



# THE CLIMATE OBSERVER

A publication of the *Midwestern Regional Climate Center*

January 2018

### MRCC

#### Product Highlight:

Interval	00
-60.0 to <-50.0	0.0
-50.0 to <-40.0	0.0
-40.0 to <-30.0	0.3

[Sub-Daily Frequency Distribution](#)

### Climate Cool Tool:



[NOHRSC Snow Analyses](#)

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### On the Road:

IL - IL Assoc. for Floodplain and Stormwater Mgmt

## How Insects Survive Winter in the Midwest

*Erica J. Kistner, Research Ecologist and Midwest Climate Hub Fellow*



Figure 1. Asian multicolored lady beetles invade home during the winter. (Photo by Joe Boggs, Ohio State University)

Midwestern winters are too cold and long for most insects to survive without special adaptations or strategies. In cold northern latitudes, insects will either 1) migrate south to spend the winter months in warmer climates (e.g. monarch butterfly) or 2) overwinter locally. Overwintering insects enter a state of inactivity known as diapause; think hibernation for insects. In this state, an insect's metabolic rate drops, growth stops, and stored body fat is used to survive the winter. Insects can diapause as adults, larvae, pupae, or eggs depending on the species. Some insects are 'freeze tolerant' and can keep their bodies from freezing by producing alcohols that act as antifreeze. However, most insects in the Midwest choose to avoid freezing and may even seek shelter inside our homes.

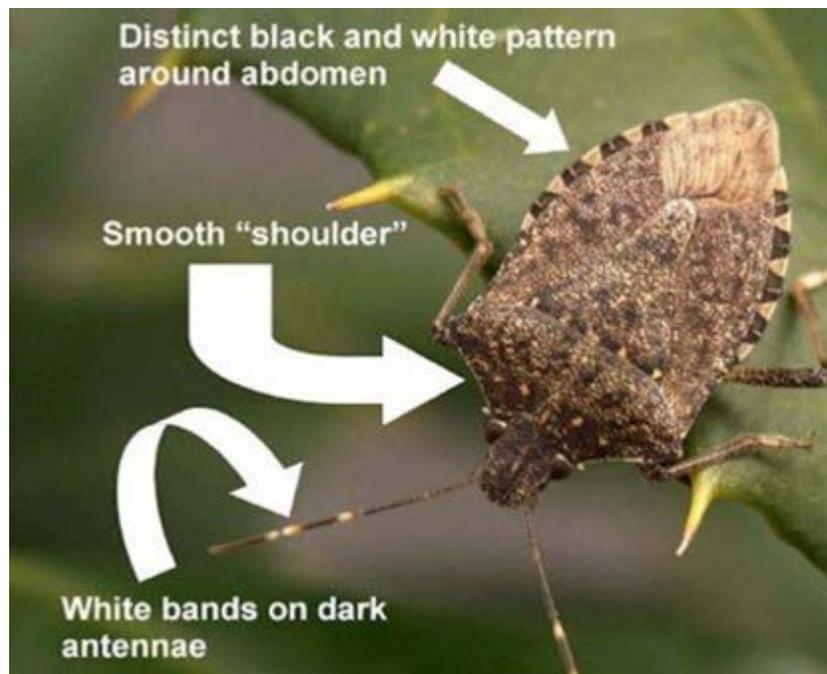
In the fall, decreasing temperatures and shortening day lengths (photoperiods) are important cues that tell insects that winter is on the way. In response, freeze-avoiding insects will seek shelter inside buildings, under tree bark, under rocks, or in leaf litter on the ground, and often in our homes (Figure 1). Even in these protective microclimates, insects are still susceptible to freezing, starvation, and dehydration during the winter. Most insect species have a lower temperature threshold and once their body temperature drops below this value, death can occur very quickly.

In the table below are a few notable insects (including pest species) that overwinter in the Midwest region.

