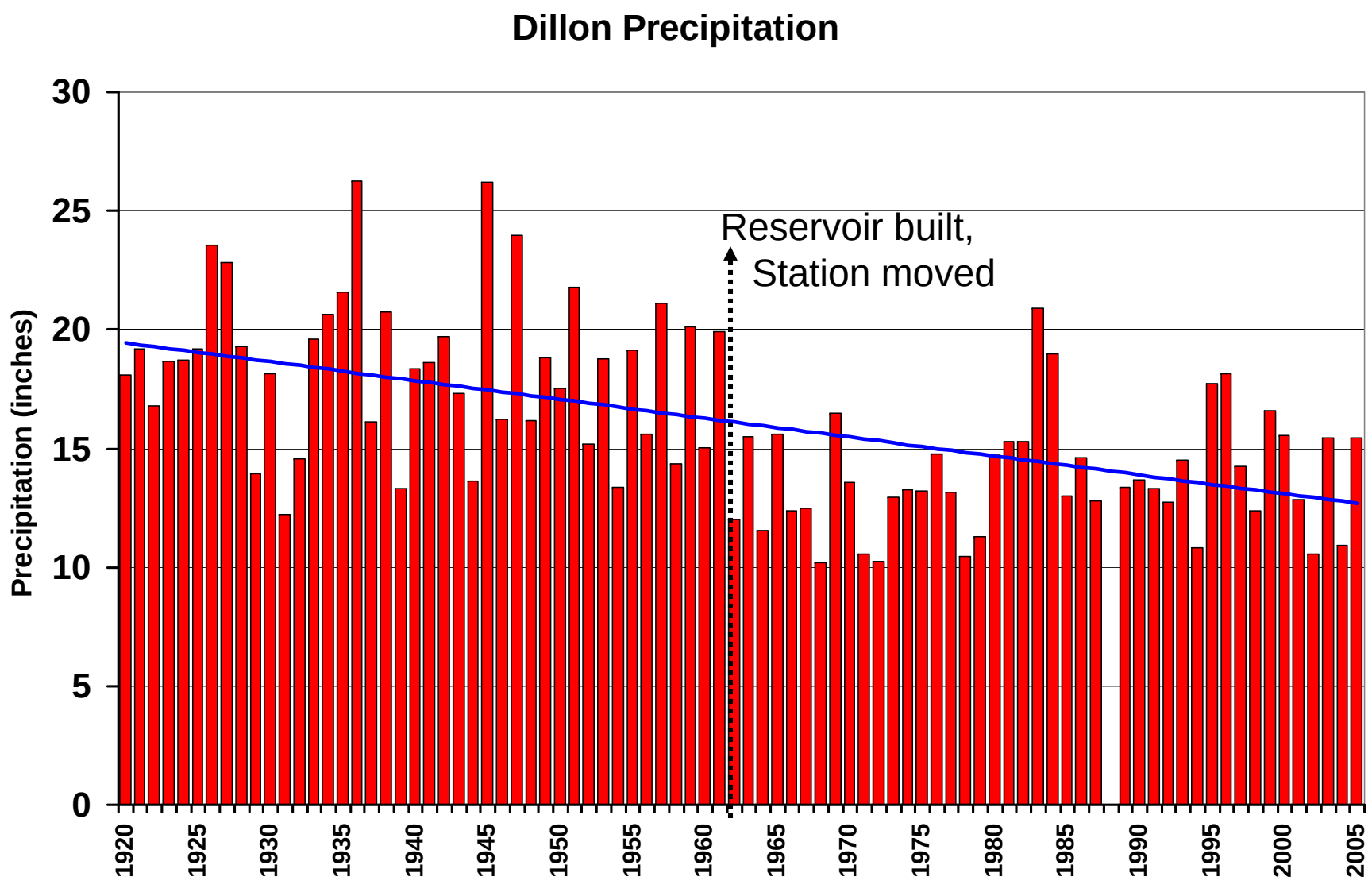
We can find many frustrating limitations to our climate records:

- Changing instrumentation
- Aging weather observers
- Changing environments around our weather stations
- Changing weather station locations
- Automation, etc.

