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The Prairie Post Quarterly Newsletter of the High Plains Regional Climate Center: January 2016

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HPRCC

January 2016

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Inside this issue:

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A flood wave coming down the Mississippi River at New Orleans, LA
(photo courtesy Josh Durkee)

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Message From The Director

By Dr. Martha Shulski

It is with mixed emotions that I compose this message as it is my last as HPRCC Director. I have had the great privilege to serve in this role since August 2009. The Climate Center staff is a hardworking and dedicated group of individuals all coming together for the common cause of regional climate services and stakeholder engagement. Over the last six years the Center has grown in size, participated in new and exciting research projects, graduated M.S. and Ph.D. students, deepened and broadened the stakeholder base, led climate service workshops, and fostered the outreach component.

Beginning in January 2016, the University of Nebraska-Lincoln Institute of Agriculture and Natural Resources has implemented the formation of a Nebraska State Climate Office in the School of Natural Resources and I will serve as Director and State Climatologist for Nebraska. The weather observing network for Nebraska (termed the Nebraska Mesonet) and the two associated staff at HPRCC who worked primarily in this program area, are now under the auspices of the State Office. With this change, HPRCC can better focus efforts directly on regional activities, such as the collection of state mesonets with the well-known Automated Weather Data Network program. I am very pleased that I will continue to be able to work with HPRCC staff on projects and service activities in my new role. The HPRCC staff and State Climatologists across the High Plains that I have gotten to know so well are a collegial and enthusiastic group and I look forward to upcoming opportunities.

Until a permanent HPRCC Director is hired, Ms. Natalie Umphlett will serve in this capacity. As the section below illustrates, you will see that she is well-versed and experienced in climate services and will keep the Center moving forward and advancing its mission.

Meet Our Regional Climatologist and Interim Director, Natalie Umphlett

Natalie is the regional climatologist and newly named interim director of the HPRCC. As regional climatologist, Natalie serves as the climate services manager and public liaison for the Center. She designs applied climate products and decision support tools based on client needs. She particularly enjoys public outreach with all age levels, and she co-leads the Climate Masters of Nebraska adult education program with Tonya Bernadt of the National Drought Mitigation Center. As interim director, Natalie manages the day-to-day operations of the Center. She received both her Bachelor's Degree in Meteorology/Climatology and her Master's Degree in Geosciences with an emphasis in Meteorology/Climatology from UNL, and she is currently pursuing a Ph.D. in Natural Resource Sciences with a Climate Assessment and Impacts specialization at UNL. Natalie is from Gainesville, Georgia and became interested in weather when a tornado hit her hometown, including her high school, on March 20, 1998. Natalie and her husband Ramesh enjoy traveling and have been to five countries together. She also likes trying different foods and finding a dive that is a particular location's best-kept secret.

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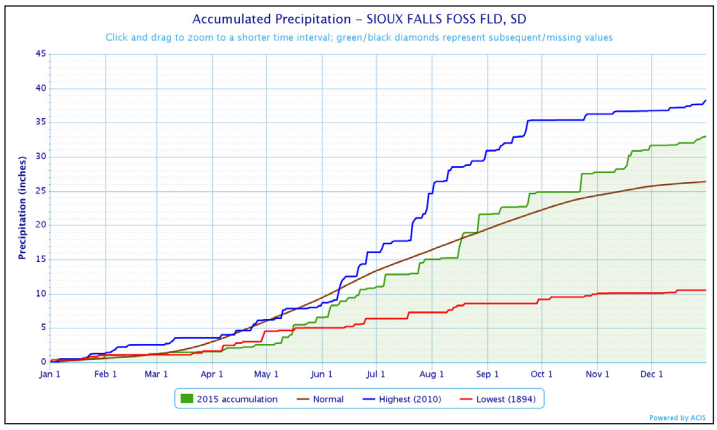
Changes At HPRCC And Establishment Of Nebraska State Climate Office

Starting from the inception of the HPRCC in 1987, state climate services for Nebraska were intricately linked with climate services at the regional level. The state's weather network developed and grew within the HPRCC, and several decades ago the Nebraska State Climatologist was in fact on staff at the regional center. Over time, state services became more intertwined in HPRCC. Beginning in 2015, however, SNR and IANR leadership at UNL began exploring the idea of developing a State Climate Office for Nebraska and what would compose the Office. After an external review and recommendation, the Office was constructed and became formalized in January 2016. Glen Roebke, who has serviced the state weather network for more than a decade, and Stonie Cooper, who administered computing systems and the Nebraska Mesonet, have moved to the newly formed State Climate Office. Data from the Nebraska Mesonet will continue to feed into the AWDN program and be utilized by the Center for products and services.

