

# New Climate-Based DSTs for Row Crop and Specialty Crop Producers

**Danny Brouillette (presenter),**

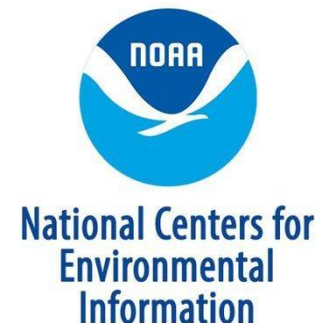
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CPASW 2024 – Florida State University – Tallahassee, Florida

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## Data Matters.

### We have tools to help you make decisions.

- Monitor regional climate conditions & impacts
- Provide climate data, derived information, and summaries
- Offer customized data services
- Research & outreach on regionally-relevant climate issues



*Partnering with the National Centers  
for Environmental Information and  
Purdue University.*

# Soil Temperature Climatology: Demand for this information has grown in recent years.



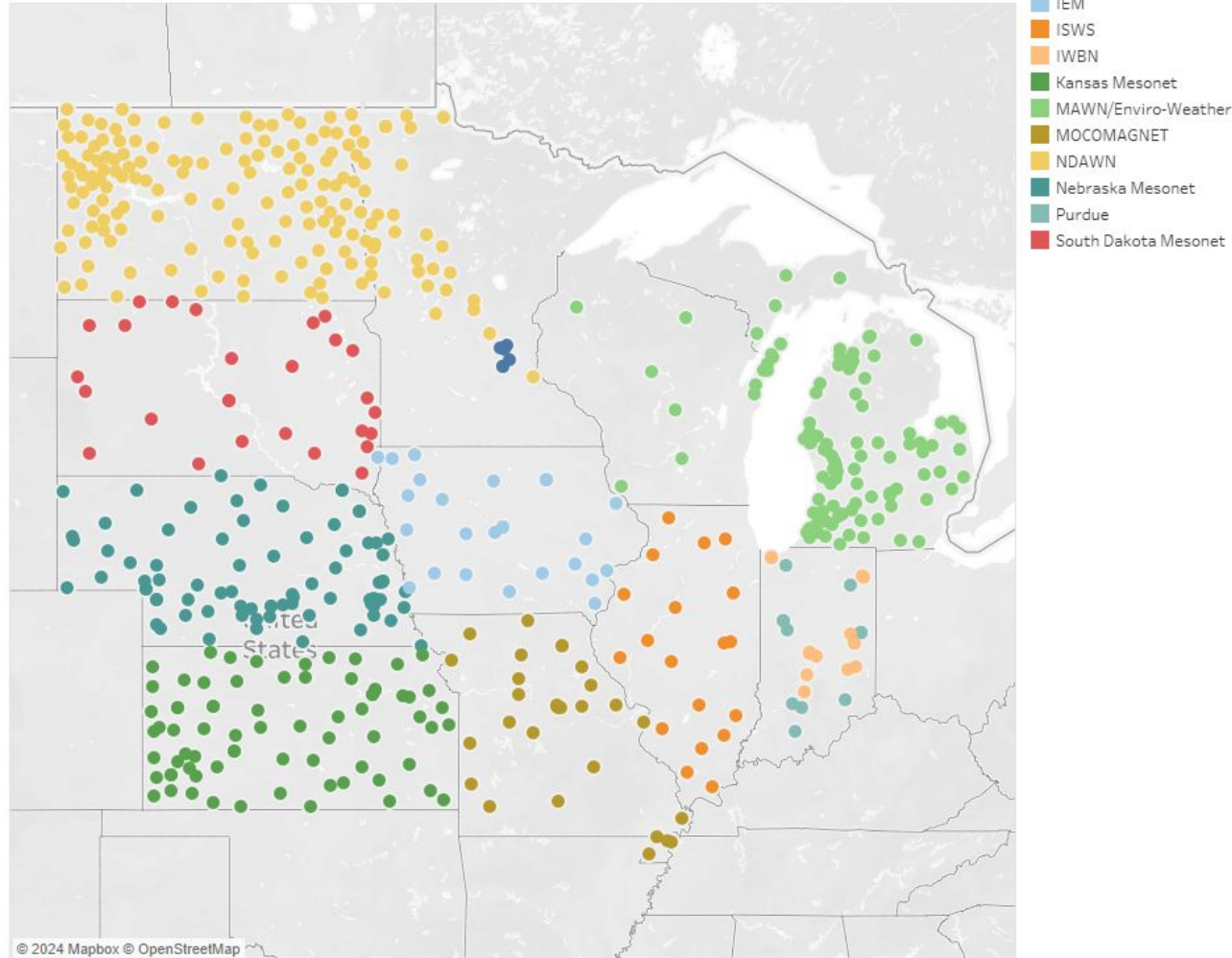
- Soil temperature information benefits a range of on-farm decisions associated with field work, plant growth, and pest and disease management.
- However, there is a lack of user-friendly interfaces for this information that has a perspective about climate patterns and risks.





