Climate Issues – A State's Perspective

Nolan J. Doesken

Colorado State Climatologist,
President Elect AASC

Colorado Climate Center, Colorado State University

FYO8 Central Regional MIC/HIC
Conference, Kansas City, MO,
October 23, 2007

What is a State Climatologist and where did we come from?

AASC
AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS

2007 Annual Meeting, Couer d'Alene, Idaho, July 16-19

1. John Young, WI
2. Nolan Doesken, CO
3. Tim Owen, NCDC
4. Ryan Boyles, NC
5. Mike Anderson, CA
6. David Zierden, FL
7. Charlie Wax, MS
8. Ted Sammis, NM
9. John Christy, AL
10. George Taylor, OR
11. Nancy Selover, AZ
12. Beth Hall, NH
13. Jim Zandlo, MN
14. Deke Arndt, OK (Asst.)
15. Lesley-Ann Dupigny-Giroux, VT
16. Dennis Todey, SD
17. Jim Angel, IL
18. Hope Mizzell, SC
19. Adnan Akyuz, ND
20. Phil Mote, WA
21. Jim O'Brien, FL (Ret.)
22. Jeff Andresen, MI
23. Ken Hubbard, HPRCC
24. Keith Eggleston, NRCC
25. Harry Hillaker, IA
26. Dave Robinson, NJ
27. Stu Foster, KY
28. Steve Hilberg, MRCC
29. Steve Gray, WY
30. Jan Curtis, USDA/NRCS
31. Kevin Robbins, SRCC
32. Pat Guinan, MO
33. Glen Conner, KY (Ret.)
34. Wenguang Zhao, ID (Asst.)
35. Kelly Redmond, WRCC
36. Martha Shulski, AK (Rep.)
37. Paul Knight, PA
38. Russ Qualls, ID

Not Pictured:
Deb Bathke, NM (Rep.)
Tony Bergantino, WY (Asst.)
Chip Conrad, SERCC
Melissa Griffin, FL (Asst.)
Ed Hopkins, WI (Asst.)
Josiah Mault, WA (Asst.)
Don Potts, MT
Jeff Rogers, OH
Jerry Stanger, VA (Asst.)
David Stooksbury, GA

Colorado Climate Center – Beginnings

- After the state climatologist position was abolished in 1974 by the federal government, the State of Colorado, through the Colorado Agricultural Experiment Station funding, established the Colorado Climate Center at Colorado State University.

Who We Are

- Nolan J. Doesken

  State Climatologist and

  Senior Research Associate,

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- Odie Bliss

  Coordinator,

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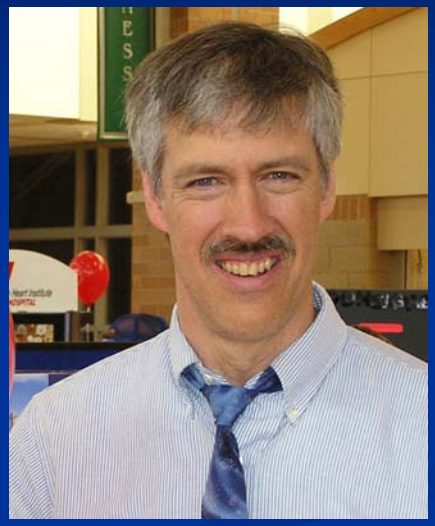
  (970) 491-3314 (fax)

  Atmospheric Science Department

  Colorado State University

  Fort Collins, CO 80523-1371

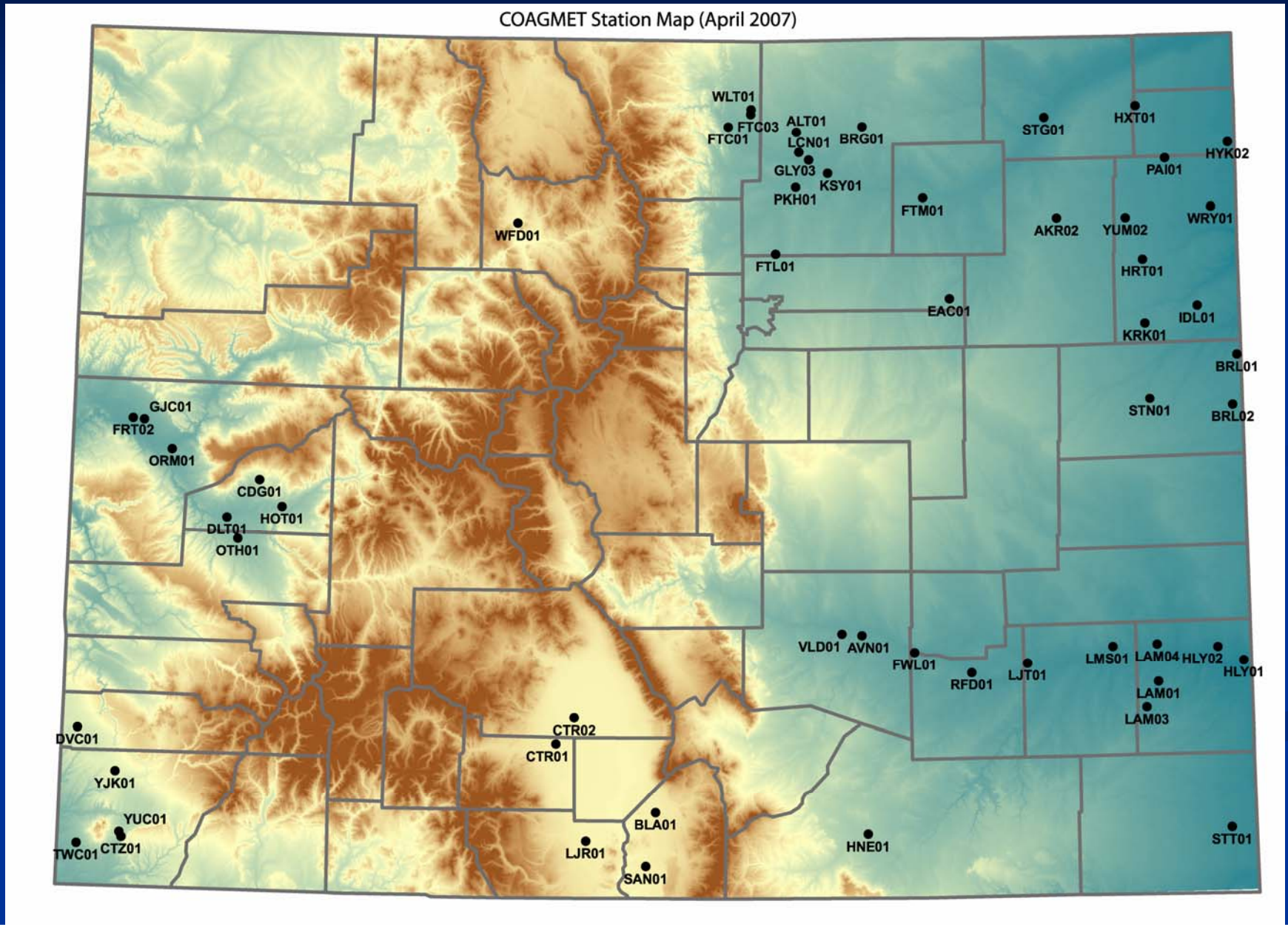



What We Do….

Data Acquisition and Archive

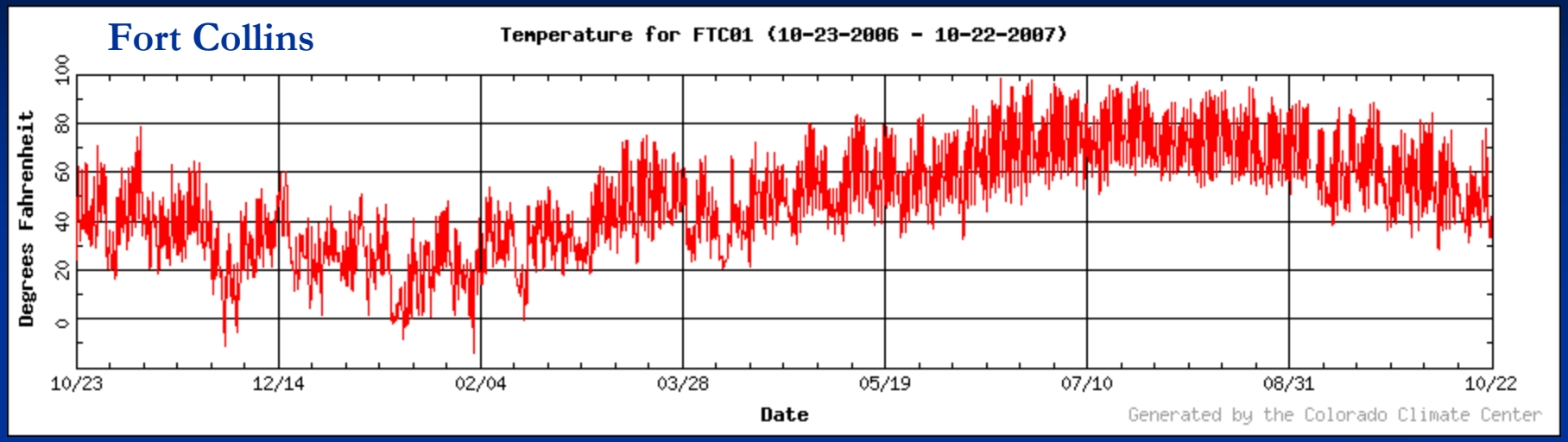
- Elements: temperature, precipitation, snow, wind, solar, evaporation, soil temperatures, humidity, cloud cover