Overwintering Insect Guide			
Insect	Lower Temp Threshold	House Pest	Brief Description
Brown Marmorated Stink Bug (BMSB)	5°F	Yes, unpleasant odor	Invasive horticultural pest, especially of apples. Adults overwinter inside buildings and under tree bark. If seen, please report to <a href="#">MISIN</a>
Japanese Beetle	15°F soil temp	No	Invasive turf grass, garden, and horticultural pest. Eggs and larva overwinter in the soil beneath lawns, parks, golf courses. Snow cover acts as an insulating layer and enables ~99% survival at -4°F air temp.
Multicolored Asian Lady Beetle (MAL)	14°F	Yes	Non-native nuisance pest. Adults enter houses via cracks in the foundation and siding. Will aggregate at high densities.
Boxelder Bug (BE)	20°F	Yes, unpleasant odor	Native to the US. Nuisance pest only. Adults overwinter along the south side of buildings, rocks, and trees in large congregations. Readily invade homes. Widespread across the Midwest.
European Corn Borer	Freeze tolerant, -7°F to -16°F	No	Invasive agricultural pest, especially of corn. Larva overwinter in cornstalks, corn cobs, weed stems, or in a spun-silk covering located in plant debris within corn fields.
Emerald Ash Borer	Freeze tolerant, -26°F	No	Invasive forest pest of Ash trees. Larva overwinter under bark of host tree. Midwestern winters do not pose a threat to this pest.
<p><b>Note:</b> BMSB, MAL, and BE are not harmful to humans or pets. MAL do bite, but this has no major health consequences. These insects do not feed, develop, or breed indoors. They are just seeking a warm place to spend the winter and will attempt to return outdoors at the onset of spring.</p>			

## Management

The best deterrence against home-invading insects is to prevent entry by caulking and sealing possible entry sites (cracks and gaps). A soapy water spray made with 5 tablespoons of liquid detergent per gallon of water can be sprayed along the foundation in the fall as a preventative measure. Soapy water applications should be applied repeatedly and direct sprays can be effective in killing nuisance insects like boxelder bugs. We recommend **NOT** killing the Multicolored Asian Lady Beetle (Figure 1), as this beneficial insect is an important predator of many agricultural pests including the soybean aphid.



*Figure 2. Identification points of the brown marmorated stink bug.*

*(Photo by USDA-ARS, Jeff Wildonger)*

## How you can help

The invasive brown marmorated stink bug (Figure 2) is spreading across the Midwest and remains a major threat to horticultural production throughout the region. If you find this insect around your home or place of business this winter, please consider reporting your find. Go to the [Midwest Invasive Species Information Network](#) (MISIN) website or mobile app, register as a user (it's free) and follow the instructions for submitting a report. The whole process takes only 5 minutes. By reporting sightings of this pest, you will be helping growers in your area prepare by identifying potential new hotspots for this pest.



*Figure 3. The Japanese beetle spends ~10 months developing underground (left) and only ~2 months as an adult above ground (right). (Photos by USDA-APHIS)*

### **What does the future hold for overwintering insects in the Midwest?**

Understanding how insects cope with cold temperatures can not only help entomologists more accurately forecast when and where insects are active, but it may also help us understand how climate change will influence insect pests. In northern regions, warmer winters could allow more insects to survive. Because insects often shift or expand their geographic range in response to changes in temperature, we will likely witness the arrival of new pest species throughout the region in the near future. Warming could also lead to more pest outbreaks. For example, warmer winter and spring weather may have contributed to the severe outbreaks of Japanese beetles (Figure 3) observed throughout the Midwest in the summer of 2017. As temperatures continue to rise, expect a greater risk of insect pest outbreaks across the Midwest.

