The CoAgMet Network: Overview, History, How It Works, What it Shows

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Colorado State University

WERA 1022 Meeting
Septermber 3-4, 2015
Fort Collins, CO

With Assistance from Noah Newman

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:

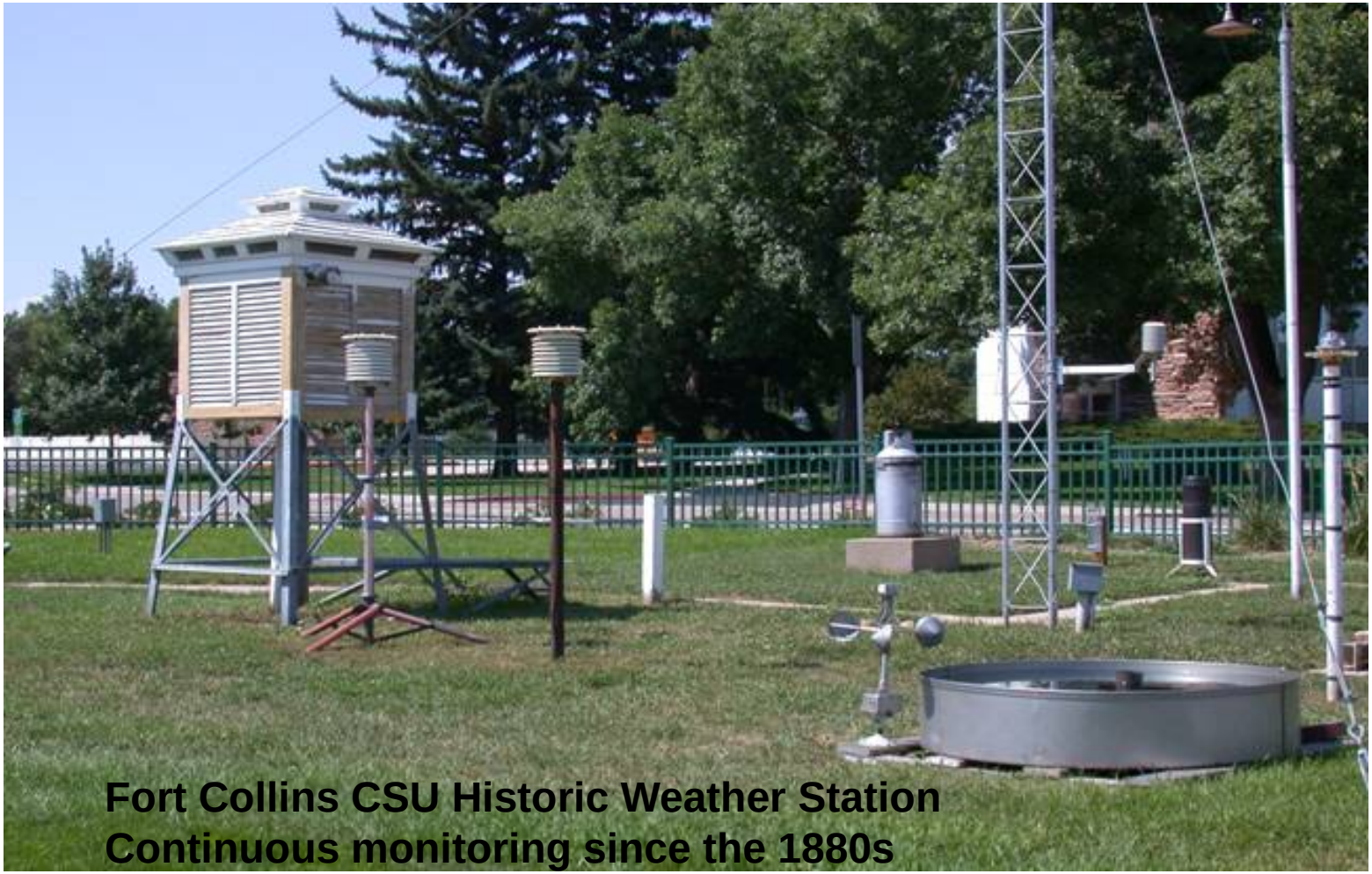
  1) ***Climate Monitoring*** (data acquisition, analysis, and archiving),

  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

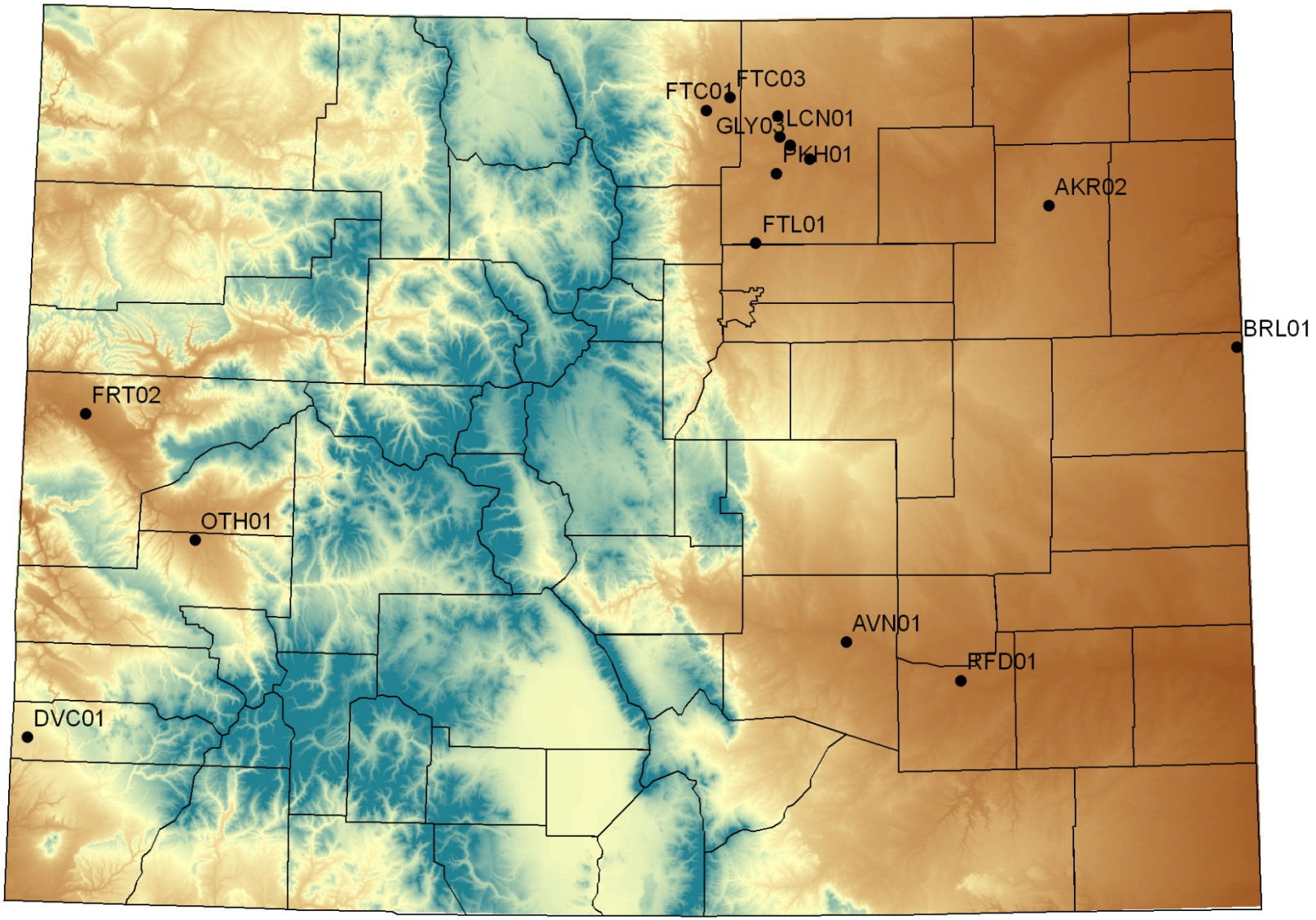
CoAgMet =

Colorado Agricultural Meteorological Network

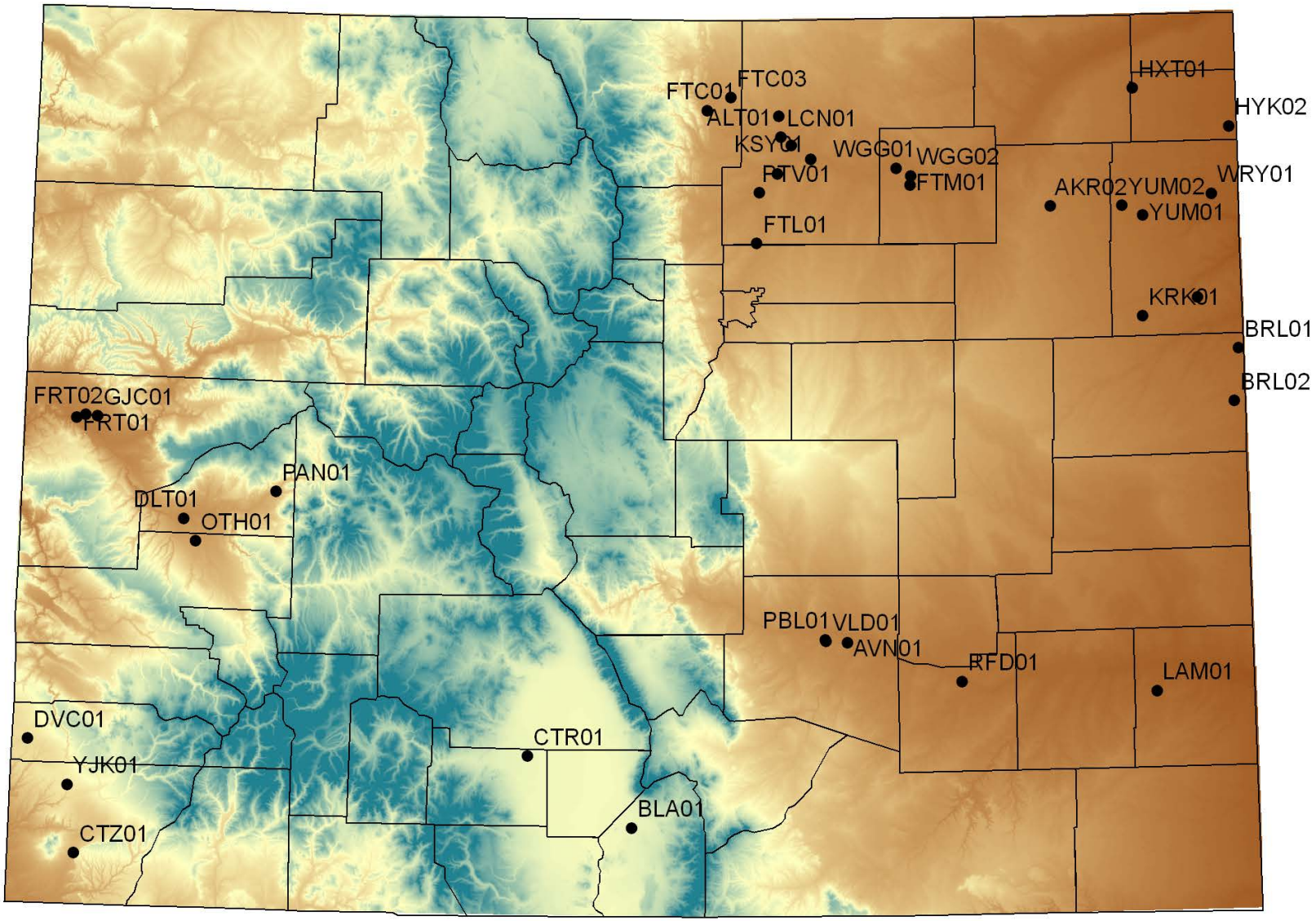
History of CoAgMet

- In the early 1990's, CSU extension plant pathologists and USDA Ag. Research Service scientists pooled resources to start collect agricultural weather data – different but complimentary reasons
- Standard automated instruments and data collection platforms were selected and a small network of stations was deployed – mostly in irrigated ag areas.

CoAgMet 1992



CoAgMet 1997



Expansion

- More applications, more partners, more opportunities -- Extension, Research, NRCS, Commodities groups, Conservation Districts and gradually water professionals
- -- Northern Colorado Water Conservancy District --

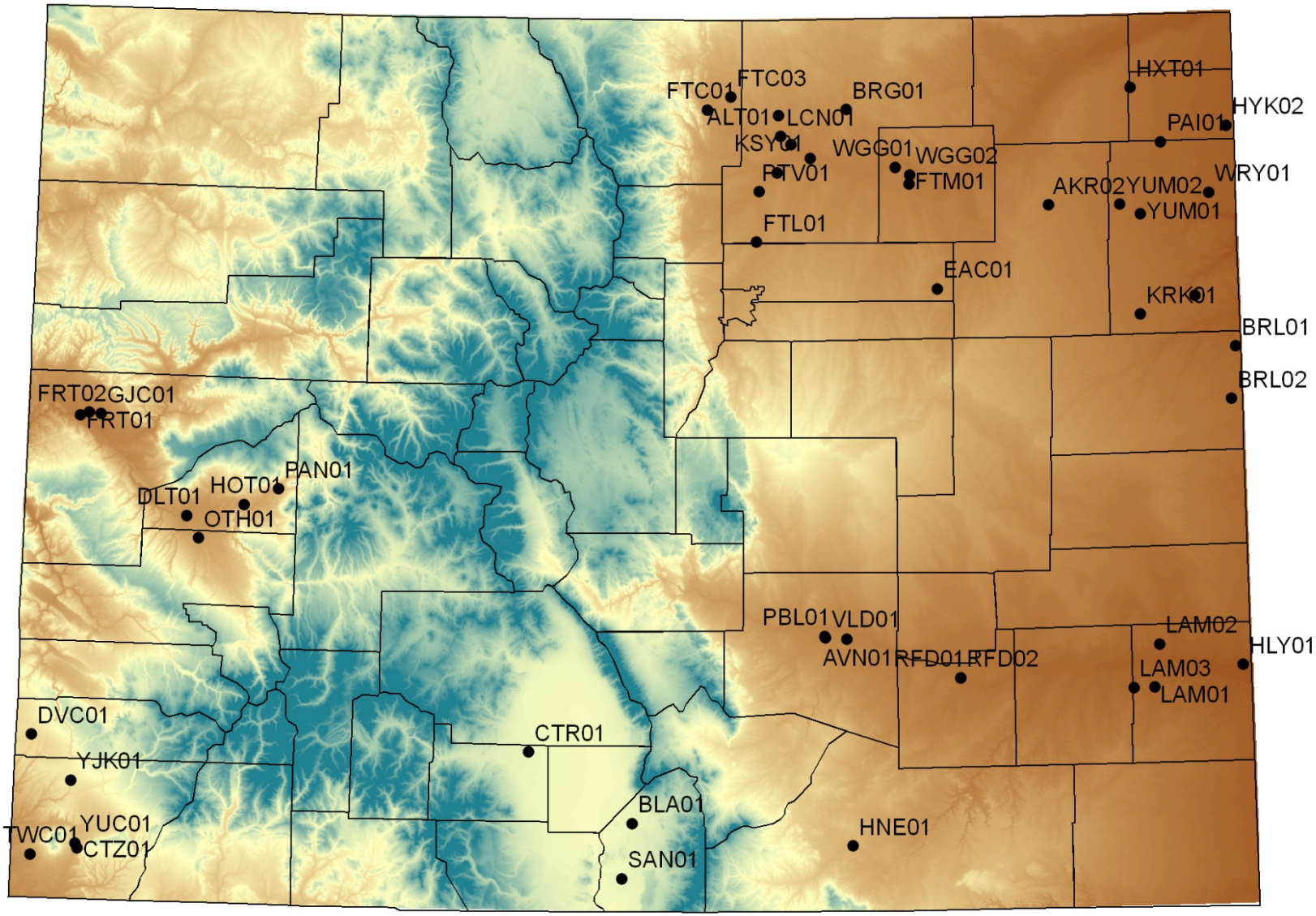
- For nearly 20 years we used a model of "shared benefits / shared responsibilities"

-- field techs, year-end funds, donations --

Colorado Climate Center's role

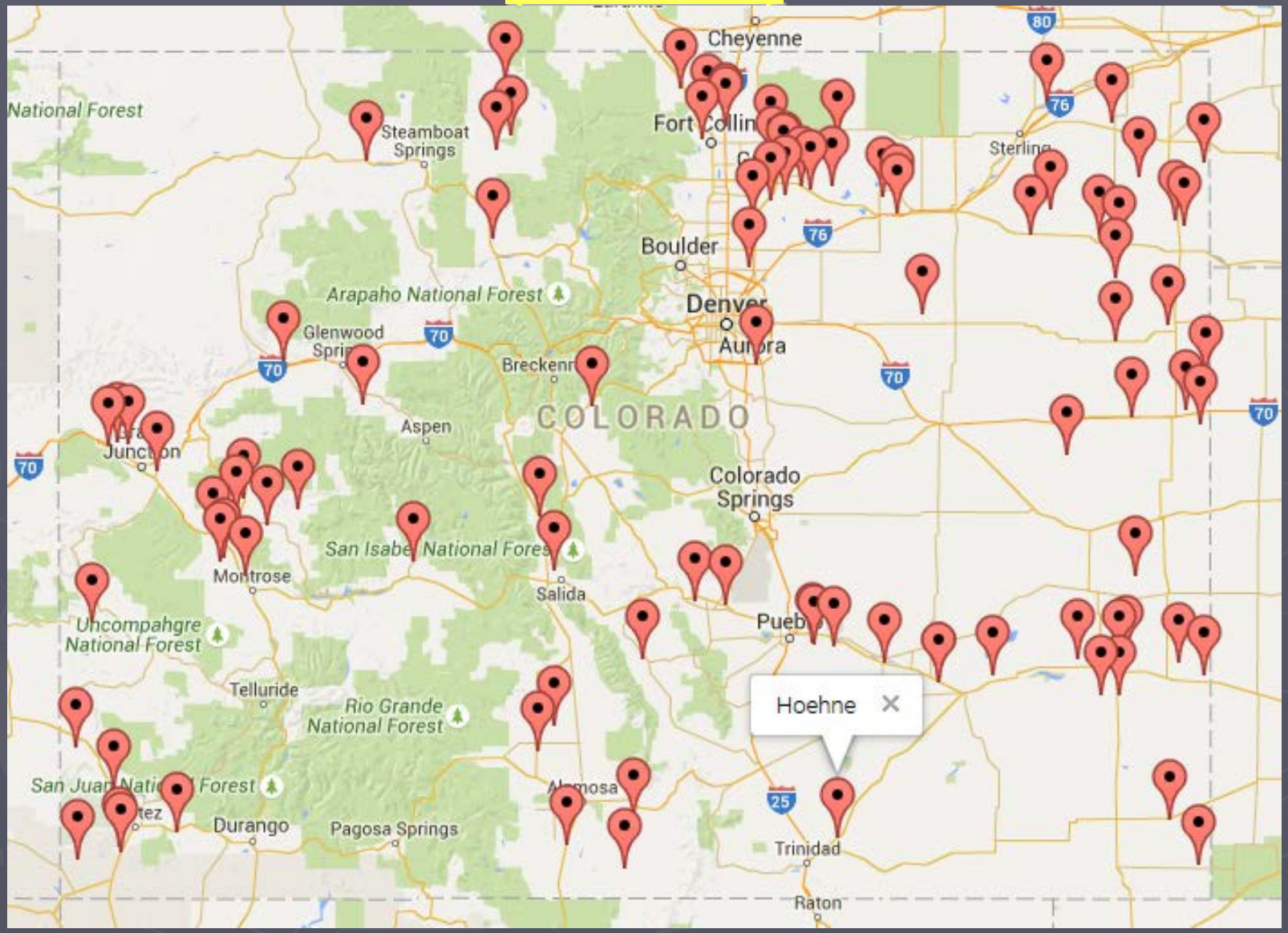
- Coodination, data management, web support
- We hosted annual meetings of key partners and data users – set priorities, secure commitments, prepare proposals (rarely funded but we persisted)
- Key people – Harold Duke, Mark Crookston, Tom Trout, John Kleist, Howard Schwartz, Mark McMillan, Troy Bauder, Lorenz Sutherland, Harold Larson, Wendy Ryan, and plenty others.