Colorado Agricultural Meteorological (CoAgMet) Network

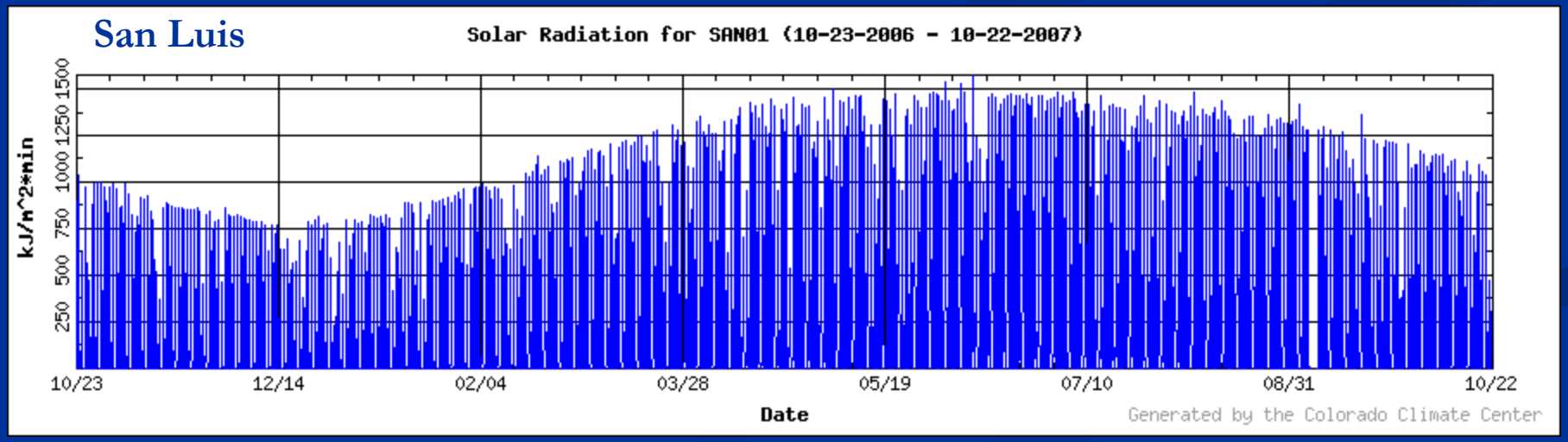


CoAgMet data

Fort Collins

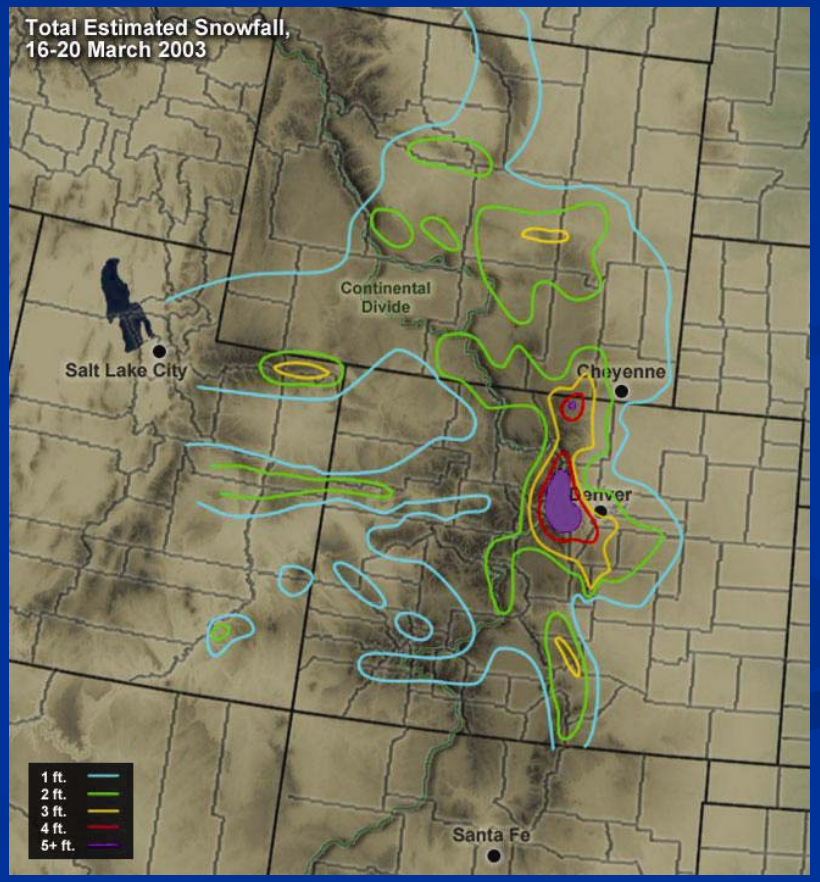


San Luis



Monitor the Climate of Colorado

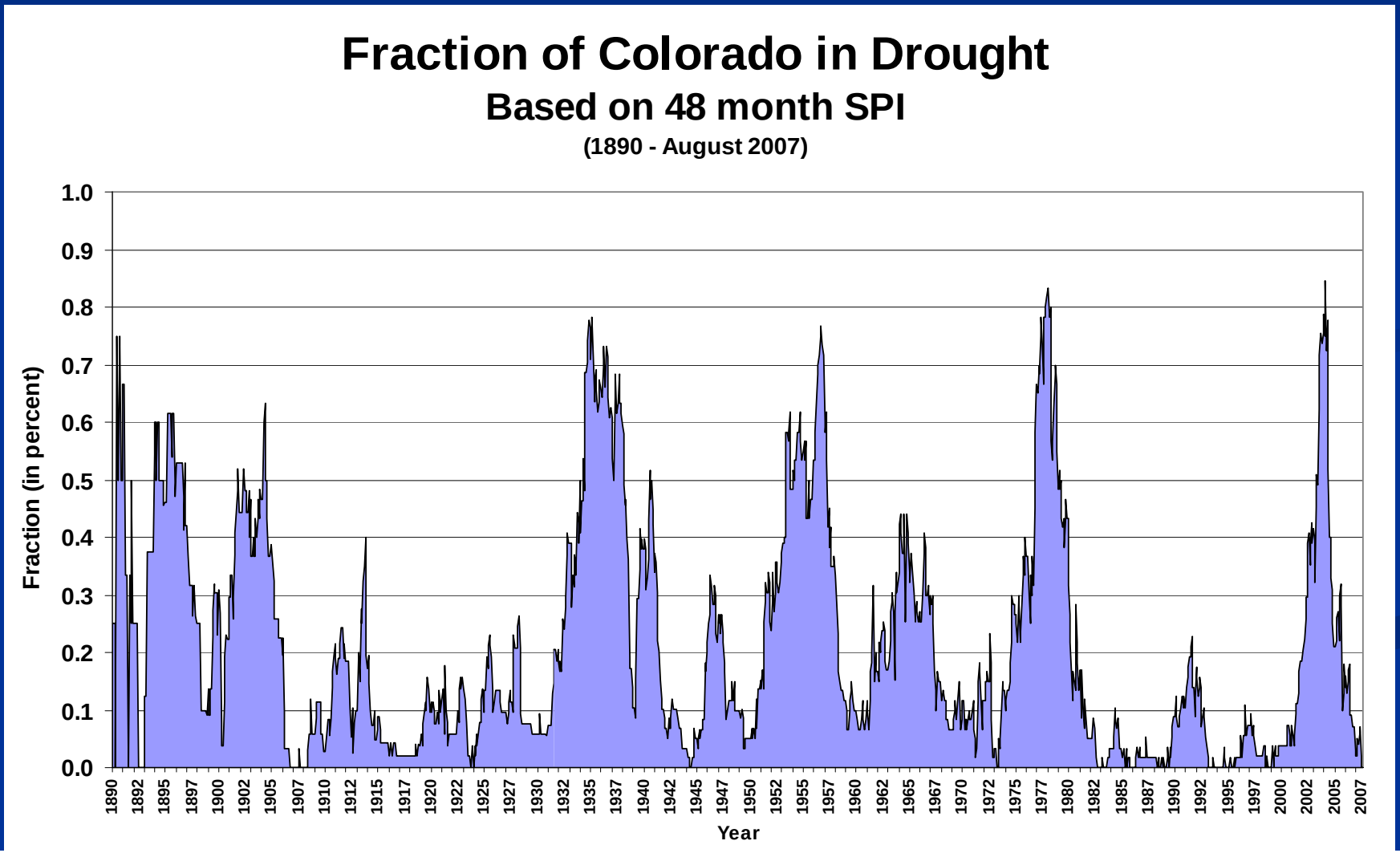
- Drought, flooding, blizzards, tornadoes, temperature extremes, Heating/Cooling Degree Data, etc.



March 2003 Snow Storm

Climatic Research

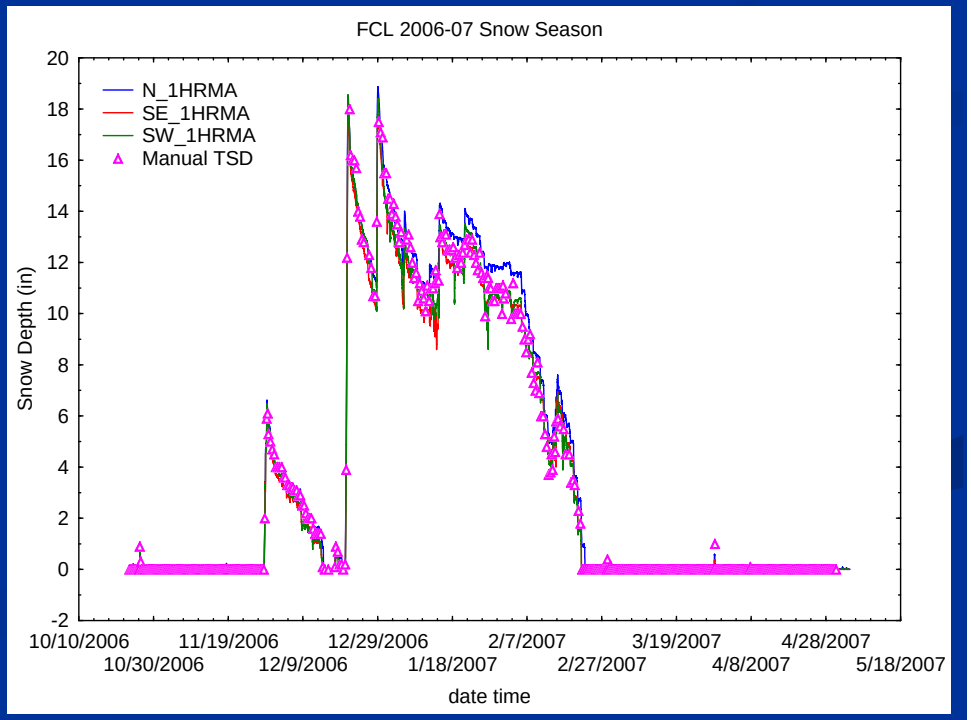
- Instrument Comparison Studies, Drought, Snow, Variability and Trends, Impacts and Modeling, etc.



Ultrasonic Snow Project

Fairbanks, AK, Snow Sensor Site

Fort Collins 2006-07 Snow Season Data



Disseminate Information

- Farmers, ranchers, consultants, engineers, print and broadcast media, water resources, utilities, construction, lawyers, federal, state and local governments, schools, universities, and many others.
- HOW? Website, phone, fax, email, publications and conferences

http://ccc.atmos.colostate.edu

(970) 491-8545 phone

(970) 491-3314 fax


Are all State Climate offices the same?
No!

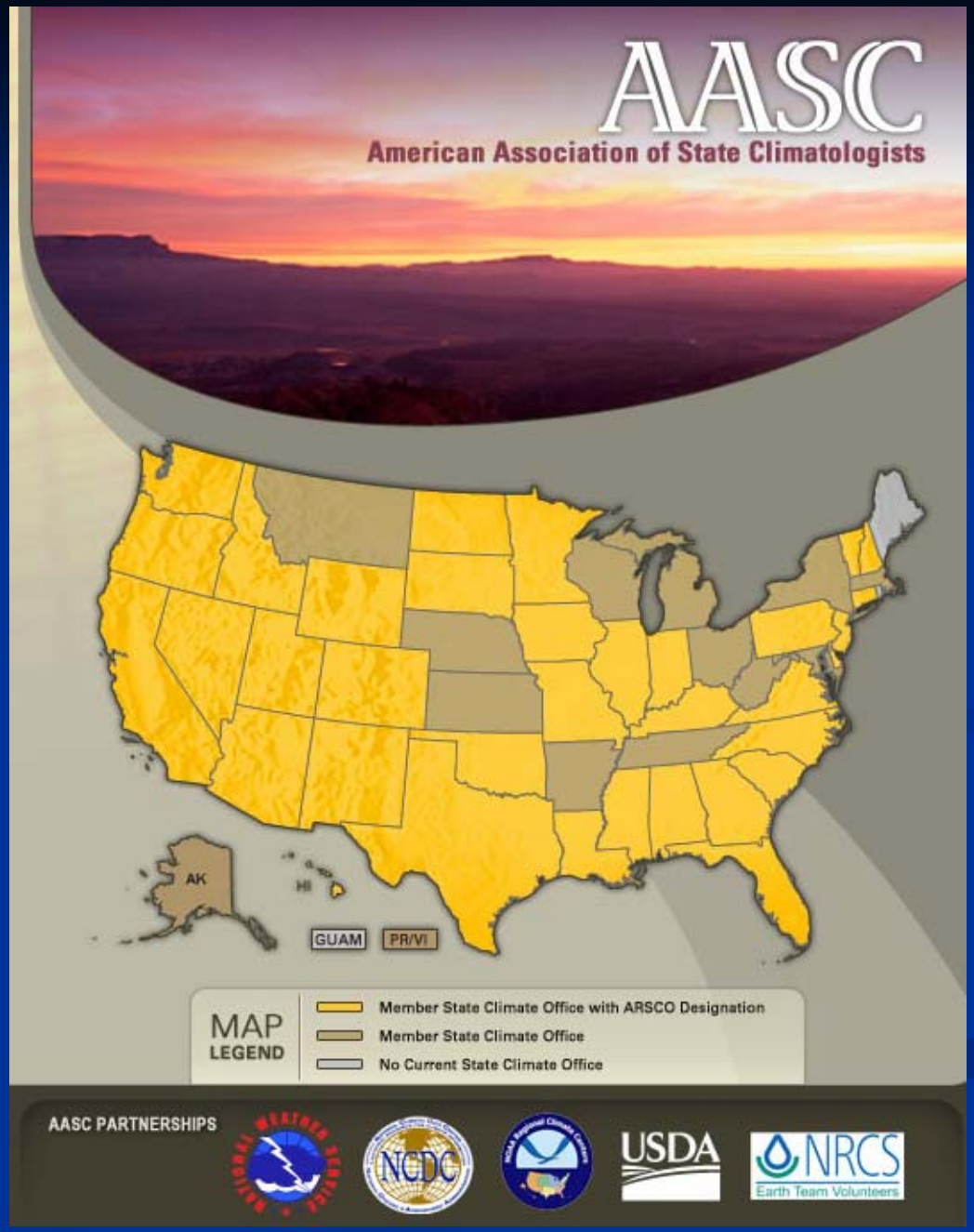
SC Offices

- We have different funding mechanisms, funding levels, and staffing
- We have different institutional structures
- We have different skills
- We have different priorities

Through the American Association of State Climatologists (AASC) we are striving to achieve a high level of effectiveness in all states so that all NWS regions and Forecast Offices can expect effective climate services and expertise within all states

State Climate Offices

http://www.stateclimate.org/



ARSCO

American Association of State Climatologists Recognized State Climate Office

Recognized State Climate Office

WHAT IS AN ARSCO?