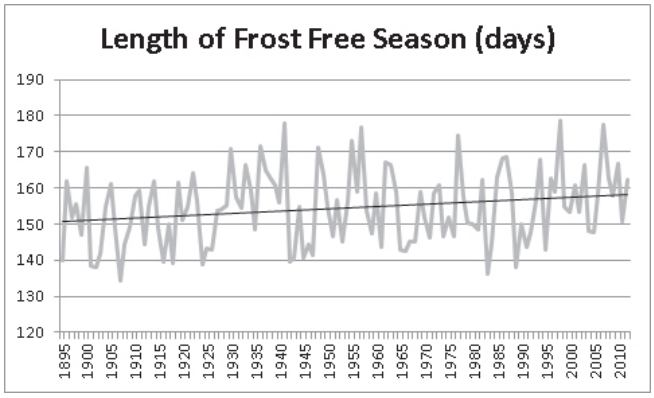
Product Highlight: CLIMOD2



Last month, HPRCC said goodbye to its long-time data access interface called CLimate Information for Management and Operational Decisions, or CLIMOD, for short. But, we didn't say goodbye without having a replacement lined up – CLIMOD2. CLIMOD2 is a new and improved version of the original, which is FREE and OPEN to the public. It utilizes the latest ACIS Web Services access method and has new products, such as temperature and precipitation graphs (see example to the left). Just like the original CLIMOD, the new version allows people easy access to temperature, precipitation, and snowfall data from thousands of stations across the country. Give it a try today! http://climod.unl.edu/

Update On Research Activities

Martha, Crystal, Natalie, and Great Lakes Integrated Sciences and Assessments (GLISA) Climate Research Associate William (BJ) Baule co-authored a journal article titled, "A Historical Perspective on Nebraska's Variable and Changing Climate," which was published in the Fall 2015 edition of *Great Plains Research*. One of the primary research findings indicated an increase in Nebraska's annual average temperature of approximately 0.6°C over the last century, which has been strongest during the winter and spring seasons, and minimum temperatures have warmed more than maximum temperatures. Additionally, results indicated a statistically significant increase in the number of days of the frost free season (see figure at right). Please see below for the full citation of the article:



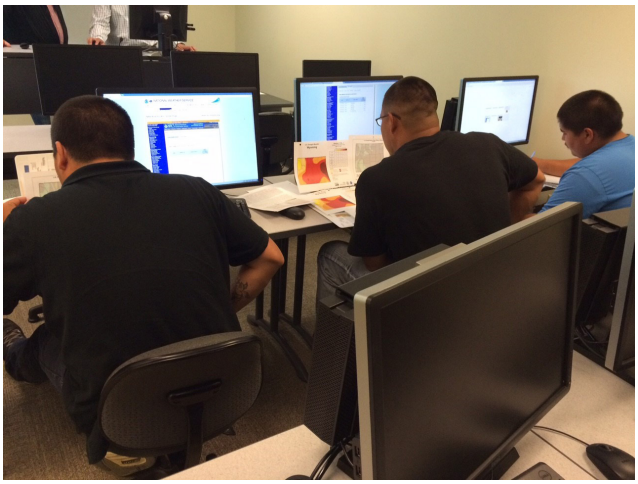
Length of the frost free season (days) for each year from 1895-2012 in Nebraska. From Shulski et al., 2015

Shulski, M.D., W. Baule, C. Stiles, and N. Umphlett, 2015. "A Historical Perspective on Nebraska's Variable and Changing Climate." *Great Plains Research*, 25 (2): 109-20.