CoAgMet 2002



Current and Closed stations

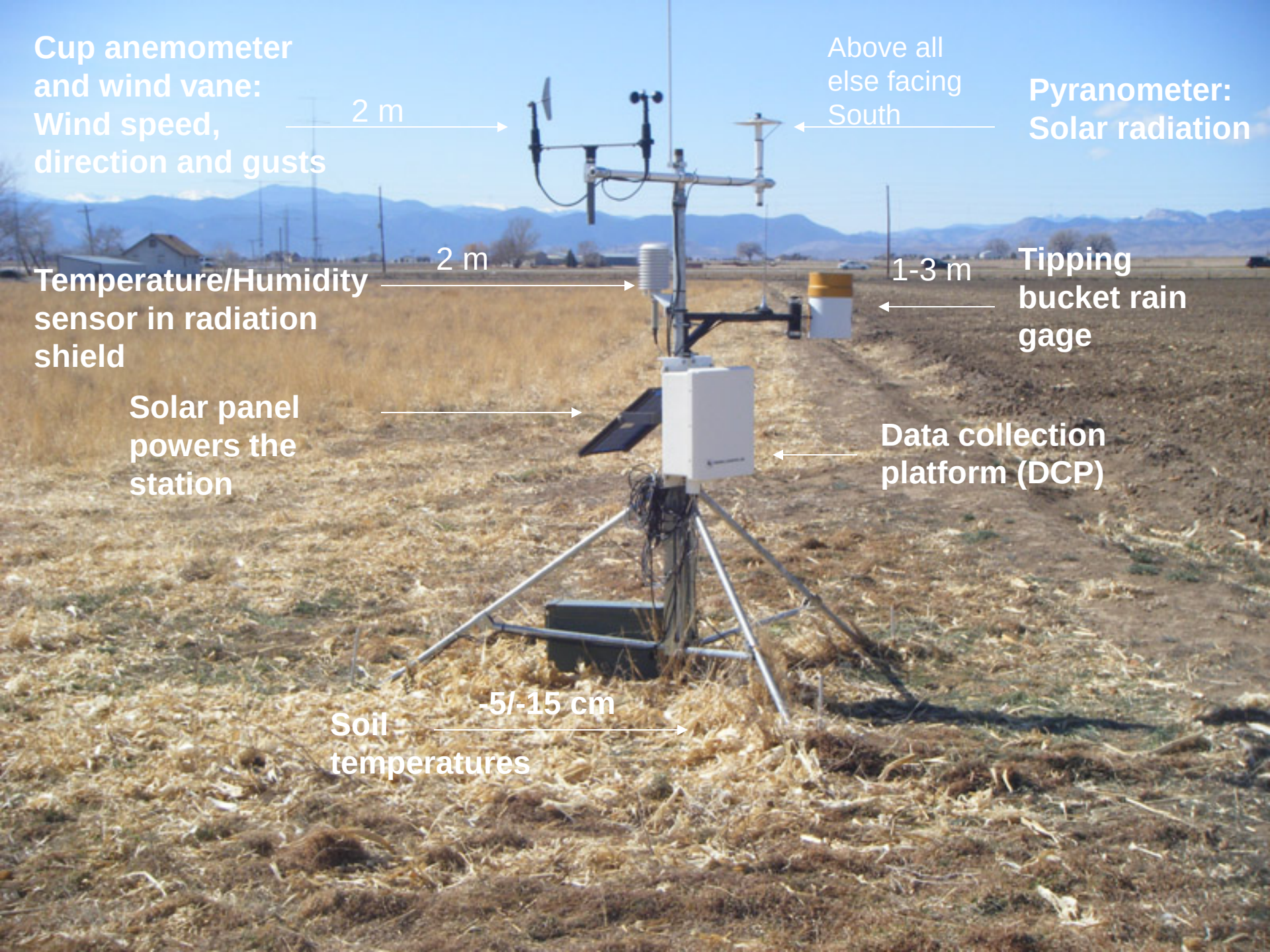
(as of 2015)



What next, Jama??

- Expect more stations soon, primarily in the Colorado River Basin (western Colorado) as a part of Upper Colorado River Compact Commission efforts to standardize upper basin states Consumptive Use estimates.

What do the stations measure?


Cup anemometer and wind vane: Wind speed, direction and gusts
2 m
Above all else facing South
Pyranometer: Solar radiation
2 m
Temperature/Humidity sensor in radiation shield
1-3 m
Tipping bucket rain gage
Solar panel powers the station
Data collection platform (DCP)
-5/-15 cm
Soil temperatures

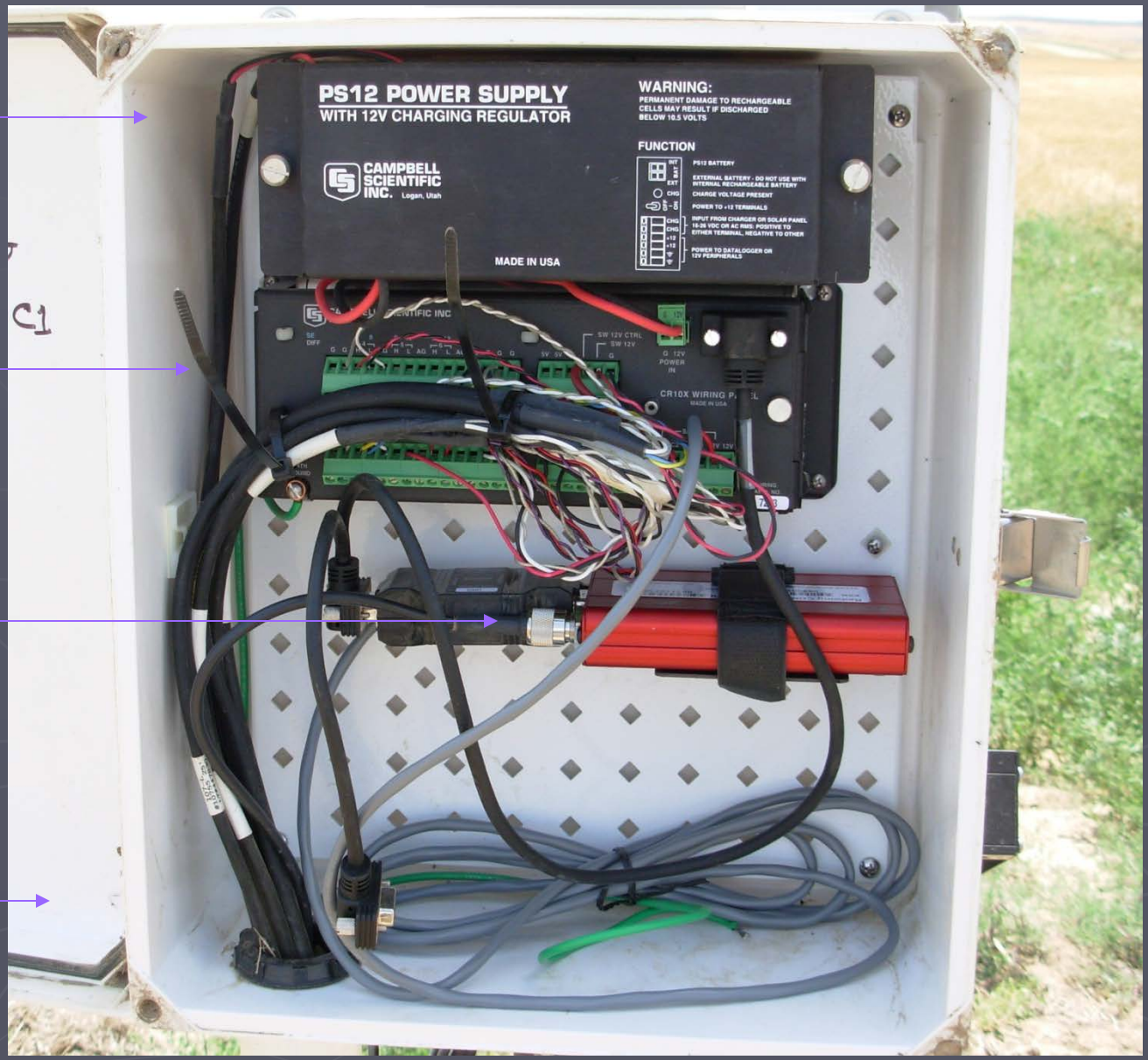
Data Collection Platform

Power supply

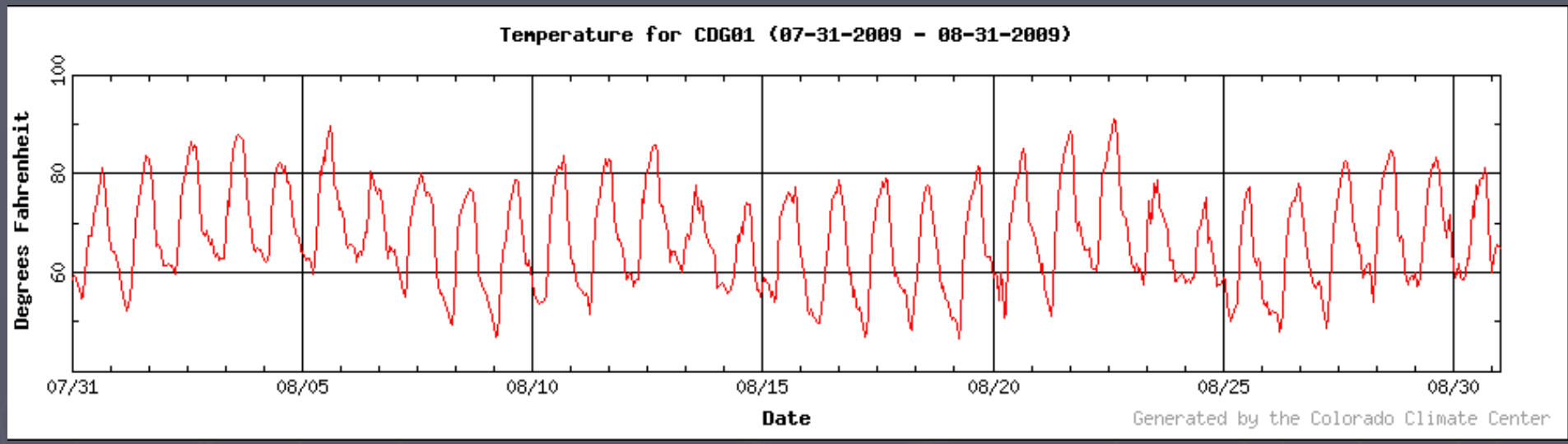
Datalogger

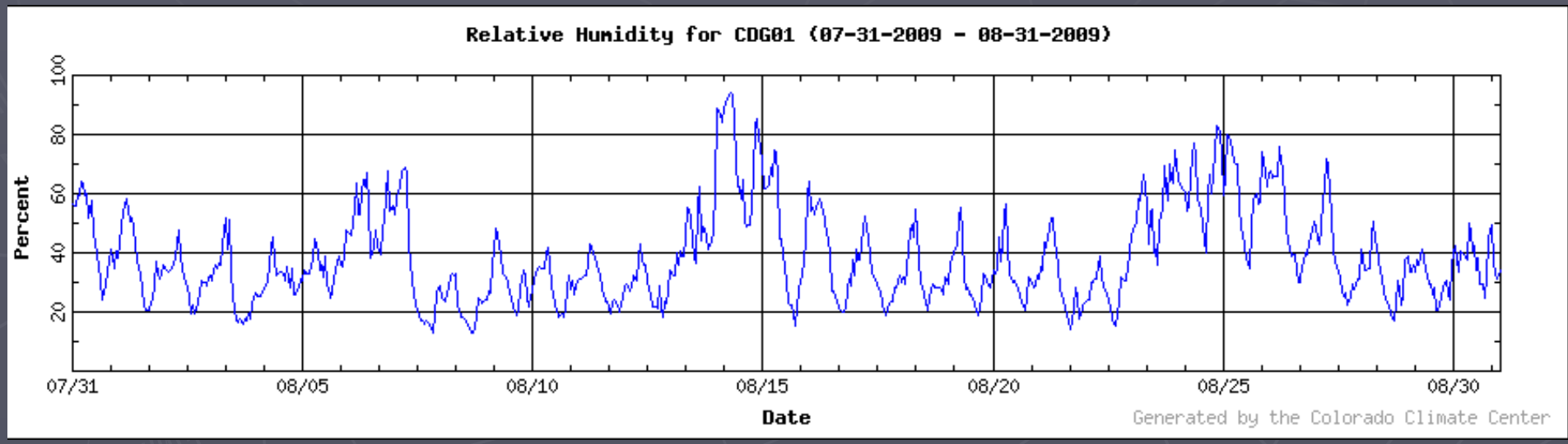
Communications device (cellular modem)

Incoming sensor cables

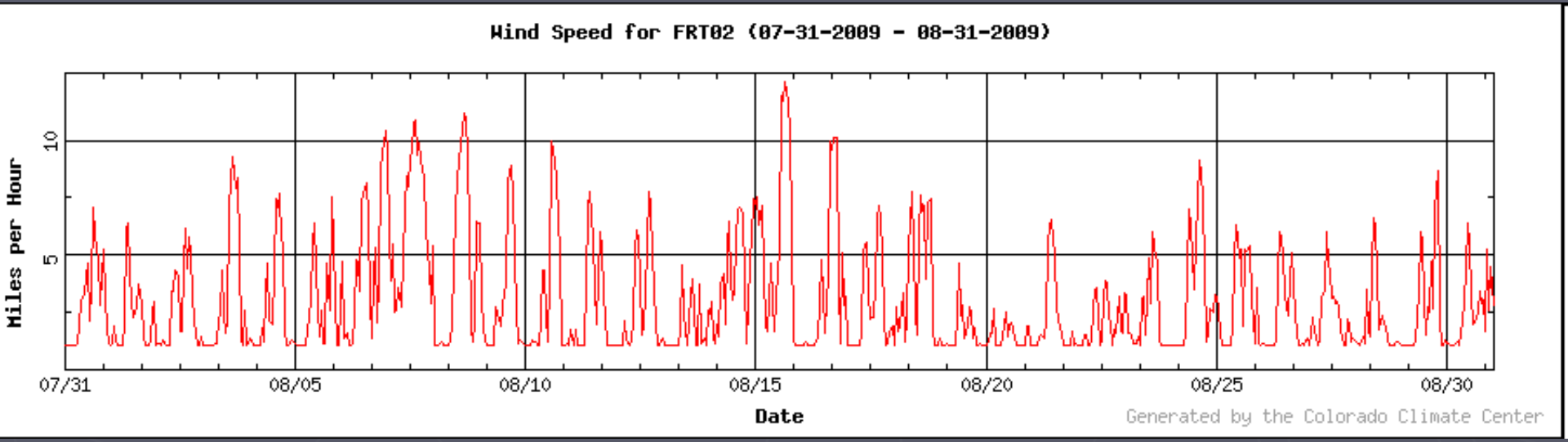


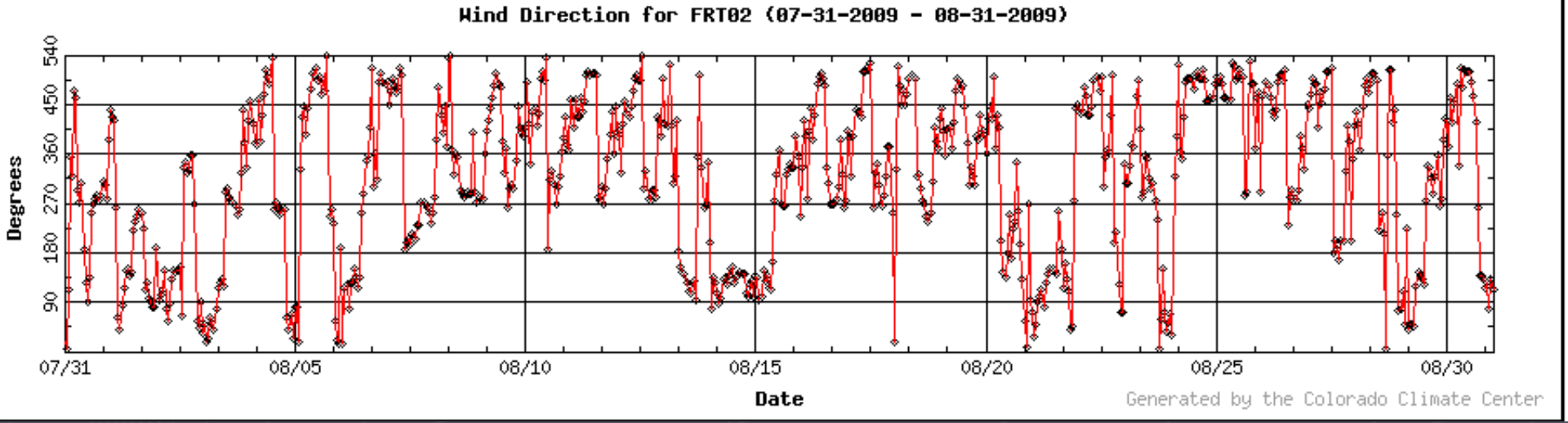
Temperature/Humidity


Temperature for CDG01 (07-31-2009 - 08-31-2009)
Degrees Fahrenheit
100
80
60
07/31
08/05
08/10
08/15
08/20
08/25
08/30
Date
Generated by the Colorado Climate Center

