Climate Tools for Agriculture

Michael S. Timlin
Midwestern Regional Climate Center

MRCC Webinar 2021
January 26, 2021

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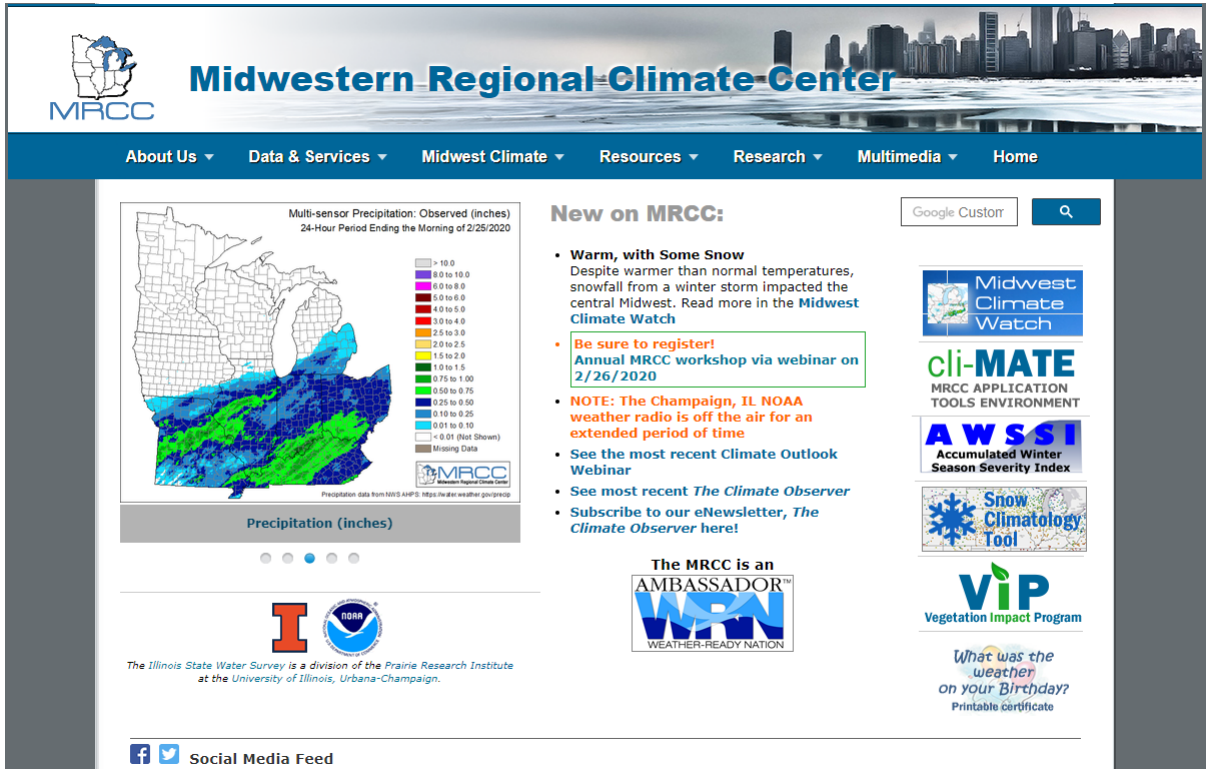

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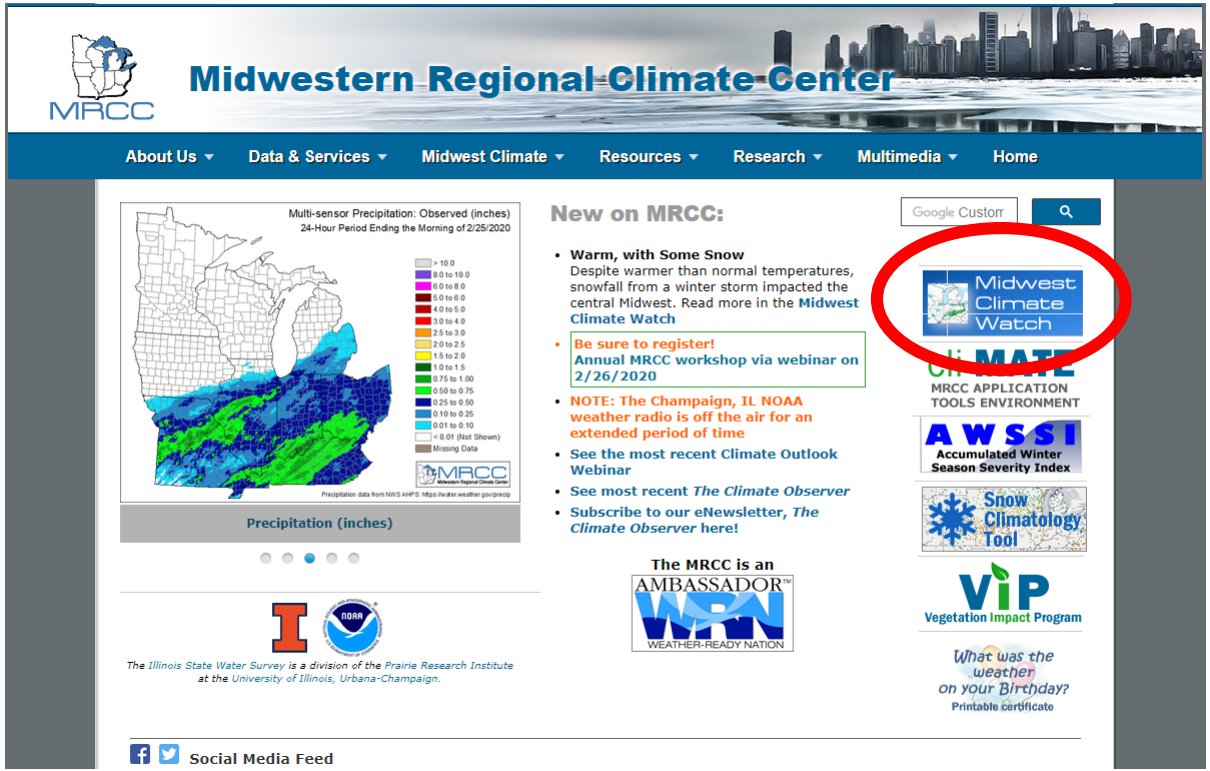

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Midwest Climate Watch

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Maps & Images | Highlights & Reports | Special Topics

The Midwest Climate Watch is the entry point to a wealth of current information on the Midwest. The Midwest Climate Watch includes daily, 7-day, 30-day, and month-to-date maps of temperature, precipitation, snowfall, snow depth, and growing degree days, as well as maps for prior months and seasons. Information and resources for the region about drought, agriculture and horticulture, and the Great Lakes can be found under the Special Topics tab. (See map run times)

The Highlights & Reports page contains climate narratives from the MRCC of the previous week's and month's temperature, precipitation, and weather events. The narrative describes the impacts of these events and includes links to other sources of information and additional charts, maps, and graphics. The narratives are archived and are searchable by event type and state.

+/- Daily Station Maps

	Station Max Temp	Station Min Temp	Freeze Maps	Station Precipitation	Station Snowfall	Station Snow Depth	NOHRSC Snowfall	Multi-Sensor Precipitation
MIDWEST								
CENTRAL								

+/- Hourly Station Maps

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Special Topics

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+/- Hourly Station Maps

	Air Temp Max	Air Temp Min	Wind Speed Avg	Wind Speed Max	Dew Point Avg	Dew Point Max	Wind Chill Min	Heat Index Max
MIDWEST								
CENTRAL								

+/- GIS-Based Tools

+/- Weekly & Monthly Maps

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Weekly & Monthly Maps

	Temp	Temp, Departure from Mean	Max Temp	Max Temp, Departure from Mean	Min Temp	Min Temp, Departure from Mean	Precip	Precip, Percent of Mean	Multi-Sensor Precip	Snowfall	Snowfall, Percent of Mean
LAST 7 DAYS											
LAST 30 DAYS											
MIDWEST MONTH-TO-DATE											
CENTRAL MONTH-TO-DATE											

CLIMATE MAPS OF RECENT MONTHS Month: January 2020 Data Type: Temperature Average Go

Seasonal Maps

State Climate Watch

Seasonal Maps

MODIFIED GROWING DEGREE DAYS

- Total MGDD 4/1
- MGDD Departure 4/1
- Total MGDD 5/1
- MGDD Departure 5/1

SNOWFALL SEASON-TO-DATE

- Accumulated Snowfall
- Accumulated Snowfall: Departure from Mean
- Accumulated Snowfall: Percent of Mean
- NOHRSC Snowfall Season-to-Date

SNOW CLIMATOLOGIES

- First Measurable Snow
- 1981-2010 Normal Annual Snowfall
- Dates of First/Last Snowfall: Midwest Region
- Dates of First/Last Snowfall: Central Region

CLIMATE MAPS OF RECENT SEASONS

Season: Fall [Sept., Oct., & Nov.]

