The Research, Products, and Services of the Colorado Climate Center

Dr. Becky Bolinger, Climatologist

Zach Schwalbe, CoAgMET Manager

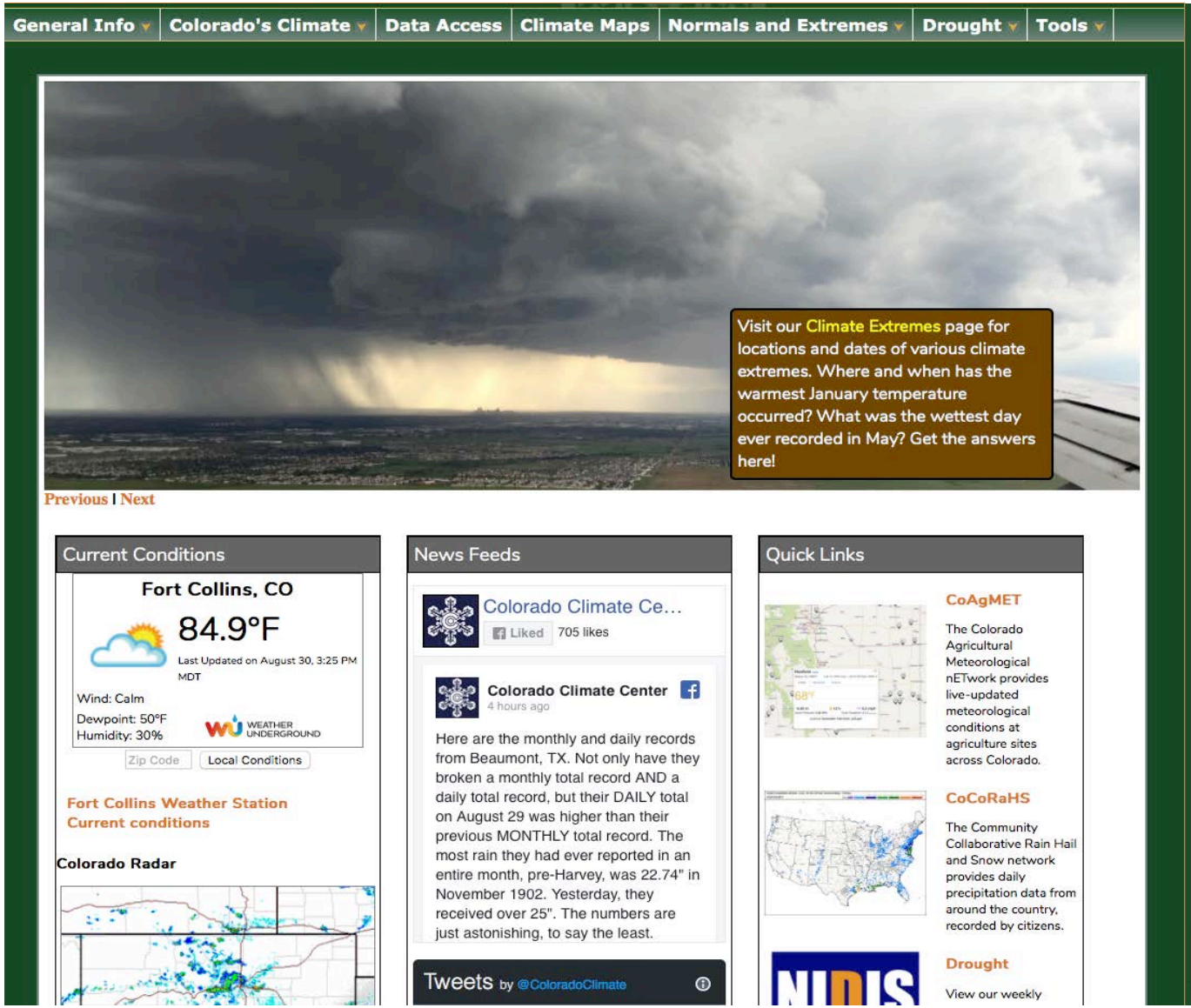
August 31, 2017

COLORADO STATE UNIVERSITY | COLORADO CLIMATE CENTER
Providing information and expertise on Colorado's complex climate

Colorado Climate Center

- Providing climate services to the state of Colorado since 1974
- “collect and observe data with the purpose of monitoring the climate…”
- “place individual events into historical perspective...”
- “disseminate climate information to the user community...”
- “communicate climate variability of Colorado to scientists, educators, stakeholders, media, and the general public.”

Our Products and Services



climate.colostate.edu

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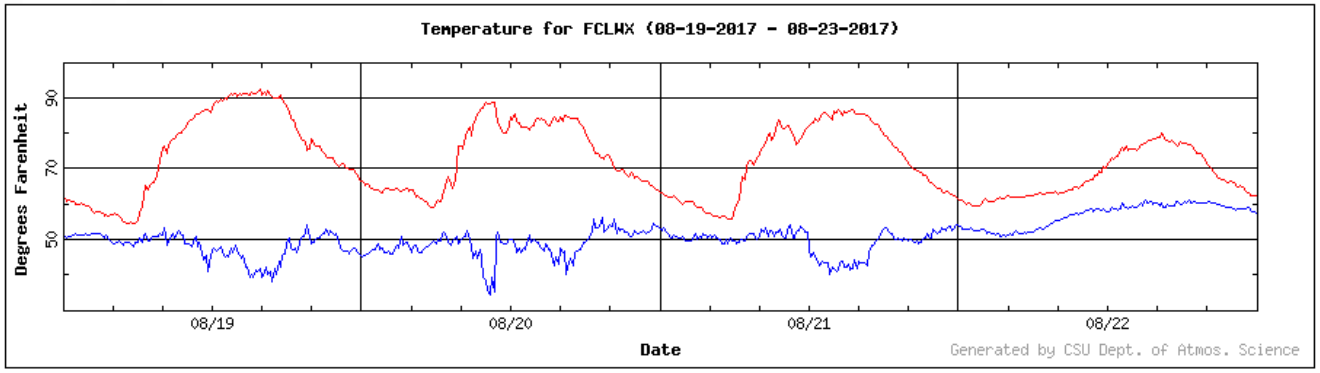

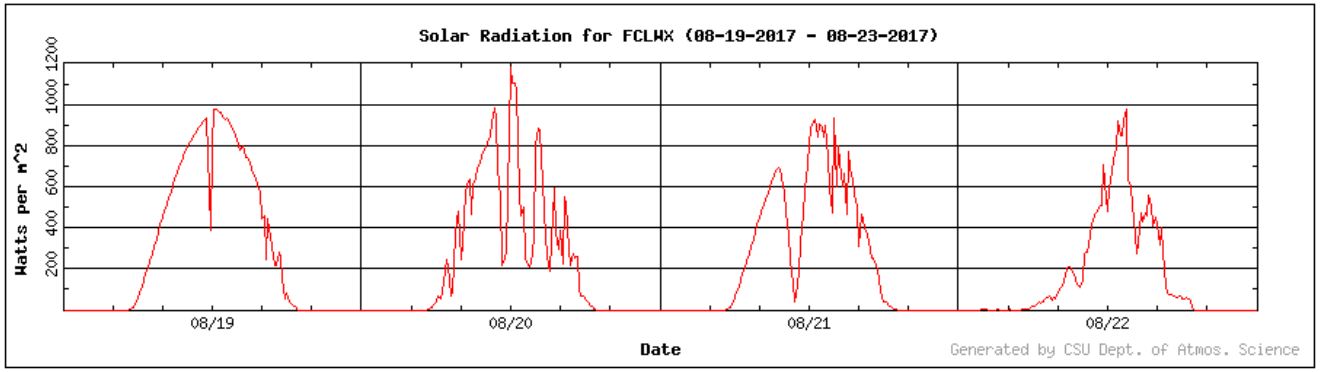

Fort Collins
Campus Weather Station

climate.colostate.edu/~autowx

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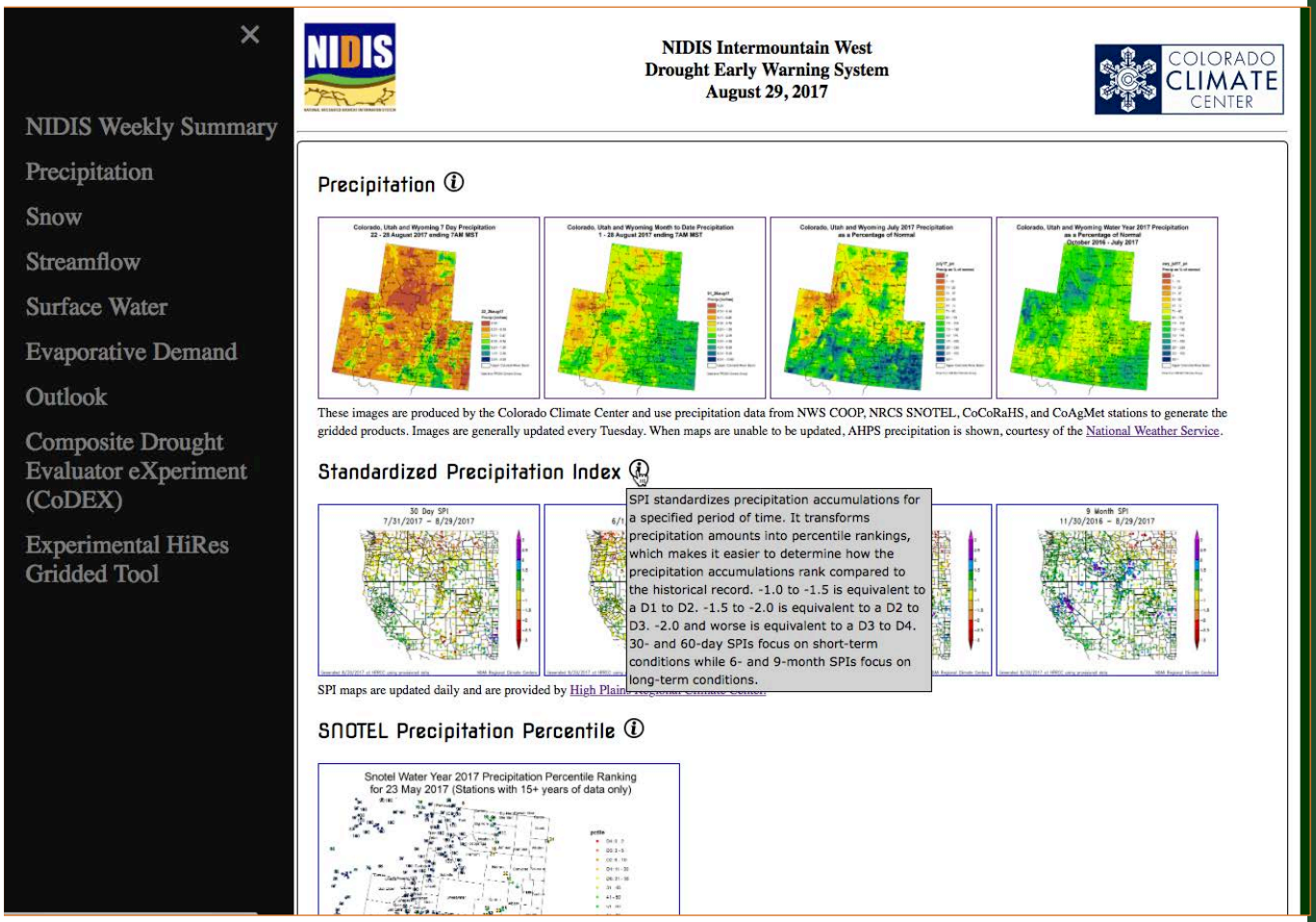

Drought Monitoring

climate.colostate.edu/~drought

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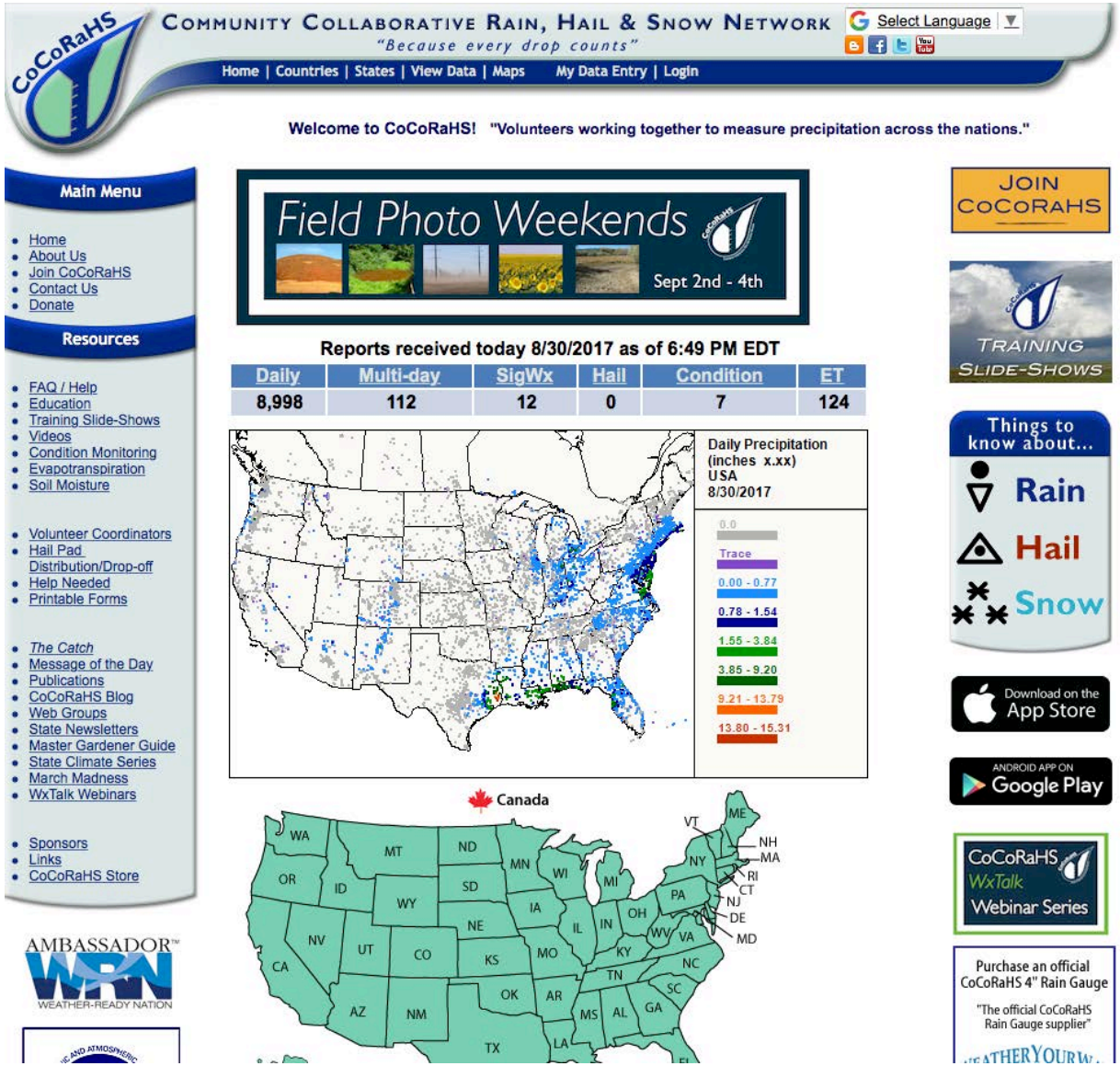

CoCoRaHS

cocorahs.org

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CoCoRaHS

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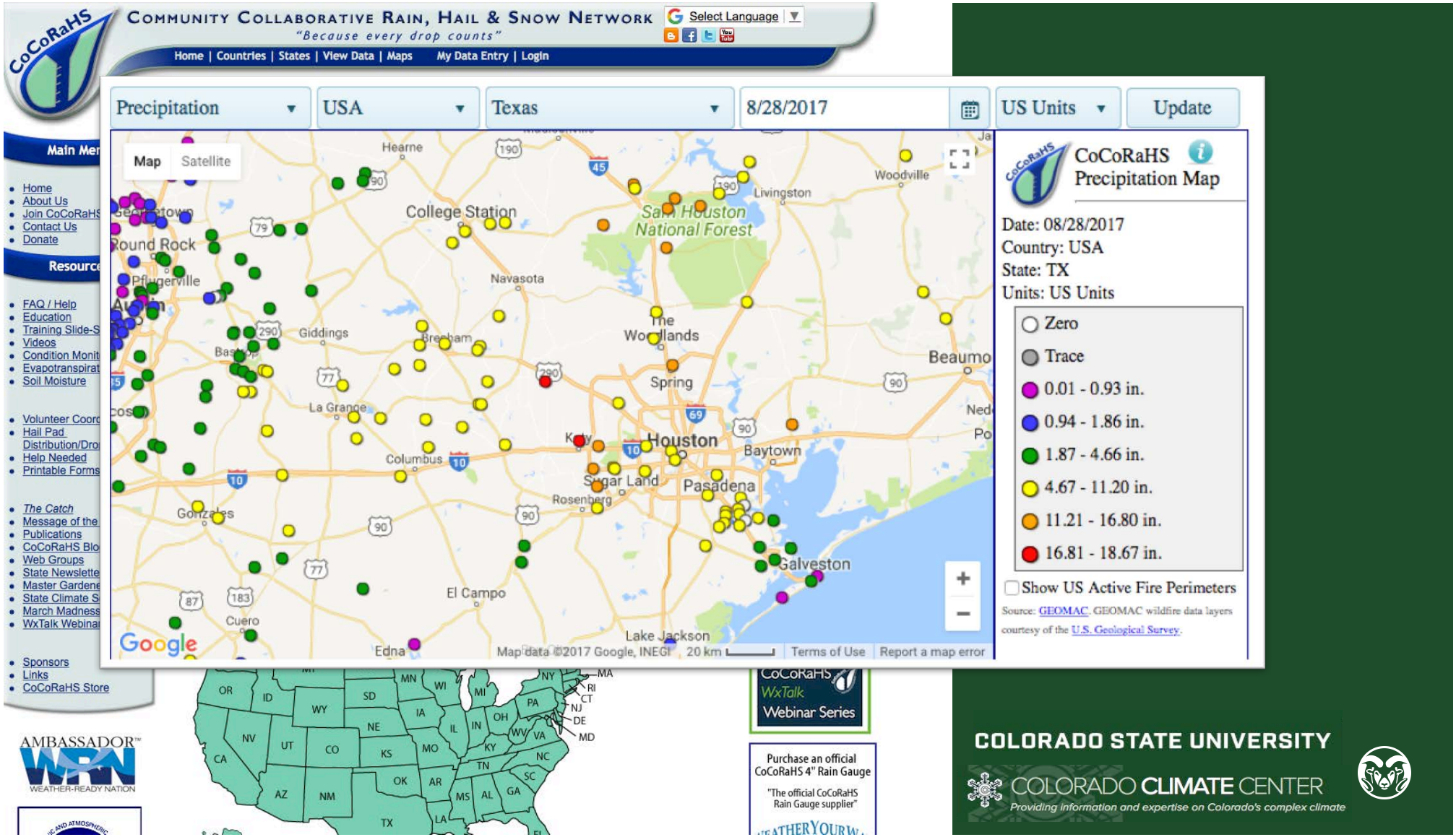
CoCoRaHS
Community Collaborative Rain, Hail & Snow Network
"Because every drop counts"
Select Language
Home | Countries | States | View Data | Maps | My Data Entry | Login
Precipitation
USA
Texas
8/28/2017
US Units
Update
Map
Satellite
College Station
Sam Houston National Forest
Navasota
Round Rock
Pflugerville
Giddings
Brenham
The Woodlands
Spring
Houston
Baytown
Pasadena
Sugar Land
Beaumo
Woodville
Livingston
La Grange
Columbus
Rosenberg
Gonzales
El Campo
Cuero
Edna
Lake Jackson
Galveston
Google
Map data ©2017 Google, INEGI
20 km
Terms of Use
Report a map error
CoCoRaHS Precipitation Map
Date: 08/28/2017
Country: USA
State: TX
Units: US Units
Zero
Trace
0.01 - 0.93 in.
0.94 - 1.86 in.
1.87 - 4.66 in.
4.67 - 11.20 in.
11.21 - 16.80 in.
16.81 - 18.67 in.
Show US Active Fire Perimeters
Source: GEOMAC. GEOMAC wildfire data layers courtesy of the U.S. Geological Survey.
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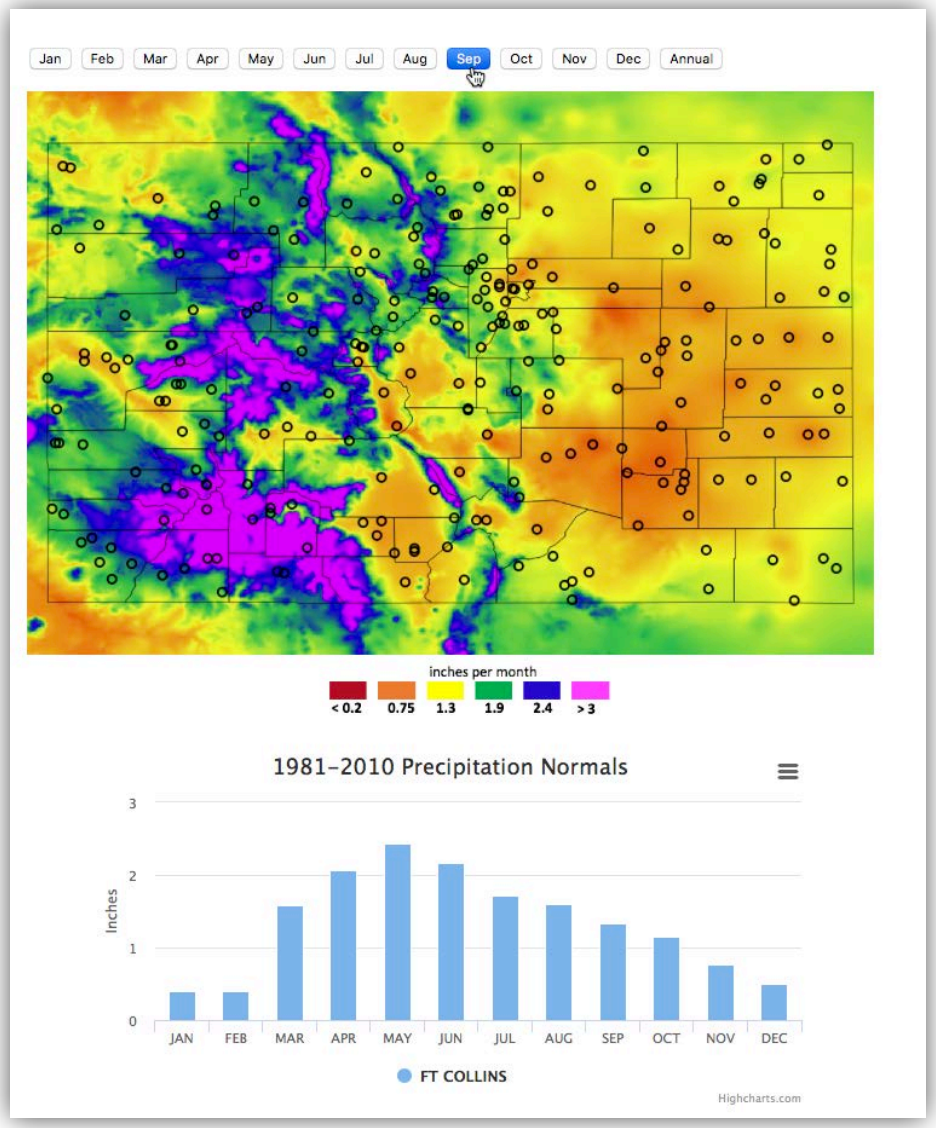

Climate Normals:

climate.colostate.edu/normals.html

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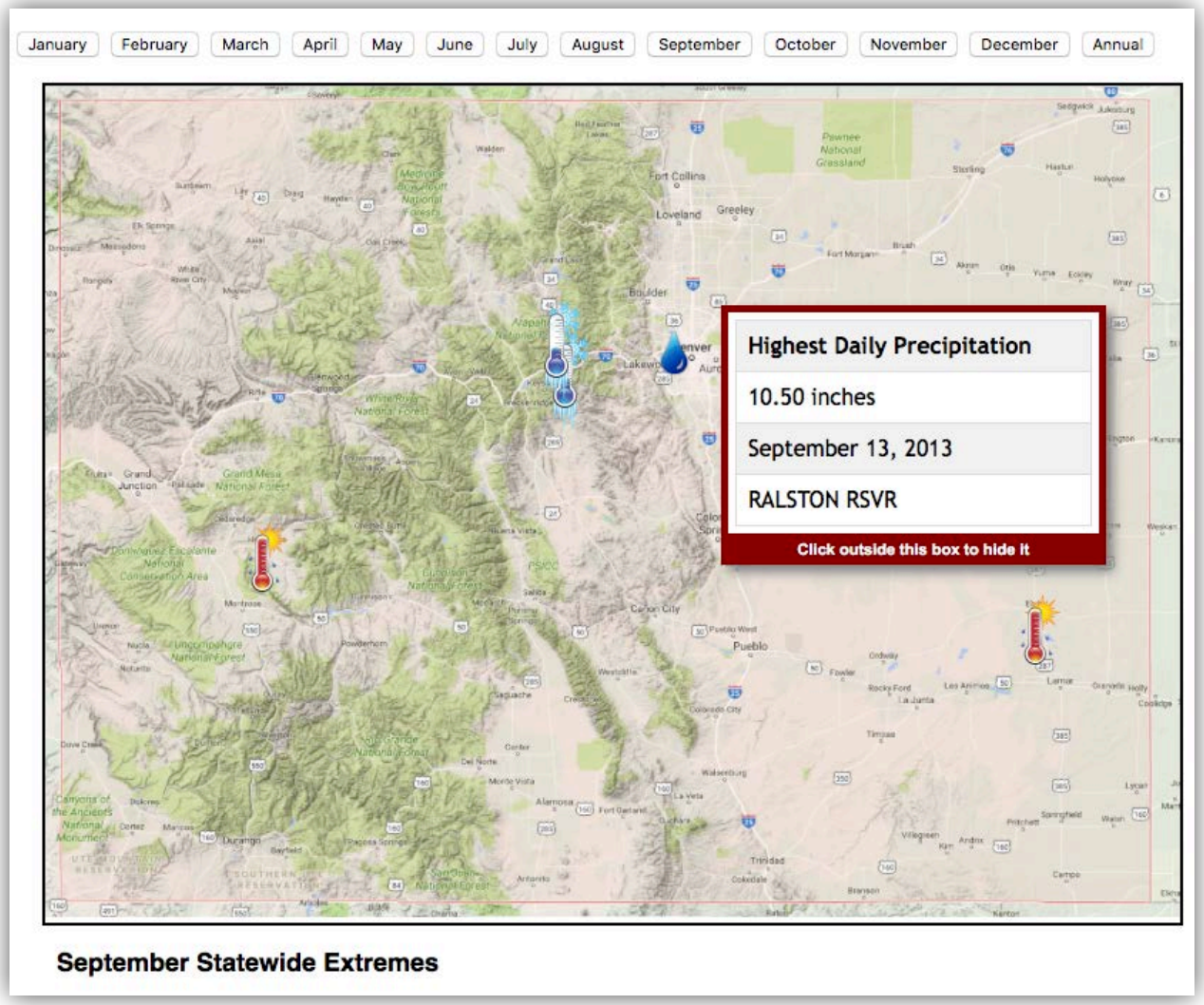