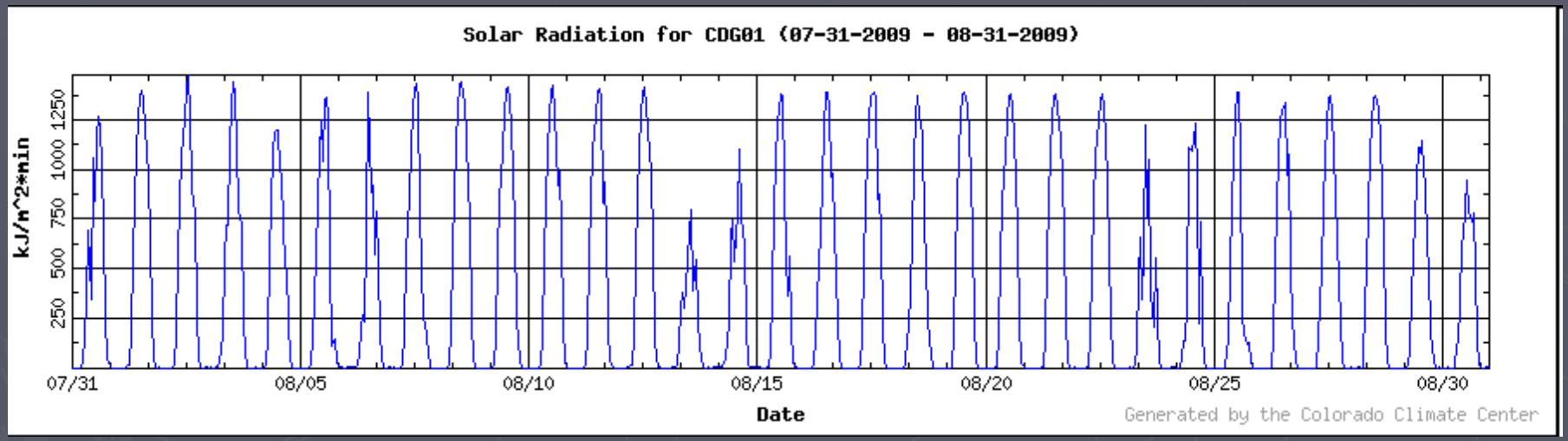

Relative Humidity for CDG01 (07-31-2009 - 08-31-2009)
Percent
100
80
60
40
20
07/31
08/05
08/10
08/15
08/20
08/25
08/30
Date
Generated by the Colorado Climate Center

Wind Movement


Wind Speed for FRT02 (07-31-2009 - 08-31-2009)
Miles per Hour
10
5
07/31
08/05
08/10
08/15
08/20
08/25
08/30
Date
Generated by the Colorado Climate Center

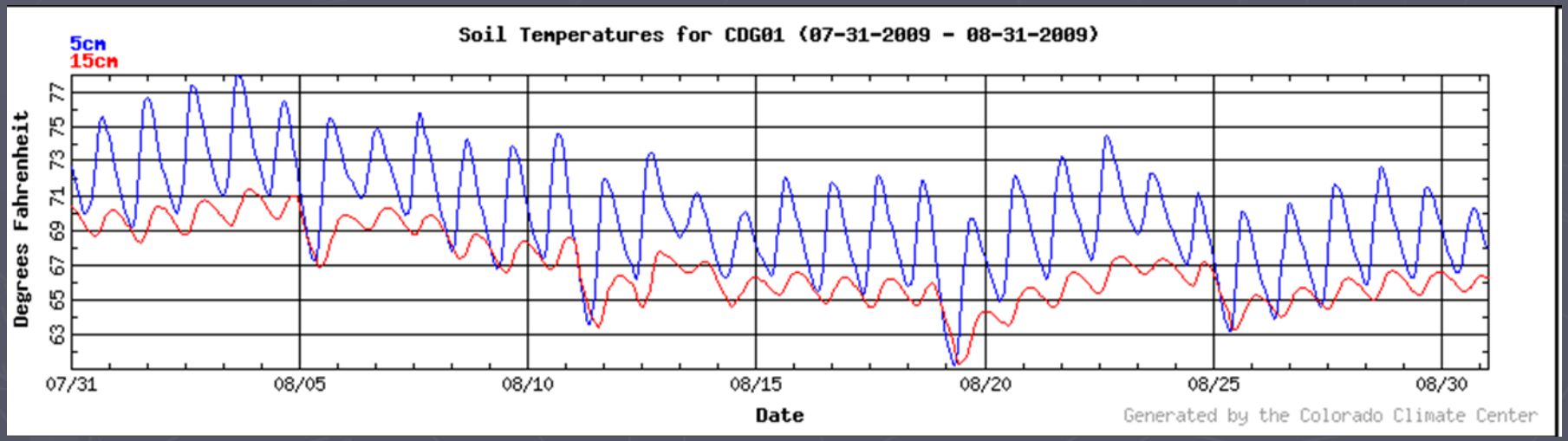

Wind Direction for FRT02 (07-31-2009 - 08-31-2009)
Degrees
540
450
360
270
180
90
07/31
08/05
08/10
08/15
08/20
08/25
08/30
Date
Generated by the Colorado Climate Center

Solar Radiation


Solar Radiation for CDG01 (07-31-2009 - 08-31-2009)
kJ/m^2*min
250
500
750
1000
1250
07/31
08/05
08/10
08/15
08/20
08/25
08/30
Date
Generated by the Colorado Climate Center

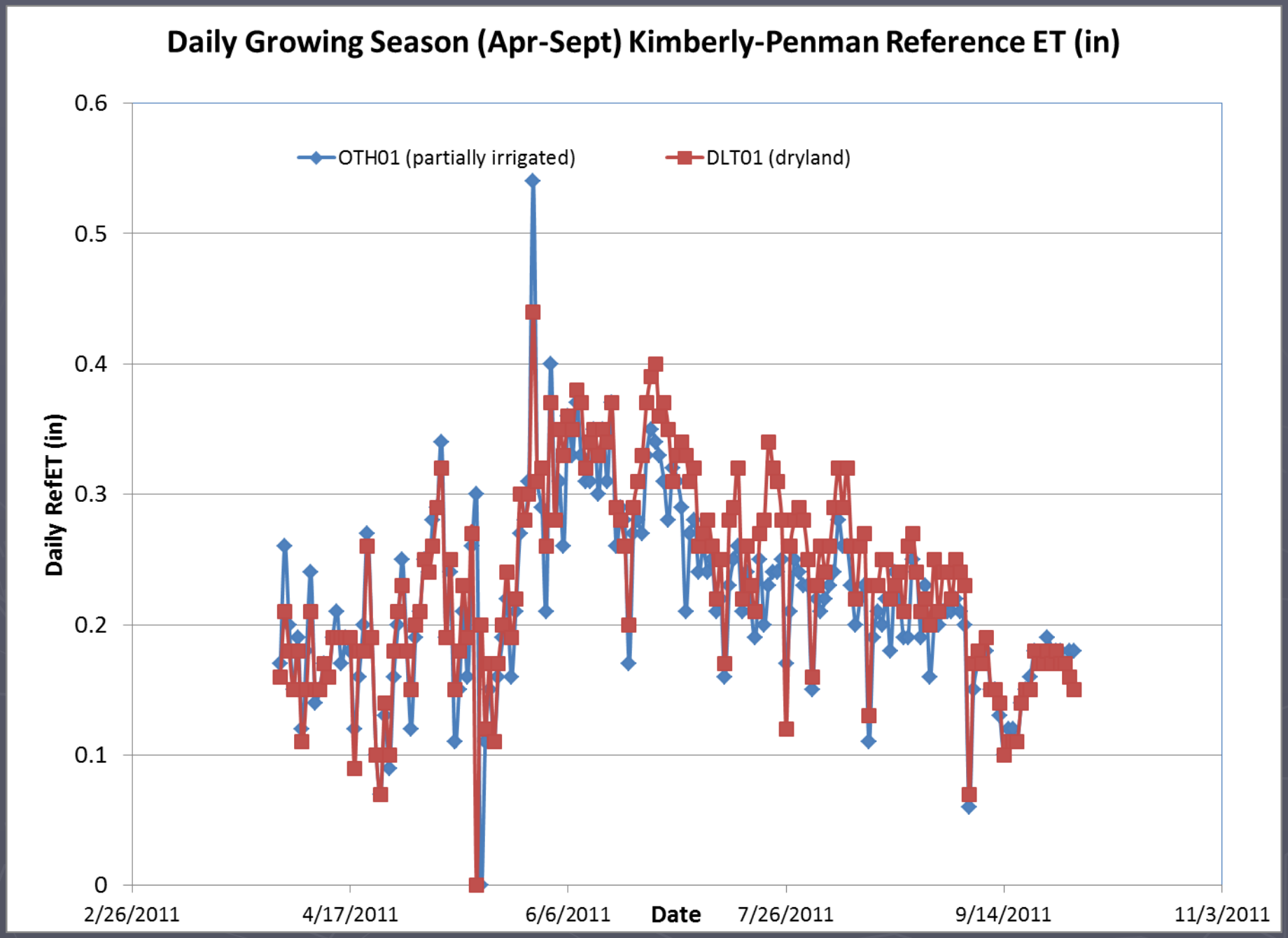
Precipitation

Soil Temperatures



CoAgMet example ET Data

- Growing season Alfalfa reference ET for 2011 growing season comparing an unirrigated site near Delta to a partially irrigated site near Olathe


Daily Growing Season (Apr-Sept) Kimberly-Penman Reference ET (in)
OTH01 (partially irrigated)
DLT01 (dryland)
Daily RefET (in)
0.6
0.5
0.4
0.3
0.2
0.1
0
2/26/2011
4/17/2011
6/6/2011
Date
7/26/2011
9/14/2011
11/3/2011

Please note:

- CoAgMet instrumentation are high quailty and the CoAgMet data are easily accessibly

. . . . . However

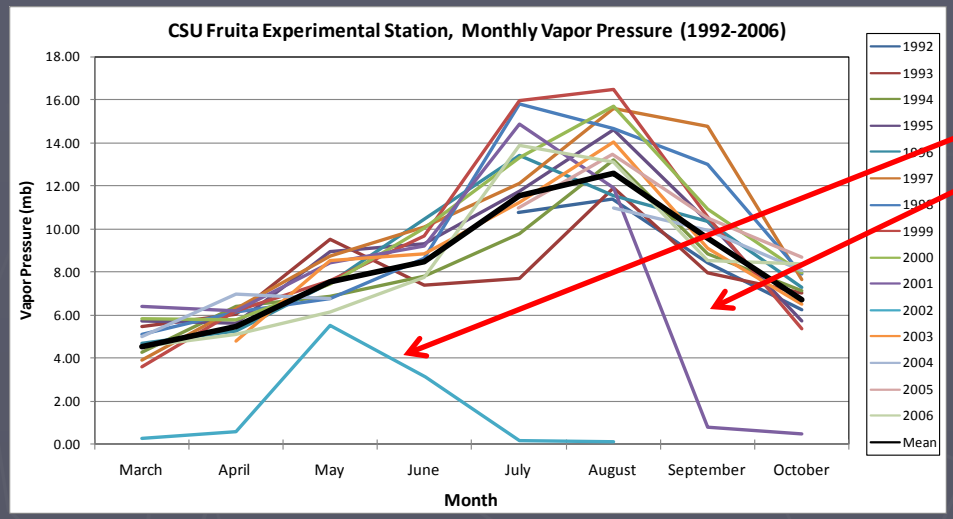
Problems with CoAgMet

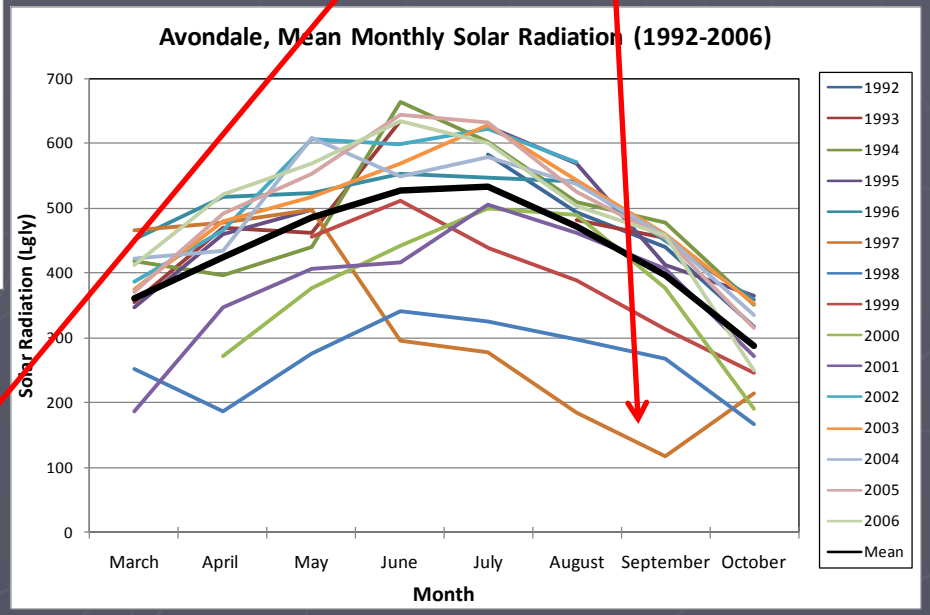
- Missing data
- Site exposure – not all sites selected with ET calculation in mind
- Routine maintenance (somewhat lacking in the earlier years of the network – much better now)

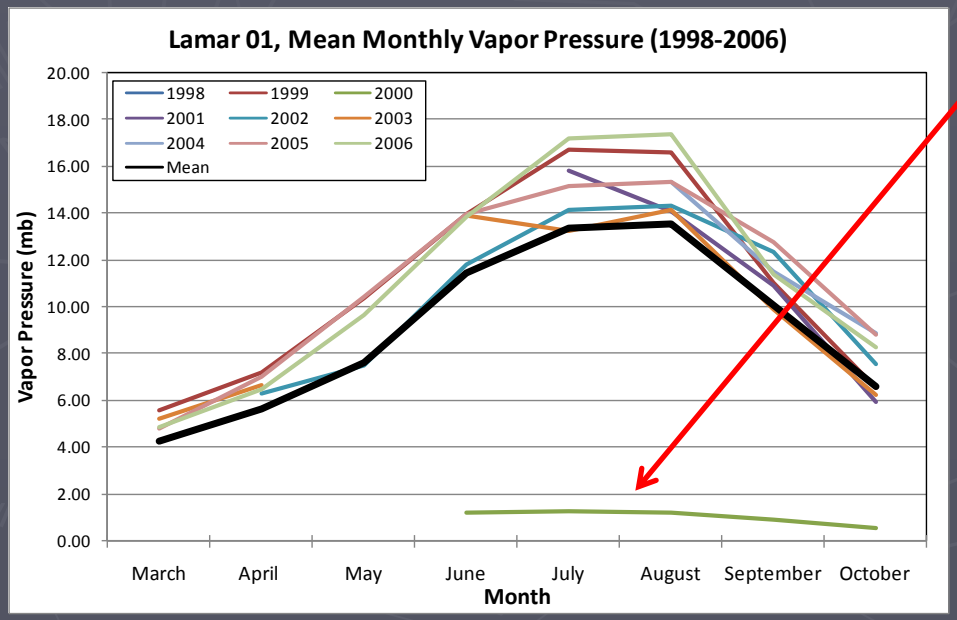
Missing/Questionable Data
(Common problem in early years, much less now)

- Battery failure and communications problems are the most common.
- Even if the whole station doesn't fail, sensors go bad and can leave some elements missing until the station is serviced.

Some Data are Questionable

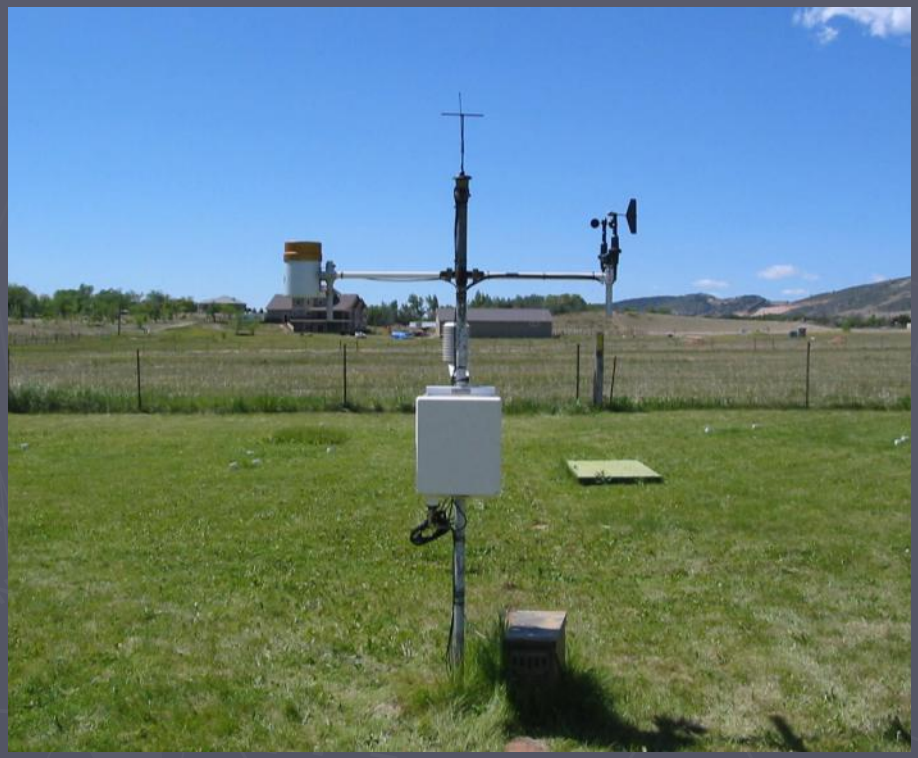






Siting and Exposure

The Good…



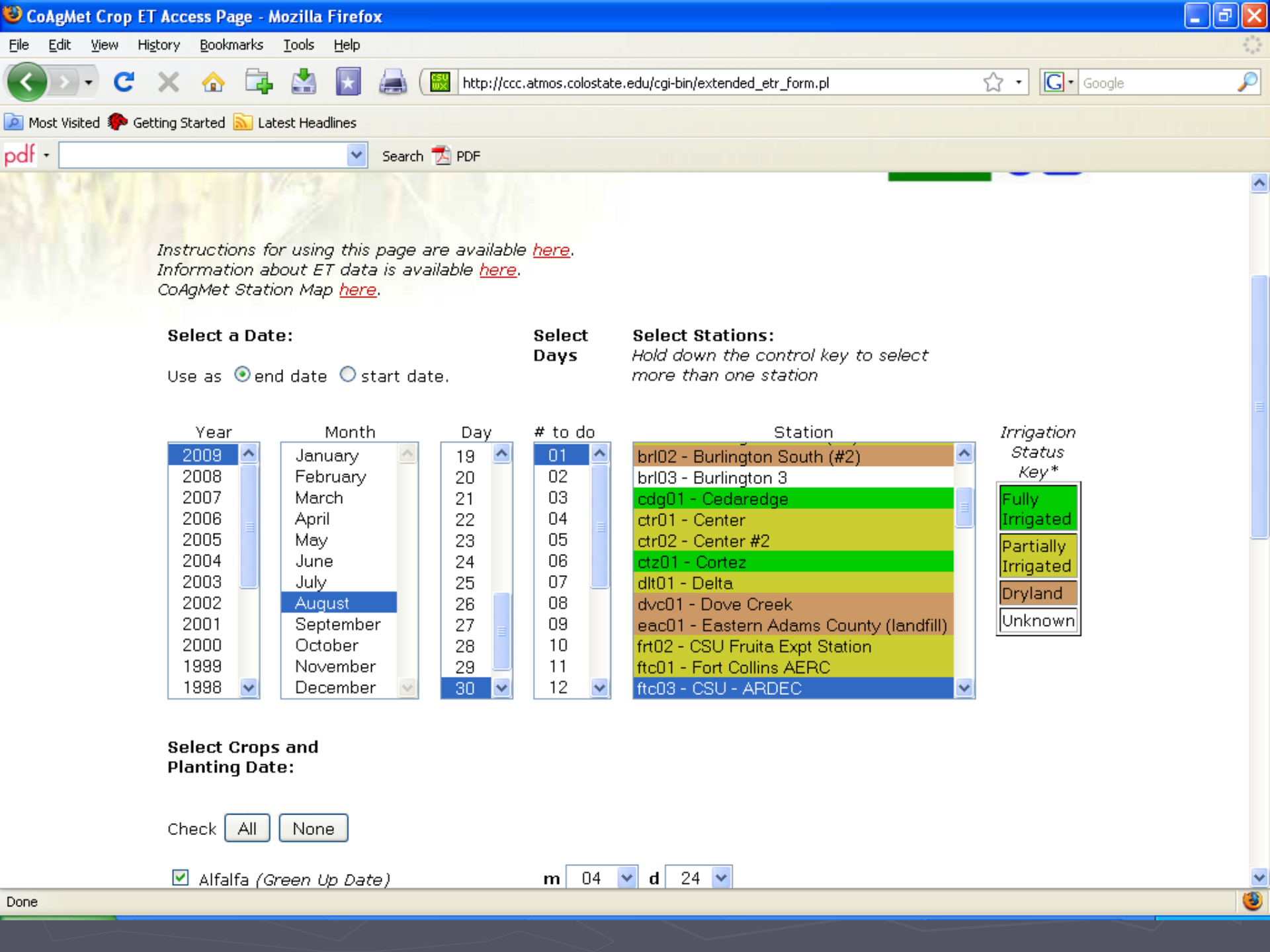
FTC01 Fort Collins AERC has appropriate citing for reference ET calculations