*For more information on the [USDA Midwest Climate Hub](#) or how climate impacts insect pests, please contact [Erica Kistner](#) via email.*

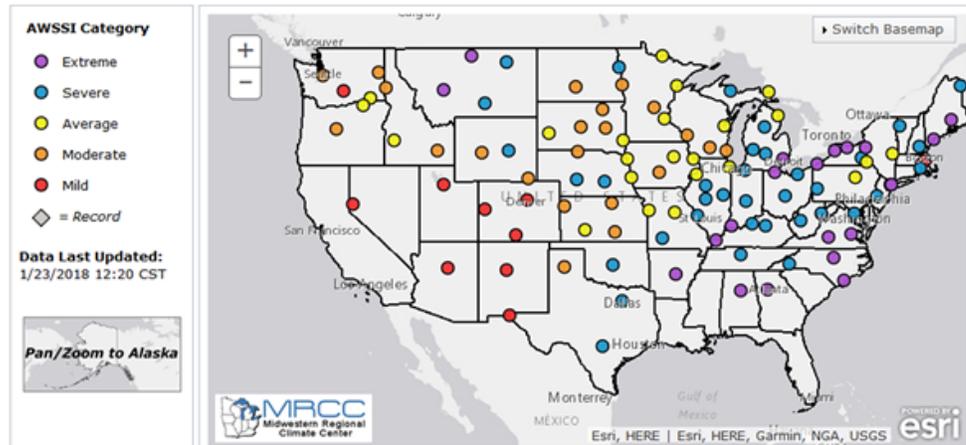
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### **Deadline Approaching: Fourth National Climate Assessment (NCA4) Public Review and Comment Period Ends January 31, 2018**

All comments must be submitted via the U.S. Global Change Research Program (USGCRP) [Review and Comment \(R&C\) System](#), using the online mechanism or an off-line spreadsheet for later upload. To register as a reviewer and access the draft, visit [review.globalchange.gov](http://review.globalchange.gov) to enter existing credentials or create a new account. A link under the 'Documents Available for Public Review' banner will become active, routing users to terms of use, instructions, and the draft of NCA4 Vol. II.

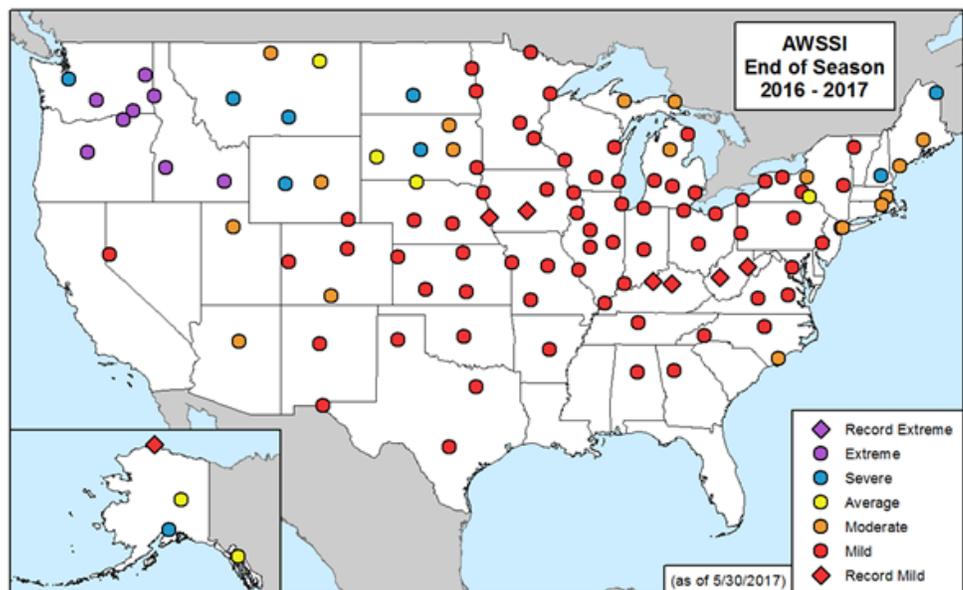
# Accumulated Winter Season Severity Index Paints a Mixed Picture for Winter 2017-2018

