

BRIAN D. WARDLOW

Center for Advanced Land Management Information Technologies (CALMIT)
School of Natural Resources
University of Nebraska-Lincoln
316 Hardin Hall
3301 Holdrege St.
Lincoln, NE 68583-0988
Telephone: (402) 472-6729 / E-mail: bwardlow2@unl.edu

EDUCATION

Ph.D. Geography (Honors), University of Kansas, Lawrence, Kansas, December 2005.

Dissertation title: *The Development of a Crop-Related Land Use/Land Cover Mapping Protocol in the U.S. Central Great Plains Using Time-Series MODIS 250-Meter Vegetation Index Data.*

Advisor: Dr. Stephen L. Egbert

M.A. Geography, Kansas State University, Manhattan, Kansas, May 1996.

Thesis title: *Temporal Monitoring of Suspended Sediment Patterns Using Landsat Thematic Mapper Imagery – A Study of Tuttle Creek Reservoir, Kansas.* Advisor: Dr. John A. Harrington, Jr.

B.S. Geography (Geology minor) (Magna Cum Laude), Northwest Missouri State University, Maryville, Missouri, May 1994. Advisor: Dr. Don Hagan

RESEARCH INTERESTS

Remote Sensing	Land Use/Land Cover Characterization	Drought Monitoring
Geographic Information Systems (GIS)	Land Surface Phenology	Biogeography
Climate-Vegetation Interactions	Land Use/Land Cover Change	Plant Ecology
Natural Resource Management	Environmental Geography	Geovisualization

PRESENT POSITION

Director and Professor, 8/2015 – Present, Center for Advanced Land Management Information Technologies (CALMIT), School of Natural Resources (SNR), University of Nebraska-Lincoln, Lincoln, NE.

Current appointment: 45% research, 30% administration and 25% teaching. Conduct research on the use of remote sensing and GIS for drought monitoring, the characterization of land use/land cover and vegetation dynamics (phenology and biophysical characteristics), and agricultural and natural resource applications. Provide leadership, coordinate projects, supervise staff, and administer all Center activities for CALMIT. Advise and mentor graduate students in Geography and SNR interested in the use of remote sensing and GIS for environmental monitoring and agricultural and natural resource applications. Teach upper-level undergraduate and graduate-level remote sensing courses including Introduction to Remote Sensing, Digital Image Analysis, Applications of Remote Sensing in Agriculture and Natural Resources, and special topics (e.g., drought monitoring tools). Conduct training and outreach activities to promote the use and transfer of satellite-based monitoring tools within the global drought monitoring community.

OTHER CURRENT APPOINTMENTS

Faculty Fellow, National Drought Mitigation Center, University of Nebraska-Lincoln, Lincoln, NE

Faculty Fellow, Daugherty Water for Food Global Institute, University of Nebraska, Lincoln, NE

Courtesy Professor, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE.

Courtesy Professor, Complex Biosystems PhD Program – Integrated Plant Biology, University of Nebraska-Lincoln, NE.

Professor, Doctor of Plant Health Program (DPH), University of Nebraska-Lincoln, Lincoln, NE.