DEFINING THE ROLE OF THE

AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS

RECOGNIZED STATE CLIMATE OFFICE

IN THE NATIONAL CLIMATE SERVICES PARTNERSHIP

September 2000

I. INTRODUCTION

The mission of the National Climate Services Partnership is to effectively provide the nation with high-quality, timely, and relevant climate services. This comes at a time when the demand for climate services is at record levels and is expected to continue growing. The National Climate Services Partnership, comprised of national and regional centers and American Association of State Climatologists (AASC) recognized state climate offices, was created to meet this need.

The Partnership seeks to meet the following objectives:

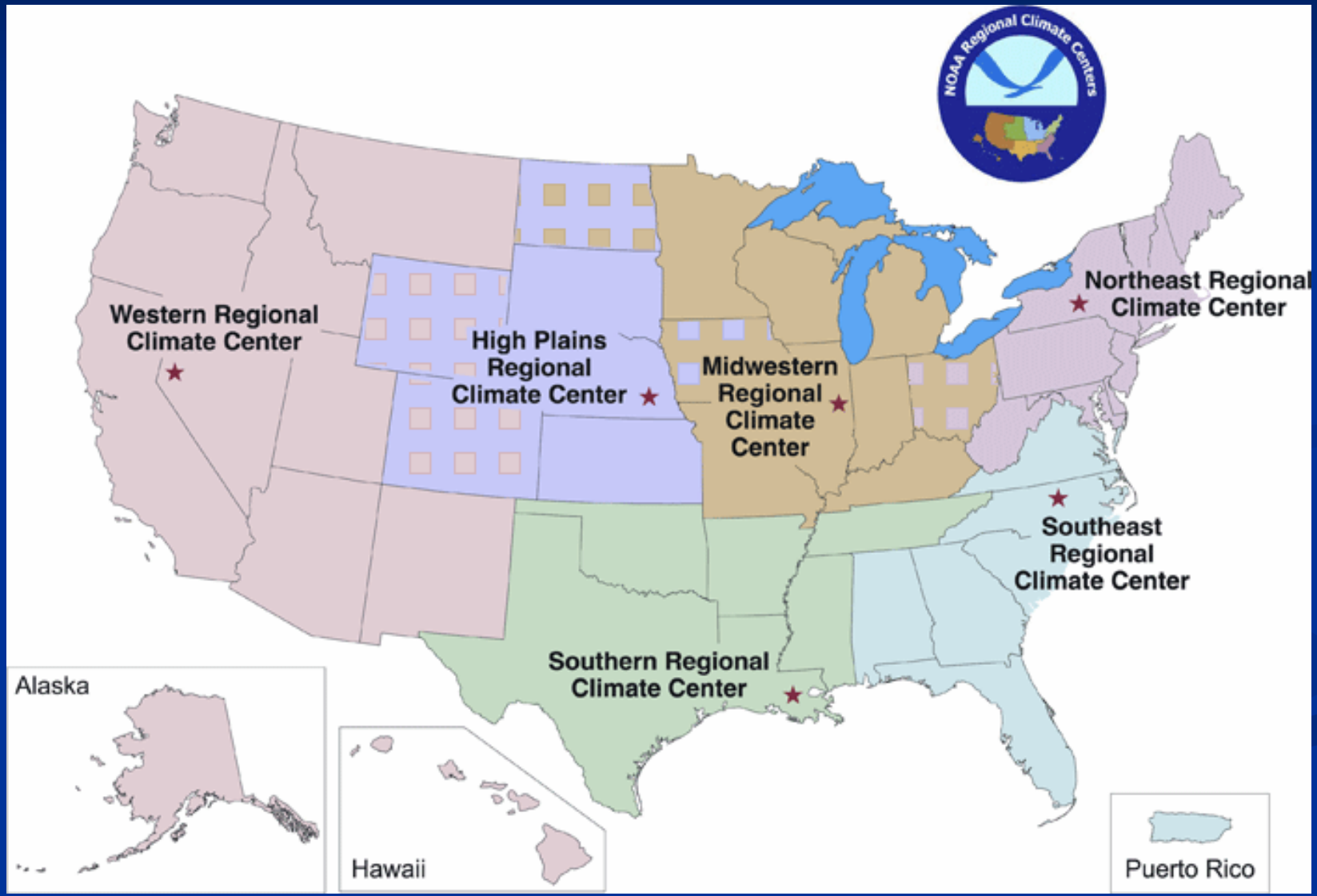
- Maximize the efficiency and effectiveness of the partners

- Minimize duplication of services

- Streamline climate information delivery

This document defines the role of the AASC Recognized State Climate Office (ARSCO) within this partnership. The ARSCOs bring their climatological expertise and climate resources to serve the citizens of their states with specific and first-hand support. This support will aid in climate-related decisions for users in the public and private sectors.

Regional Climate Centers (RCC)



Current AASC Action Priorities

- Data Stewardship Priorities –

  (a) Guidelines Siting, Sensors and Metadata

  (b) Mesonet Policy – What data sources can be considered "official"

  (c) QA/QC – Caring for the "Fab 5" (Tmx, Tmn, Pr, Sn, Sd)

Current AASC Action Priorities

- Strengthen State Climate Programs
  - (a) ARSCO status
  - (b) Advocacy and support
  - (c) Developing State Climatologist – Applied Climate Information System, SC-ACIS

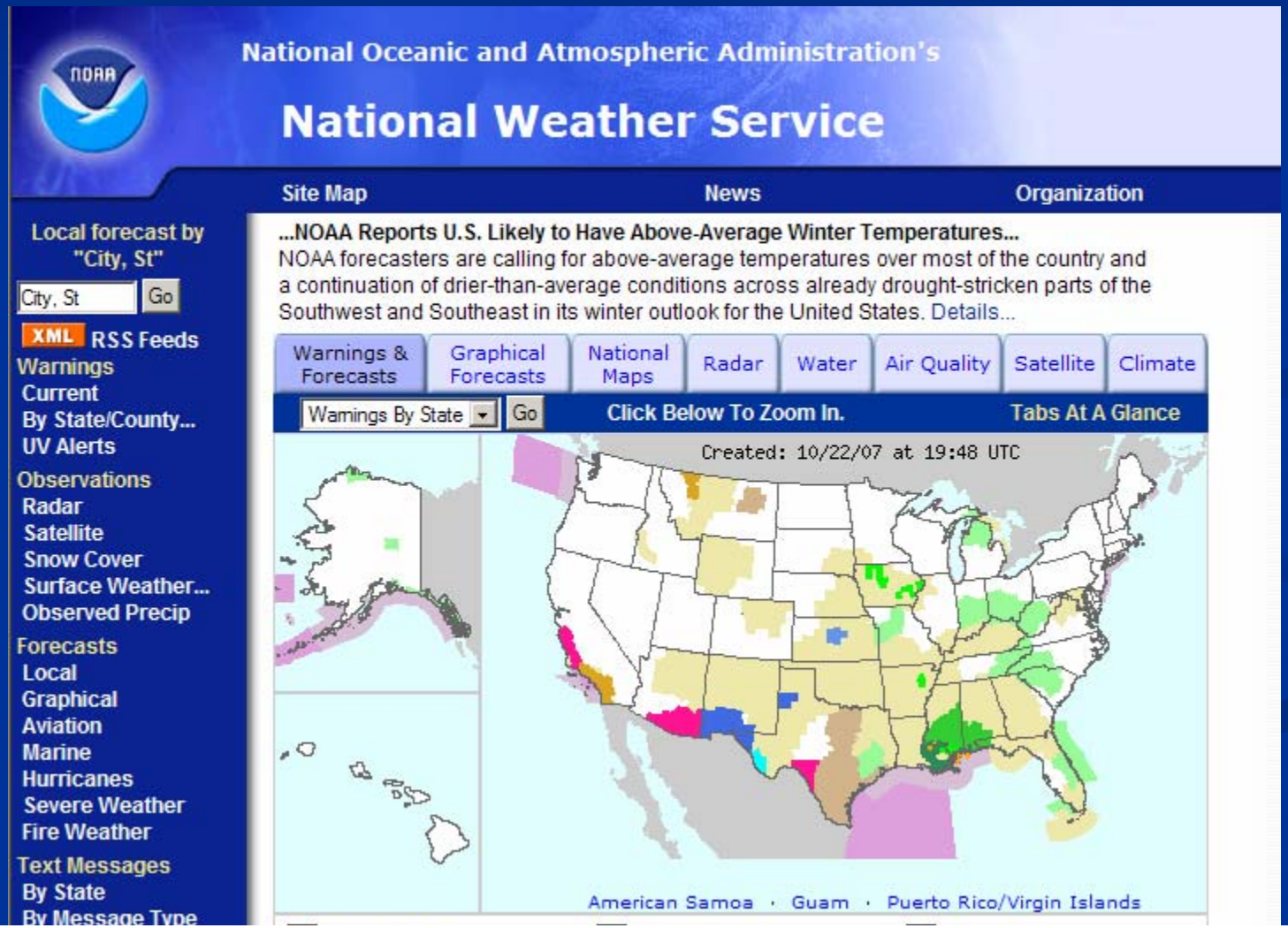
What do State Climate Offices have to offer NWS?

- A very thorough knowledge of our respective states and climate sensitivities
- Local and regional climate expertise
- Strong knowledge of climate data resources
- A long-term perspective

Cont'd

- Climate information resources
- Data
- Content for public presentations
- Political clout (????)

What do State Climatologists expect from the NWS?



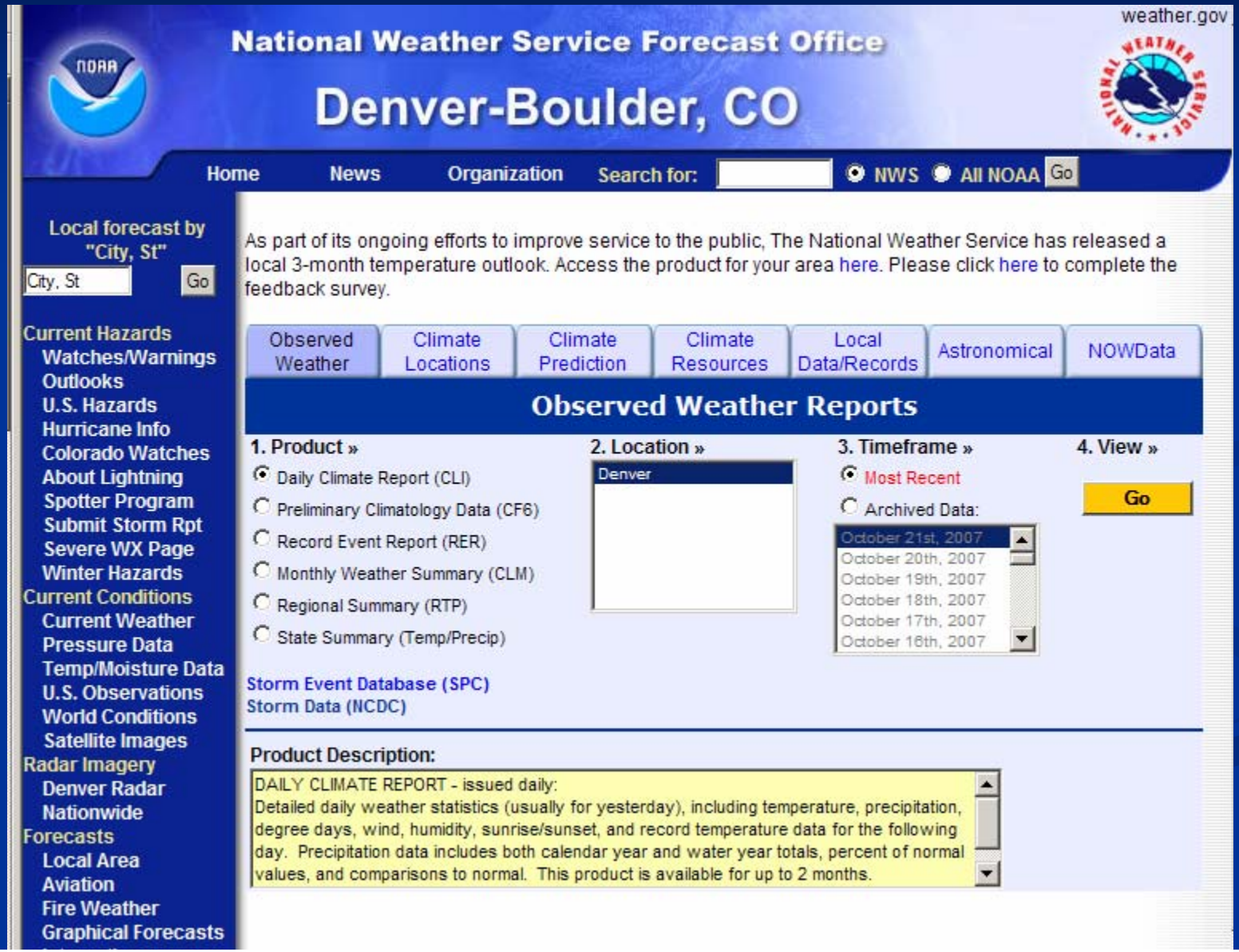
Collaboration and friendship

Layton Munson (Center), Sedgwick observer, receives Helmut Lundsberg 60-years Service Award