Steve Hilberg, Climatologist, Midwestern Regional Climate Center



The AWSSI as of January 23, 2018

Winter 2017-2018 is exhibiting a much different character than the past two winters across the U.S. based on the Accumulated Winter Season Severity Index (AWSSI). At the midpoint of winter, the season in much of the U.S. east of the Rockies to the Mississippi River was experiencing a moderate to average winter in most locations. East of the Mississippi River, winter has been in the average to extreme category. West of the Rockies, it has been a very mild winter. Last season winter was mild to record mild across much of the eastern two-thirds of the U.S.

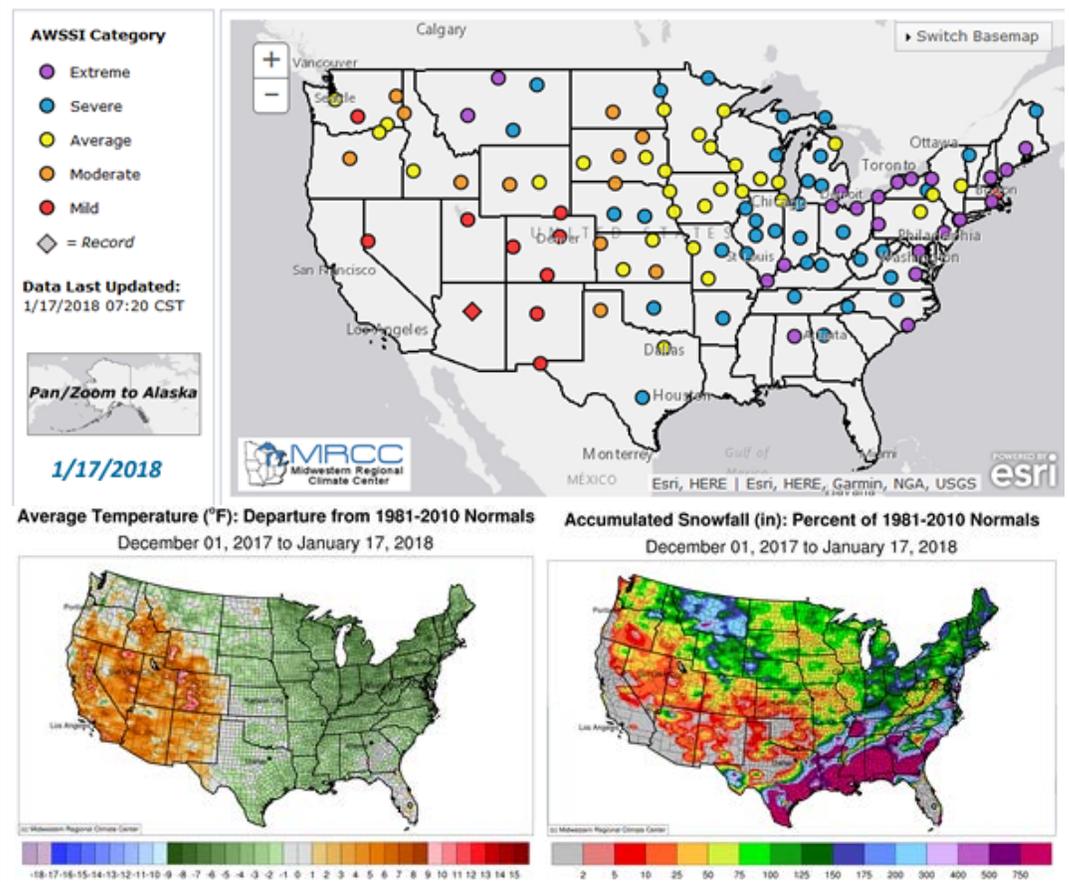


The final AWSSI for the winter of 2016-2017

The AWSSI is an objective index that uses commonly available data to quantify and describe the relative severity of the winter season. The AWSSI does for winter what other such scales do for hurricanes, tornadoes, and droughts. During the winter season, daily scores are calculated based on scores assigned to temperature, snowfall,