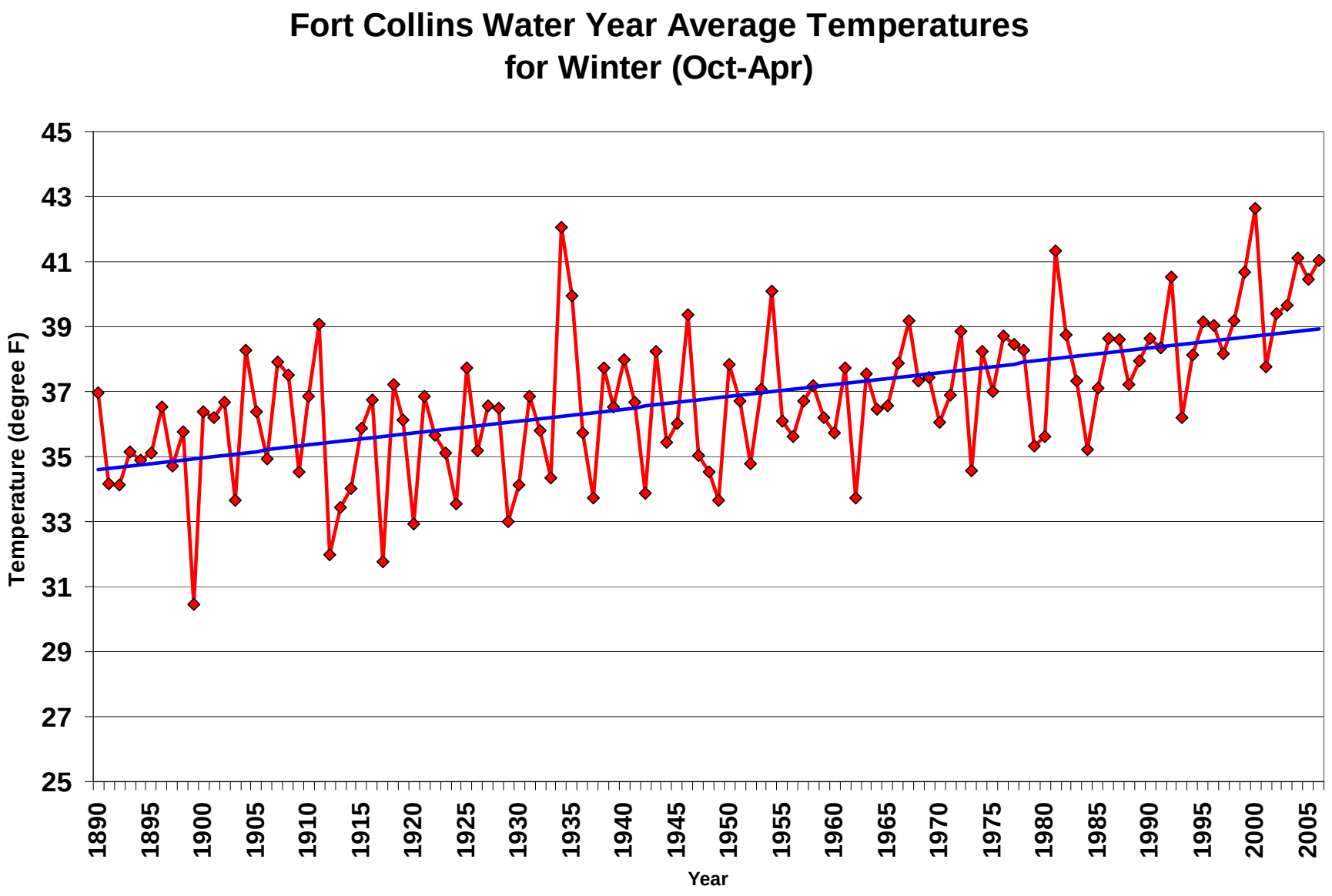
Denver All Stations



Dillon Annual Precipitation

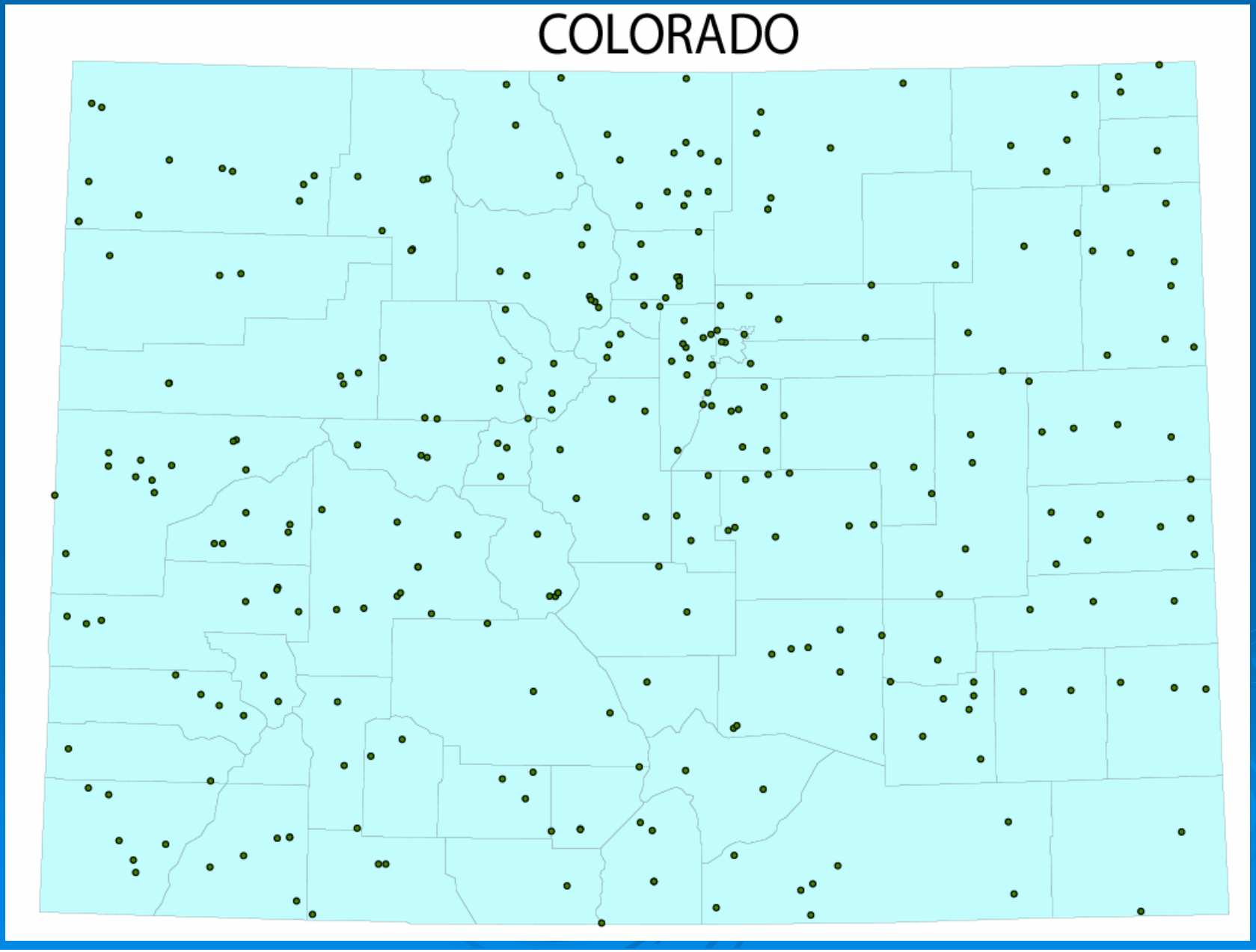


Fort Collins Winter Temperatures

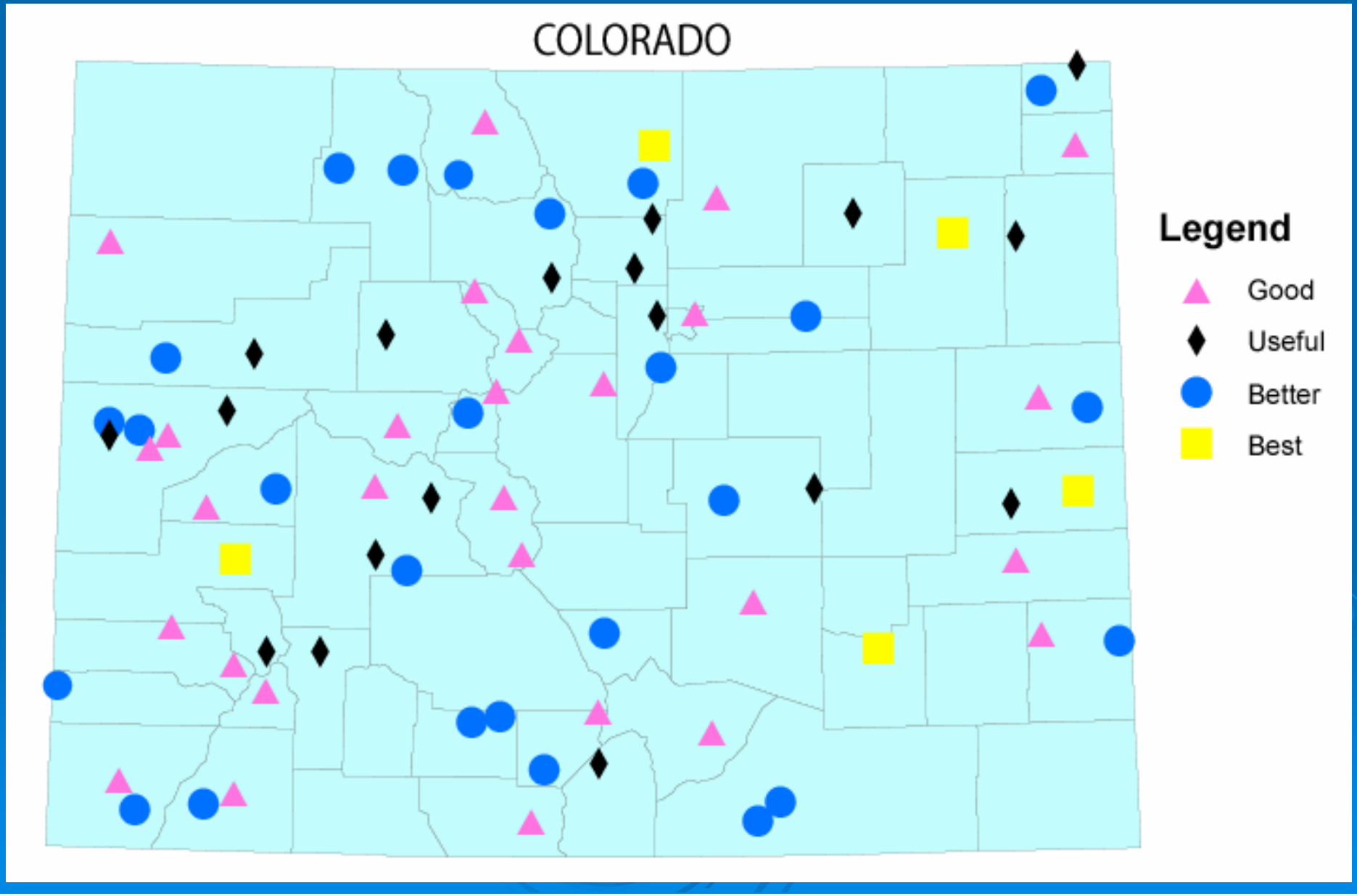


Still, our climate records are more complete, consistent, and widespread than nearly all other forms of long-term environmental monitoring (i.e. we shouldn't whine).