# Soil Temperature Climatology: It is based on data from the North America Regional Reanalysis.

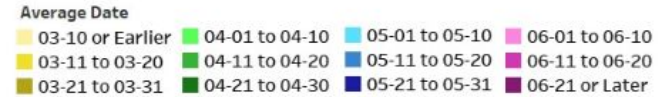
Station Map



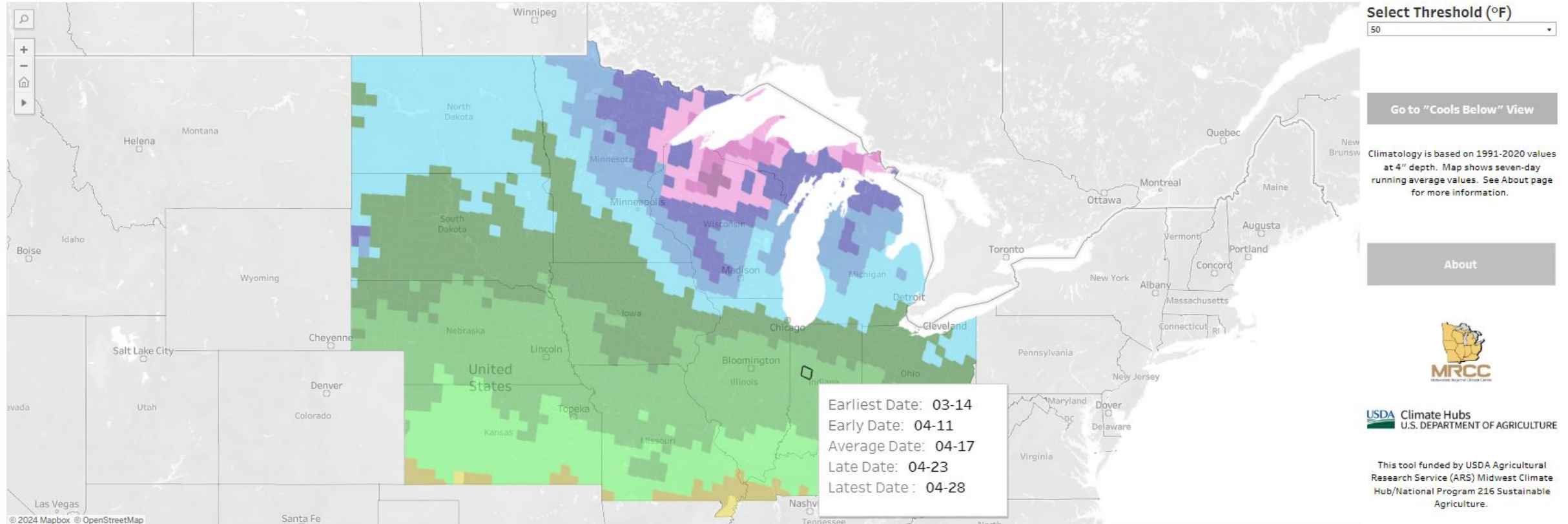
- Daily-resolution 4” soil temperature values from the NARR were obtained for the 1991 to 2020 period for much of the north-central U.S.
- These values were then bias-corrected on a day-by-day basis.
- We may expand this climatology to other regions in the future, but that will require further region-by-region analysis.

