Promoting Climate-Informed Decisions Since 2014.

Preparing for Disaster in the Midwest: The Land of Extremes

2019 has proven to be an extreme year weather-wise here in the Midwest: From Extreme cold in January, the bomb cyclone in March, and tornadoes in April to extensive rain and subsequent flooding in May and June. The Midwest states are no strangers to disaster. As we look back on this tumultuous year, the Midwest Climate Hub would like to take a moment and focus on disaster preparedness resources and what that means to producers in a changing climate (select here for more information).

The USDA Climate Hubs work alongside other USDA agencies and partners to provide region-specific information to producers and natural resources managers that enable robust and healthy agro-ecosystems before, during and after disasters.

Flooding along the Cottonwood River, MN, July 2018 (photo Credit: Peter Boulay)

Scientific Discoveries: The Impact of ARS

The Agricultural Research Service (ARS) is the chief, in-house scientific research agency of the U.S. Department of Agriculture. It is a dynamic organization whose scientific and technological achievements have far-reaching impact. ARS has a long tradition of scientific excellence, integrity, and timely information sharing.

In this latest edition of ARS Scientific Discoveries, you'll read about select ARS accomplishments in crop and animal production, animal welfare, food safety, human nutrition, natural resources, and other areas of high national importance. You'll also read about some of the unique facilities and assets that ARS brings to bear in tackling these priorities—from the Electron and Confocal Microscopy Research Unit in Beltsville, MD, to the National Plant Germplasm System, a living collection of plant genetic diversity that's critical to world food security.

Take a look at many of ARS's programs, priorities, facilities and more by selecting here.

RMA Announces Change to Haying and Grazing Date for Prevented Planting Acres Planted to a Cover Crop

Farmers who planted cover crops on prevented plant acres will be permitted to hay, graze or chop those fields earlier than November this year, the U.S. Department of Agriculture (USDA) announced June 20th, 2019. USDA's Risk Management Agency (RMA) adjusted the 2019 final haying and grazing date from November 1st to September 1st to help farmers who were prevented from planting because of flooding and excess rainfall this spring.

"We recognize farmers were greatly impacted by some of the unprecedented flooding and excessive rain this spring, and we made this one-year adjustment to help farmers with the tough decisions they are facing this year," said Under Secretary for Farm Production and Conservation Bill Northey. "This change will make good stewardship of the land easier to accomplish while also providing an opportunity to ensure quality forage is available for livestock this fall."

For frequently asked questions on **Prevented Planting Flooding**, please select here.

CHU in Every Issue...

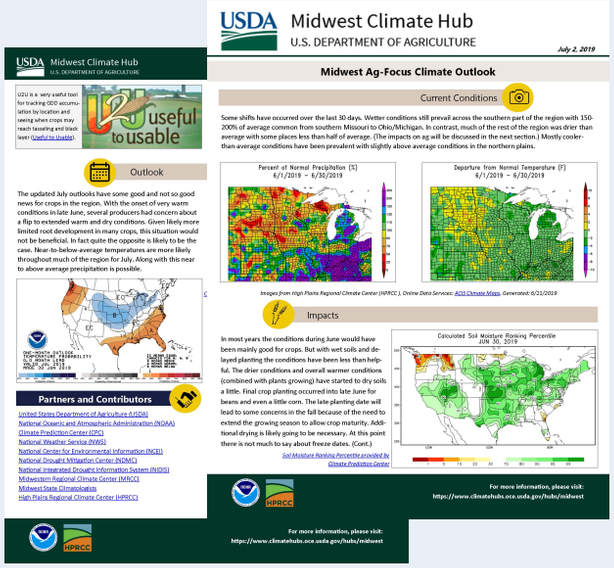
Midwest Ag Focus Climate Update: June 2, 2019

Current Conditions: Some shifts have occurred over the last 30 days. Wetter conditions still prevail across the southern part of the region with 150-200% of average common from southern Missouri to Ohio/Michigan. In contrast, much of the rest of the region was drier than average with some places less than half of average.

Outlook: The updated July outlooks have some good and not so good news for crops in the region. With the onset of very warm conditions in late June, several producers had concern about a flip to extended warm and dry conditions. Given likely more limited root development in many crops, this situation would not be beneficial. In fact quite the opposite is likely to be the case. Near-to-below-average temperatures are more likely throughout much of the region for July. Along with this near to above average precipitation is possible.