A commitment to quality and ongoing surface weather observations

Photo provided by NWS-Den

Readily accessible data



Timely and accurate documentation (metadata)

Rev 2/200

COOPERATIVE STATION SERVICE ACCOUNTABILITY
STATION REPORT (B-44 Long)

Station Info

Station Name: **CENTER 4 SSW** *Station Number:* **05-1458** *Climate Division:* **05** *Rendition:* **14**

STATION LOCATION *Station ID:* **CENC2**

Latitude	*Longitude*	*Horiz Ref Datum*	*Vert Ref Datum*
37.7067	-106.1444	NAD83	NAVD88

Lat/Lon Source: GPS - GARMIN MODEL III PLUS
CPA Region: CR

County	*State*	*Elevation (ft)*
RIO GRANDE	CO	7673

STATION DETAIL

Zero Datum (River Sites):
Time Zone: MOUNTAIN
Station Type: 92-COOPERATIVE OBSERVER STN
COOP Network: COOPAB-COOP STATION CLIMATE - HYDRO (AB)

STATION MGMT

Cpa	*Cwa*	*Hsa*
PUB	PUB	PUB

Et	*Rfc*
PUB	FWR(WGRFC

STATION ADMIN

Auth Doc	*Auth Date*	*Stn Begin Date*	*Primary Signature*	*Secondary Signature*
NETWORK	06-24-1941	07-01-1941	RICHARD GRIGGS, DAPM/PUB	

Reason for Report (see Remarks)		*Effective Date*	*Nwsrep*
10	CHANGE	09-12-2002	PUB

Topography

LARGE OPEN TREELESS & LEVEL VALLEY SURROUNDED BY MOUNTAINS.

Driving Directions

FROM MONTE VISTA, GO NORTH 9 MILES ON CO #285, TO ROAD 9N. TURN EAST AND GO 0.2 MI TO THE RESEARCH CENTER ON THE NORTH SIDE OF THE ROAD. EQUIPMENT IS DIRECTLY BEHIND MAIN OFFICE ABOUT 0.2 MI.

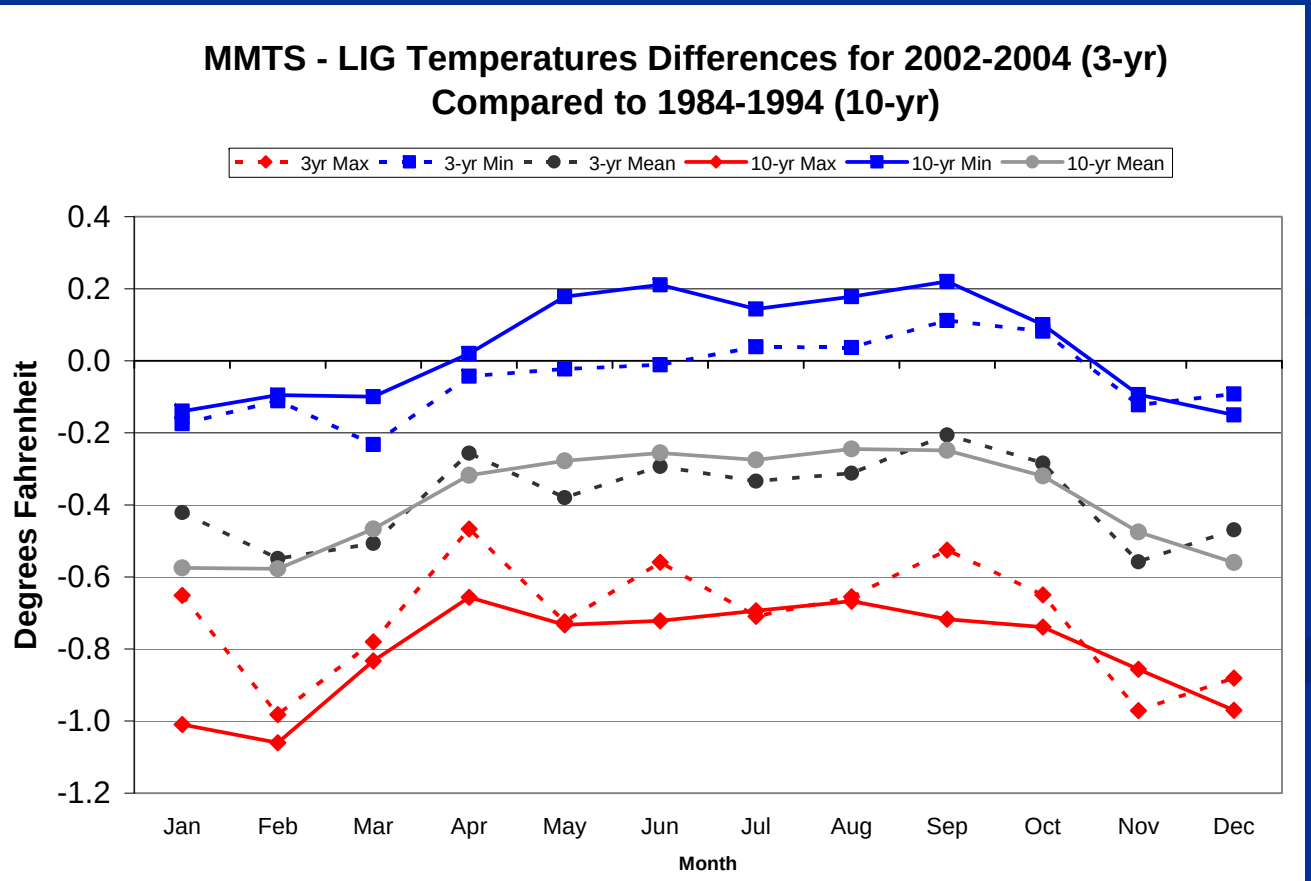
Remarks

UPDATE IDENTIFICATION, CONTACT OBSERVER IS SHARON YUST. UPDATE OB INFO TO DELETE HOURLY PRECIP.
UPDATE OTHER EQUIP TO DESCRIBE OBSERVER OWNED EQUIPMENT. STATION BEGIN DATE WAS CORRECTED TO 07/01/1941. EARLY STATION RECORDS INDICATE THIS AS THE CORRECT DATE. IT WAS CHANGED FROM 08/01/1944. THE SBD HAS BEEN INCORRECT AT LEAST AS FAR BACK AS RENDITION #5 DATED 08/16/1988.

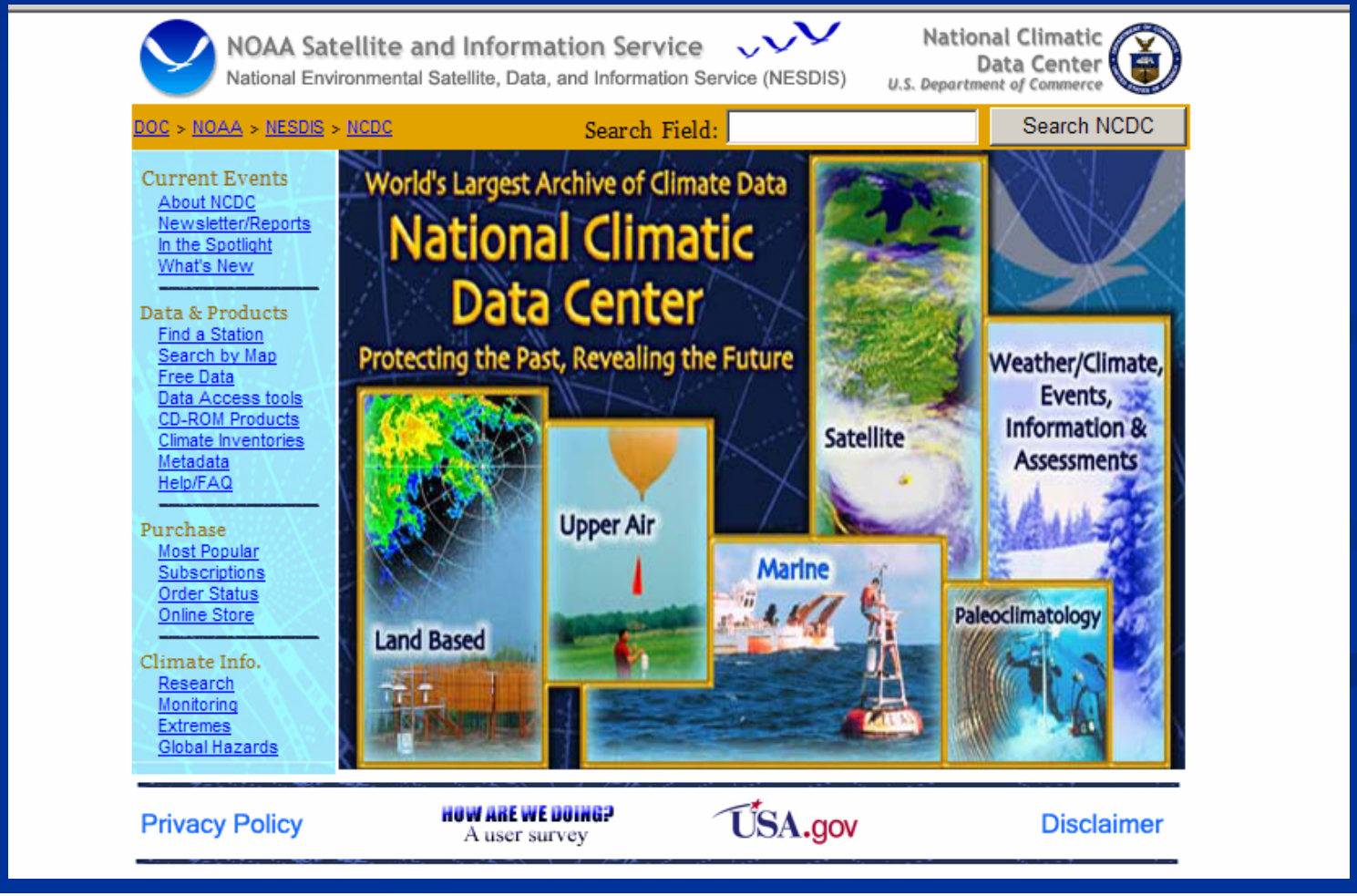
Data quality control

(if we want it in a hurry, we won't always get it right, but if we get it right eventually, we're happier!)