Colorado Cooperative Stations



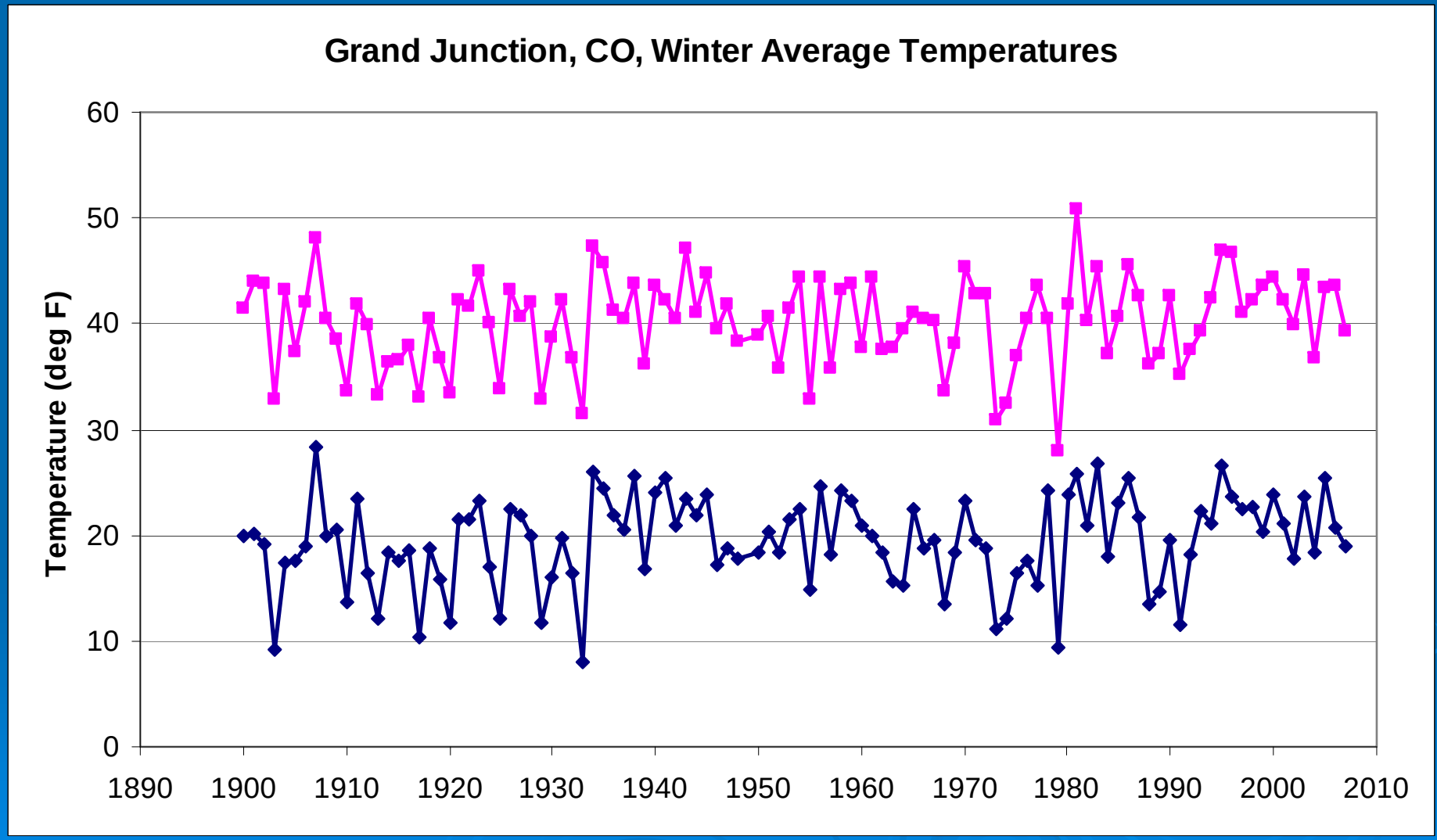
Long-Term Analysis Stations



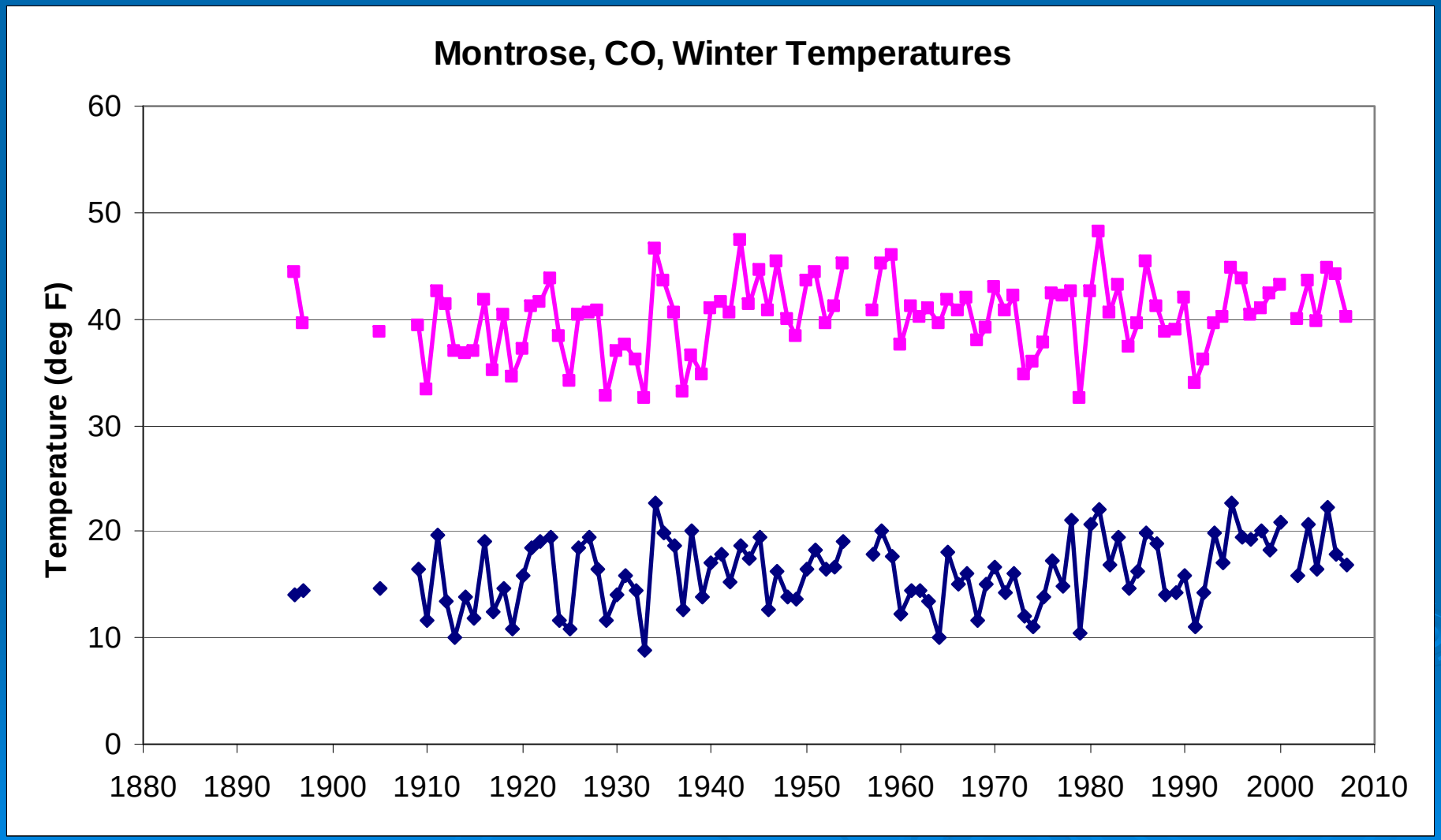
Recently, upward trends in seasonal temperatures have become noticeable in parts of Colorado

That may be significant for water users/planners whether or not precipitation is changing