The HPRCC was collectively involved in three proposals submitted in September to the NOAA Sectoral Applications Research Program (SARP). Crystal is lead PI and Martha is co-PI on a project that proposes developing a climate summary and providing training on how to put one together for tribes in Nebraska and South Dakota, which is an expansion of work that has been done with the Wind River tribes in Wyoming. Martha is lead PI and Natalie is co-PI of a proposal to work with municipalities in the region to increase and promote climate adaptation planning. Crystal is co-PI on a proposal that examines the application of FEMA's Threat and Hazard Identification and Risk Assessment process to drought scenarios and planning in Nebraska. It is expected that funding announcements will be made Spring 2016.

Partnership Spotlight: The North Central Climate Science Center

The HPRCC has an established partnership with the North Central Climate Science Center (NC CSC) and has enjoyed collaborating on regional projects since its inception. Housed at Colorado State University in Fort Collins, the NC CSC is one of eight such centers that were established in 2010 within the U.S. Department of the Interior. The mission of the Climate Science Centers is to help meet the changing needs of land and resource managers across the U.S. (For more information on the Climate Science Centers, please visit: https://www.doi.gov/csc/about.) The NC CSC collaborates with a consortium of nine institutions that provide expertise in climate science and sectors impacted by climate. The University of Nebraska-Lincoln, where HPRCC is housed, is a member of this consortium.



Three technicians from the Office of the Tribal Water Engineer practice writing a summary of drought conditions during a climate summary training workshop in Lincoln, NE in July 2015. (Photo courtesy Crystal Stiles)

One example of collaboration between the HPRCC and the NC CSC is regarding the Wind River Indian Reservation drought and climate project. If you have read previous issues of *The Prairie Post*, then you may already be familiar with the work HPRCC has done with the tribes of Wind River in Wyoming. Research scientists from the NC CSC laid the groundwork by establishing a working relationship with the tribes, which allowed institutions such as the HPRCC and the National Drought Mitigation Center to get involved in the project and offer their services to the tribes. HPRCC's primary involvement in this project is its leading role in the development of a quarterly climate and drought summary for the Wind River Reservation and surrounding area. The summary is intended to serve as a decision support tool for water managers and other stakeholders in and around the reservation who are making decisions that are impacted by climate and extreme events.

The design of the summary underwent several iterations with the tribes and project partners, including the NC CSC, who provided input and feedback that ultimately improved the summary. This process occurred during a period of time when drought was not occurring in the Wind River region, which was ideal so that there was time for the summary to be fully developed. Recently, part of the Wind River region was placed in moderate drought conditions by the U.S. Drought Monitor, so now the summary can be used as an important tool for decision making during drought. The HPRCC has also begun to train technicians from the Office of the Tribal Water Engineer to put the summary together themselves. Input from the technicians has already proven valuable, as they have incorporated local, on-the-ground observations of their changing water supply conditions that cannot be provided by the HPRCC from so far away. Since the summary became operational in March 2015, the NC CSC has housed the climate summaries on its website.

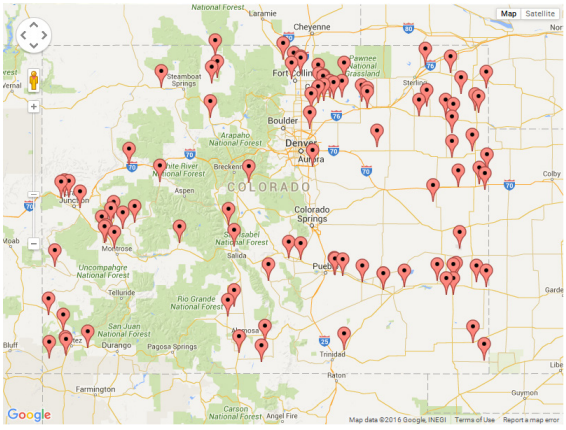
Dr. Shannon McNeeley, research scientist at NC CSC, talks with tribal decision makers about the need for more water resource monitoring at a Wind River drought workshop in March 2015. (Photo courtesy Nicole Wall)

The climate summary is one part of a larger project that is assessing the reservation's vulnerability to drought. Funding for this two-year project is provided by the NC CSC and includes a host of individuals and institutions, including the HPRCC as a collaborator. For more information on this project, please visit: http://revampclimate.colostate.edu/revamp/project/wind-river-drought-preparedness. We look forward to future opportunities for collaboration with the NC CSC.