and snow depth thresholds. The daily scores are accumulated through the winter season, allowing a running total of winter severity in the midst of a season as well as a final, cumulative value characterizing the full season. Accumulations of the temperature and snow components of the index are computed separately and then added together for the total index. This allows comparison of the relative contribution of each to the total score. The AWSSI can be tracked as the season progresses, and it allows comparisons of winter severity compared to average and to previous years.

At the midpoint of winter 2017-2018, one interesting aspect is that the higher index values in the eastern U.S. have been driven largely by the Arctic outbreaks starting in late December, and not as much by snow (see images below). In the upper Midwest, the lack of snow is a big factor moderating the AWSSI even though temperatures are running below normal. The lack of snow across the western U.S. is also remarkable.



With another month or more of winter remaining, the AWSSI map will continue to change. You can monitor the progress of this winter season with the AWSSI on the [MRCC's AWSSI web page](#), as well as read more background information on the AWSSI.

For more information on this article or the [AWSSI](#), please contact [Steve Hilberg](#) via email.

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## MRCC's 2018 Summer Student Intern Program!

*Beth Hall, Director, Midwestern Regional Climate Center*



The [Midwestern Regional Climate Center \(MRCC\)](#) has offered paid summer internships to college students for over a decade. These internships have provided students with an opportunity to work directly with historical atmospheric data and experience the diverse applications and needs of acquiring, maintaining, and analyzing these data. From

serving the public's need for climate information, to participating in applied climate research, to contributing to the development of tools and resources for accessing and interpreting climate data, summer interns gain an appreciation for the field of climate sciences.



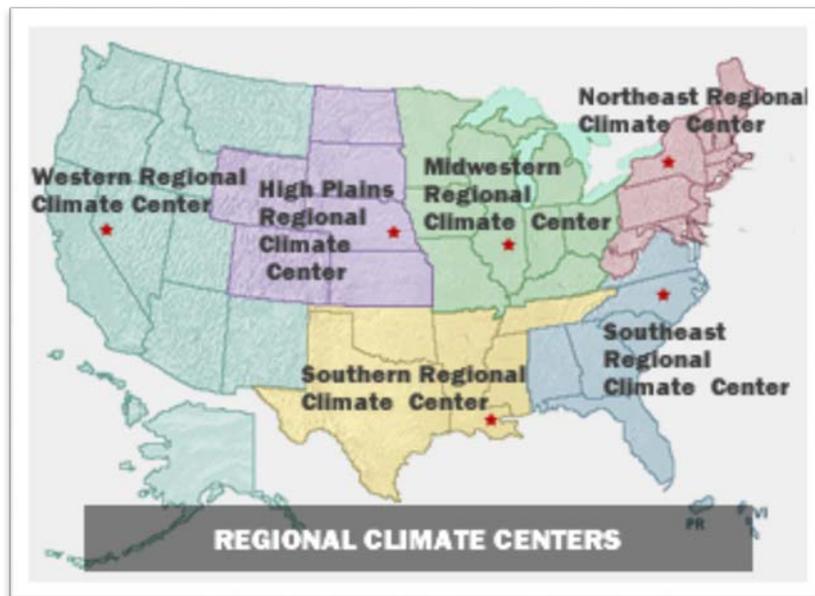
*The Champaign, Illinois cooperative weather station (118740) at the Illinois State Water Survey.*

*(Photo courtesy of Jim Angel, Illinois State Climatologist)*

The MRCC is located at the University of Illinois at Urbana-Champaign and is one of 6 Regional Climate Centers across the United States that has been supported through federal funds since the early 1980s. Its mission has four components:

- Provide high-quality climate data, derived information, and data summaries for the Midwest 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

Student interns have the opportunity to help support MRCC's climate service activities and/or provide support on an applied climate or climate monitoring project. Past projects have covered topics from examining climate teleconnection relationships to



widespread drought, using climate data to study and compare heat waves in Chicago, identifying extreme precipitation events that have impacted major metropolitan areas, to

improving the metadata records of national climate datasets. Several MRCC interns have even had the opportunity to present their applied climate internship project at professional conferences! Three current MRCC climatologists were former MRCC summer interns, and other past interns have gone on to pursue and succeed in careers within the climatology and atmospheric sciences.