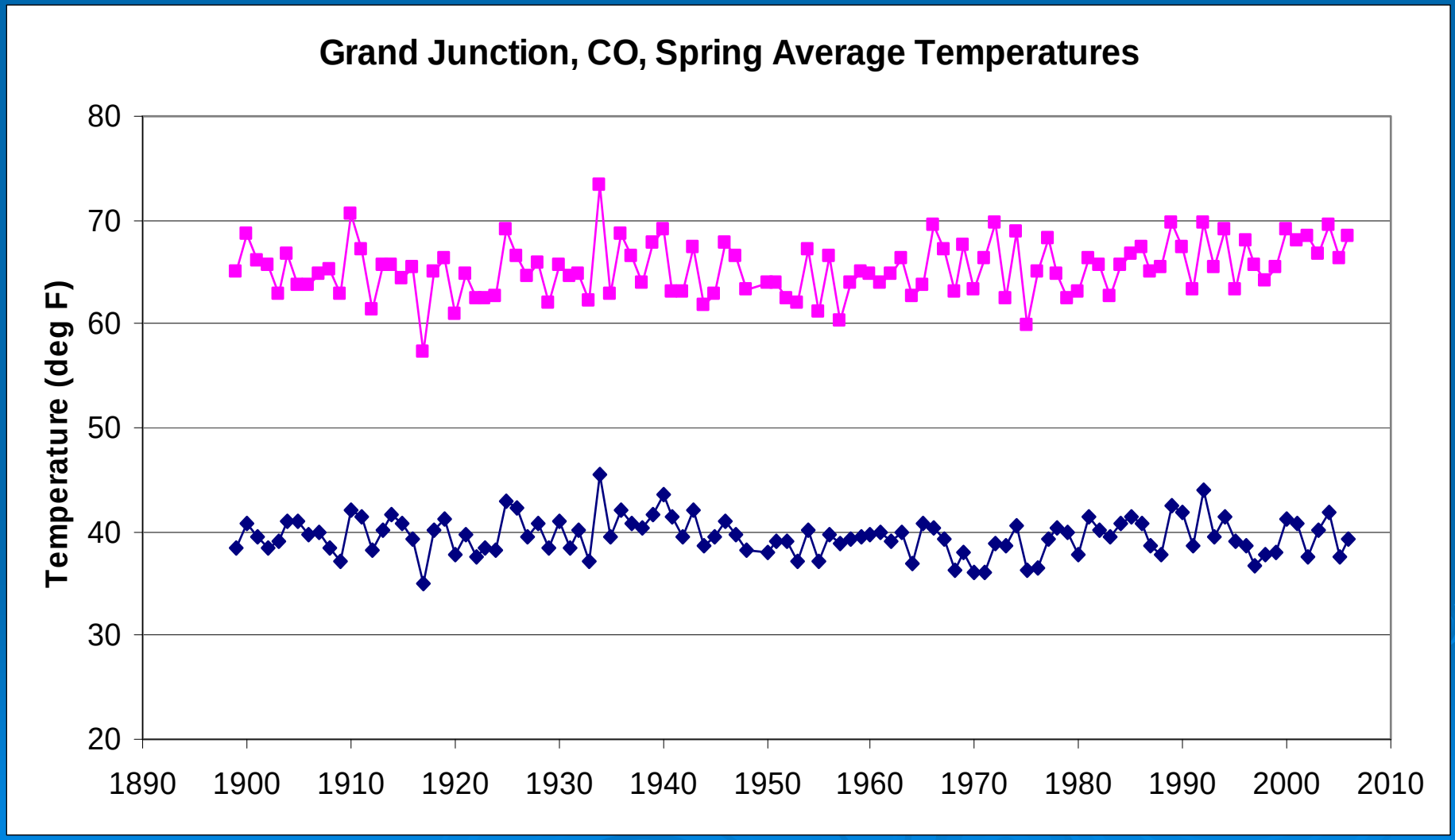
Grand Junction Winter Temperatures



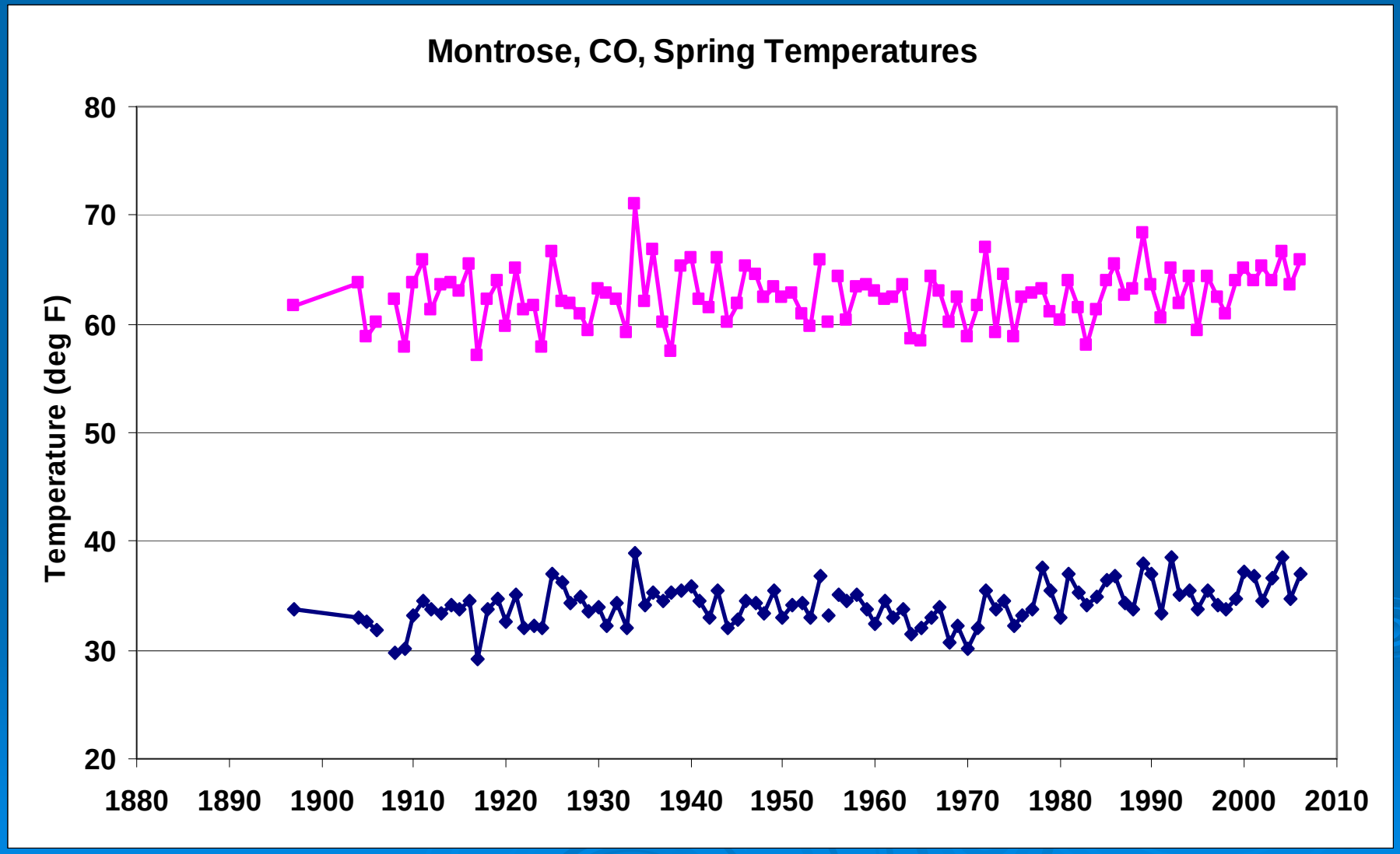
Montrose Winter Temperatures



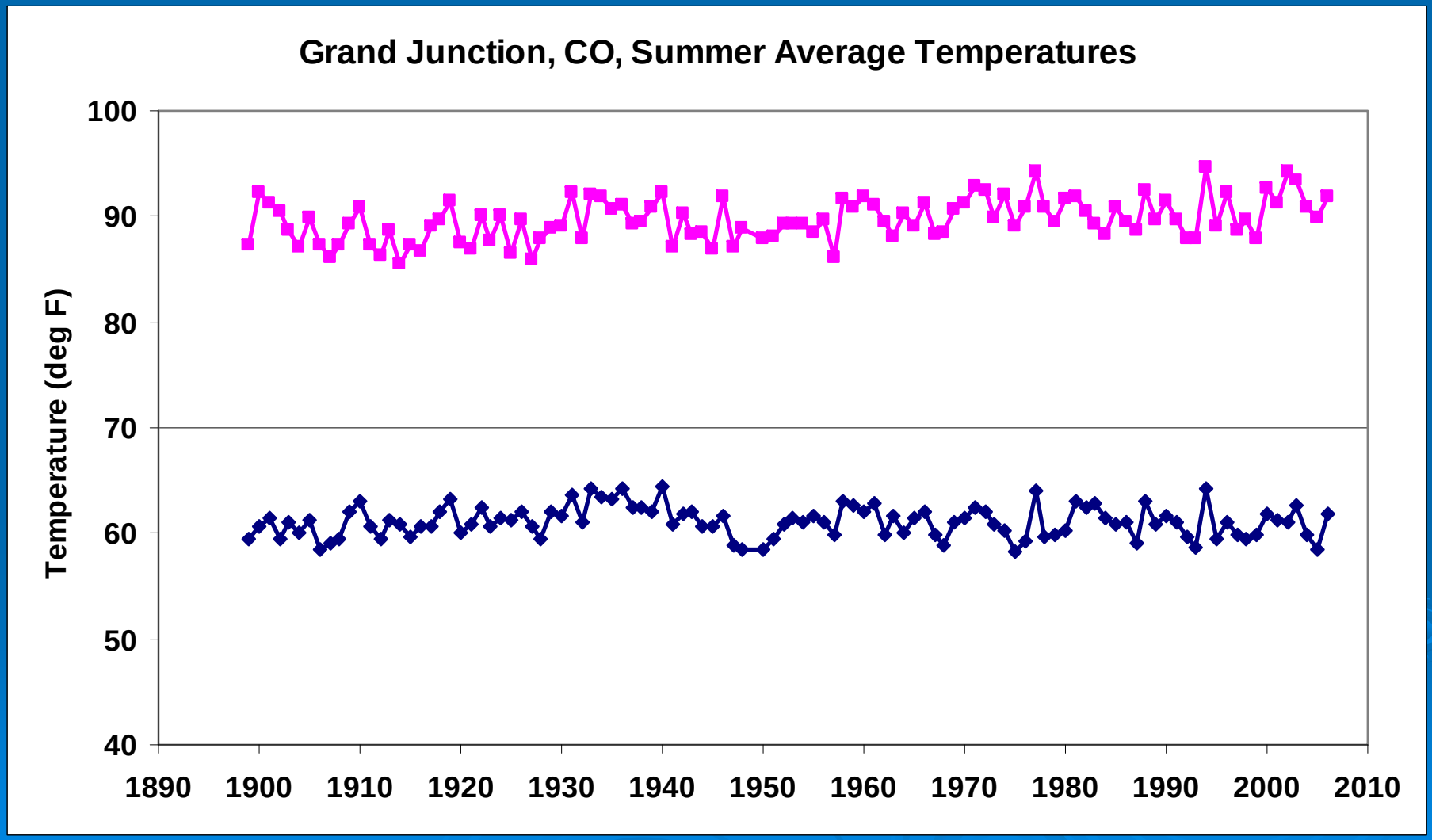
Grand Junction Spring Temperatures



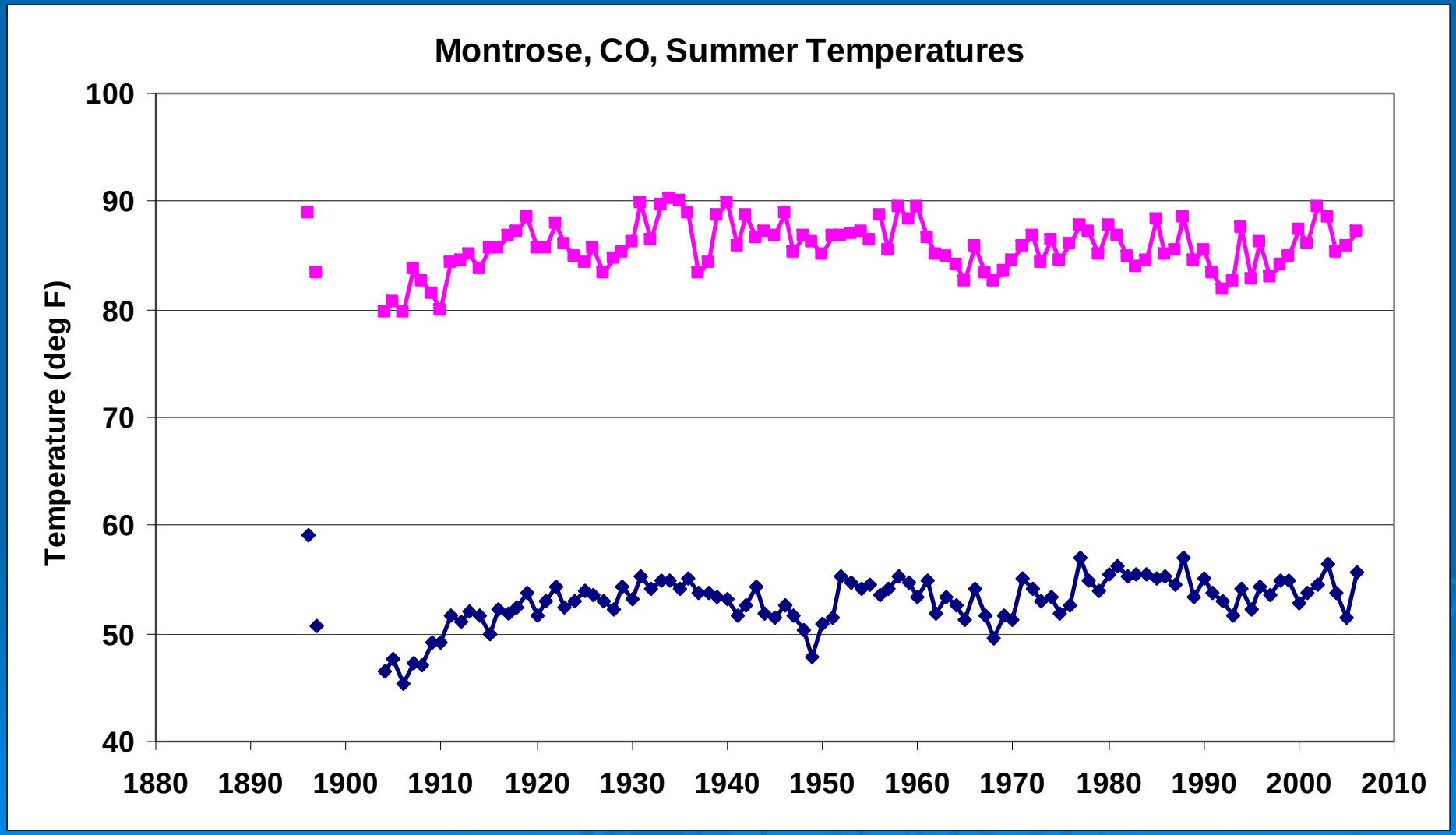