# Soil Temperature Climatology: Users can view “warms above” dates.

## Soil Temperature Climatology



Date When Soil Temperature Warms Above 50 °F



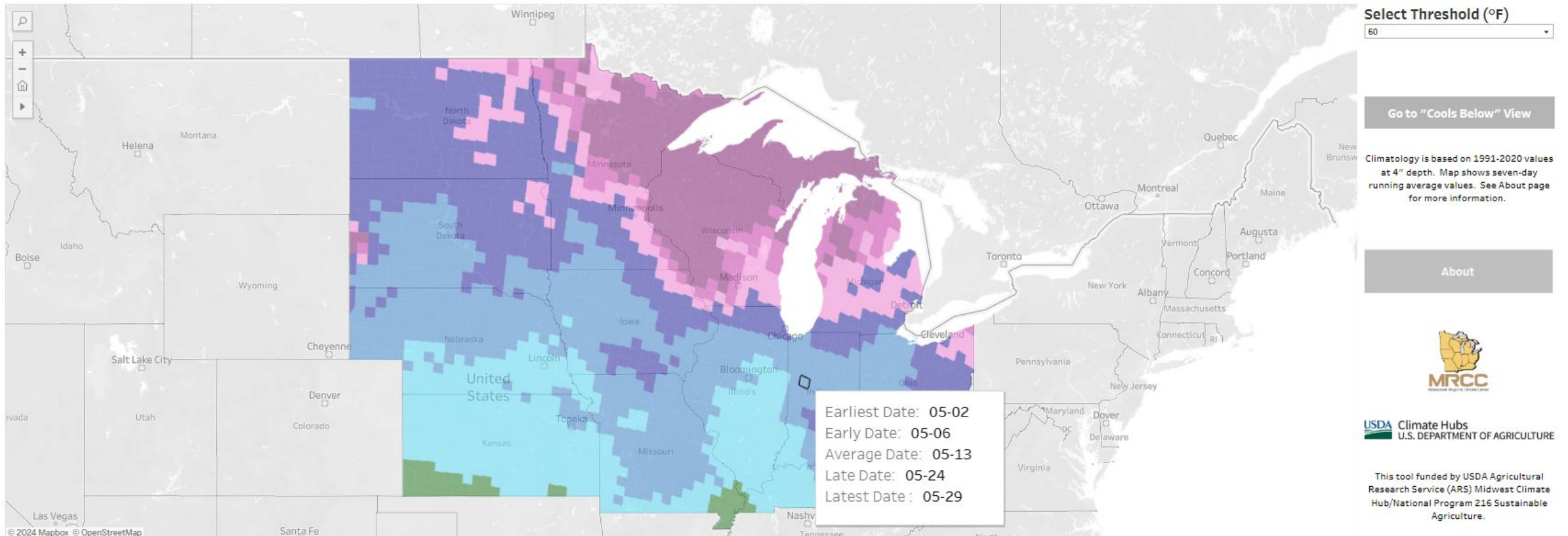
# Soil Temperature Climatology: Users can view these dates at various temperature thresholds.

## Soil Temperature Climatology

Average Date

03-10 or Earlier	04-01 to 04-10	05-01 to 05-10	06-01 to 06-10
03-11 to 03-20	04-11 to 04-20	05-11 to 05-20	06-11 to 06-20
03-21 to 03-31	04-21 to 04-30	05-21 to 05-31	06-21 or Later