September Statewide Extremes

Climate Extremes:

climate.colostate.edu/extremes.html

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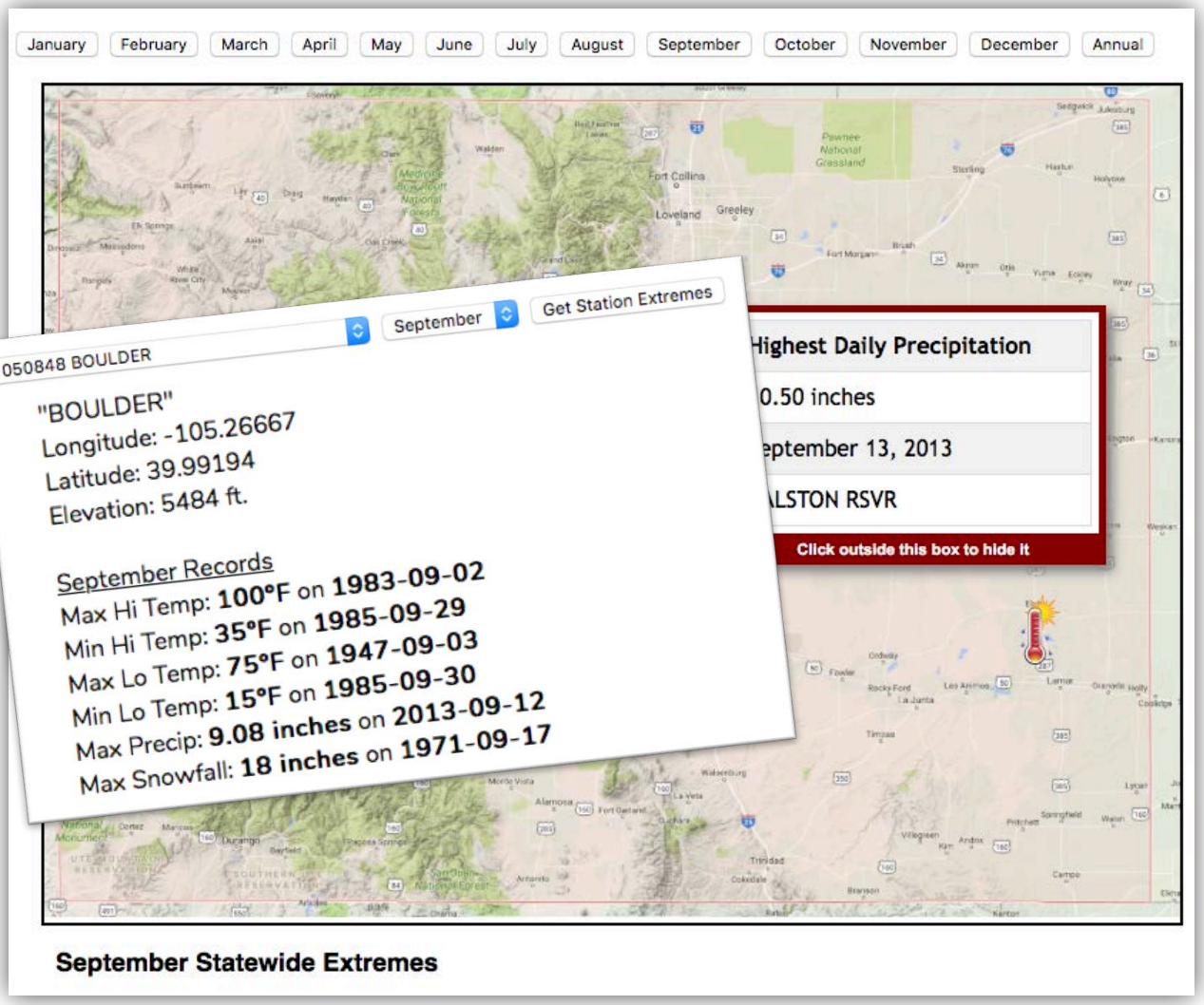

September Statewide Extremes

Climate Extremes:

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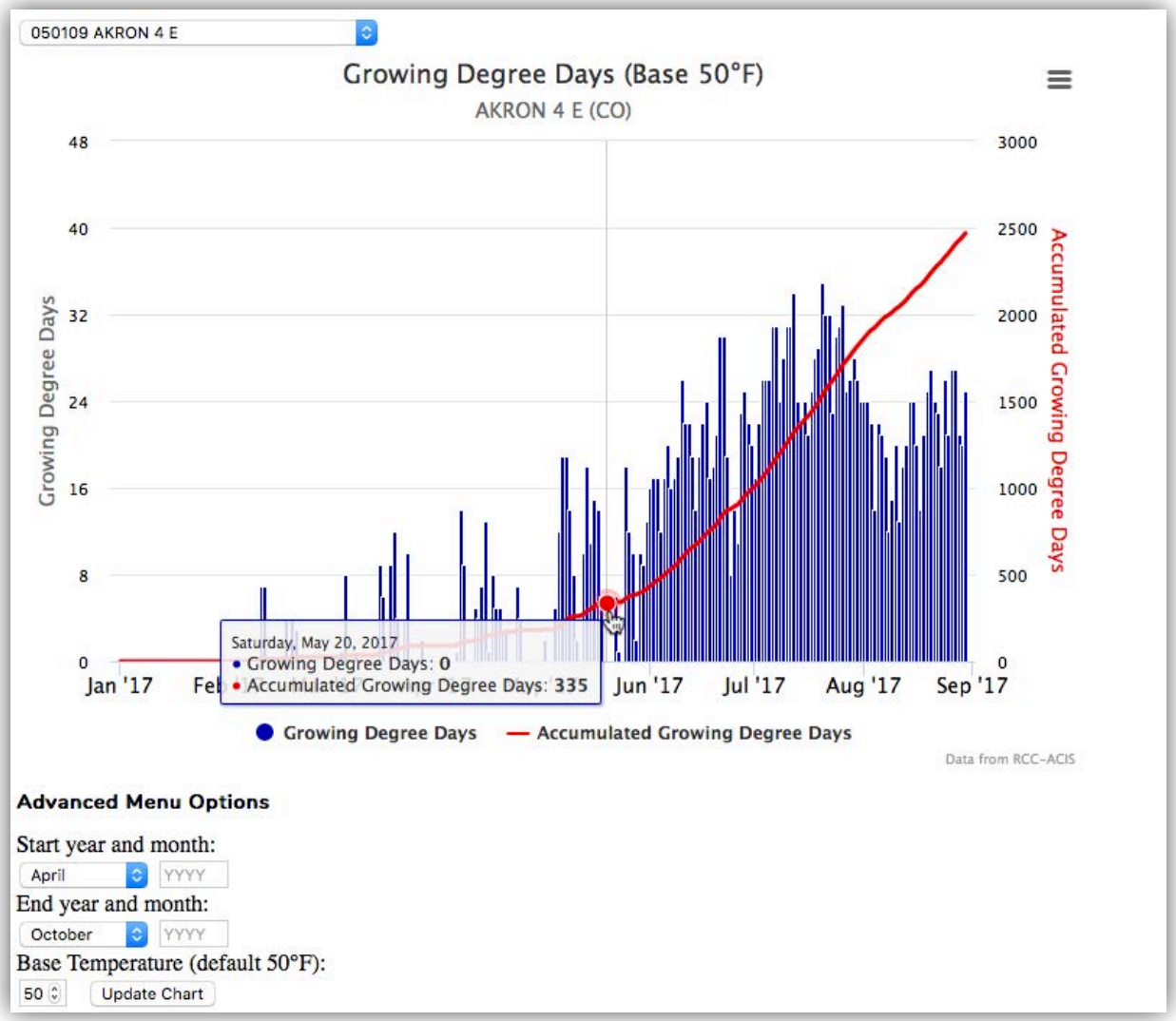

Tools:

climate.colostate.edu/tools.html

← Growing Degree Days Tool

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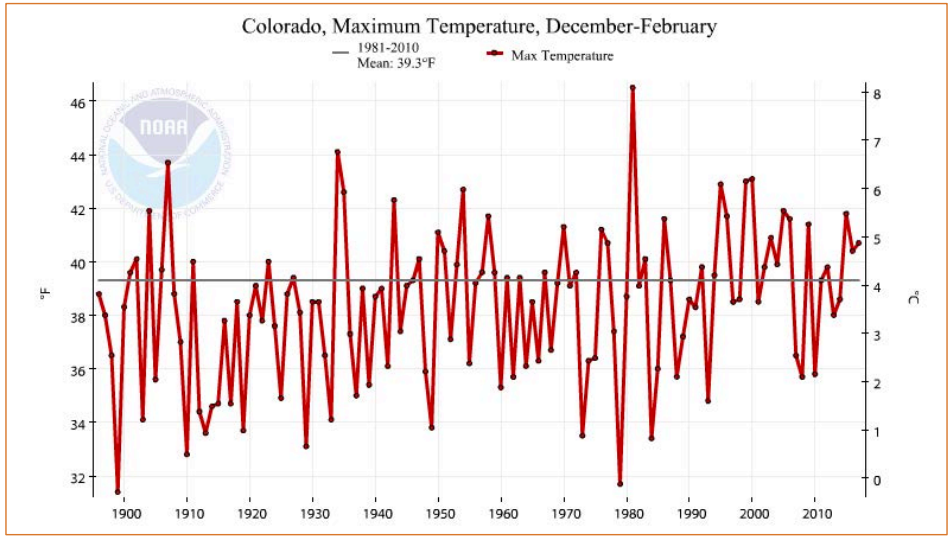
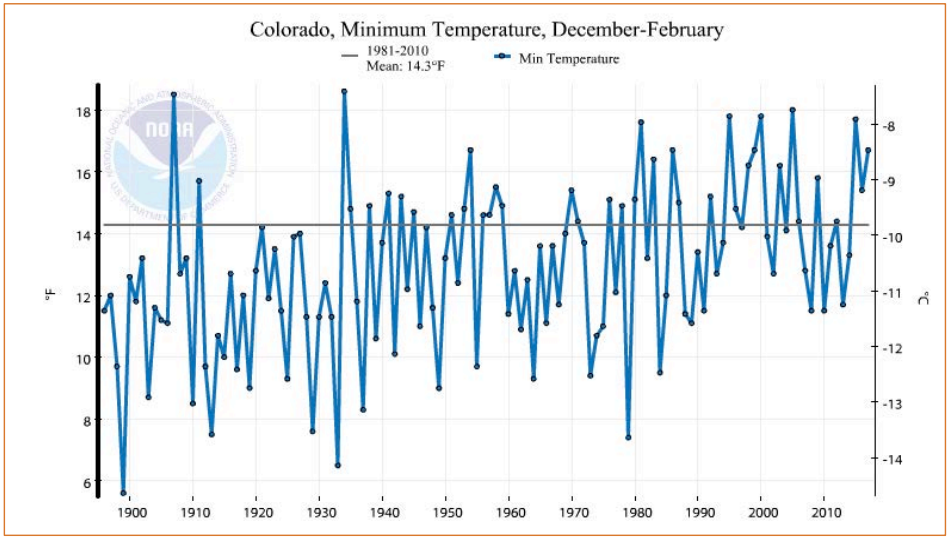
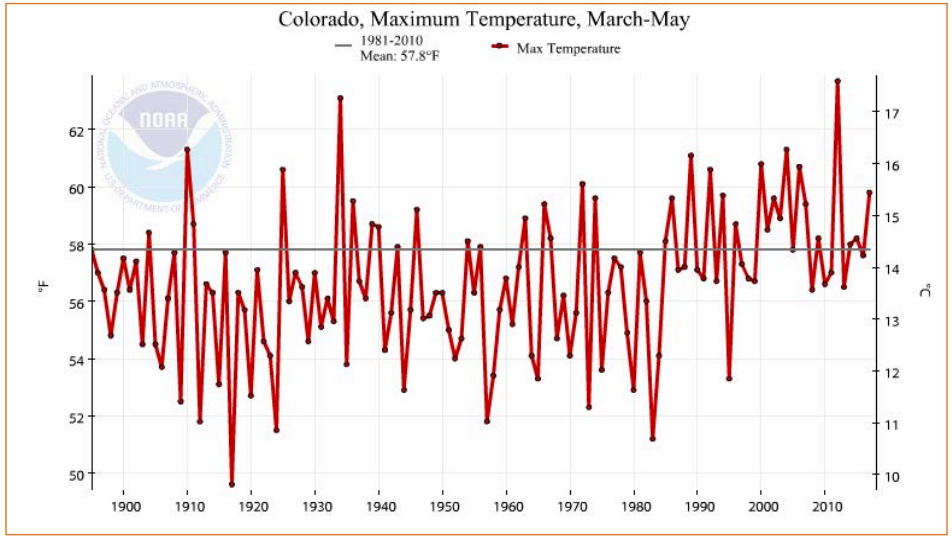
The Climate of Colorado