Notification when something is going to change (as far in advance as possible)



Close and functional NWS relationships with the National Climatic Data Center



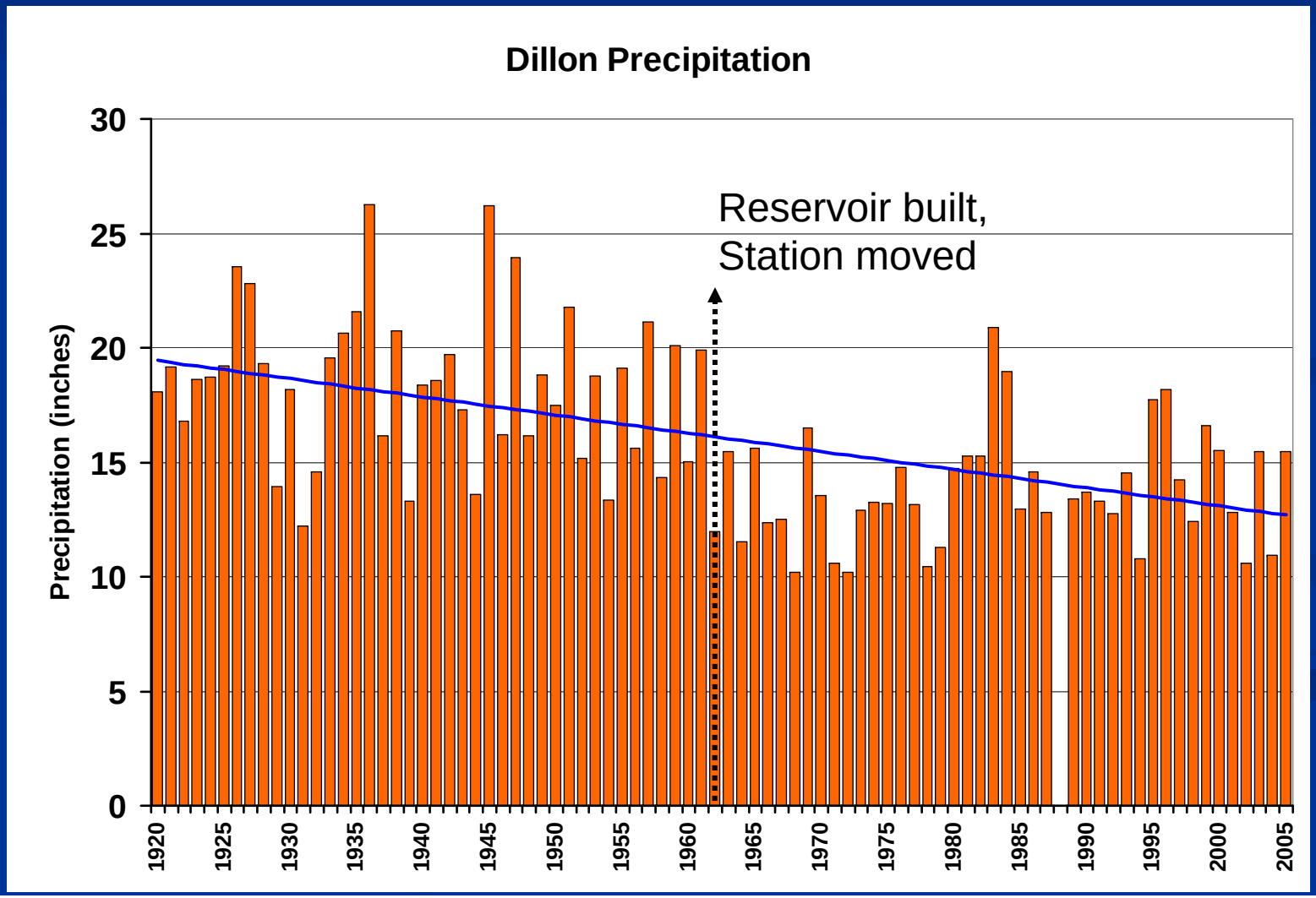

A strong Cooperative Network
Photo by Christopher Davey

A strong Cooperative Network

(YES!, I did mean to say this twice)

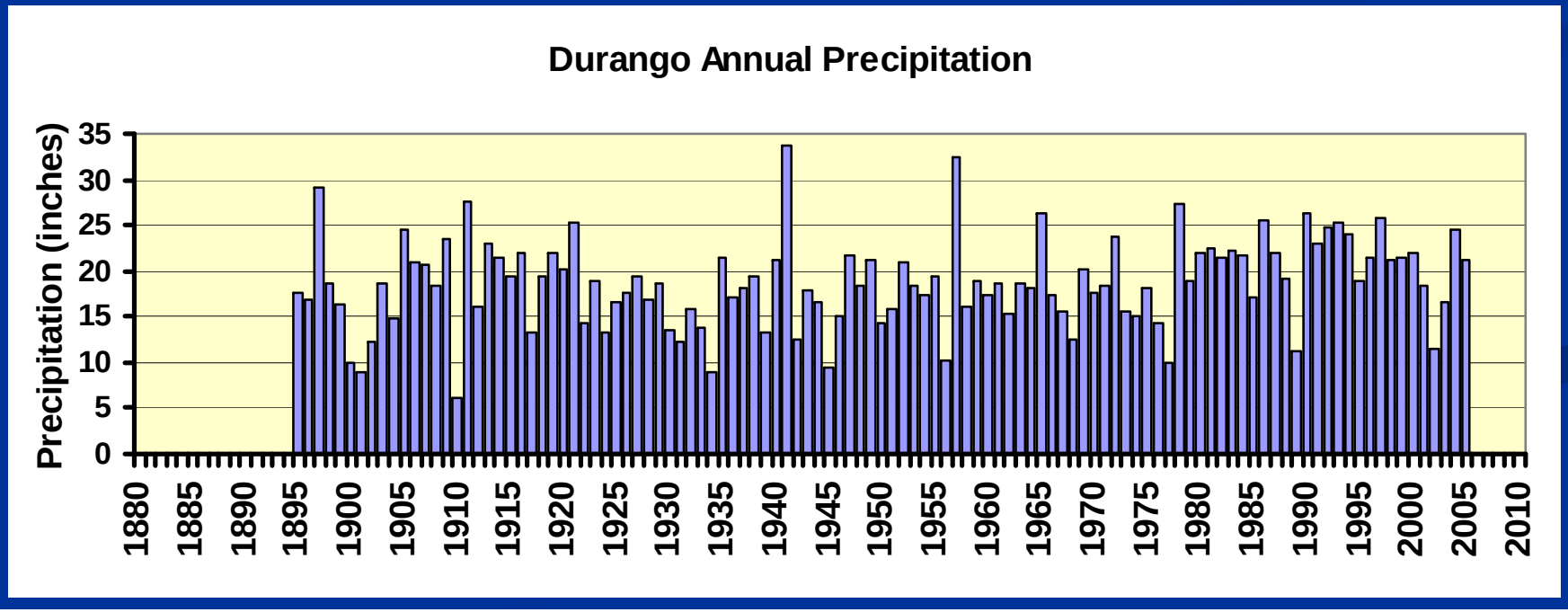
Holyoke, Colo, NWS Cooperative Site

When changes are planned for important long-term stations, we also would *GREATLY APPRECIATE* a 1-2 year overlap in data between the old and the new.

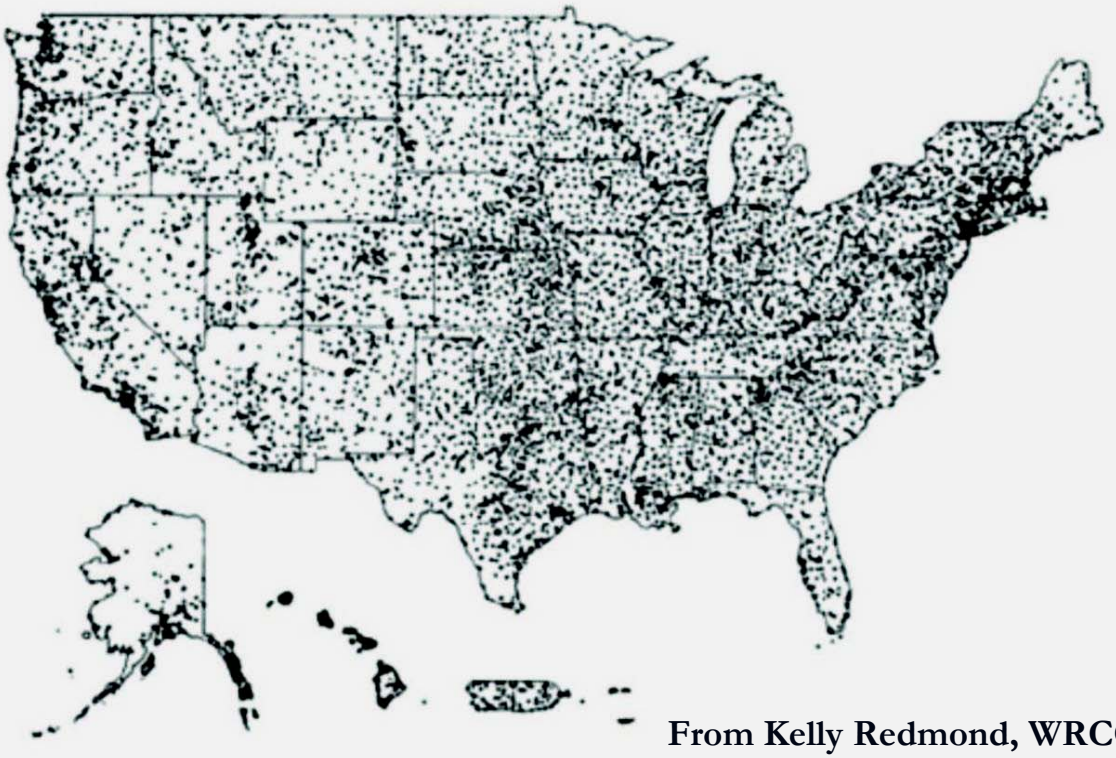


Why are Climatologists still enamored by the old-fashioned, low-tech Cooperative Network??

It may be imperfect, but the NWS Cooperative Network is still the BEST source of long-term data for tracking variations and changes in temperature and precipitation



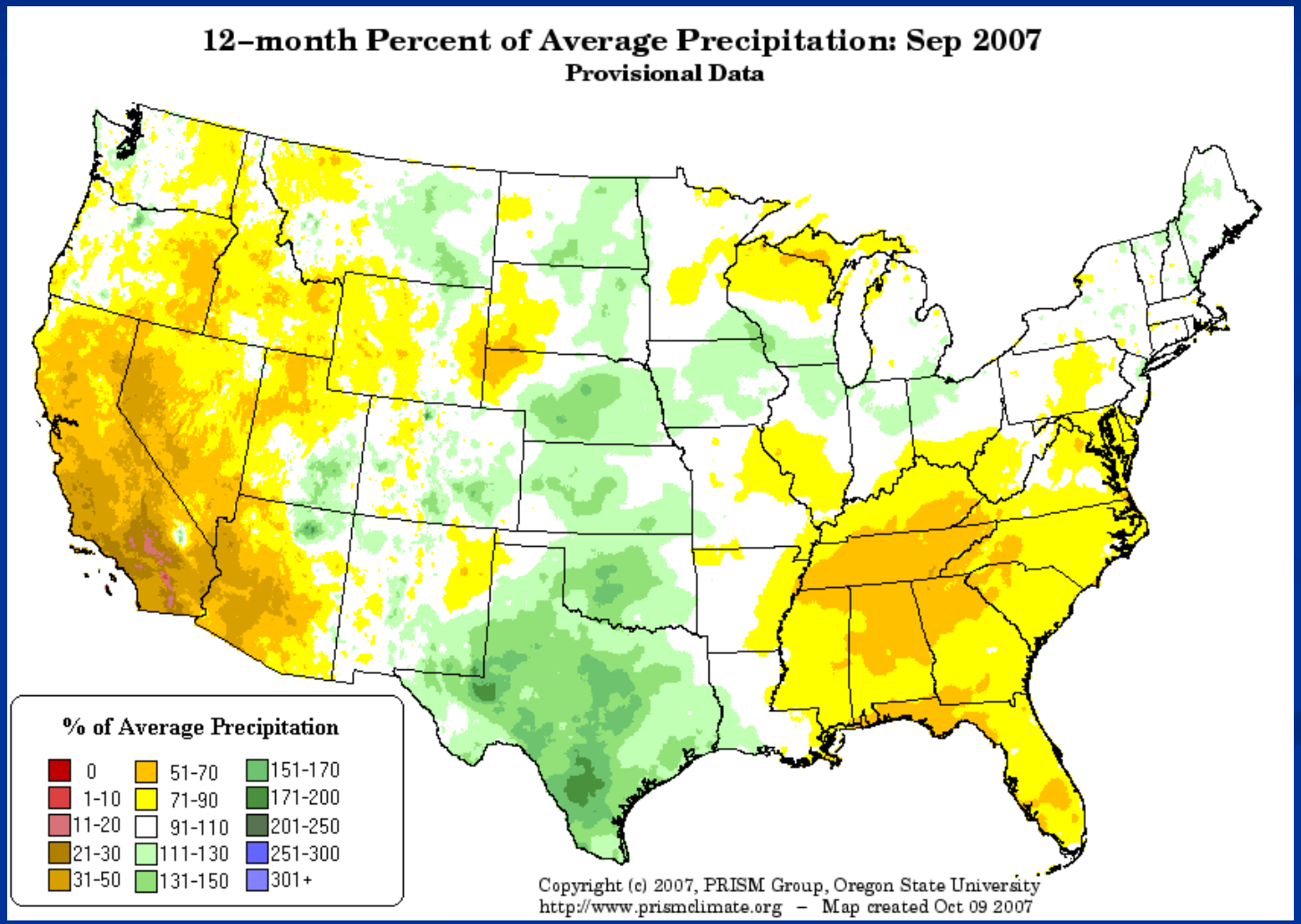
The NWS Cooperative Network is the only consistent nationwide source of basic climate information on a county level



