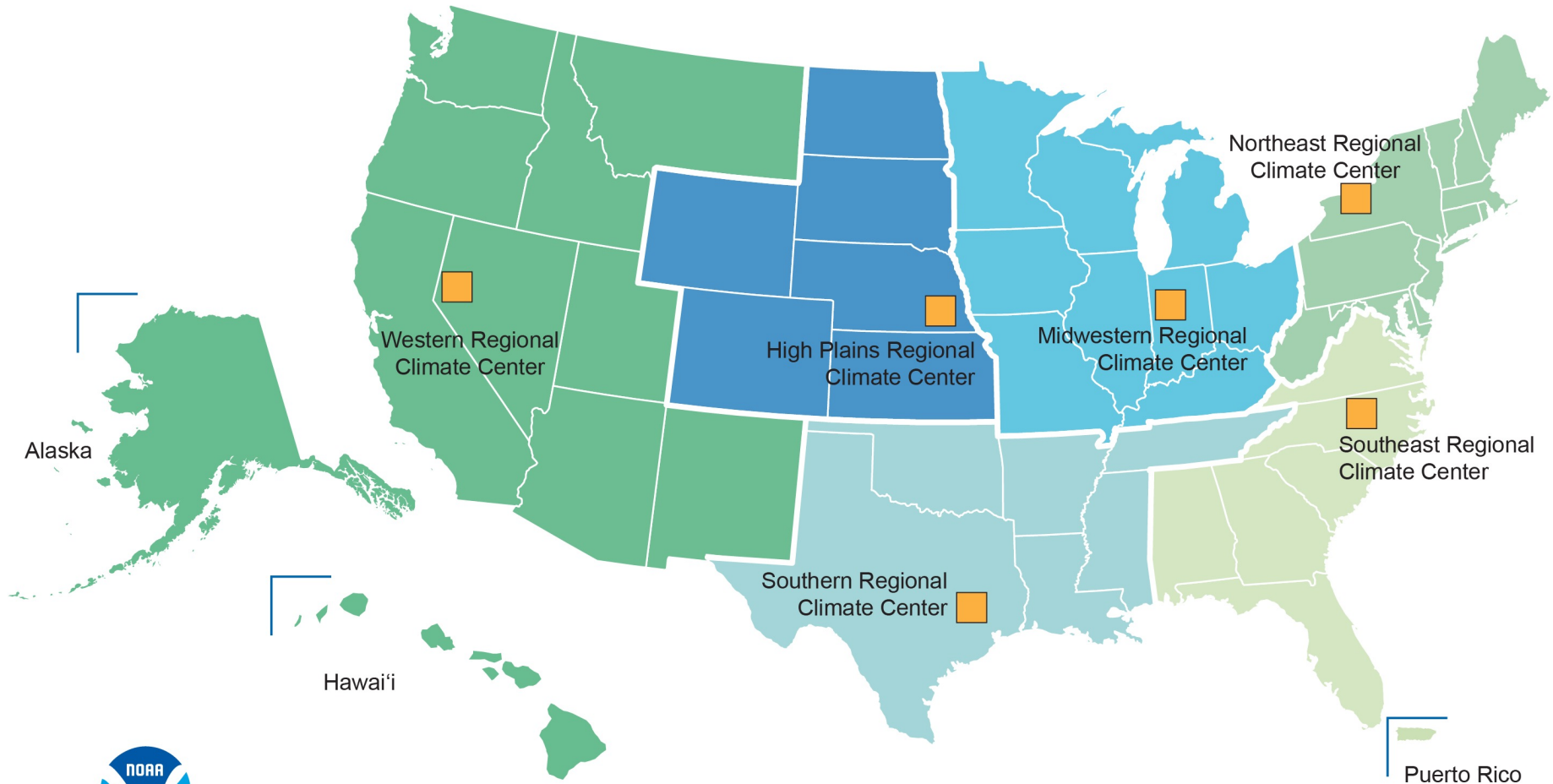


# Climate Data Resources

## Midwestern Regional Climate Center



May 2021



**MRCC**  
Midwestern Regional  
Climate Center

*Dr. Beth Hall*  
*Director, MRCC*  
*November 2021*

**PURDUE**  
UNIVERSITY®

# Mission of MRCC

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- Provide high-quality climate data, derived information, and data summaries for the region
- Monitor and assess regional climate conditions and their impacts
- Prepare specialized historical climate data sets
- Coordinate and conduct applied research on climate-related issues and problems

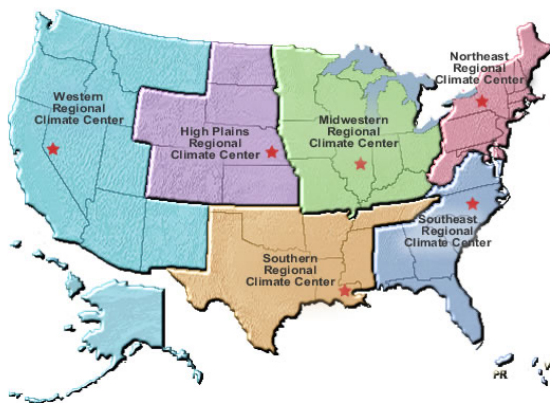
Bonus Missions: Outreach and education

# RCCs – *What makes them different?*

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## RCCs

- Work directly with climate data
  - Observation data
- Accesses, organizes, stewards of historical climate data
- Develop decision-support tools
- Develop value-added climate tools and monitoring resources
- Any sector, stakeholder

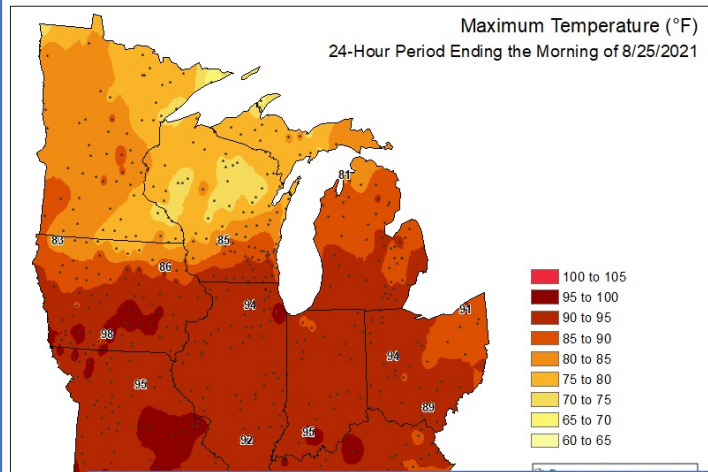


## Other Climate Programs

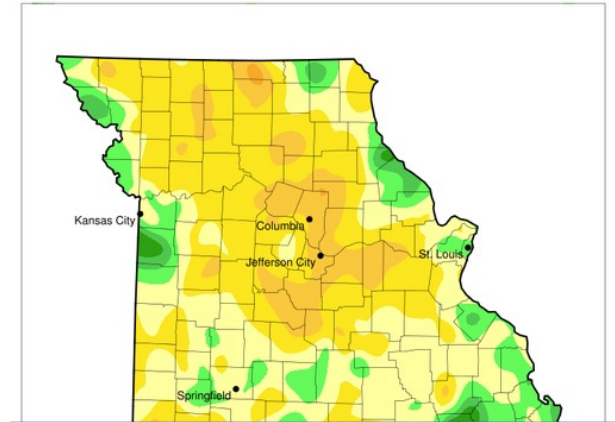
- Identifying sector-specific climate impacts
- Establishing adaptation plans for impacts
- Social science analysis of incorporating plans, policies
- More agency-focused
- More future-planning



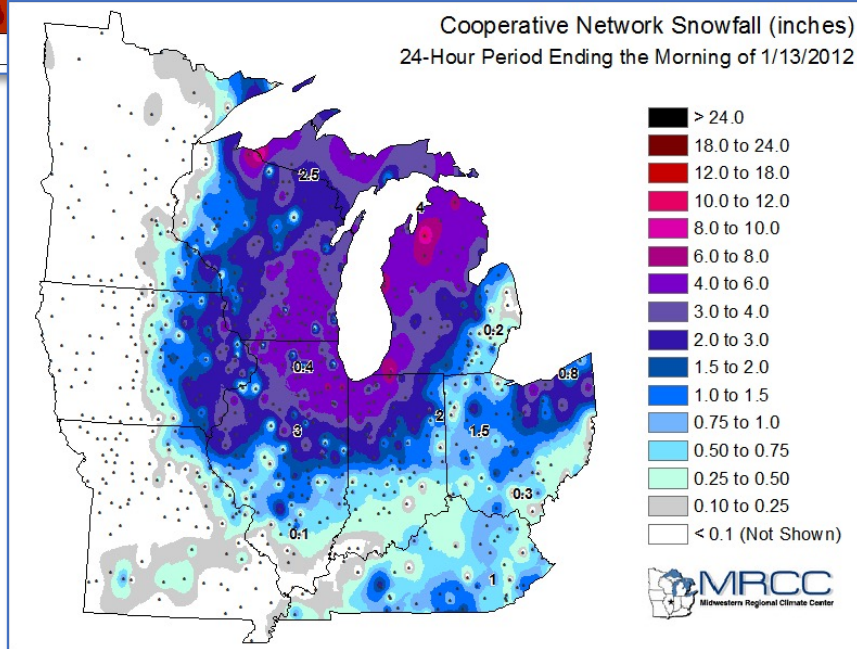
Current | -1 days | -2 days | -3 days | -4 days | -5 days | -6 days | -7 days



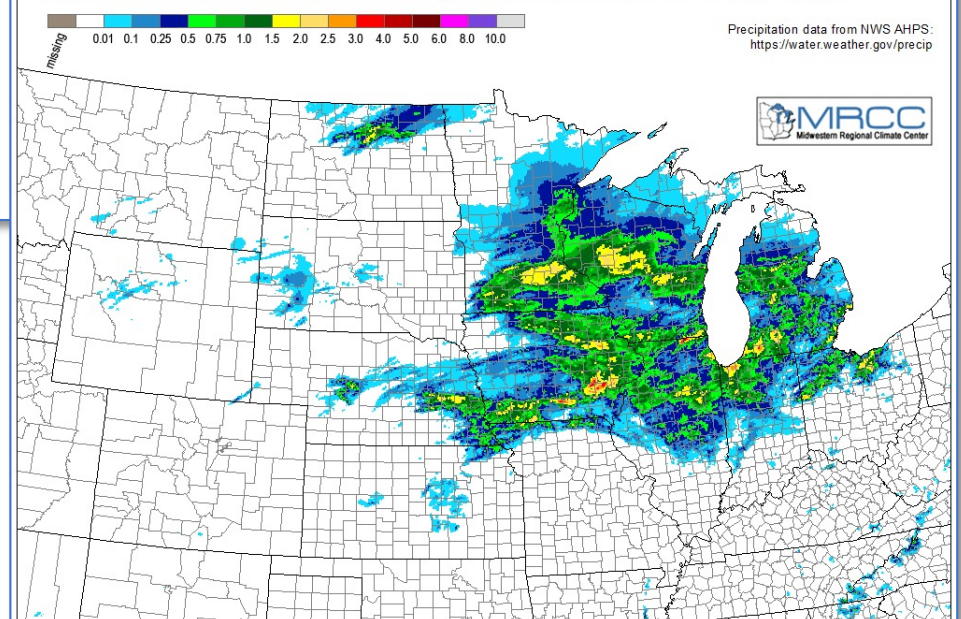
Accumulated Precipitation (in): Departure from 1991-2020 Normals  
August 01, 2021 to August 31, 2021



Current | -1 days | -2 days | -3 days | -4 days | -5 days | -6 days | -7 days

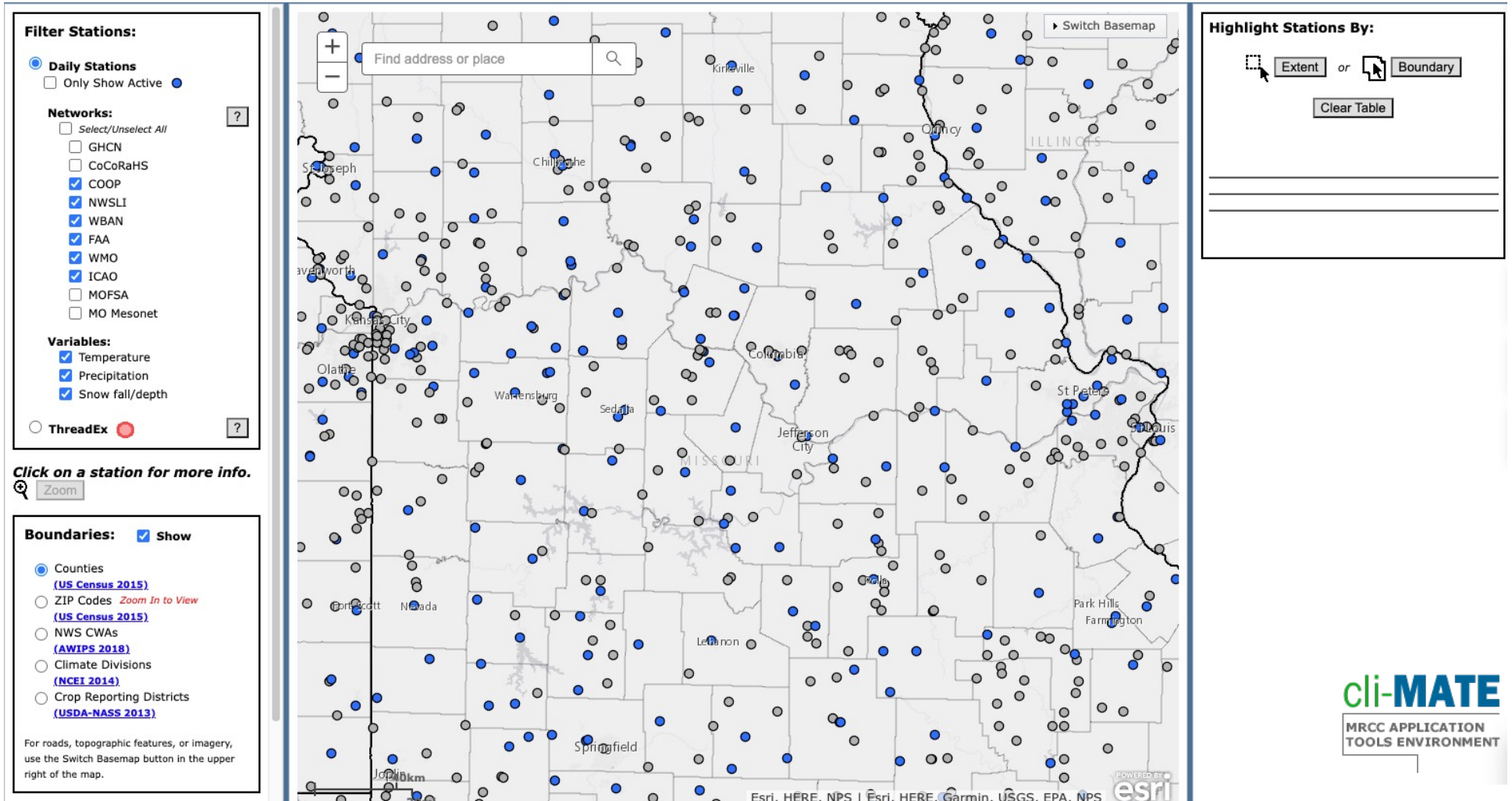


Multi-sensor Precipitation: Observed (inches) 24-Hour Period Ending the Morning of 8/25/2021