Data Type: Temperature Average Go

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Midwest Climate Watch

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Maps & Images | Highlights & Reports | Special Topics

- Agriculture
- Drought
- Great Lakes
- Winter

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MIDWEST					
CENTRAL					

+/- Hourly Station Maps

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Maps & Images | Highlights & Reports | Special Topics

Agriculture Resources

Map Run Times | Back to Climate Watch: Special Topics

- +/- U2U - Useful to Usable Tools (info)
- +/- Modified Growing Degree Days (info)
- +/- Freeze Maps (info)
- +/- State Ag Tools
- +/- Pest and Disease Management
- +/- Soil Temperature Maps (info)
- +/- Modified Corn Stress Degree Days (info)
- +/- Chilling Hours Maps (info)
- +/- NLDAS Soil Moisture Maps (info)
- +/- USDA Climate Hubs

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Regional Mesonet Program (RMP)

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RMP HOME • CURRENT • ARCHIVED • INTERACTIVE • METADATA • ABOUT • PARTNERS • MRCC HOME

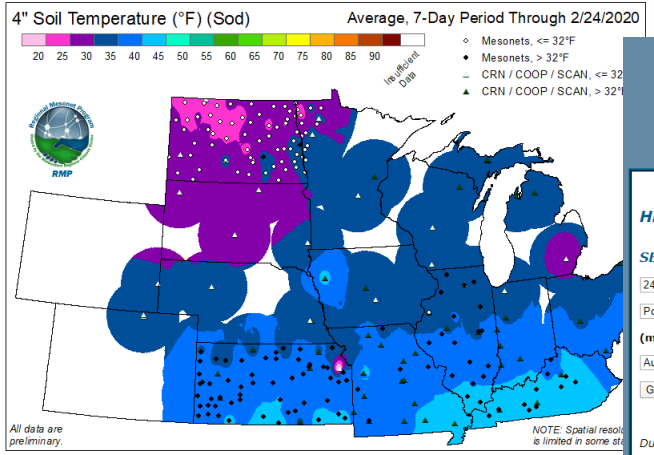
Current Maps

24-HOUR PERIOD

7-DAY PERIOD

- 2-inch Under Bare Soil
- 2-inch Under Sod
- 4-inch Under Bare Soil
- 4-inch Under Sod
- Potential Evapotranspiration (PET)

HISTORICAL MAP ARCHIVE



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Historical Maps Archive

SELECT PARAMETERS

24-Hour Period

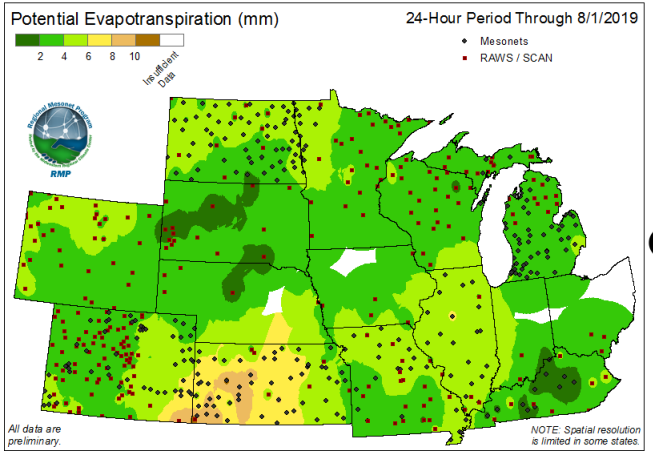
Potential Evaporation (PET)

(maps begin 6/18/2014)

Aug 1 2019

Get Map

Due to the evolution of this product over time, maps may vary in style and complexity.



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+/- U2U - Useful to Usable Tools

info

AgClimate Viewer

Corn GDD

Climate Patterns Viewer

Corn Split N

Irrigation Investment Tool

Probable Fieldwork Days

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Probable Fieldwork Days

U2U@MRCC: Corn Split Nitrogen Application

Welcome to the Corn Split N decision support tool.

This product is designed to help farmers and farm advisors understand the risks and benefits of using post-planti nitrogen (N) application for corn production. The Corn Split N tool combines historical weather and fieldwork data with economic considerations to determine the feasibility and profitability of completing a second (split) N application within a user-specified time period. This tool may help you with decisions that:

- Increase corn yields
- Reduce nitrogen costs
- Reduce nitrogen losses to the environment
- Affect the likelihood of completing in season fieldwork

With the Corn Split N tool you can quantify the costs and benefits of post-planting nitrogen applications for your farming operation to help your bottom line and the environment.

Map | Scenario/Results | About SplitN | HELP

This tab allows you to customize inputs for your farm and view summarized results.
Location: Champaign Co, Illinois; Crop Reporting District: East (5)

Planting Date: May 15
Yield Goal: 173 bu/acre
Initial Nitrogen Application: 0 lbs
Apply N by what stage? V8 — V8 expected by Jun 17; End Date to Apply is later
Apply Nitrogen from: June 10 to: June 23

Yield penalty for not getting post-planting N applied: ☐ 76 bu/acre
Yield benefit from post-planting N application: ☐ 5 bu/acre
Reduced N applied due to post-planting N application: ☐ 15 lbs/acre

*Yield penalties/benefits and reduced N usage are critical inputs. **The provided default values should be adjusted** with help from Univ. Extension specialists or crop consultants **to ensure accuracy** for your soil and climatic conditions. More info*

Nitrogen Price ($/lb): $0.40 /lb
Corn Price ($/bu): $3.75 /bu
Sidedress Cost ($/acre): $15.00 /acre

Implement width (ft): 36
Implement speed (mph): 5
Field efficiency: ☐ 0.75
Acres worked per hour: 16
Acres: 1500
Calculated hours needed: 92
Hours in field per day:
◉ All daylight hours 15.0
○ Custom hours
Days worked in 7: 6
Days in selected period: 14
Average days suitable in period: 8.0
Average hours suitable in period: 121

Economic Analysis | Acres Completed Summary | Crop Calendar Summary

Economic Analysis using 35 years of Field Work Days History

Scenarios	Acres	Units/acre	Dollars/unit	Total Dollars
Input Acres Completed (completed 1500 acres post-planting N application 28 years of 35 years, or 80% of years)				
Additional cost of post-planting fertilizer application	1500	1	$15.00	$(23,000)
Yield loss due to unfertilized acres	0	76	$3.75	$0
Yield gain due to post-planting fertilization	1500	5	$3.75	$28,000
Nitrogen saved (lb) due to post-planting fertilization	1500	15	$0.40	$9,000
Net Benefit of Post-planting N application on 1500 acres				**$14,000**
Average Acres Completed (completed an average of 1500 acres post-planting N application 28 years of 35 years, or 80% of years)				
Additional cost of post-planting fertilizer application	1500	1	$15.00	$(23,000)
Yield loss due to unfertilized acres	0	76	$3.75	$0
Yield gain due to post-planting fertilization	1500	5	$3.75	$28,000
Nitrogen saved (lb) due to post-planting fertilization	1500	15	$0.40	$9,000
Average Net Benefit of Post-planting N application on 1500 acres				**$14,000**
Worst Case (At least 568 acres of post-planting N application completed in all years)				
Additional cost of post-planting fertilizer application	568	1	$15.00	$(9,000)
Yield loss due to unfertilized acres	932	76	$3.75	$(266,000)
Yield gain due to post-planting fertilization	568	5	$3.75	$11,000
Nitrogen saved (lb) due to post-planting fertilization	1500	15	$0.40	$9,000
Worst Case Net Benefit of Post-planting N application on 1500 acres				**$(255,000)**
Best/Max Case (could have completed up to 2949 acres 1 year(s) of 35 years, or 3% of years)				
Up to 2949 acres of post-planting N application completed	2949			
Breakeven Number of Acres (Post-planting N revenue equal costs in 29 years of 35 years, or 83% of years)				
Number of acres (out of 1500 acres) requiring post-planting N application to breakeven 1449				

Note: This information is educational and should not be the sole source of information used to make a management decision.
Total Dollars are rounded to nearest thousand.

