



THE CLIMATE OBSERVER

A publication of the *Midwestern Regional Climate Center*

March 15, 2013

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The Great Ohio Valley Flood of 1913

Sarah Jamison, Service Hydrologist NWS Cleveland and Silver Jackets member



Town Street Bridge collapses into the river; Columbus, Ohio
Source: Postcard collection of Mr. Ray Thomas, www.brisray.com

100 years ago this March, one of the greatest natural disasters to strike the nation came in the form of a cataclysmic flood. The rain started on Easter Sunday, March 23rd, 1913 and continued for three days and nights.

Before the rain was over, hundreds of thousands were relocated as towns along creeks and rivers were inundated with flood waters. Levees built to previous record stages were quickly overtopped, burying towns with debris-filled, rushing water that uplifted roads, tore down bridges, and destroyed thousands of homes and businesses. When the rains finally stopped, three state capitals (Indianapolis, Indiana; Columbus, Ohio; and Albany, New York) were under water. Property damage was estimated in the hundreds of millions of dollars — approximately 5-7 billion dollars today — and around a thousand lives had been lost.

"Let us not look back in anger or forward in fear, but around in awareness."

— James Thurber

At the time of the disaster, the Ohio Valley was home to a quarter of the nation's population and was the largest producer of the country's coal, natural gas, and steel. When the region was decimated by the floods, the ripple effect was felt across the country. This was the largest and most widespread disaster to strike the United States at that point, and is comparable with the more recent Hurricanes Katrina and Sandy.

1913 Flood Storm Summary

On the morning of Easter Sunday, March 23rd, the low responsible for the Great Flood was over Colorado. By Sunday afternoon, temperatures, humidity, and winds out of the southeast had increased notably across the Midwest. This warm and unstable airmass

On the Road:

NC - NCDC Dataset Workshop

IL - NWS Convective Workshop, MRCC Mesonet Workshop, IL GIS Assoc. Spring Conference, NWS Open House

DC - Congress and Climate Partners Meetings

FL - Drought Monitor Forum

IN, MI, OH - MRCC Spring Regional Road Trip

UT - Climate Prediction Apps Science Workshop

provided the fuel for severe and tornadic storms that day and night. Strong southerly winds, sustained over 35 mph with gusts in the 50s, had developed over central Kansas, resulting in a severe dust storm. The strong winds then moved into Missouri, this time associated with heavy rain and hail.

By evening on Sunday, stations observed sustained southerly winds of 40 to 50 mph with gusts to 60 mph, mainly over Nebraska, Iowa, and Illinois. From Chicago to Milwaukee there were reports of roofs blown off and city houses overturned. Significant tornadoes tore through several states, resulting in over 150 fatalities, most notably in Omaha, Nebraska and Terre Haute, Indiana.



Dayton, Ohio - March 25, 1913. Photo courtesy Library of Congress.