From Kelly Redmond, WRCC

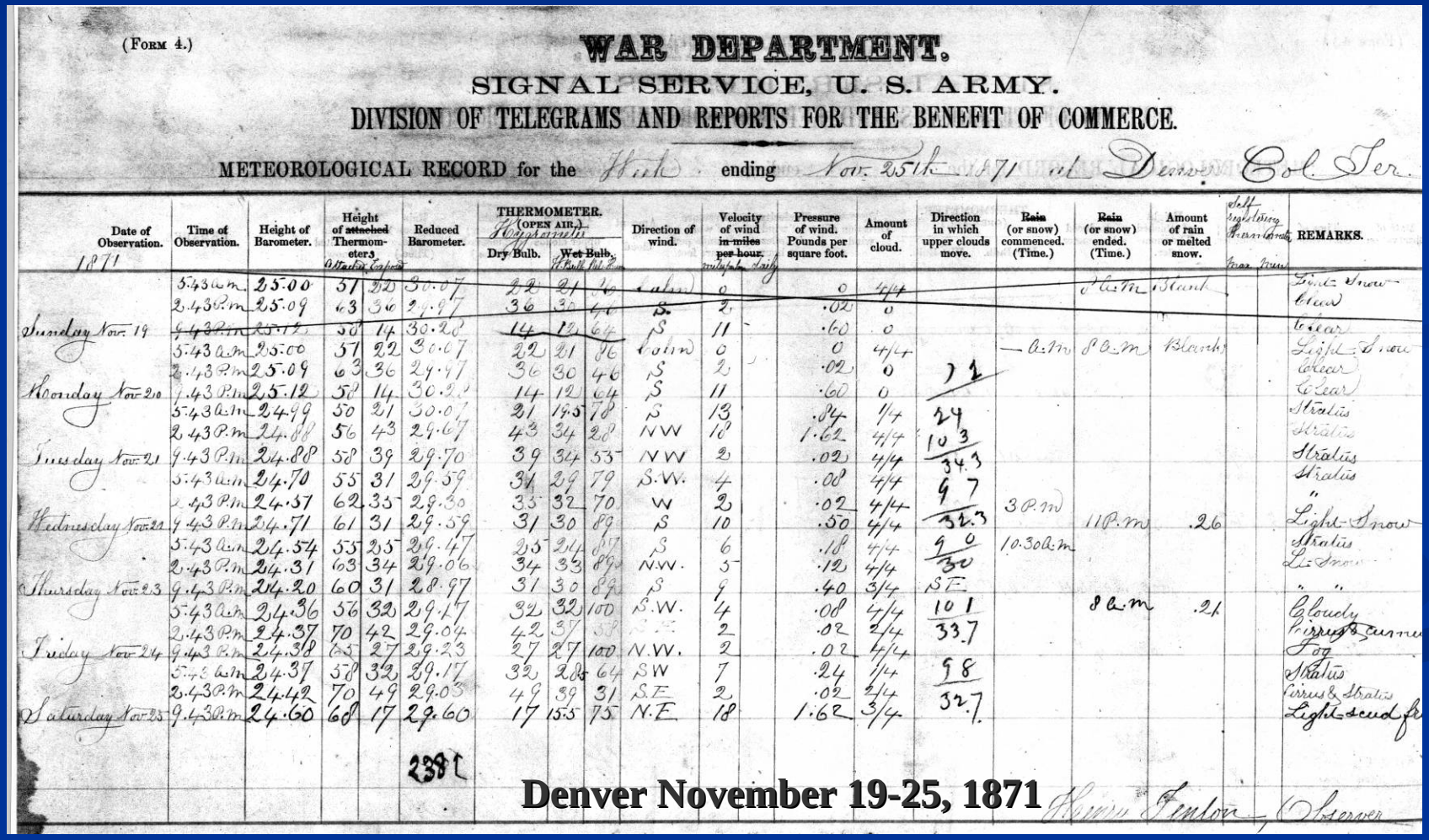
Approximately 5000 daily max/min temperature stations, 8000 daily precipitation stations, 3000 automated hourly precipitation stations.

The NWS Cooperative Network is the only source of climate-quality precipitation data for computing and mapping monthly, seasonal and annual totals



The NWS Cooperative Network is the only reliable nationwide source for snowfall and snow depth

The NWS Cooperative Network is valuable because station changes and instrumentation changes have been documented through history



(Form 4.)

WAR DEPARTMENT.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

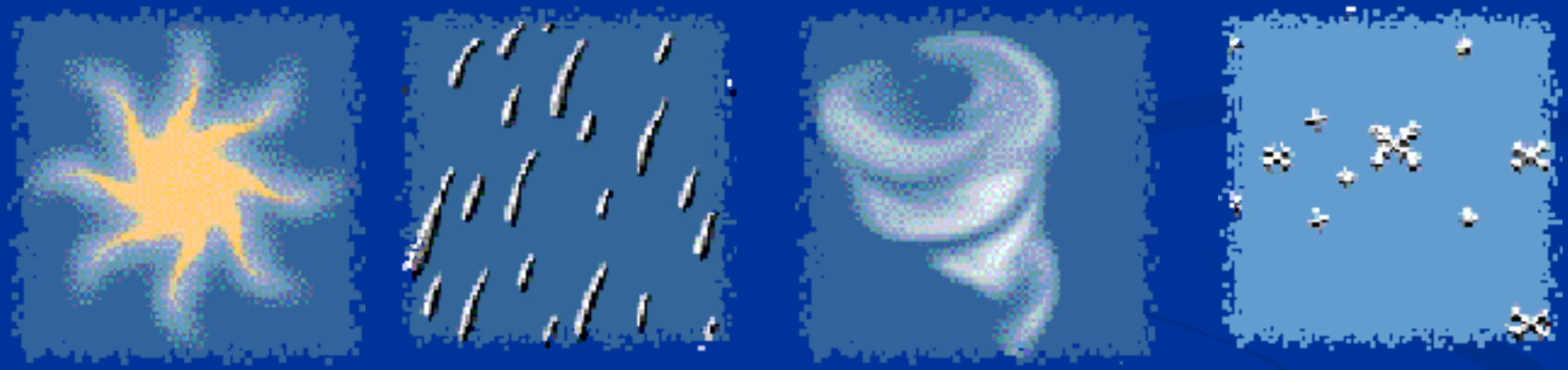
METEOROLOGICAL RECORD for the Week ending Nov. 25th 1871 at Denver Col. Ter.

Date of Observation. 1871	Time of Observation.	Height of Barometer.	Height of ~~attached~~ Thermometers Attached Cistern	Reduced Barometer.	THERMOMETER. (OPEN AIR.) Hygrometric Dry Bulb.	Wet Bulb.	Dew Point	Direction of wind.	Velocity of wind ~~in miles per hour.~~ miles p. hr. daily	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	30.07	22	21	96	Calm	0	0	4/4			8 a.m.	Blank		Light Snow
	2.43 P.m.	25.09	63	24.97	36	30	46	S.	2	.02	0						Clear
Sunday Nov. 19	9.43 P.m.	25.12	58	30.28	14	12	64	S	11	.60	0						Clear
	5.43 a.m.	25.00	57	22	30.07	22	21	96	Calm	0	0	4/4		— a.m.	8 a.m.	Blank	Light Snow
	2.43 P.m.	25.09	63	36	24.97	36	30	46	S	2	.02	0	11				Clear
Monday Nov. 20	9.43 P.m.	25.12	58	14	30.28	14	12	64	S	11	.60	0					Clear
	5.43 a.m.	24.99	50	21	30.07	21	19.5	78	S	13	.94	1/4	24				Stratus
	2.43 P.m.	24.88	56	43	29.67	43	34	28	NW	10	1.62	4/4	103				Stratus
Tuesday Nov. 21	9.43 P.m.	24.88	58	39	29.70	39	34	53	NW	2	.02	4/4	34.3				Stratus
	5.43 a.m.	24.70	55	31	29.59	34	29	79	S.W.	4	.08	4/4	97				Stratus
	2.43 P.m.	24.37	62	35	29.30	33	32	70	W	2	.02	4/4		3 P.m	11 P.m	.26	"
Wednesday Nov. 22	9.43 P.m.	24.71	61	31	29.59	31	30	89	S	10	.50	4/4	32.3				Light Snow
	5.43 a.m.	24.54	55	25	29.47	25	24	87	S	6	.18	4/4	90	10.30 a.m.			Stratus
	2.43 P.m.	24.31	63	34	29.06	34	33	89	N.W.	5	.12	4/4	30				Light Snow
Thursday Nov. 23	9.43 P.m.	24.20	60	31	28.97	31	30	89	S	9	.40	3/4	SE				" "
	5.43 a.m.	24.36	56	32	29.17	32	32	100	S.W.	4	.08	4/4	101		8 a.m.	.21	Cloudy
	2.43 P.m.	24.37	70	42	29.04	42	37	58	[illegible]	2	.02	2/4	33.7				Drizzling Sunset
Friday Nov. 24	9.43 P.m.	24.38	65	27	29.23	27	27	100	N.W.	2	.02	4/4					Fog
	5.43 a.m.	24.37	58	32	29.17	32	28	64	SW	7	.24	1/4	98				Stratus
	2.43 P.m.	24.42	70	49	29.03	49	39	31	S.E.	2	.02	2/4	32.7				Cirrus & Stratus
Saturday Nov. 25	9.43 P.m.	24.60	68	17	29.60	17	15.5	75	N.E.	18	1.62	3/4					Light scud fr
					2381												

Denver November 19-25, 1871

Observer

The NWS Cooperative Network is elegant by way of it's simplicity!