WORK EXPERIENCE

1. **Director and Professor**, 8/2015-present, Center for Advanced Land Management Information Technologies (CALMIT), School of Natural Resources (SNR), University of Nebraska-Lincoln, Lincoln, NE.
2. **Professor**, 06/2025-present, Doctor of Plant Health Program (DPH), University of Nebraska-Lincoln, Lincoln, NE.
3. **Director and Associate Professor**, 8/2012 - 7/2015, Center for Advanced Land Management Information Technologies (CALMIT), School of Natural Resources (SNR), University of Nebraska-Lincoln, Lincoln, NE.
4. **Assistant Professor**, 3/2012 – 07/2012, School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE.
5. **Research Assistant Professor and GIScience Program Area Leader**, 3/2006 – 3/2012, National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE.
6. **NASA Earth System Science Graduate Research Fellow**, 9/2002 - 3/2006, Kansas Applied Remote Sensing Program, University of Kansas, Lawrence, KS
7. **Graduate Research Assistant**, 9/1999 - 8/2002, Kansas Applied Remote Sensing Program, University of Kansas, Lawrence, KS
8. **Remote Sensing Scientist**, 10/1996 - 8/1999, USGS Earth Resources Observation Science (EROS) Center, Sioux Falls, SD
9. **Graduate Research Assistant**, 5/1996 - 9/1996, Kansas Geological Survey, University of Kansas, Lawrence, KS
10. **Graduate Research Assistant**, 5/1995 - 9/1995, Department of Geography, Kansas State University, Manhattan, KS
11. **Community and Regional Planning Intern**, 5/1993 - 9/1994, Southeast Nebraska Development District (SEND), Humboldt, NE

TEACHING EXPERIENCE

Courses Taught

1. Introduction to Remote Sensing
2. Practical Applications of Remote Sensing in Agriculture and Natural Resources
3. Special Topics: Survey of Drought Monitoring Techniques
4. Special Topics: Selected Topics in Remote Sensing
5. Special Topics: Basic Image Processing and Analysis
6. Introduction to Global Positioning Systems (GPS)

Previous Teaching Experience

1. **Guest Lecturer**, Spring 2006, GEOG 980 Remote Sensing Graduate Seminar, Department of Geography, University of Kansas, Lawrence, KS.
2. **Guest Lecturer**, Fall 2004, GEOG 526 Remote Sensing I, Department of Geography, University of Kansas, Lawrence, KS.

3. **Graduate Teaching Assistant**, Fall and Spring 1994-1996, Remote Sensing of the Environment Lab (GEOG 705) Department of Geography, Kansas State University, Manhattan, KS

HONORS AND AWARDS

1. Northwest Missouri State University M-Club Scholar Athlete Hall of Fame member, 2023.
2. John I. Davidson President's Award for Best Practical Paper presented by the American Society of Photogrammetry and Remote Sensing, 2007.
3. Leica Geosystems Award for Best Scientific Paper in Remote Sensing presented by the American Society of Photogrammetry and Remote Sensing, 2007.
4. GIS/Remote Sensing Specialty Group Illustrated Paper Award (1st place), Association of American Geographers 99th Annual Meeting, New Orleans, LA, 2003.
5. USGS EROS Data Center Group Achievement Award for the National Land Cover Data Set Mapping Team, 2000.
6. White Geography Distinguished Graduate Teaching Assistant Excellence Award, Department of Geography, Kansas State University, 1996.
7. Mark Jefferson Outstanding Geography Student Award, Department of Geography, Northwest Missouri State University, 1994.
8. Scholar Athlete Award, Northwest Missouri State University, 1994.
9. Academic All-Conference Team, Mid-America Intercollegiate Athletic Association (MIAA), 1992-1994.
10. Regents' Scholarship, Northwest Missouri State University, 1990-1994.
11. Athletic Department Scholarship, Northwest Missouri State University, 1990-1994.

PUBLICATIONS

Refereed Journal Articles (Published)