# Climate Products and Services

## Daily Stations



Temperature (max, min, average, degree days, departures)  
Precipitation (liquid, snow, percent of mean, departures)



**Filter Stations:**

**Hourly Stations**

Only Show Active ●, ■

**Networks:** ?

Select/Unselect All

WBAN

FAA

AirForce

CRN

**Restricted Access Networks:** ?

Select/Unselect All

MO Mesonet

**Click on a station for more info.**

**Boundaries:**  Show

Counties Zoom In to View  
[\(US Census 2015\)](#)



ZIP Codes Zoom In to View  
[\(US Census 2015\)](#)

NWS CWAs  
[\(AWIPS 2015\)](#)

Climate Divisions  
[\(NCEI 2014\)](#)

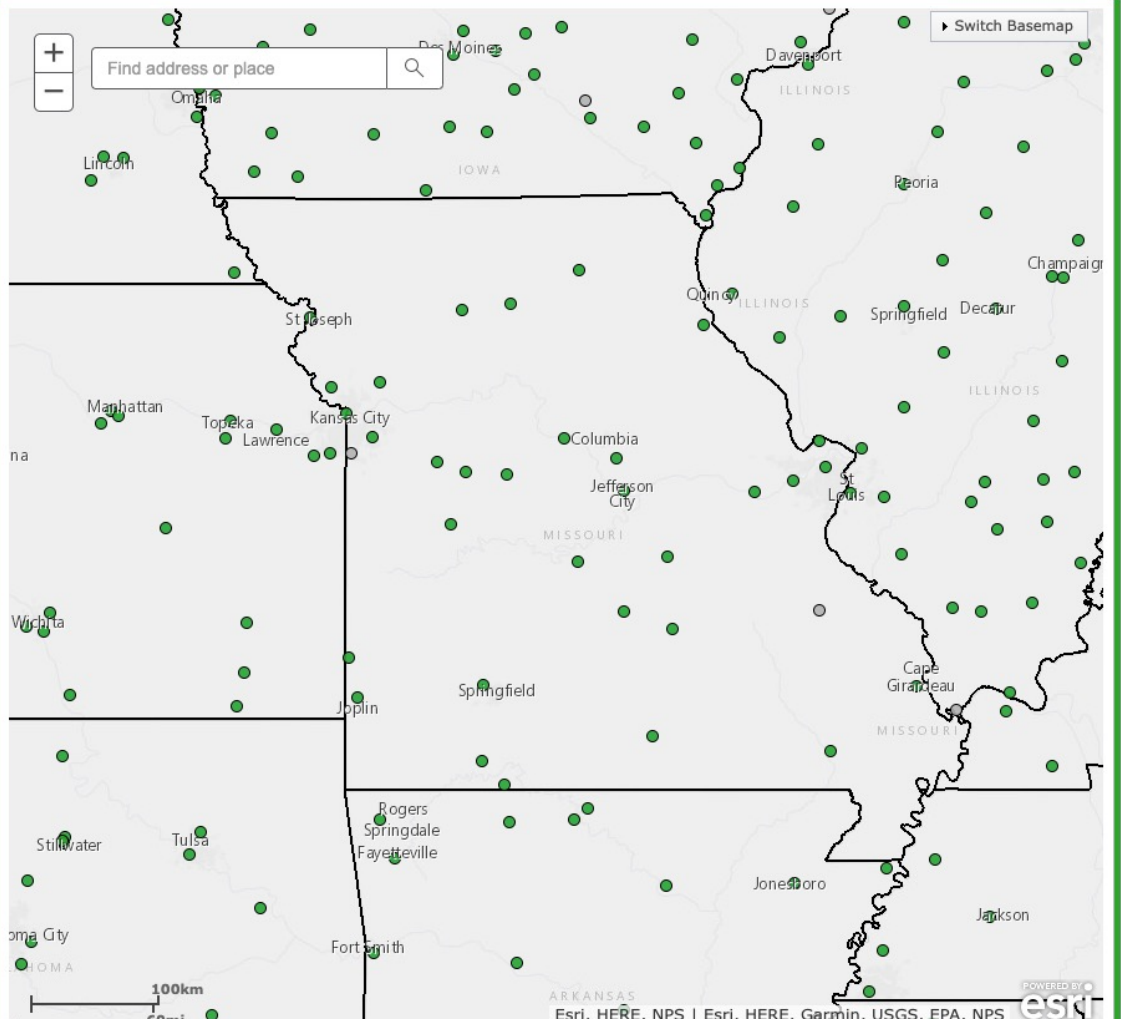
Crop Reporting Districts  
[\(USDA-NASS 2013\)](#)


For roads, topographic features, or imagery, use the Switch Basemap button in the upper right of the map.

[Send Feedback](#)

Find address or place



Esri, HERE, NPS | Esri, HERE, Garmin, USGS, EPA, NPS 

**Highlight Stations By:**

or

---

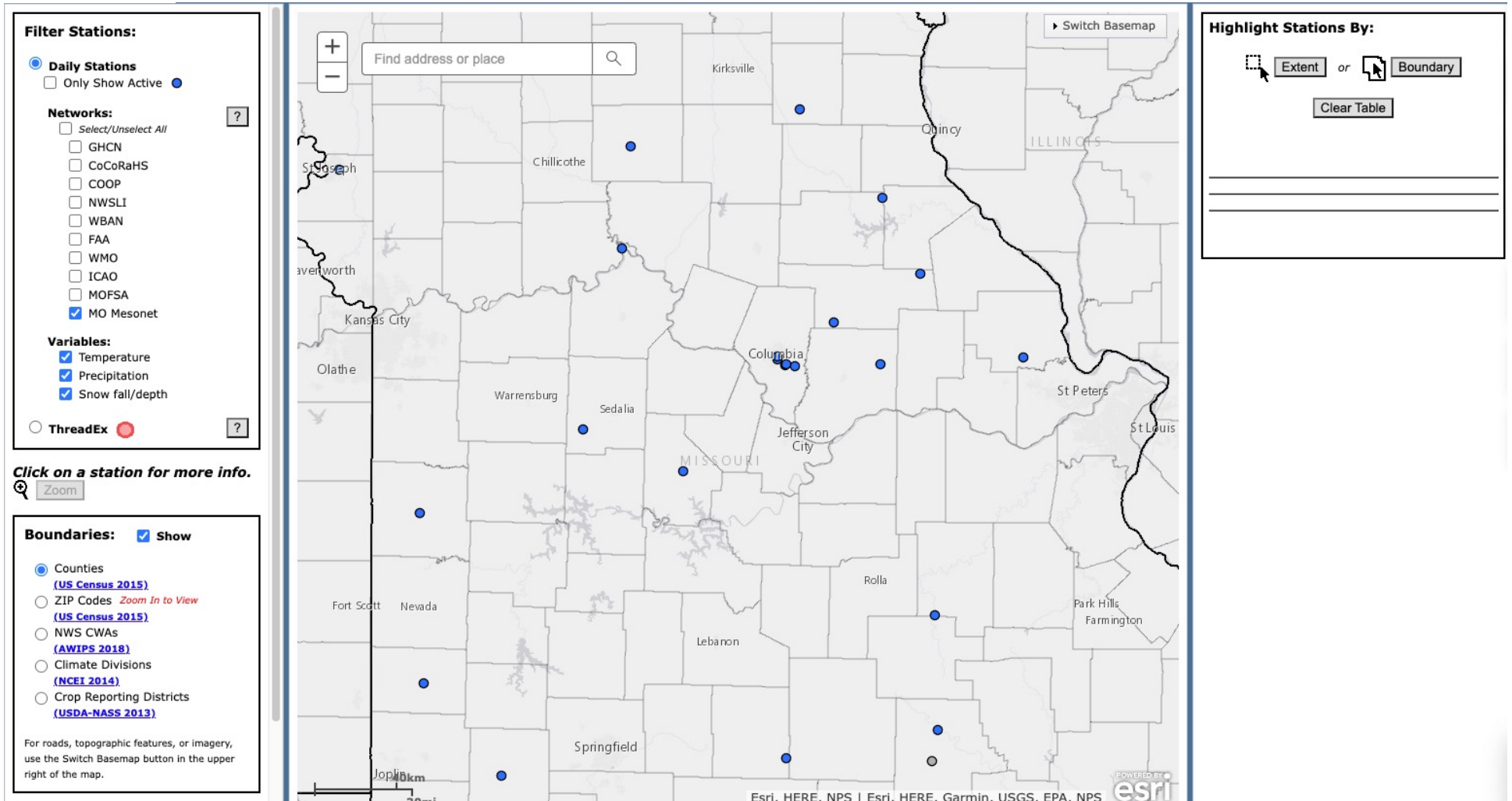


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Temperature, Precipitation, Winds, Humidity, Pressure, Visibility  
 Wind chill, heat index, wind roses



Temperature, Precipitation, Winds, Humidity, Pressure, solar radiation  
Wind chill, heat index, wind roses, low-level inversion



# Climate Products and Services

## *Ranks, thresholds, and records*

**Ranking for Maximum Temperature for August 18  
COLUMBIA REGIONAL AIRPORT (MO)  
USW00003945**

Year	Max Temp (°F)	Standard	Dense	Ordinal
1936	106	1	1	1
2003	101	2	2	2
1894	101	2	2	3
2006	99	4	3	4
1972	99	4	3	5
1900	99	4	3	6
1995	98	7	4	7
1983	98	7	4	8
1978	98	7	4	9
1925	97	10	5	10
1914	97	10	5	11
1913	97	10	5	12
2005	96	13	6	13
1988	96	13	6	14
1947	96	13	6	15
1937	96	13	6	16
1916	96	13	6	17
1891	96	13	6	18
2007	95	19	7	19
1993	95	19	7	20
1934	95	19	7	21
1979	94	22	8	22
1922	94	22	8	23
1911	94	22	8	24

**Threshold Search for Precipitation (in)  
COLUMBIA REGIONAL AIRPORT (MO)  
USW00003945  
Lat/Lon/Elev: 38.8169/-92.2183/893.0  
Years: 2012 to 2021  
Dates: 07-01 to 08-31  
Condition is: Precipitation (in) greater than 1.00**

To sort multiple columns, hold SHIFT while clicking on the columns.

Date	PCPN	MAXT
2012-08-31	2.23	79
2013-07-21	1.04	83
2014-08-07	1.59	79
2015-07-01	1.70	81
2015-07-08	1.62	68
2015-07-19	2.42	85
2015-07-26	1.63	89
2015-08-22	1.95	81
2016-07-02	1.87	69
2016-07-03	3.58	70
2016-07-25	1.47	84
2016-08-02	2.68	87
2016-08-09	1.08	90
2017-07-05	1.10	78
2017-08-16	1.51	82
2017-08-22	1.25	83
2018-07-19	1.11	82
2018-08-29	1.17	82



**Degree Data for a Station**  
**MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT(MN)**  
**USW00014922**  
**Degree Days ABOVE Base**  
**Base 50 F**

Date	Max Temp (°F)	Min Temp (°F)	DegDay	Accumulation since Apr 01	Seasonal Missing Values
2021-08-24	82	65	24	2622	0
2021-08-25	84	67	26	2648	0
2021-08-26	73	63	18	2666	0
2021-08-27	76	68	22	2688	0
2021-08-28	83	67	25	2713	0
2021-08-29	81	66	24	2737	0
2021-08-30	M	M	M	2737 *	1
<b>Sum:</b>			139		
<b>Count:</b>	6	6	6		
<b>Average:</b>	79.8	66.0	23.2		
<b>Median:</b>	81.5	66.5	24.0		
<b>Low Value:</b>	73	63	18		
<b>High Value:</b>	84	68	26		

M = Missing  
 \* Data incomplete

Time of observation may vary by station, date, and/or variable

Midwestern Regional Climate Center  
 cli-MATE: MRCC Application Tools Environment  
 Generated at: 8/30/2021 11:16:31 AM CDT

- Last 7 Days
- Last 30 Days
- This Month
- Last Month
- This Year

Temperature  
 Temperature

Custom

Base:

Lower Line

Upper Line

Accumula

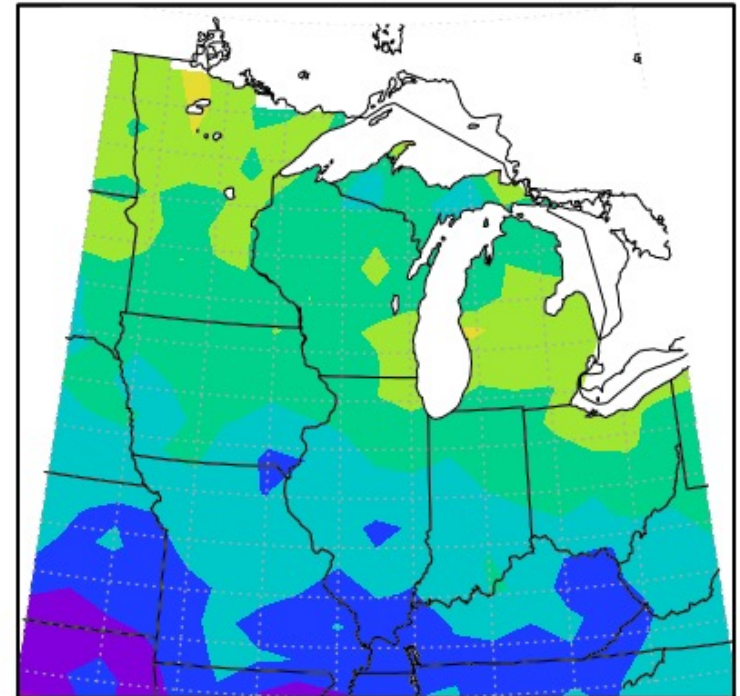
Number

Novem

Novem

## Application Products

MGDD Departure, 4/1/2021 to 8/29/2021

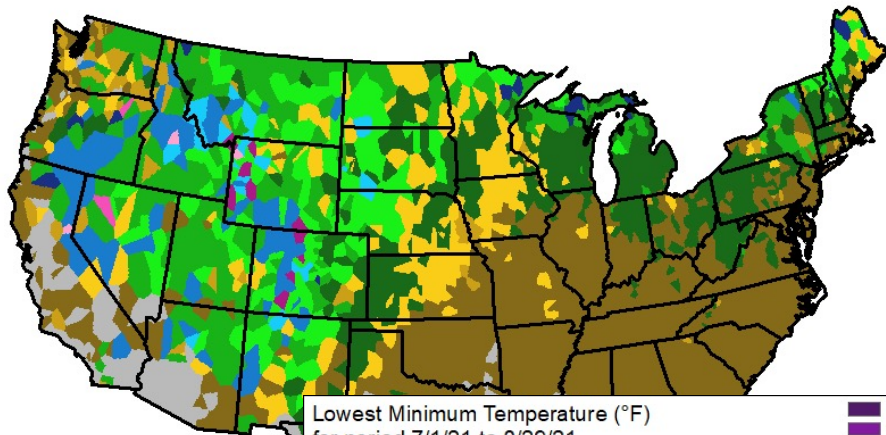


Midwestern Regional Climate Center  
 Purdue University

## A one-stop shop for Frost/Freeze products and forecasts

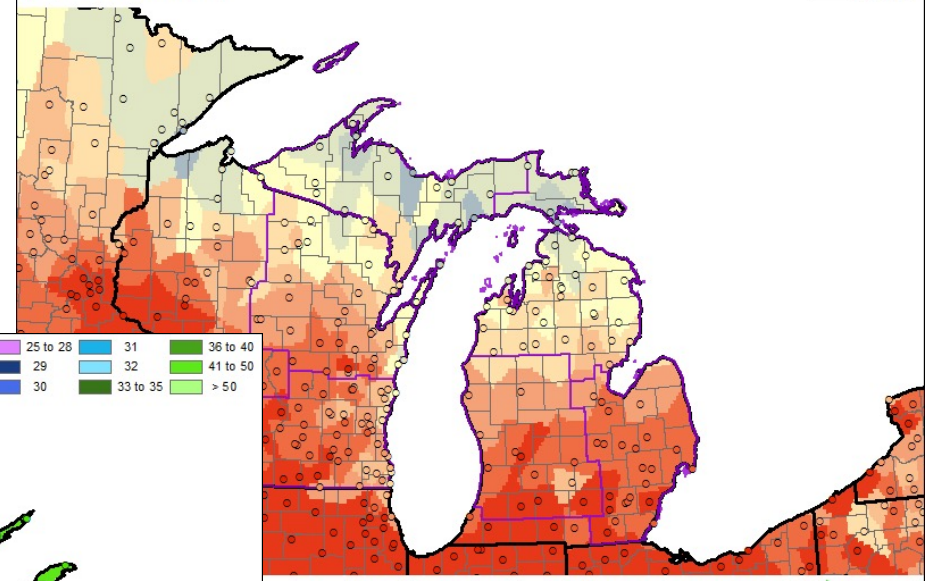
**Date of Last 32°F Freeze for period 8/1/16 to 7/31/17**

Apr 10 or Earlier	May 1 - 10	Jun 1 - 10	Jul 1 - 10
Apr 11 - 20	May 11 - 20	Jun 11 - 20	Jul 11 - 20
Apr 21 - 30	May 21 - 31	Jun 21 - 30	Jul 21 or Later
No Freeze since 3/1			



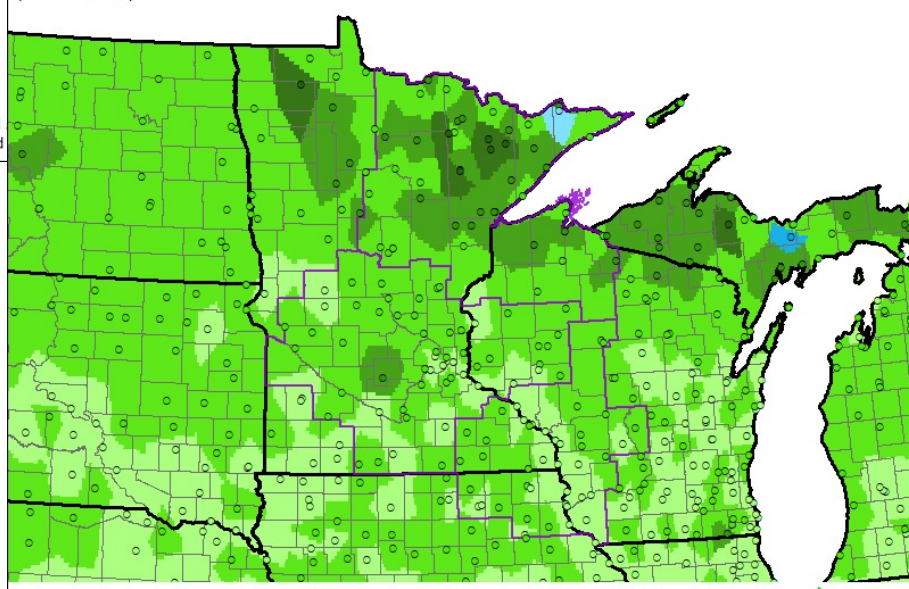
**Accumulated Growing Degree Days (base 54°F) Since Most Recent 32°F Freeze (map created on 6/5/18)**

0 - 10	51 - 75	151 - 200	301 - 350
11 - 25	76 - 100	201 - 250	351 - 400
26 - 50	101 - 150	251 - 300	401 +
No Freeze			



**Lowest Minimum Temperature (°F) for period 7/1/21 to 8/29/21 (10°F to 50°F)**

< 10	25 to 28	31	36 to 40
10 to 19	29	32	41 to 50
20 to 24	30	33 to 35	> 50



MRCC Experimental Freeze Guidance:  
These experimental maps may be utilized for freeze conditions but should NOT be used

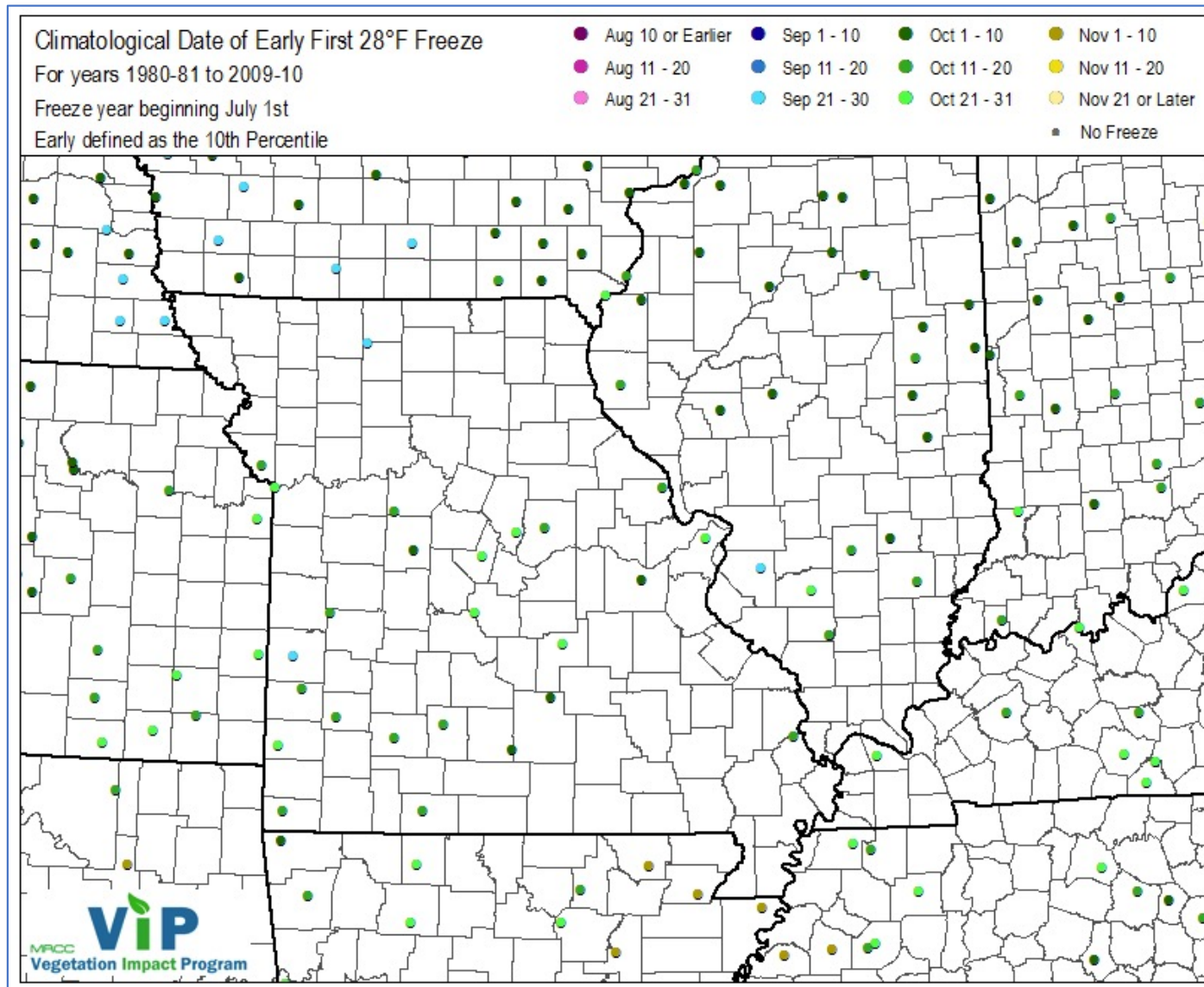
MRCC Experimental Freeze Guidance:  
These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.



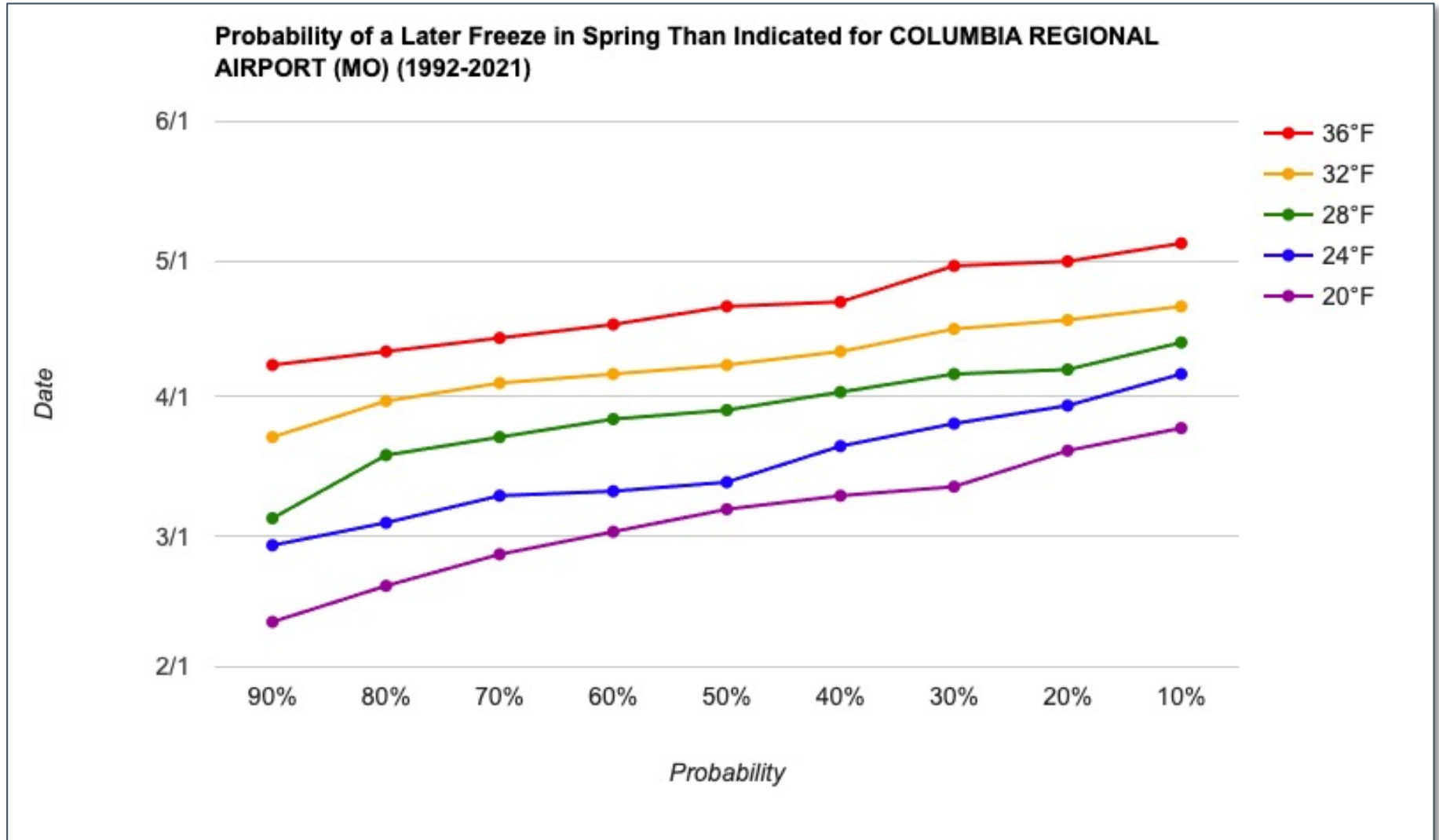
ance:  
utilized as a guide to local and regional  
be used by themselves for decision processes.