To read the full outlook including impacts to agriculture, select here.

To sign up to receive these outlooks in your inbox, email charlene.felkley@usda.gov.



Quarterly Climate Impacts and Outlooks

In collaboration with NOAA, NIDIS, and the Midwest Regional Climate Center, we are pleased to provide the following June 2019, Regional Outlooks and Drought Status Update. These can be accessed by clicking on their titles to the right. Select here for a list of all regions.

Missouri River Basin

Midwest Region

Great Lakes Region

Meet the Climate Hub Partners: Aaron Wilson, Research Climate Scientist, OSU

The success of the Midwest Climate Hub in transferring management practices, decision tools and information to our stakeholders can only be achieved through coordination via a diverse array of regional partners. In that spirit, we would like to highlight one of our partners: Aaron Wilson, Research Climate Scientist, The Ohio State University (OSU).

Aaron Wilson grew up in the Buckeye State and has always been captivated by the power of weather. As a climate specialist for OSU, Aaron's positions allow him to engage with the public on weather and climate, something he truly enjoys. "To have the opportunity to extend this knowledge into the public sphere in a way that can improve lives, means a lot to me."

Aaron Wilson has been an active partner of the Midwest Climate Hub since 2017. As a member of the Midwest Agriculture Climate Team (MAC-T), Aaron connects and stays connected to regional weather and climate-related Ag issues in consistent information sharing. This process is pertinent to those he serves in Ohio through OSU Extension. Aaron has also partnered with the Hub to improve Ohio's nascent mesonet program by the purchase and installation of temperature/humidity sensors. These improvements are a step toward developing a robust, long-term monitoring network in Ohio.

"I think the Midwest Climate Hub is an awesome resource for the collection and generation of conditions across the Midwest...(It's) more a hub of people and brainpower working on similar goals rather than a facility.
-Aaron Wilson

Aaron B. Wilson is an atmospheric scientist at The Ohio State University (OSU), and an expert in weather, climatology and climate change. He holds a joint appointment as Research Scientist at the Byrd Polar and Climate Research Center and as Climate Specialist with OSU Extension and is a contributing member to the State Climate Office of Ohio. In his 'off time' Aaron loves spending time with his children who he has deemed a source of inspiration.

For more on the State Climate Office of Ohio, select here.

For more on the Byrd Polar and Climate Research Center, select here.

On the RADAR....

Sustainable Agronomy Conference
Omaha, NE: July 10-11, 2019

This conference will provide Certified Crop Advisers (CCAs) and Agri-Sale Professionals with the opportunity to better understand and implement sustainable agronomy in the field by implementing soil carbon focused agronomy using the farmer's cropping system. Conference attendees will learn how observed climate data is telling a story for row crop farmers, some of the economic benefits related to soil carbon, agronomic system implications for the farmer, environmental benefits ultimately by developing soil carbon enriching row cropping systems. Economic, environmental, and social aspects of annual row crop farming is the agriculture space we will walk through together at the conference.

Justin Mount, NRCS Midwest Climate Hub Liaison and Natural Resources Specialist will be presenting at the Sustainable Agronomy Conference in Omaha, NE: Session #5 Environmental Benefits of Sustainable Agronomy (2.0 CEUs), Thursday, July 11th, 2019 from 8:05 am to 8:35 am. Title: Building Environmental Resiliency through Soil Re-carbonization and Digital Agronomy.

Partnership for Ag Resource Management (PARM) Webinar
WEBINAR: July 16, 2019
10:00-11:00 am CDT

Justin Mount, USDA Midwest Climate Hub NRCS Liaison and Natural Resource Specialist will be presenting a webinar for Partnership for Ag Resource Management (PARM).

Re-carbonizing Row Crop Farms: Engaging the Integrated Erosion Tool (IET) to define Soil Conditioning Index (SCI), understand impacts of climate on modeled cropping systems plus improve farmer profitability. (1.5 free CCA CEUs are available for watching the webinar, one for soil and water management and 0.5 for nutrient management.)