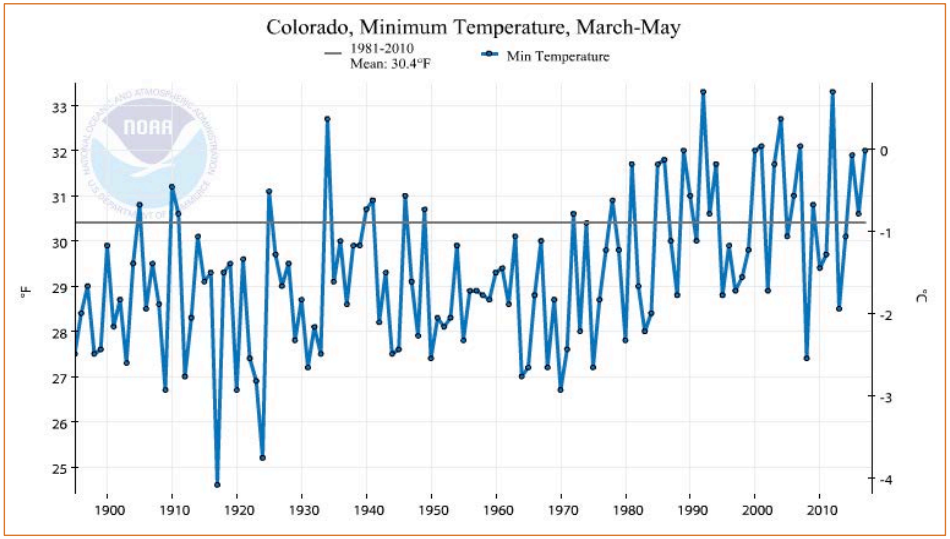
Winter Temperature Variability



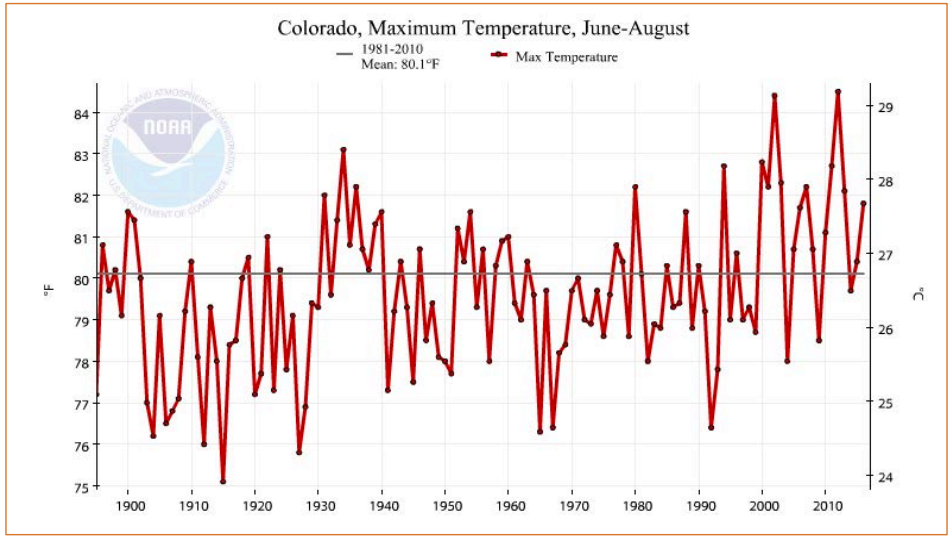


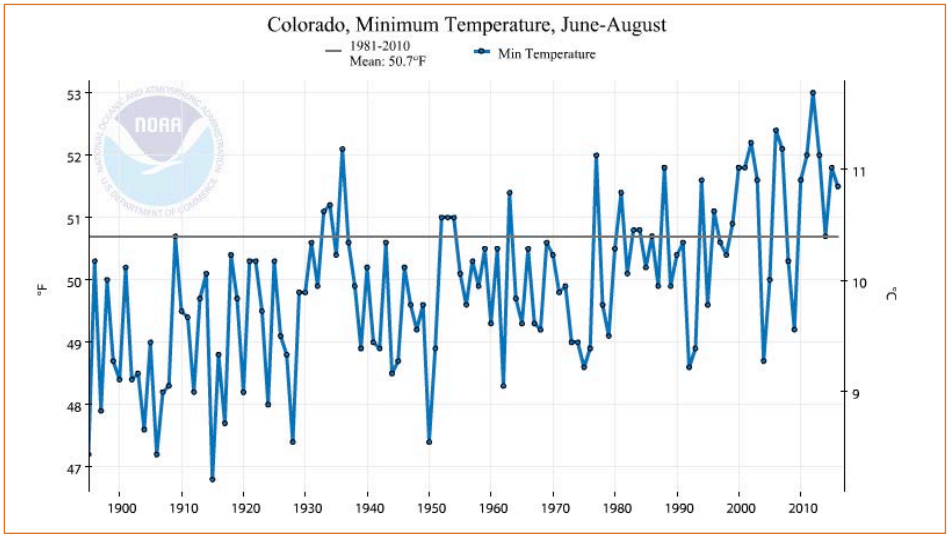
Spring Temperature Variability



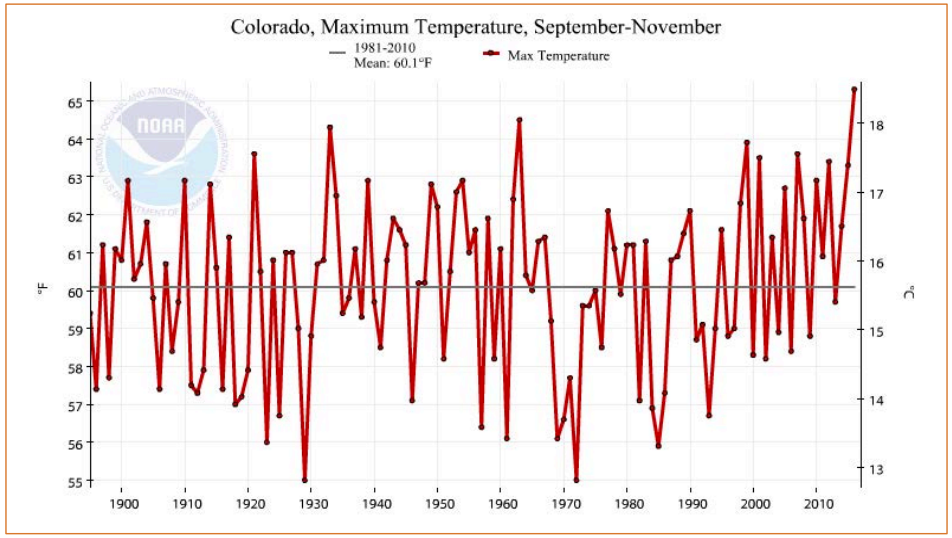


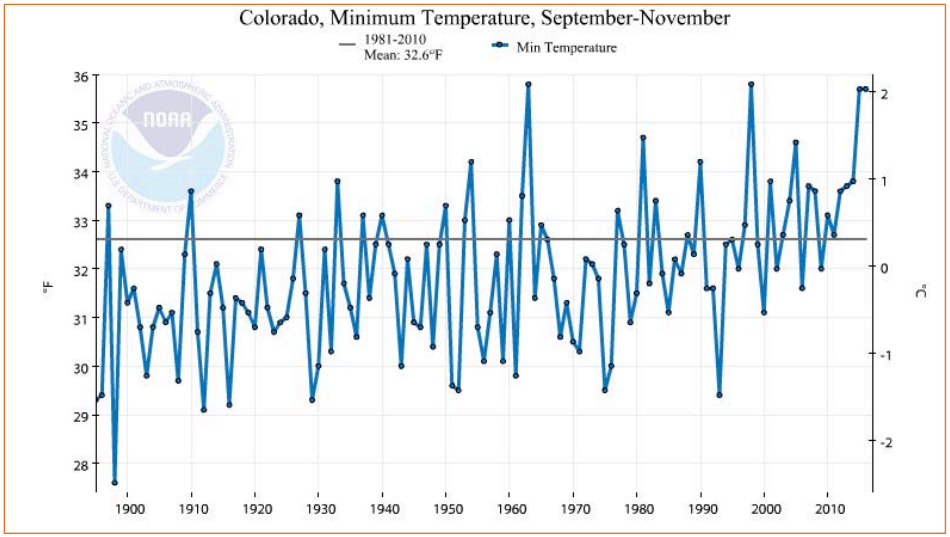
Summer Temperature Variability



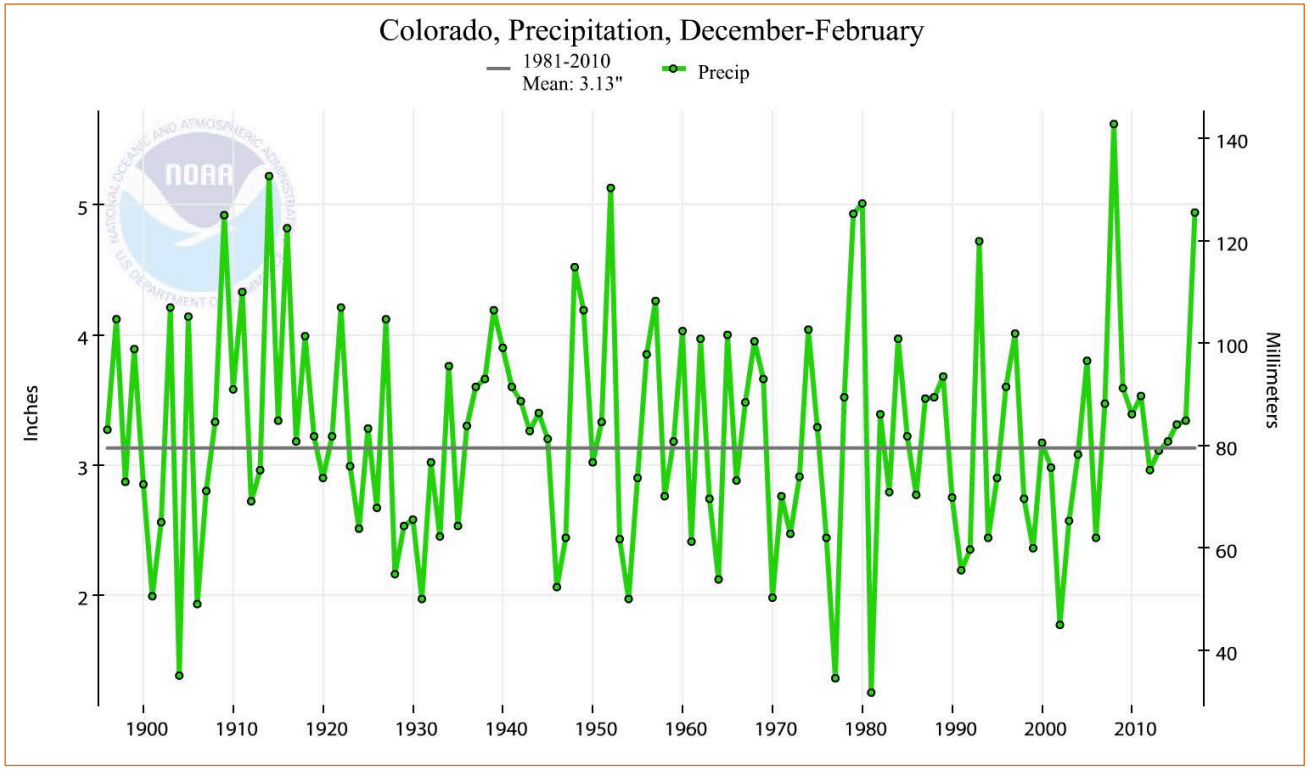


Fall Temperature Variability

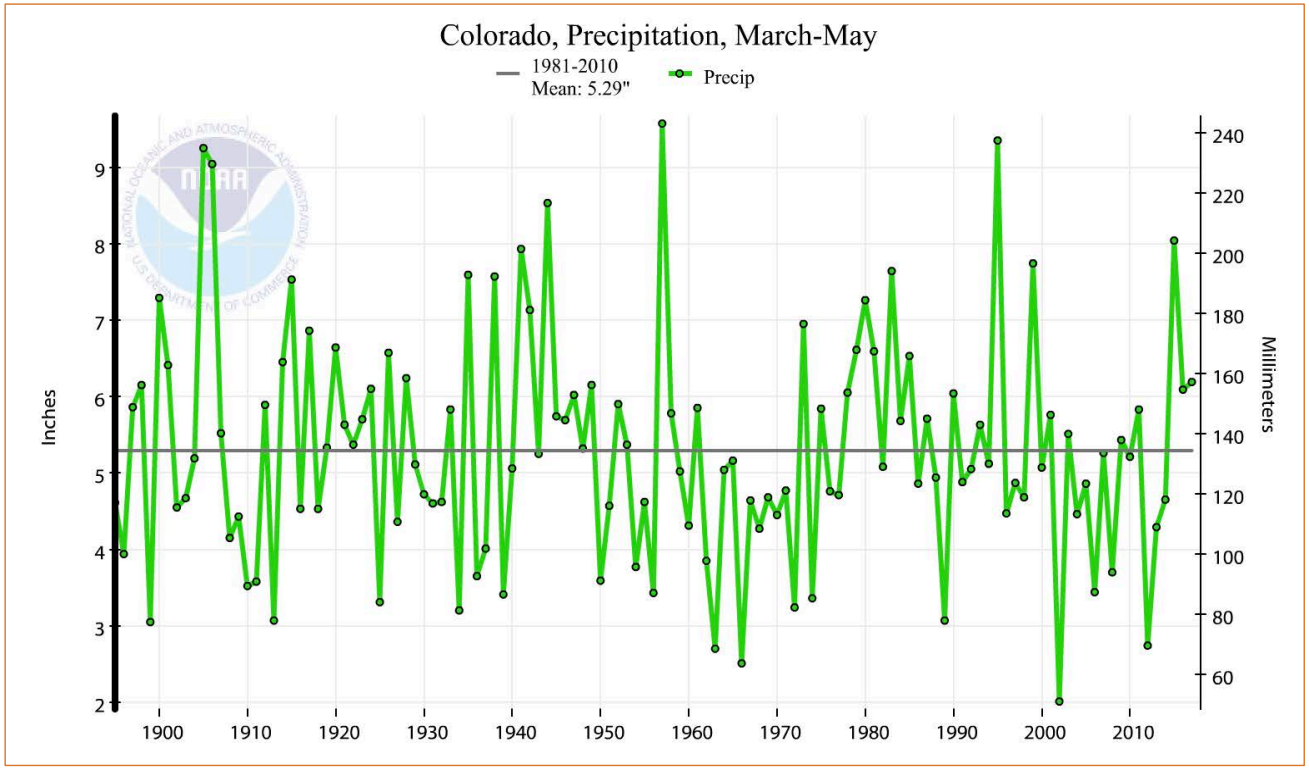




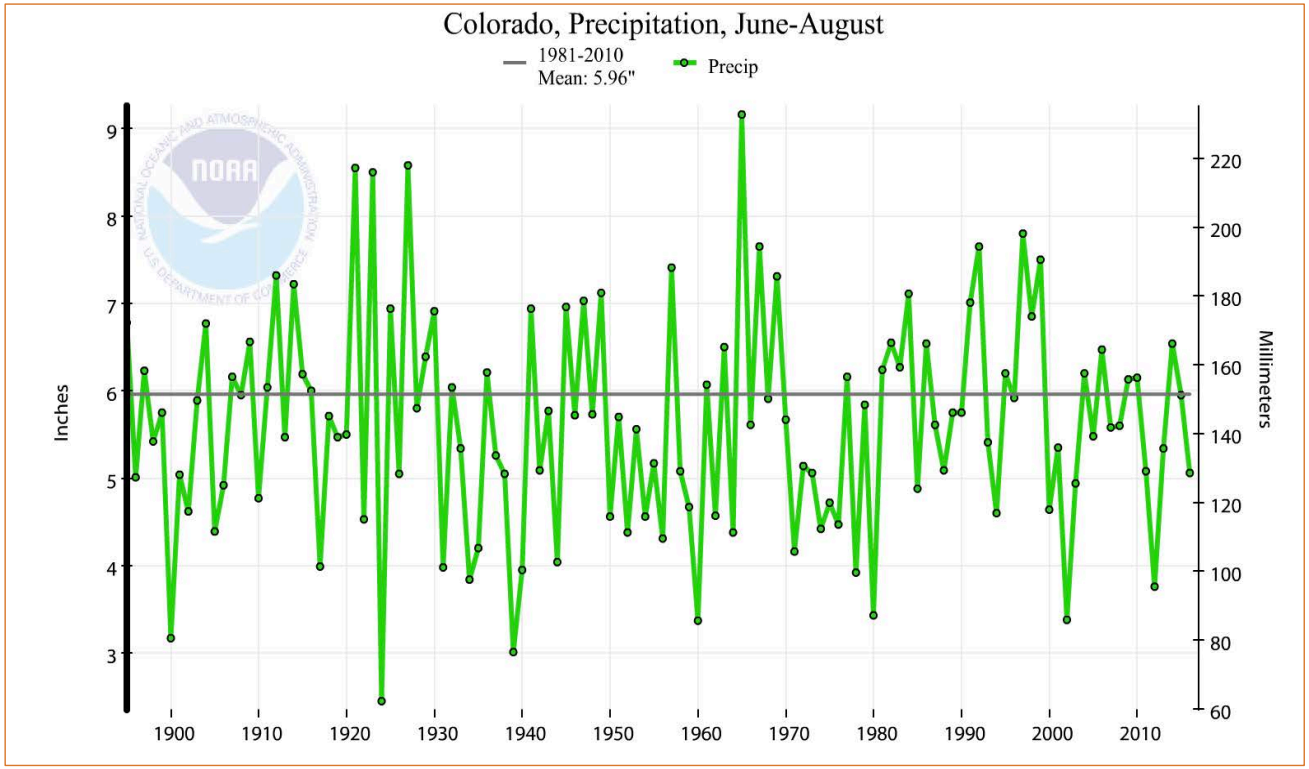
Winter Precipitation Variability



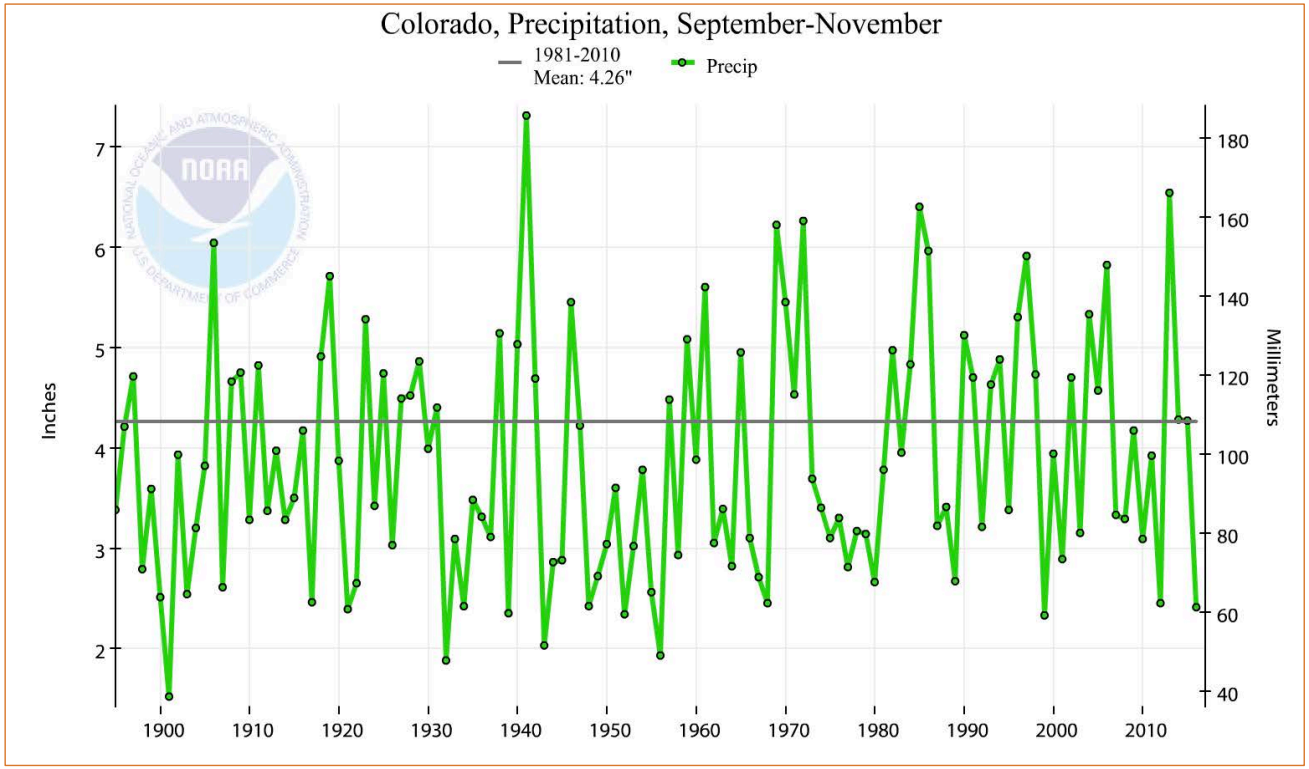
Spring Precipitation Variability



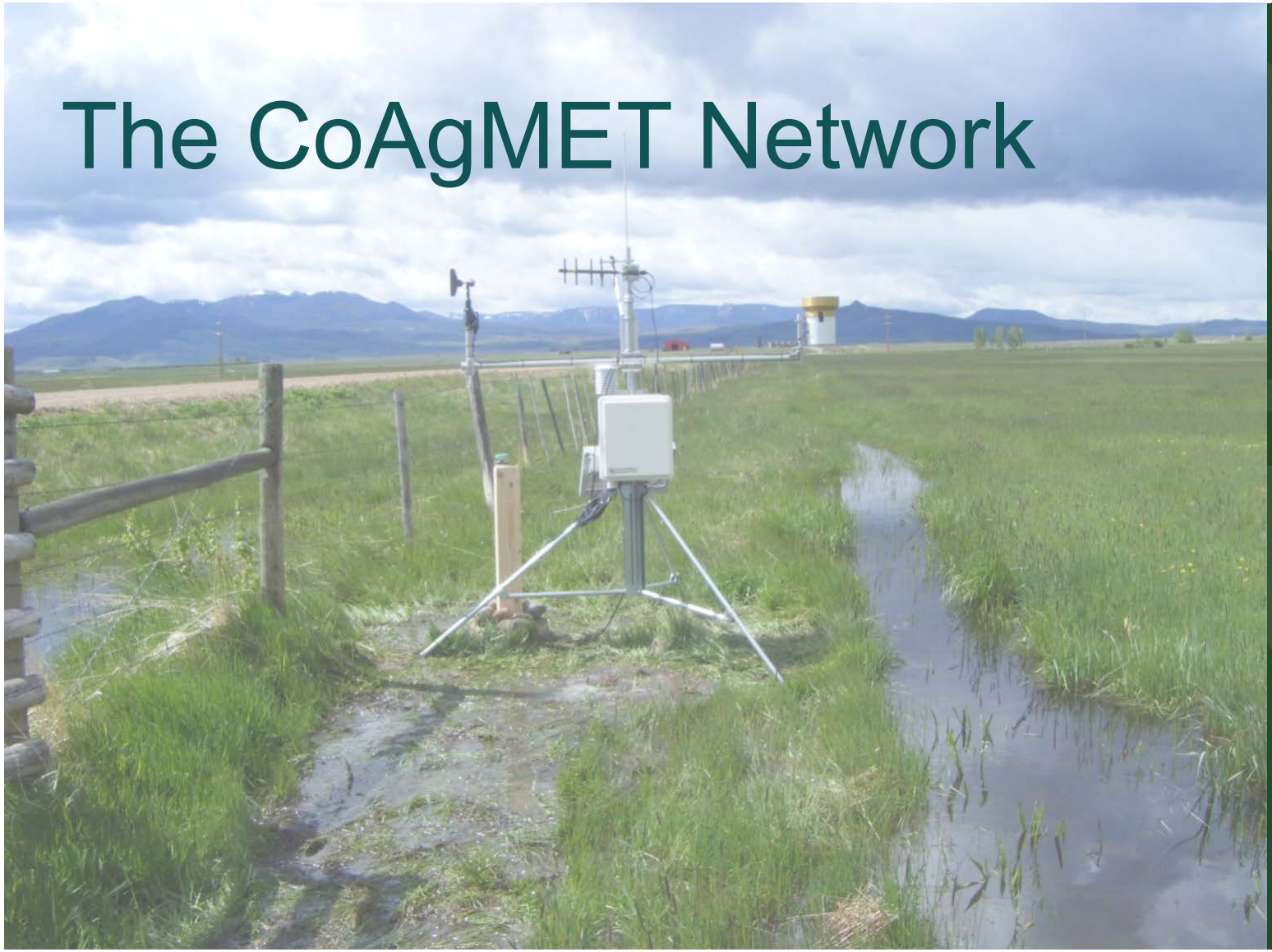
Summer Precipitation Variability



Fall Precipitation Variability



The CoAgMET Network



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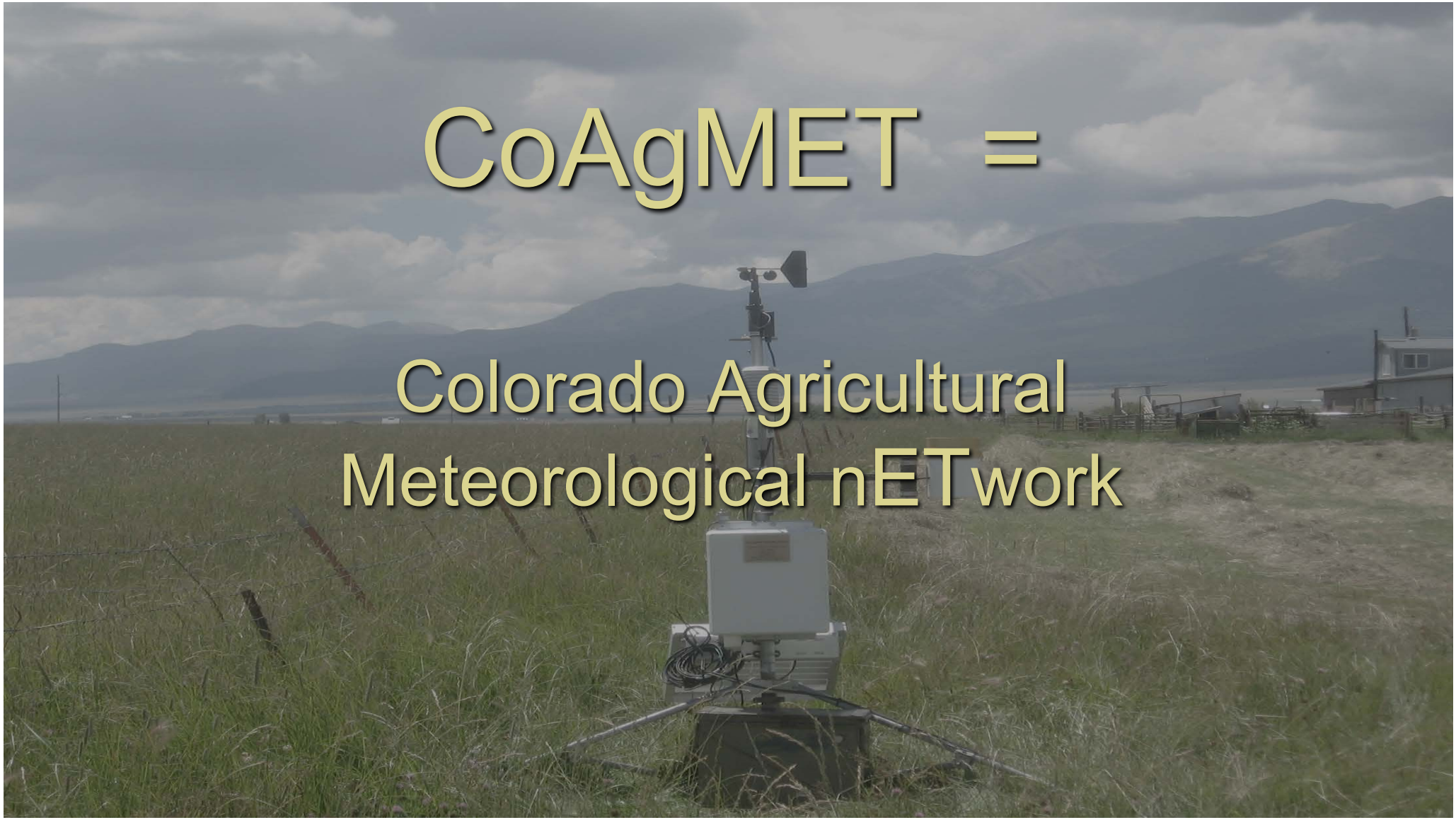
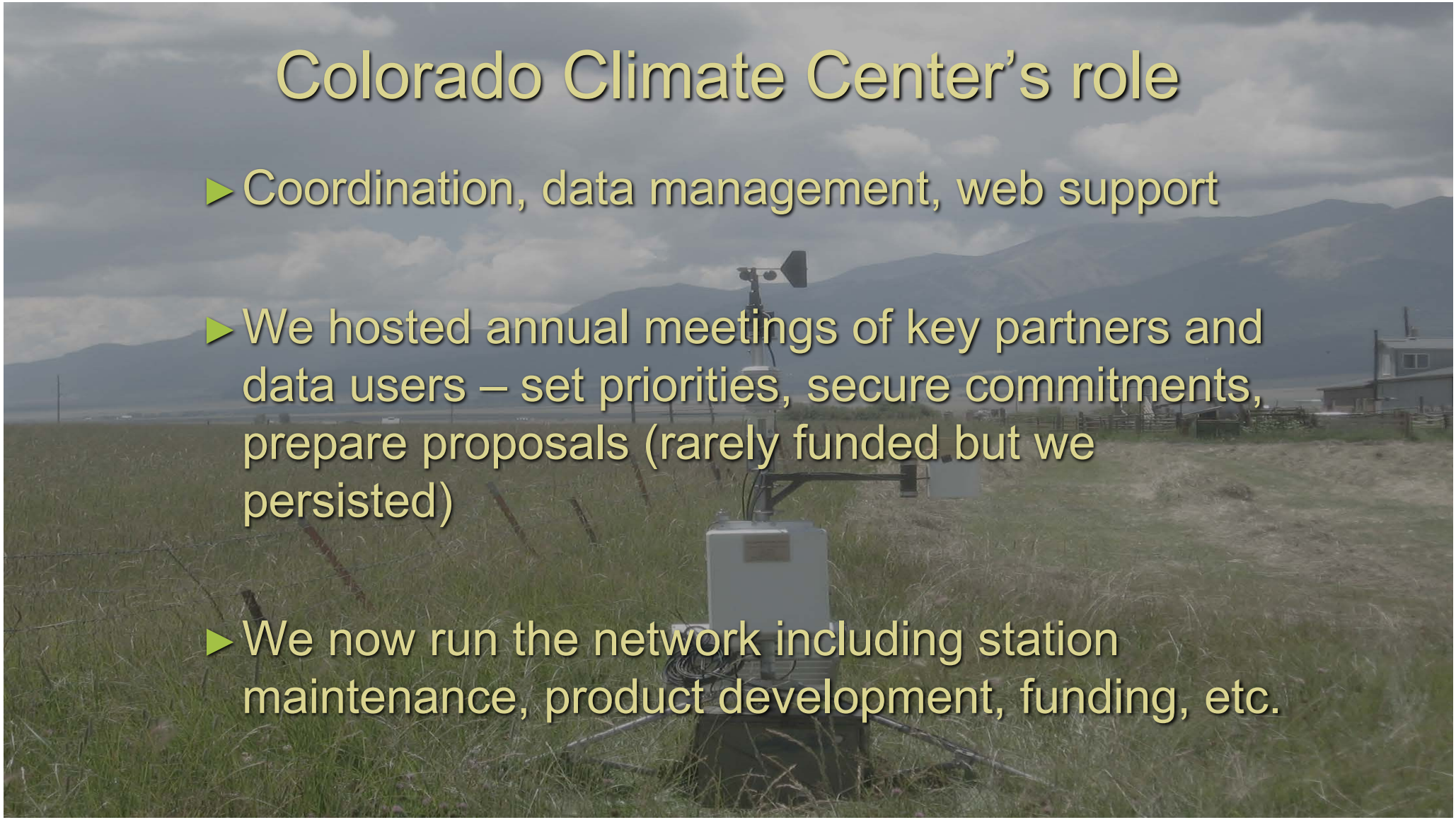

CoAgMET =
Colorado Agricultural
Meteorological nETwork

History

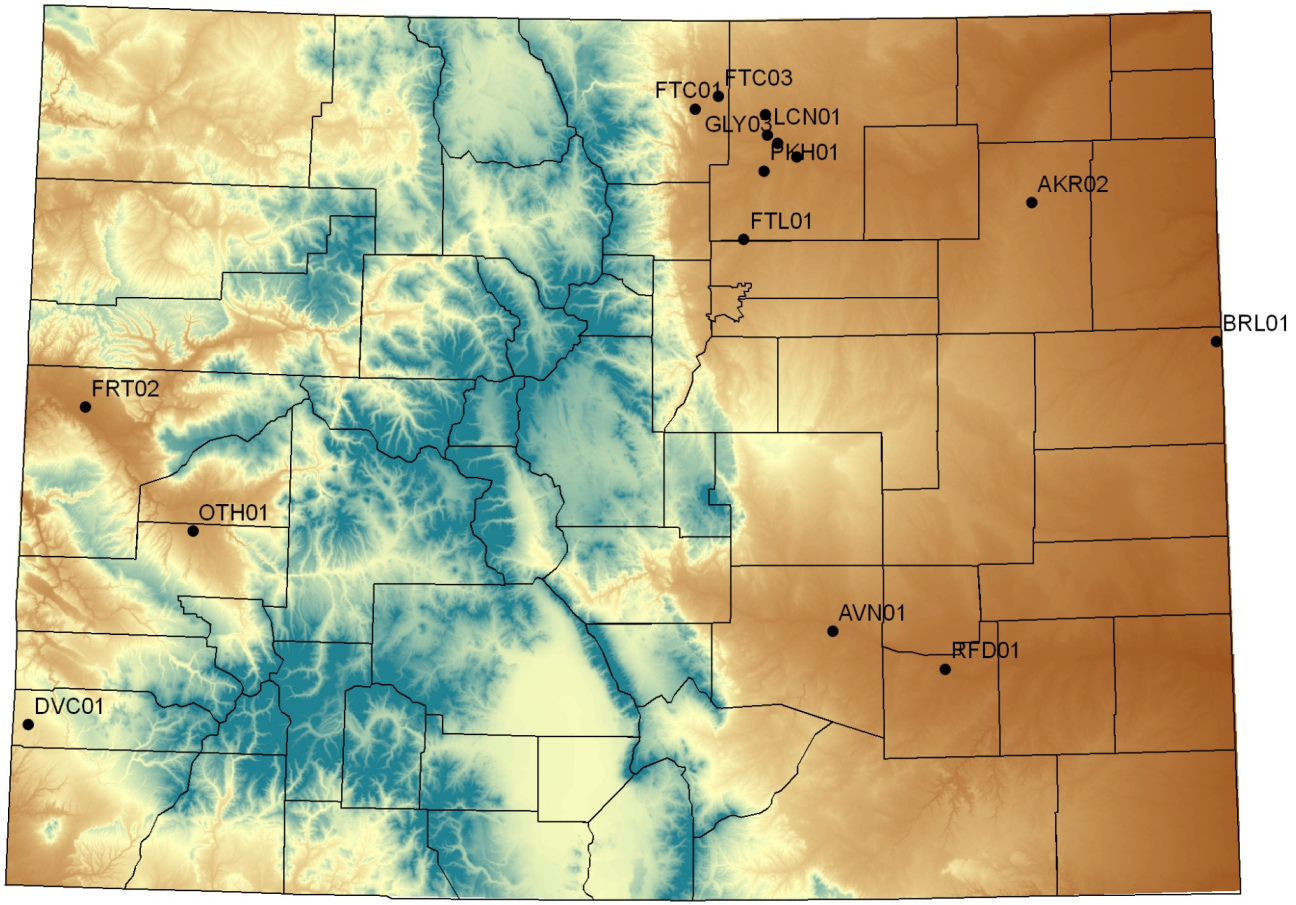
- In the early 1990's, CSU extension plant pathologists and ARS scientists decided to collaborate efforts to collect detailed agricultural weather data.
- Standard instruments and data collection platform were selected and a small network of stations were deployed in fully irrigated agriculture.
- As the network grew, the Colorado Climate Center became increasingly interested in using the data, began daily data collection, quality control and built a web interface to distribute data and products to users across the state.



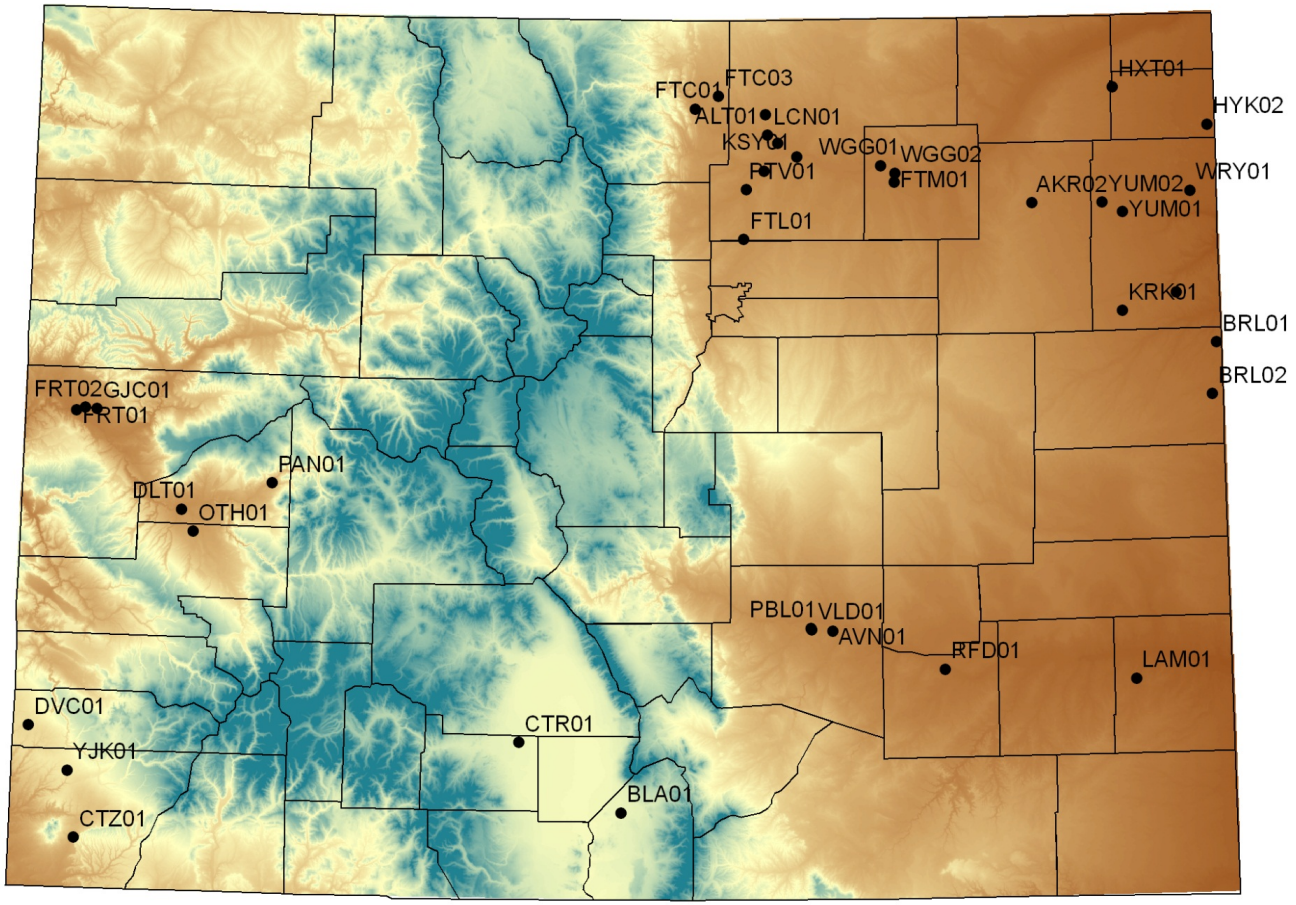
Colorado Climate Center's role

- Coordination, 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)
- We now run the network including station maintenance, product development, funding, etc.