1. Shiferaw, A., G. Birru, T. Tadesse, **B. Wardlow**, T. Awada, V. Jin, M. Schmer, A. Freidenreich and J. Iqbal. 2025. Geographical variation in cover crop management and outcomes in continuous corn farming system in Nebraska. *Agriculture* 15(16), 1776, <https://doi.org/10.3390/agriculture15161776>.
2. Zhao, B., J. Hiller, T. Awada, **B. Wardlow**, G. Erickson and Y. Shi. 2025. Forage biomass estimation using UAV-based remote sensing and machine learning: a tool for assessing management practices. *Ecological Informatics*, 90, <https://doi.org/10.1016/j.ecoinf.2025.103361>.
3. Tadesse, T., S. Connolly, **B. Wardlow**, M. Svoboda, B. Zhang, B.A. Fuchs, H. Aslam, C. Asaro, F.H. Kocj, T. Bernadt, C. Poulsen, J. Wisner, J. Nothwehr, I. Ratcliffe, K. Varisco, L. Johnson and C. Riganti. 2025. Development and evaluation of the Forest Drought Response Index (ForDRI): an integrated tool for monitoring drought stress across forest ecosystems in the contiguous United States. *Forests* 16, 1187, <https://doi.org/10.3390/f16071187>.
4. Zoller, A.L., B. Birru, T. Kharel, V. Jin, M.R. Schmer, A. Freidenreich, **B. Wardlow**, T. Kettler and T. Gala. 2025. Remote sensing of soil organic carbon in varied tillage-crop systems. *Journal of Environmental Quality* <https://doi.org/10.1002/jeq2.70060>.
5. Baldisarra, M., A. Barg, A. Little, Z. Tang, **B. Wardlow** and D. Uden. 2025. Remote sensing and landcover in ringed-neck pheasant research: a review of data sources and scales. *Ecology and Evolution* <https://doi.org/10.1002/ece3.71576>.
6. Kulkarni, S., Y. Sawada, Y. Bayissa and **B. Wardlow**. 2025. Global assessment of socio-economic impacts of subnational droughts: a comparative study of combined versus single drought indicators. *Hydrology and Earth Systems Sciences* 29(18), <https://doi.org/10.5194/hess-29-4341-2025>.
7. Zhao, B., M.B. Stephenson, T. Awada, J.D. Volesky, **B. Wardlow**, Y. Zhou and Y. Shi. 2025. 15-Yr biomass production in semiarid Nebraska sandhills grassland: part 2 – response to seasonal