and the *Not* so Good

HOT01 Hotchkiss is not ideally cited for reference ET calculations

Site Exposure

- One of the assumptions of the evapotranspiration equations is that water is not limited (i.e. in full irrigation).
- Some stations are not located in ideal “reference” conditions.
- Some stations have obstructions (buildings/crops) that affect the amount of wind in certain directions.
- The exposure of the site can have an impact on the data and over/under estimate reference ET.


CoAgMet Crop ET Access Page - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://ccc.atmos.colostate.edu/cgi-bin/extended_etr_form.pl
Most Visited Getting Started Latest Headlines
pdf Search PDF
Instructions for using this page are available here.
Information about ET data is available here.
CoAgMet Station Map here.
Select a Date:
Use as end date start date.
Select Days
Select Stations:
Hold down the control key to select more than one station
Year
2009
2008
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
Month
January
February
March
April
May
June
July
August
September
October
November
December
Day
19
20
21
22
23
24
25
26
27
28
29
30
to do
01
02
03
04
05
06
07
08
09
10
11
12
Station
brl02 - Burlington South (#2)
brl03 - Burlington 3
cdg01 - Cedaredge
ctr01 - Center
ctr02 - Center #2
ctz01 - Cortez
dlt01 - Delta
dvc01 - Dove Creek
eac01 - Eastern Adams County (landfill)
frt02 - CSU Fruita Expt Station
ftc01 - Fort Collins AERC
ftc03 - CSU - ARDEC
Irrigation Status Key*
Fully Irrigated
Partially Irrigated
Dryland
Unknown
Select Crops and Planting Date:
Check All None
Alfalfa (Green Up Date)
m 04
d 24
Done

CoAgMet Website Demonstration

It's not beautiful but it's fast and full of rich data

Web Data Access: http://ccc.atmos.colostate.edu/~coagmet/

(or found in the left hand menu of the Colorado Climate Center home page)

CoAgMet Homepage

News

- **Make a Donation**

  Make a donation to CoAgMet. Choose "Atmospheric Science" in the pull-down menu at the top, and in the "comments" field at the bottom, indicate "Gift is for Colorado Climate Center - new gift fund"

- **Web Services**

  It is now possible to access a variety of data and metadata through the Climate Center's Web Services. This link will be useful to those accessing data using scripts.

  To see the program documentation or to run Web Services, go here.

- **Older Posts**

  Find older posts here..

- About CoAgMet
  A brief history of how CoAgMet came to be.
- CoAgMet factsheet has useful information on using this page.
- CoAgMet Crop Water Use (ET) Access
  Page for obtaining crop and turf water use information (ET).
- CoAgMet Text Message Service.
  Sign up for our SMS/email message service. You will be able to customize the messages sent to your cell phone (or email address).
- Evapotranspiration Reports
  ETRs are daily reports for selected stations by region.
- Station Description
  A description of a typical CoAgMet station.

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  Plots of temperature, humidity and wind for all CoAgMet stations.
- Raw Data Access
  Direct access to the raw data. Select hourly or daily data from our archives.
- Web Services
  Access to a variety of data including CoAgMet. Web Services are especially useful to those who are using scripts to access data.
- Map of CoAgMet Stations
  A Google Maps based map showing CoAgMet station locations. Access current data, metadata and images.
- Miscellaneous Tools
  Miscellaneous tools and analyses.
- Other Climatic Data
  The Colorado Climate Center maintains a database of historical climatic data for many weather stations throughout Colorado.

E-mail questions, comments, or concerns about the CoAgMet page to the webmaster

Disclaimer Equal Opportunity AASC Policy Statement

Crop Specific ET Reports

Click Here

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Crop Specific ET Reports

CoAgMet Extended Crop Evapotranspiration

Station:Hebron
Location:13 miles SW of Walden
Elevation:8170
Longitude:106.388
Latitude:40.5455

Crop Evapotranspiration in Inches

Date	Alfalfa	Corn	Drybeans	Smallgrn	Sgrbeets	Potatoes	Onion/sd	WntrWheat	Turf	RefET	Precip
08/23/2015	0.26	0.25	0.26	0.06	0.26	0.23	0.21	0.06	0.17	0.26	0.00
08/24/2015	0.26	0.25	0.26	0.06	0.26	0.24	0.21	0.06	0.18	0.26	0.00
08/25/2015	0.20	0.19	0.20	0.04	0.20	0.18	0.16	0.04	0.14	0.20	0.00
08/26/2015	0.19	0.18	0.19	0.04	0.19	0.17	0.15	0.04	0.13	0.19	0.00
08/27/2015	0.15	0.14	0.15	0.03	0.15	0.14	0.12	0.03	0.10	0.15	0.01
08/28/2015	0.17	0.17	0.17	0.04	0.17	0.16	0.14	0.04	0.12	0.17	0.00
08/29/2015	0.21	0.21	0.21	0.05	0.21	0.19	0.17	0.05	0.15	0.21	0.00
08/30/2015	0.22	0.21	0.22	0.05	0.22	0.20	0.17	0.05	0.15	0.22	0.02
08/31/2015	0.17	0.17	0.17	0.04	0.17	0.15	0.14	0.04	0.12	0.17	0.03
09/01/2015	0.22	0.21	0.22	0.05	0.22	0.20	0.18	0.05	0.15	0.22	0.00
Sum	2.06	1.98	2.06	0.45	2.06	1.85	1.65	0.45	1.39	2.06	0.06
Average	0.21	0.20	0.21	0.05	0.21	0.19	0.16	0.05	0.14	0.21	0.01

- Calculates multi-day ET for: alfalfa, corn, dry beans, small grain, sugar beets, potatoes, onion, winter wheat, turf grass, via *ASCE standard (daily or hourly)* and *Kimberly-Penman modells*

Daily Text Message Services

Click Here

- About CoAgMet
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Daily Regional Climatic and ET Comparison

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Daily Regional Climatic and ET Comparison

CoAgMet Regional ETR Summary Results

CoAgMet/NCWCD Meteorological Data for 5/30/2007

	North Central Area												
	FtColl	ARDEC	HortFm	Lovlnd	Lngmnt	Peckhm	Eaton	Lucern	Greely	FtLptn	Ault	Brigsd	Wellnt	
HiTemp	65	63	63	65	65	66	64	65	63	m	63	63	65	degF
LoTemp	36	37	38	39	41	40	40	41	42	m	41	41	38	degF
Precip	0.14	0.03	0.31	0.06	0.01	0.03	0.53	0.10	0.08	0.00	0.01	0.11	0.02	in
P/Month	0.18	0.06	0.34	0.11	0.06	0.07	0.61	0.15	0.13	0.05	0.06	0.19	0.05	in
P/Year	0.28	0.16	0.48	0.24	0.24	0.17	0.70	0.23	0.20	0.25	0.12	0.23i	0.16	in
WindGst	15.7	18.0	19.3	17.0	14.7	17.0	17.5	20.9	19.7	18.5	15.8	18.8	20.7	mph
Ref ET	0.18	0.18	0.15	0.15	0.15	0.19	0.13	0.18	0.17	0.00	0.18	0.17	0.20	in
GrowDD	3560	3559	3482	3769	3688	3623	3579	3639	3635	m	3647	2608	3550	degF
5cm Soil	50.5	48.8	m	m	m	60.1	m	55.6	53.0	57.6	55.6	50.5	56.0	degF
	Crop Evapotranspiration													
Alfalfa	0.06	0.06	0.05	0.05	0.05	0.06	0.05	0.06	0.06		0.06	0.06	0.07	in
Corn	0.04	0.04	0.03	0.03	0.03	0.04	0.03	0.04	0.03		0.04	0.03	0.04	in
Drybeans	m	m	m	m	m	m	m	m	m	m	m	m	m	in
Smallgrn	0.04	0.04	0.03	0.03	0.03	0.04	0.03	0.04	0.03		0.04	0.03	0.04	in
Sgrbeets	0.04	0.04	0.03	0.03	0.03	0.04	0.03	0.04	0.03		0.04	0.03	0.04	in
Potatoes	m	m	m	m	m	m	m	m	m	m	m	m	m	in
Onion/sd	0.07	0.07	0.06	0.06	0.06	0.07	0.05	0.07	0.07		0.07	0.07	0.08	in
WntrWheat	0.04	0.04	0.03	0.03	0.03	0.04	0.03	0.04	0.03		0.04	0.03	0.04	in

North Central Region, May 30, 2007

Daily Regional Climatic and ET Comparison

CoAgMet Regional ETR Summary Results

CoAgMet/NCWCD Meteorological Data for 9/1/2015

	North Central									
	Peckhm	Kersey	Kersey	Lucern	Greely	Gilcrs	FtLptn	Ault	Brigsd	
HiTemp	92	91	92	92	90	90	91	88	93	degF
LoTemp	51	48	50	48	60	52	52	50	49	degF
Precip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in
P/Month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in
P/Year	11.82	13.26	12.08	12.55	11.86i	12.55	10.02	11.32	9.52	in
WindGst	10.1	10.0	11.0	11.3	11.7	24.5	24.9	16.0	13.8	mph
Ref ET	0.22	0.23	0.24	0.20	0.20	0.23	0.27	0.24	0.26	in
GrowDD	2524	2476	2512	2419	2443	2551	2461	2353	2409	degF
5cm Soil	72.6	64.7	68.9	68.5	69.4	m	71.5	64.3	64.7	degF
	Crop Evapotranspiration									
Alfalfa	0.22	0.23	0.24	0.20	0.20	0.23	0.27	0.24	0.26	in
Corn	0.19	0.20	0.17	0.19	0.19	0.19	0.18	0.20	0.18	in
Drybeans	0.22	0.23	0.24	0.20	0.20	0.23	0.27	0.24	0.26	in
Smallgrn	0.05	0.05	0.05	0.04	0.04	0.05	0.06	0.05	0.06	in
Sgrbeets	0.22	0.22	0.23	0.20	0.20	0.23	0.26	0.24	0.24	in
Potatoes	0.20	0.20	0.22	0.18	0.18	0.21	0.24	0.22	0.23	in
Onion/sd	0.16	0.18	0.11	0.16	0.16	0.16	0.12	0.16	0.12	in
WntrWheat	0.05	0.05	0.05	0.04	0.04	0.05	0.06	0.05	0.08	in

North Central Region, September 1, 2015

Daily Regional Climatic and ET Comparison

CoAgMet Regional ETR Summary Results

CoAgMet/NCWCD Meteorological Data for 7/18/2015

Lower Arkansas River Basin 2

	Lamar	Lamar3	Lamar4	SndCrk	Holly	Holly2	Walsh	
HiTemp	98	96	94	96	96	97	94	degF
LoTemp	61	60	57	60	61	56	65	degF
Precip	0.10	0.00	0.02	0.01	0.00	0.01	0.03	in
P/Month	1.20	1.61	0.98	0.17	0.40	0.95	3.53	in
P/Year	16.62	10.45	11.60	11.15	8.94	10.53	11.63	in
WindGst	22.3	26.5	30.0	28.7	28.0	26.4	26.0	mph
Ref ET	0.37	0.35	0.33	0.41	0.40	0.36	0.36	in
GrowDD	1987	2006	1790	1839	1872	1916	1956	degF
5cm Soil	68.1	71.2	71.6	73.6	73.7	69.3	69.1	degF
Crop Evapotranspiration								
Alfalfa	0.37	0.35	0.33	0.41	0.40	0.36	0.36	in
Corn	0.36	0.33	0.32	0.39	0.38	0.35	0.34	in
Drybeans	0.37	0.35	0.33	0.41	0.40	0.36	0.36	in
Smallgrn	0.08	0.08	0.07	0.09	0.09	0.08	0.08	in
Sgrbeets	0.37	0.35	0.33	0.41	0.40	0.36	0.36	in
Potatoes	0.31	0.29	0.23	0.32	0.35	0.27	0.32	in
Onion/sd	0.30	0.28	0.26	0.33	0.32	0.29	0.29	in
WntrWheat	0.08	0.08	0.07	0.09	0.09	0.08	0.08	in

Lower Arkansas River Basin 2, July 18, 2015

Station Description

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Station Description

Most stations have a similar configuration, but sensors, dataloggers and settings vary somewhat throughout the network.

Details of the models and specs for the following:

Sensors

- Temperature and Relative Humidity
- Wind
- Solar Radiation
- Precipitation
- Soil Temperature

Data Loggers

Example Site Photos

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Station Index

ID	Station Name	Location	Latitude	Longitude	Elev.	First Obs.	Last Obs.
AKR02	Akron	USDA-ARS-GPRC	40.1548	103.142	4537	07-01-1992	08-30-2015
ALT01	Ault	1 mi SE Ault	40.569	104.72	4910	03-17-1992	09-01-2015
AVN01	Avondale	1 mi SE Avondale	38.2166	104.341	4580	06-04-1992	09-01-2015
BLA01	Blanca	8 mi SW Blanca	37.3905	105.557	7755	02-24-1997	08-25-2015
BNV01	Buena Vista	CDW Area SW of Buena Vista	38.8315	106.129	7900	10-12-2010	09-01-2015
BRG01	Briggsdale	3 mi S Briggsdale	40.5947	104.319	4858	07-31-2002	09-01-2015
BRK01	Bedrock	1 mile NE of Bedrock	38.3279	108.855	4973	11-07-2013	09-01-2015
BRL01	Burlington North (#1)	18 mi NNE Burlington	39.4998	102.074	3900	05-07-1992	01-02-2012
BRL02	Burlington South (#2)	6 mi SE Burlington	39.2651	102.109	4170	01-02-1992	09-01-2015
BRL03	Burlington 3	4 mi NE of Burlington	39.3374	102.196	4068	03-21-2008	09-01-2015
CBL01	Carbondale	Carbondale	39.3623	107.208	6293	05-08-2015	09-01-2015
CDG01	Cedaredge	Cedaredge	38.9142	107.932	6404	02-18-2006	05-06-2015
CKP01	Cherokee Park	1 mile west of US 287 on Road 80C	40.8263	105.267	5956	07-25-2014	09-01-2015
CNN01	Canon City	East of Canon City	38.4319	105.178	5273	12-31-2010	09-01-2015
COW01	Cowdrey	9 miles north of Walden	40.8659	106.336	7895	06-10-2009	09-01-2015
CTR01	Center	CSU San Luis Valley Expt Sta	37.7067	106.144	7702	10-08-1993	09-01-2015
CTR02	Center #2	Coors Research Farm	37.8288	106.038	7608	10-02-2003	09-01-2015
CTZ01	Cortez	9 mi SW Cortez	37.2248	108.673	6015	01-02-1992	09-01-2015
DLT01	Delta	3 mi W Delta	38.7342	108.118	5010	04-19-1995	09-01-2015
DVC01	Dove Creek	4 mi NW Dove Creek	37.7265	108.954	6595	10-28-1992	09-01-2015
EAC01	Eastern Adams County (landfill)	10 mi W Last Chance	39.7857	103.798	4907	07-17-2000	09-01-2015
EKT01	Eckert	0.5 miles west of Eckert, CO	38.8398	107.973	5522	05-07-2015	09-01-2015

Click on any Station ID to see more information

Station Index

Example Details of HYK02 Holyoke

CoAgMet Stations Details

ID:	HYK02
Name:	Holyoke
Location:	12 mi SE Holyoke
Latitude:	40.4909
Longitude:	102.089
Elevation:	3735 ft
Num Daily Obs:	8,318
Num Hourly Obs:	200,462
First Observation:	01-02-1992
Last Observation:	09-01-2015
Irrigation type:	dry
Comment:	Approaching dryland conditions Station sited in a unirrigated grassland Distant center-pivot irrigation
Owner:	Ron & Tommy Thompson
Sponsor(s):	CSU Ag Experiment Station - Fort Collins
	Haxtun Conservation District