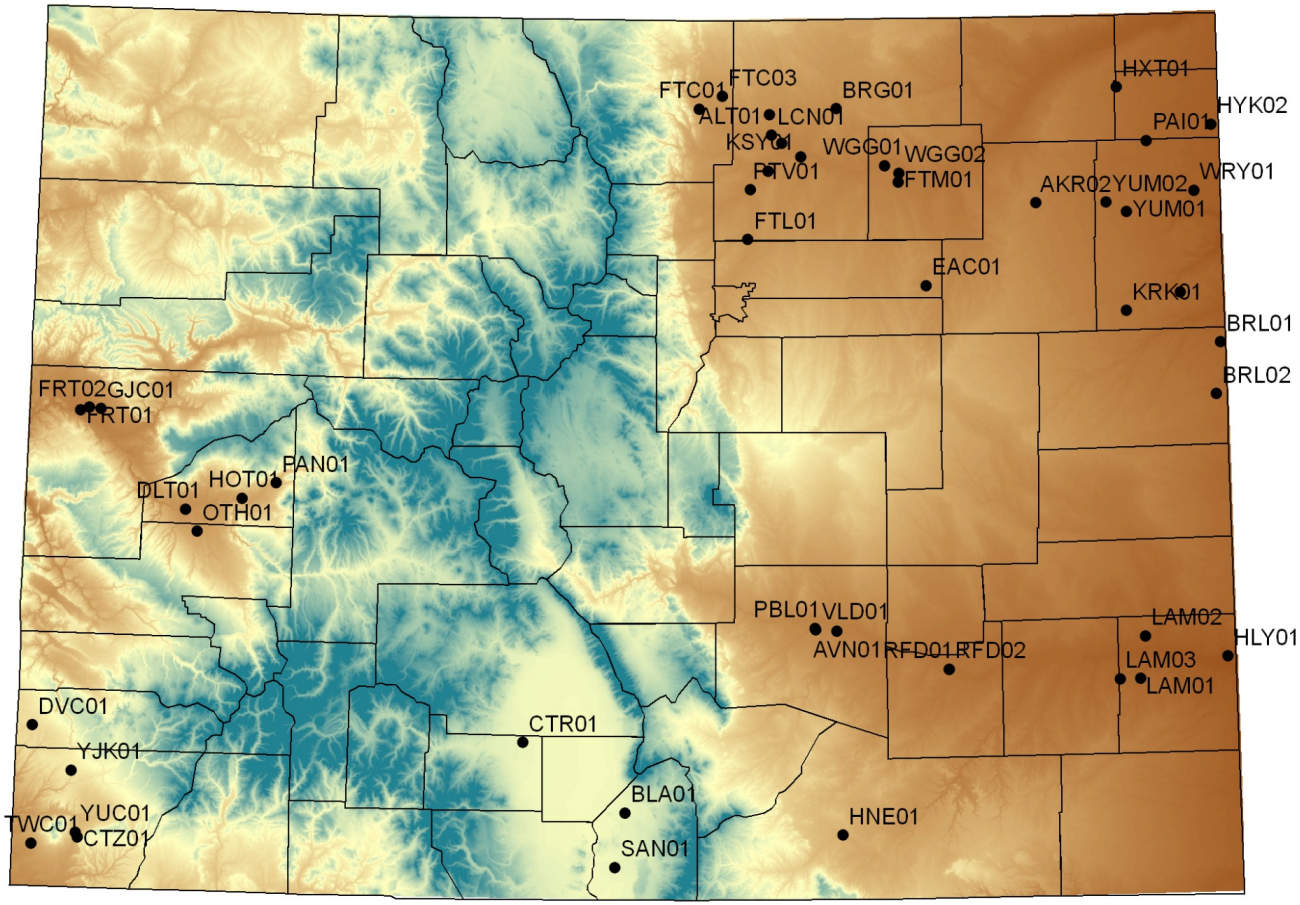
CoAgMet 1992



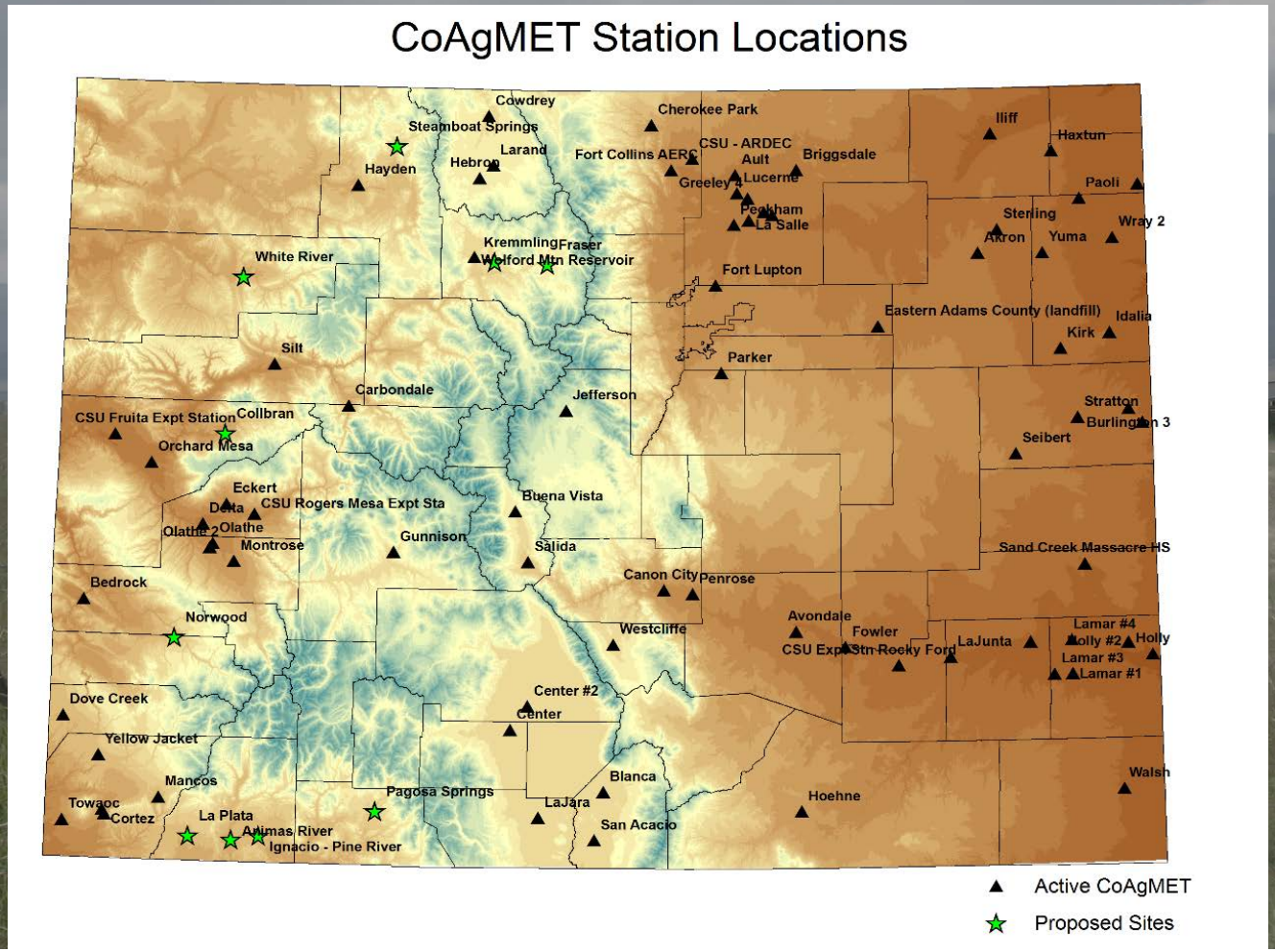
CoAgMet 1997



CoAgMet 2002

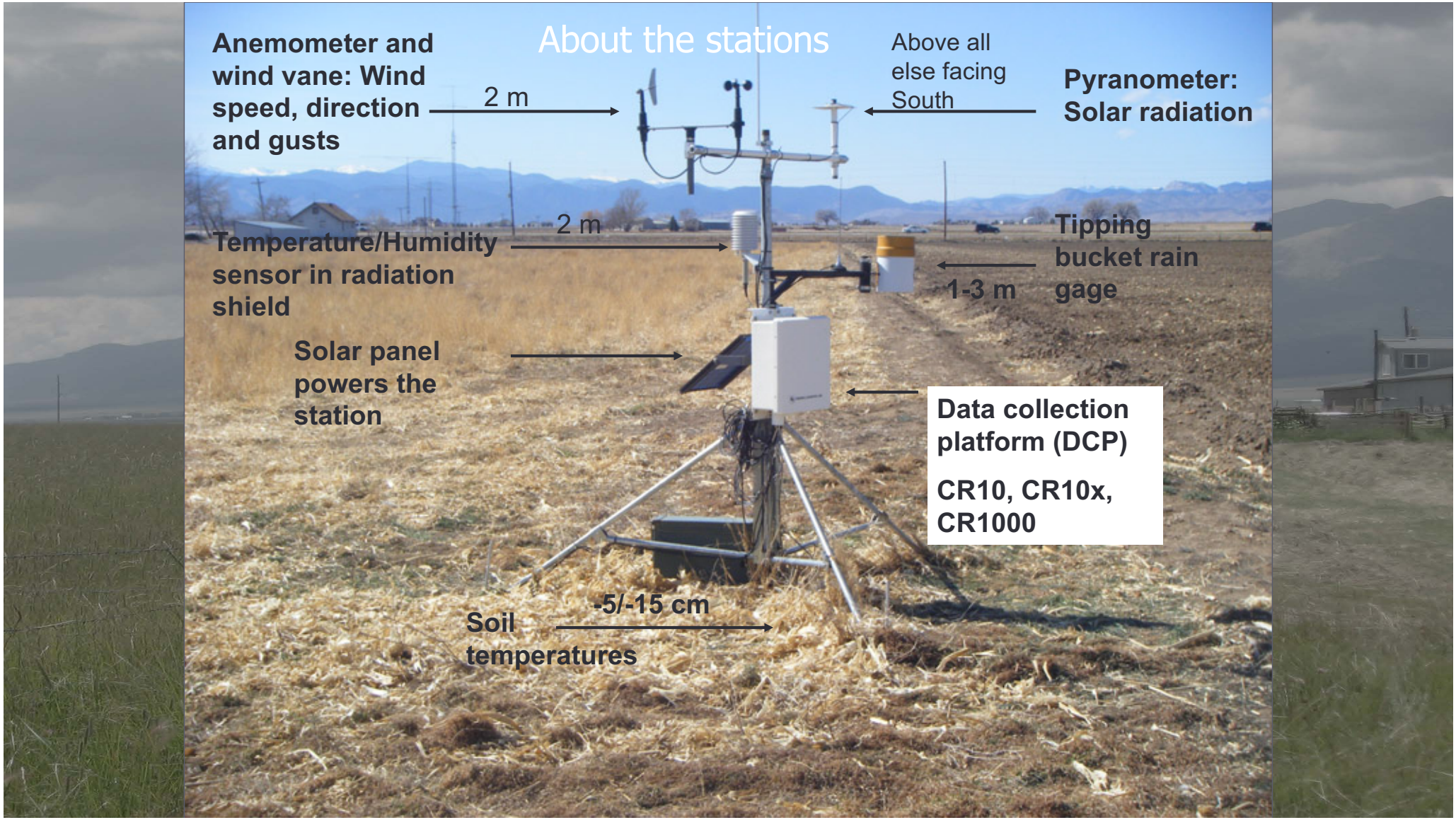


CoAgMET Today



Overview of CoAgMET Network

- Currently there are 75 stations
  - Soon to be 85
- Data are collected hourly, daily and introducing 5-minute and include: temperature, humidity, solar radiation, wind speed and direction, and soil temperatures.
- Data and graphics are available online:
  - http://coagmet.colostate.edu


About the stations
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
Tipping bucket rain gage
1-3 m
Solar panel powers the station
Data collection platform (DCP)
CR10, CR10x, CR1000
-5/-15 cm
Soil temperatures

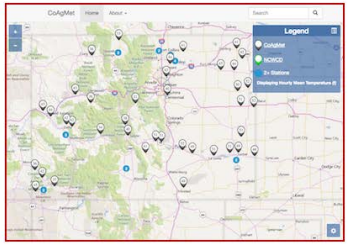
CoAgMET web access:

http://coagmet.colostate.edu/

Data are free and available to the public

- 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.
- 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.

CoAgMet Mapping and Metadata by eRAMS



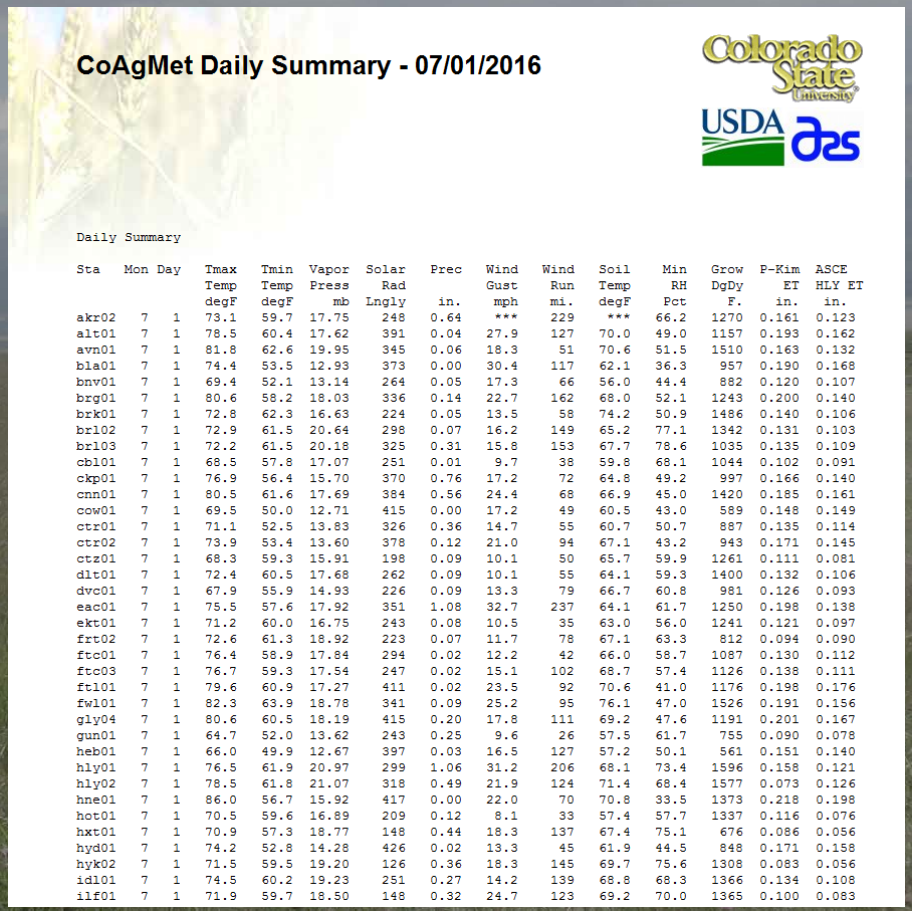
Daily data for a month

Station:Cortez
Location:9 mi SW Cortez
Elevation:6015
Longitude:108.673
Latitude:37.2248

Summary for Cortez - 09/2016

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.
ctz01	9	1	85.1	58.3	13.66	463	0.16	16.3	70	61.3	28.1	2472	0.187	0.212
ctz01	9	2	81.4	58.3	15.30	429	0.00	15.3	49	62.8	33.9	2492	0.162	0.162
ctz01	9	3	79.4	58.3	13.26	428	0.00	16.2	88	62.1	33.2	2511	0.190	0.202
ctz01	9	4	78.4	52.1	8.82	507	0.00	19.7	103	61.1	12.6	2526	0.236	0.259
ctz01	9	5	80.3	45.0	6.90	530	0.00	16.3	79	57.7	15.0	2541	0.230	0.241
ctz01	9	6	81.6	46.7	7.60	419	0.00	13.0	49	57.3	16.9	2557	0.173	0.175
ctz01	9	7	78.2	49.5	8.29	439	0.00	12.8	54	57.8	19.4	2571	0.170	0.176
ctz01	9	8	83.5	43.0	7.01	519	0.00	13.7	72	56.7	12.3	2588	0.215	0.223
ctz01	9	9	84.9	49.5	5.87	513	0.00	17.8	115	56.8	11.5	2605	0.256	0.297
ctz01	9	10	83.9	41.3	7.18	504	0.00	17.0	60	55.8	16.0	2622	0.203	0.210
ctz01	9	11	82.6	50.8	8.40	412	0.00	15.5	47	56.6	19.6	2639	0.159	0.177
ctz01	9	12	75.6	50.0	9.88	367	0.19	24.0	127	57.0	28.5	2652	0.195	0.185
ctz01	9	13	75.9	58.1	9.82	401	0.04	26.4	153	58.1	26.9	2669	0.215	0.233
ctz01	9	14	74.9	51.7	9.06	362	0.01	19.3	128	58.0	26.4	2682	0.198	0.201
ctz01	9	15	74.7	39.1	6.14	505	0.00	16.5	69	54.5	11.7	2694	0.195	0.194
ctz01	9	16	75.9	37.9	5.22	498	0.00	11.3	65	52.7	12.3	2707	0.191	0.198
ctz01	9	17	77.1	37.8	5.44	495	0.00	15.2	57	52.3	11.2	2721	0.176	0.188
ctz01	9	18	80.2	38.0	5.64	493	0.00	11.2	72	51.6	10.8	2736	0.188	0.212
ctz01	9	19	82.1	44.0	5.37	482	0.00	15.3	59	51.7	10.9	2752	0.171	0.208
ctz01	9	20	77.0	49.0	7.37	202	0.00	21.9	89	53.9	15.9	2765	0.132	0.158
ctz01	9	21	76.5	54.2	14.11	238	0.10	19.3	71	56.3	47.3	2781	0.098	0.104
ctz01	9	22	80.7	62.5	11.63	410	0.00	27.9	201	58.3	20.7	2802	0.244	0.266
ctz01	9	23	67.8	37.0	8.60	235	0.13	25.5	92	52.7	29.6	2811	0.134	0.089
ctz01	9	24	63.8	39.8	7.84	308	0.00	12.5	58	52.2	33.0	2818	0.124	0.109
ctz01	9	25	72.6	35.8	6.90	464	0.00	12.2	73	51.6	22.7	2829	0.165	0.170
ctz01	9	26	76.2	40.9	7.79	452	0.00	14.0	47	51.4	24.8	2843	0.131	0.155
ctz01	9	27	75.7	43.2	7.84	454	0.00	9.8	52	51.3	23.3	2855	0.136	0.157
ctz01	9	28	78.8	43.2	8.96	430	0.00	16.2	77	52.6	20.5	2870	0.154	0.193
ctz01	9	29	65.2	51.3	12.41	116	0.13	23.2	95	56.1	45.1	2878	0.065	0.076
ctz01	9	30	69.9	46.2	12.24	376	0.00	13.2	54	54.4	50.4	2888	0.113	0.133

Daily Data

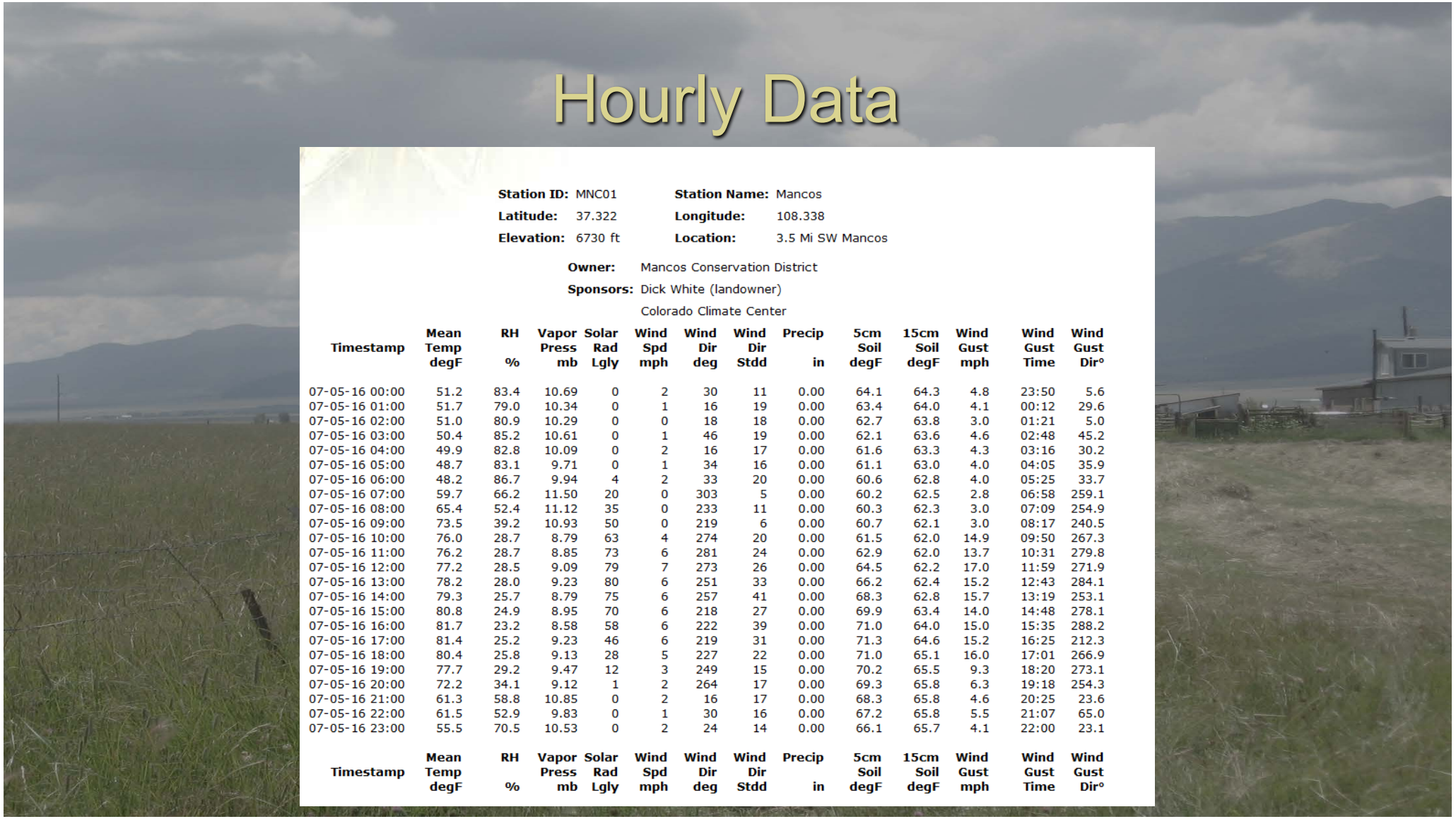


CoAgMet Daily Summary - 07/01/2016

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	7	1	73.1	59.7	17.75	248	0.64	***	229	***	66.2	1270	0.161	0.123
alt01	7	1	78.5	60.4	17.62	391	0.04	27.9	127	70.0	49.0	1157	0.193	0.162
avn01	7	1	81.8	62.6	19.95	345	0.06	18.3	51	70.6	51.5	1510	0.163	0.132
bla01	7	1	74.4	53.5	12.93	373	0.00	30.4	117	62.1	36.3	957	0.190	0.168
bnv01	7	1	69.4	52.1	13.14	264	0.05	17.3	66	56.0	44.4	882	0.120	0.107
brg01	7	1	80.6	58.2	18.03	336	0.14	22.7	162	68.0	52.1	1243	0.200	0.140
brk01	7	1	72.8	62.3	16.63	224	0.05	13.5	58	74.2	50.9	1486	0.140	0.106
brl02	7	1	72.9	61.5	20.64	298	0.07	16.2	149	65.2	77.1	1342	0.131	0.103
brl03	7	1	72.2	61.5	20.18	325	0.31	15.8	153	67.7	78.6	1035	0.135	0.109
cbl01	7	1	68.5	57.8	17.07	251	0.01	9.7	38	59.8	68.1	1044	0.102	0.091
ckp01	7	1	76.9	56.4	15.70	370	0.76	17.2	72	64.8	49.2	997	0.166	0.140
cnn01	7	1	80.5	61.6	17.69	384	0.56	24.4	68	66.9	45.0	1420	0.185	0.161
cow01	7	1	69.5	50.0	12.71	415	0.00	17.2	49	60.5	43.0	589	0.148	0.149
ctr01	7	1	71.1	52.5	13.83	326	0.36	14.7	55	60.7	50.7	887	0.135	0.114
ctr02	7	1	73.9	53.4	13.60	378	0.12	21.0	94	67.1	43.2	943	0.171	0.145
ctz01	7	1	68.3	59.3	15.91	198	0.09	10.1	50	65.7	59.9	1261	0.111	0.081
dlt01	7	1	72.4	60.5	17.68	262	0.09	10.1	55	64.1	59.3	1400	0.132	0.106
dvc01	7	1	67.9	55.9	14.93	226	0.09	13.3	79	66.7	60.8	981	0.126	0.093
eac01	7	1	75.5	57.6	17.92	351	1.08	32.7	237	64.1	61.7	1250	0.198	0.138
ekt01	7	1	71.2	60.0	16.75	243	0.08	10.5	35	63.0	56.0	1241	0.121	0.097
frt02	7	1	72.6	61.3	18.92	223	0.07	11.7	78	67.1	63.3	812	0.094	0.090
ftc01	7	1	76.4	58.9	17.84	294	0.02	12.2	42	66.0	58.7	1087	0.130	0.112
ftc03	7	1	76.7	59.3	17.54	247	0.02	15.1	102	68.7	57.4	1126	0.138	0.111
ftl01	7	1	79.6	60.9	17.27	411	0.02	23.5	92	70.6	41.0	1176	0.198	0.176
fwl01	7	1	82.3	63.9	18.78	341	0.09	25.2	95	76.1	47.0	1526	0.191	0.156
gly04	7	1	80.6	60.5	18.19	415	0.20	17.8	111	69.2	47.6	1191	0.201	0.167
gun01	7	1	64.7	52.0	13.62	243	0.25	9.6	26	57.5	61.7	755	0.090	0.078
heb01	7	1	66.0	49.9	12.67	397	0.03	16.5	127	57.2	50.1	561	0.151	0.140
hly01	7	1	76.5	61.9	20.97	299	1.06	31.2	206	68.1	73.4	1596	0.158	0.121
hly02	7	1	78.5	61.8	21.07	318	0.49	21.9	124	71.4	68.4	1577	0.073	0.126
hne01	7	1	86.0	56.7	15.92	417	0.00	22.0	70	70.8	33.5	1373	0.218	0.198
hot01	7	1	70.5	59.6	16.89	209	0.12	8.1	33	57.4	57.7	1337	0.116	0.076
hxt01	7	1	70.9	57.3	18.77	148	0.44	18.3	137	67.4	75.1	676	0.086	0.056
hyd01	7	1	74.2	52.8	14.28	426	0.02	13.3	45	61.9	44.5	848	0.171	0.158
hyk02	7	1	71.5	59.5	19.20	126	0.36	18.3	145	69.7	75.6	1308	0.083	0.056
idl01	7	1	74.5	60.2	19.23	251	0.27	14.2	139	68.8	68.3	1366	0.134	0.108
ilf01	7	1	71.9	59.7	18.50	148	0.32	24.7	123	69.2	70.0	1365	0.100	0.083