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Climate Patterns Viewer

Irrigation Investment Tool

GDD Start: April 10

Comparison Years: ×2018

Corn Maturity Days: 100

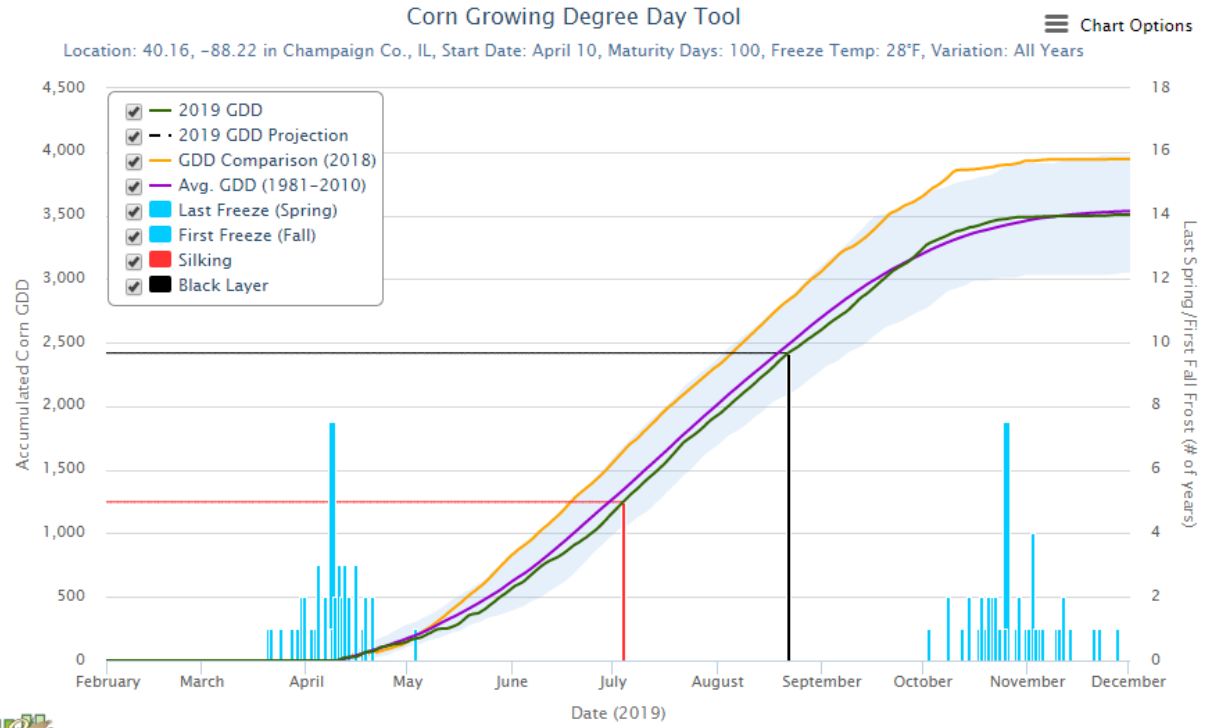
Silking GDDs: 1246

Freeze Temperature (°F): 28

Variation: All Years

Current Day: Today

Black Layer GDDs: 2401



Tool Tips:

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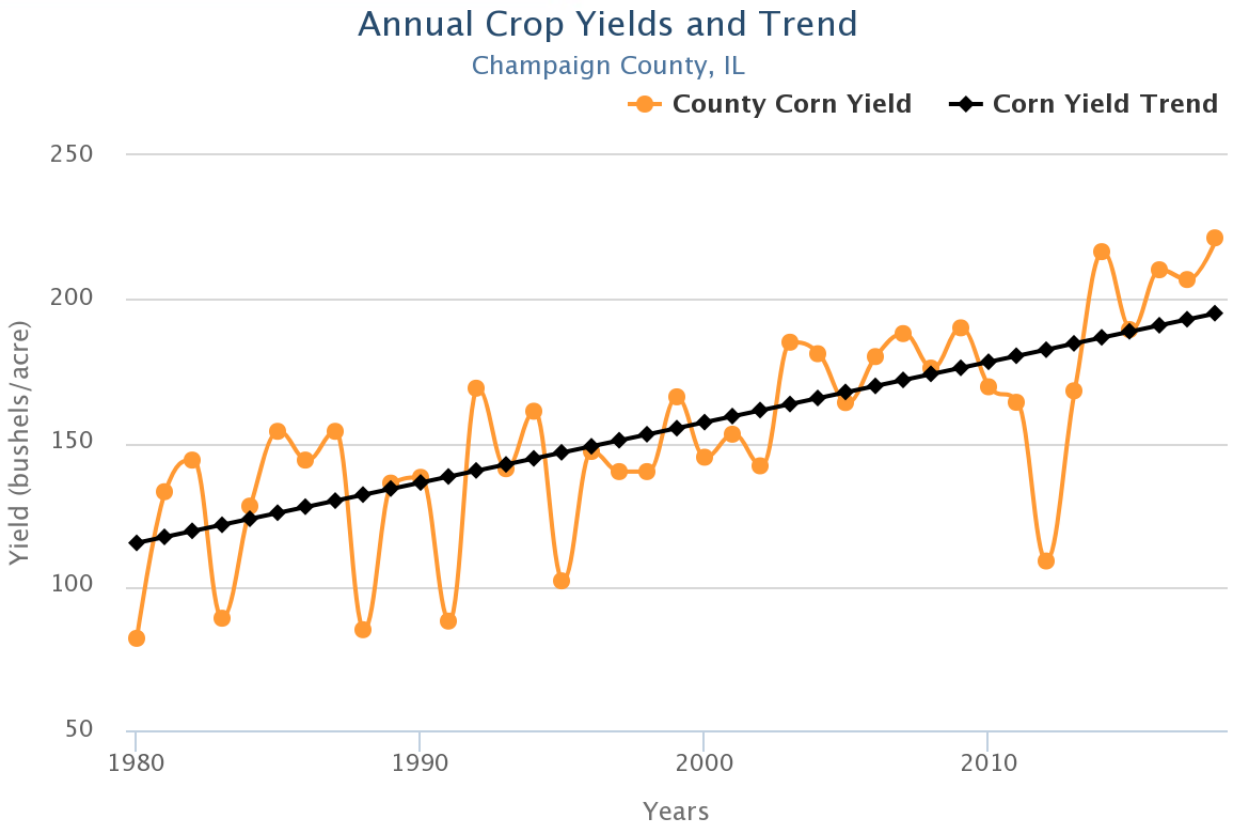

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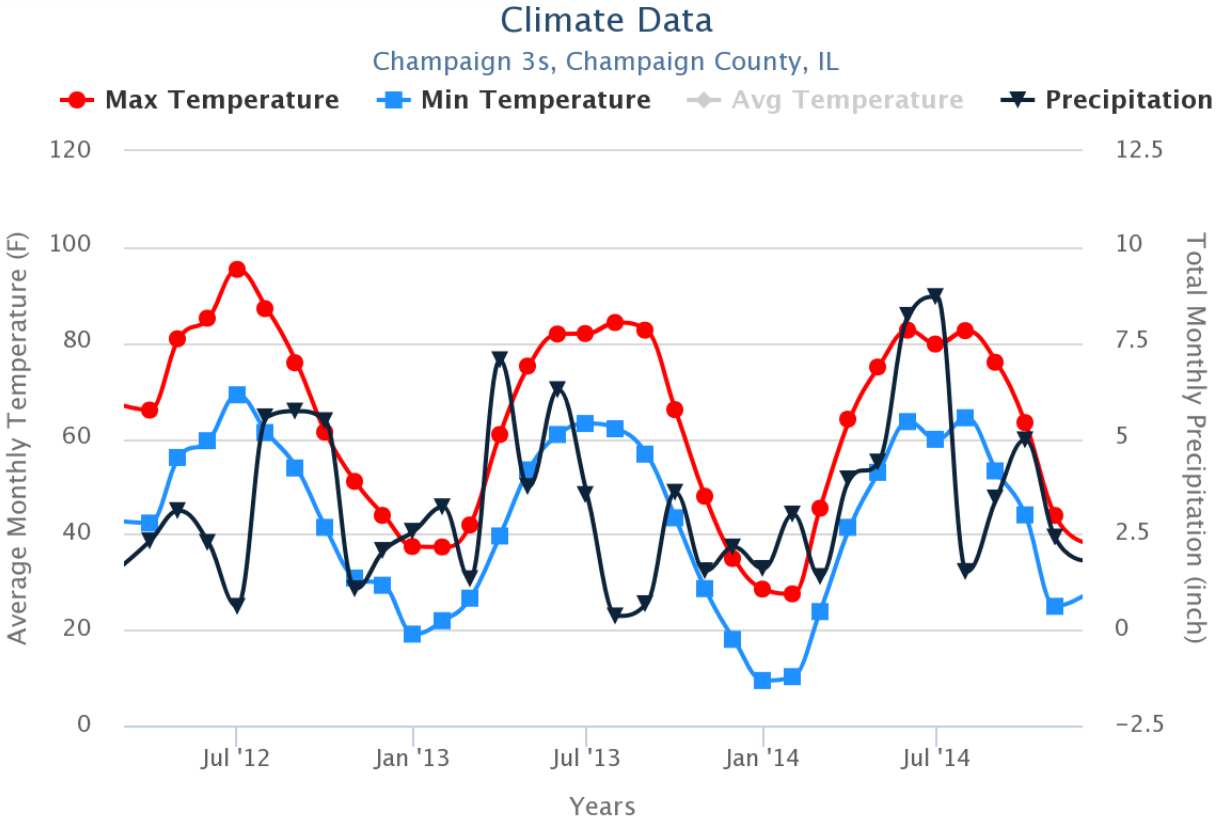