Date When Soil Temperature Warms Above 60 °F





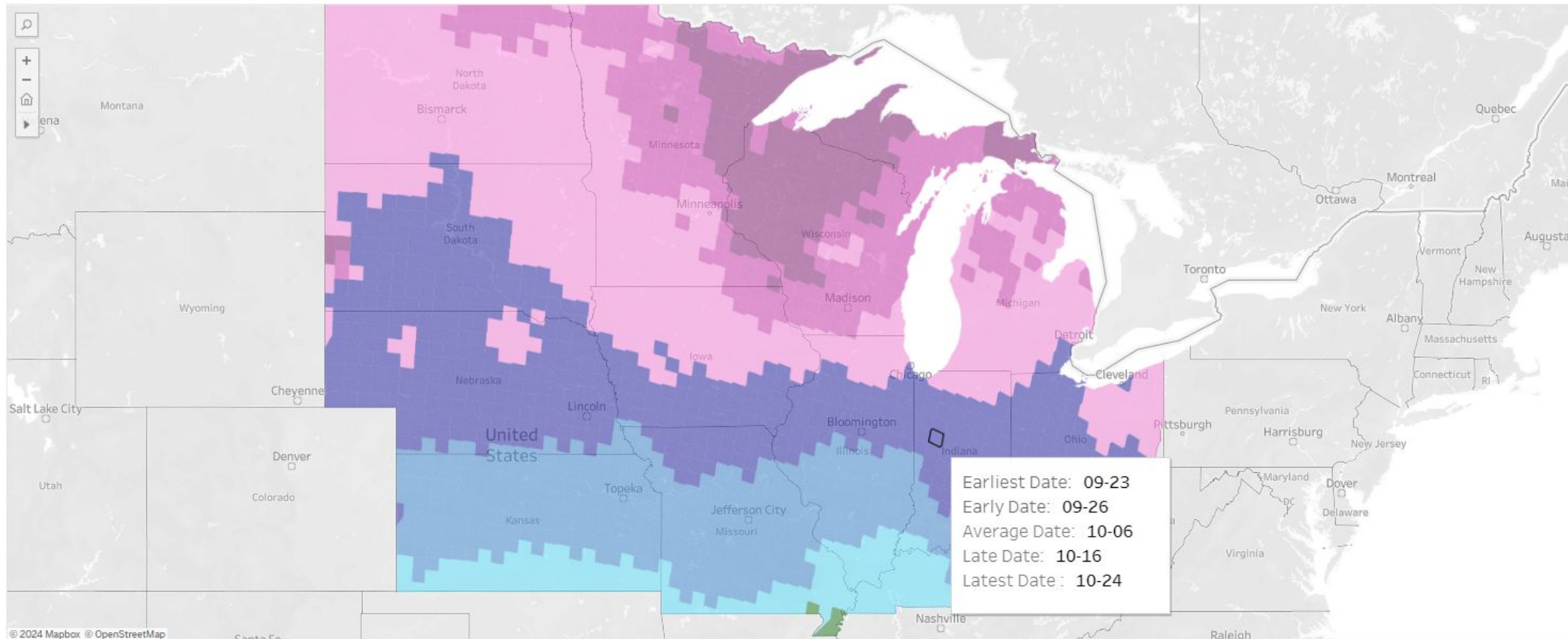
# Soil Temperature Climatology: Users also can view “cools below” dates.

## Soil Temperature Climatology

Date When Soil Temperature Cools Below 60 °F

### Average Date

- |                  |                |                |                |
|------------------|----------------|----------------|----------------|
| 09-10 or Earlier | 10-01 to 10-10 | 11-01 to 11-10 | 12-01 to 12-10 |
| 09-11 to 09-20   | 10-11 to 10-20 | 11-11 to 11-20 | 12-11 to 12-20 |
| 09-21 to 09-30   | 10-21 to 10-31 | 11-21 to 11-30 | 12-21 or Later |



Select Threshold (°F)

Go to “Warms Above” View

Climatology is based on 1991-2020 values at 4” depth. Map shows seven-day running average values. See About page for more information.

About



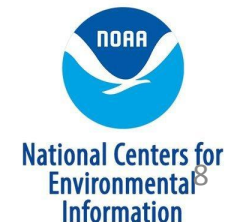
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This tool funded by USDA Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.