Hourly Data



Station ID: MNC01 **Station Name:** Mancos

Latitude: 37.322 **Longitude:** 108.338

Elevation: 6730 ft **Location:** 3.5 Mi SW Mancos

Owner: Mancos Conservation District

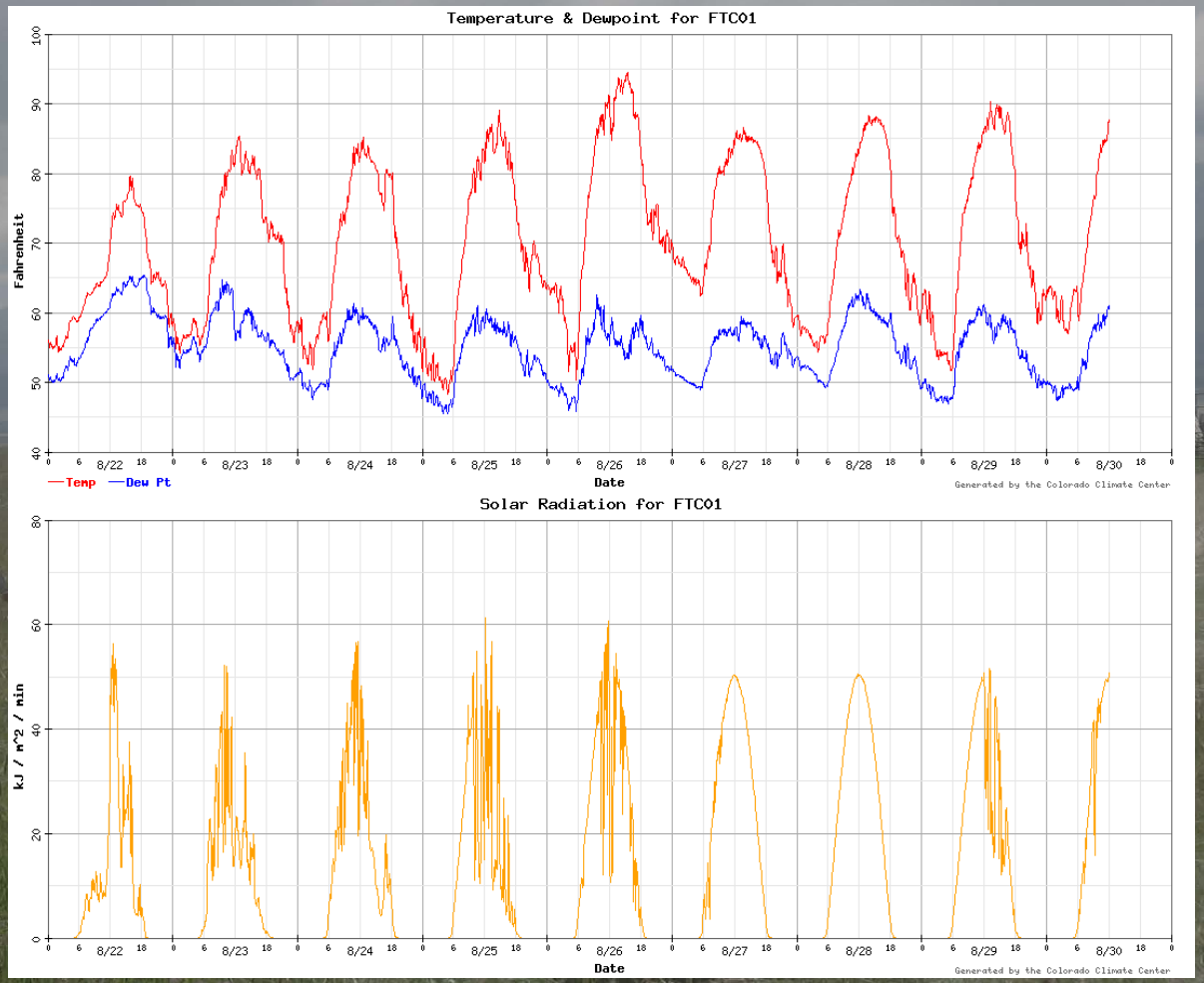
Sponsors: Dick White (landowner)

Colorado Climate Center

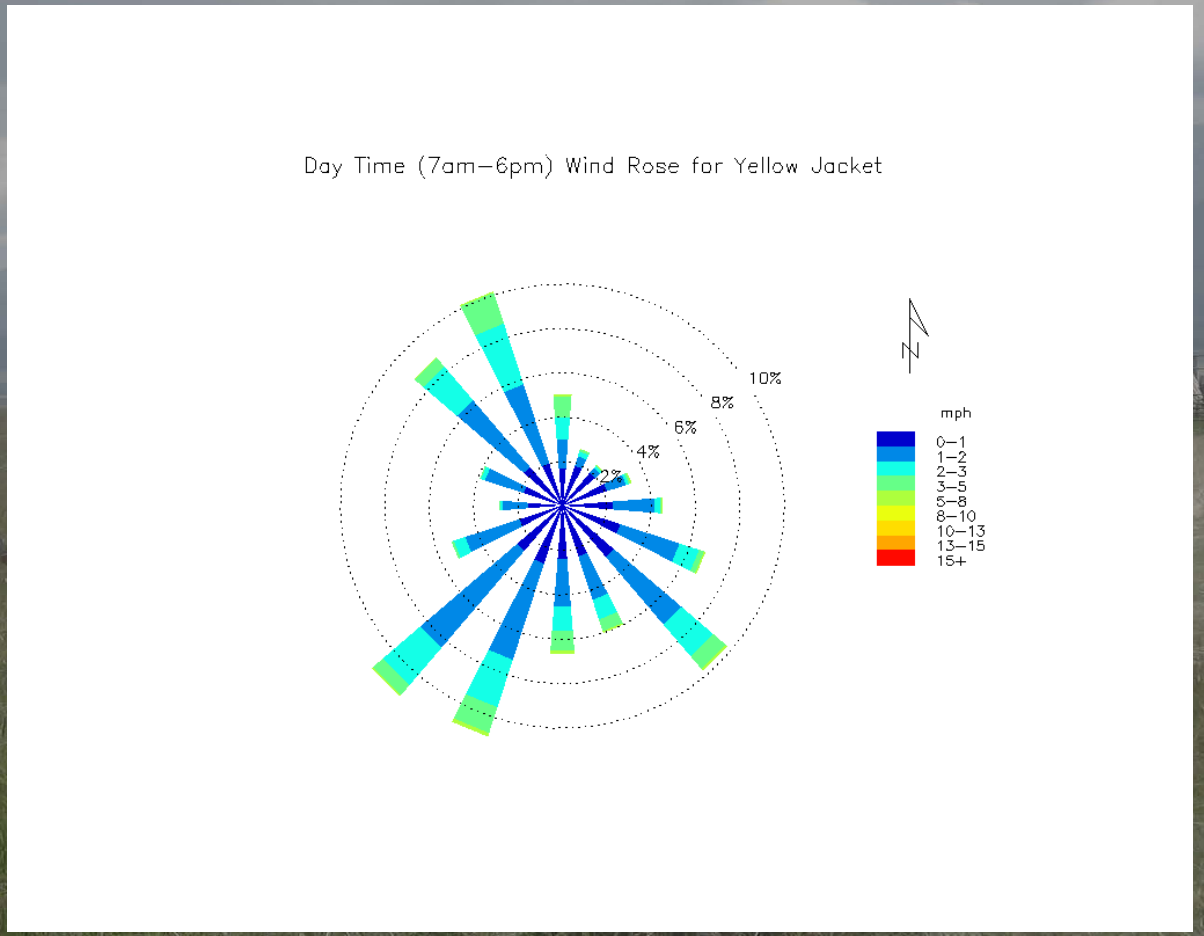
Timestamp	Mean Temp degF	RH %	Vapor Press mb	Solar Rad Lgly	Wind Spd mph	Wind Dir deg	Wind Dir Stdd	Precip in	5cm Soil degF	15cm Soil degF	Wind Gust mph	Wind Gust Time	Wind Gust Dir°
07-05-16 00:00	51.2	83.4	10.69	0	2	30	11	0.00	64.1	64.3	4.8	23:50	5.6
07-05-16 01:00	51.7	79.0	10.34	0	1	16	19	0.00	63.4	64.0	4.1	00:12	29.6
07-05-16 02:00	51.0	80.9	10.29	0	0	18	18	0.00	62.7	63.8	3.0	01:21	5.0
07-05-16 03:00	50.4	85.2	10.61	0	1	46	19	0.00	62.1	63.6	4.6	02:48	45.2
07-05-16 04:00	49.9	82.8	10.09	0	2	16	17	0.00	61.6	63.3	4.3	03:16	30.2
07-05-16 05:00	48.7	83.1	9.71	0	1	34	16	0.00	61.1	63.0	4.0	04:05	35.9
07-05-16 06:00	48.2	86.7	9.94	4	2	33	20	0.00	60.6	62.8	4.0	05:25	33.7
07-05-16 07:00	59.7	66.2	11.50	20	0	303	5	0.00	60.2	62.5	2.8	06:58	259.1
07-05-16 08:00	65.4	52.4	11.12	35	0	233	11	0.00	60.3	62.3	3.0	07:09	254.9
07-05-16 09:00	73.5	39.2	10.93	50	0	219	6	0.00	60.7	62.1	3.0	08:17	240.5
07-05-16 10:00	76.0	28.7	8.79	63	4	274	20	0.00	61.5	62.0	14.9	09:50	267.3
07-05-16 11:00	76.2	28.7	8.85	73	6	281	24	0.00	62.9	62.0	13.7	10:31	279.8
07-05-16 12:00	77.2	28.5	9.09	79	7	273	26	0.00	64.5	62.2	17.0	11:59	271.9
07-05-16 13:00	78.2	28.0	9.23	80	6	251	33	0.00	66.2	62.4	15.2	12:43	284.1
07-05-16 14:00	79.3	25.7	8.79	75	6	257	41	0.00	68.3	62.8	15.7	13:19	253.1
07-05-16 15:00	80.8	24.9	8.95	70	6	218	27	0.00	69.9	63.4	14.0	14:48	278.1
07-05-16 16:00	81.7	23.2	8.58	58	6	222	39	0.00	71.0	64.0	15.0	15:35	288.2
07-05-16 17:00	81.4	25.2	9.23	46	6	219	31	0.00	71.3	64.6	15.2	16:25	212.3
07-05-16 18:00	80.4	25.8	9.13	28	5	227	22	0.00	71.0	65.1	16.0	17:01	266.9
07-05-16 19:00	77.7	29.2	9.47	12	3	249	15	0.00	70.2	65.5	9.3	18:20	273.1
07-05-16 20:00	72.2	34.1	9.12	1	2	264	17	0.00	69.3	65.8	6.3	19:18	254.3
07-05-16 21:00	61.3	58.8	10.85	0	2	16	17	0.00	68.3	65.8	4.6	20:25	23.6
07-05-16 22:00	61.5	52.9	9.83	0	1	30	16	0.00	67.2	65.8	5.5	21:07	65.0
07-05-16 23:00	55.5	70.5	10.53	0	2	24	14	0.00	66.1	65.7	4.1	22:00	23.1

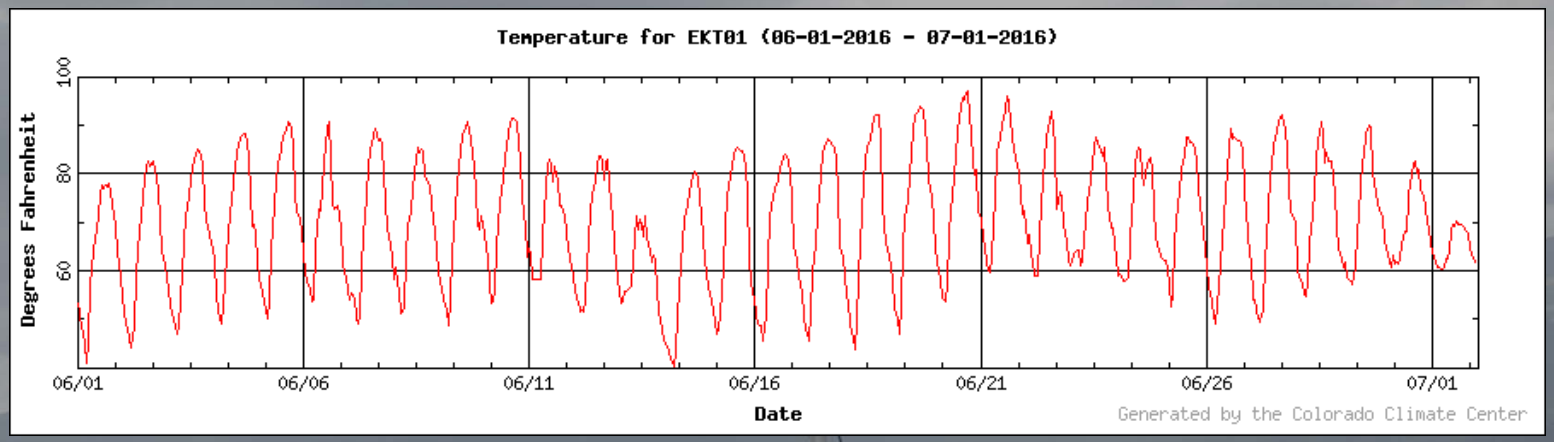
Timestamp	Mean Temp degF	RH %	Vapor Press mb	Solar Rad Lgly	Wind Spd mph	Wind Dir deg	Wind Dir Stdd	Precip in	5cm Soil degF	15cm Soil degF	Wind Gust mph	Wind Gust Time	Wind Gust Dir°

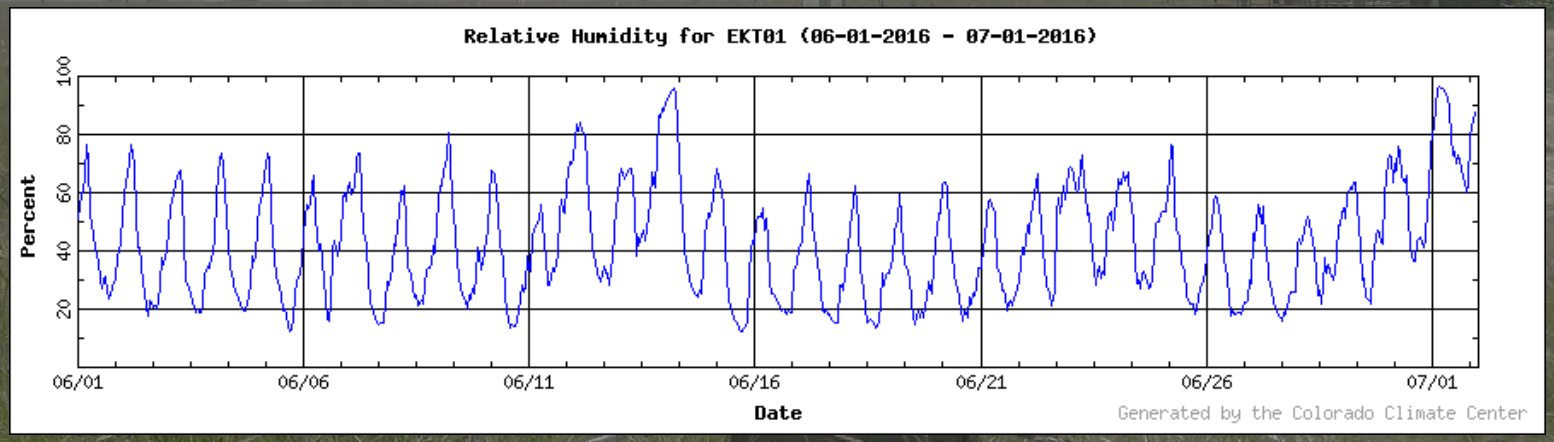
Five minute data

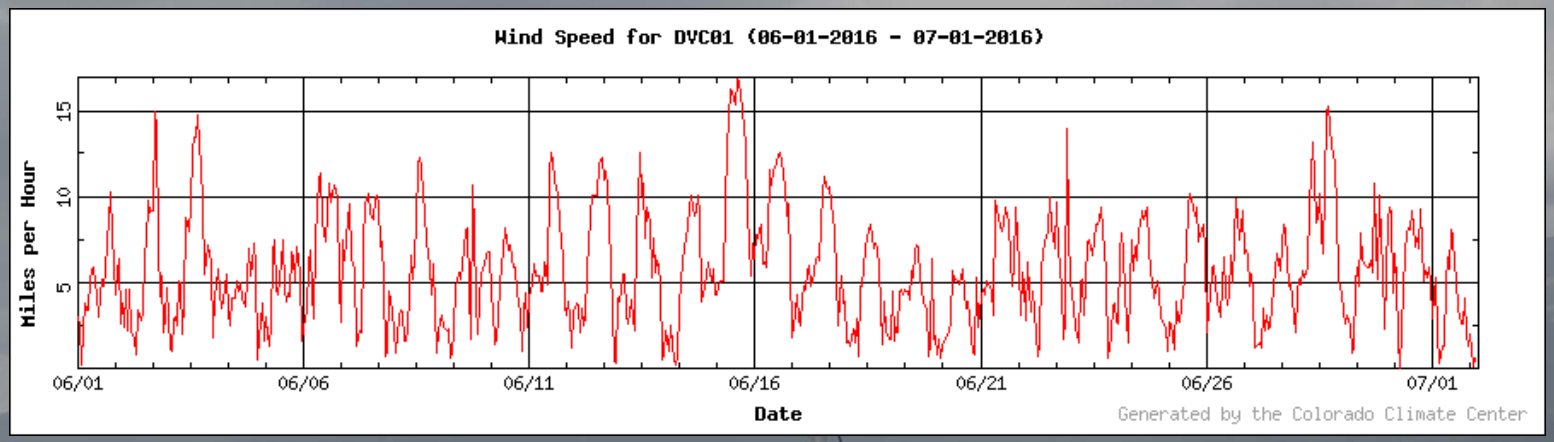


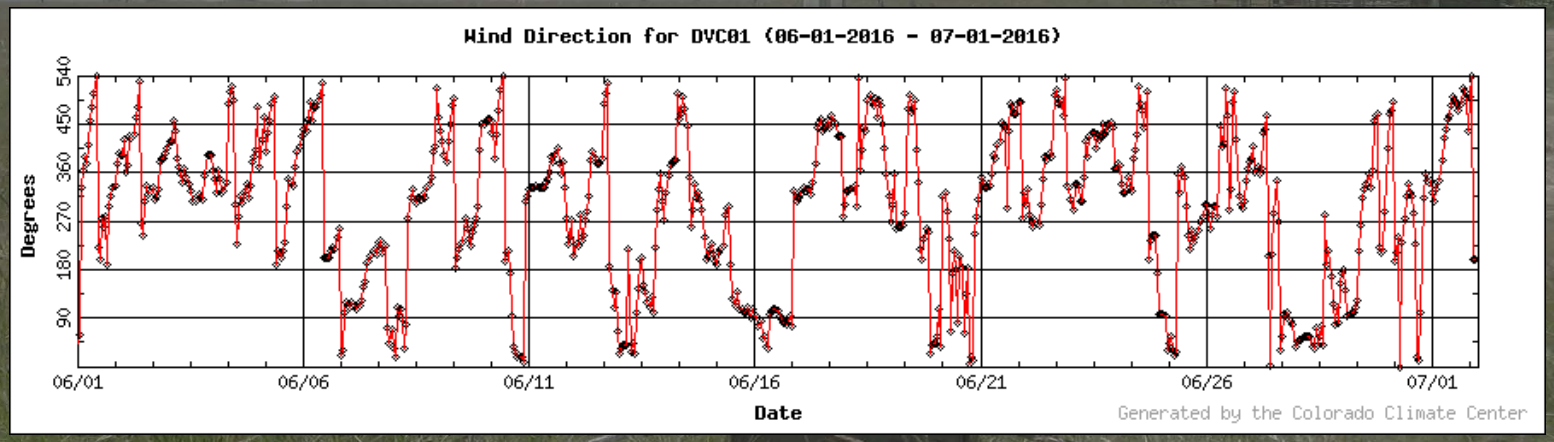
Wind summaries



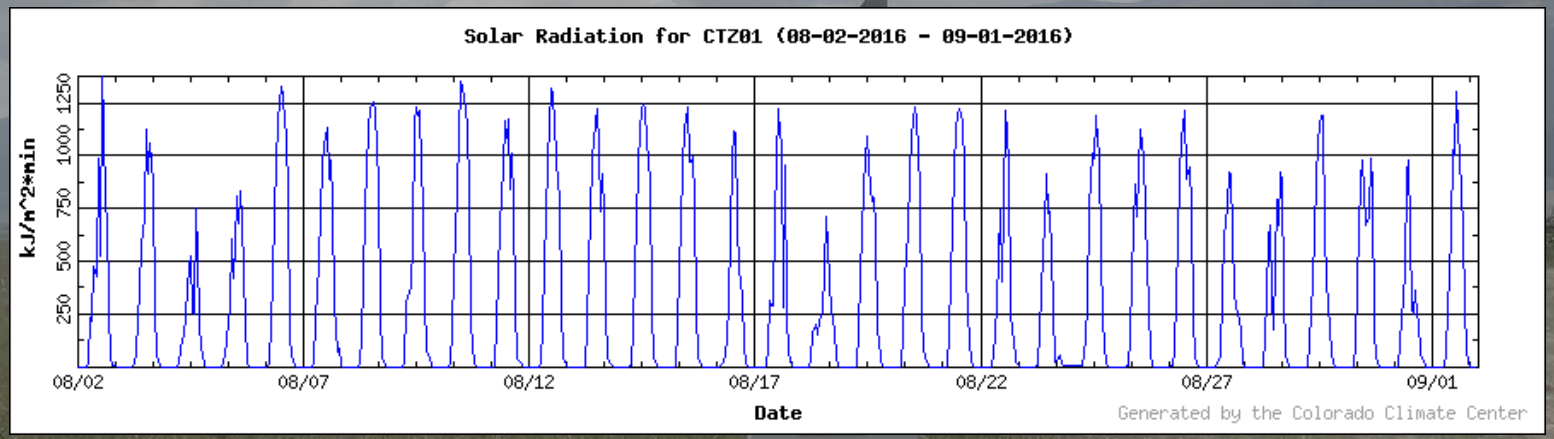

Temperature for EKT01 (06-01-2016 - 07-01-2016)
Degrees Fahrenheit
100
80
60
06/01
06/06
06/11
06/16
06/21
06/26
07/01
Date
Generated by the Colorado Climate Center


Relative Humidity for EKT01 (06-01-2016 - 07-01-2016)
Percent
100
80
60
40
20
06/01
06/06
06/11
06/16
06/21
06/26
07/01
Date
Generated by the Colorado Climate Center

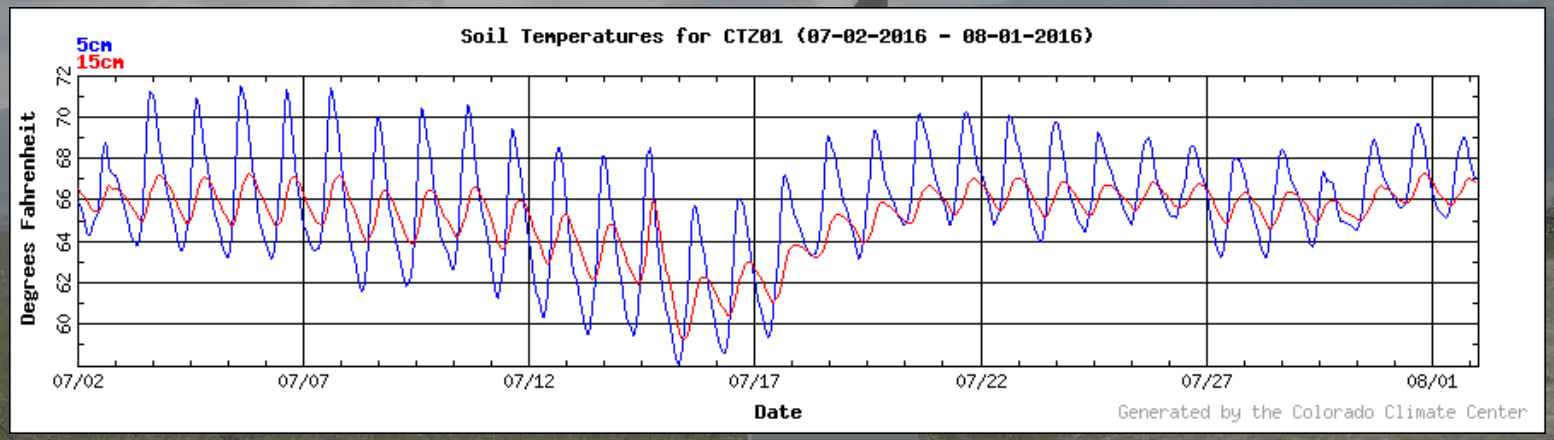

Wind Speed for DVC01 (06-01-2016 - 07-01-2016)
Miles per Hour
15
10
5
06/01
06/06
06/11
06/16
06/21
06/26
07/01
Date
Generated by the Colorado Climate Center