Montrose Spring Temperatures



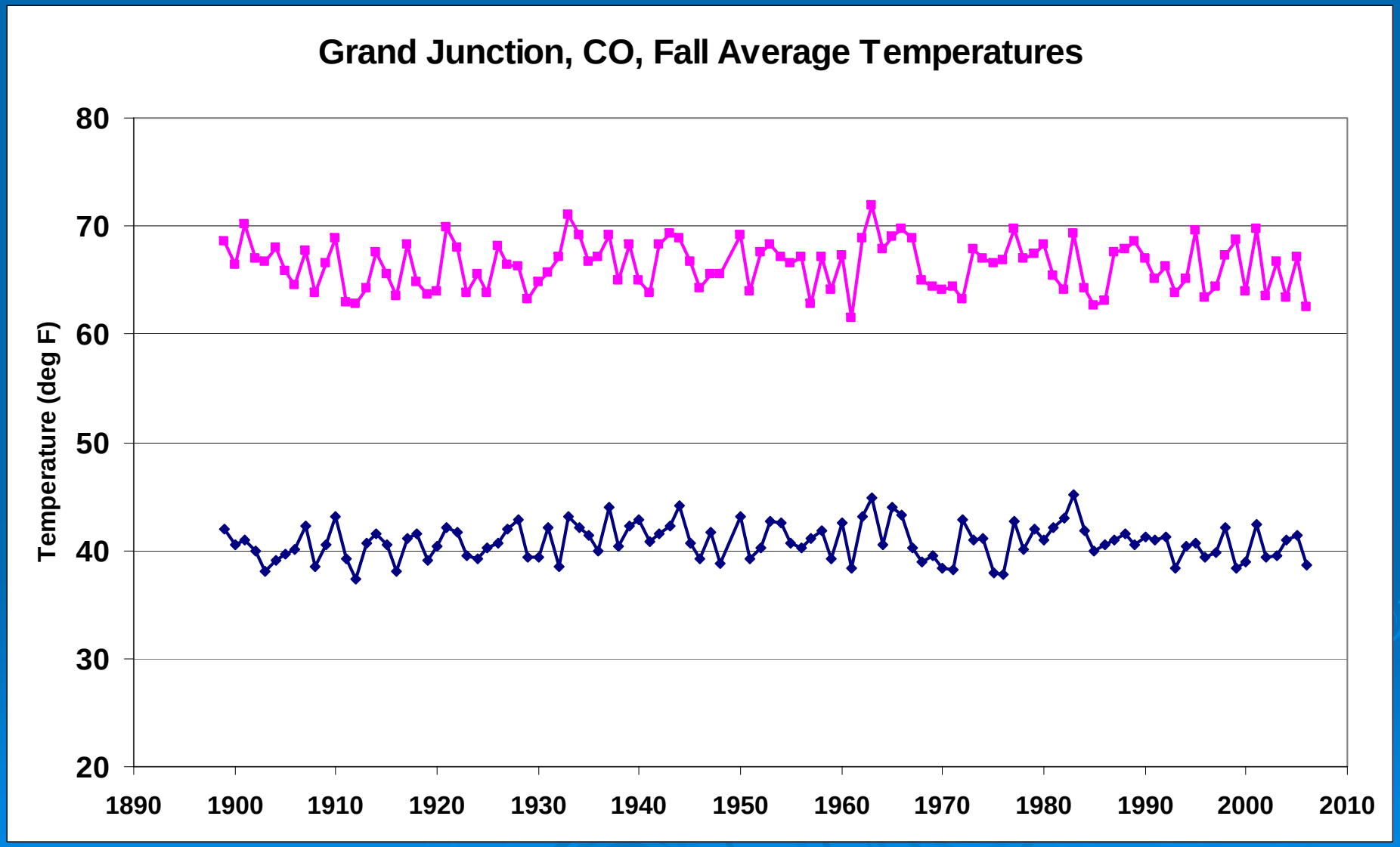
Grand Junction Summer Temperatures



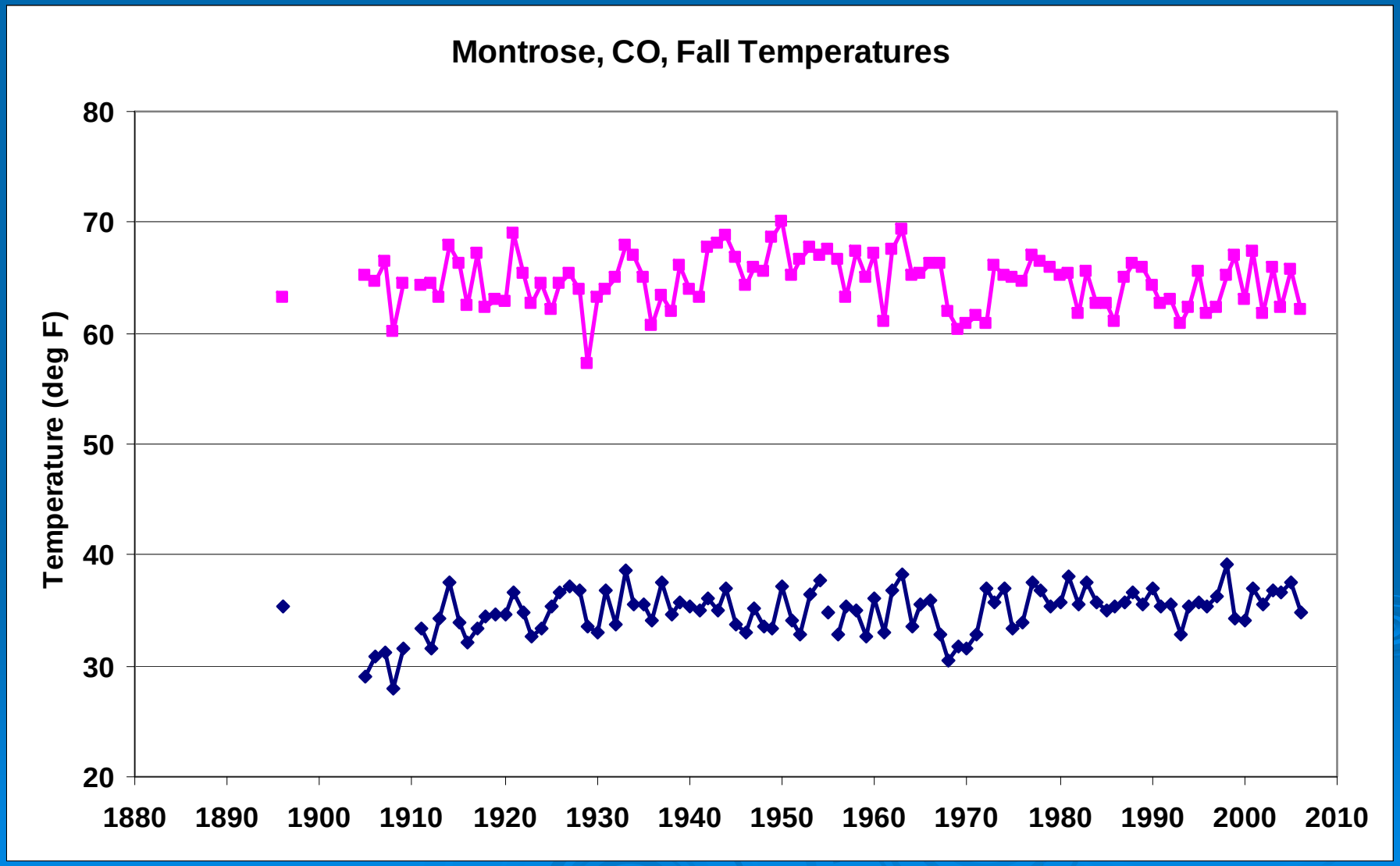
Montrose Summer Temperatures



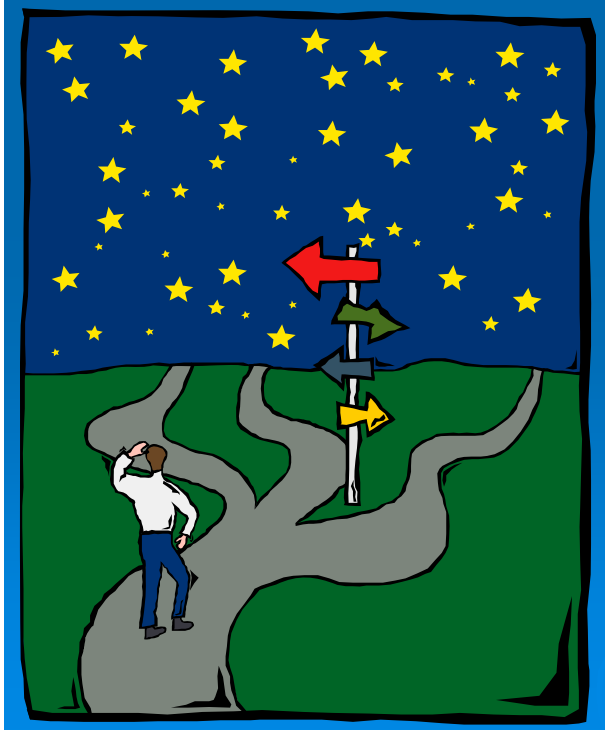
Grand Junction Fall Temperatures