# Custom Chilling Hours Tool: There has been a desire from for a customizable chilling hours monitoring tool with climatological perspective.

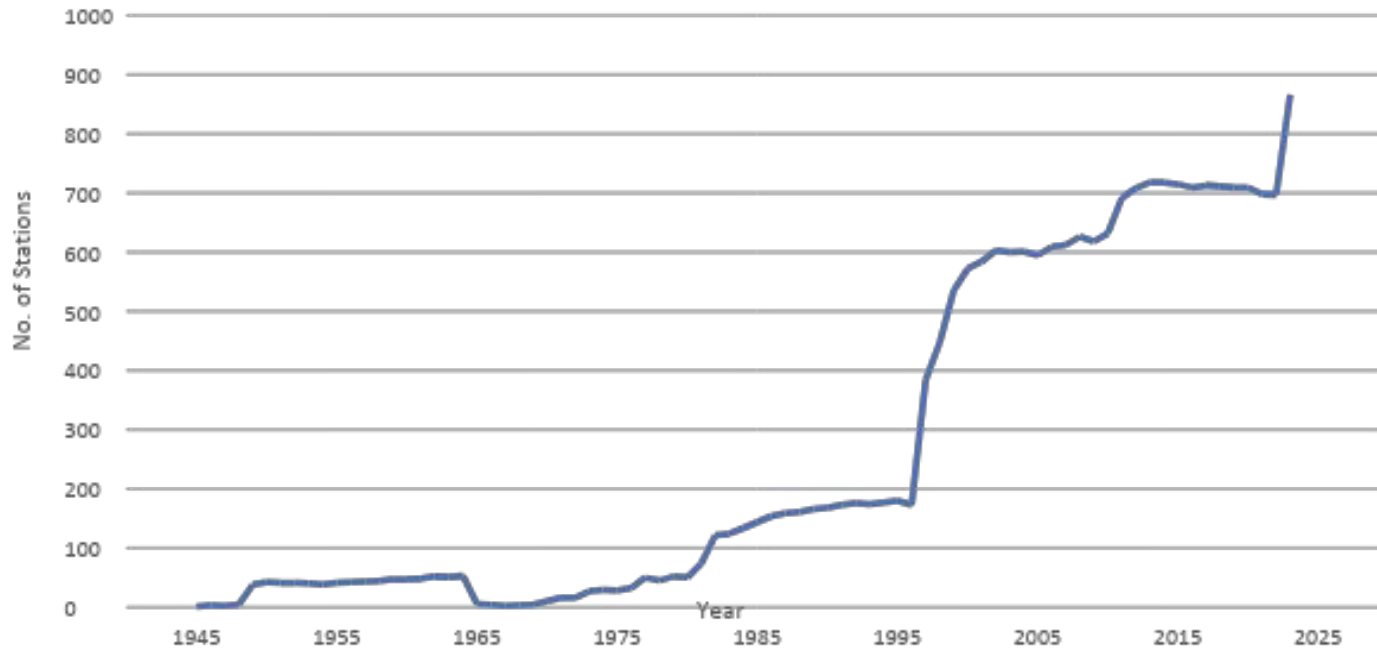
- Almond, 500-60
- Apple, 400-1000 (low-chill varieties are less)
- Apricot, 500-600
- Blackberry, 200-500
- Blueberry, Northern, 800
- Cherry, 700-800
- Chestnut, 400-500
- Citrus, 0
- Currant, 800-1000
- Fig, 100-200
- Filbert, 800
- Gooseberry, 800-1000
- Grape, 100+
- Kiwi, 600-800
- Mulberry, 400
- Peach, 600-800
- Pear, European, 600-800
- Pear, Japanese, 400-500
- Persimmon, 200-400
- Plum Cot, 400
- Plum, European, 800-900
- Plum, Japanese, 300-500
- Pomegranate, 100-200
- Quince, 300-500
- Raspberries, 700-800
- Strawberry, 200-300
- Walnut, 600-700

- Accumulated chilling hours offer a way to track the length of exposure to optimum dormancy temperatures that are required for many fruit-producing plants to produce a successful and quality crop the following growing season.
- Since each type of fruit plant requires a specific range of accumulated chilling hours, we developed a fully customizable tool that offers a unique opportunity for enhanced specialty crop monitoring and management.