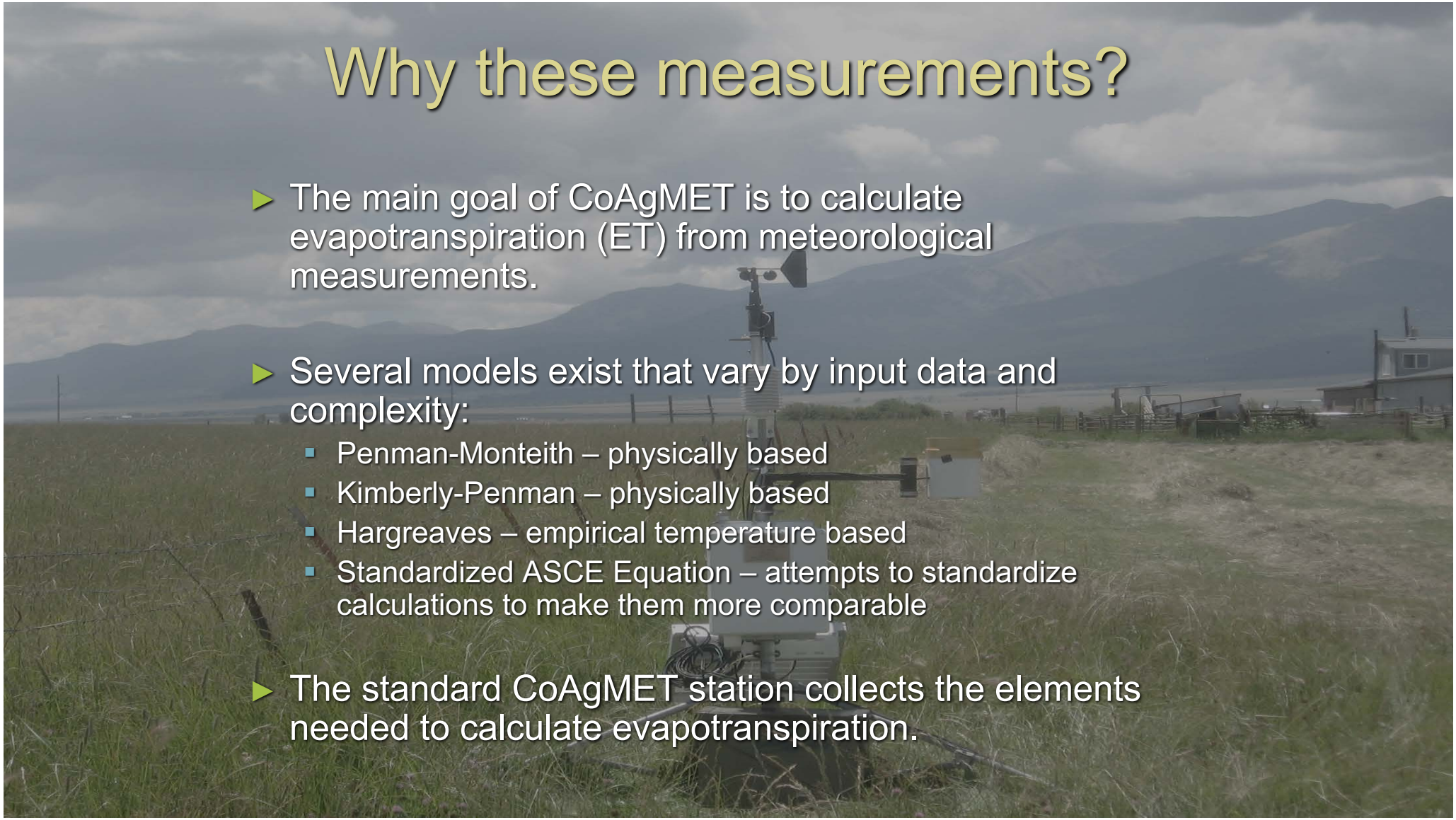

Wind Direction for DVC01 (06-01-2016 - 07-01-2016)
Degrees
540
450
360
270
180
90
06/01
06/06
06/11
06/16
06/21
06/26
07/01
Date
Generated by the Colorado Climate Center

Solar Radiation



Soil Temperatures

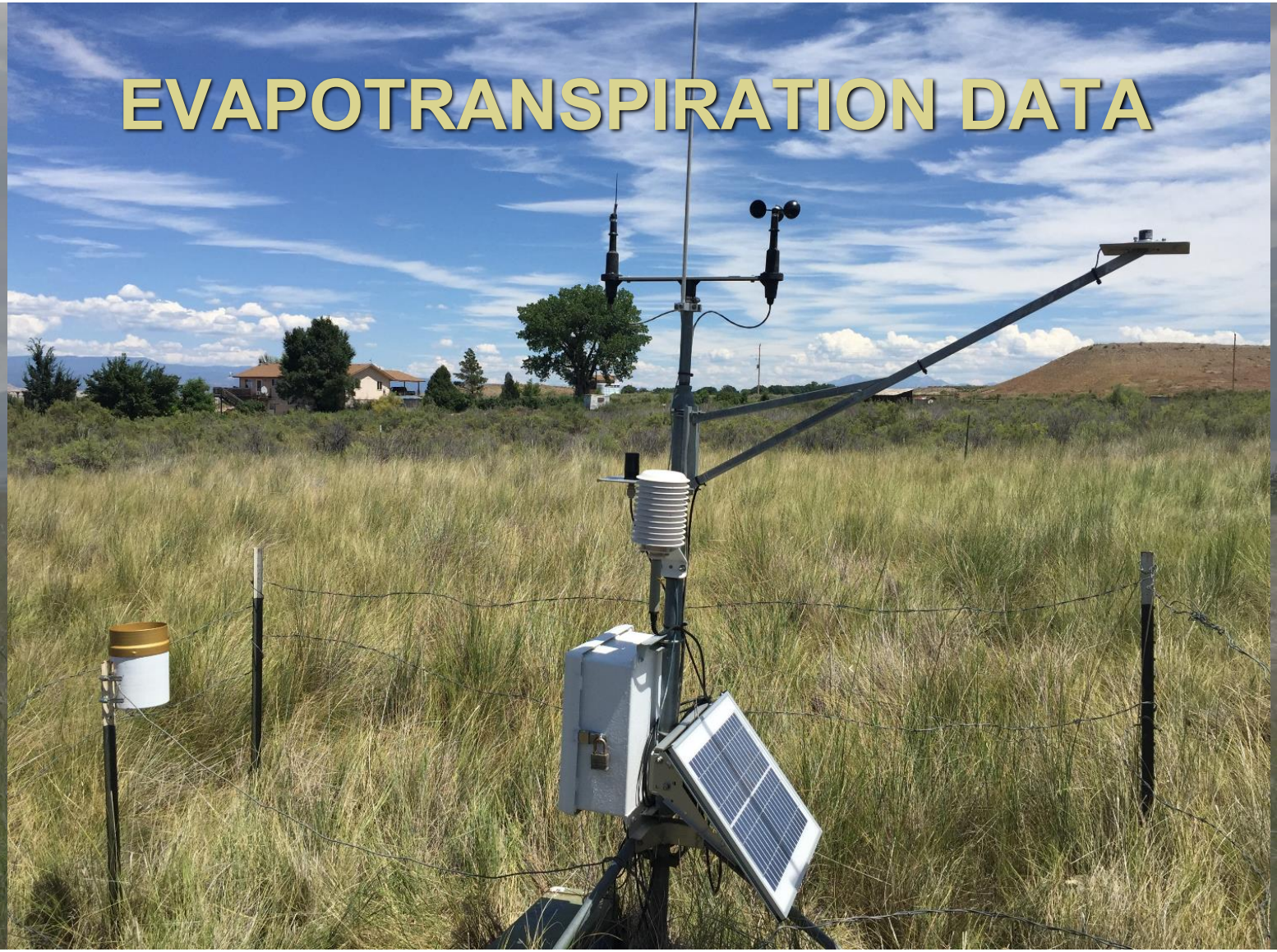




Why these measurements?

- The main goal of CoAgMET is to calculate evapotranspiration (ET) from meteorological measurements.
- Several models exist that vary by input data and complexity:
  - Penman-Monteith – physically based
  - Kimberly-Penman – physically based
  - Hargreaves – empirical temperature based
  - Standardized ASCE Equation – attempts to standardize calculations to make them more comparable
- The standard CoAgMET station collects the elements needed to calculate evapotranspiration.

EVAPOTRANSPIRATION DATA



CoAgMet Homepage

News

- 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"
- A variety of data and metadata are available 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.
- It is now possible to extract five minute data for the ARDEC and Cherokee Parks stations using Web Services. For example, to extract summer 2015 temperature and preciptations for ARDEC use:

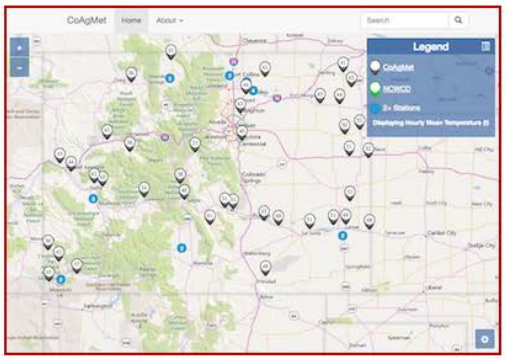
```
http://coagmet.colostate.edu/cgi-bin/web_services.pl?type=five_minute&sids=ftc03&sdate=2015-06-01&edate=2015-08-31&elems=tmean,pp
```

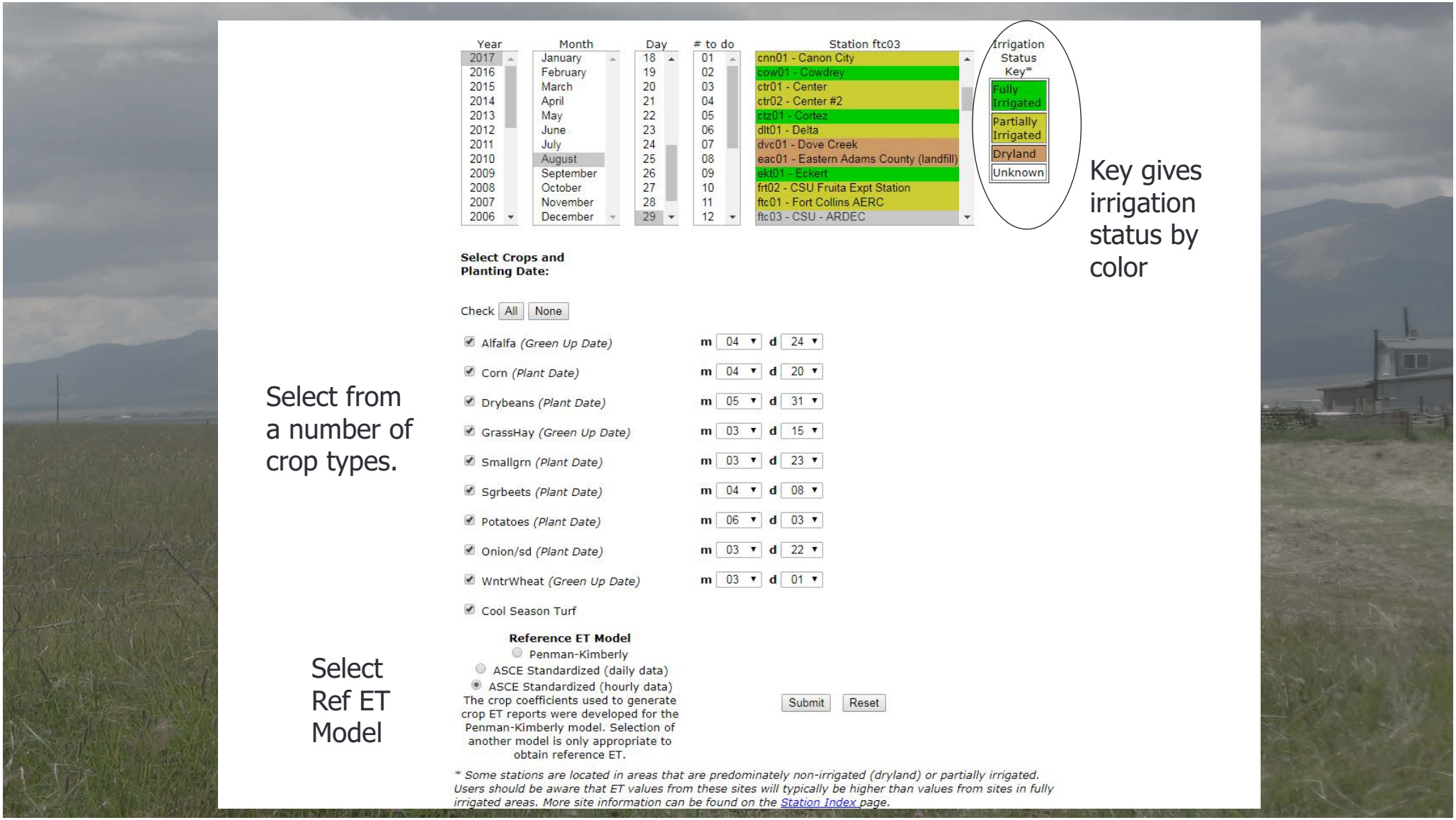
For more information, see the Web Services page.

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.
- 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.

CoAgMet Mapping and Metadata by eRAMS




Year
Month
Day
to do
Station ftc03
Irrigation Status Key*
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
January
February
March
April
May
June
July
August
September
October
November
December
18
19
20
21
22
23
24
25
26
27
28
29
01
02
03
04
05
06
07
08
09
10
11
12
cnn01 - Canon City
cow01 - Cowdrey
ctr01 - Center
ctr02 - Center #2
ctz01 - Cortez
dlt01 - Delta
dvc01 - Dove Creek
eac01 - Eastern Adams County (landfill)
ekt01 - Eckert
frt02 - CSU Fruita Expt Station
ftc01 - Fort Collins AERC
ftc03 - CSU - ARDEC
Fully Irrigated
Partially Irrigated
Dryland
Unknown
Key gives irrigation status by color
Select Crops and Planting Date:
Check All None
Alfalfa (Green Up Date) m 04 d 24
Corn (Plant Date) m 04 d 20
Drybeans (Plant Date) m 05 d 31
GrassHay (Green Up Date) m 03 d 15
Smallgrn (Plant Date) m 03 d 23
Sgrbeets (Plant Date) m 04 d 08
Potatoes (Plant Date) m 06 d 03
Onion/sd (Plant Date) m 03 d 22
WntrWheat (Green Up Date) m 03 d 01
Cool Season Turf
Select from a number of crop types.
Reference ET Model
Penman-Kimberly
ASCE Standardized (daily data)
ASCE Standardized (hourly data)
The crop coefficients used to generate crop ET reports were developed for the Penman-Kimberly model. Selection of another model is only appropriate to obtain reference ET.
Select Ref ET Model
Submit
Reset
* Some stations are located in areas that are predominately non-irrigated (dryland) or partially irrigated. Users should be aware that ET values from these sites will typically be higher than values from sites in fully irrigated areas. More site information can be found on the Station Index page.

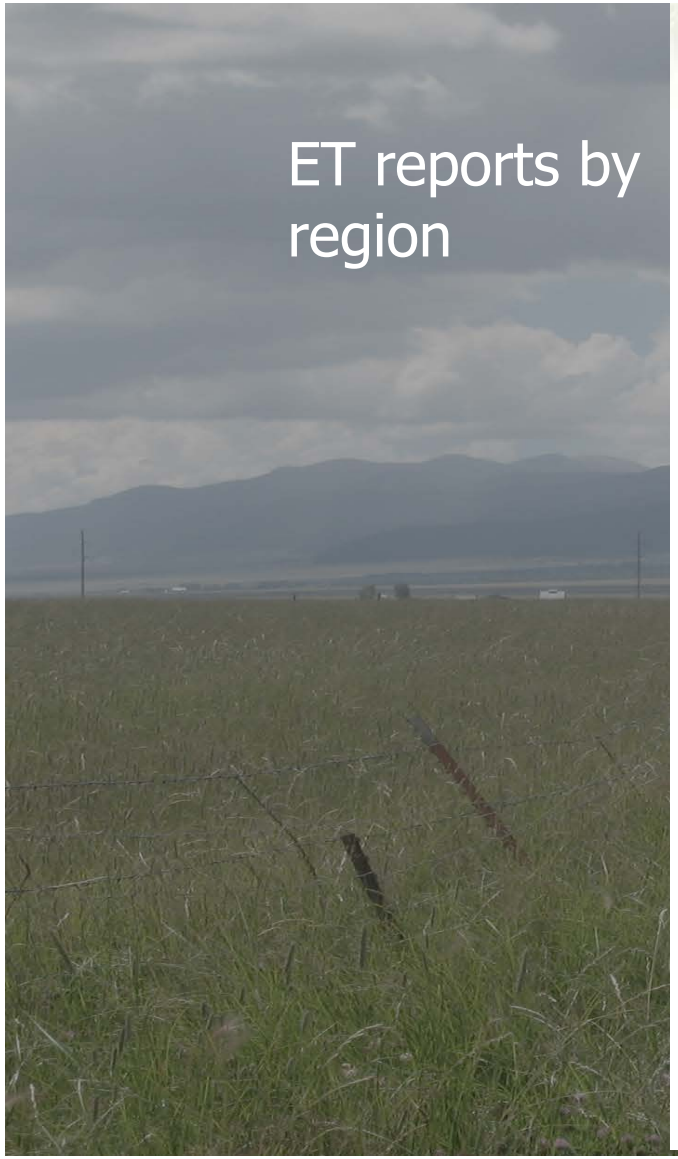
CoAgMet Extended Crop Evapotranspiration

Station:CSU - ARDEC
Location:6 mi NE Fort Collins
Elevation:5110
Longitude:105
Latitude:40.6525

Crop Evapotranspiration in Inches

Date	Alfalfa	Corn	Drybeans	GrassHay	Smallgrn	Sgrbeets	Potatoes	Onion/sd	WntrWheat	Turf	RefET	Precip
08/10/2017	0.13	0.12	0.13	0.11	0.03	0.13	0.10	0.10	0.03	0.09	0.13	0.49
08/11/2017	0.14	0.13	0.14	0.12	0.03	0.14	0.11	0.11	0.03	0.09	0.14	0.00
08/12/2017	0.14	0.14	0.14	0.13	0.03	0.14	0.11	0.12	0.03	0.10	0.14	0.11
08/13/2017	0.18	0.18	0.18	0.16	0.04	0.18	0.14	0.15	0.04	0.12	0.18	0.01
08/14/2017	0.19	0.19	0.19	0.17	0.04	0.19	0.16	0.16	0.04	0.13	0.19	0.02
08/15/2017	0.17	0.17	0.17	0.15	0.04	0.17	0.14	0.14	0.04	0.12	0.17	0.43
08/16/2017	0.18	0.17	0.18	0.16	0.04	0.18	0.15	0.14	0.04	0.12	0.18	0.00
08/17/2017	0.20	0.19	0.20	0.17	0.04	0.20	0.16	0.16	0.04	0.13	0.20	0.00
08/18/2017	0.23	0.22	0.23	0.20	0.05	0.23	0.19	0.18	0.05	0.15	0.23	0.00
08/19/2017	0.24	0.23	0.24	0.21	0.05	0.24	0.20	0.19	0.05	0.16	0.24	0.00
08/20/2017	0.23	0.22	0.23	0.20	0.05	0.23	0.20	0.19	0.05	0.16	0.23	0.00
08/21/2017	0.26	0.25	0.26	0.23	0.06	0.26	0.23	0.21	0.06	0.18	0.26	0.00
08/22/2017	0.12	0.12	0.12	0.11	0.03	0.12	0.11	0.10	0.03	0.08	0.12	0.00
08/23/2017	0.20	0.20	0.20	0.18	0.05	0.20	0.18	0.16	0.05	0.14	0.20	0.00
08/24/2017	0.21	0.21	0.21	0.19	0.05	0.21	0.19	0.17	0.05	0.15	0.21	0.00
08/25/2017	0.23	0.22	0.23	0.20	0.05	0.23	0.21	0.18	0.05	0.16	0.23	0.00
08/26/2017	0.30	0.28	0.30	0.26	0.07	0.30	0.27	0.24	0.07	0.20	0.30	0.00
08/27/2017	0.25	0.24	0.25	0.22	0.06	0.25	0.23	0.20	0.06	0.17	0.25	0.00
08/28/2017	0.23	0.22	0.23	0.20	0.05	0.23	0.21	0.18	0.05	0.16	0.23	0.00
08/29/2017	0.26	0.25	0.26	0.23	0.06	0.26	0.24	0.21	0.06	0.18	0.26	0.00
Sum	4.12	3.95	4.12	3.58	0.91	4.12	3.50	3.29	0.91	2.78	4.12	1.06
Average	0.21	0.20	0.21	0.18	0.05	0.21	0.17	0.16	0.05	0.14	0.21	0.05

Return to the CoAgMet ETR Summary Access.



ET reports by region

CoAgMet/NCWCD Meteorological Data for 8/29/2017

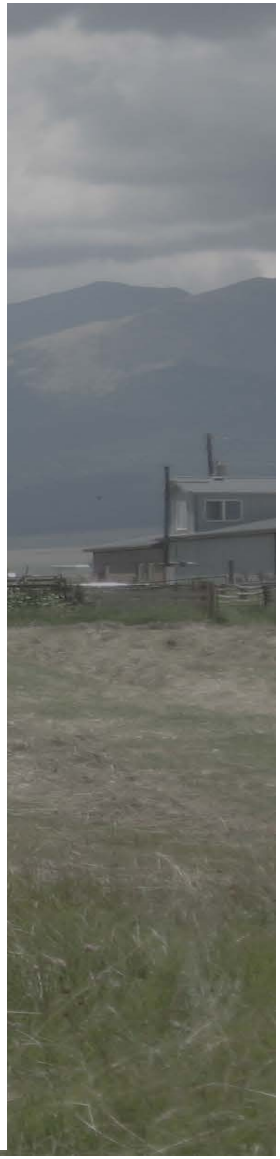
	North Front Range							
	FtColl	ARDEC	HortFm	Lovlnd	Cherpk	Lngmnt	Parker	
HiTemp	91	89	89	91	88	91	94	degF
LoTemp	52	53	50	54	56	51	62	degF
Precip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in
P/Month	2.16	2.14	3.26	2.00	2.17	1.11	1.66	in
P/Year	10.17	4.02i	11.42	11.44	9.68	9.00	3.41i	in
WindGst	12.5	16.8	19.2	13.5	18.8	19.1	25.0	mph
Ref ET	0.20	0.26	0.25	0.20	0.26	0.23	0.32	in
GrowDD	2347	1191	2357	2594	2109	2331	1635	degF
5cm Soil	62.6	68.3	m	m	66.1	m	71.6	degF
	Crop Evapotranspiration							
Alfalfa	0.21	0.26	0.25	0.20	0.26	0.23	0.32	in
Corn	0.20	0.24	0.15	0.19	0.20	0.18	0.11	in
Drybeans	0.21	0.26	0.25	0.20	0.26	0.23	0.32	in
GrassHay	0.18	0.22	0.22	0.17	0.22	0.20	0.28	in
Smallgrn	0.05	0.06	0.05	0.04	0.06	0.05	0.07	in
Sgrbeets	0.21	0.26	0.22	0.20	0.25	0.23	0.26	in
Potatoes	0.18	0.23	0.22	0.18	0.23	0.21	0.29	in
Onion/sd	0.16	0.21	0.11	0.16	0.18	0.17	0.14	in
WntrWheat	0.05	0.06	0.15	0.04	0.06	0.05	0.32	in

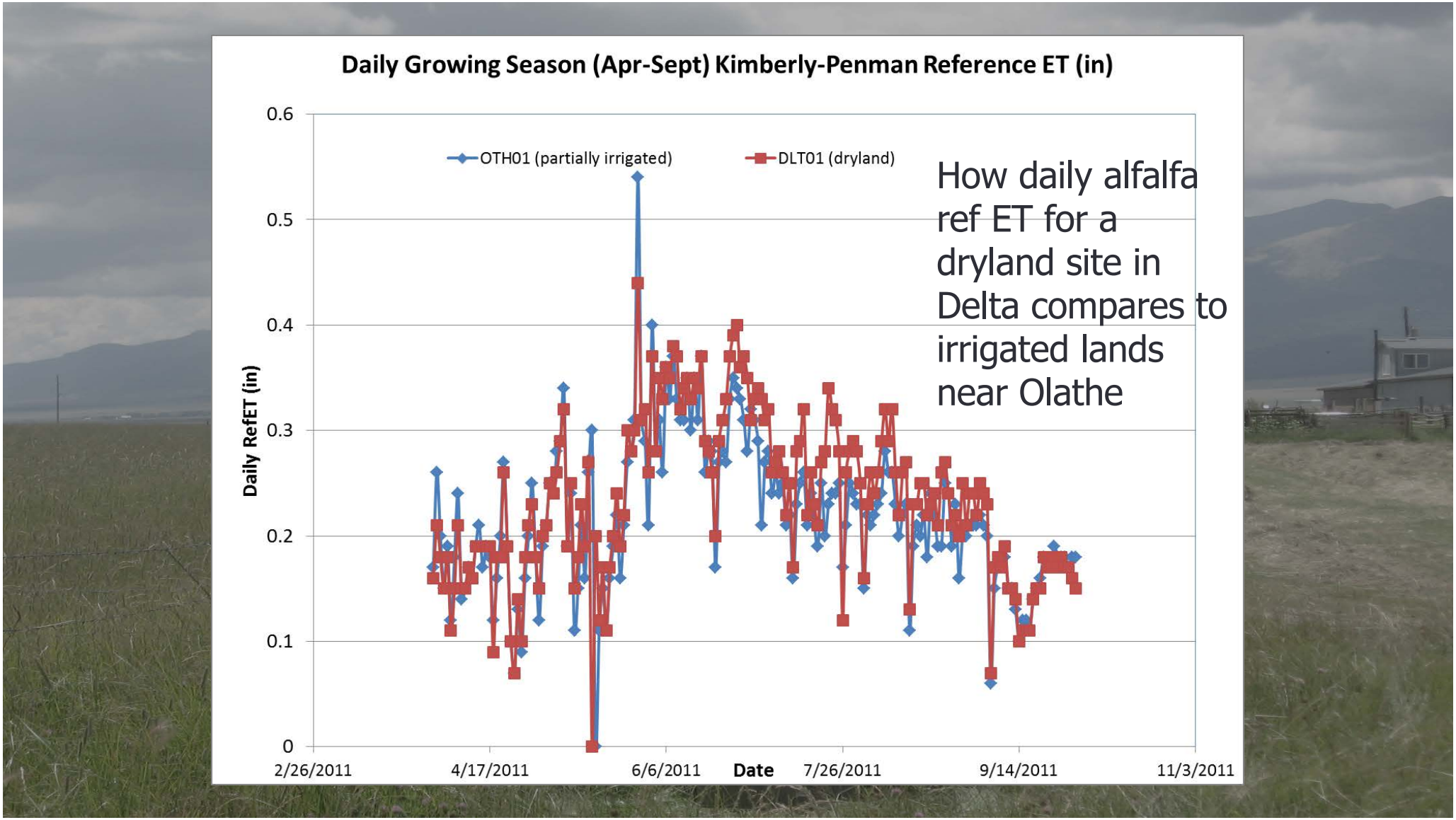
CoAgMet/NCWCD Meteorological Data for 8/29/2017