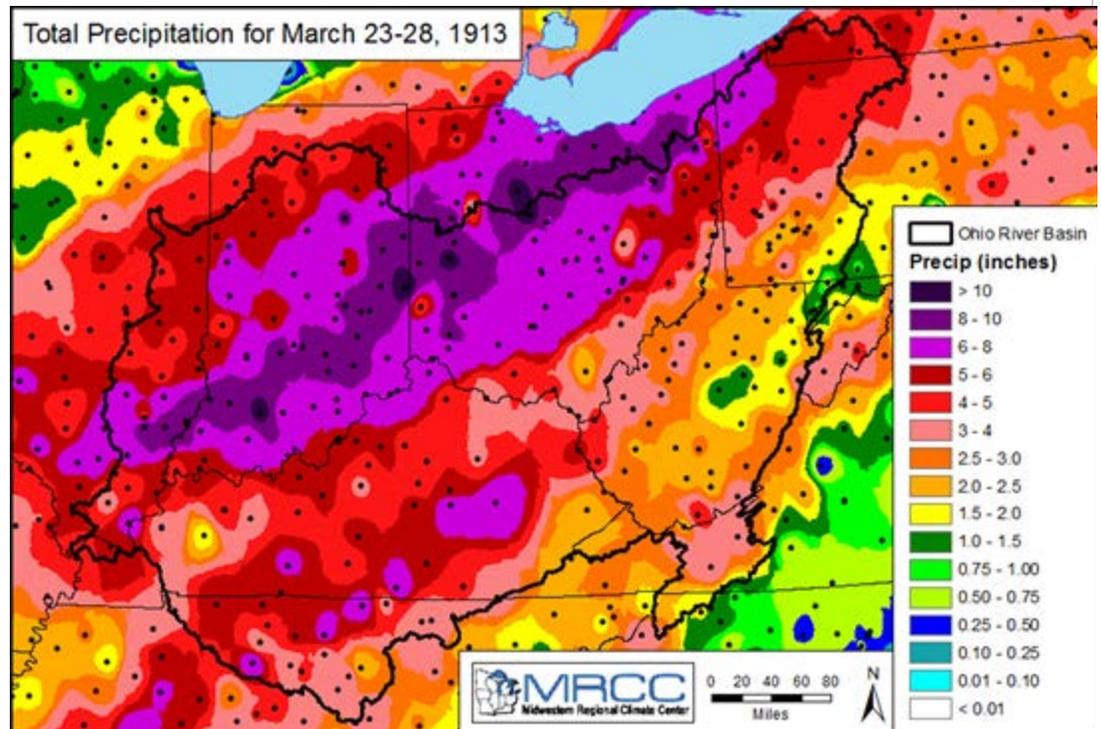
Given the extensive telephone, telegraph, and power line damage from this event and the previous storms, there was little way to forewarn others of the powerful and destructive storm heading their way. In addition to severe storms and winds, the rain began to fall in sheets over Illinois and Indiana. The warm moist air coming out of the south provided unusually heavy rainfall for late March, with rainfall heaviest over northwest Ohio and central Indiana, where rain averaged over two inches for the day.

On the night of the 23rd, the storm system deepened. It rained most of the night, with intense rainfall leading to the onset of flash flooding starting in Indiana. The ground was unable to absorb the rapidly falling rain, resulting in washouts of roads and railway tracks.

As if perfectly designed for maximum rainfall, a quasi-stationary front, the type generally considered to be the most efficient heavy-rain producer, was stalled over the Ohio Basin on Monday, March 24th. Rainfall on this day measured highest in southern Indiana and western Ohio averaging 3 to 6 inches. Storm total rainfall between Easter Sunday through Monday was a swath of 3 to 8 inches over Ohio, Indiana, and southern Illinois, surpassing monthly rainfall totals in less than 48 hours. The rain however, was far from over.

On Monday night and the morning of Tuesday the 25th, the second storm system was moving into southern Indiana and Illinois, resulting in scattered reports of tornadoes and damaging winds. Over the Ohio Valley, the rain continued to fall on Tuesday the 25th, and more railroads and bridges were being damaged or destroyed across Ohio, Indiana, and Pennsylvania as powerful floodwaters swept the states. Communities were

cut off from the outside world, becoming islands in many instances.



It wasn't until midday on March 27th that a cold front, followed by an area of high pressure, was finally able to drive the trough of low pressure eastward into Pennsylvania and New York, slowly ending the heavy rain over the Ohio Valley. In Indiana, the rain was replaced with heavy snow, with amounts up to 8 inches over the hardest hit central and northern portions of the state. In Ohio, light snow followed the cold front that pushed through on Thursday, which was followed by cold high pressure centered over Kentucky the next day, and resulted in widespread frosts down into the Gulf States. Total precipitation across the region during this historic event is shown in the figure above. Visit the 100th Anniversary website for a more [detailed storm summary](#).

Flood Preparedness

During the last century, state and federal agencies developed numerous flood warning, awareness, and protection services to protect life and property for those who live in flood zones. Some of the strategies include:

- Prevention measures (building, zoning, storm water management, floodplain regulations)
- Property protection measures (acquisition, elevation, relocation, flood insurance)
- Natural resource protection (wetland protection, erosion/sediment control)
- Emergency services (warning programs, disaster response)
- Structural projects (dams, levees, channel modifications)
- Public information (outreach, technical assistance, education)
- Flood Warnings and alerts

In this spirit, the newly developed [Silver Jackets Teams](#), composed of local, state, and federal agencies, provide a unified approach to find common solutions to manage flood risk. What did the lessons of the 1913 flood teach us about safe and sustainable flood management? The Great Flood of 1913 attracted Congressional interest and investment in controlling or managing flood-prone areas that later resulted in the Flood Control Act of 1917. This was the first of several 20th century legislative actions that eventually resulted in the creation of the National Flood Insurance Program of 1968, the Federal Emergency Management Agency (FEMA) in 1979 and the Robert T. Stafford Disaster Act of 1988.