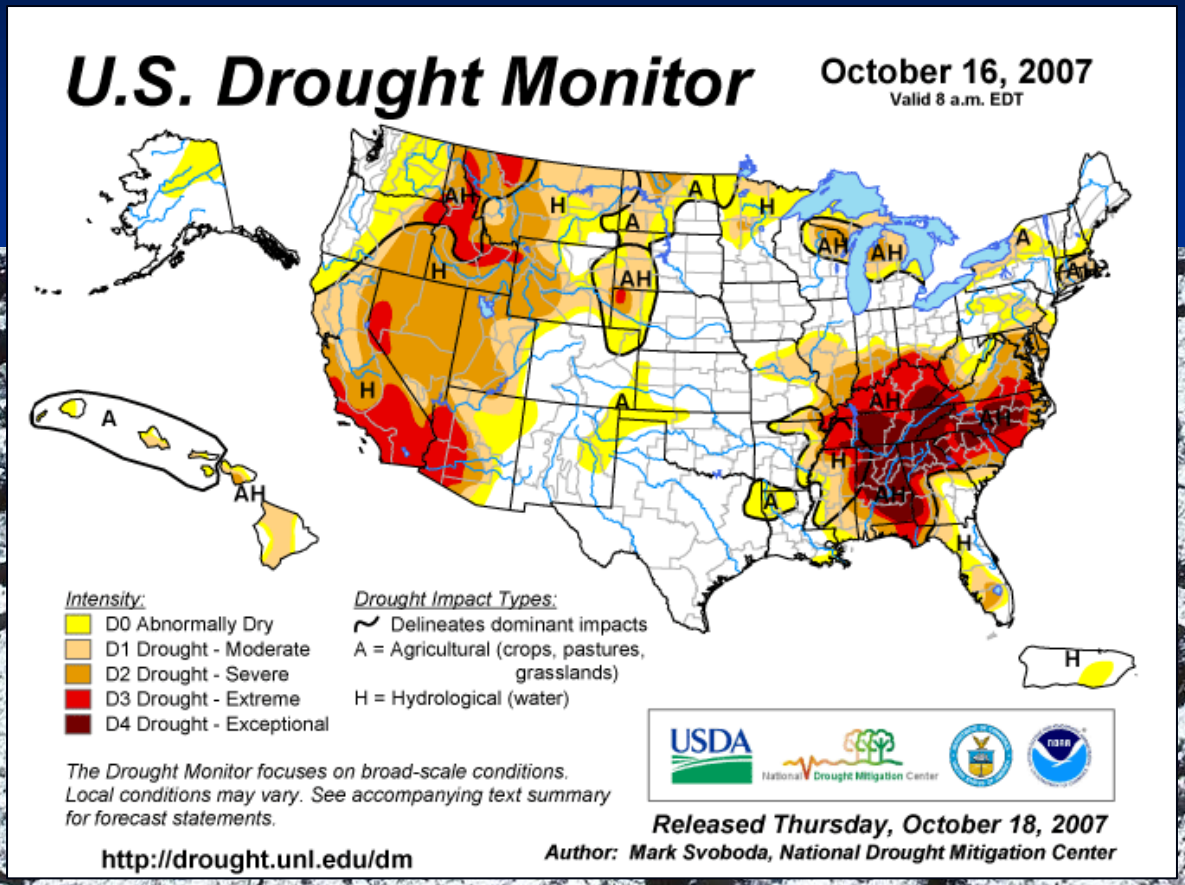


Why are climatologists so picky about data?

Because the data are used for very important applications!

Structural Engineering

Agricultural production and food supplies



Civil engineering

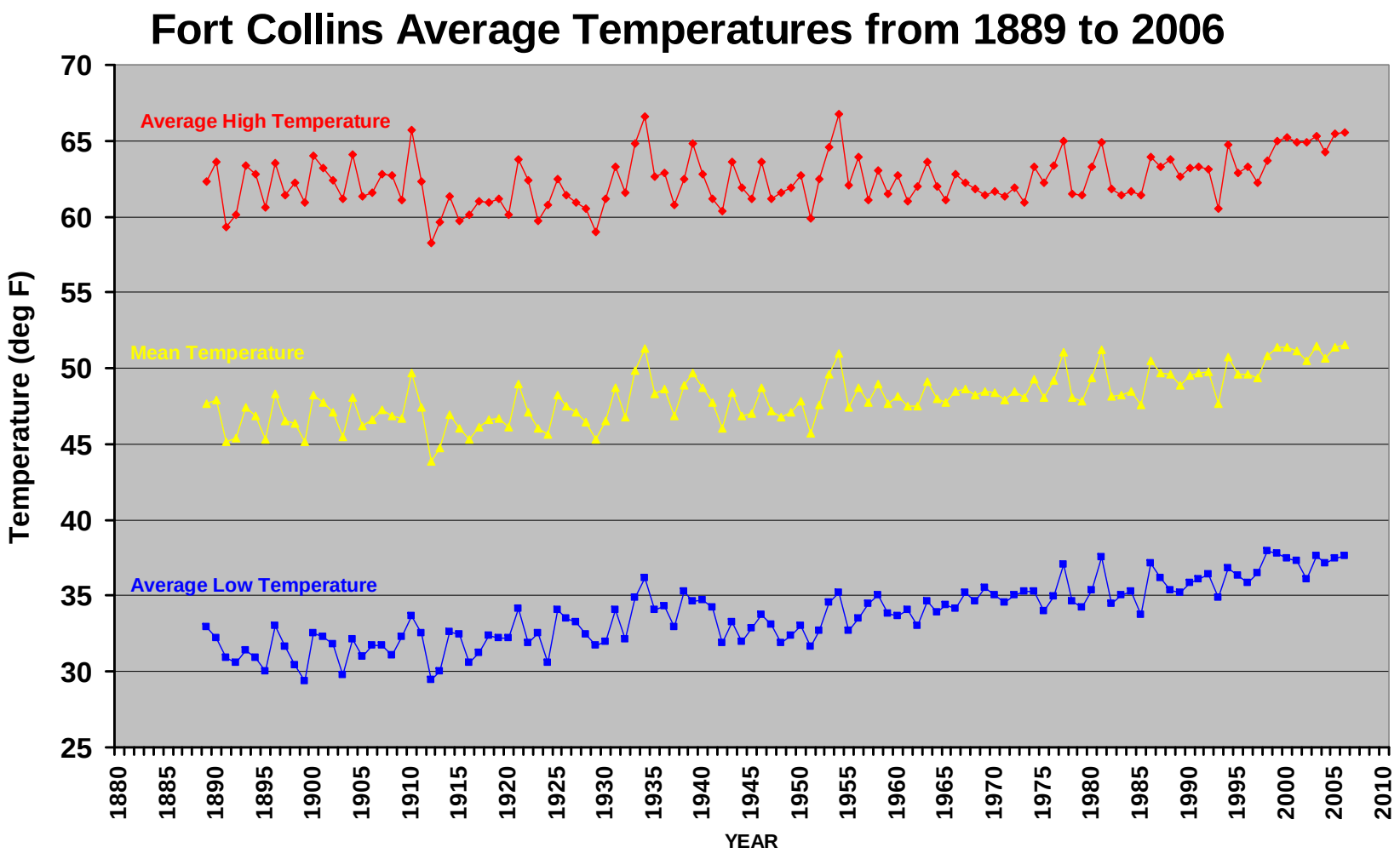
Water resources planning and management

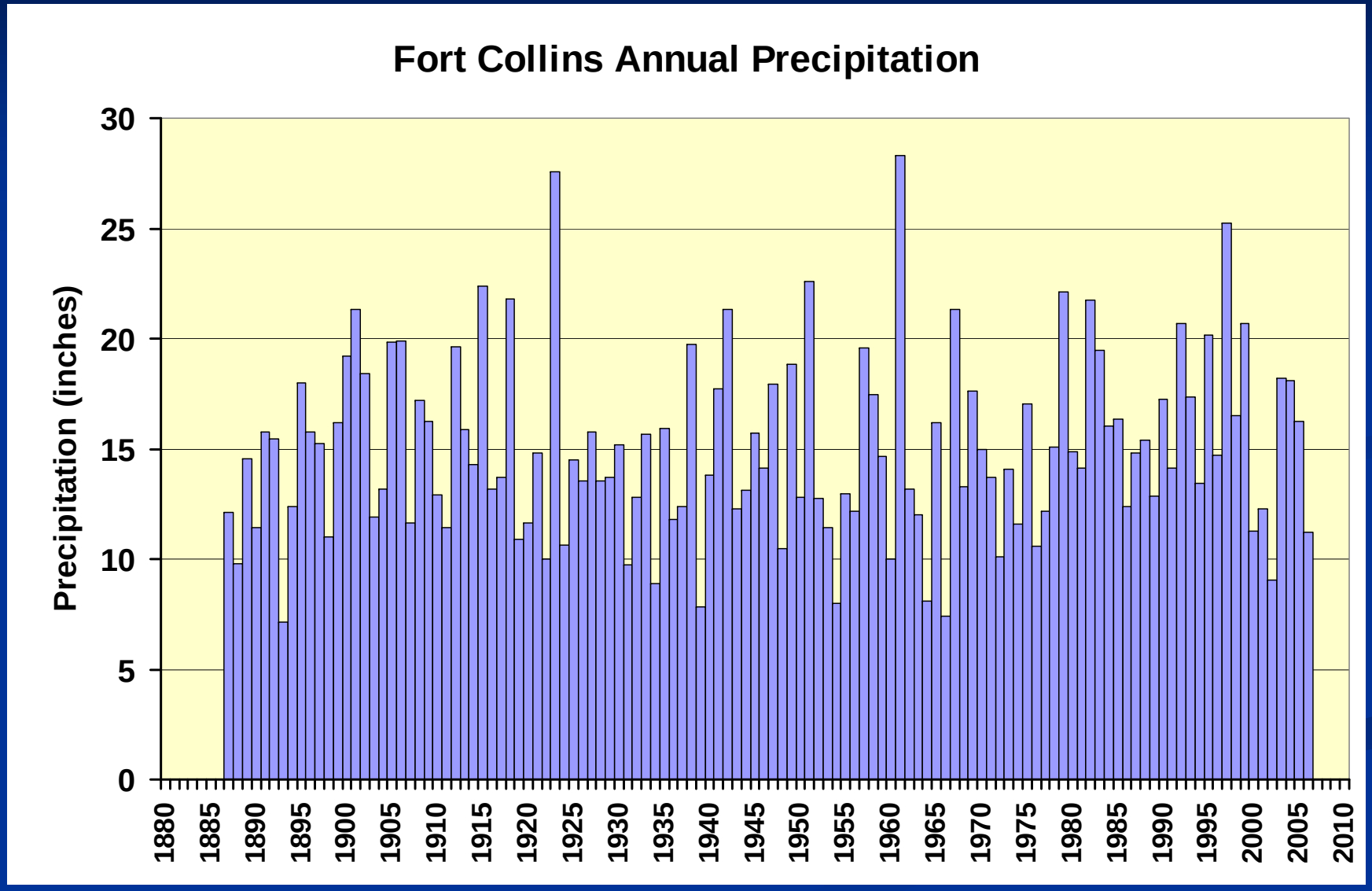
Energy

Power distribution

Health and wellness

Understanding and communicating about climate change



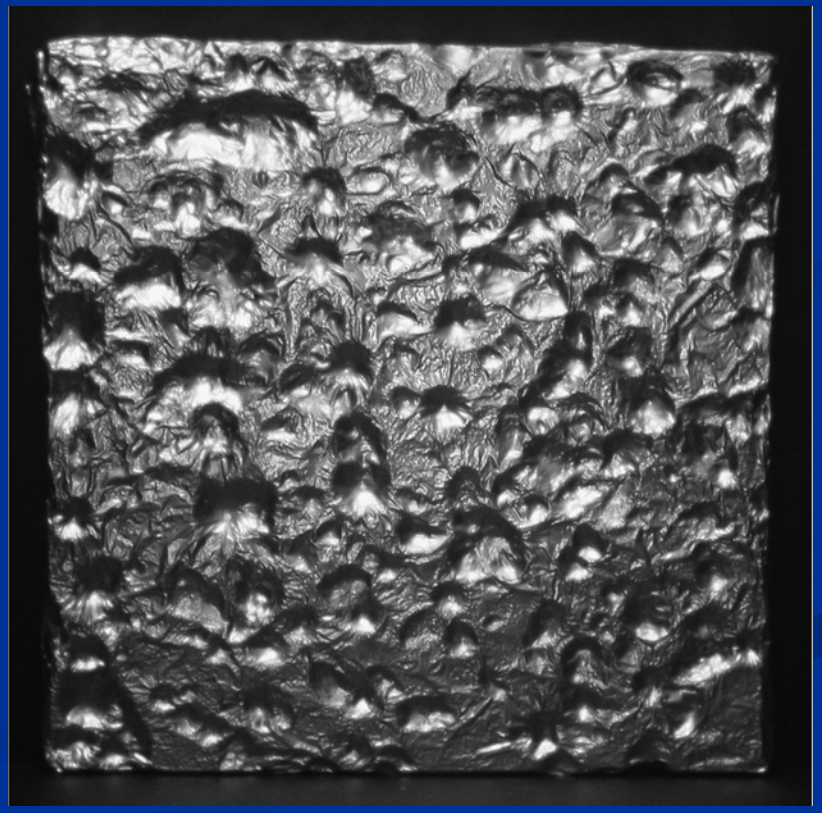

Fort Collins Annual Precipitation
Precipitation (inches)
30
25
20
15
10
5
0
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

What is CoCoRaHS and Where does that fit?

http://www.cocorahs.org

CoCoRaHS
(Community Collaborative Rain, Hail and Snow network)