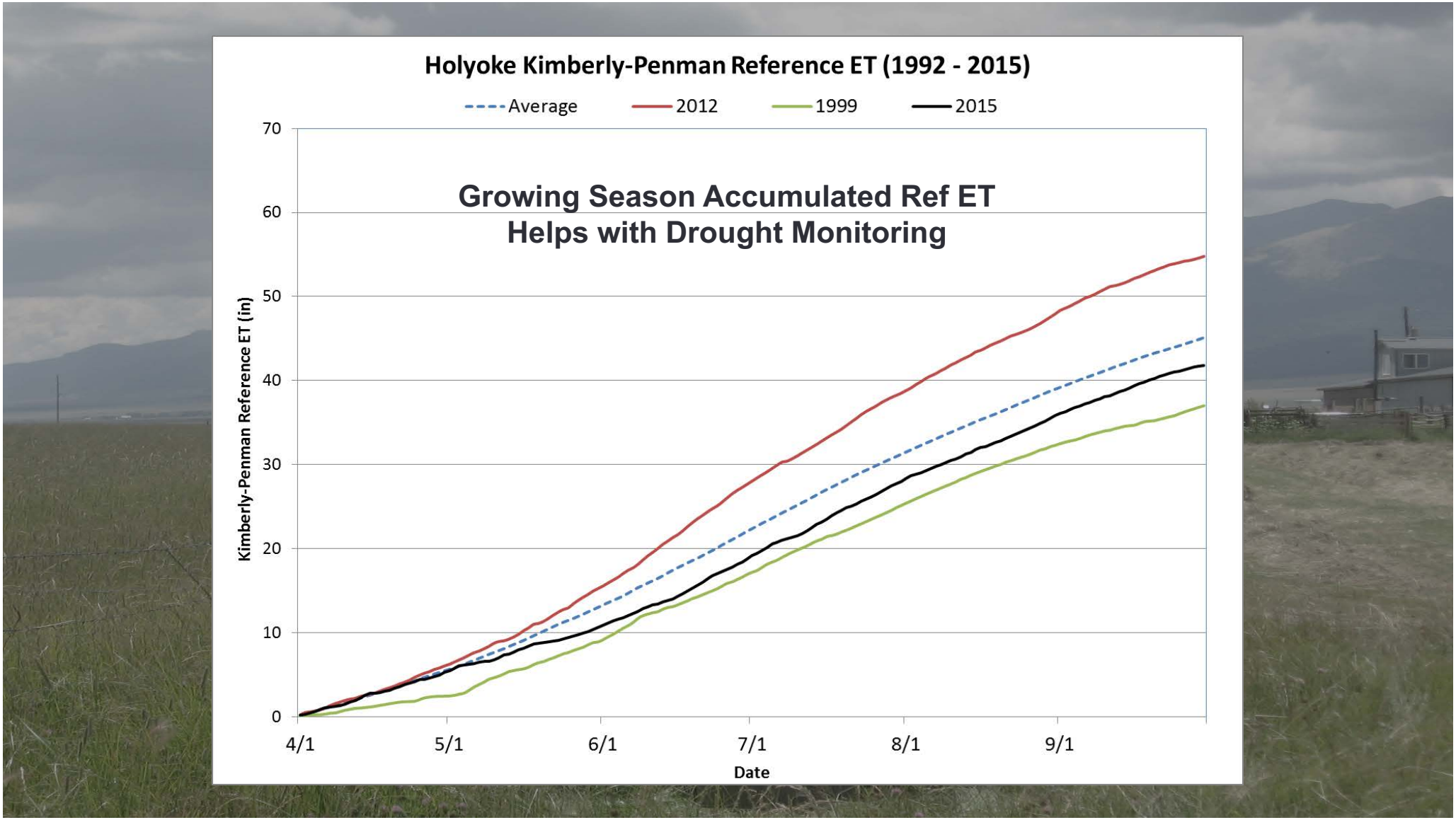
	North Central									
	Peckhm	Kersey	Kersey	Lucern	Greely	Gilcrs	FtLptn	Ault	Brigsd	
HiTemp	93	94	96	92	m	92	95	91	95	degF
LoTemp	52	50	52	50	m	50	58	51	47	degF
Precip	0.00	0.00	0.00	0.00	m	0.00	0.00	0.00	0.45	in
P/Month	2.11	1.58	1.85	0.63	1.84i	1.72	1.04	3.40	2.11	in
P/Year	2.28i	12.78i	8.75i	15.53i	11.37i	11.06	8.74i	13.08	8.85i	in
WindGst	14.3	19.3	18.2	14.8	m	17.0	19.2	14.2	25.9	mph
Ref ET	0.23	0.25	0.25	0.23	m	0.22	0.28	0.27	0.26	in
GrowDD	665	2363	2576	2442	m	2347	2701	2358	2392	degF
5cm Soil	70.0	67.4	70.1	71.3	m	m	72.4	66.1	65.8	degF
	Crop Evapotranspiration									
Alfalfa	0.23	0.25	0.25	0.23	m	0.22	0.28	0.27	0.26	in
Corn	0.10	0.22	0.15	0.18	m	0.20	0.16	0.19	0.18	in
Drybeans	0.23	0.25	0.25	0.23	m	0.22	0.28	0.27	0.26	in
GrassHay	0.20	0.22	0.22	0.20	m	0.19	0.24	0.23	0.23	in
Smallgrn	0.05	0.05	0.06	0.05	m	0.05	0.06	0.06	0.06	in
Sgrbeets	0.19	0.24	0.23	0.22	m	0.22	0.25	0.25	0.25	in
Potatoes	0.21	0.22	0.23	0.20	m	0.20	0.25	0.24	0.24	in
Onion/sd	0.10	0.20	0.11	0.16	m	0.17	0.12	0.17	0.12	in
WntrWheat	0.23	0.05	0.08	0.05	m	0.05	0.24	0.06	0.08	in

CoAgMet/NCWCD Meteorological Data for 8/29/2017

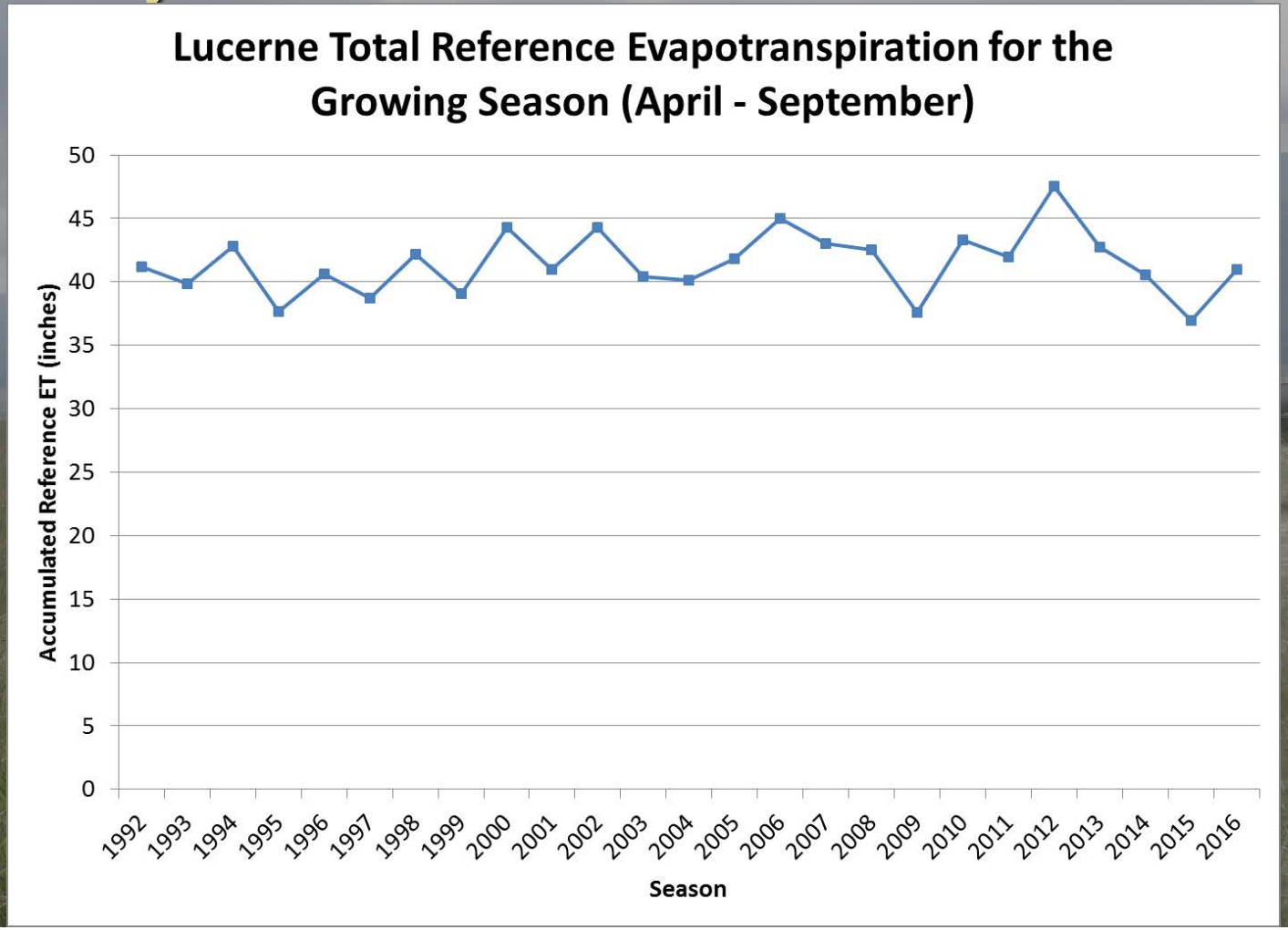
Lower South Platte




Daily Growing Season (Apr-Sept) Kimberly-Penman Reference ET (in)
OTH01 (partially irrigated)
DLT01 (dryland)
How daily alfalfa ref ET for a dryland site in Delta compares to irrigated lands near Olathe
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


Holyoke Kimberly-Penman Reference ET (1992 - 2015)
Average
2012
1999
2015
Growing Season Accumulated Ref ET
Helps with Drought Monitoring
Kimberly-Penman Reference ET (in)
70
60
50
40
30
20
10
0
4/1
5/1
6/1
7/1
8/1
9/1
Date

25 years of Ref ET Data now available



http://coagmet.colostate.edu/

CoAgMet Homepage

News

- 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"
- A variety of data and metadata are available 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.
- It is now possible to extract five minute data for the ARDEC and Cherokee Parks stations using Web Services. For example, to extract summer 2015 temperature and preciptations for ARDEC use:

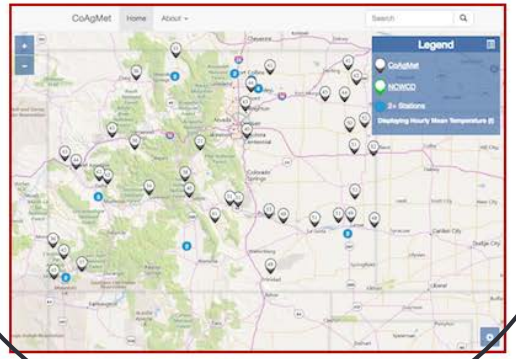
```
http://coagmet.colostate.edu/cgi-bin/web_services.pl?type=five_minute&sids=ftc03&sdate=2015-06-01&edate=2015-08-31&elems=tmean,pp
```

For more information, see the Web Services page.

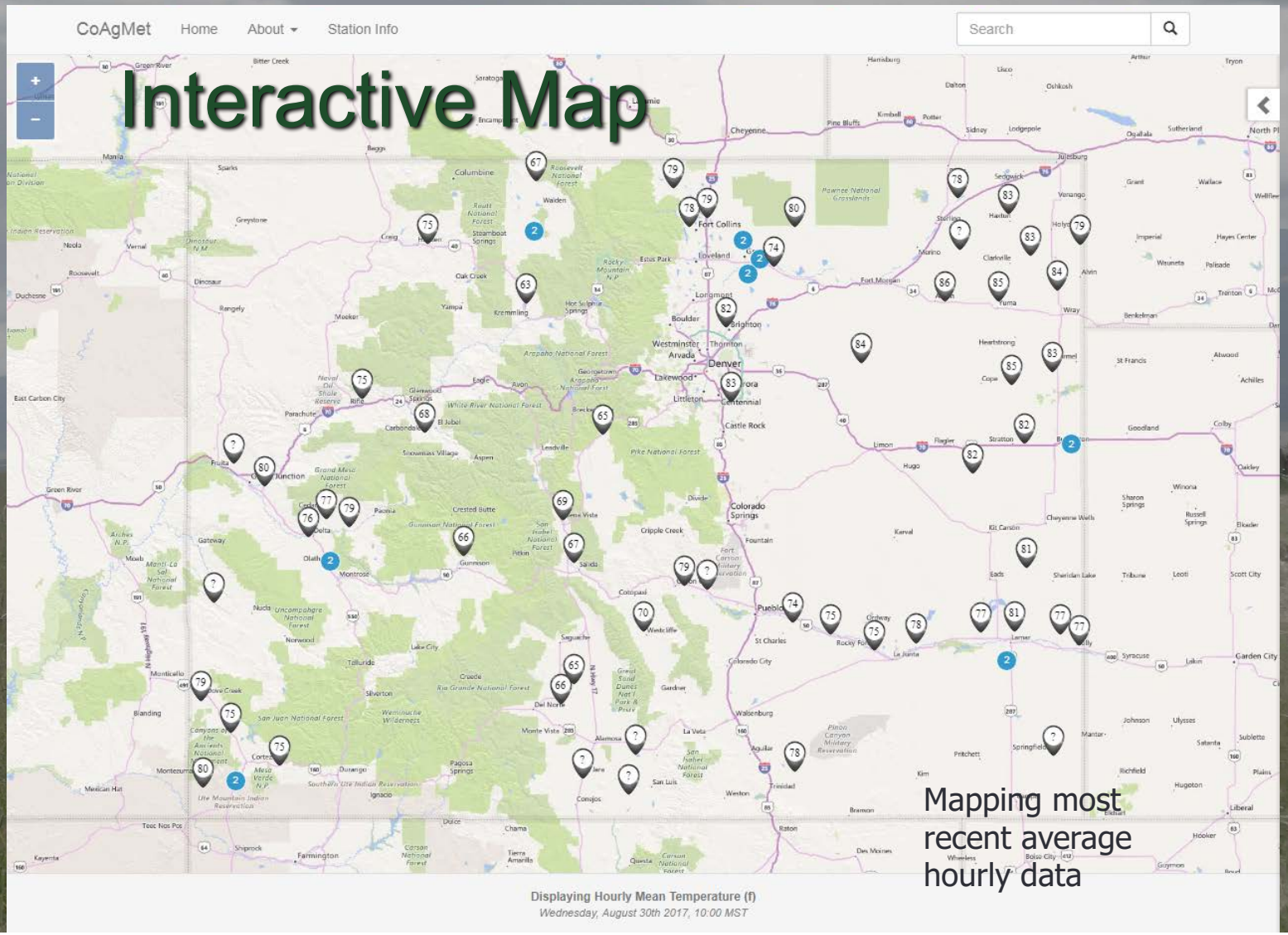
Find older posts here.

- 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.
- 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.