Although the flood management systems of today have performed remarkably well, we should still ask what we can learn and how to continually improve the overall system. In the goal of learning from past floods to improve future flood fights, the Silver Jackets seek further improvements through a comprehensive approach.

100th Anniversary Website

For the 100th Anniversary of the Great Flood, the Silver Jackets have teamed with the Midwestern Regional Climate Center (MRCC) to spread the word about this historic event and increase flood awareness. The website, "[The Great Flood of 1913 – 100 Years Later](#)" tells the stories of many communities impacted by this disaster, as well as the meteorological and hydrological conditions before and during. Resources for flood awareness, preparation, and mitigation are available for families, educators, agriculture and businesses.

For more information on this article or the [Silver Jackets](#), please contact Sarah Jamison via email at sarah.jamison@noaa.gov.

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Summer Internship Program at MRCC

Beth Hall, MRCC Director

For over a decade, the Midwestern Regional Climate Center (MRCC) has offered paid summer internships to undergraduate students, most often majoring in an atmospheric science discipline. These internships have provided students with an opportunity to work directly with historical atmospheric data and realize the diverse applications and needs of

acquiring and maintaining this 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 Urbana, Illinois cooperative weather station (118740) at the Illinois State Water Survey. Photo courtesy Jim Angel, Ill. State Climatologist.

backyard, the MRCC and ISWS not only get to experience the reward of contributing to a long history of climate data for a location, but also realize the complexity and challenges that data collection carries in terms of quality control.

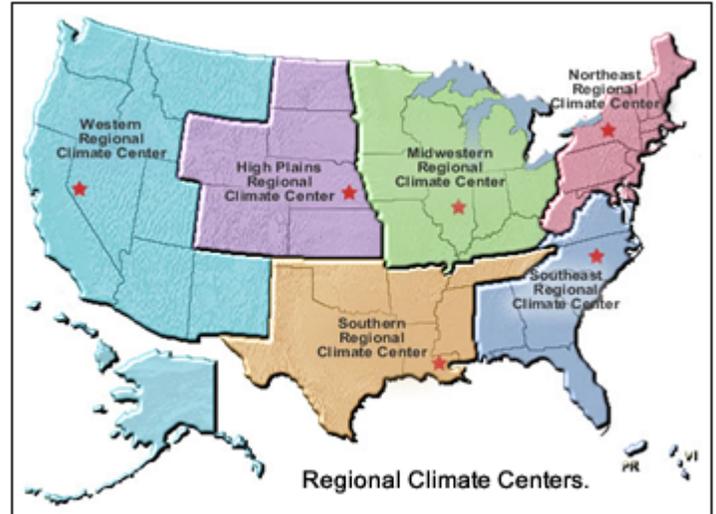
The MRCC is one of 6 Regional Climate Centers across the United States that has been supported through federal funds since the early 1980s. Its mission has four components:

- 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 spread their time between providing support in the [MRCC Climate Service Office](#) in addition to supporting an applied climate

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. One former MRCC intern had the opportunity to present his applied climate internship project at the 2013 American Meteorological Society meeting. Two current climatologists at the MRCC were former summer interns at the MRCC and other interns have gone on to pursue and succeed in careers within the climatology and atmospheric sciences.