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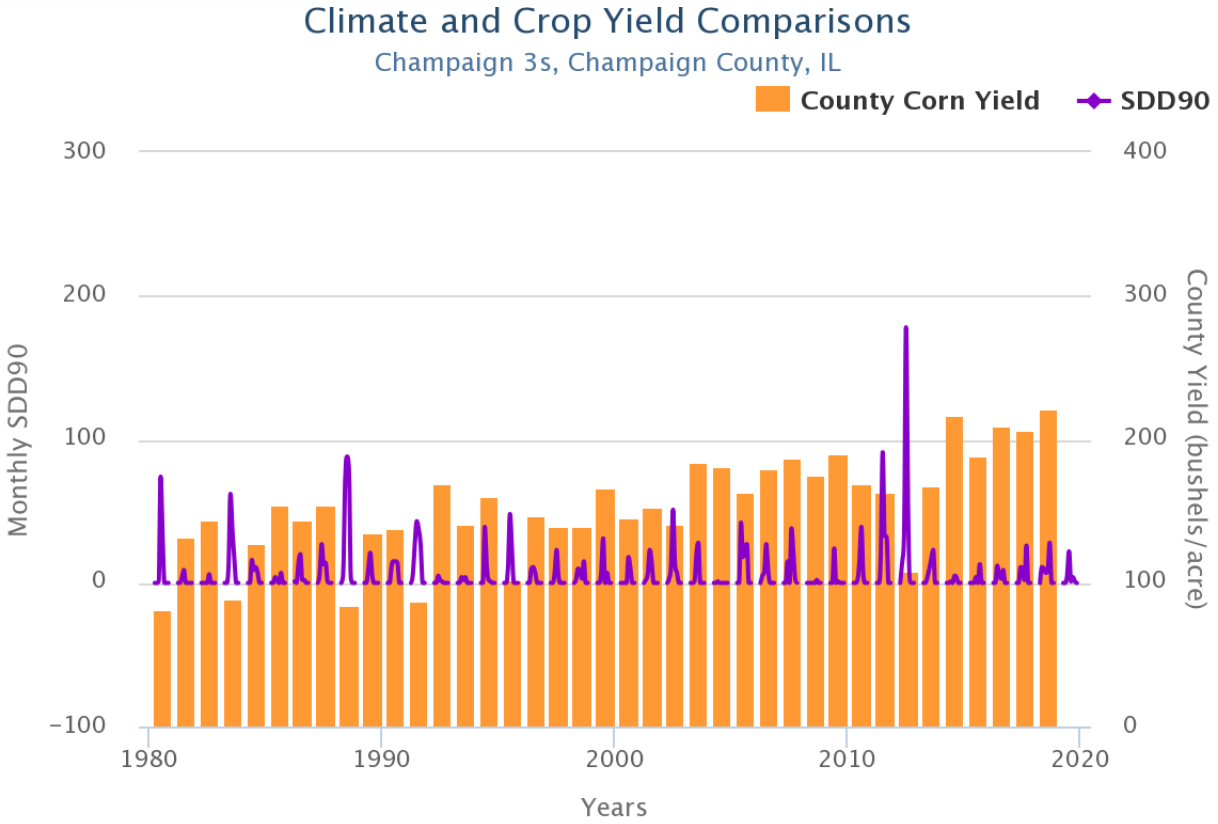

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MRCC Vegetation Impact Program

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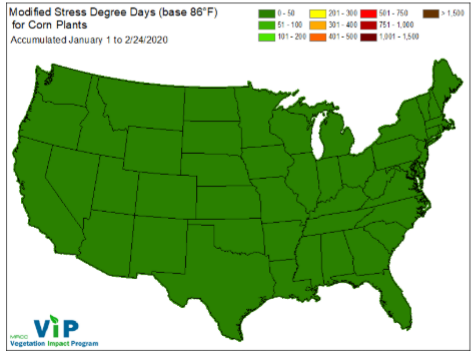
VIP Home | Frost Freeze Guidance | Vegetation Climate | GIS Maps | Resources

Modified Stress Degree Days for Corn

About | GIS Maps

Click map for large version.

All plants have an optimum range of temperatures for growth. While it may be obvious that temperatu
not damage the plant), temperatures that are too high can cause stress for the plant. Stress Degree Da
how much stress a type of plant has been subjected to within its growing season. To learn more, see ou
page.



CLICK TO ZOOM

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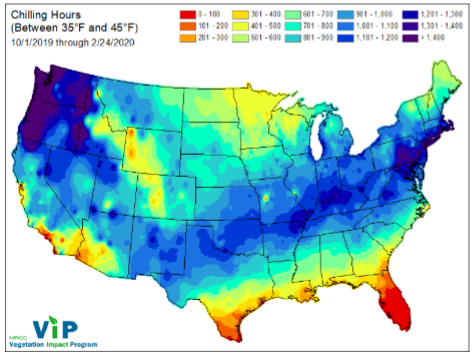
Chilling Hours Maps - October 1 Start

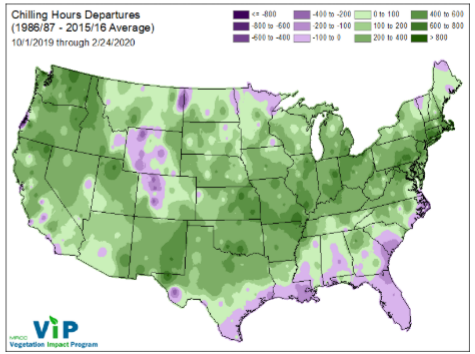
About | GIS Maps

Go to maps with September 1 start date | Click map for large version.

(+/-) Chilling Hours description

(+/-) Chilling Hour requirements by type of fruit *(courtesy RaintreeNursery.com)*





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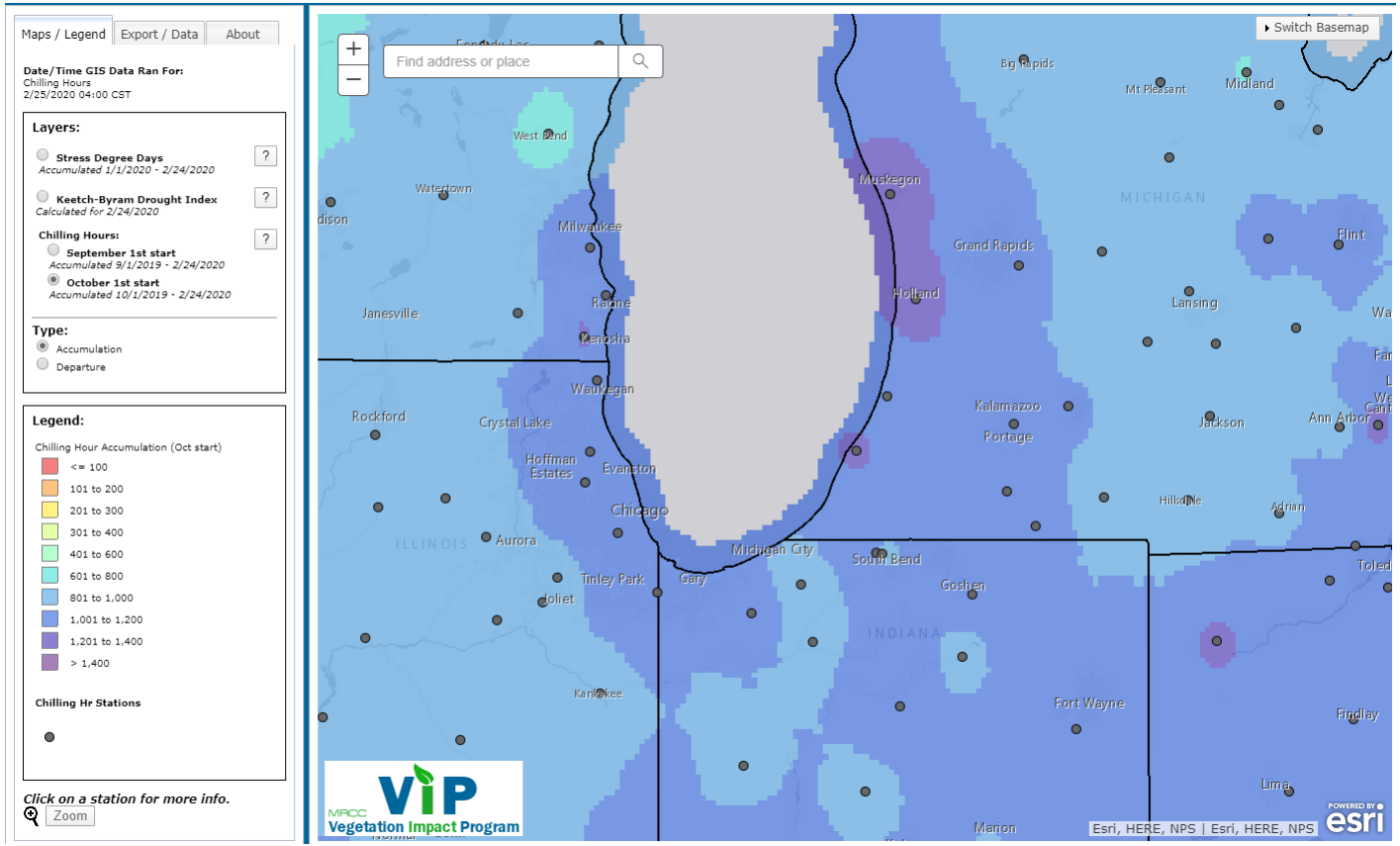