## A one-stop shop for Frost/Freeze products and forecasts

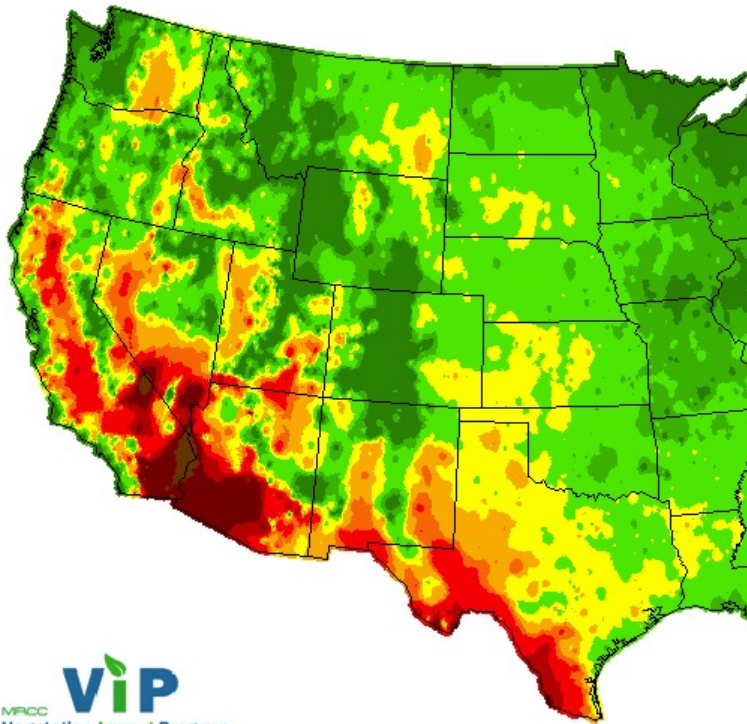


## Freeze Probabilities

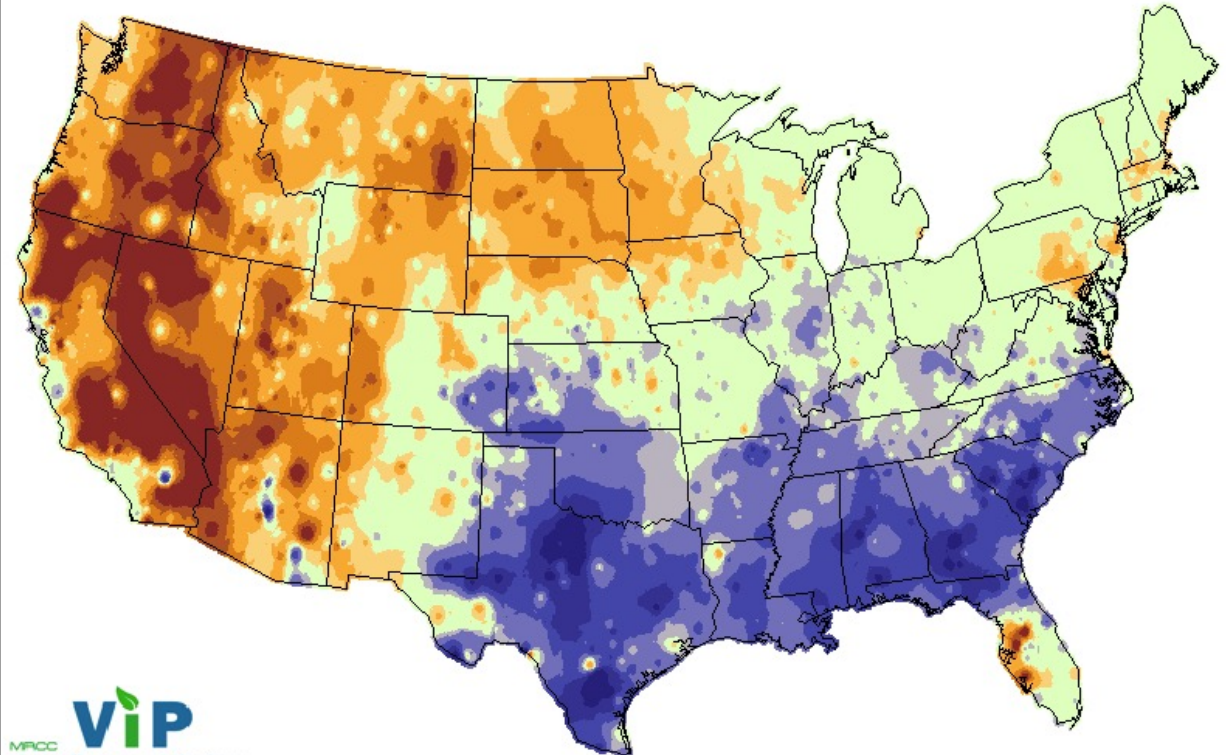
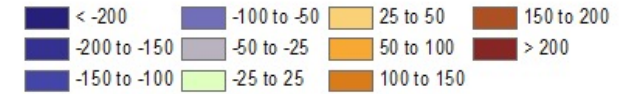


## Stress degree-days and Accumulated chilling hours

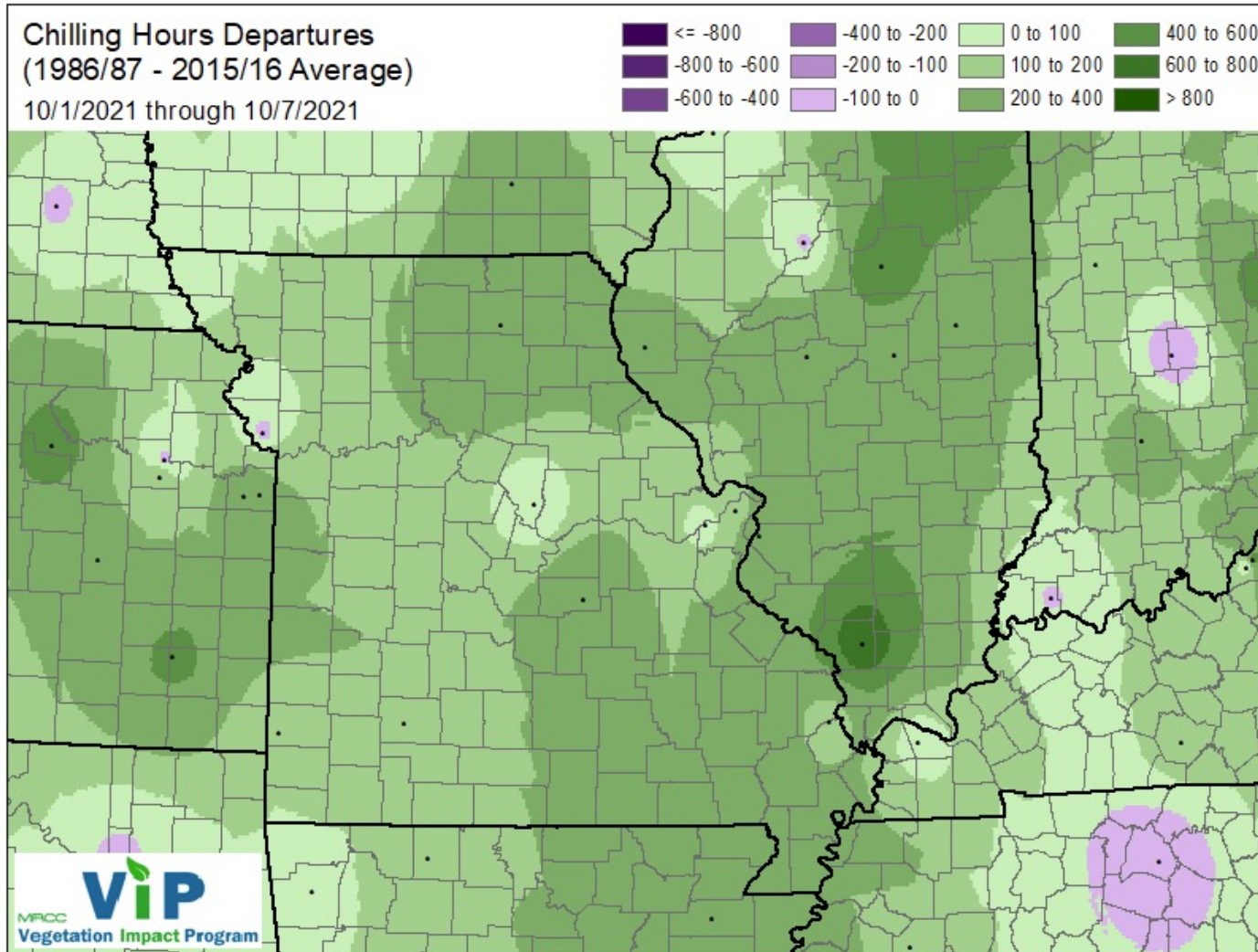
Modified Stress Degree Days (base 86°F)  
for Corn Plants  
Accumulated January 1 to 7/14/2021



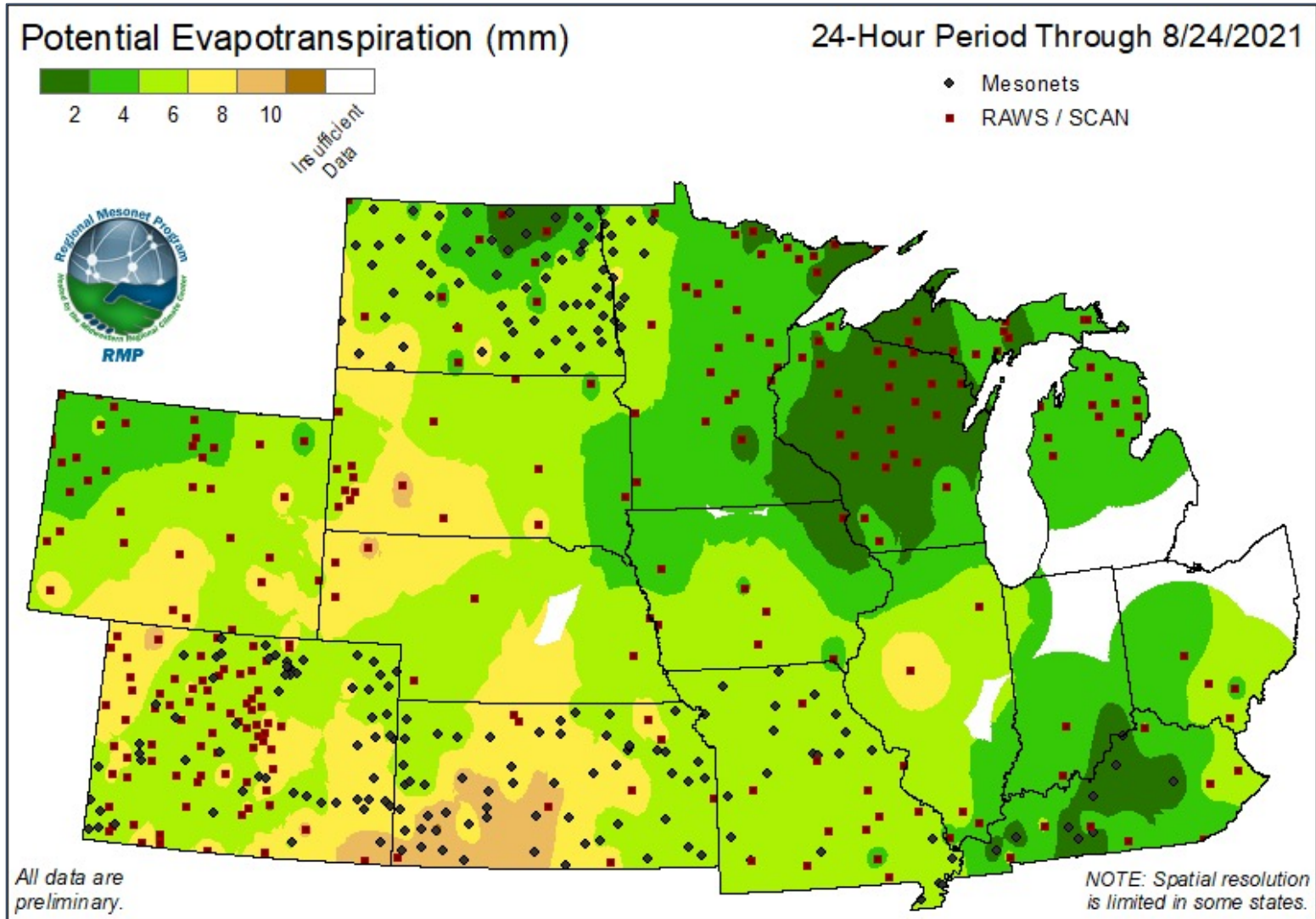
Modified Stress Degree Days (base 86°F)  
for Corn Plants, Departure From Normal  
Accumulation January 1 to 7/14/2021