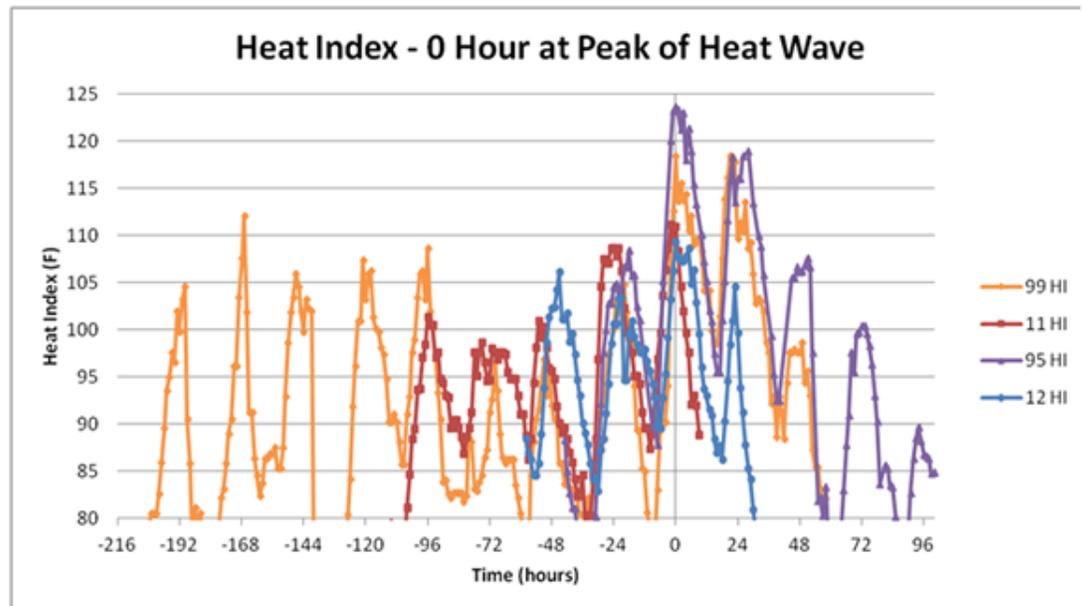


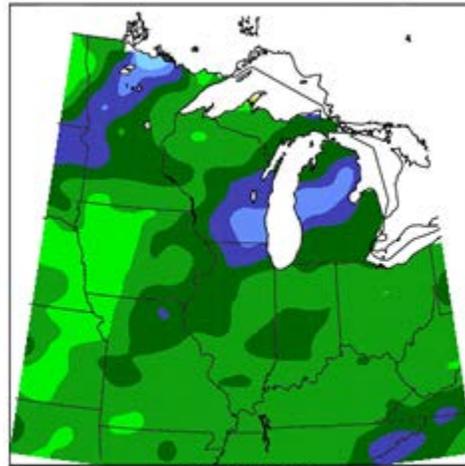
Figure from a former MRCC intern's applied climate project on comparing the severity of heat waves in Chicago. This project was presented by the intern at the 2013 American Meteorological Society meeting.

This year, the MRCC is offering 2 paid summer internships! One internship will be awarded to an undergraduate student (currently of either Sophomore or Junior standing) who is majoring in an [atmospheric science discipline](#). The other internship will be awarded to either an undergraduate or graduate student with [computer programming experience](#) along with an interest in working with large atmospheric datasets. For more information on these internship opportunities, please email [Beth Hall](#).

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Midwest Climate at a Glance - Winter Recap

Accumulated Precipitation: Percent of Mean
December 1, 2012 to February 28, 2013



50 75 100 125 150 175 200 300

Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Winter temperatures were above normal for the Midwest but trended from much above normal in December to below normal in February. Throughout the winter, temperatures swung between above and below normal with the below normal periods becoming colder and more frequent later in the season. Warm spells in December and January led to hundreds of record highs but record lows were much less frequent occurring mostly in just two of the cold spells, one each in January and February.

Winter precipitation was above normal for most of the Midwest, a welcome respite from last year's drought. The locations of the plentiful

precipitation changed throughout the season but by the end of the three-month period most of the region was above normal. Western Iowa and northwest Missouri were the biggest exception with slightly below normal totals for the winter. Totals exceeded normal in two swaths, one across northwest Minnesota and a second extending from south central Wisconsin ENE across lower Michigan. [Read more...](#)

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MRCC Product Highlight



Last Spring Freeze: The last spring freeze starts the growing season each year and is monitored by NWS personnel, farmers, and gardeners. The [MRCC spring freeze maps](#) document the timing of the last spring freeze (32°F and 28°F thresholds) at several hundred stations across the Midwest and High Plains. The maps are updated each day. Stations with sufficient data are noted by dots indicating the amount of time that has passed since the last freeze. When the dots are shaded completely, that indicates that the minimum temperature has been greater than the threshold (either 32°F or 28°F) for at least the past 14 days. Additional maps show the median date for the last spring freeze for 1981-2010 for comparison with the current year. State maps can also be viewed by clicking on a state in any of the regional maps.