Montrose Fall Temperatures



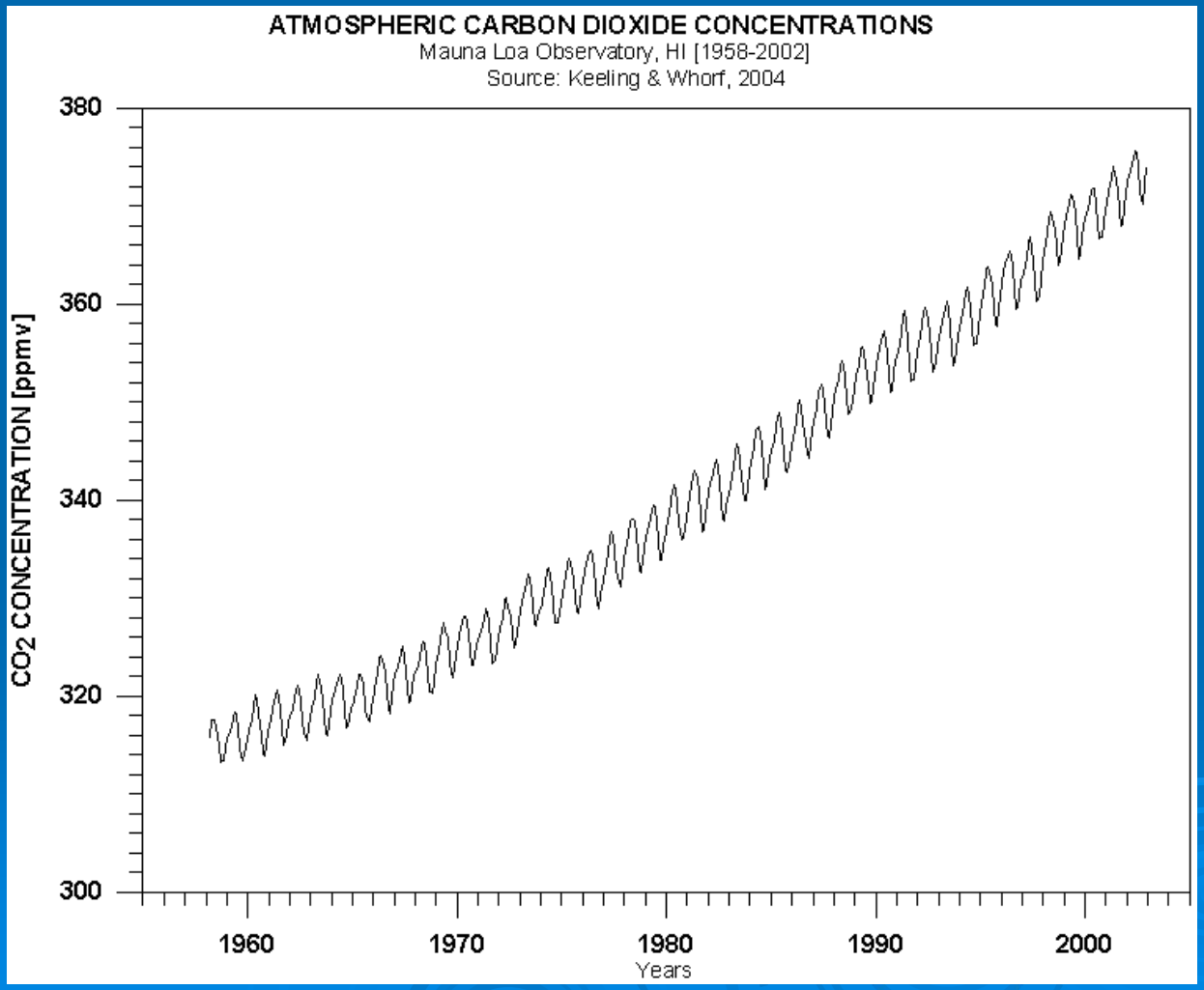
With even the best stations, there is uncertainty



Should Planners be concerned about Climate Change?

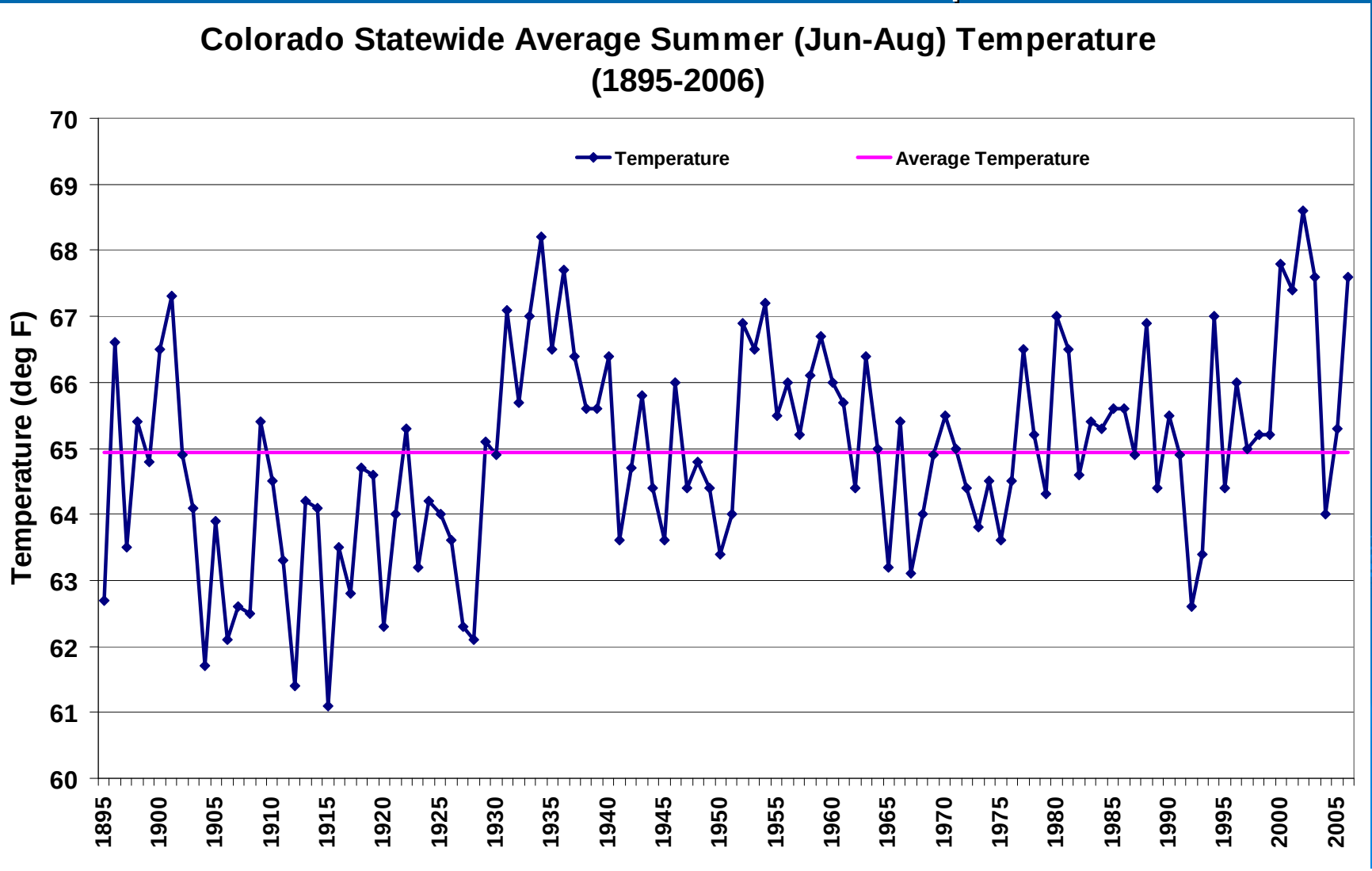
- Any trends so far are subtle, but that may not always be the case

