Metadata Records
Irrigation Innovation Consortium-Supported Project Datasets

Please use a separate sheet for each dataset. Answers are automatically saved.
Questions? Contact Diane DeJong: diane.de_jong@colostate.edu.

Thank you!

Question	Answer
Project name	Towards Pivot Automation with Proximal Sensing for Maize and Soybean in the Great Plains
Project background	The next step forward for advancing irrigation management, especially in the sub-humid eastern portion of the Great Plains, is increasing the adoption rates of scientific irrigation scheduling through center pivot automation (CPA). The objectives of this project are to: 1) evaluate the accuracy of multispectral (MS) and infrared thermometers (IRTs) sensors mounted on pivot by comparing to stationary sensors and sensors deployed on unmanned aircraft; 2) comparison of crop health in terms of vegetative indices and crop water stress for maize and soybean in relation with varying levels of soil water content; 3) develop thresholds for thermal indices (to trigger an irrigation event) for the sub-humid climate of the eastern Great Plains; and 4) test and evaluate an existing irrigation scheduling supervisory control and data acquisition system (ISSCADA) by comparing with different irrigation methods in terms of total applied irrigation and crop yield. Field experiments will be carried out on a standard size (60 ha) center-pivot-irrigated field at the UNL Eastern Nebraska Research and Extension Center (ENREC) near Mead, NE. Irrigation scheduling methods will include: plant feedback method (IRTs), hybrid method (IRTs and Acclima soil water sensors), spatial evapotranspiration model, and common practice. These methods will further be applied at four refill levels (0%, 50%, 100%, and 150%). The 0% level will correspond to rainfed conditions, with crop water stress being most likely to occur in these plots. The first three objectives will be in the pre-competitive space and can be incorporated by any manufacturer and service provider, moving the industry toward center pivot automation, and the last project objective will be specific to Valmont Industries. All results will be published and disseminated to producers through Extension programs.
Dataset name	2021 Field Research Data
Primary author Include first & last name, institution affiliation, and email address.	Derek Heeren, University of Nebraska - Lincoln; derek.heeren@unl.edu
Primary contact The primary contact may be the same or different from the primary author. Include first & last name, institution affiliation, and email address.	Derek Heeren, University of Nebraska - Lincoln; derek.heeren@unl.edu
Dataset description Please provide a brief, clear summary description of the dataset contents. Indicate as applicable: purpose and scope; time period; areas of investigation; and any other special characteristics.	Field research data, including weather, soil water, canopy temperature and reflectance, irrigation applied, etc.

Spatial coverage Please be specific as possible about the geographic coverage of your data, and record the information according to defined standards, such as FGDC or the Getty Thesaurus of Geographic Names. You can enter lat/long data, county names, state names, etc.	Field experiments were carried out on a standard size (60 ha) center-pivot-irrigated field at the UNL Eastern Nebraska Research and Extension Center (ENREC) near Mead, NE.
Temporal coverage Describe the temporal coverage of your dataset: Start: Time of day, Date, Month, Year Finish: Time of day, Date, Month Year	2021 growing season
Re-use limitations Describe known problems or caveats that would limit reuse of the data (e.g., uncertainty, sampling problems, blanks, quality control samples) and/or that future potential users of your dataset should know about. Or indicate "None."	None
Citations Please include full citations and DOIs for articles published based on or related to this dataset. Or indicate "None."	Bhatti, S., D. M. Heeren, S. A. O'Shaughnessy, S. R. Evett, M. S. Maguire, S. P. Kashyap, and C. M. U. Neale. 2022a. Comparison of stationary and mobile canopy sensing systems for irrigation management of maize and soybean in Nebraska. Applied Engineering in Agriculture 38(2): 331-342.https://doi.org/10.13031/aea.14945 Bhatti, S., D. M. Heeren, S. R. Evett, S. A. O'Shaughnessy, C. M. U. Neale, D. R. Rudnick, T. E. Franz, and Y. Ge. 2022b. Crop response to thermal stress without yield loss in irrigated maize and soybean in Nebraska. *Agricultural Water Management* 274, https://doi.org/10.1016/j.agwat.2022.107946 Bhatti, S., D. M. Heeren, S. R. Melvin, T. E. Franz, E. Wilkening, & C. M. U. Neale. 2022. Sensors on the pivot for automated irrigation scheduling in the Great Plains. UNL CropWatch. Available at: https://cropwatch.unl.edu/2022/sensors-pivot-automated-irrigation-scheduling-great-plains Bhatti3, S., Heeren, D. M., O'Shaughnessy, S. A., Neale, C. M. U., LaRue, J. L., Melvin, S. R., Wilkening1, E. J., & Bai, G. 2023. Toward automated irrigation management with integrated crop water stress index and spatial soil water balance. Precision Agriculture. https://doi.org/10.1007/s11119-023-10038-4
Keywords Please add a few appropriate National Agricultural Library keywords: https://agclass.nal.usda.gov/vocabularies/nalt	maize, soybeans, Nebraska, center pivot irrigation,
Tags Please add a few of your own user-defined tags that would be useful to others who might use your dataset in the future.	multispectral sensors, infared thermometers; thermal indices; crop water stress index
Acronyms & abbreviations Please define any acronyms, site abbreviations, or other project specific designations used in your dataset. Or indicate "none."	CPA - center pivot automation; MS - multispectral; IRT - infared thermometers; ISSCADA - irrigation scheduling supervisory control and data acquisition system; ENREC - Eastern Nebraska Research and Extension Center; CWSI - crop water stress index

Other dataset storage location Has this dataset already been uploaded elsewhere? Yes or No Reasons may include a requirement as part of publishing a paper or storing data on GitHub or other locations to make accessible to others. If yes, please provide the link or other information to explain where the dataset is located and where or how it can be accessed.	None