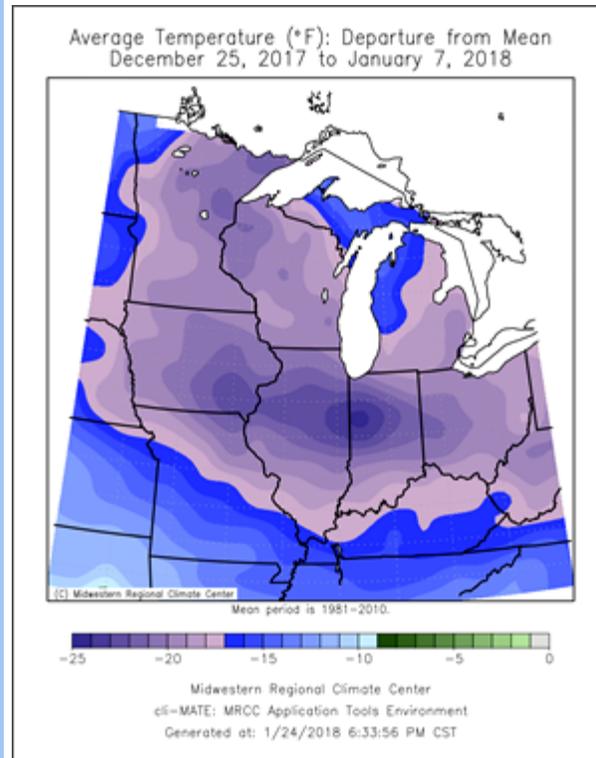
This summer, the MRCC plans to hire three summer student interns. All of them will have the opportunity to contribute to applied climate research or monitoring projects. One of the positions will focus on using GIS techniques for climate services delivery; another will apply programming experience toward the development and/or modification of MRCC value-added online tools, and another position will engage in exploratory activities to better understand historical climate events across the Midwest and background research on applied climate science topics. Hiring requests for the 2018 MRCC Summer Student Internship opportunities are currently going through the University approval process. However, **DRAFT** position announcements can be found at the links below for those who may be interested. Note that application deadlines at this time are only tentative and interested candidates should keep an eye on the [MRCC website](#) when more official announcements are made available.

[Climatologist Intern](#) • [Climatologist/Computer Programmer Intern](#) • [GIS Technician Intern](#)

*For more information on this article or the MRCC Summer Intern Program, please contact [Dr. Beth Hall](#) via email.*

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## Midwest Climate at a Glance



Arctic air poured into the Midwest in late December and early January. Temperatures averaged between 15°F and 25°F below normal for nearly all of the region for the two-week period including the [last week of 2017](#) and the [first week of 2018](#). More than 1,000 daily record lows were set in each of the weeks with records scattered across the entire region. Temperatures dropped to below zero across much of the region at some point in the cold snap. Much colder temperatures were recorded in the northern parts of Minnesota where temperatures fell to -40°F or colder on some

nights, while the average for the two-week period was less than -10°F. Minimum temperatures for the period averaged below zero for all of Minnesota, Wisconsin, and Iowa, much of Michigan, Illinois, and Indiana, and parts of Missouri and Ohio. Minimum temperatures in Kentucky averaged around 10°F for the two-week period.