Monthly Station Summaries

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Monthly Station Summaries

LAR01 August 2015

Station:Larand

Location:8 miles south of Walden

Elevation:8252

Longitude:106.3

Latitude:40.6126

Summary for Larand - 08/2015

Station	Mon	Day	Tmax Temp degF	Tmin Temp degF	Vapor Press mb	Solar Rad Lngly	Prec in.	Wind Gust mph	Wind Run mi.	Soil Temp degF	Min RH Pct	Grow DgDy F.	P-Kim ET in.	ASCE HLY ET in.
lar01	8	1	80.7	40.0	9.29	540	0.00	10.1	57	51.4	14.2	902	0.210	0.215
lar01	8	2	81.0	43.2	9.64	566	0.00	17.8	88	51.7	14.4	917	0.239	0.252
lar01	8	3	71.9	47.7	11.12	336	0.05	20.0	106	52.5	28.4	928	0.165	0.153
lar01	8	4	70.6	46.2	10.16	619	0.00	25.0	201	51.9	28.9	939	0.272	0.249
lar01	8	5	77.0	38.8	9.50	545	0.00	20.3	135	51.5	24.1	952	0.252	0.256
lar01	8	6	70.6	42.8	7.97	581	0.00	21.2	155	52.1	20.0	962	0.258	0.265
lar01	8	7	66.7	39.6	9.13	241	0.00	27.5	69	51.6	30.2	971	0.121	0.104
lar01	8	8	69.7	44.4	9.97	594	0.00	32.0	154	51.4	32.6	981	0.231	0.250
lar01	8	9	70.9	41.8	8.46	662	0.00	19.2	156	51.7	25.8	991	0.264	0.271
lar01	8	10	79.7	34.9	8.03	648	0.00	13.7	79	51.4	16.0	1006	0.247	0.243
lar01	8	11	80.2	42.9	10.81	407	0.01	18.8	83	52.3	25.0	1021	0.182	0.175
lar01	8	12	73.5	43.5	12.03	468	0.00	15.8	142	52.6	40.9	1033	0.194	0.196
lar01	8	13	88.6	-40.0	11.97	***	0.17	24.7	97	53.0	0.0	1051	***	***
lar01	8	14	79.7	40.9	11.56	551	0.00	19.7	81	52.5	24.6	1066	0.210	0.219
lar01	8	15	81.5	45.8	12.03	596	0.03	19.0	124	53.2	24.3	1081	0.248	0.256
lar01	8	16	77.8	43.4	11.92	447	0.03	29.5	110	53.6	26.3	1095	0.199	0.178
lar01	8	17	73.9	42.8	9.08	608	0.00	26.7	138	53.3	20.9	1107	0.257	0.267
lar01	8	18	64.9	33.8	7.48	458	0.00	20.7	133	52.2	28.1	1115	0.202	0.189
lar01	8	19	63.9	29.4	6.52	655	0.00	21.2	109	50.9	26.5	1122	0.226	0.219
lar01	8	20	69.6	35.4	6.60	617	0.00	21.0	156	50.9	20.2	1131	0.251	0.260
lar01	8	21	74.1	35.6	6.19	606	0.00	24.7	178	50.9	15.3	1143	0.282	0.318
lar01	8	22	72.6	35.5	6.86	590	0.00	26.4	163	51.0	19.2	1155	0.258	0.309
lar01	8	23	74.3	32.0	5.97	609	0.00	17.3	119	50.5	13.8	1167	0.251	0.270
lar01	8	24	78.1	39.6	6.34	568	0.00	21.9	122	50.9	13.7	1181	0.249	0.275
lar01	8	25	83.0	32.7	6.72	563	0.00	26.2	69	50.3	12.1	1197	0.222	0.237
lar01	8	26	76.3	39.1	9.94	357	0.04	22.5	111	51.4	22.9	1211	0.173	0.175
lar01	8	27	65.1	41.7	11.90	283	0.01	19.7	115	52.6	56.3	1218	0.112	0.111
lar01	8	28	71.2	34.0	9.32	467	0.00	16.3	81	51.3	30.5	1229	0.169	0.176
lar01	8	29	78.1	32.3	7.45	589	0.00	13.2	81	50.7	13.2	1243	0.217	0.235
lar01	8	30	77.4	42.1	9.00	501	0.00	27.5	161	51.3	24.8	1256	0.233	0.255
lar01	8	31	70.3	39.4	10.58	336	0.01	22.4	139	52.2	36.2	1267	0.152	0.145

Daily Climatic Summary

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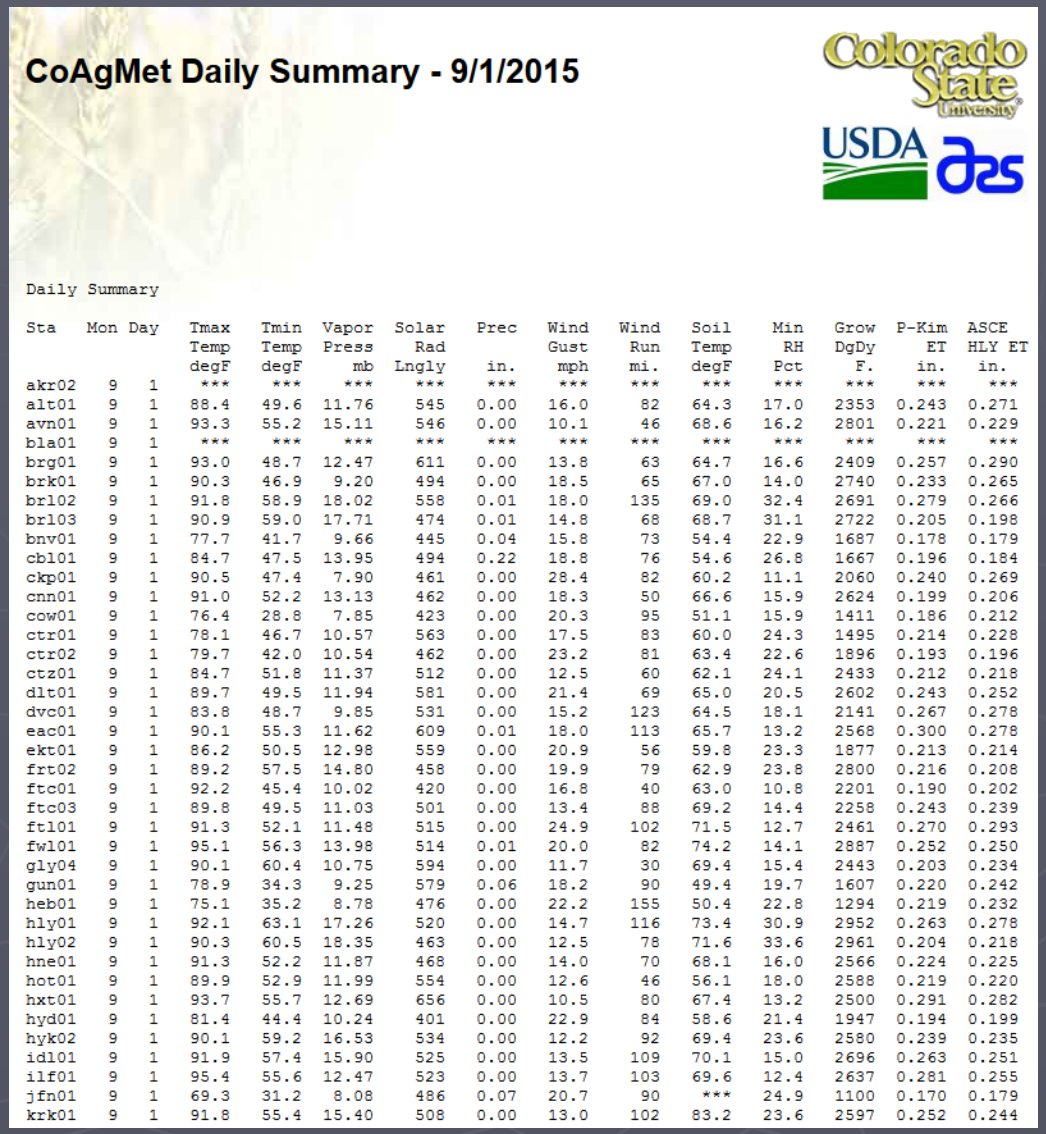
Daily Climatic Summary

All Stations
(more than shown here)



CoAgMet Daily Summary - 9/1/2015

Daily Summary

Sta	Mon	Day	Tmax Temp degF	Tmin Temp degF	Vapor Press mb	Solar Rad Lngly	Prec in.	Wind Gust mph	Wind Run mi.	Soil Temp degF	Min RH Pct	Grow DgDy F.	P-Kim ET in.	ASCE HLY ET in.
akr02	9	1	***	***	***	***	***	***	***	***	***	***	***	***
alt01	9	1	88.4	49.6	11.76	545	0.00	16.0	82	64.3	17.0	2353	0.243	0.271
avn01	9	1	93.3	55.2	15.11	546	0.00	10.1	46	68.6	16.2	2801	0.221	0.229
bla01	9	1	***	***	***	***	***	***	***	***	***	***	***	***
brg01	9	1	93.0	48.7	12.47	611	0.00	13.8	63	64.7	16.6	2409	0.257	0.290
brk01	9	1	90.3	46.9	9.20	494	0.00	18.5	65	67.0	14.0	2740	0.233	0.265
brl02	9	1	91.8	58.9	18.02	558	0.01	18.0	135	69.0	32.4	2691	0.279	0.266
brl03	9	1	90.9	59.0	17.71	474	0.01	14.8	68	68.7	31.1	2722	0.205	0.198
bnv01	9	1	77.7	41.7	9.66	445	0.04	15.8	73	54.4	22.9	1687	0.178	0.179
cbl01	9	1	84.7	47.5	13.95	494	0.22	18.8	76	54.6	26.8	1667	0.196	0.184
ckp01	9	1	90.5	47.4	7.90	461	0.00	28.4	82	60.2	11.1	2060	0.240	0.269
cnn01	9	1	91.0	52.2	13.13	462	0.00	18.3	50	66.6	15.9	2624	0.199	0.206
cow01	9	1	76.4	28.8	7.85	423	0.00	20.3	95	51.1	15.9	1411	0.186	0.212
ctr01	9	1	78.1	46.7	10.57	563	0.00	17.5	83	60.0	24.3	1495	0.214	0.228
ctr02	9	1	79.7	42.0	10.54	462	0.00	23.2	81	63.4	22.6	1896	0.193	0.196
ctz01	9	1	84.7	51.8	11.37	512	0.00	12.5	60	62.1	24.1	2433	0.212	0.218
dlt01	9	1	89.7	49.5	11.94	581	0.00	21.4	69	65.0	20.5	2602	0.243	0.252
dvc01	9	1	83.8	48.7	9.85	531	0.00	15.2	123	64.5	18.1	2141	0.267	0.278
eac01	9	1	90.1	55.3	11.62	609	0.01	18.0	113	65.7	13.2	2568	0.300	0.278
ekt01	9	1	86.2	50.5	12.98	559	0.00	20.9	56	59.8	23.3	1877	0.213	0.214
frt02	9	1	89.2	57.5	14.80	458	0.00	19.9	79	62.9	23.8	2800	0.216	0.208
ftc01	9	1	92.2	45.4	10.02	420	0.00	16.8	40	63.0	10.8	2201	0.190	0.202
ftc03	9	1	89.8	49.5	11.03	501	0.00	13.4	88	69.2	14.4	2258	0.243	0.239
ftl01	9	1	91.3	52.1	11.48	515	0.00	24.9	102	71.5	12.7	2461	0.270	0.293
fwl01	9	1	95.1	56.3	13.98	514	0.01	20.0	82	74.2	14.1	2887	0.252	0.250
gly04	9	1	90.1	60.4	10.75	594	0.00	11.7	30	69.4	15.4	2443	0.203	0.234
gun01	9	1	78.9	34.3	9.25	579	0.06	18.2	90	49.4	19.7	1607	0.220	0.242
heb01	9	1	75.1	35.2	8.78	476	0.00	22.2	155	50.4	22.8	1294	0.219	0.232
hly01	9	1	92.1	63.1	17.26	520	0.00	14.7	116	73.4	30.9	2952	0.263	0.278
hly02	9	1	90.3	60.5	18.35	463	0.00	12.5	78	71.6	33.6	2961	0.204	0.218
hne01	9	1	91.3	52.2	11.87	468	0.00	14.0	70	68.1	16.0	2566	0.224	0.225
hot01	9	1	89.9	52.9	11.99	554	0.00	12.6	46	56.1	18.0	2588	0.219	0.220
hxt01	9	1	93.7	55.7	12.69	656	0.00	10.5	80	67.4	13.2	2500	0.291	0.282
hyd01	9	1	81.4	44.4	10.24	401	0.00	22.9	84	58.6	21.4	1947	0.194	0.199
hyk02	9	1	90.1	59.2	16.53	534	0.00	12.2	92	69.4	23.6	2580	0.239	0.235
idl01	9	1	91.9	57.4	15.90	525	0.00	13.5	109	70.1	15.0	2696	0.263	0.251
ilf01	9	1	95.4	55.6	12.47	523	0.00	13.7	103	69.6	12.4	2637	0.281	0.255
jfn01	9	1	69.3	31.2	8.08	486	0.07	20.7	90	***	24.9	1100	0.170	0.179
krk01	9	1	91.8	55.4	15.40	508	0.00	13.0	102	83.2	23.6	2597	0.252	0.244

Hourly Climate Data Plots

Click Here

Plots can be made with a variable time axis (1-366 days)

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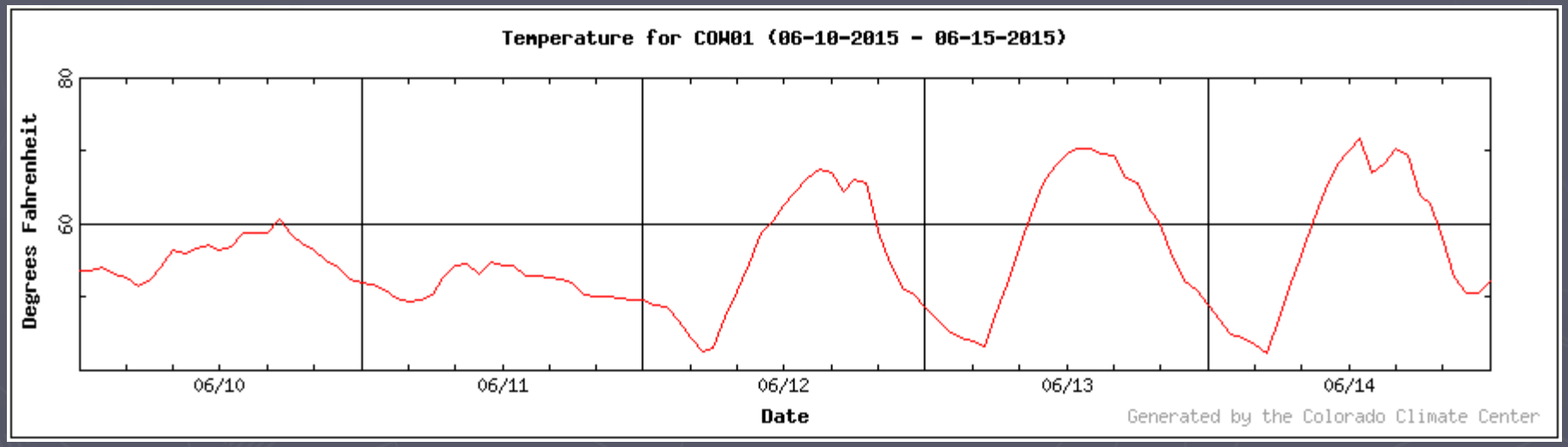
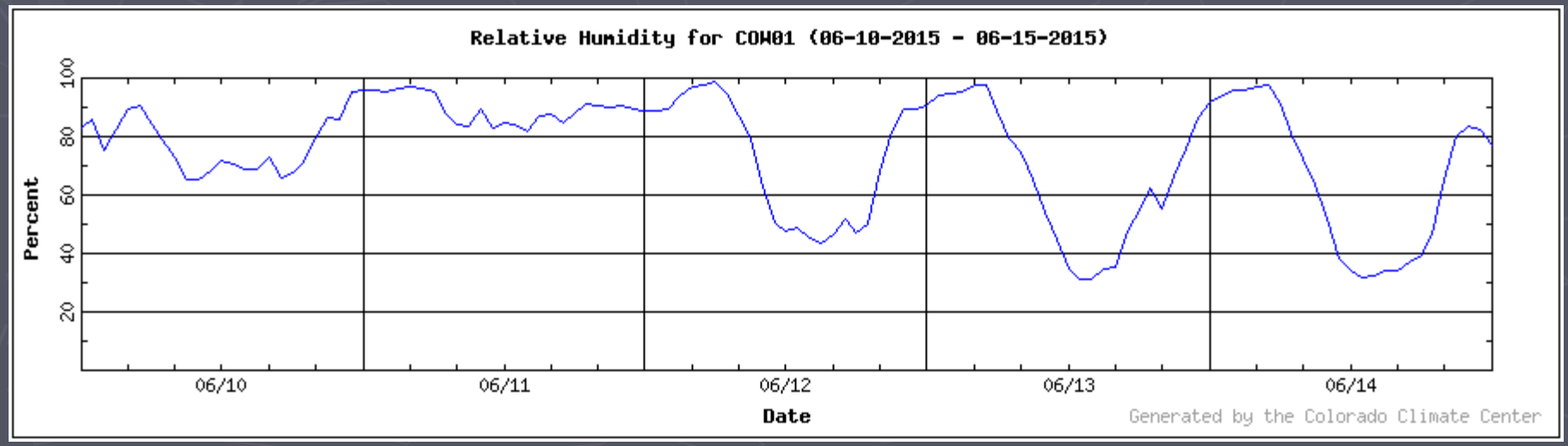
Hourly Climate Data Plots