Learn More About The Automated Weather Data Network

The Colorado Agricultural Meteorological nETwork - COAGMET

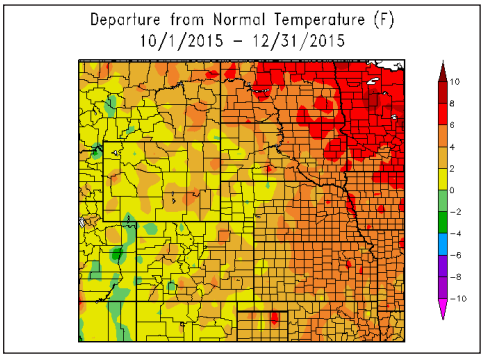
CoAgMet started in the early 1990s with a partnership at Colorado State University between the Plant Pathology extension specialists and the USDA's Agricultural Research Service Water Management Unit. The network began with eight stations, which were placed in irrigated areas of eastern Colorado, and has grown to over 75 stations across the state. Data available from CoAgMet include temperature, precipitation, vapor pressure, solar radiation, wind speed and direction, soil temperature, relative humidity, growing degree days, and evapotranspiration. Data collection and station maintenance is managed by the Colorado Climate Center, which has developed numerous tools based on the data and maintains an online interface for data access. Data and tools may be accessed here: http://www.coagmet.colostate.edu/.



Measuring wintertime precipitation

Snow is a tricky thing to measure out here on the Plains. High winds often accompany our snowstorms, resulting in an uneven distribution of snowfall. If you live in the Plains, you've probably witnessed two-foot drifts on one side of your yard, while another part has been blown bare. So, how do we measure snowfall and the moisture that it contains? Much of the time, snowfall and its liquid equivalent are measured by hand. Thousands of volunteers go out each wintry morning to measure new snowfall and melt a snow core to determine the amount of liquid in the snow. They have to use the skills they learned in training to make good decisions about how and where to measure the snow. For instance, measuring snowfall in a large drift would not be advised! But, what happens in the wintertime at automated stations? In the case of ASOS or AWOS stations (think airport stations), people go out and obtain these observations. But, many stations in other networks, like the AWDN, are located in areas that are not easily accessible in the wintertime. In this case there are a few options. One option is to decide not to measure the wintertime precipitation. For stations in the Plains portion of the High Plains region, this can work out okay. Winter is the driest season of the year for the Plains and most of the precipitation that falls does not infiltrate because the soils are frozen. For the most part, the soil moisture that is present at the end of the fall gets frozen in the soil until it is ready to be used in the spring. So, not knowing the exact amount at any one location is not a huge loss, especially since there are many stations within the COOP and CoCoRaHS networks that can supplement the missing data. Another option is to have a heated rain gauge. Currently, the Wyoming network of automated stations and two stations in Nebraska are the only ones in the region that have heated rain gauges. When snow falls onto the gauge, it is melted and measured automatically by the gauge.

2015 Ended With Warm And Wet Conditions



Analyses by NOAA and NASA showed that 2015 was THE warmest year on record for Earth since 1880, when records began. Although this does not mean that every area of Earth was warmer than usual, this was the case for the High Plains region. The warmth experienced earlier in the year continued during the fall and early winter, with temperature departures ranging from 2.0-6.0°F above normal for many locations across the region during the three month period of October, November, and December.

It was also a wet end to the year for many locations. Because of the warm temperatures, precipitation that normally falls as snow, actually fell as rain. This allowed for higher precipitation totals than would be expected for this time of year – the driest season of the year in the Plains. Large areas of Kansas, Nebraska, and South Dakota had precipitation totals in excess of 200 percent of normal during the month of December. Places like Salina, KS and Omaha, NE had their wettest Decembers on record. Omaha's record was particularly impressive, coming in at 4.22 inches above normal, or 506 percent of normal precipitation. Turning the focus to the mountainous parts of the region, snowpack data showed that areas of the southern Rockies were off to a good start, while areas to the north, like Wyoming, were not faring as well. This snowfall pattern is in line with earlier outlooks for this El Niño winter. The good news is that it is still early in the snowpack season and there are many chances to build the snowpack as we move into late winter and early spring.