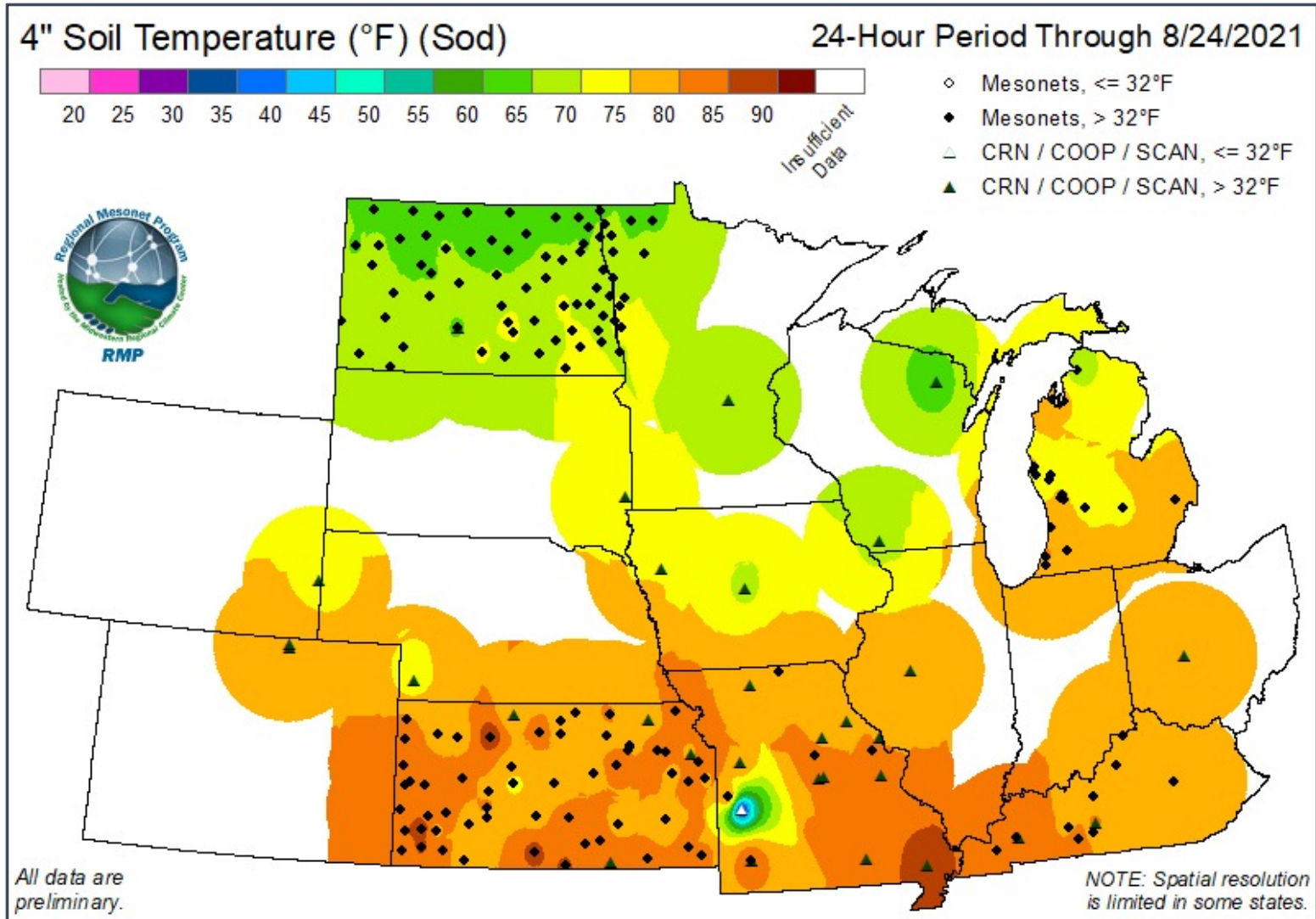
## Accumulated chilling hours



## Regional Mesonet Program



## Regional Mesonet Program

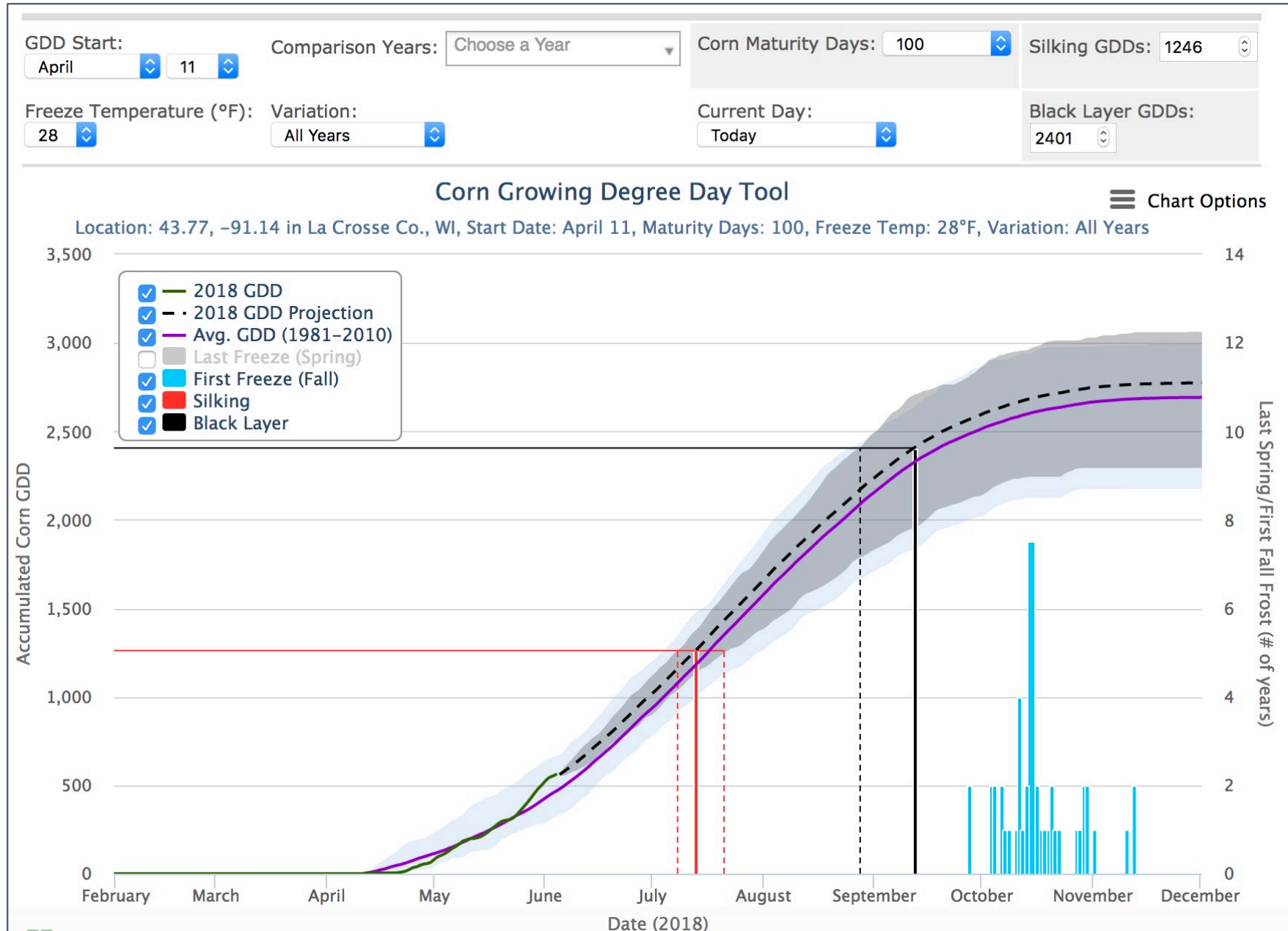






# Useful To Usable (U2U)

## Corn Growing Degree Day Monitoring



## Ag Climate Viewer

This tab allows you to plot countywide annual yield data with up to two climate variables.

**Step 1: Select one of the crops**

Corn  Soybean  None

**Step 2: Select up to two monthly climate variables**

Show Deviation from...

Max Temperature  Min Temperature  Precipitation

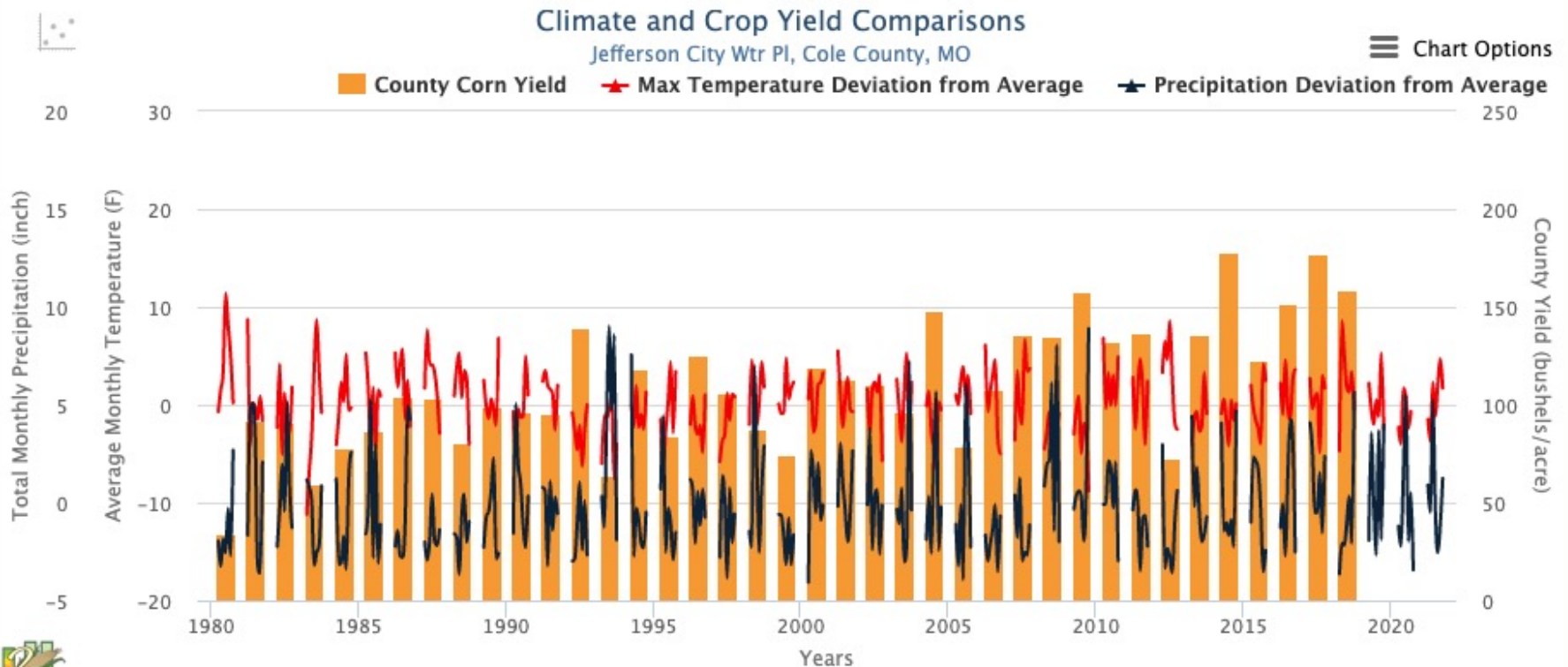
GDD50

**Step 3: Select start & end month range to plot**

April  October

**Step 4: Select start & end year range to plot**

1980  2021



## Climate Patterns Viewer

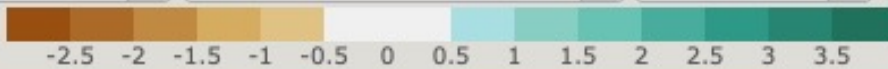
About CPV

Click on the map to view a chart of the data for that location; chart will appear below the maps.  Four Maps



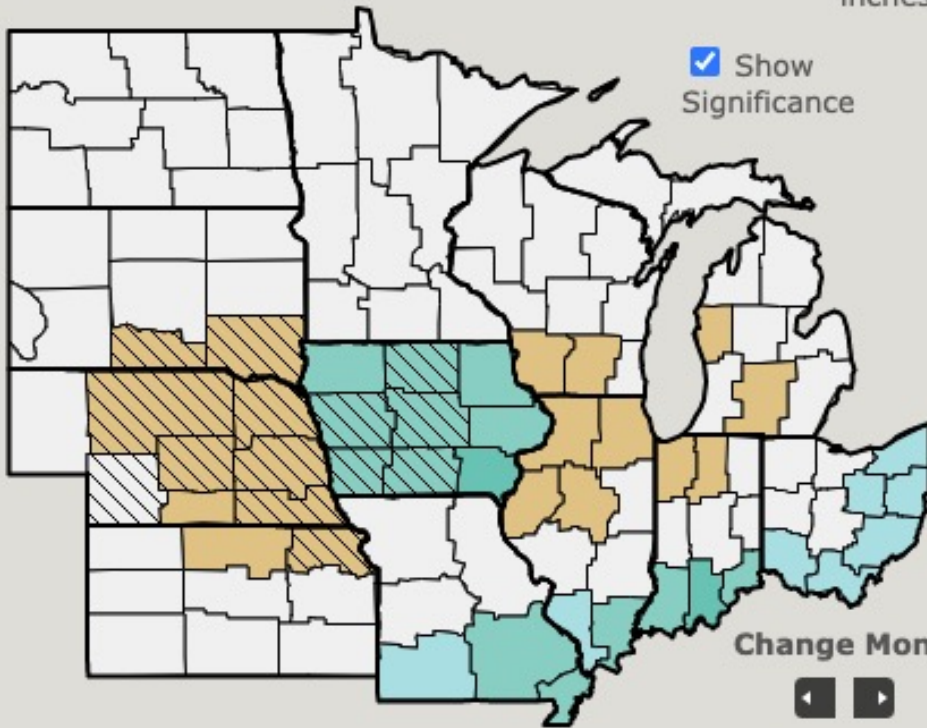
### ENSO Average Observed Monthly Precipitation (inches)