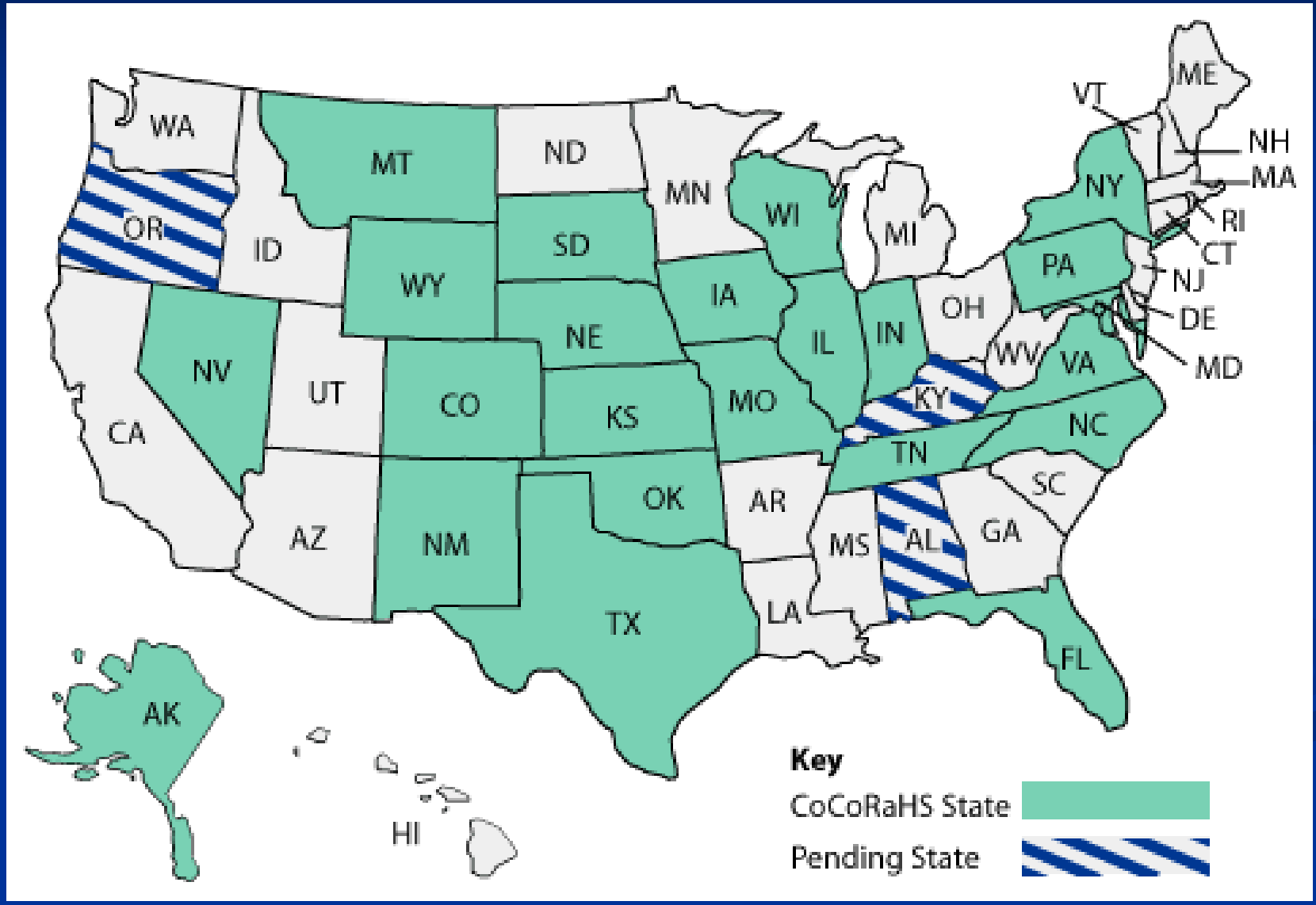
Photo by Henry Reges



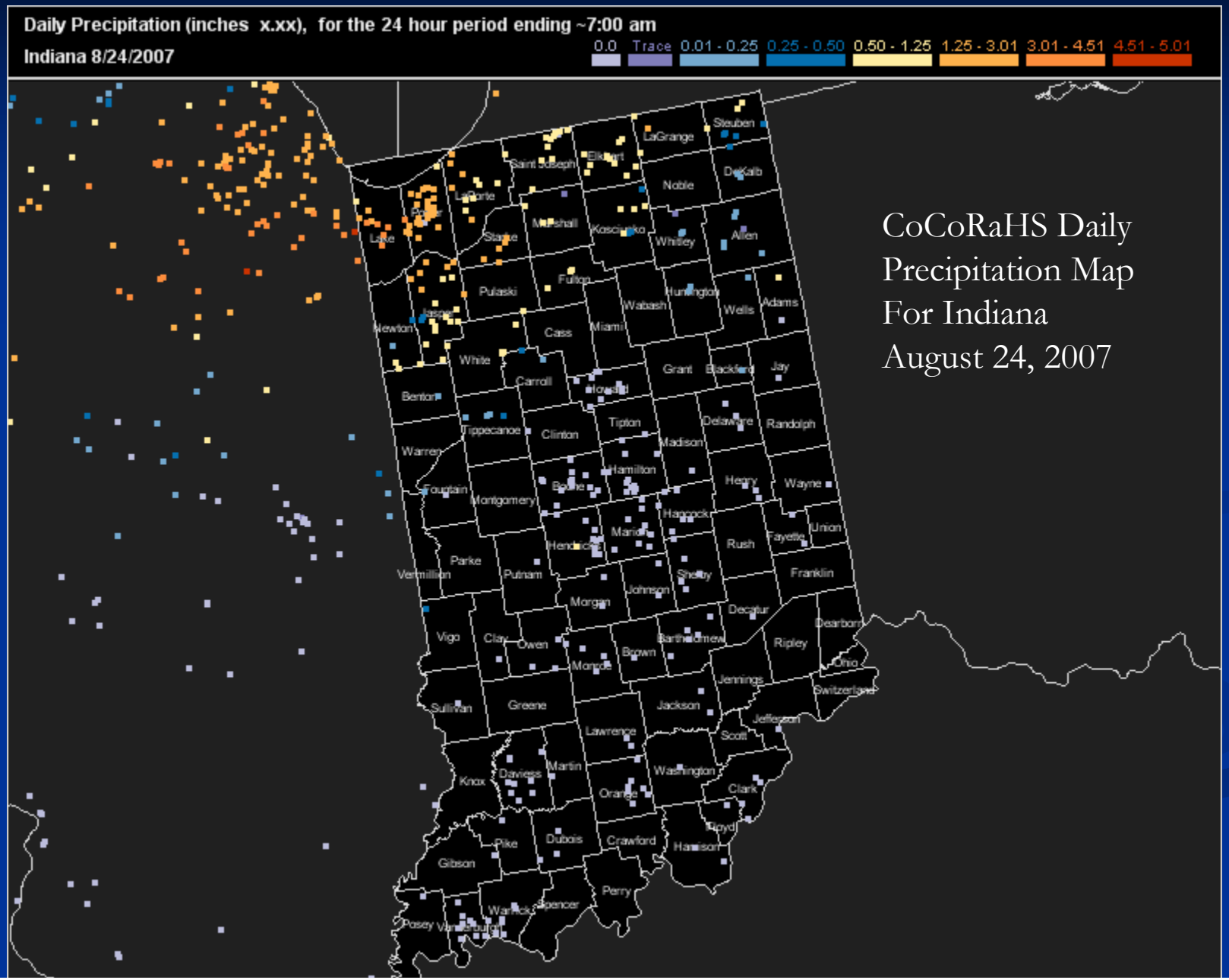
Main features of CoCoRaHS

- Local leadership, web-based, low cost, simple measurements, high participation, frequent and personal feedback
- Local precipitation monitoring is the lowest common denominator of earth science research and education

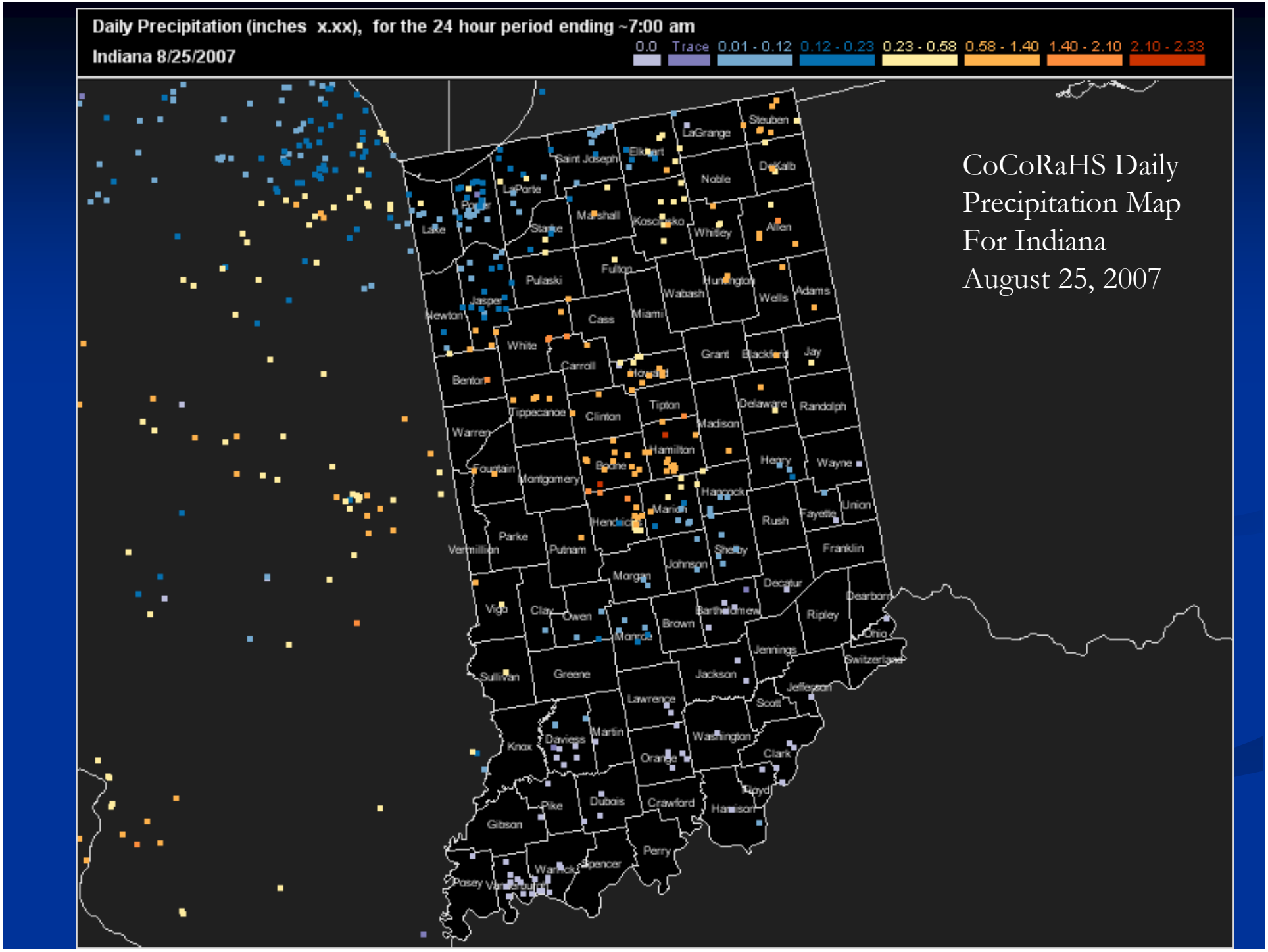
CoCoRaHS today



Should NWS participate?



CoCoRaHS Daily Precipitation Map For Indiana August 24, 2007


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Indiana 8/25/2007
0.0
Trace
0.01 - 0.12
0.12 - 0.23
0.23 - 0.58
0.58 - 1.40
1.40 - 2.10
2.10 - 2.33
CoCoRaHS Daily Precipitation Map For Indiana August 25, 2007

That is entirely up to you –

- CoCoRaHS should be voluntary, not mandatory but NWS participation really helps!
- CoCoRaHS must ***NOT*** compete with or undermine the Cooperative Network but rather enhance and support it

Suggestions!

- Get to know your State Climatologist
- Get out of your office and go visit
- Team up for at least one outreach effort each year
- Show your SC what new climate data and services your office is working on

Suggestions cont'd

- Find out what resources they have to offer
- Invite your SC to give a climate briefing to your office staff every few years
- Consider offering a combined weather and climate class for selected constituents. Become a climate services team
- Do CoCoRaHS together


The End!