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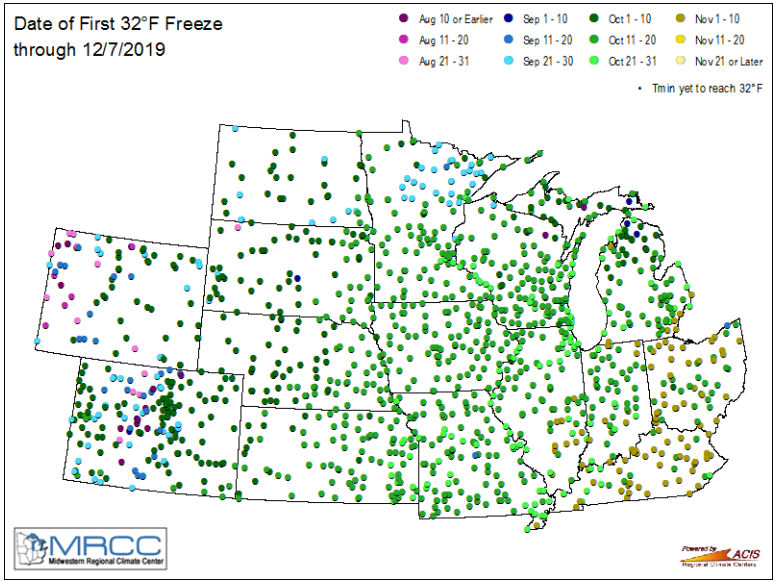

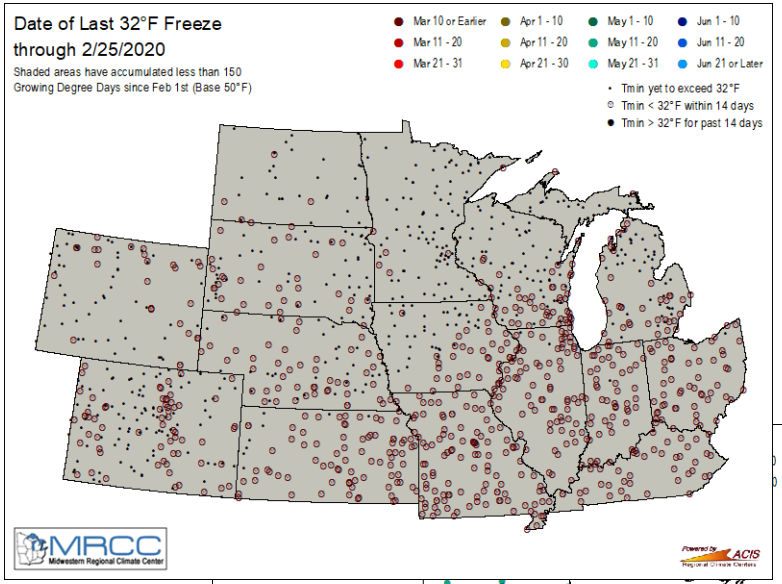

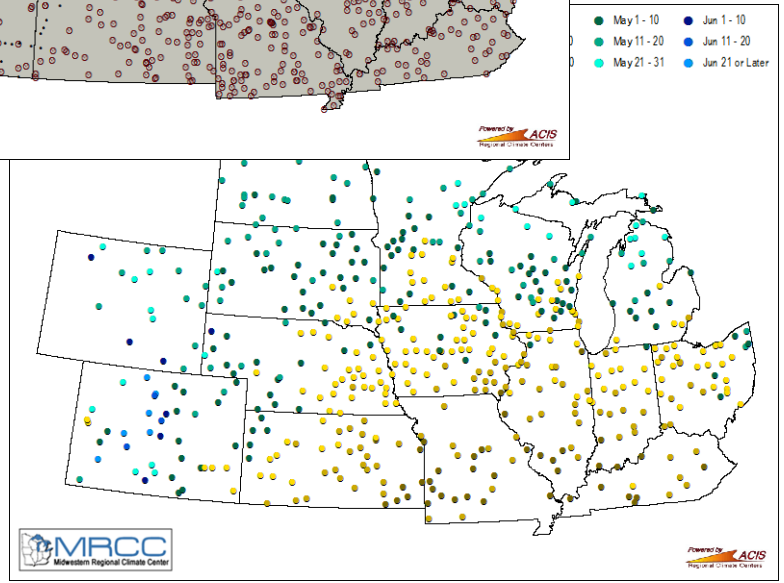

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Freeze Maps

All Frost/Freeze Products

About

Training

Select header below to expand category and click item to change map. Click on map area for zoomed version.

Show only points (no shading)

SHADED MAPS MENU

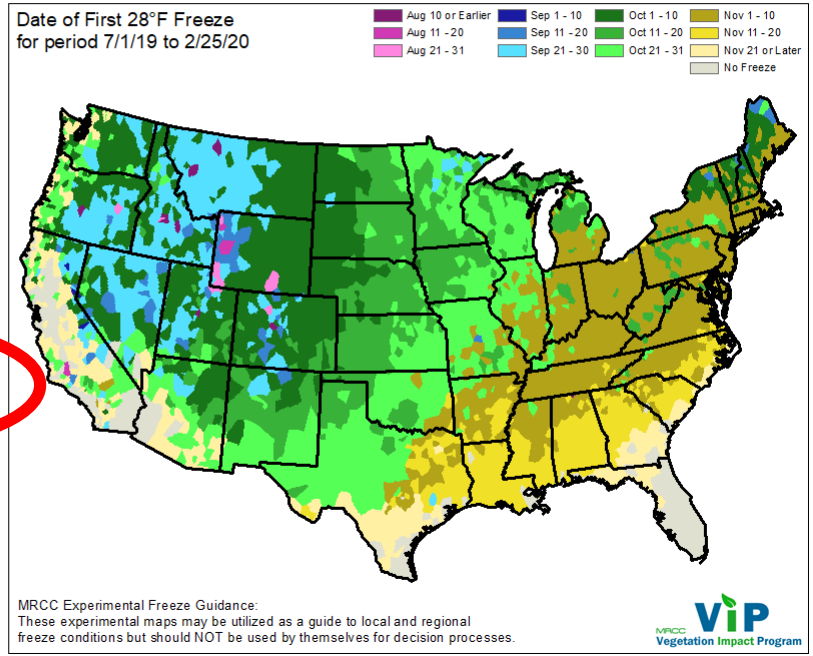
CURRENT SEASON FREEZES

- 28°F: Date of first Freeze
- 28°F: Date of most recent Freeze
- 28°F: Days since most recent Freeze
- 28°F: Over past 14 days, num. < 28°F
- 32°F: Date of first Freeze
- 32°F: Date of most recent Freeze
- 32°F: Days since most recent Freeze
- 32°F: Over past 14 days, num. < 32°F
- Lowest Min Temp: 10°F to 50°F
- Lowest Min Temp: -38°F to 10°F