La Niña Deviation from Normal March



inches

Show Significance



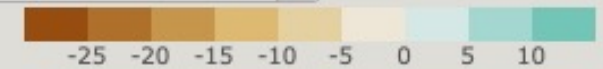
Change Month



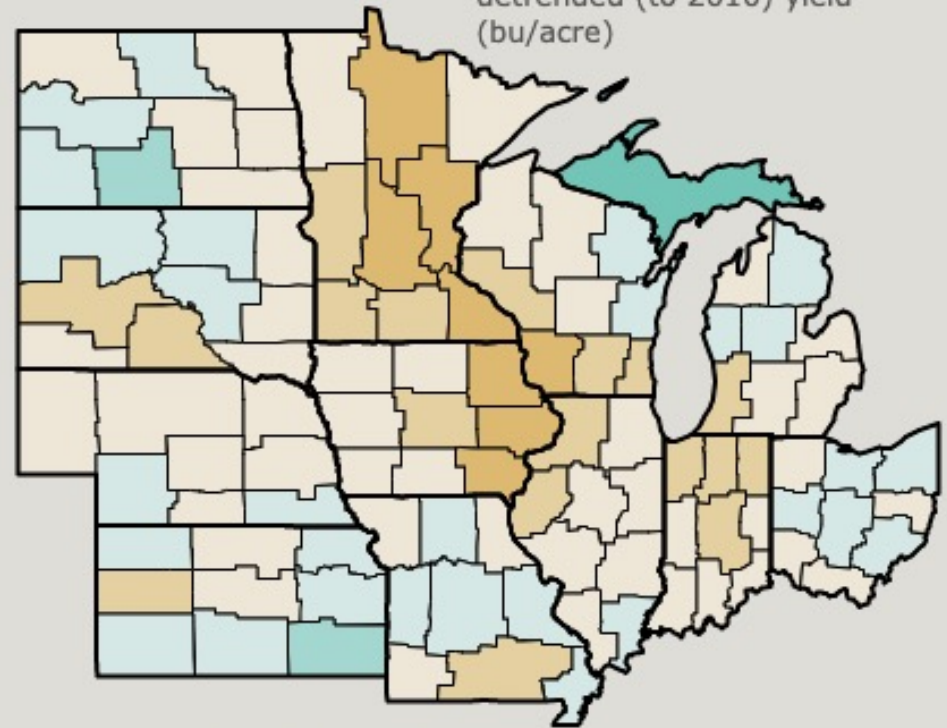
Link map

### ENSO Observed Corn Yield (bushels/acre)

La Niña Deviation from Mean

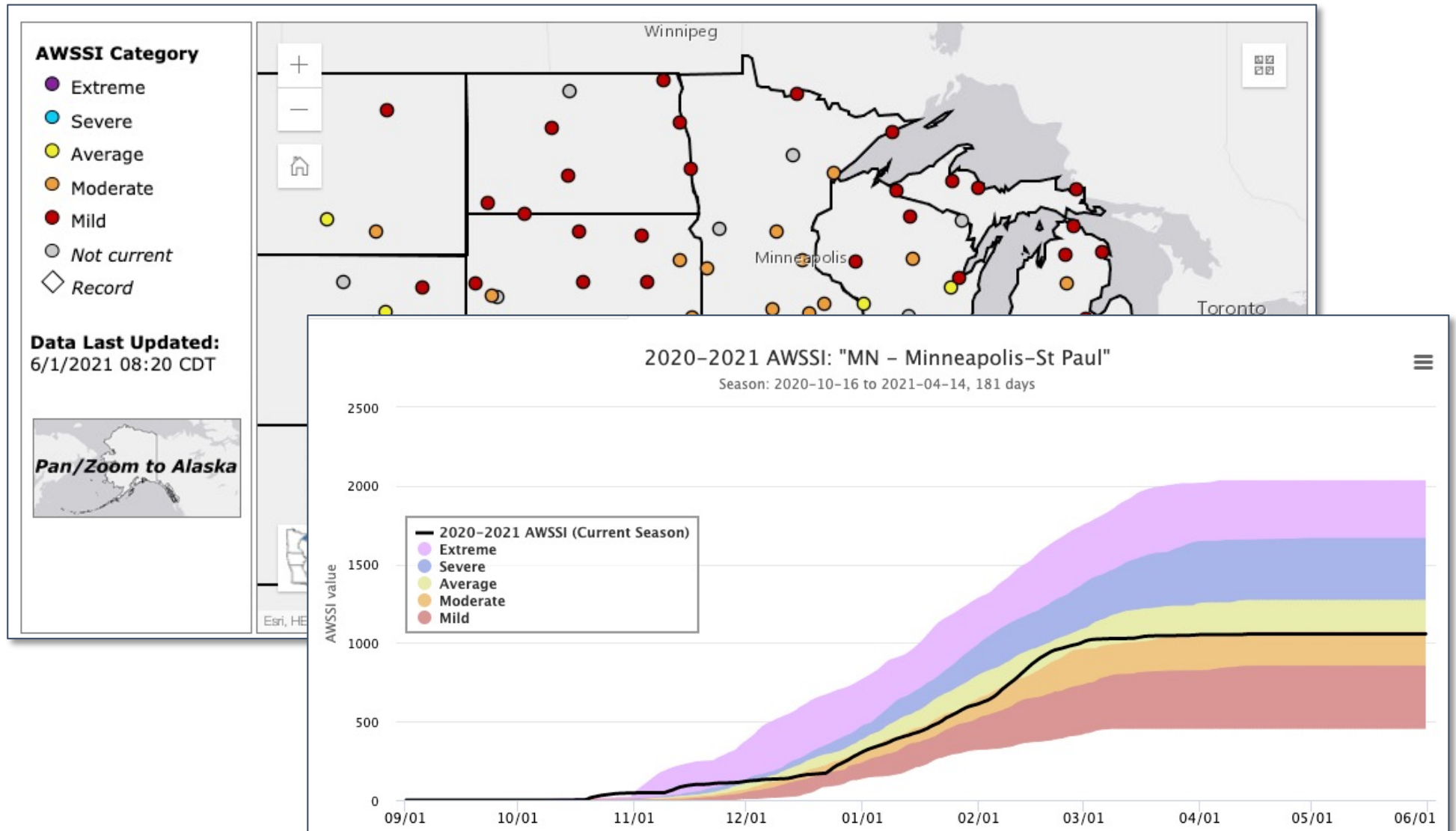


detrended (to 2010) yield (bu/acre)



Years: 1985, 1988, 1999, 2000, 2007, 2010

## Accumulated Winter Season Severity Index (AWSSI)



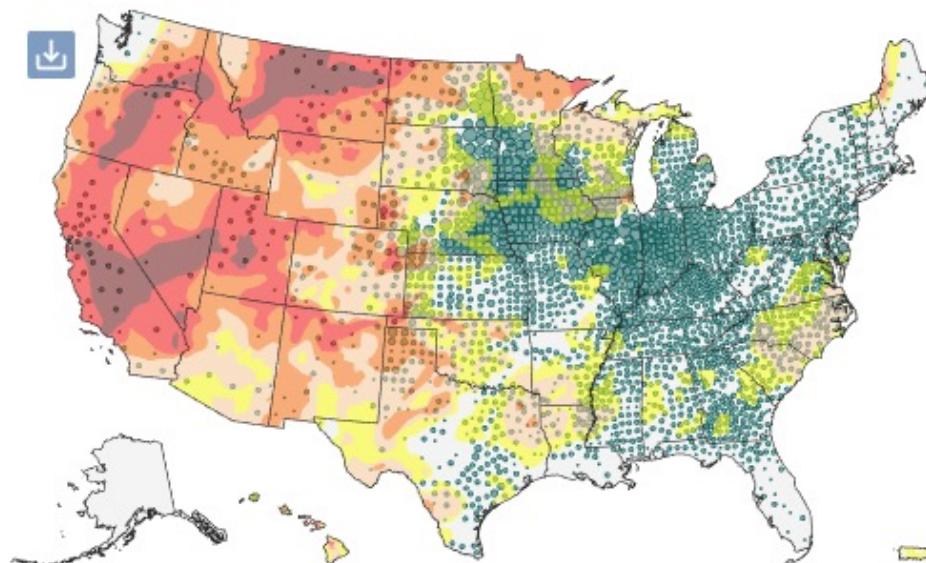
## U.S. Crops and Livestock in Drought

[View Interactive Map](#)


[Corn](#) [Soybeans](#) [Hay](#) [Cattle](#) [Wheat](#)

The U.S. Department of Agriculture's (USDA's) National Agricultural Statistics Service (NASS) conducts hundreds of surveys each year and a Census of Agriculture every 5 years. NASS prepares reports covering virtually every aspect of U.S. agriculture, including agricultural commodities statistics for crops and livestock.

This map displays USDA corn crop production (data from 2014) alongside current U.S. Drought Monitor (USDM) drought designations. [Learn more.](#)



### Corn Produced by County

 Scales by Acreage

### U.S. Drought Monitor



Source(s): [USDA NASS](#), [U.S. Drought Monitor](#)

USDM Updates Weekly - 11/23/21

**1,671**

counties with crops experiencing drought (D1-D4)

**173.7 Million**

acres of crops experiencing drought (D1-D4)

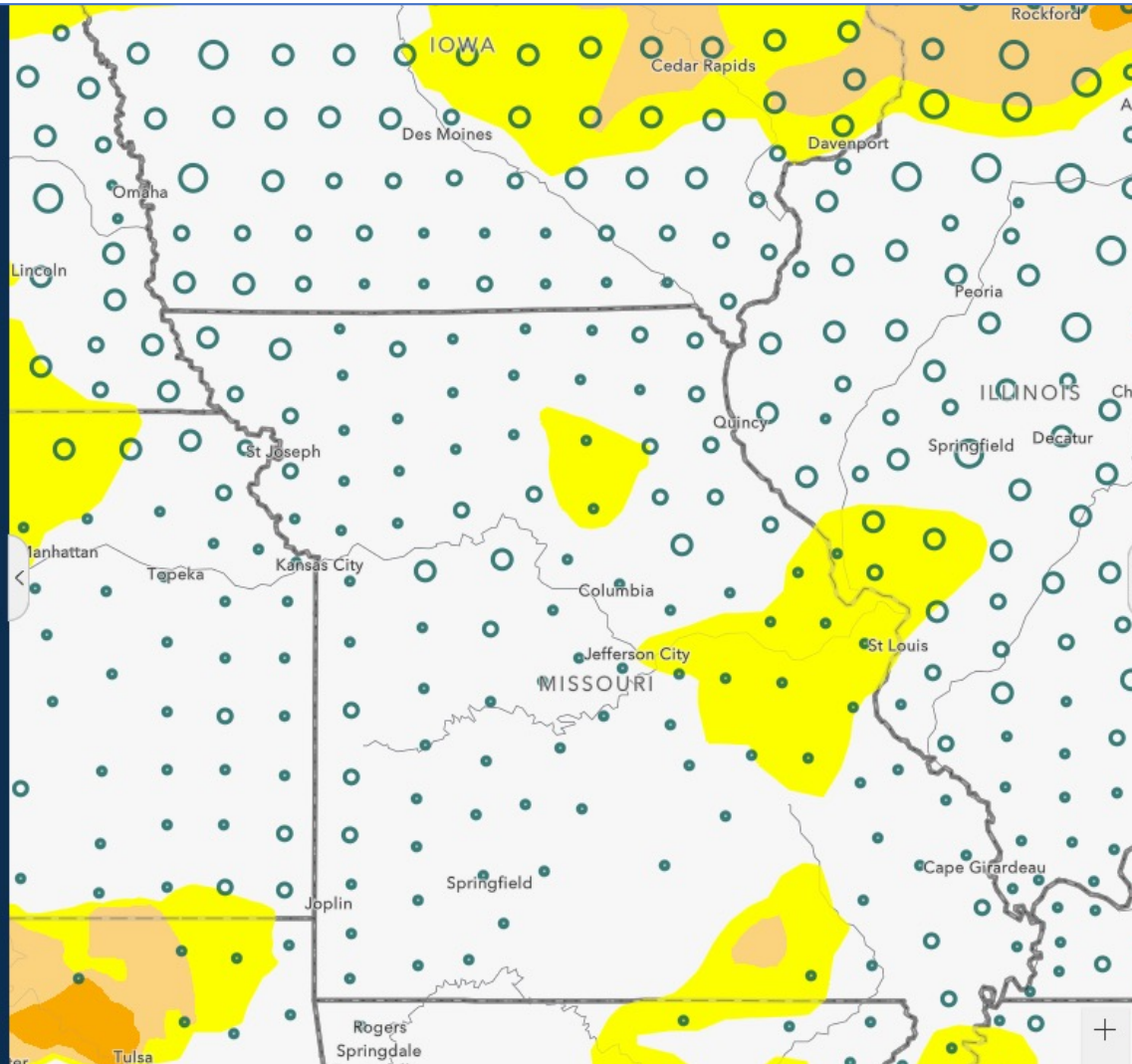
**20.1 Million**

beef cattle experiencing drought (D1-D4)

**646**

counties with drought declarations

- ▶ United States Drought Monitor (USDM) / North American Drought Monitor (NADM) ...
- ▶ CPC Drought Outlooks and Forecasts ...
- ▶ Current Weather Observations ...
- ▶ Recent Precipitation Conditions ...
- ▶ Recent Temperature Conditions ...
- ▶ Evaporative Demand Drought Index (EDDI) ...
- ▶ Short- and Long-term Drought Indicator Blends ...
- ▶ U.S. Palmer Drought Severity Index (PDSI) ...
- ▶ CPC 3-month Standardized Precipitation Index (SPI) outlooks ...
- ▶ CMORPH Daily Standardized Precipitation Index (SPI) ...



This map displays agricultural data by county for the United States alongside a number of climate and drought indicators.

**Crop data** is displayed both as total acres per county (circle) and as percent land area occupied by a crop in each county (diamond).

- ◊ Corn
- ◊ Cotton
- ◊ Hay
- ◊ Haylage
- ◊ Rice
- ◊ Sorghum
- ◊ Soybean
- ◊ Wheat

**Livestock data** is displayed in terms of total inventory.

- Cattle (Milk)
- Cattle (Beef)
- Hog
- Sheep

Learn more about the agricultural data [here](#).