As precipitation event intensity, timing and location variability continue to increase, improve your understanding of why annual row crop farmer soil resource resiliency can be somewhat determined by modeling their cropping system and observing the foundational soil metric Soil Condition Index (SCI). This webinar will briefly discuss observed and predicted rainfall variations across the country, define the functions of a healthy soil, explain what Soil Condition Index (SCI) is and why SCI is a foundational soil resource metric for annual row crop farmers plus explain how a cropping system can be modeled using the Integrated Erosion Tool (IET) to include IET outputs plus actions farmers can avoid or implement in order to increase financial resiliency.

For more on PARM and to register, select here.

Climate Smart: Farming with Weather Extremes

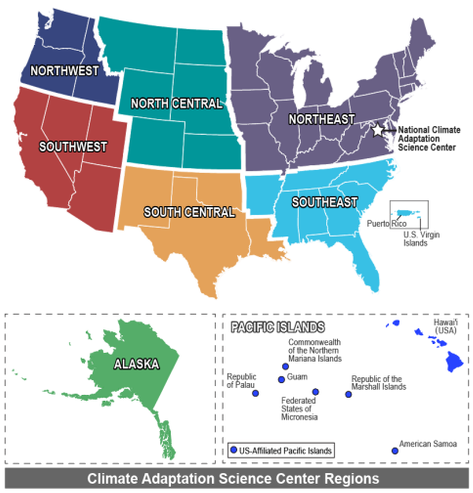
Plain City, OH: July 18, 2019

The Ohio State University

The climate of Ohio is changing, and these changes are challenging farmers to think about ways of building resilience to negative impacts. Join us as we discuss climate impacts on farming in Ohio. Key topic areas include water management, crop insurance, risk management, conservation, and technology. We are pleased to announce that Tyler Williams, Cropping Systems Extension Educator with the University of Nebraska – Lincoln, will join us to discuss early lessons from the Spring 2019 Nebraska Flood event. - This event will take place at Der Dutchman Restaurant and Bakery in Plain City, 445 South Jefferson St, Rt 42, Plain City, Ohio 43064. Select here to register.

Additional Resources

Launch of the New Climate Adaptation Science Center Network Website



The Climate Adaptation Science Centers (CASCs) have a new network website! On the new site, you can continue to find information about our science, partners, and program, with some new features added in throughout. Along with the new website, Project Explorer was also launched featuring our regional and national scale science projects from the CASCs. Use the explorer to browse our projects by region and theme, or search our projects by keywords.

Select here to access the new CASC website.

USGS science for a changing world

When Do Cover Crops Pay? New USDA-SARE Report Addresses the Question

Farmers around the country are planting cover crops on millions of acres to protect and improve the soil, and the more that farmers use cover crops, the more they value this conservation practice. Cover Crop Economics, a new report published by USDA-SARE looks at the economics of cover crops to help farmers answer that big question: "When do cover crops pay?"

The key, says North Dakota farmer Justin Zahradka, who has been planting cover crops since 2011, is to "look at cover crops as an investment rather than a cost."

For full article and to download the full report, select here.

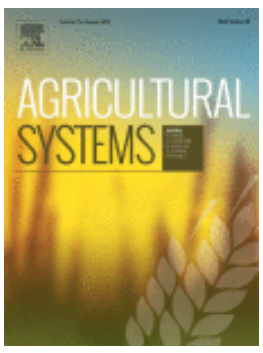
SARE Sustainable Agriculture Research & Education

The U.S. Climate Resilience Toolkit: Evidence of Progress

The U.S. Climate Resilience Toolkit (toolkit.climate.gov) is a federal website, launched in 2014, designed for state and local decision makers to bolster capacity for resilience to climate-related hazards. This paper documents the development, conceptual foundation, and evolution of this toolkit to illustrate how to put data and tools into context for decision makers, namely by framing climate resilience within risk management, focusing on end users' stories, and engaging directly with users. As this is the first effort to bring together multiple federal agencies' tools, data, and case studies into a decision support platform, most attention has been given to framing climate adaptation and resilience. To that end, we introduce the Steps to Resilience, which incorporate risk management and decision making for climate-related hazards. The site structure and content support that framework. This paper also introduces a five-part "Quality of Relationship" metric that helps the team define and measure success via the website and via engagement with end-users. Results provide avenues for developers of similar toolkits to meaningfully present climate science to adaptation professionals and the decision makers they serve.

More on the U.S. Climate Resilience Toolkit here.