Increases in greenhouse gases are real and large



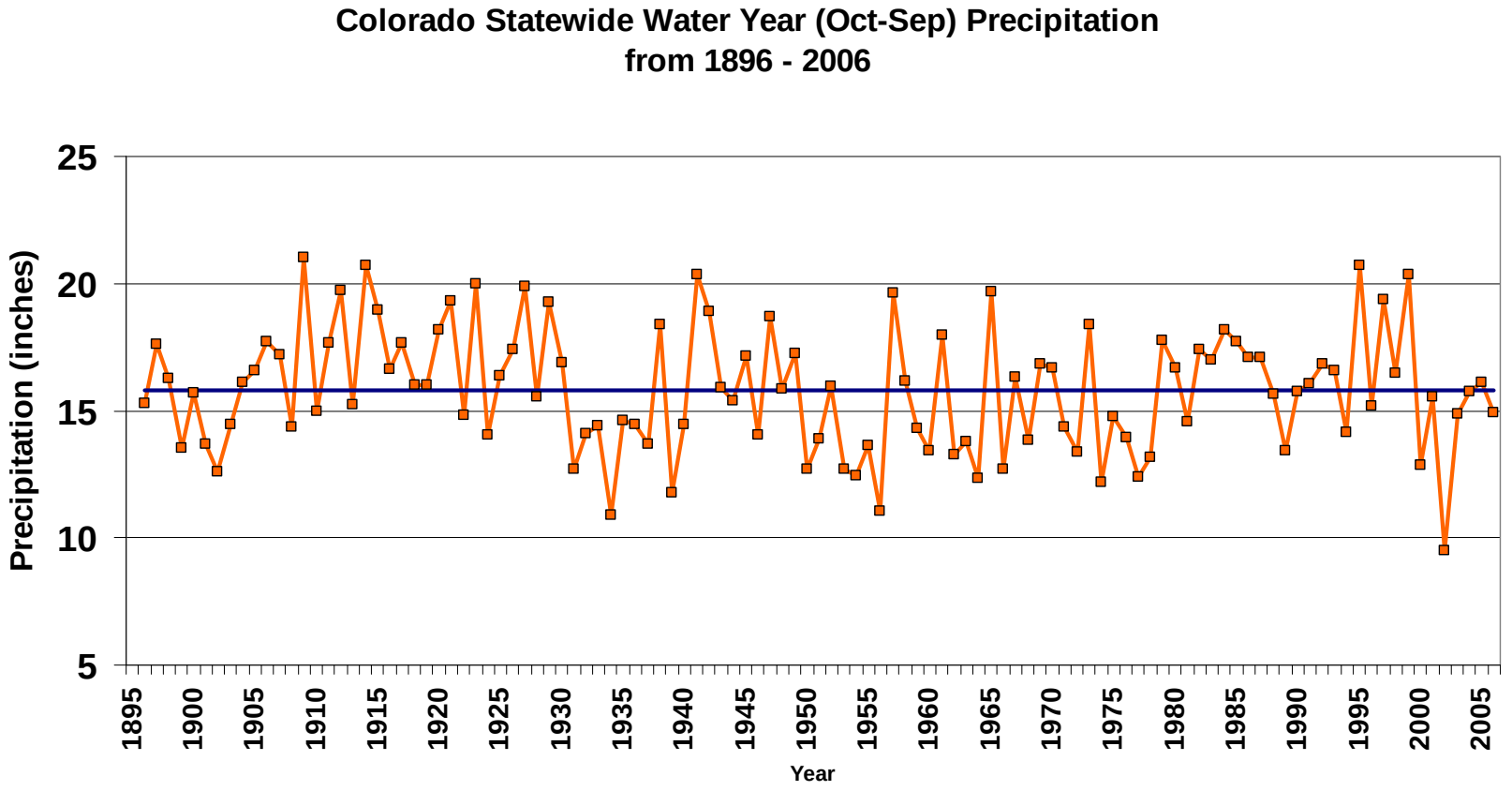
When significant temperature trends begin, we will be able to detect them

Colorado Statewide Summer Temperatures



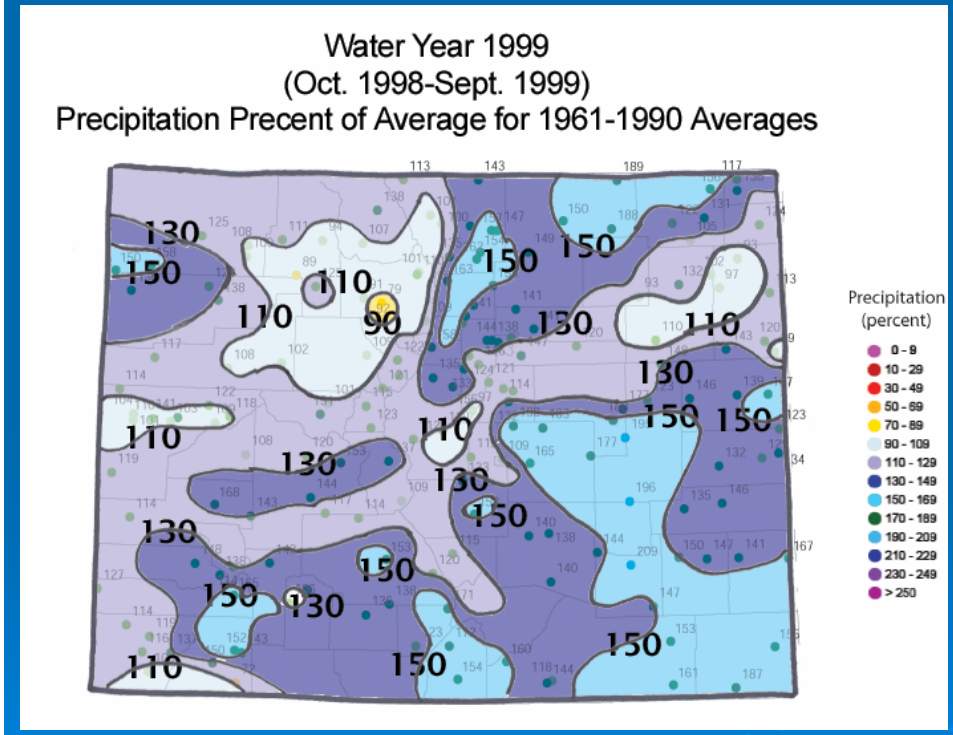
Detecting changes in precipitation will be much more difficult

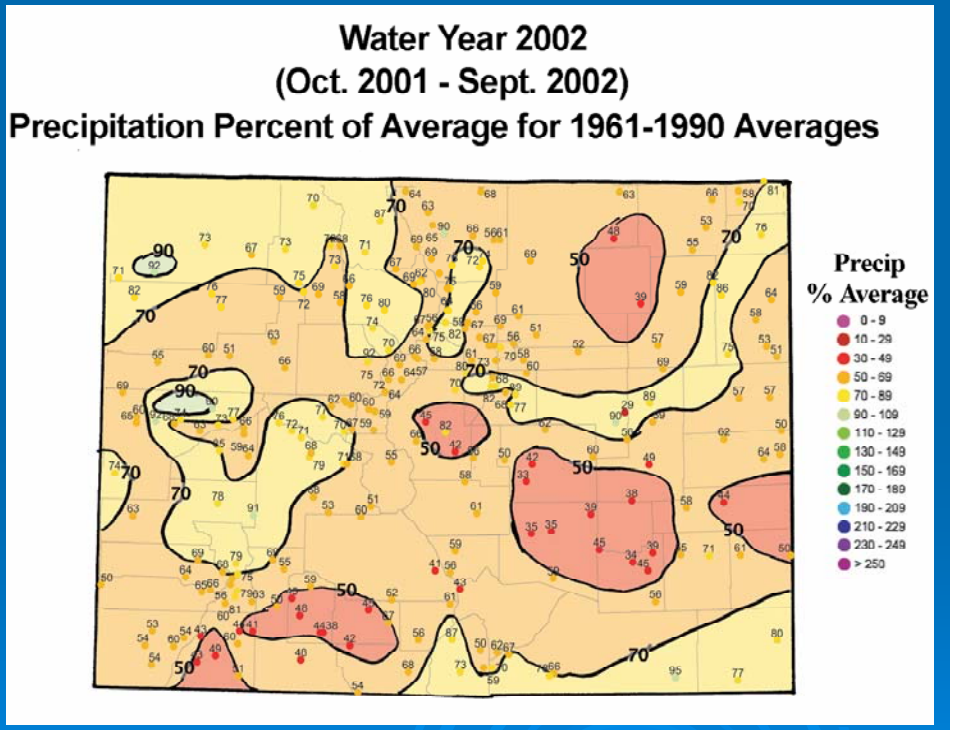
Colorado Statewide Water Year Precipitation