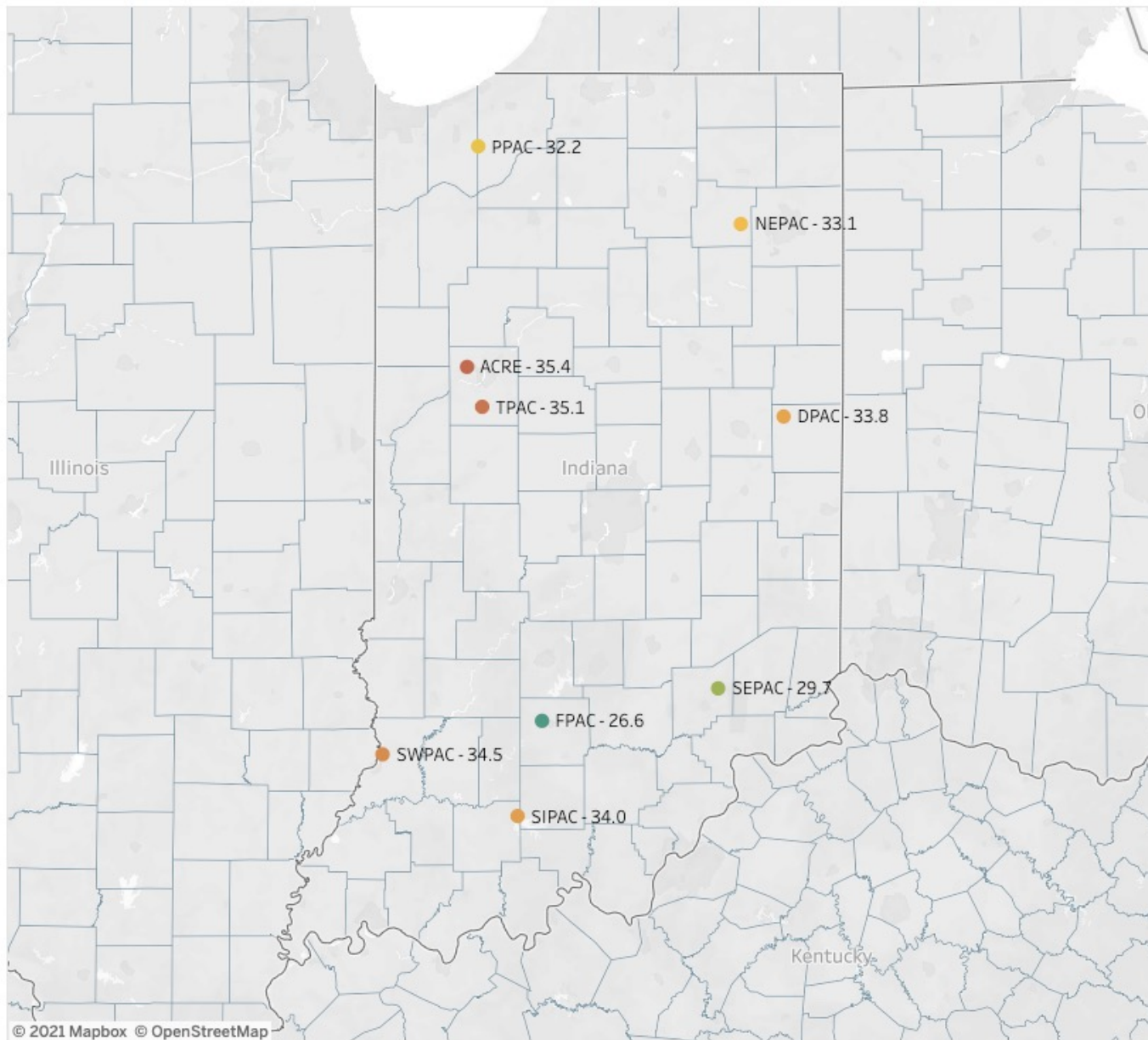
Use the layer tool on the left to select which layers to display. Use the legend tool below to view information about each layer.

Click the Map and Layer Tools tab on the right to learn more about the tools available.

## Legend

\* Click on a layer below to view legend information

Choose Station(s) to Retrieve Data:



Choose Variable to Map:

Air Temp (°F)



Choose Label:

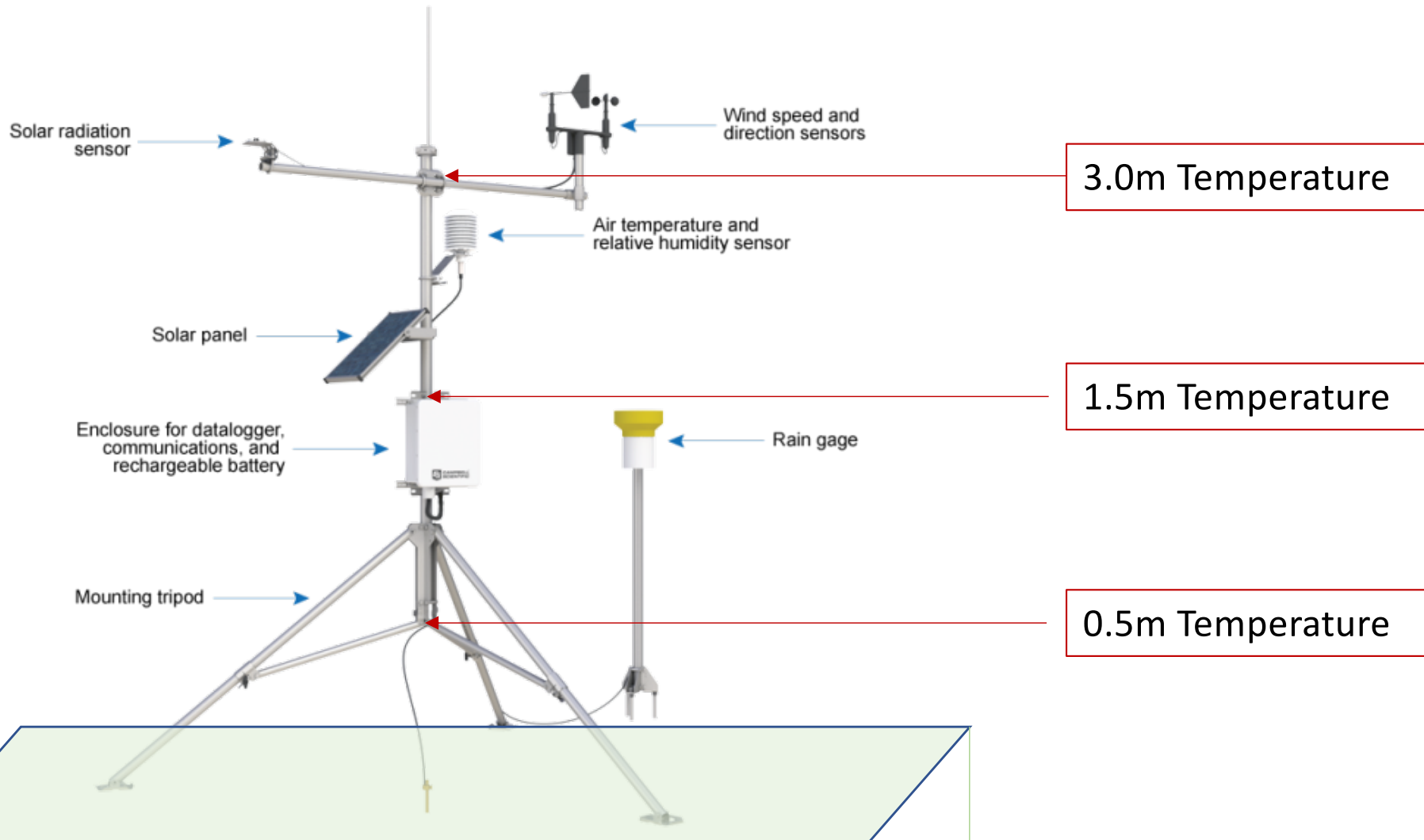
Station ID and Value

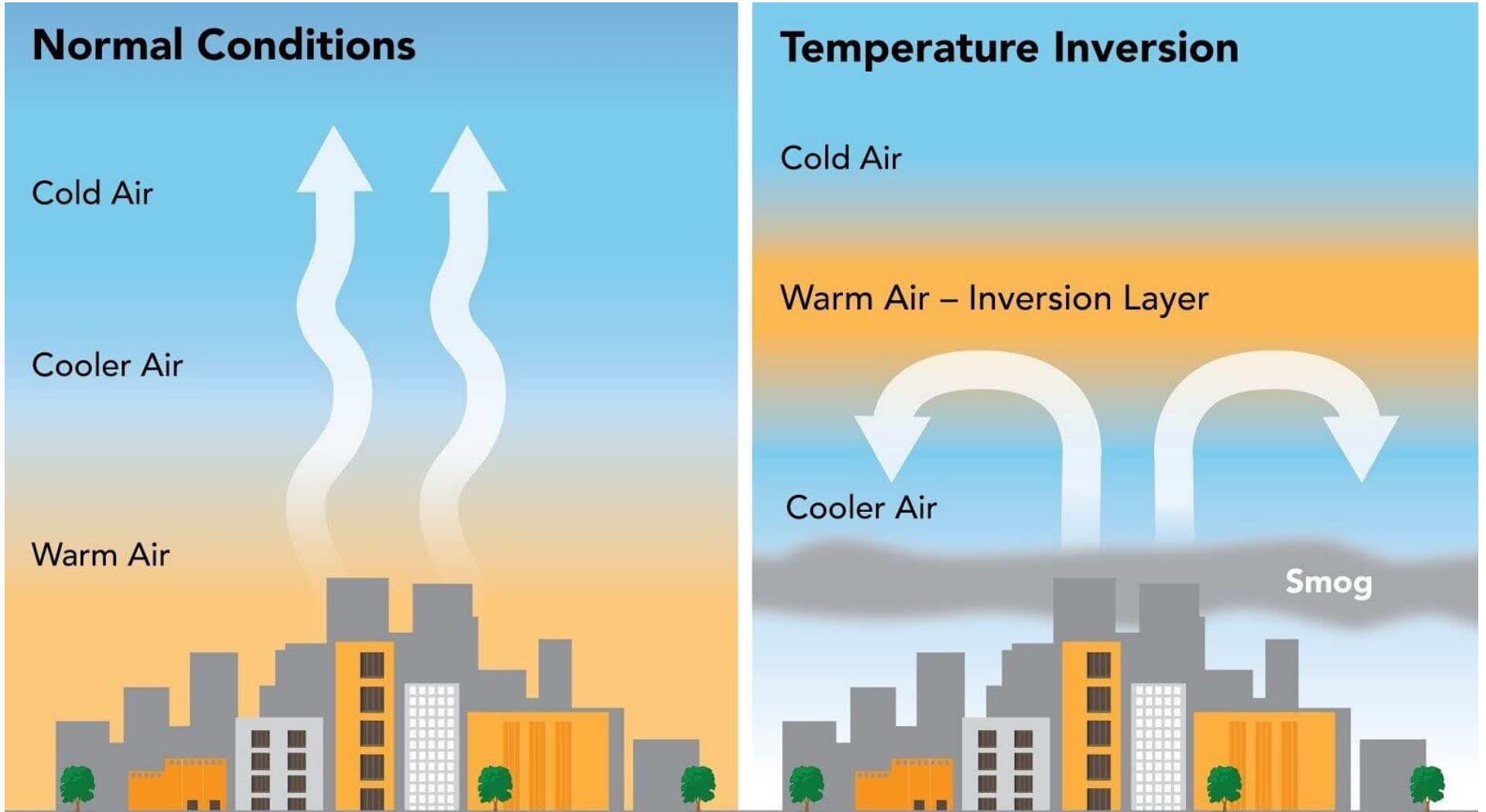
Station Status:

● Active

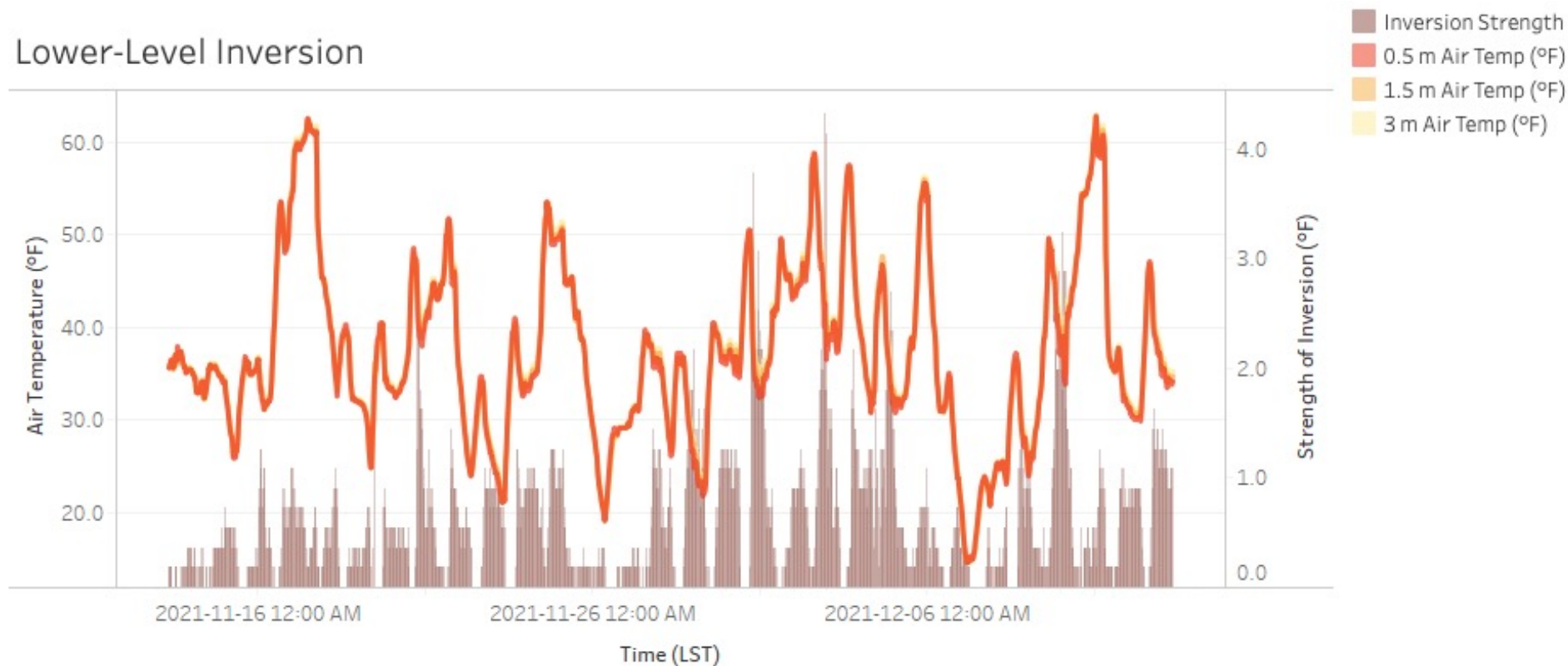
Air Temp (°F)  
0.5 m Air Temp (°F)  
1.5 m Air Temp (°F)  
3 m Air Temp (°F)  
Inversion Strength (°F)  
Relative Humidity (%)  
24 hr Total Precipitation (in)  
Solar Radiation (kW/m<sup>2</sup>)  
Wind Speed (mph)  
Wind Direction (°)  
Wind Gust (mph)  
4" Bare Soil Temp (°F)  
4" Grass Soil Temp (°F)  
2" Soil Temp (°F)  
2" Soil Water Content (%)  
4" Soil Temp (°F)  
4" Soil Water Content (%)  
8" Soil Temp (°F)  
8" Soil Water Content (%)  
20" Soil Temp (°F)  
20" Soil Water Content (%)