GROWING DEGREE DAYS

28° FREEZE CLIMATOLOGIES

32° FREEZE CLIMATOLOGIES



All Frost/Freeze Products

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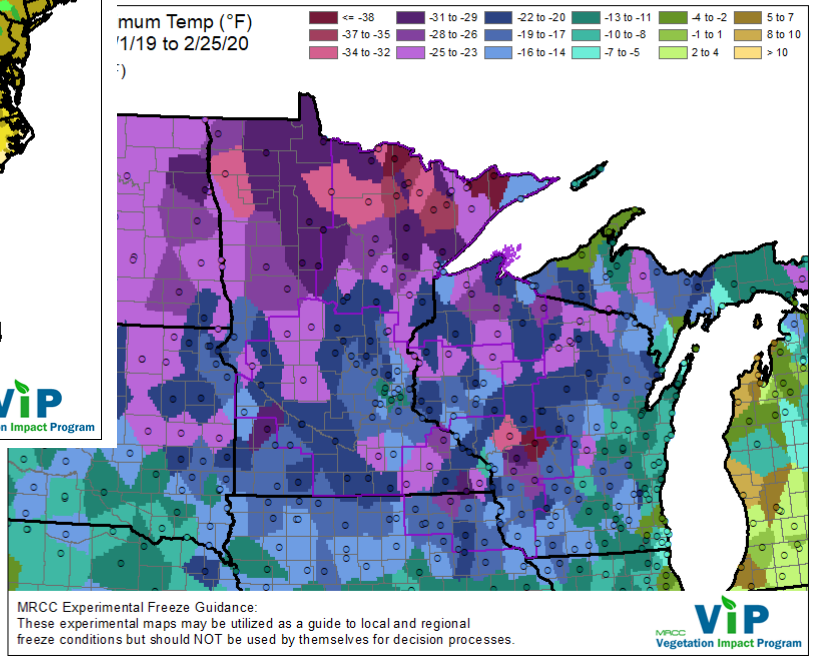

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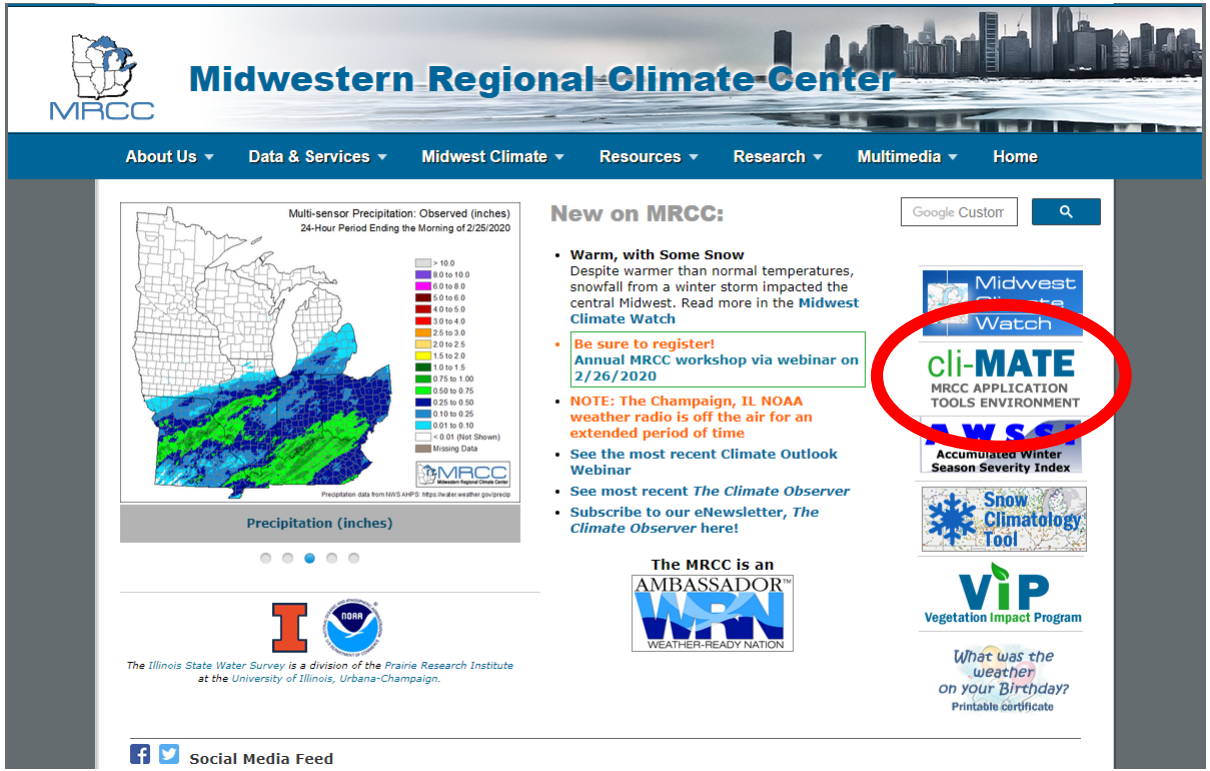

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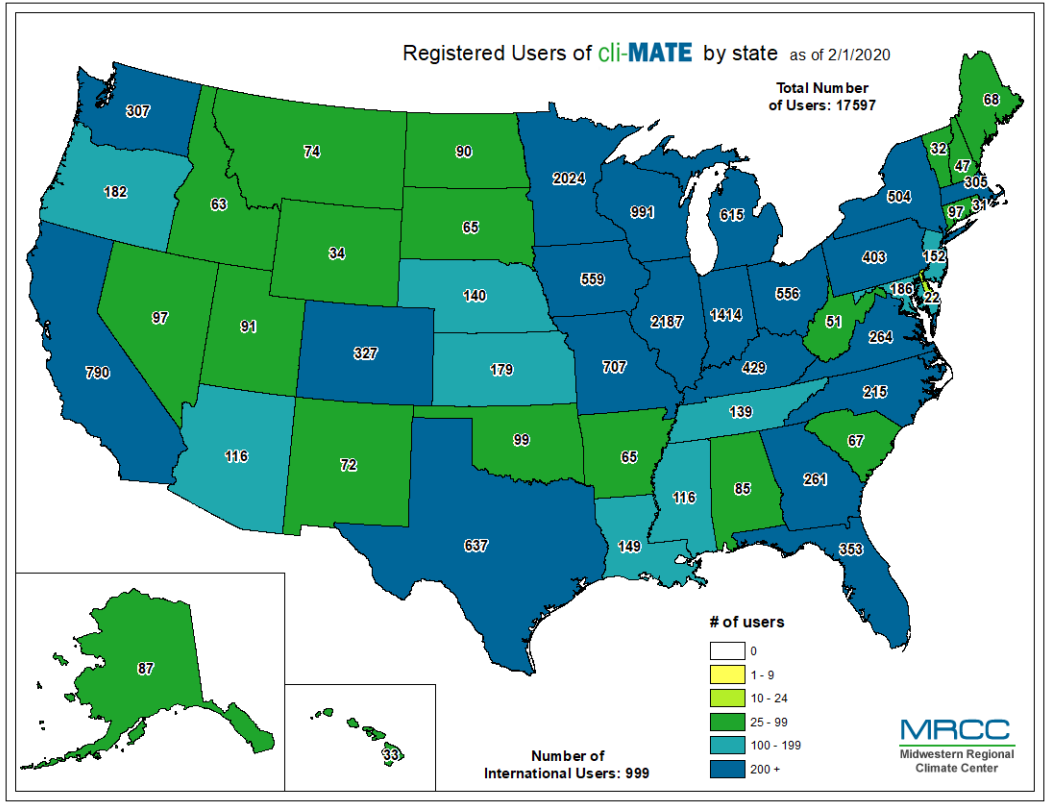