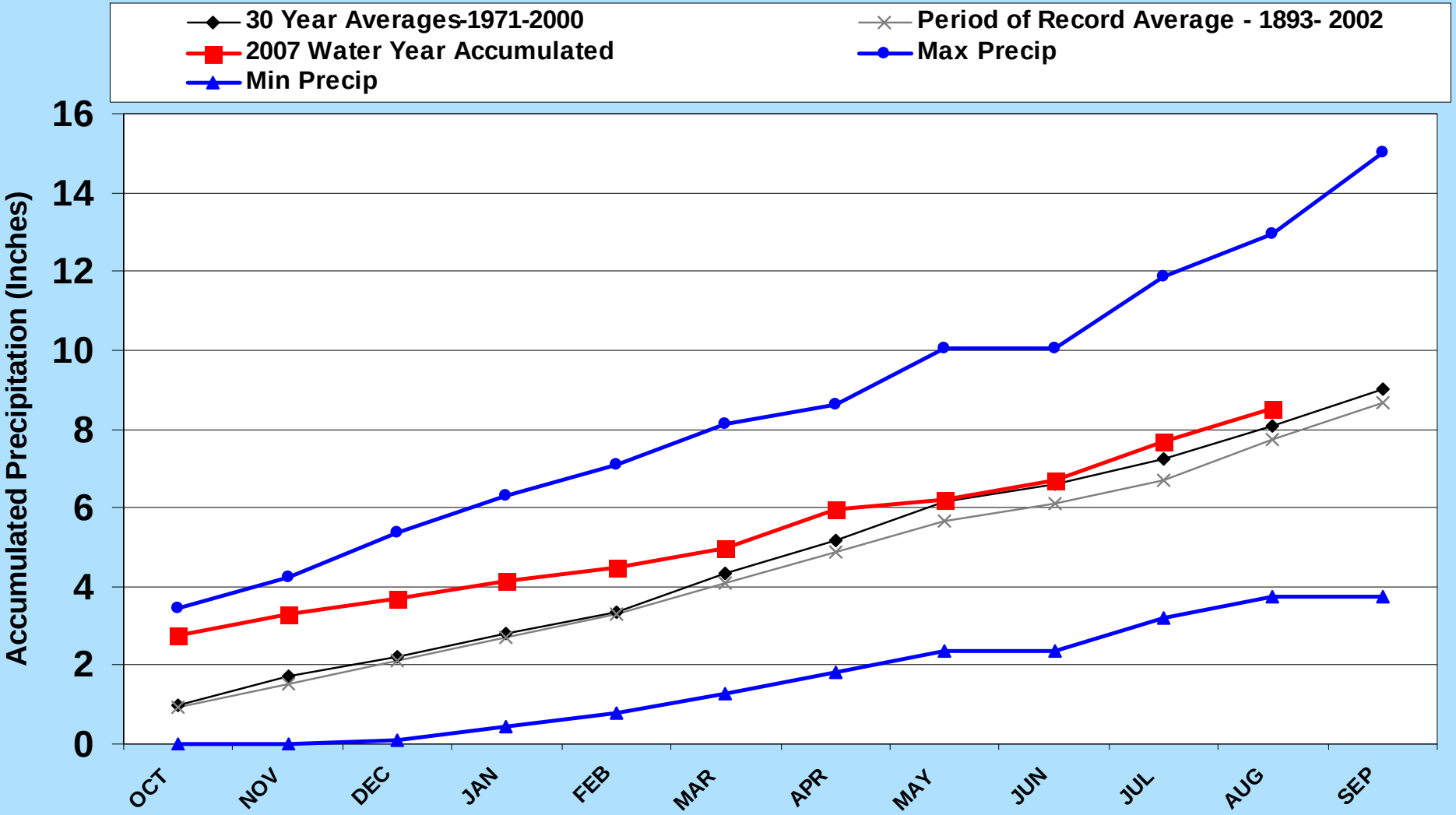
What should we do??

The Colorado Climate Center will continue to monitor Colorado's climate very closely

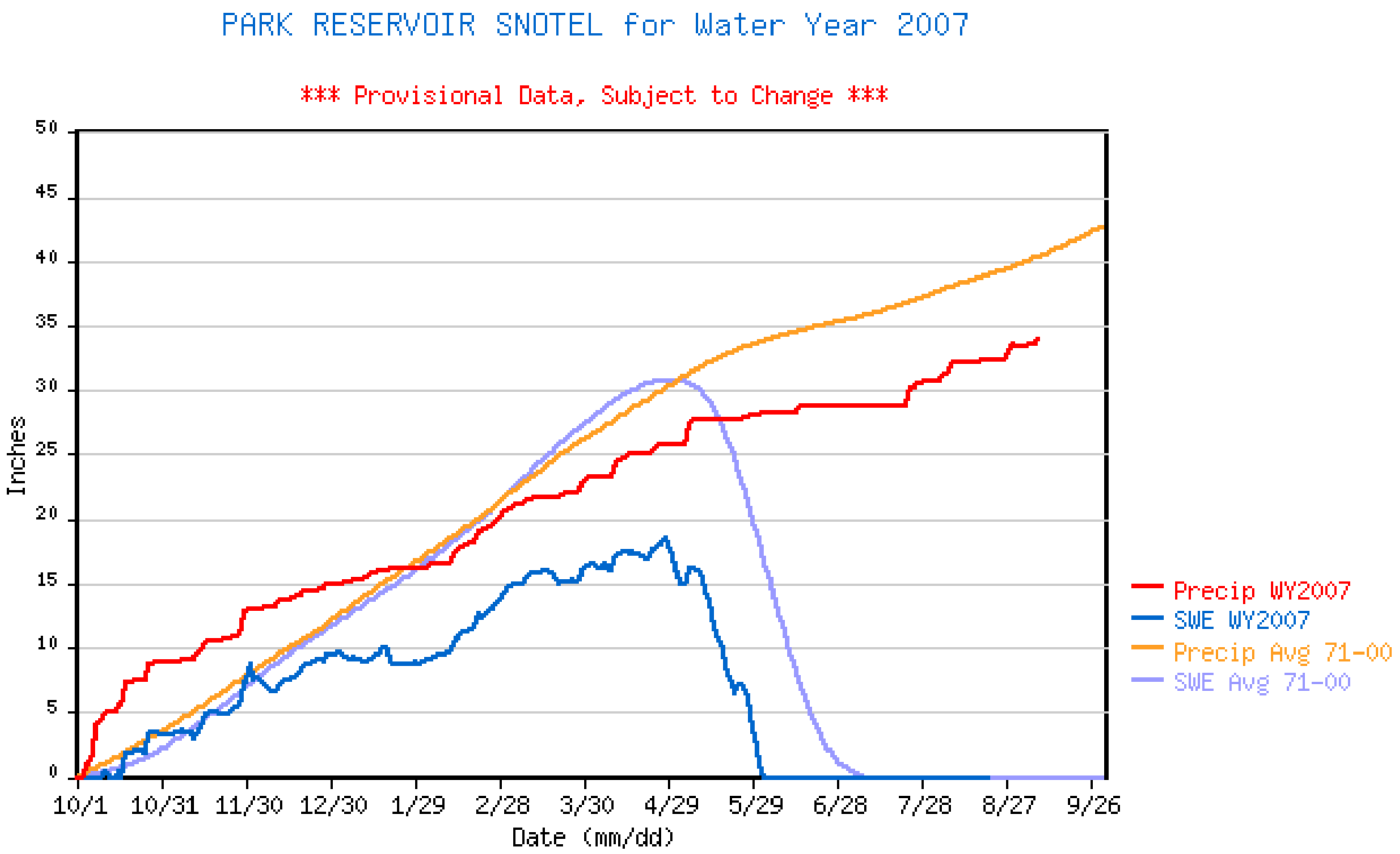




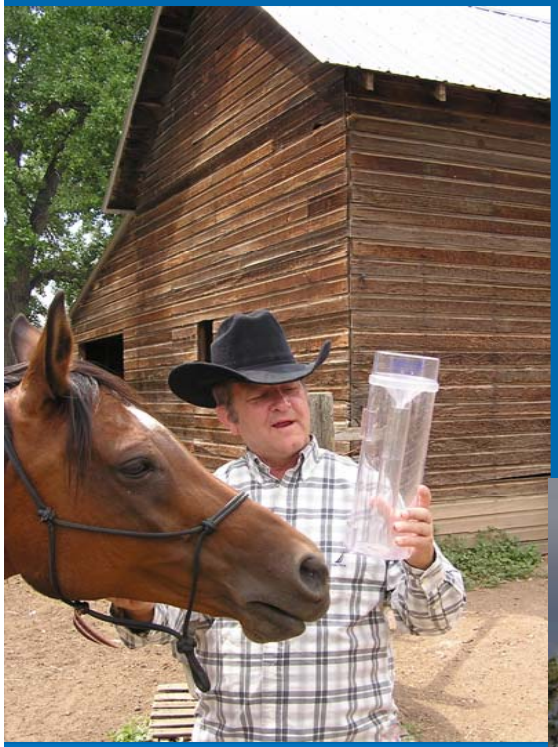
Grand Junction WSFO
2007 Water Year



Park Reservoir Snotel (Grand Mesa)



We are also encouraging citizens across the State to help us measure local precipitation



Photos by H. Reges

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.

Colorado Climate Center

Data and Power Point Presentations available for downloading

http://ccc.atmos.colostate.edu

Colorado State University
Knowledge to Go Places

Colorado Climate Center