Increasing risks of multiple breadbasket failure under 1.5 and 2 °C global warming



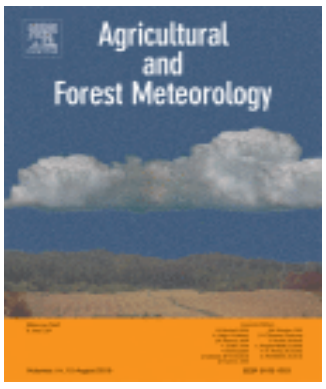
The increasingly inter-connected global food system is becoming more vulnerable to production shocks owing to increasing global mean temperatures and more frequent climate extremes. Little is known, however, about the actual risks of multiple breadbasket failure due to extreme weather events. Motivated by the Paris Climate Agreement, this paper quantifies spatial risks to global agriculture in 1.5 and 2 °C warmer worlds. This paper focuses on climate risks posed to three major crops - wheat, soybean and maize - in five major global food producing areas. Climate data from the atmosphere-only HadAM3P model as part of the "Half a degree Additional warming, Prognosis and Projected Impacts" (HAPPI) experiment are used to analyse the risks of climatic extreme events. Using the copula methodology, the risks of simultaneous crop failure in multiple breadbaskets are investigated. Projected losses do not scale linearly with global warming increases between 1.5 and 2 °C Global Mean Temperature (GMT). In general, whilst the differences in yield at 1.5 versus 2 °C are significant they are not as large as the difference between 1.5 °C and the historical baseline which corresponds to 0.85 °C above pre-industrial GMT. Risks of simultaneous crop failure, however, do increase disproportionately between 1.5 and 2 °C, so surpassing the 1.5 °C threshold will represent a threat to global food security. For maize, risks of multiple breadbasket failures increase the most, from 6% to 40% at 1.5 to 54% at 2 °C warming. In relative terms, the highest simultaneous climate risk increase between the two warming scenarios was found for wheat (40%), followed by maize (35%) and soybean (23%). Looking at the impacts on agricultural production, we show that limiting global warming to 1.5 °C would avoid production losses of up to 2753 million (161,000, 265,000) tonnes maize (wheat, soybean) in the global breadbaskets and would reduce the risk of simultaneous crop failure by 26%, 28% and 19% respectively.

Climate-smart pest management: building resilience of farms and landscapes to changing pest threats

Climate change is affecting the biology, distribution and outbreak potential of pests in a vast range of crops and across all land uses and landscapes. Up to 40% of the world's food supply is already lost to pests; the reduction in pest impact is more important than ever to ensure global food security, reduced application of inputs and decreased greenhouse gas emissions. Climate-smart pest management (CSPM) is a cross-sectoral approach that aims to reduce pest-induced crop losses, enhance ecosystem services, reduce the greenhouse gas emissions intensity per unit of food produced and strengthen the resilience of agricultural systems in the face of climate change. Through the implementation of CSPM, crop production, extension, research and policy act in coordination towards more efficient and resilient food production systems.

Click here to access journal article in its entirety.

Spatiotemporal patterns of maize and winter wheat yields in the United States: Predictability and impact from climate oscillations



Studies have shown linkages of climate oscillations with climate extreme events, such as floods and droughts, which may induce risks in summer and winter crop productions. The goal of this study is to explore spatial and temporal variability of a summer crop (maize) and a winter crop (wheat) yields and its linkages with influential climate oscillations in the United States. The county level yield data over 1960–2016 for maize and winter wheat were aggregated into each of the 260 climate divisions in the rainfed regions of the United States, with the linear yield trend being removed. The rotated Principal Component Analysis (PCA) reveals that the first five principal components explain 79% (maize) and 72% (winter wheat) of the spatial and temporal variability of crop anomalies. The first principal component of crop yield variability is strongly associated with the Atlantic Multidecadal Oscillation (AMO). The results of multiple linear regressions for predicting yield anomalies using climate indices show that, climate indices during the reproductive period of maize explained final yield better than the vegetation period (30% versus 26%), while climate indices for winter wheat during the dormant and reproductive growth periods are similar and not significant (25% versus 28%). Categorical yield forecasts using random forecast techniques show that the low (below 30th percentile) and high (above 70th percentile) yields are well predicted by climate indices. Spatially, AMO is identified as the most important predictor for maize in 46% climate divisions and for wheat in 33% climate divisions. The results from this study may contribute to understanding the risks of large-scale climate oscillations to local-scale crop production and improving crop yield predictions.

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