COW01 Cowdrey June 10, 2015 through June 15, 2015

Temperature



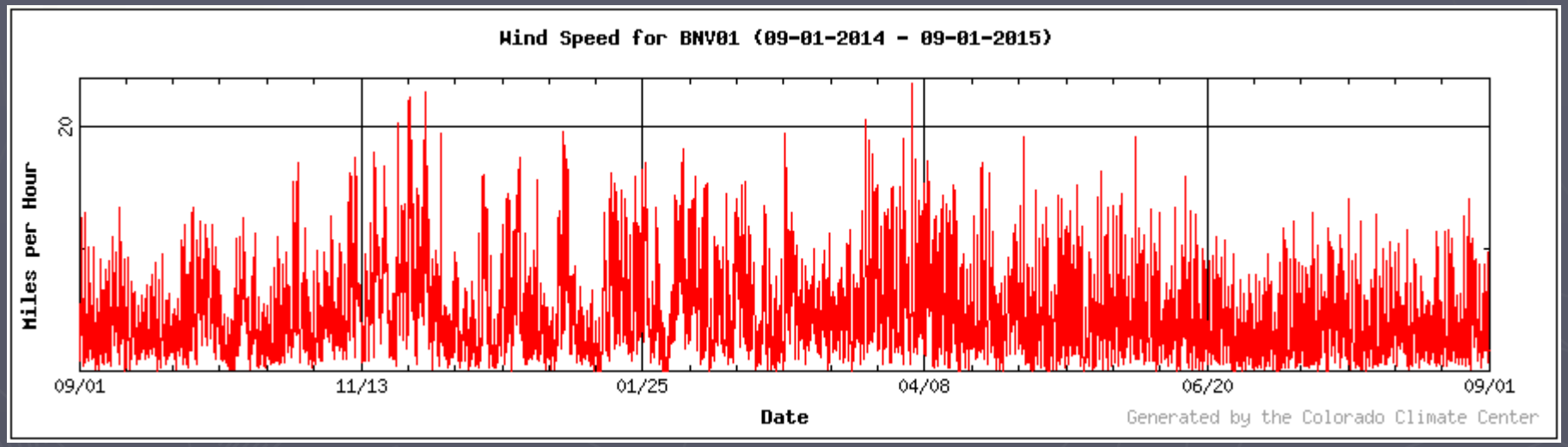
Relative Humidity



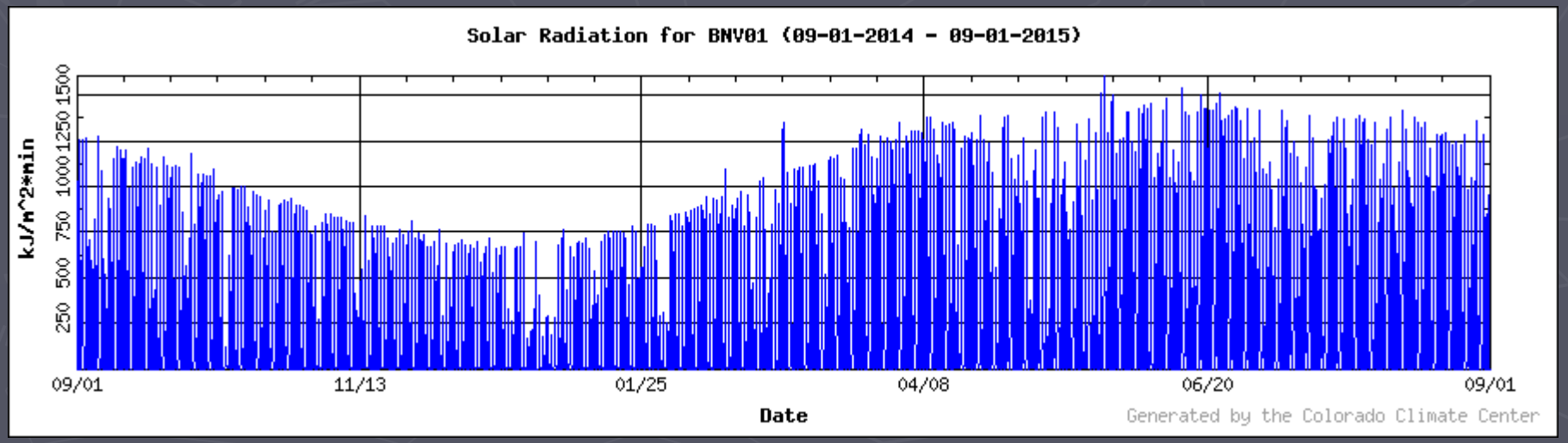
Hourly Climate Data Plots

BNV01 Buena Vista Sept 1, 2014 through Sept 1, 2015

Wind Speed



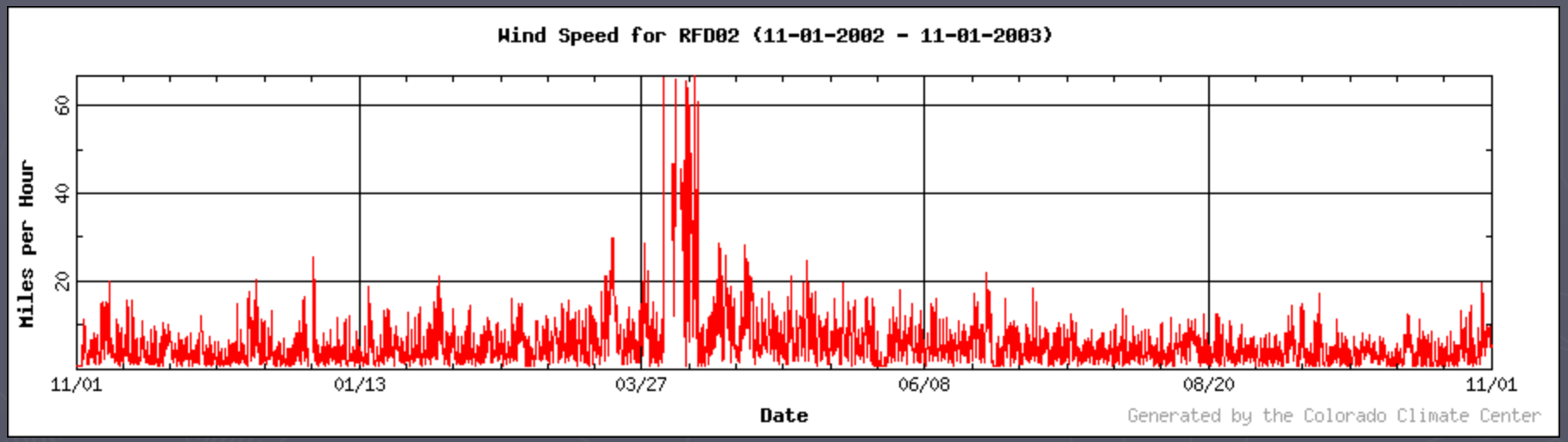
Solar Radiation



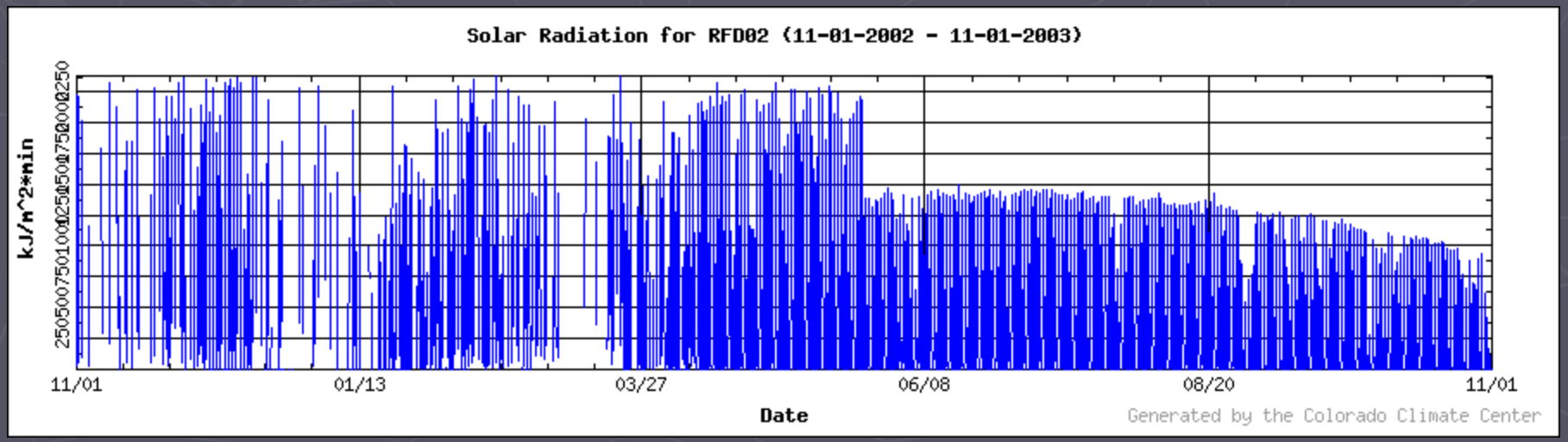
Inferior Data Do Exist

RFD02 Rocky Ford Nov 1, 2002 through Oct 31, 2003

Wind Speed



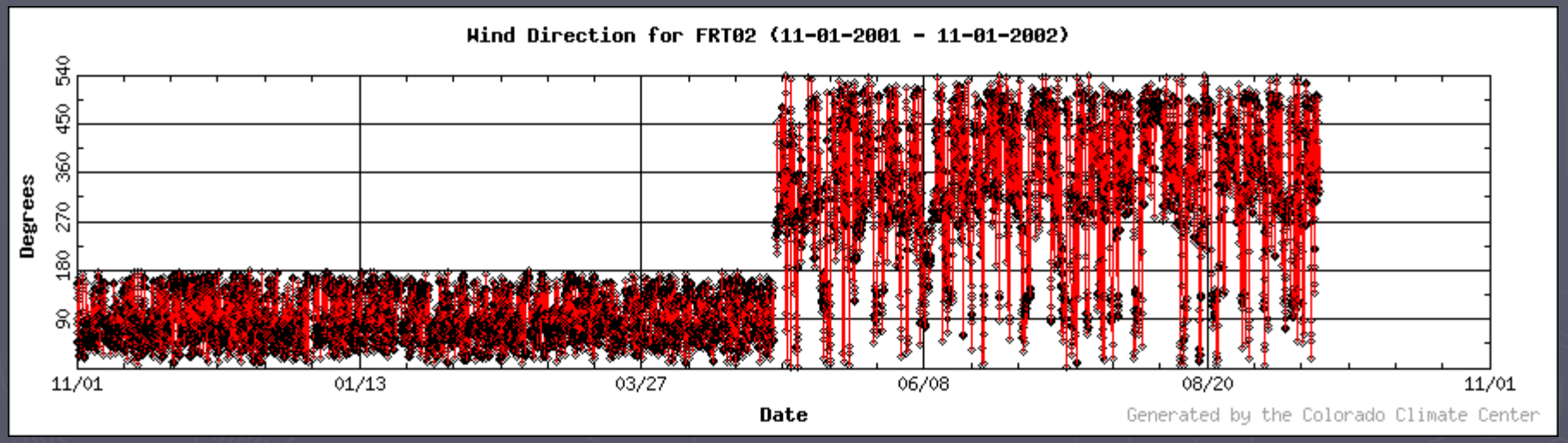
Solar Radiation



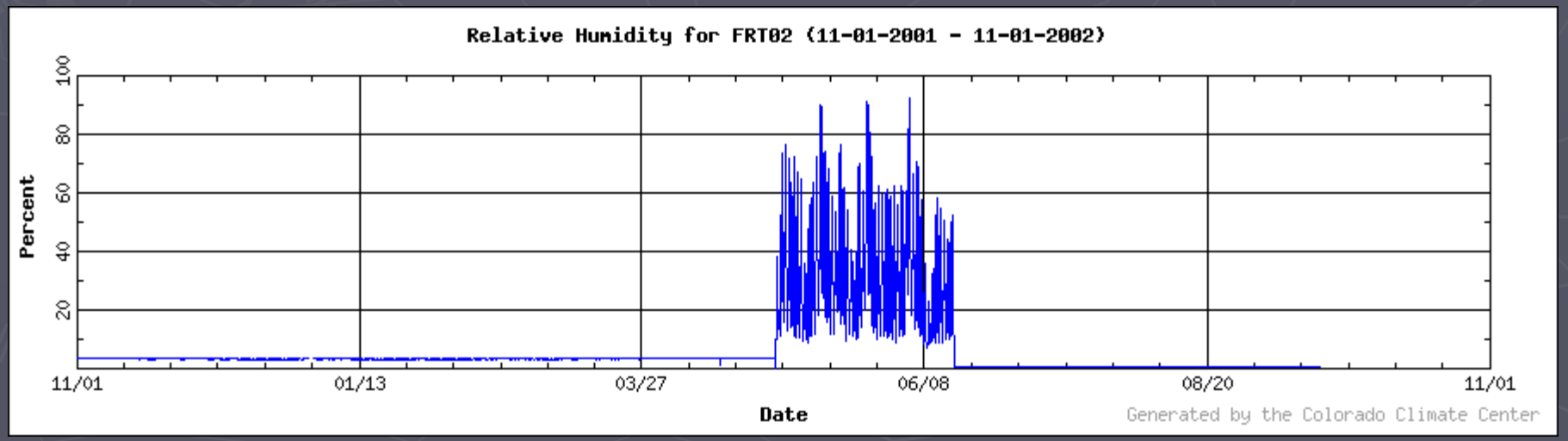
But the graphics

FRT02 Fruita Nov 1, 2001 through Oct 31, 2002

Wind Direction



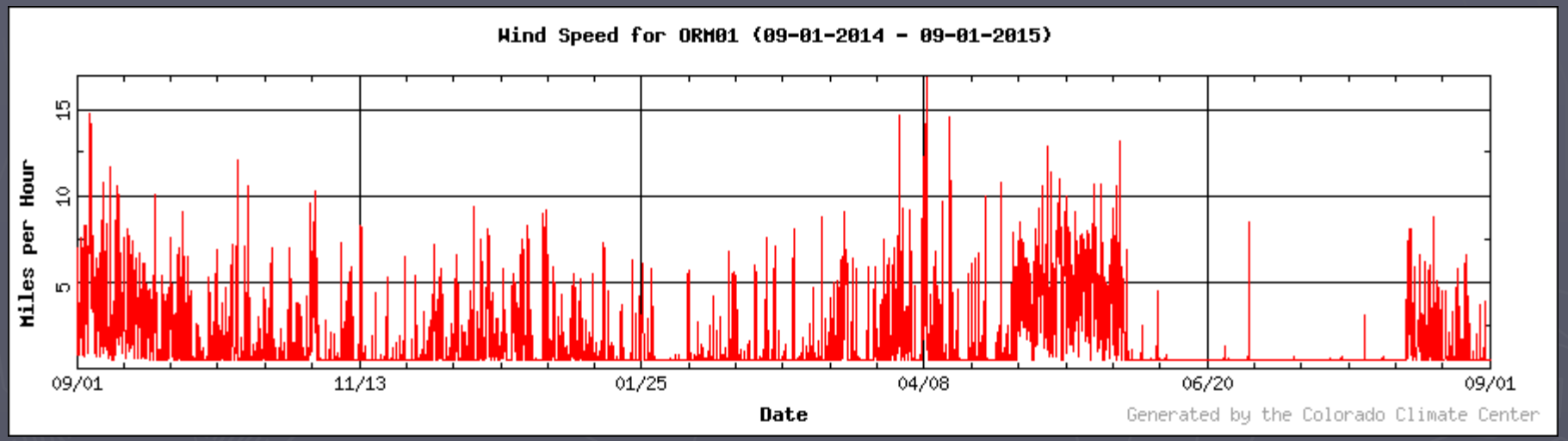
Relative Humidity



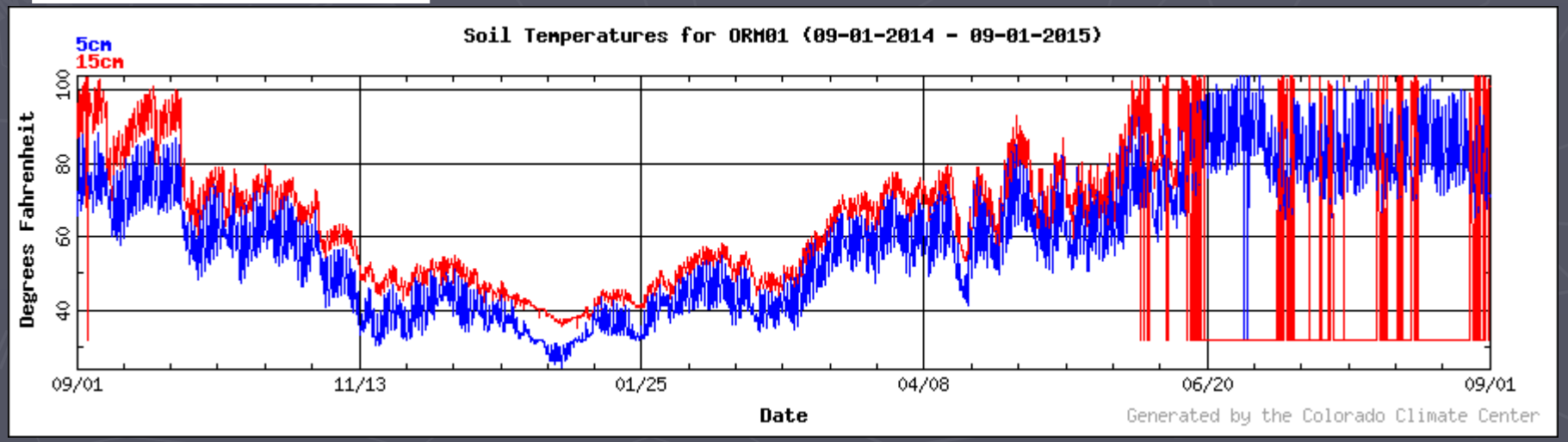
Make it quite obvious

ORM01 Orchard Mesa Sept 1, 2014 through Aug 31, 2015

Wind Speed



Soil Temperatures

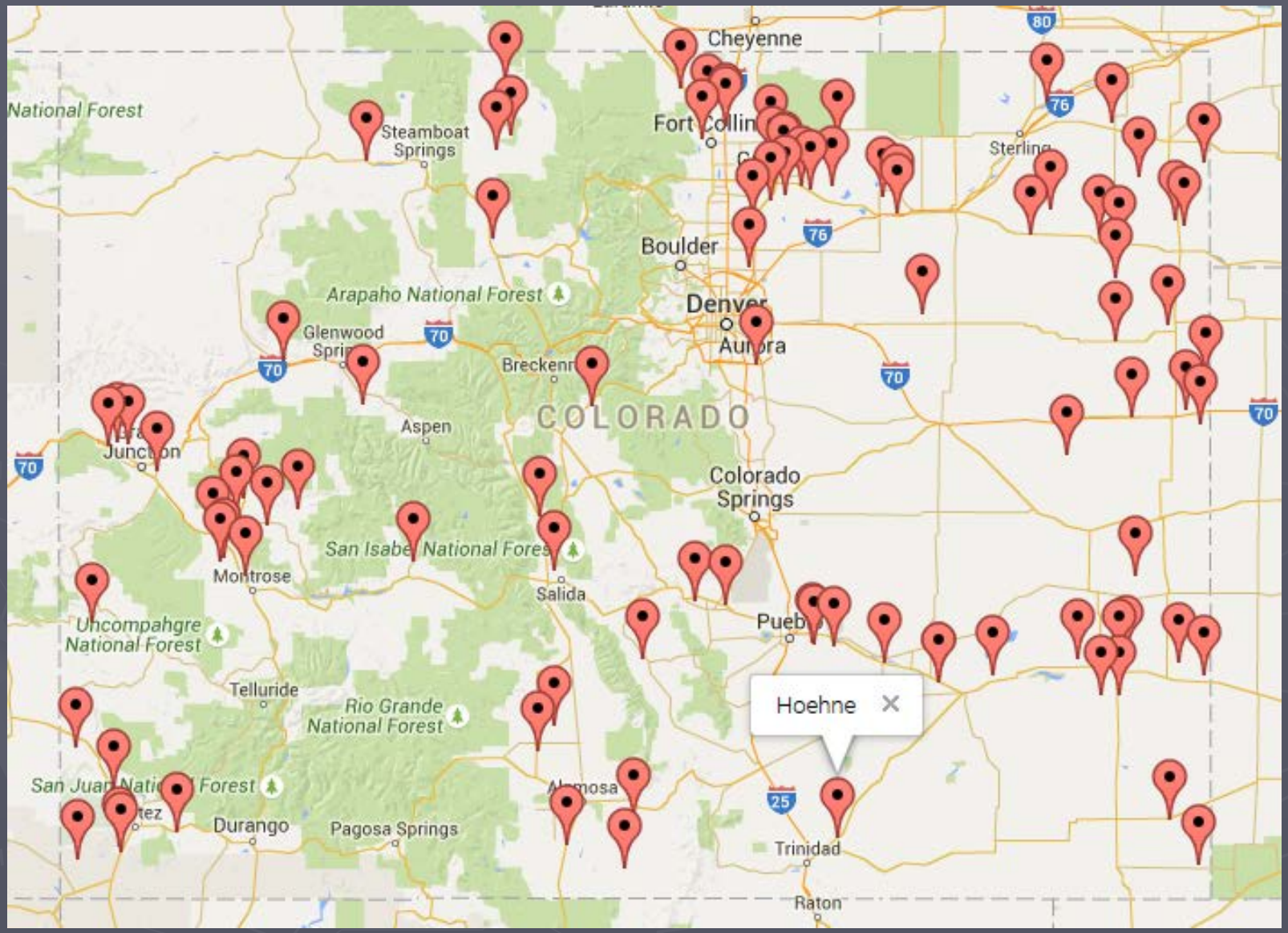


Map of CoAgMet Stations

Click Here

- Station Index
  Metadata on all of the stations on the CoAgMet network.
- Monthly Summaries
  Interactive access to the daily data set for a particular station and selected months.
- Daily Summaries (all stations)
  Daily summary files are formatted to display selected parameters for all stations.
- Hourly Data Access
  Interactive access to the hourly data set for a particular station and selected days.
- Hourly Data Plots
  Plots of temperature, humidity and wind for all CoAgMet stations.
- Raw Data Access
  Direct access to the raw data. Select hourly or daily data from our archives.
- Web Services
  Access to a variety of data including CoAgMet. Web Services are especially useful to those who are using scripts to access data.
- Map of CoAgMet Stations
  A Google Maps based map showing CoAgMet station locations. Access current data, metadata and images.
- Miscellaneous Tools
  Miscellaneous tools and analyses.
- Other Climatic Data
  The Colorado Climate Center maintains a database of historical climatic data for many weather stations throughout Colorado.