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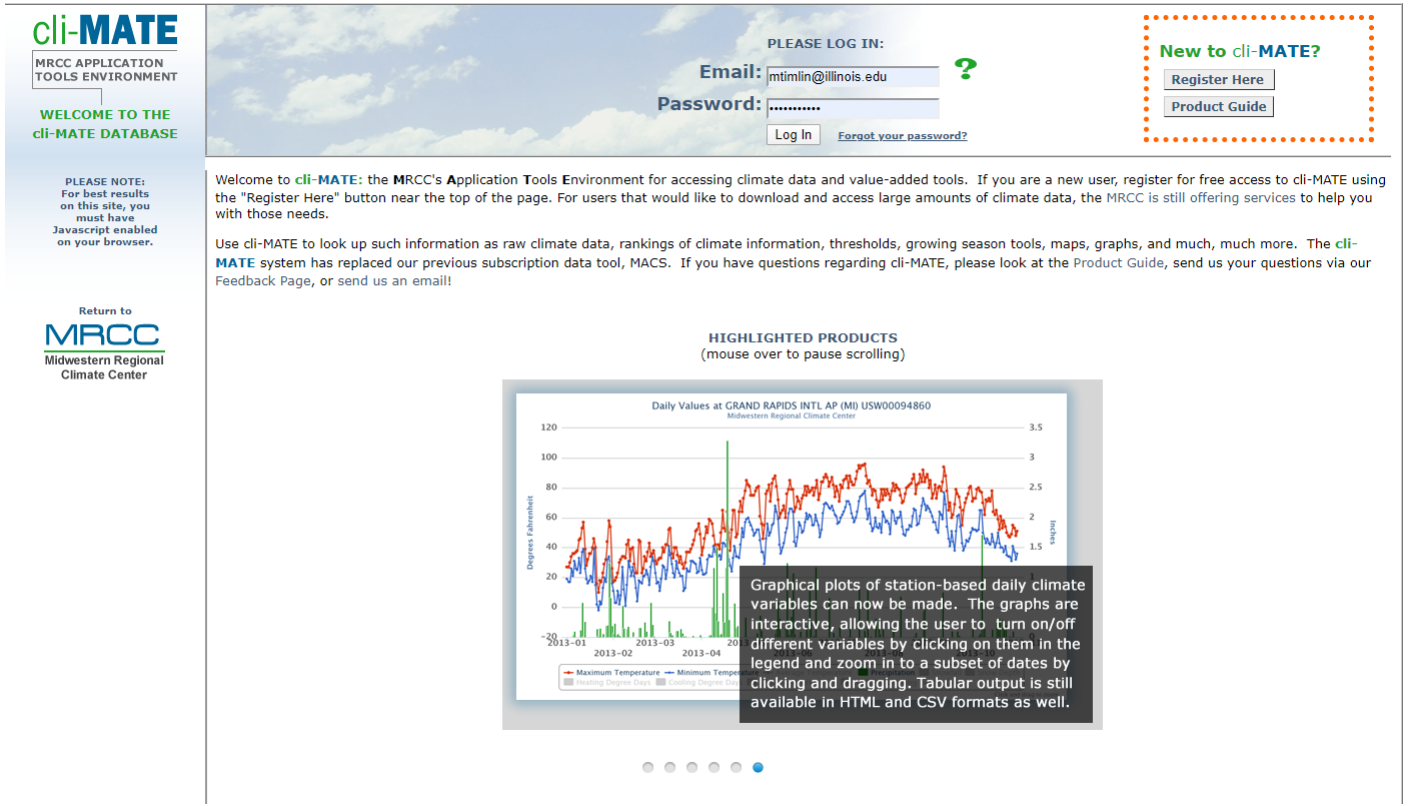

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cli-MATE

MRCC APPLICATION TOOLS ENVIRONMENT

Hi Michael!

Log out

CURRENT STATION INFORMATION:
Station Name: CINCINNATI/NORTHERN KENTUCKY I
County: BOONE
State: KY

More Info

Previous Page

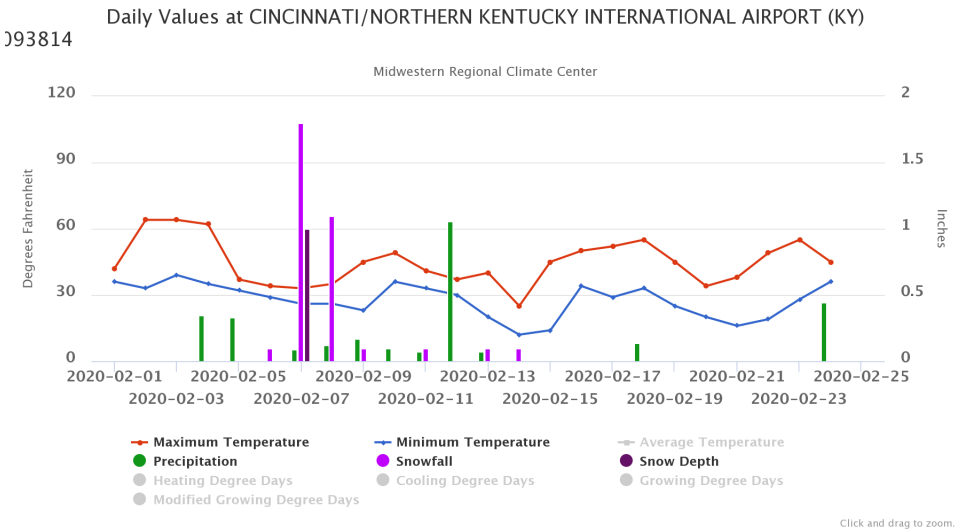
Printer Version

CSV Version

Send Feedback

Daily Data Between Two Dates
CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT (KY)
USW00093814

Date	Precipitation (in)	Snowfall (in)	Snow Depth (in)	Max Temp (°F)	Min Temp (°F)
2020-02-01	T	0.0	0	42	36
2020-02-02	0.00	0.0	0	64	33
2020-02-03	0.00	0.0	0	64	39
2020-02-04	0.35	0.0	0	62	35
2020-02-05	0.33	T	0	37	32
2020-02-06	T	0.1	0	34	29
2020-02-07	0.09	1.8	1	33	26
2020-02-08	0.12	1.1	T	35	26
2020-02-09	0.17	0.1	0	45	23
2020-02-10	0.10	0.0	0	49	36
2020-02-11	0.07	0.1	0	41	33
2020-02-12	1.06	T	0	37	30
2020-02-13	0.07	0.1	0	40	20
2020-02-14	T	0.1	T	25	12
2020-02-15	0.00	0.0	0	45	14
2020-02-16	0.00	0.0	0	50	34



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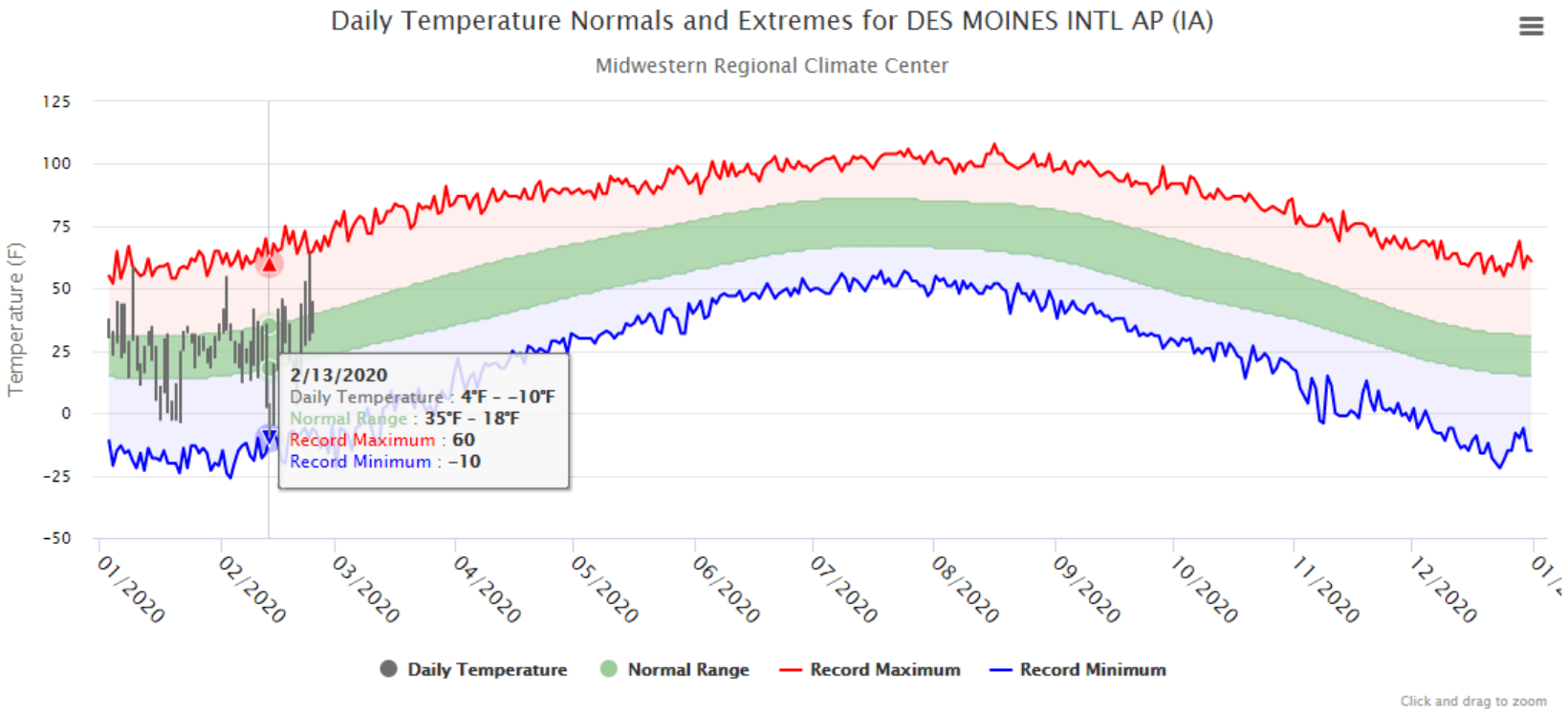