Outreach And Stakeholder Engagement Activities

HPRCC conducts outreach at Pound Middle School, Lincoln, NE

Sometimes, HPRCC staff get the opportunity to visit classrooms in the local schools. At the end of October, Natalie visited 7th grade science students at Pound Middle School in Lincoln, NE and helped lead an activity with science teacher Anica Brown. The activity was a huge success and the students had fun learning about the difference between weather and climate with yummy M&Ms.

Natalie talks with students about the differences between weather and climate. (Photo courtesy Anica Brown)

At HPRCC, we really enjoy conducting climate outreach with school-age children. We have designed several activities to accommodate different classroom settings and student grade levels. We have taught children about weather and climate using hands-on activities such as manipulating instruments from a mobile weather station, to even using M&Ms, like in the activity above. If you have a weather or climate-related class and are interested in having an HPRCC staff member come to your class, please contact us: http://www.hprcc.unl.edu/contact.php.


A weather station is installed at a school on the Winnebago Reservation in Nebraska. (Photo courtesy Martha Shulski)

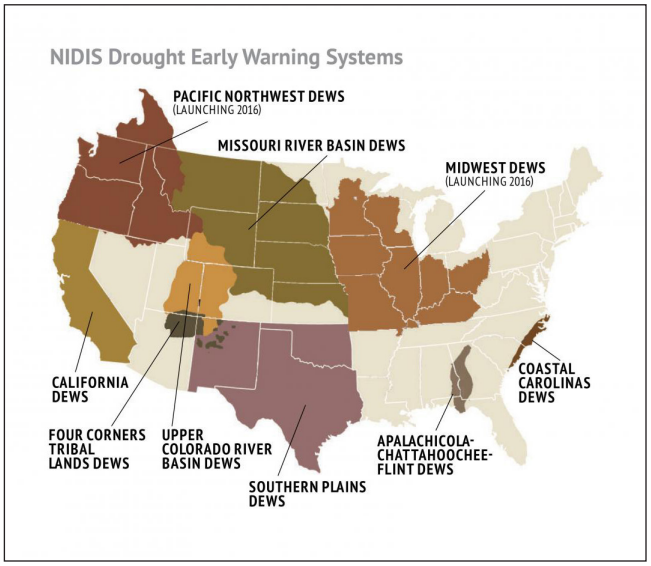
HPRCC staff install a weather station on the Winnebago Reservation

Martha and Nebraska mesonet manager Stonie Cooper traveled to Winnebago, NE in October to meet with middle school teachers and students at St. Augustine Indian Mission School, which is on the Winnebago Reservation in northeast Nebraska. The purpose was to install a weather station in their outdoor classroom area and talk to their 7th and 8th grade science classes. The school has installed a beautiful outdoor classroom area where students can learn about native plants and grasses, gather for instruction, and learn in nature. One thing missing was weather observations, which is where our expertise came in. They now have their own data records for both science and math classes.

Would you like to have a weather station installed at your school, but don't know where to begin? We can help. Just use our contact form by clicking on the link above, and we would be happy to assist with your weather station needs and answer your questions.

HPRCC staff helping with implementation of NIDIS Midwest DEWS

The National Integrated Drought Information System (NIDIS) has implemented several Regional Drought Early Warning Systems (DEWS) throughout the country, including the one in the Missouri River Basin, in which HPRCC has been involved. According to the U.S. Drought Portal, "DEWS explore and demonstrate a variety of early warning and drought risk reduction strategies that incorporate drought monitoring and prediction information in partnership with users and federal, state, regional, and local agencies" (https://www.drought.gov/drought/content/regional-programs/regional-drought-early-warning-system). A new DEWS is being developed for the Midwest region, which borders the Missouri River Basin DEWS region (see image at right, courtesy of NIDIS). HPRCC applied climatologist Crystal Stiles will be assisting NIDIS on behalf of the National Drought Mitigation Center with the implementation of this DEWS. She is on the Midwest DEWS kickoff meeting planning committee, as well as the steering committee for the DEWS. Crystal is planning to attend and help facilitate the kickoff meeting in February (see upcoming travel and activities on page 6). Crystal is pleased to assist with this new DEWS, as the Missouri River Basin DEWS and Midwest DEWS border one another but climate knows no boundaries!