Map of CoAgMet Stations



Miscellaneous Tools

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Miscellaneous Tools

- Daily Statistics
- Daily Data (set your own parameters)
- Monthly Data (monthly reports for an entire year)
- Wind Summaries

Miscellaneous Tools

Monthly Data

Want to know how many days with a max temp >=90 degrees from 2004-2014 in Haxtun?

Station:Haxtun

Location:2.5 mi NW Haxtun

Elevation:4040

Longitude:102.647

Latitude:40.6722

Monthly Climatic Data for for years 2004 - 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Number of days with max. temp. >= 90 deg.F.													
2004	M	M	0	0	3	3	15	6	8	0	0	0	
2005	M	0	0	0	M	7	23	12	10	M	M	M	
2006	M	M	M	M	M	16	17	M	M	M	M	M	
2007	M	M	M	M	M	M	M	17	10	2	0	M	
2008	0	M	0	0	1	3	21	5	2	0	0	0	
2009	0	0	0	0	3	3	8	8	1	0	0	M	
2010	0	0	0	0	M	7	15	16	5	0	0	0	
2011	0	0	0	0	1	10	19	18	2	0	0	0	50
2012	0	M	0	1	3	19	26	17	9	0	0	0	
2013	0	0	0	0	2	12	11	16	9	0	0	M	
2014	0	0	0	0	1	2	12	5	2	0	0	M	

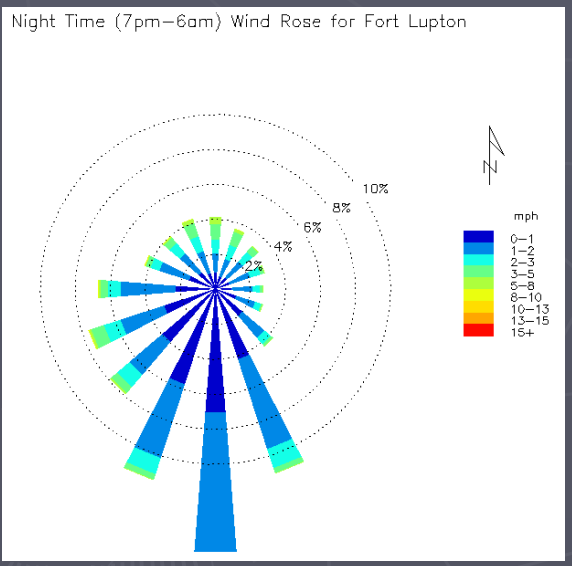
Miscellaneous Tools

Wind Summaries

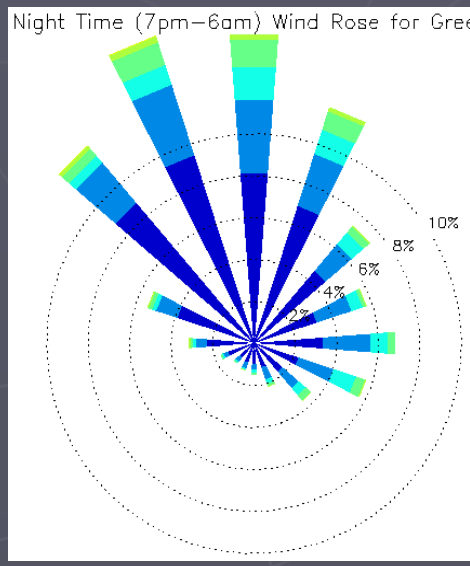
Wind Roses

Select 8 or 16 point, daytime, night time or both

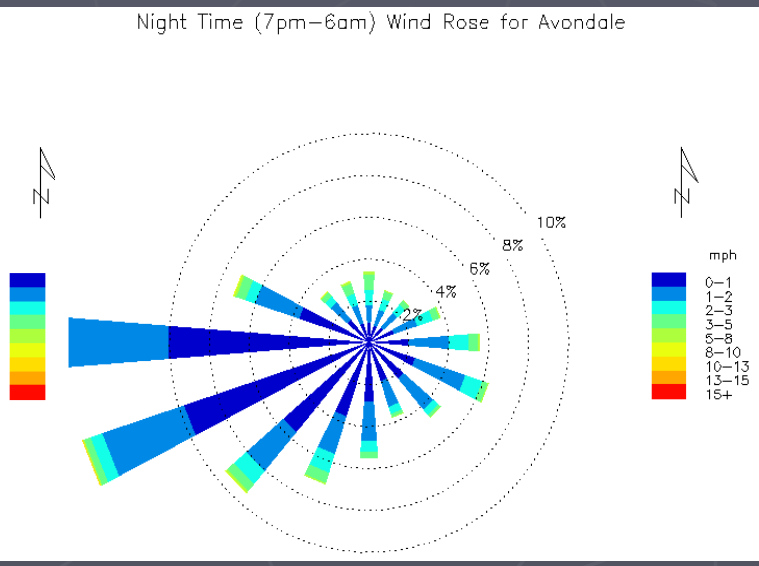
Ft. Lupton



Greeley



Avondale



16 point night time selected for all three examples above

Site Photos

4 Cardinal Directions + Ground photo

Site Photos – Year to Year Comparison

Holly (HLY01) – Looking towards the West

5/28/2009

Site Photos – Year to Year Comparison

Holly (HLY01) – Looking towards the West

7/19/2010

Site Photos – Year to Year Comparison

Holly (HLY01) – Looking towards the West

7/21/2011

Site Photos – Year to Year Comparison

Holly (HLY01) – Looking towards the West

6/4/2012

Site Photos – Year to Year Comparison

Holly (HLY01) – Looking towards the West

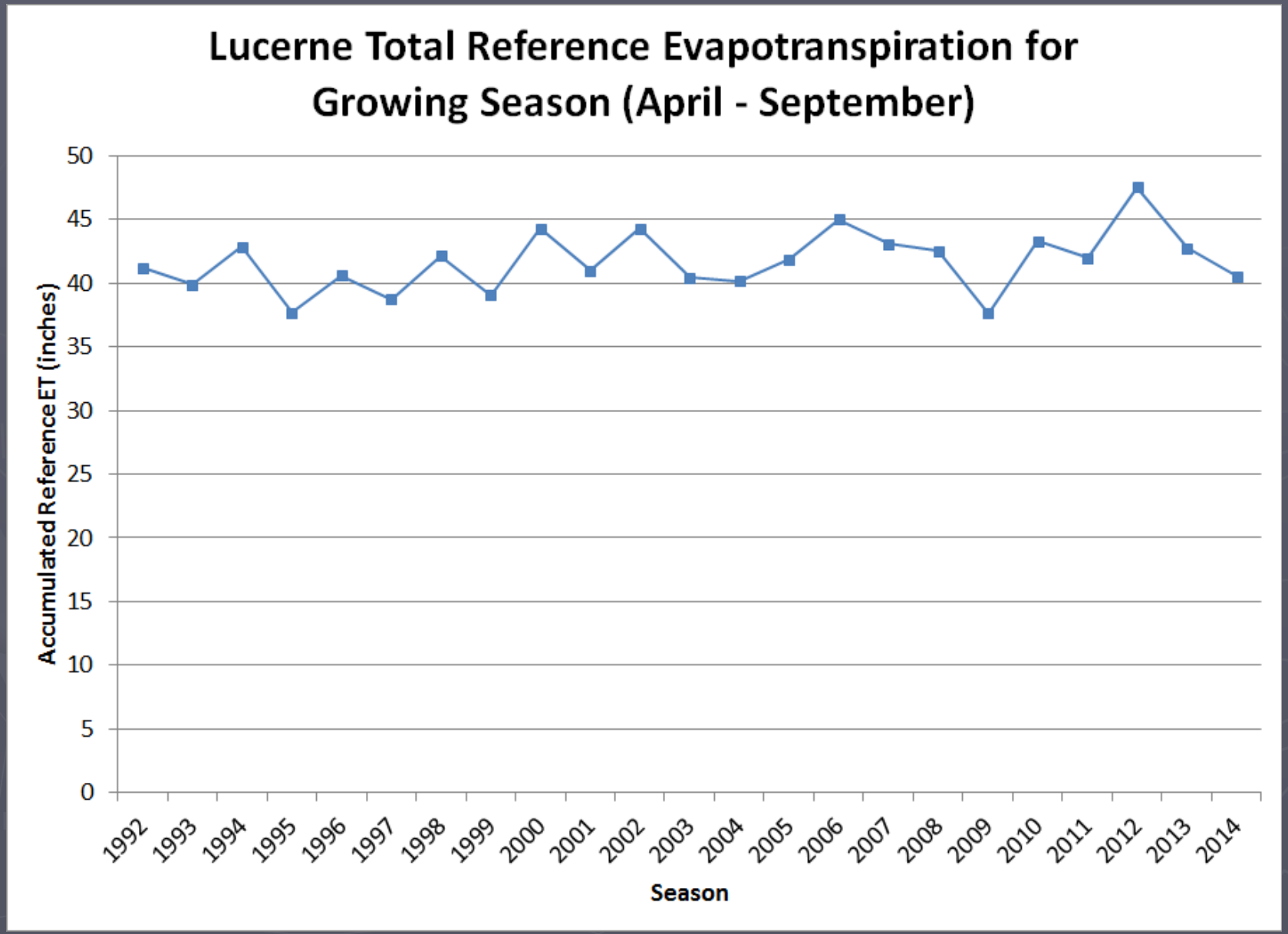
8/21/2013

Site Photos – Year to Year Comparison

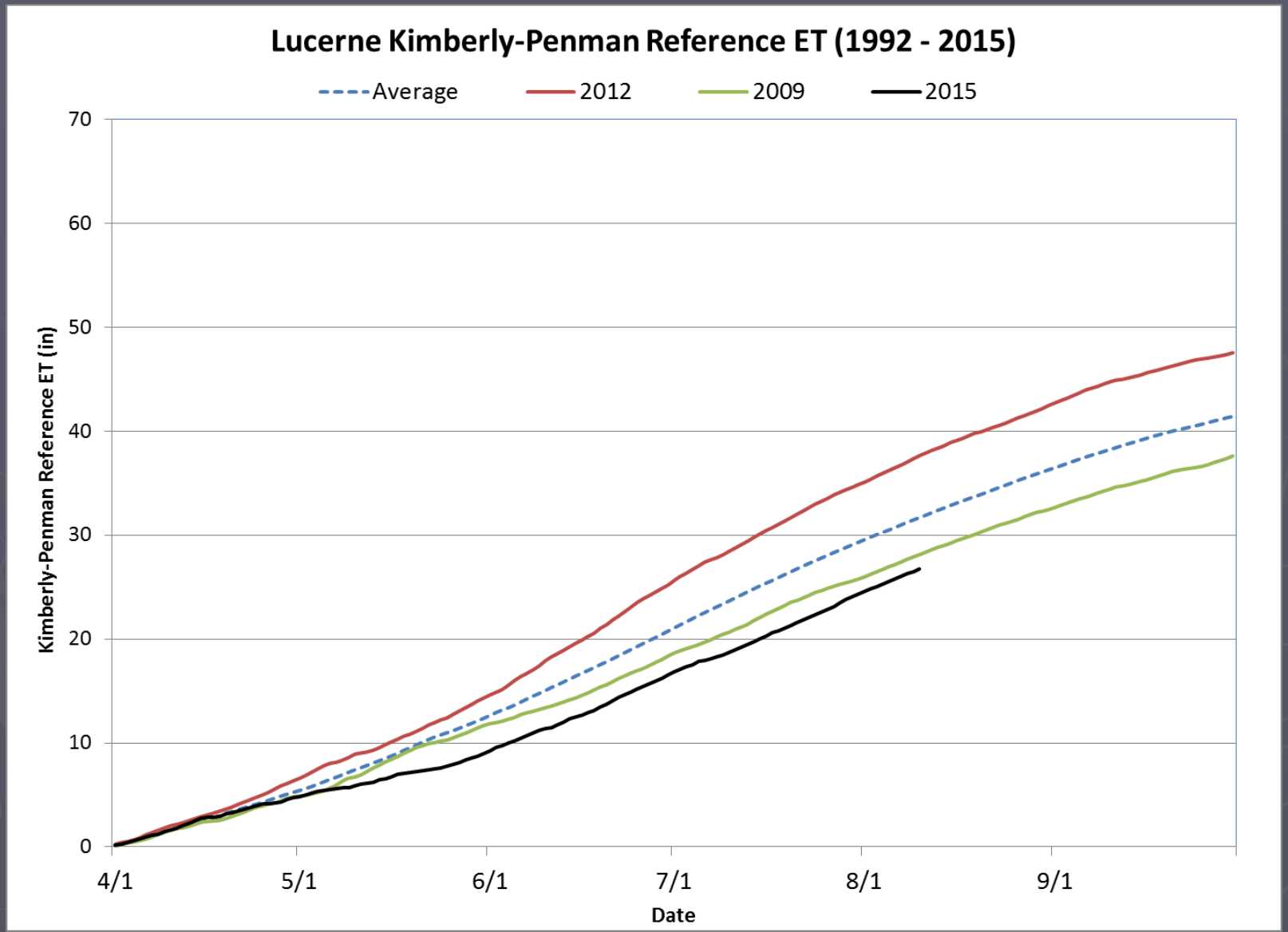
Holly (HLY01) – Looking towards the West