# Custom Chilling Hours Tool: Hourly temperature data come from ASOS/AWOS stations and are filtered.

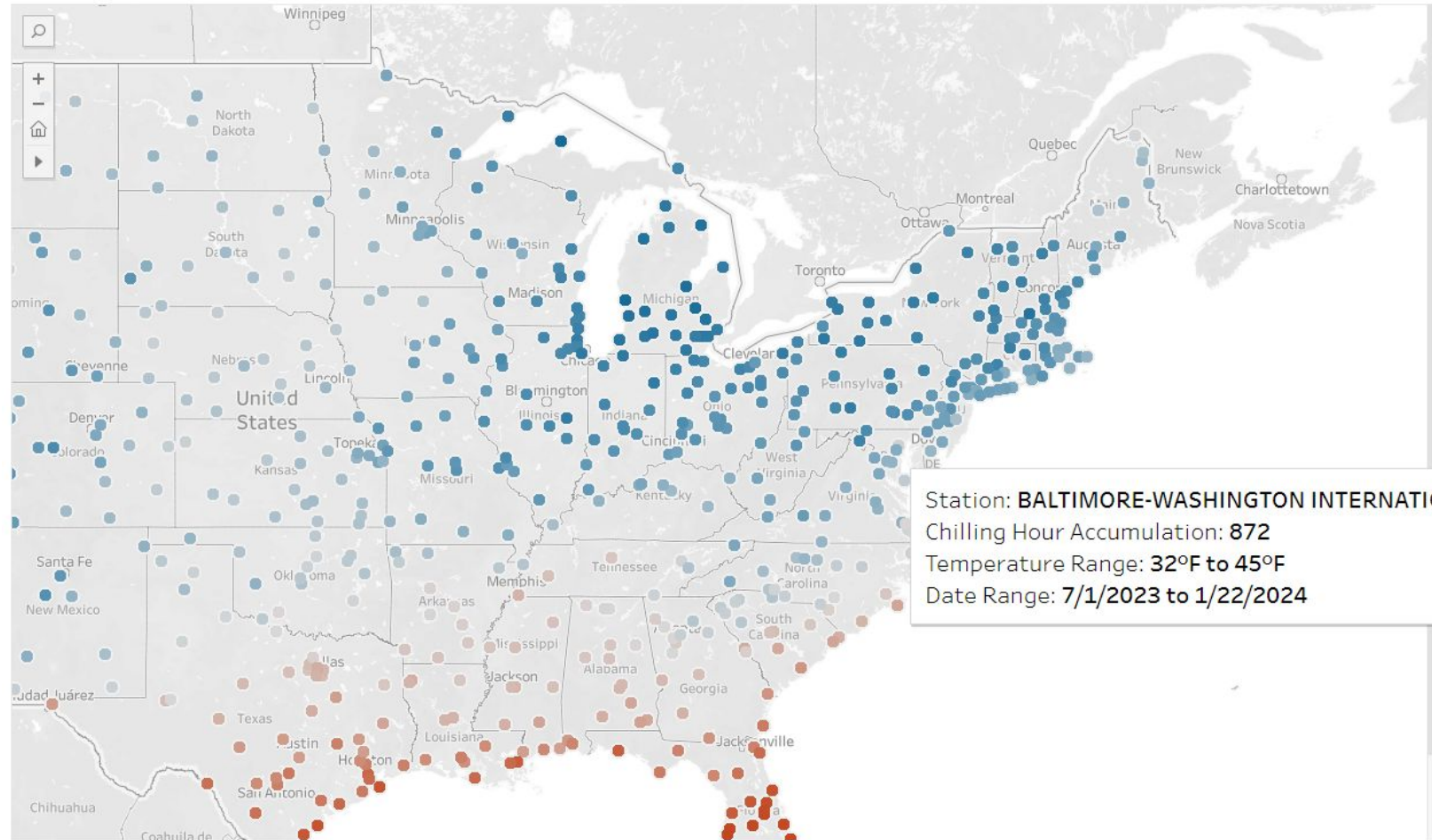


- Hourly temperature values from ASOS and AWOS stations across the U.S. as far back as 1944 are obtained through a custom-designed data feed from the API of the ACIS hourly data-set. The database is updated daily to provide a real-time monitoring product.
- Three filtering criteria are used to ensure that stations with too many missing values are excluded, helping ensure high-quality information.
- Digitized hourly data were sparse prior to the early 1980's.

# Custom Chilling Hours Tool: Map view shows accumulations for user-specified temperature thresholds and date ranges.

## Map of Chilling Hour Accumulation

Click on station dot to see accumulation plot