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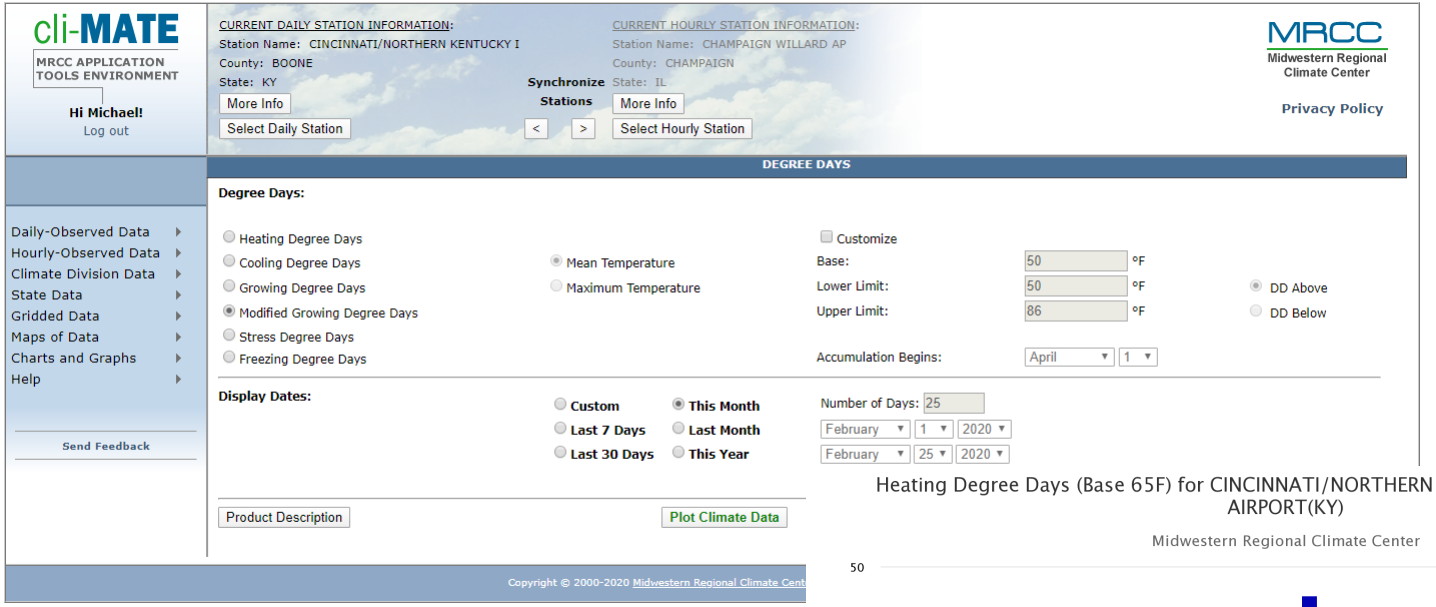

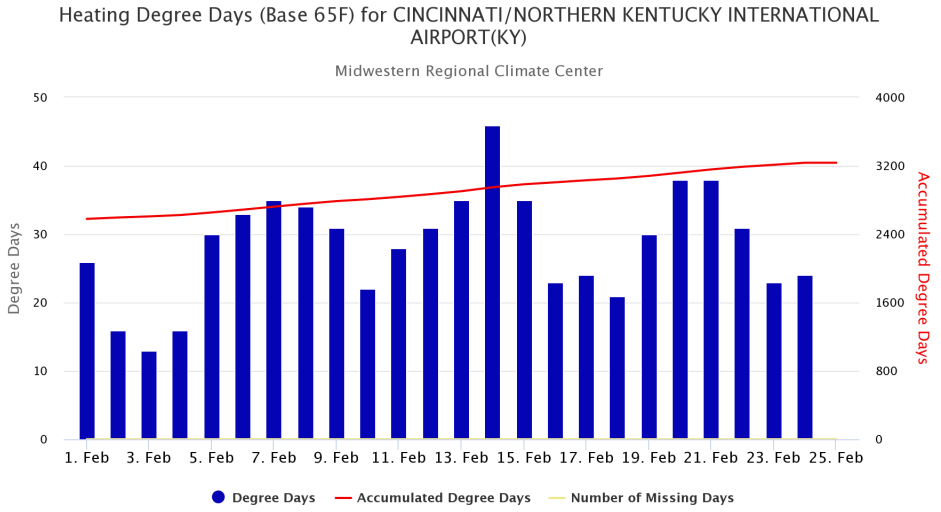

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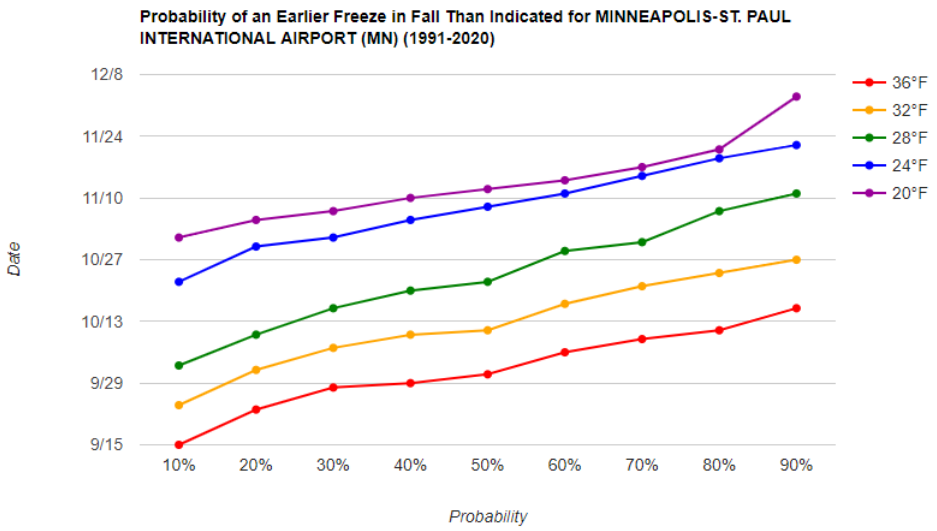
Seasonal Statistics
Growing Season based on 32F
DES MOINES INTL AP (IA)
USW00014933

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

Year	Last Spring Freeze	First Fall Freeze	Season Length	Modified Growing Degree Days
2011	05-03	10-20	169	3550
2012	04-11	10-06	177	3901
2013	04-25	10-23	180	3681
2014	04-15	10-31	198	3440
2015	04-04	11-13	222	3786
2016	04-12	11-12	213	4120
Earliest/Min	04-04-2015	10-06-2012	169	3440
Median Date	04-13	10-26	189	3733.5
Latest/Max	05-03-2011	11-13-2015	222	4120



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MAPS OF GRIDDED DATA - SPECIFIC PERIOD

Date

- (●) **Custom**
- ( ) **Last 7 Days**
- ( ) **Last 30 Days**
- ( ) **This Month**
- ( ) **Last Month**
- ( ) **This Year**

Number of Days: 10

Beginning Date:

November ▾ 26 ▾ 2014 ▾ Autocompute End Date

Ending Date:

December ▾ 5 ▾ 2014 ▾ Autocompu

Variable:

- ( ) Accumulated Precipitation
- ( ) Average Daily Precipitation
- ( ) Accumulated Snowfall
- (●) Average Temperature
- ( ) Average Minimum Temperature
- ( ) Average Maximum Temperature

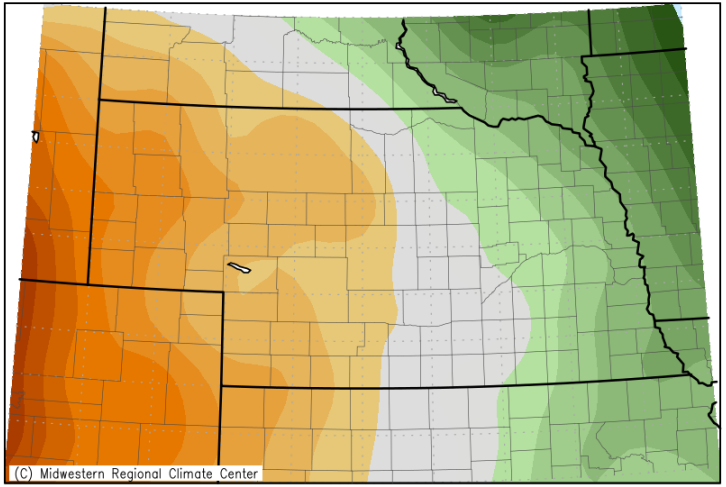
Calculation: ( ) Actual Values (●) Departure from Mean ( ) Percent of Mean

Location:

- ( ) Region — United States ▾
- (●) State — Nebraska ▾
- ( ) IL -

Create Map

Average Temperature (°F): Departure from Mean
November 26, 2014 to December 5, 2014



Mean period is 1981–2010.

Midwestern Regional Climate Center

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Thanks!

mtimlin@Illinois.edu

https://mrcc.Illinois.edu

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