Recent And Upcoming Travel And Activities

Dr. Jennifer Francis addresses the public regarding connections between Arctic Amplification and mid-latitude weather. (Photo courtesy Ken Dewey)

Implications of a Changing Arctic on Water Resources and Agriculture in the Central U.S. Workshop, Lincoln, NE (November 10-12)

Martha organized and Crystal attended this workshop where discussions took place regarding connections between Arctic Amplification (the enhanced warming that has been observed in the Arctic) and impacts to agriculture and water resources in the mid-latitudes. Next steps that were identified included broadening the topic to discuss this issue at the national level, creating actionable science and engaging stakeholders through the National Weather Service, and conducting co-produced, interdisciplinary research on the topic that incorporates aspects of social science.

Urban Thinkers Campus, Omaha, NE (November 16-17)

Natalie had the pleasure of speaking about HPRCC's work on municipal climate adaptation at the Urban Thinkers Campus. The Urban Thinkers Campus is a United Nations Habitat initiative and only 28 of these programs were scheduled throughout the world. The program in Omaha had the privilege of focusing on "The Role and Opportunities in Urban Sustainability for Small and Mid-sized Cities" and the results of this program will help inform the upcoming Habitat III Conference on Sustainable Cities. The final report can be found here: http://www.joslyninstitute.org/utc_omaha_report_to_wuc.pdf.

RMA Meeting, Kansas City, MO (December 16-17)

Natalie took a last minute trip before the winter break and went down to Kansas City, MO to learn about the climate-related needs of the USDA's Risk Management Agency (RMA). According to its website, RMA's mission is to serve the agricultural producers of America through effective, market-based risk management tools and solutions in order to strengthen the economic stability of agricultural producers and rural communities. You may know RMA best for the crop insurance it provides to farmers and ranchers. Since weather and climate conditions can have such an impact on agriculture, it is helpful to understand the needs of the RMA, so that we can better serve this community.

AMS Annual Meeting, New Orleans, LA (January 10-14)

Crystal and Natalie attended the American Meteorological Society meeting in New Orleans where they talked about tribal engagement activities in the Missouri River Basin, an assessment of the 2012 Central U.S. drought, and municipal climate adaptation planning in the Midwest and Great Plains. They also had an opportunity to interact with colleagues and learn about what others are doing in climate services. It was not all business though, as Natalie and Crystal enjoyed fantastic Cajun food, live jazz music, and entertainment on Bourbon Street.

Natalie and Crystal pose with colleagues BJ Baule (GLISA) and Melissa Widhalm (U2U) at AMS. (Photo courtesy Ken Dewey)

Upcoming: NIDIS Midwest DEWS Kickoff Meeting, St. Louis, MO (February)

Crystal is attending the National Integrated Drought Information System (NIDIS) Drought Early Warning System (DEWS) kickoff meeting for the Midwest region in February. This meeting is intended to bring stakeholders together to talk about what a DEWS would look like for the Midwest. Crystal is on the kickoff meeting planning committee and the Midwest DEWS steering committee.

Upcoming: USDA Northern Plains Climate Hub Meetings, Brookings, SD and Casper, WY (March)

Several HPRCC staff will attend two USDA Northern Plains Climate Hub meetings that will be taking place in March - one in Brookings, SD and one in Casper, WY. Purposes of the meetings include building partnerships between participants and discussing agricultural-related climate tools and products. Representatives from numerous local, state, tribal, and federal organizations will be at the meetings.

Upcoming: Great Plains Tribal Water Alliance Meeting (Spring 2016)

Originally scheduled for December, organizers postponed this meeting due to a winter storm in the region and have tentatively rescheduled for spring. Crystal is still planning to attend to talk about tribal climate activities and opportunities occurring around the region.