First, select state(s).

(All)

Then, select lower-bound and upper-bound temperatures and start and end dates.  
Please allow a few moments after each selection.

Lower-Bound Temperature (°F)

Must be less than Upper-Bound Temperature

32

Upper-Bound Temperature (°F)

Must be greater than Lower-Bound Temperature

45

Start Date

Must be on or after July 1st in a July 1st to June 30th year

7/1/2023

End Date

Must be on or before the next June 30th after the Start Date

1/22/2024



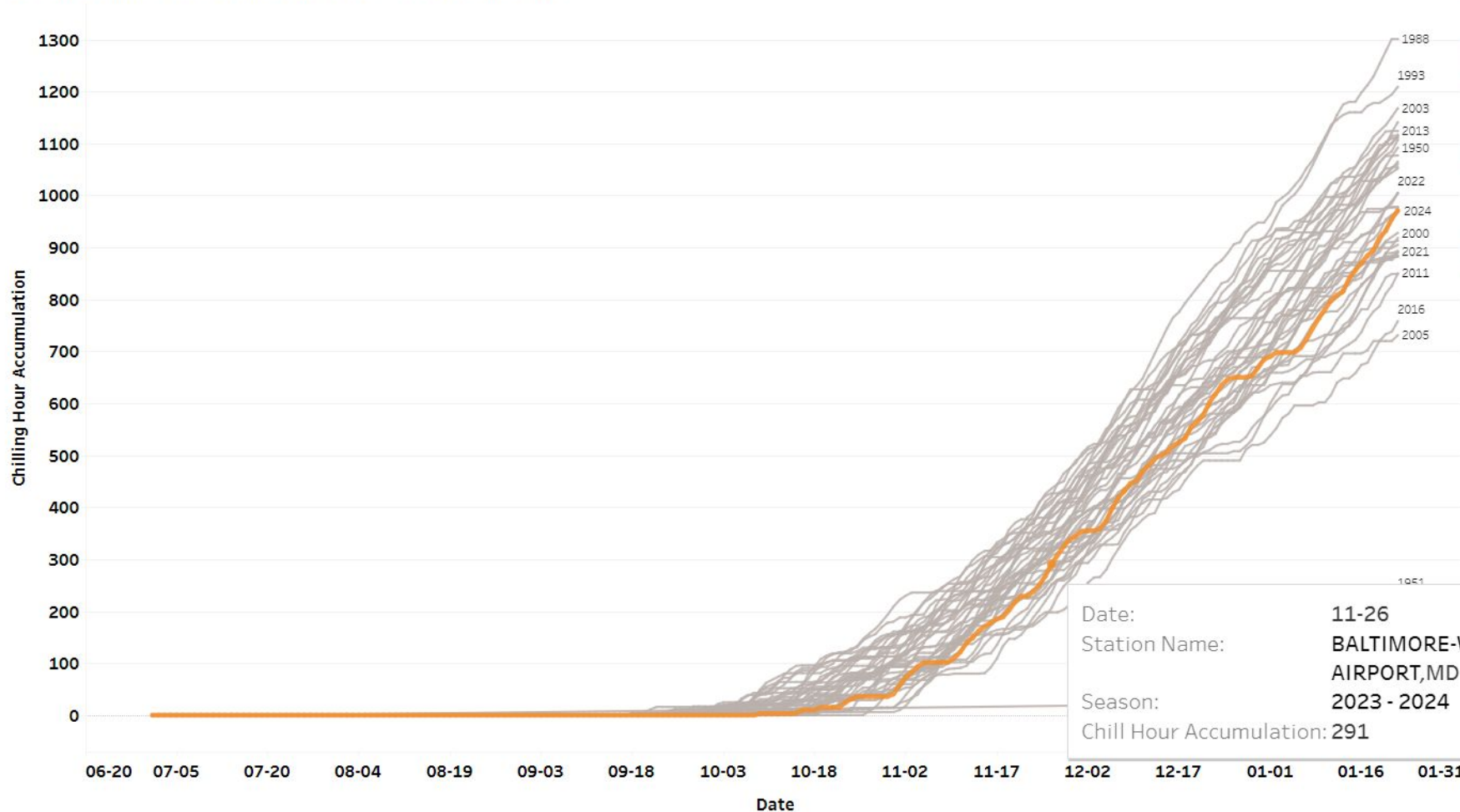
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This tool was funded by the NOAA National Centers for Environmental Information (NCEI) and USDA-Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture