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Climate Cool Tool



mPING – Mobile Precipitation Identification Near the Ground

The National Severe Storms Laboratory (NSSL) has been involved with a research project that seeks to improve precipitation algorithms for the weather NEXRAD radars. Located across the United States, NEXRAD radars show where precipitation is presumed to be falling including the type of precipitation. In order to improve the NEXRAD precipitation algorithms, NSSL needs a lot of ground observation data.

The mPING mobile application is a free app that the public can download to help with this NSSL research project. Using the GPS location capabilities of most mobile devices, the app allows the user to submit the current precipitation type that is occurring (including “None”) at their location that can then be spatially correlated with data from the nearby radars. This app is available for both Apple and Android devices. For more information, see the PING Project web site at <http://www.nssl.noaa.gov/projects/ping/>

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MRCC On The Road



Asheville, NC (Mar. 19-21) - NCDC Dataset discover Day Workshop #2: Frost/Freeze Data

Allan Curtis will be presenting work the MRCC has led in conjunction with numerous NWS offices and other agricultural experts on the development of frost/freezing guidance products. He will also talk about the future direction of the suite of products and some of the positive results and feedback from the user base.

Lincoln, IL (Mar. 21) - NWS Convective Workshop

Beth Hall will be presenting recent enhancements and product updates to the MRCC frost/freezing guidance project website to the local NWS office's convective workshop.

Champaign, IL (Mar. 27-28) - MRCC Mesonet Workshop

Beth Hall, Leslie Stoecker, and Nancy Westcott will be hosting a workshop to bring mesonet (atmospheric and soil monitoring network of observing stations over a relatively small region) operators and managers from Missouri, Michigan, Kentucky, and Illinois together to discuss opportunities to consolidate data into the Applied Climate Information System that the Regional Climate Centers and other climate partners use to access climate information.

Washington, DC (Apr. 8-12) - Meet with Congress and Climate Partners

Beth Hall will be spending a week meeting with various climate partners and congressional delegates concerning the national Regional Climate Center program.

West Palm Beach, FL (Apr. 13-15) - Drought Monitor Forum

Mike Timlin will meet with the National Drought Mitigation Center staff, Drought Monitor authors, and other contributors to discuss the production of the weekly US Drought Monitor.

Champaign, IL (Apr. 17-18) - Illinois GIS Association Spring Conference

Zoe Zaloudek will be attending this conference to continue to develop and learn new GIS skills. This event will feature structured workshops, technical sessions, technology demonstrations, project updates, as well as national and state speakers.

Northern Indiana, Michigan, and Northern Ohio (Apr. 22-26) - MRCC Spring Regional Road Trip

Beth Hall and Allan Curtis will be embarking on their 2nd annual MRCC Spring Regional Road Trip. They are still in the early stages of planning visits for this trip, so if you're anywhere in these regions and would like the MRCC to stop by, please let them know!

Logan, UT (Apr. 23-25) - Climate Prediction Applications Science Workshop

Mike Timlin will be attending this workshop that will bring together climate researchers, climate product producers, and users to share developments in research and climate service or prediction applications used for decision-making.

Romeoville, IL (May 4) - NWS Romeoville (Chicago) Open House

Beth Hall will be representing the MRCC at the local NWS Open House to the public.

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Can't Find a Climate Product?
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[Email us](#) your local climate impacts! We are constantly keeping a log of how climate is impacting our region, and our information would not be complete with YOUR help!

Have something to share as a feature article in an upcoming *The Climate Observer* issue, or interested in being contacted for an article interview? [Please let us know!](#)

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The MRCC is a partner in a national climate service program that includes the [NOAA National Climatic Data Center](#), [Regional Climate Centers](#), and [State Climate Offices](#).

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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