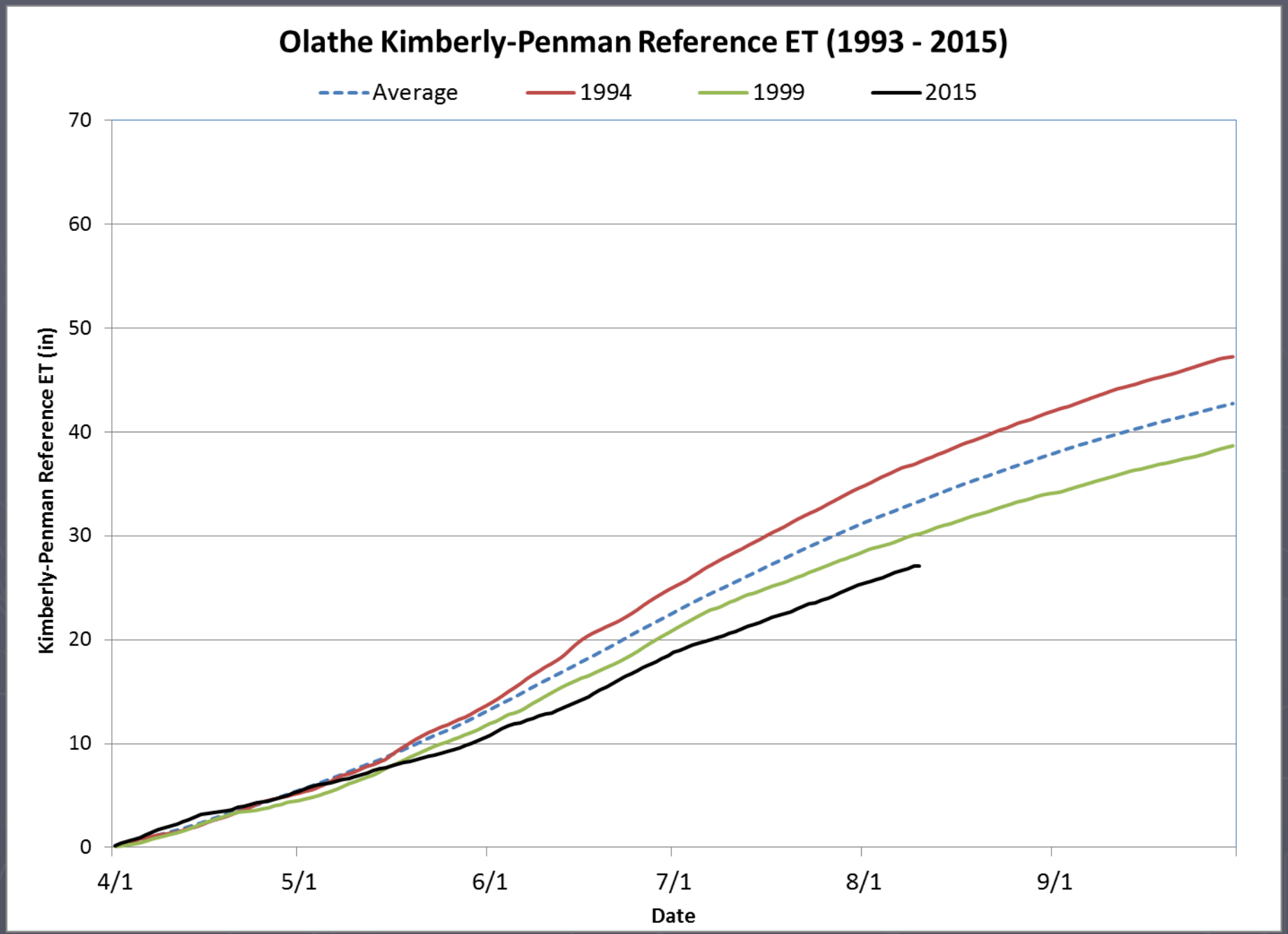
6/12/2014

The Fruit – nearly 25 years of ref ET data now available – neat stuff



We now rely on CoAgMet ref ET to guide U.S. Drought Monitor mapping



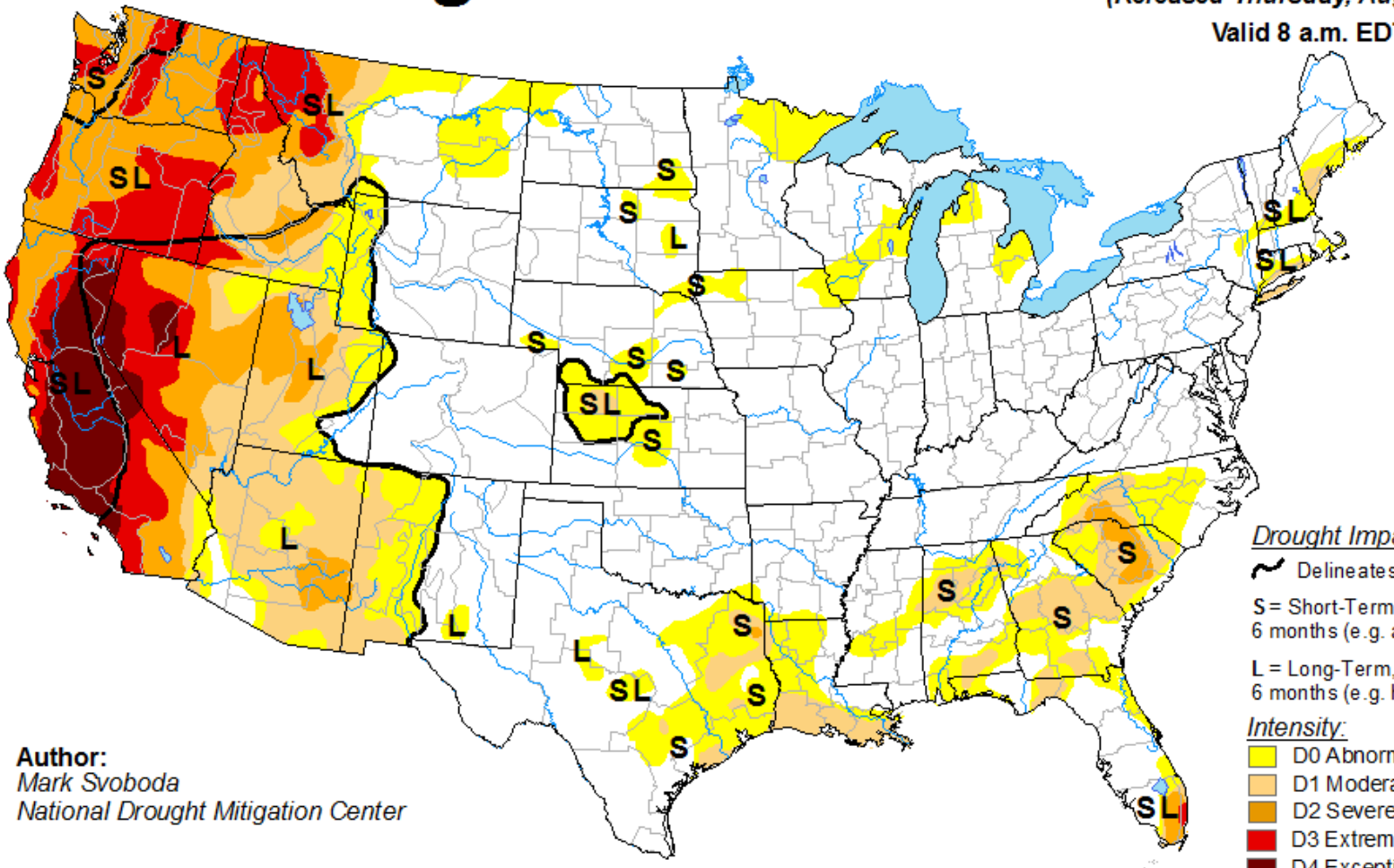

Olathe Kimberly-Penman Reference ET (1993 - 2015)
Average
1994
1999
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date

U.S. Drought Monitor

August 4, 2015

(Released Thursday, Aug. 6, 2015)

Valid 8 a.m. EDT



Author:
Mark Svoboda
National Drought Mitigation Center

Drought Impact Types:

Delineates dominant impacts

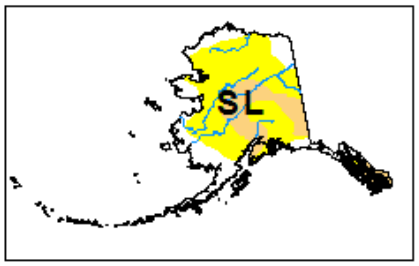
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

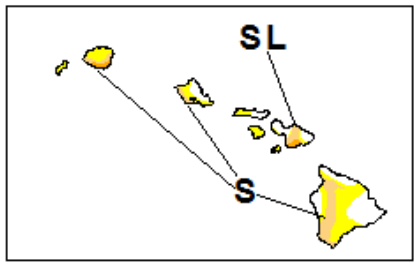
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

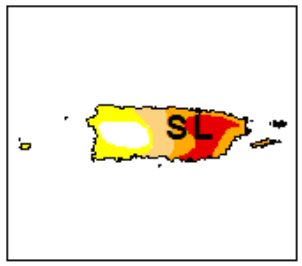
Intensity:

- 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.





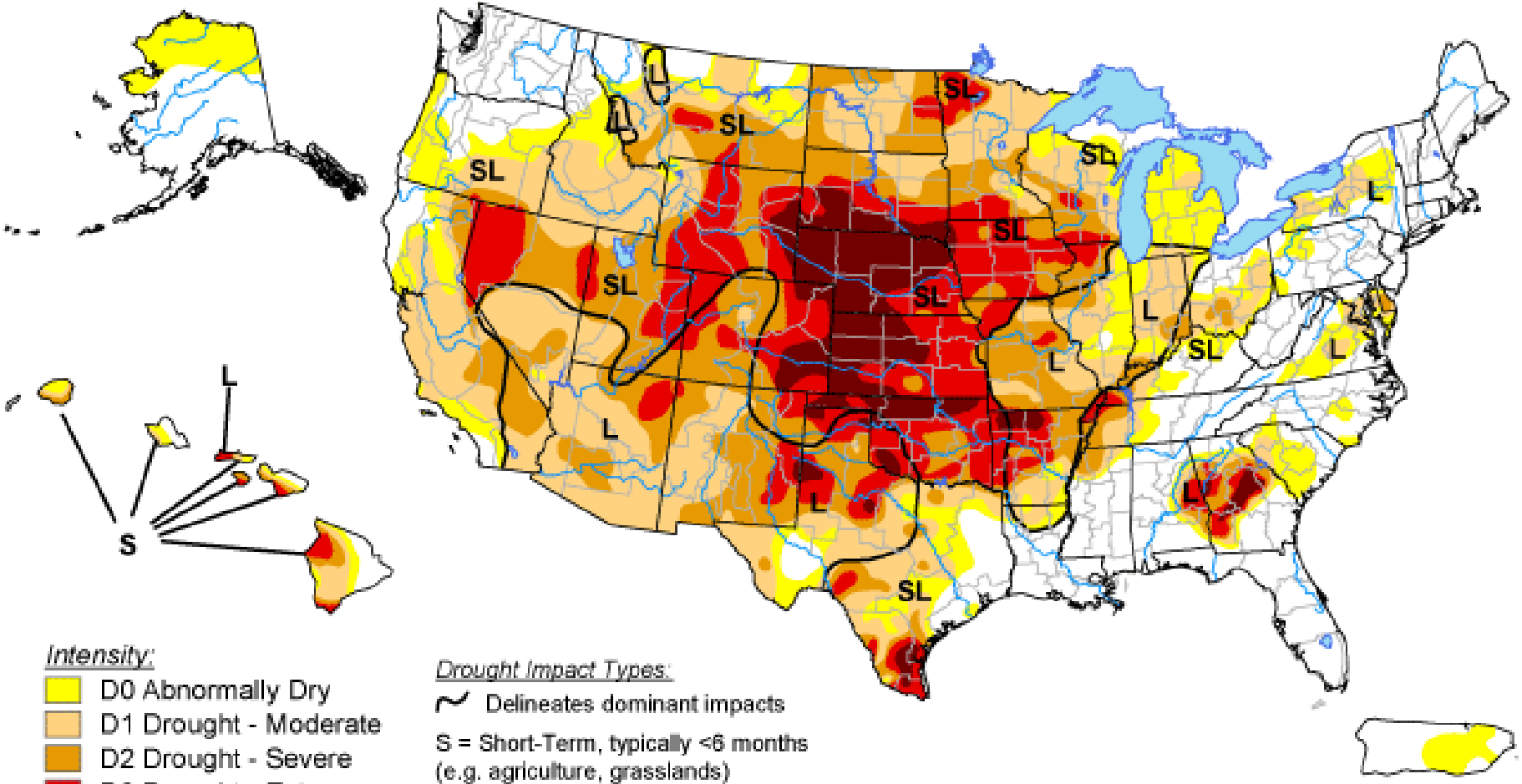


USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

October 2, 2012
Valid 7 a.m. EDT



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http://droughtmonitor.unl.edu/

Released Thursday, October 4, 2012

Author: Anthony Artusa, NOAA/NWS/NCEP/CPC

CoAgMet web access:

http://ccc.atmos.colostate.edu/~coagmet/

Colorado Climate Center

Colorado State University
Knowledge to Go Places

So . . My question is "Do you have a rain gauge?"

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

http://www.cocorahs.org

or see me today

Rain!

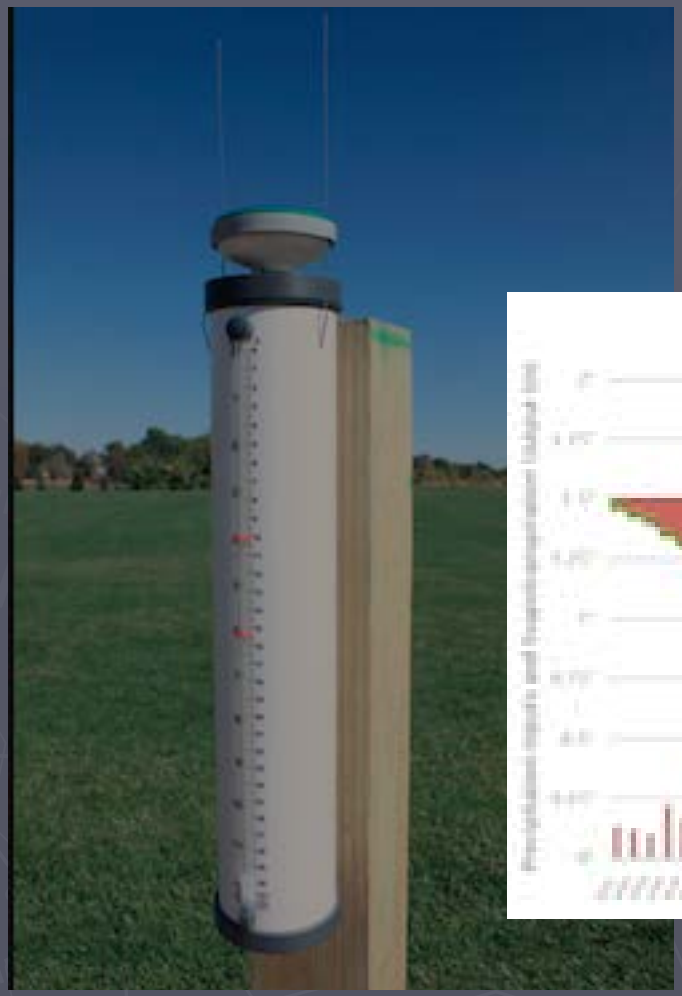
Hail!

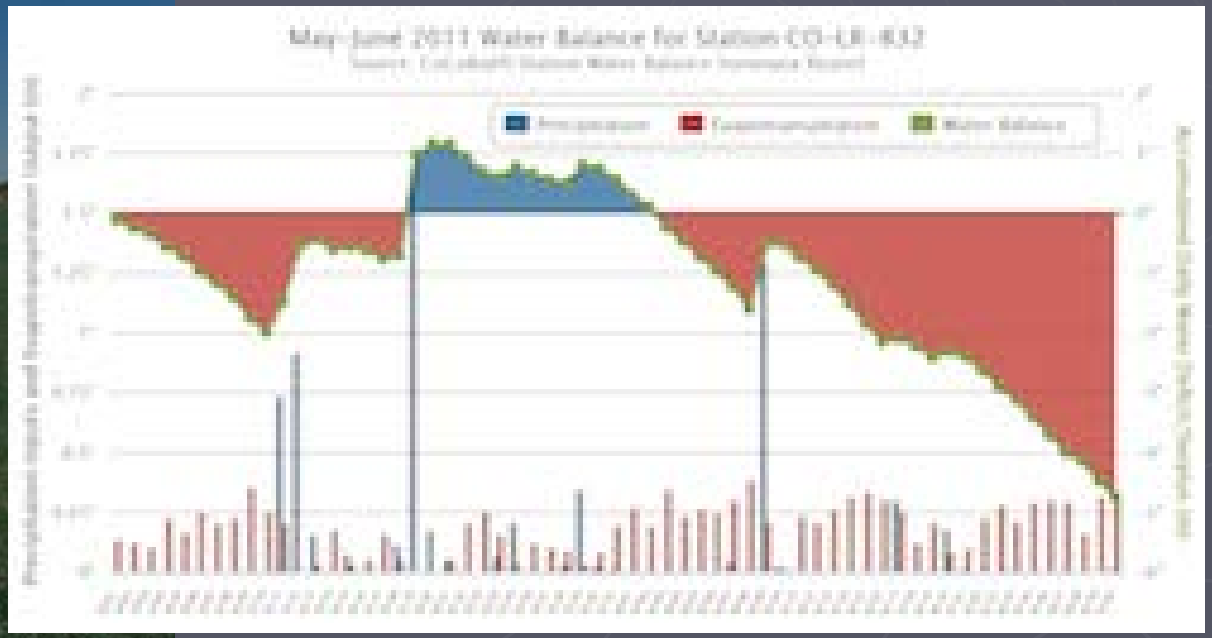
Snow!

CoCoRaHS (Community Collaborative Rain, Hail and Snow) – A simple but effective way to help scientists track our climate

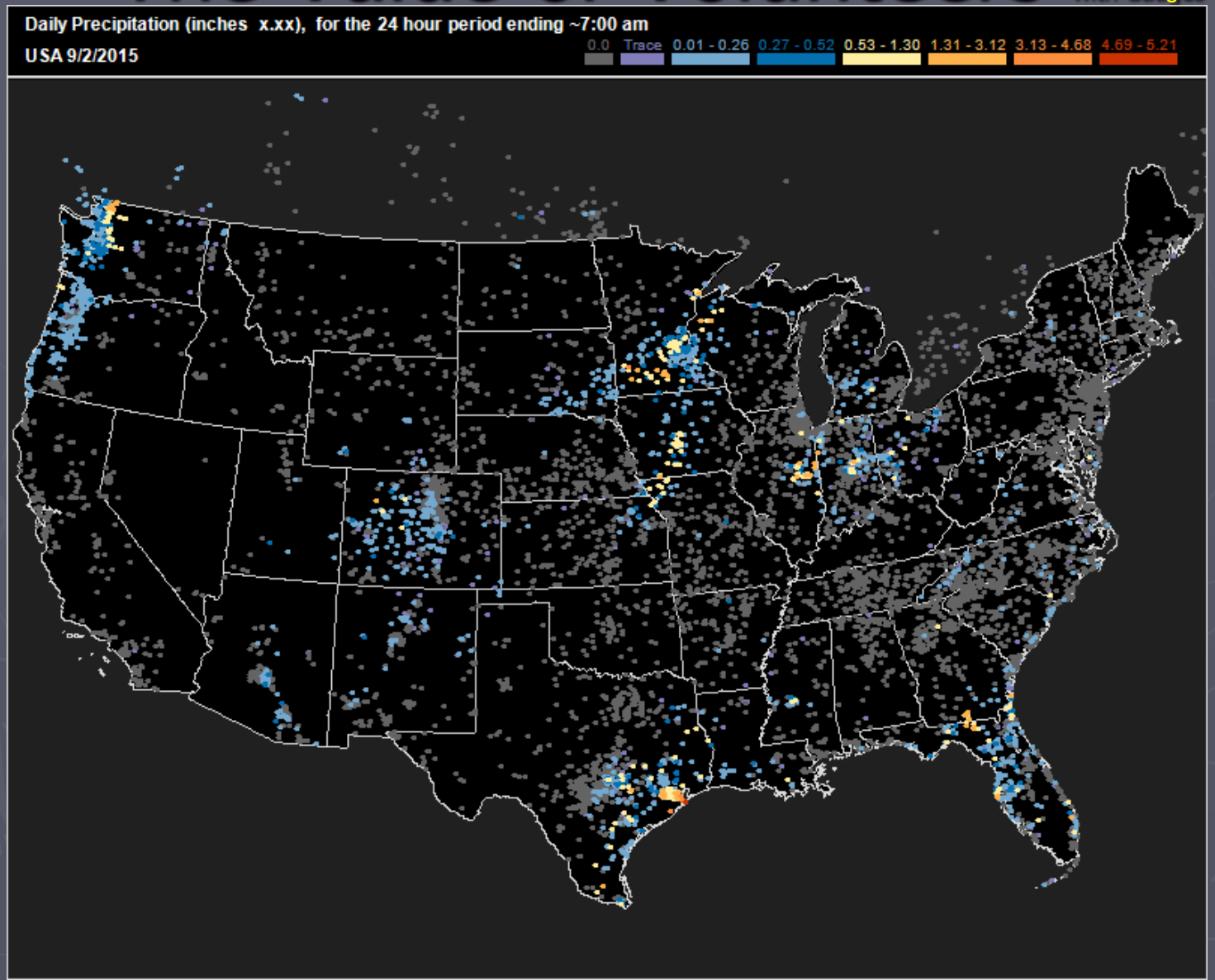
http://www.cocorahs.org

We Even Measure Eto and the water balance





Mapping our water as it lands: -The Value of Volunteers with Gauges



Join Us! Tell others!
We need rural observers

http://www.cocorahs.org