# Custom Chilling Hours Tool: Plot view gives a seasonal and climatological perspective of accumulations at a user-specified station. (COMING SOON)

Running Chilling Hour Accumulation over All Seasons in Period of Record  
 BALTIMORE-WASHINGTON INTERNATIONAL AIRPORT, MD  
 "Season" year listed at end of plot lines refers to selected End Date.



Select lower-bound and upper-bound temperatures and start and end dates. Please allow a few moments after each selection.

**Lower-Bound Temperature (°F)**  
 Must be less than Upper-Bound Temperature  
 32

**Upper-Bound Temperature (°F)**  
 Must be greater than Lower-Bound Temperature  
 45

**Start Date**  
 Must be on or after July 1st in a July 1st to June 30th year  
 7/1/2023

**End Date**  
 Must be on or before the next June 30th after the Start Date  
 1/22/2024

[Go Back to Map View](#)



Date: 11-26  
 Station Name: BALTIMORE-WASHINGTON INTERNATIONAL AIRPORT, MD  
 Season: 2023 - 2024  
 Chill Hour Accumulation: 291

mental Information (NCEI)  
 Hub/National Program 216

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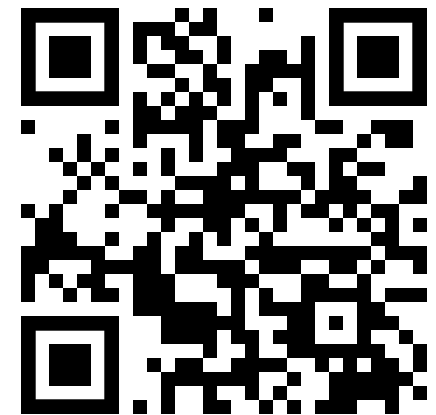
# Looking ahead...

- For the Soil Temperature Climatology, we plan to investigate adding the capability to see soil temperature information given a user-specified date, real-time station data, and more based on user feedback. Expansion to other regions is also possible.
- For the Custom Chilling Hours Tool, we hope to add features that provide more inter-seasonal and intra-seasonal climatological perspective, investigate interpolating hourly data in the more distant past, and (again) add more based on user feedback.
- **Feel free to contact me at [dbrouill@purdue.edu](mailto:dbrouill@purdue.edu) or any other personnel at the MRCC or USDA Midwest Climate Hub with questions and feedback.**

**See the tools online here!**      
<https://mrcc.purdue.edu/clim/Soil-T>  
<https://mrcc.purdue.edu/ChillingHours>



**Soil Temperature  
Climatology**



**Custom Chilling  
Hours Tool**