CoAgMet Mapping and Metadata by eRAMS

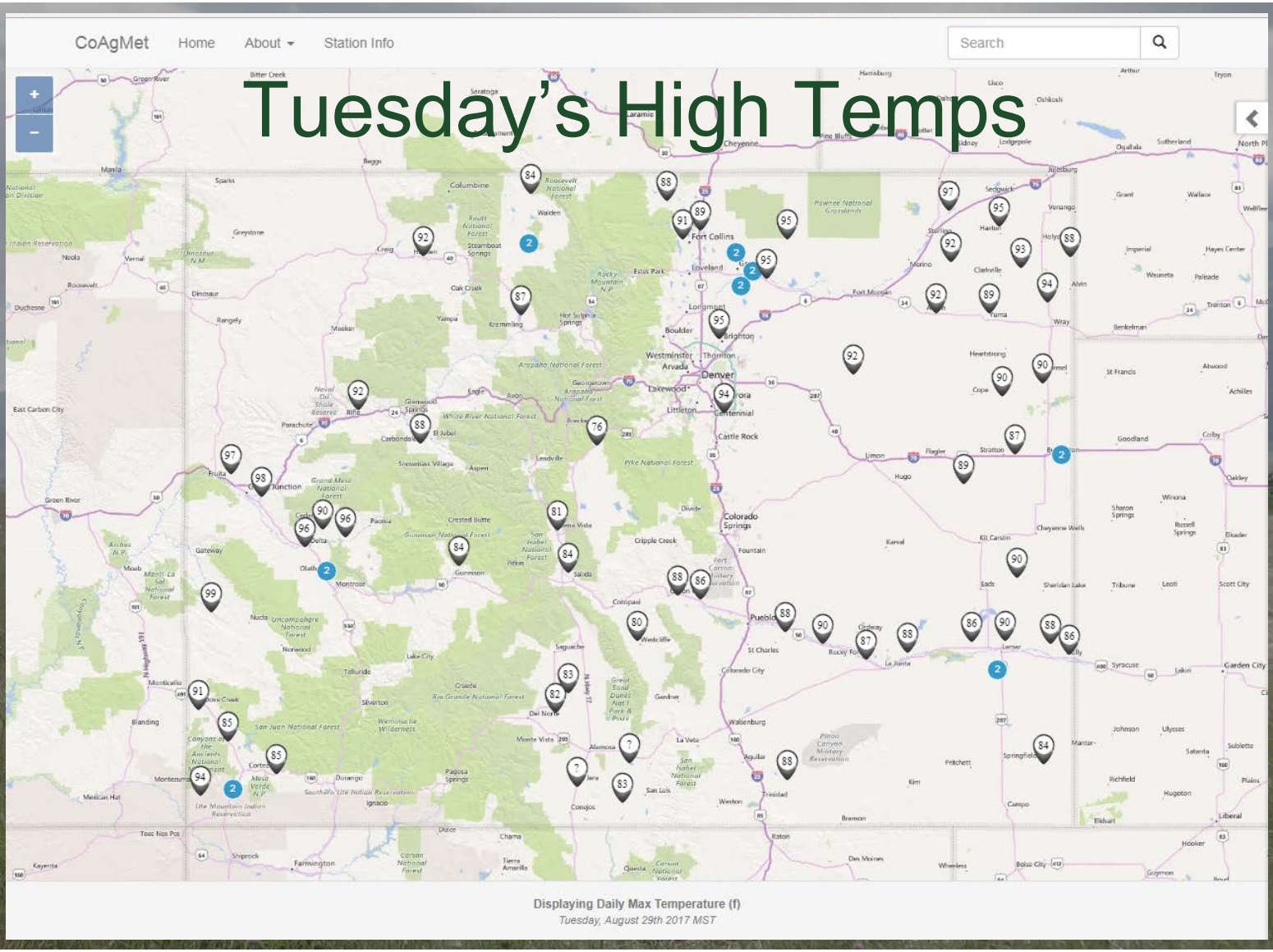


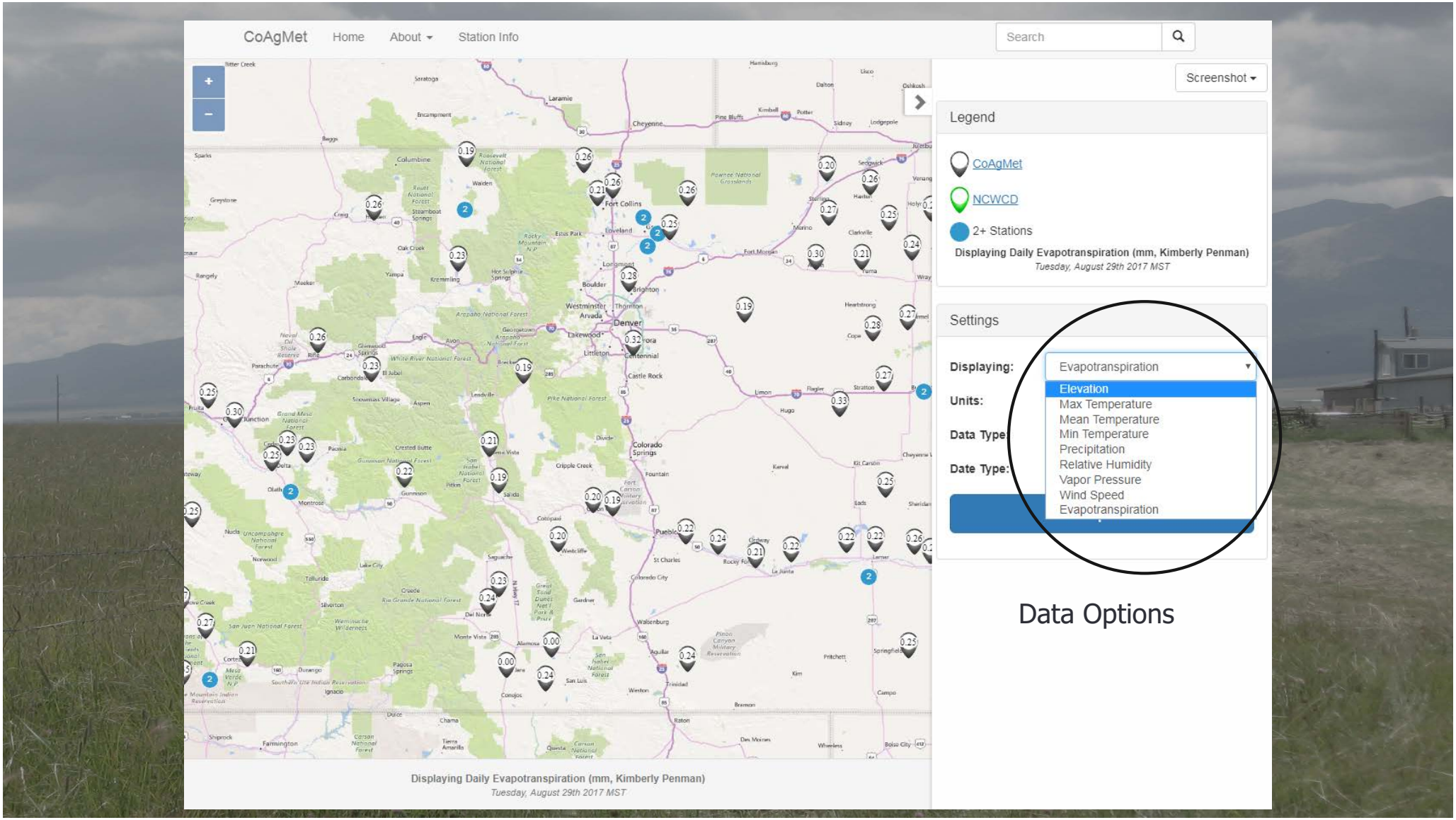
Interactive Map



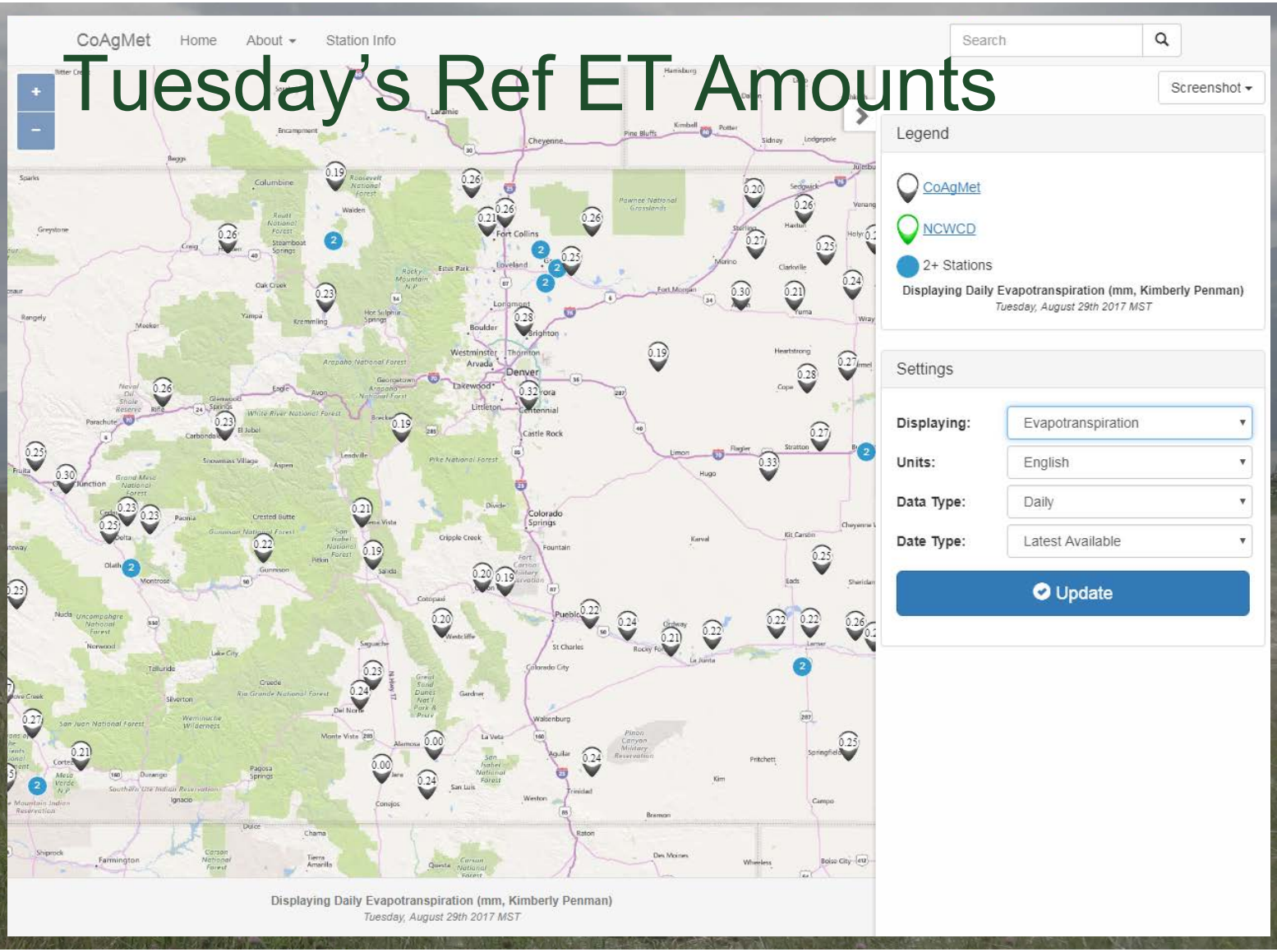
Mapping most recent average hourly data

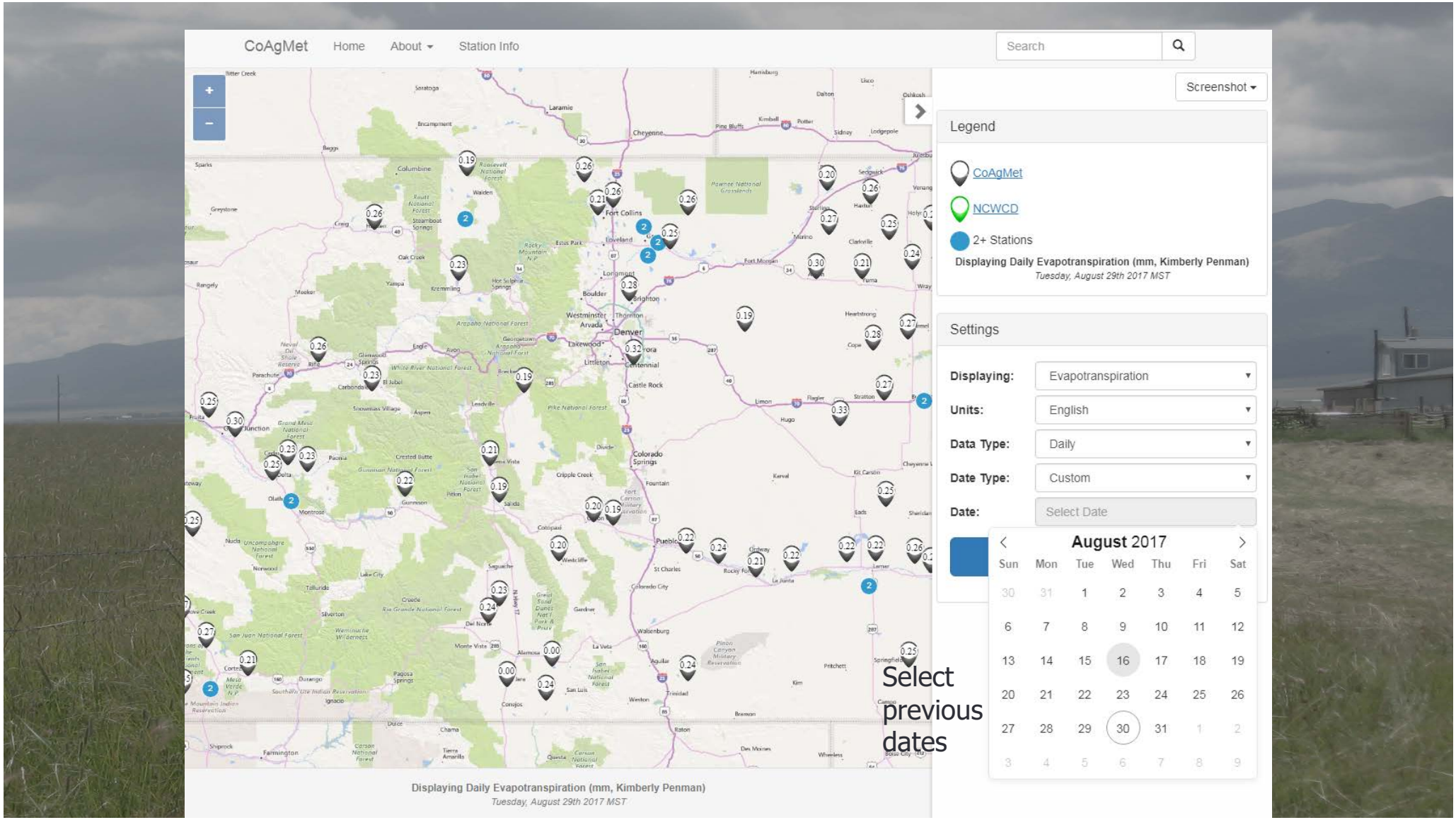
Tuesday's High Temps

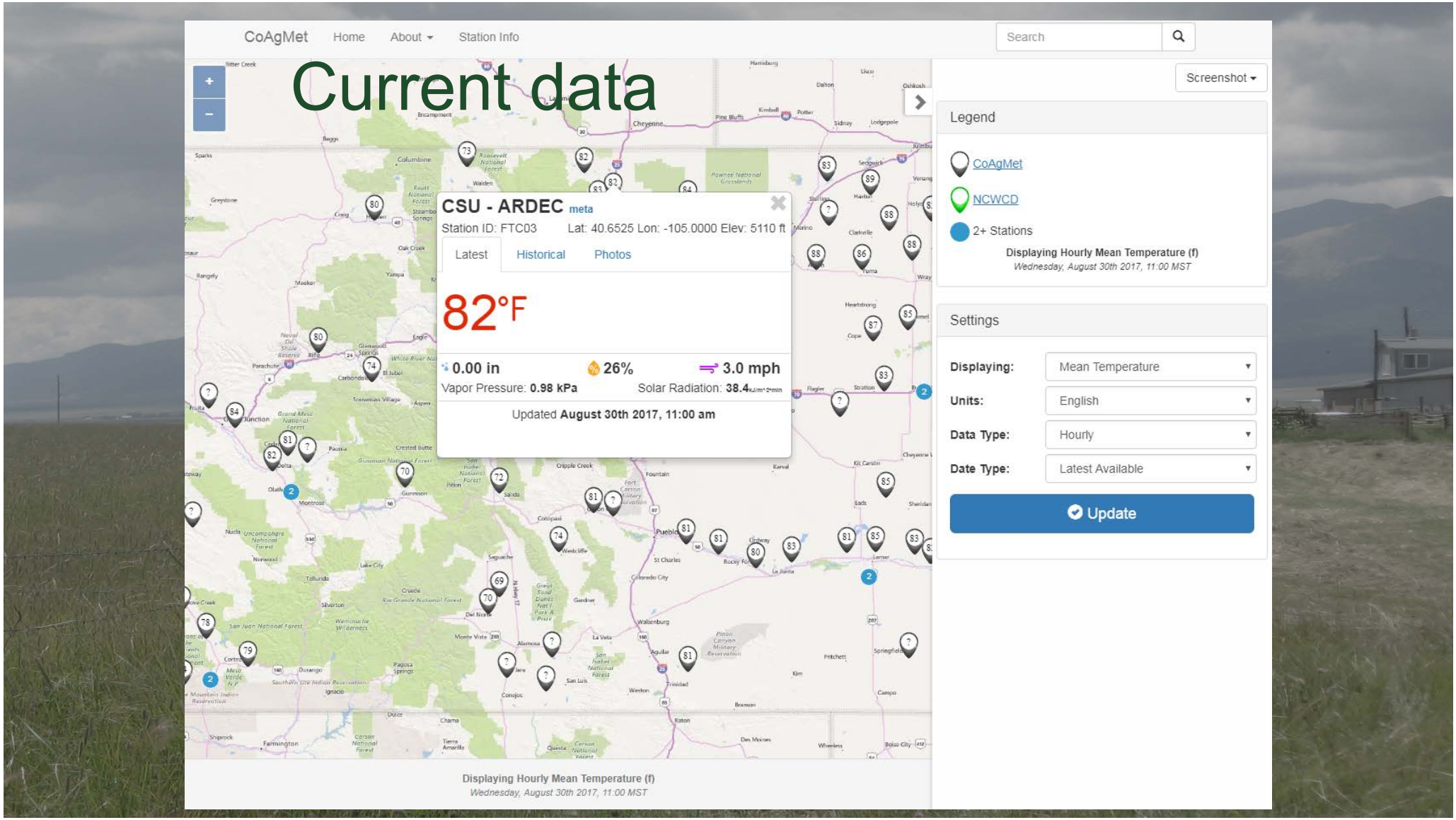



CoAgMet
Home
About
Station Info
Search
Screenshot
Legend
CoAgMet
NCWCD
2+ Stations
Displaying Daily Evapotranspiration (mm, Kimberly Penman)
Tuesday, August 29th 2017 MST
Settings
Displaying:
Evapotranspiration
Units:
Data Type:
Date Type:
Elevation
Max Temperature
Mean Temperature
Min Temperature
Precipitation
Relative Humidity
Vapor Pressure
Wind Speed
Evapotranspiration
Displaying Daily Evapotranspiration (mm, Kimberly Penman)
Tuesday, August 29th 2017 MST
Data Options

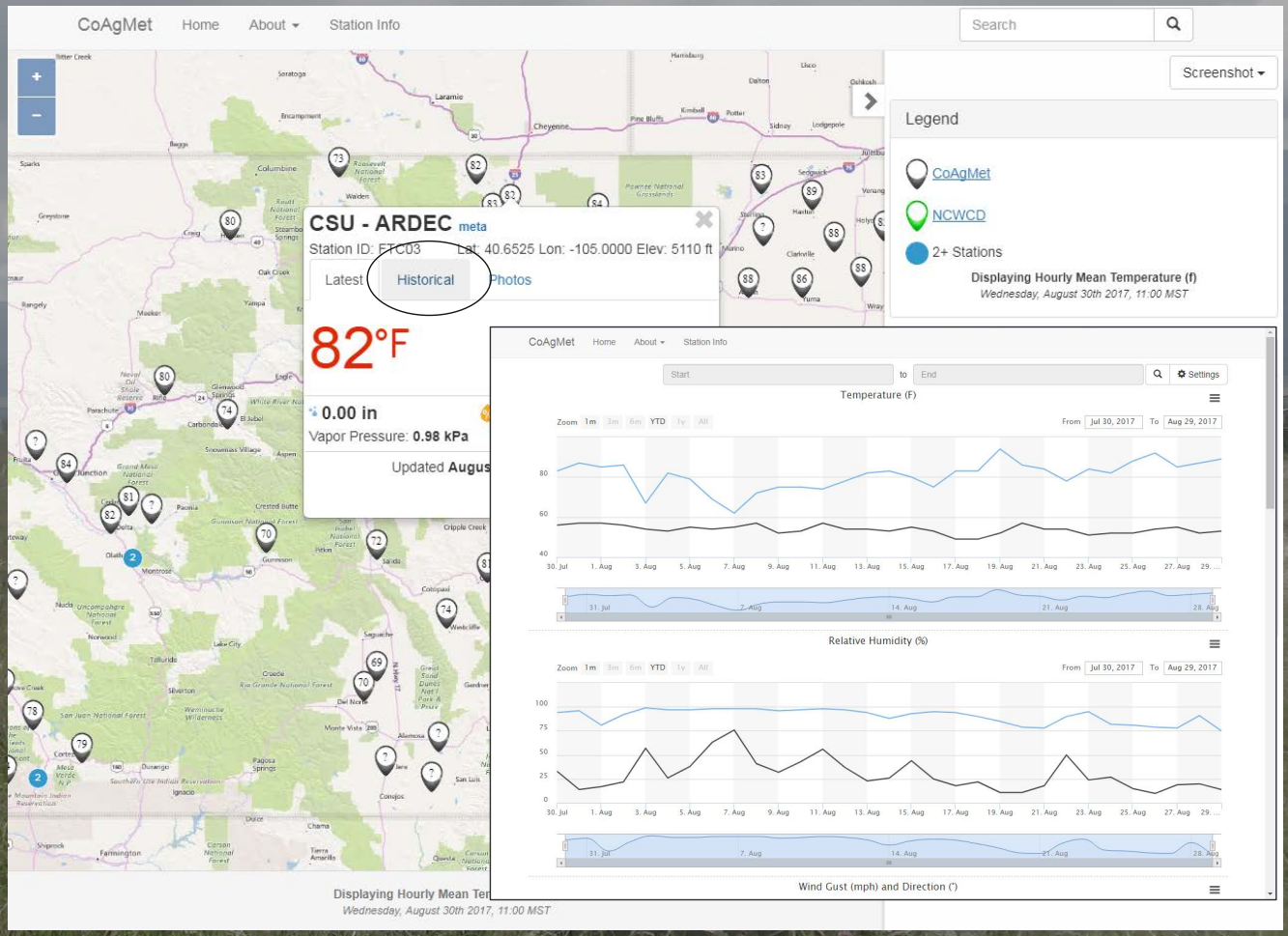
Tuesday's Ref ET Amounts



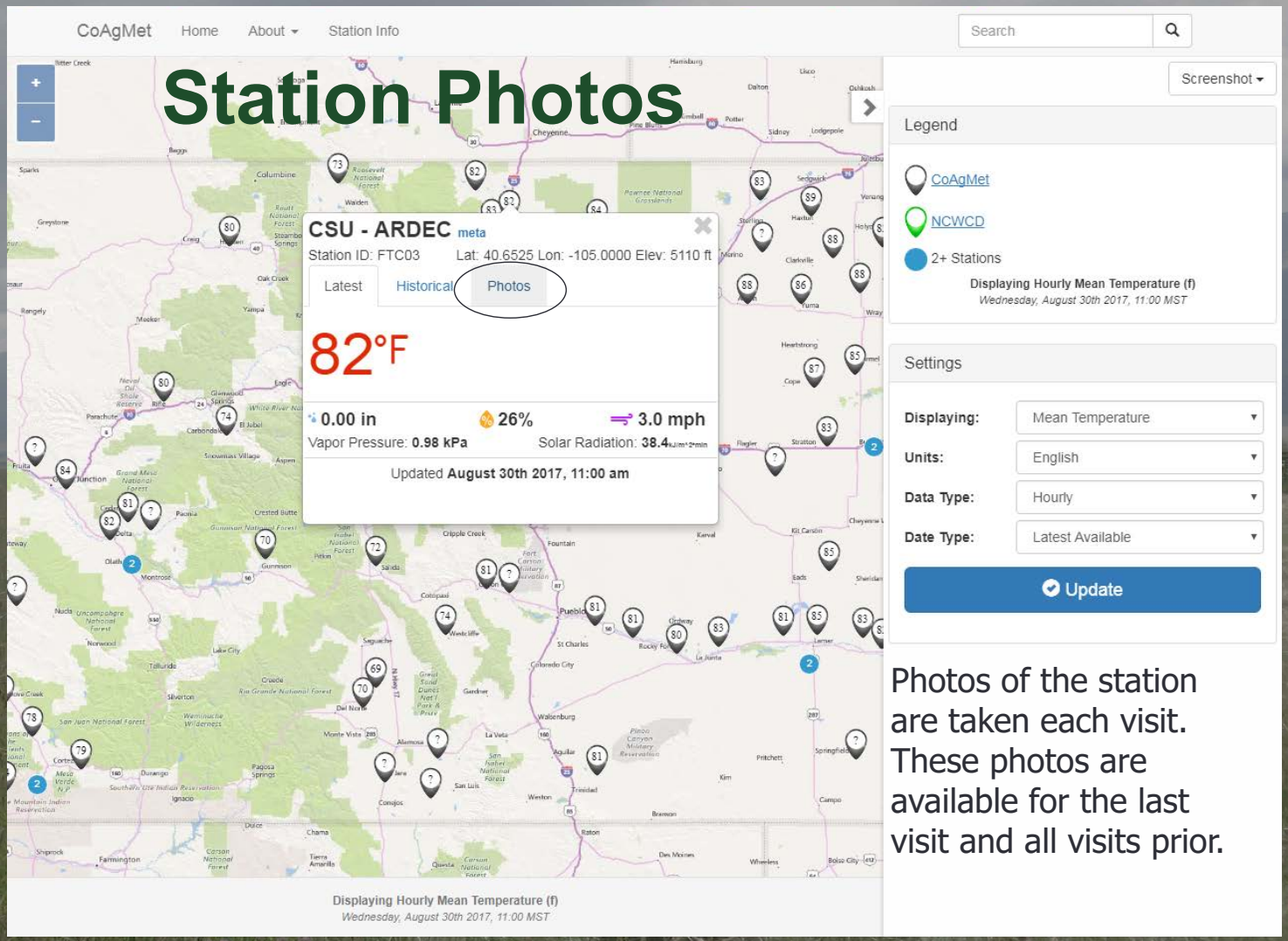

CoAgMet
Home
About
Station Info
Search
Screenshot
Legend
CoAgMet
NCWCD
2+ Stations
Displaying Daily Evapotranspiration (mm, Kimberly Penman)
Tuesday, August 29th 2017 MST
Settings
Displaying:
Evapotranspiration
Units:
English
Data Type:
Daily
Date Type:
Custom
Date:
Select Date
August 2017
Sun Mon Tue Wed Thu Fri Sat
Select previous dates
Displaying Daily Evapotranspiration (mm, Kimberly Penman)
Tuesday, August 29th 2017 MST


CoAgMet
Home
About
Station Info
Search
Current data
Screenshot
Legend
CoAgMet
NCWCD
2+ Stations
Displaying Hourly Mean Temperature (f)
Wednesday, August 30th 2017, 11:00 MST
Settings
Displaying:
Mean Temperature
Units:
English
Data Type:
Hourly
Date Type:
Latest Available
Update
CSU - ARDEC meta
Station ID: FTC03
Lat: 40.6525 Lon: -105.0000 Elev: 5110 ft
Latest
Historical
Photos
82°F
0.00 in
26%
3.0 mph
Vapor Pressure: 0.98 kPa
Solar Radiation: 38.4
Updated August 30th 2017, 11:00 am
Displaying Hourly Mean Temperature (f)
Wednesday, August 30th 2017, 11:00 MST

Can view historical data



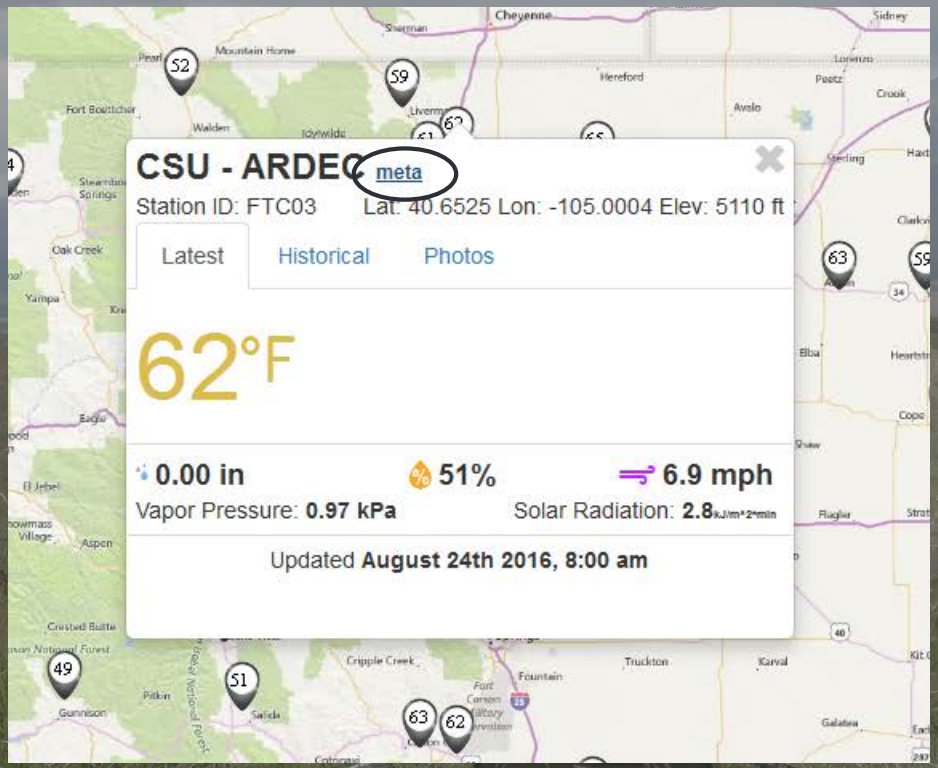
Station Photos

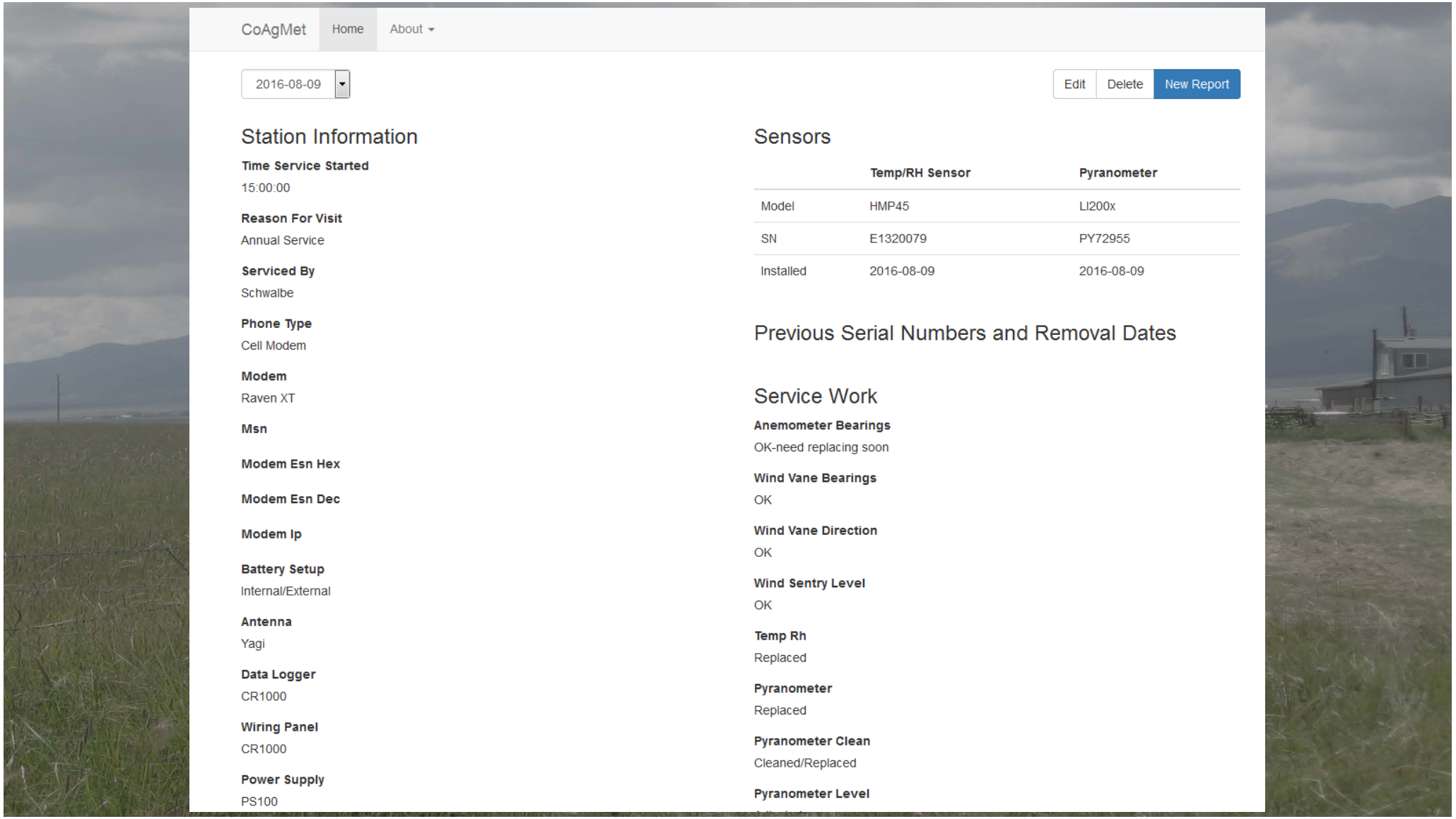


Photos of the station are taken each visit. These photos are available for the last visit and all visits prior.

All 4 directions plus the ground, and past photos

Station metadata





CoAgMet Home About

2016-08-09

Edit Delete New Report

Station Information

Time Service Started
15:00:00

Reason For Visit
Annual Service

Serviced By
Schwalbe

Phone Type
Cell Modem

Modem
Raven XT

Msn

Modem Esn Hex

Modem Esn Dec

Modem Ip

Battery Setup
Internal/External

Antenna
Yagi

Data Logger
CR1000

Wiring Panel
CR1000

Power Supply
PS100

Sensors

	Temp/RH Sensor	Pyranometer
Model	HMP45	LI200x
SN	E1320079	PY72955
Installed	2016-08-09	2016-08-09

Previous Serial Numbers and Removal Dates

Service Work

Anemometer Bearings
OK-need replacing soon

Wind Vane Bearings
OK

Wind Vane Direction
OK

Wind Sentry Level
OK

Temp Rh
Replaced

Pyranometer
Replaced

Pyranometer Clean
Cleaned/Replaced

Pyranometer Level

Maintaining the data

- Our goal is to visit each station at least once a year to make sure the station is operating properly.
  - Sensor are swapped out once every 2 years.
  - Emergency visits to stations when there is a problem with the station causing bad data or an interruption of data.
- Data are quality controlled daily to catch data errors and catch issues with stations before it becomes a problem.

climate.colostate.edu

coagmet.colostate.edu

Thank you

Colorado State University

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Zach.Schwalbe@colostate.edu