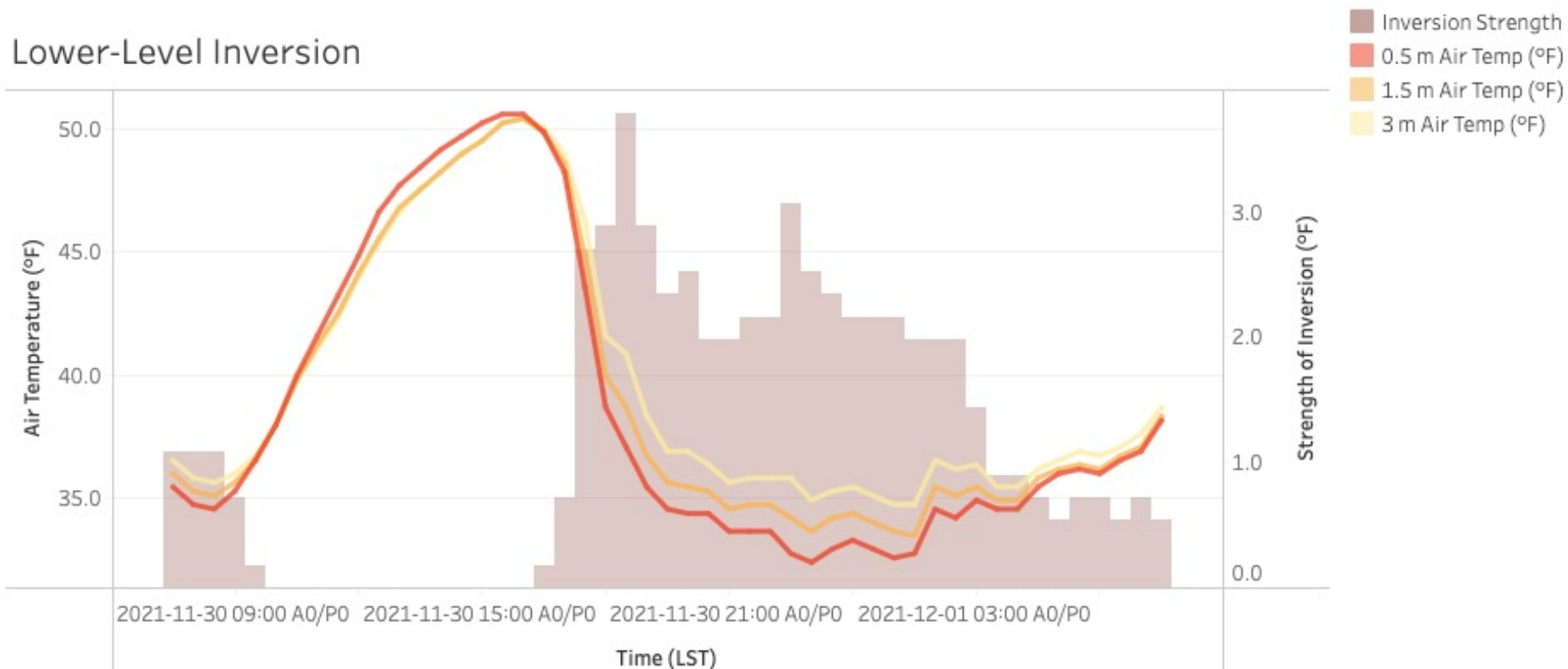


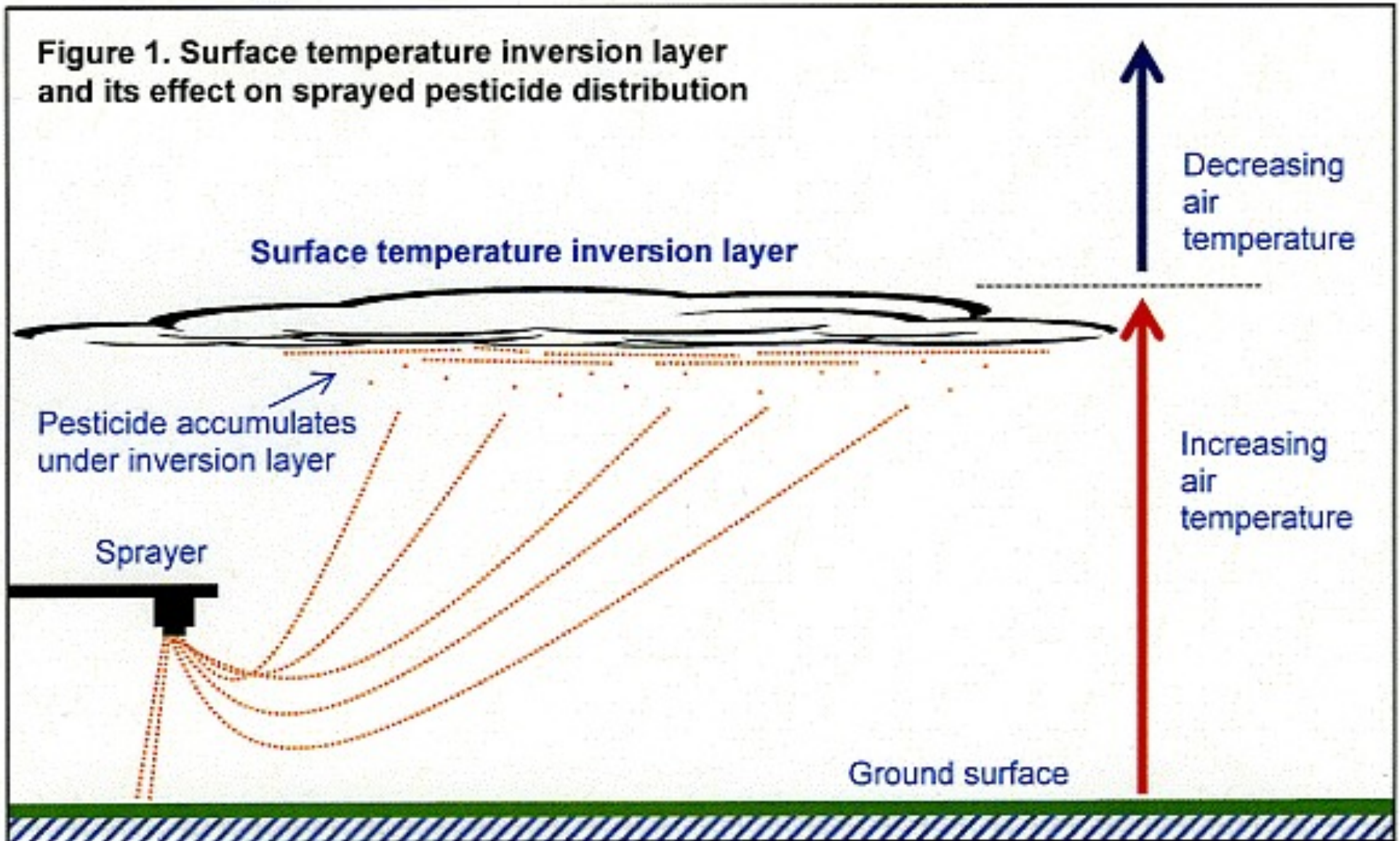


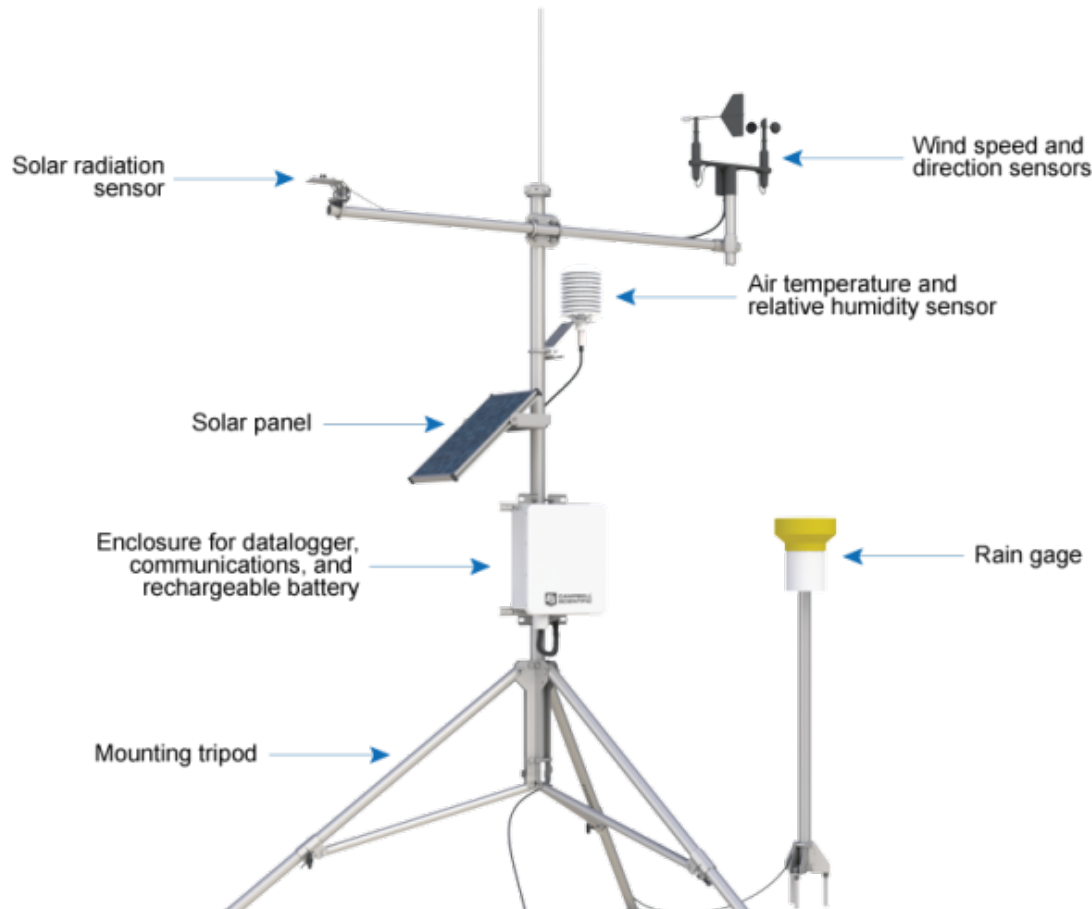
## Lower-Level Inversion



## Lower-Level Inversion







2" Soil T & Moisture

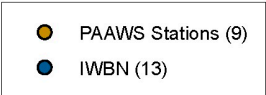
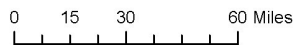
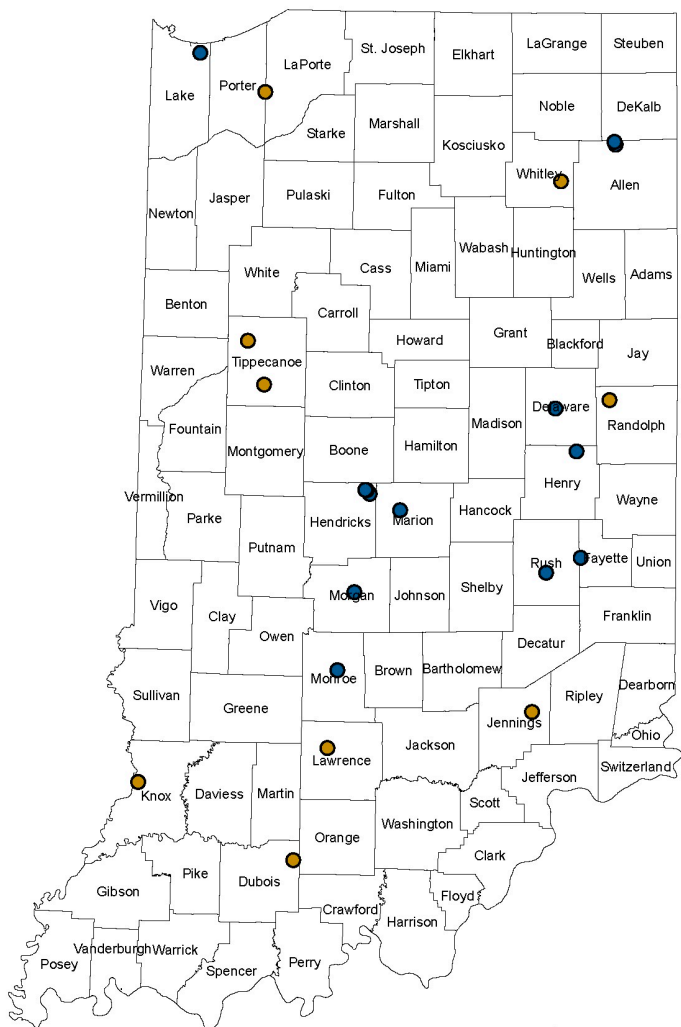
4" Soil T & Moisture

8" Soil T & Moisture

20" Soil T & Moisture

# Purdue and IWBN Mesonets

## Publicly-Managed Mesonet Stations





# MRCC

Midwestern Regional  
Climate Center

[mrcc.purdue.edu](http://mrcc.purdue.edu)



# CLIMATE™

THE INDIANA STATE  
CLIMATE OFFICE

[purdue.ag/insco](http://purdue.ag/insco)

**Email:** [bethhall@purdue.edu](mailto:bethhall@purdue.edu)