Both weeks were well below-normal in precipitation over the vast majority of the region. Snowfall was dominated by lake-effect snows, aided as relatively warm waters of the Great Lakes provided both heat and moisture to the cold air flowing over them. [See the Midwest Climate Watch pages for more](#) ...

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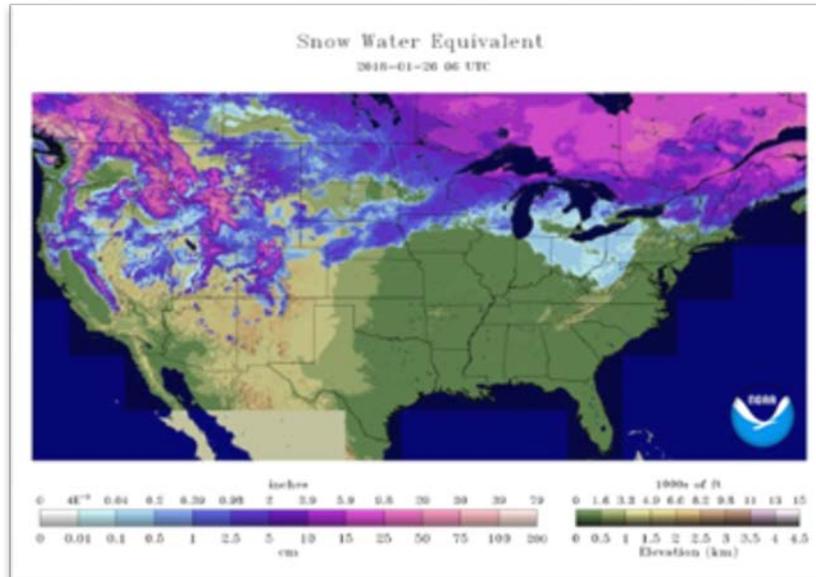
How many times has the wind chill been below 0°? What is the average number of hours the wind speed is above 10mph? The new [cli-MATE Sub-Daily Frequency Distribution tool](#) can help answer these questions and more. The user can look at the data either by frequency for each hour or by month. When “Tabulate by

Hour” is selected, data can be restricted to specific parts of the year, and output can be shown as a percentage or the total number of hours. Data can be restricted to specific hours when “Tabulate by Month” is selected, and output can be shown as a percentage,

total number of hours, or the average number of hours. This product can be found at Hourly-Observed Data > Frequency Distribution.

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## Climate Cool Tool



The National Operational Hydrologic Remote Sensing Center (NOHRSC) provides remotely-sensed and modeled hydrology products for the coterminous U.S. and Alaska. NOHRSC

airborne, satellite, and modeled snow data and products are used by NWS, other government agencies, the private sector, and the public to support operational and research hydrology programs across the nation.

These [NOHRSC Snow analyses](#) are available for 18 different regions, and include maps for Snow Water Equivalent (shown), Snow Depth, Average Snowpack Temp, SWE Change, Snow Precipitation, Snow Melt, Blowing Snow Sublimation, Surface Sublimation, and Non-Snow Precipitation and can be animated.

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## MRCC On The Road



### **Tinley Park, IL (March 14-15) – Illinois Association for Floodplain and Stormwater Management**

Zoe Zaloudek will be attending the 2018 Annual Conference of the Illinois Association for Floodplain and Stormwater Management.

### **Indianapolis, IN (Feb 12-15) – Indiana Horticultural Congress**

Beth Hall will be co-hosting a booth at the 2018 Indiana Horticultural Congress to share information about the MRCC and NOAA data and tools, and learn more about climate services needs from specialty crop producers.

## Washington, DC (Apr 2-6) – Congressional meeting for MRCC funding

Beth Hall will be joined by the other 5 Regional Climate Center (RCC) directors to encourage continue federal support for the RCC program.

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MRCC is based at the Illinois State Water Survey, a division of the Prairie Research Institute

at University of Illinois Urbana-Champaign.

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