- precipitation and temperature. *Rangeland Ecology and Management* 101, <https://doi.org/10.1016/j.rama.2025.03.007>.
8. Shine, A.E., M. Mamo, G.O. Abagandura, W. Schacht, J. Volesky and **B. Wardlow**. 2024. Unmanned aerial vehicle-based remote sensing of cattle dung: detection, classification, and spatial analysis of distribution. *Rangeland Ecology and Management* <https://doi.org/10.1016/j.rama.2024.06.002>.
 9. Sur, C., W.H. Nam, X. Zhang, T. Tadesse and **B. Wardlow**. 2024. Assessment of agricultural drought status using visible infrared imaging radiometer suite land products. *Theoretical and Applied Climatology* 155, <https://doi.org/10.1007/s00704-024-05038-x>.
 10. Zhao, B., M.B. Stephenson, T. Awada, J.D. Volesky, **B. Wardlow**, Y. Zhou and Y. Shi. 2024. 15-year biomass production in semiarid Nebraska Sandhills grasslands: part 1 – plant functional group analysis. *Rangeland Ecology and Management* 93, <https://doi.org/10.1016/j.rama.2023.12.001>.
 11. Wang, R., J.A. Gamon, S.E. Russo, A.V. Nishimwe, H. Ellerman and **B. Wardlow**. 2024. Multitemporal airborne imaging spectrometry and fluorometry reveal contrasting photoprotective responses of trees. *Remote Sensing of Environment* 311, <https://doi.org/10.1016/j.rse.2024.114295>.
 12. Shiferaw, A.S., G. Birru, T. Tadesse, M.R. Schmer, T. Awada, V.L. Jin, **B. Wardlow**, J. Iqbal, A. Freidenreich, T.P. Kharel, M. Khorchani, Z. Mersha, S. Begna and C.D.D. Sohoulade. 2024. Optimizing cover crop management in eastern Nebraska: insights from crop simulation modeling. *Agronomy* 14(7), 1561, <https://doi.org/10.3390/agronomy14071561>.
 13. Nam, W.H., C. Sur, X. Zhnag, T. Tadesse and **B. Wardlow**. 2024. Assessment of agricultural drought status using Visible Infrared Imaging Radiometer Suite land products. *Theoretical and Applied Climatology* <https://doi.org/10.1007/s00704-024-05038-x>.
 14. Birru, G., A. Shiferaw, T. Tadesse, **B. Wardlow**, V. Jin, M.R. Schmer, T. Awada, T. Kharel, and J. Iqbal. 2024. Cover crop performance under a changing climate in continuous corn system over Nebraska. *Journal of Environmental Quality*, <https://doi.org/10.1002/jeq2.20526>.
 15. Allen, R., A. Mazis, **B. Wardlow**, P. Cherubini, J. Hiller, D. Wedin and T. Awada. 2023. Coupling dendroecological and remote sensing techniques to assess the biophysical traits of woody Juniperus Virginiana and Pinus Ponderosa within the semi-arid grasslands of the Nebraska Sandhills. *Forest Management* 544(13), <https://doi.org/10.1016/j.foreco.2023.121184>.
 16. Zhang, B., F.K. Abu Salem, M.J. Hayes, K. Helm Smith, T. Tadesse and **B.D. Wardlow**. 2023. Explainable machine learning for the prediction and assessment of complex drought impacts. *Science of the Total Environment* 898, <https://doi.org/10.1016/j.scitotenv.2023.165509>.
 17. Poděbradská, M., B. Wylie, M. Hayes, D. Bathke, Y. Bayissa, S. Boyte, J. Brown, and **B. Wardlow**. 2023. Using seasonal climate scenarios in the ForageAhead annual forage production model for early drought impact assessment. *Ecosphere* 14(5), <https://doi.org/10.1002/ecs2.4496>.
 18. Sur, C., W.-H. Nam, X. Zhang, T. Tadesse and **B.D. Wardlow**. 2023. Assessment of an evapotranspiration algorithm accounting for land cover types and photosynthetic perspectives using remote sensing images. *GIScience and Remote Sensing* 60(1), <https://doi.org/10.1080/15481603.2023.2279802>.
 19. Mazis, T., T. Awada, G.E. Erickson, **B. Wardlow**, B.J. Wienhold, V. Jin, M. Schmer, A. Suyker, Y. Zhou and J. Hiller. 2023. Synergistic use of optical and biophysical traits to assess *Bromus inermis* pasture performance and quality under different management strategies in Eastern Nebraska, U.S. Agriculture. *Ecosystems and Environment* 348, <https://doi.org/10.1016/j.agee.2023.108400>.
 20. Birru, G., A. Shiferaw, T. Tadesse, M. Schmer, V.L. Jin, **B. Wardlow**, K. Koehler-Cole, T. Awada, S. Beebout, T. Tsegaye and T. Kahrel. 2023. Simulated Impacts of Winter Rye Cover Crop on Continuous Maize Yield and Soil Parameters. *Agronomy Journal*, <https://doi.org/10.1002/agj2.21291>.
 21. Poděbradská, M., B.K. Wylie, D.J. Bathke, Y.A. Bayissa, D. Dahal, J.D. Derner, P.A. Fay, M.J.. Hayes, W.H. Schacht, J.D. Volesky, P. Wagle and **B.D. Wardlow**. 2022. Monitoring climate impacts on annual forage production across U.S. semi-arid grasslands. *Remote Sensing* 14(1), 4; <https://doi.org/10.3390/rs14010004>.

22. Lee, H.J., W.N. Nam, D.H. Yoon, M.D. Svoboda, **B.D. Wardlow** and J. A. Otkin. 2022. Flash drought mechanism and characteristics in South Korea. *Journal of the Korean Society of Hazard Mitigation* 22(3) <https://doi.org/10.9798/KOSHAM.2022.22.3.25>.
23. Gao, F., M.C. Anderson, D.M. Johnson, R. Seffrin, **B. Wardlow**, A. Suyker, C. Diao and D.M. Browning. 2021. Towards routine mapping of crop emergence within the growing season using the Harmonized Landsat and Sentinel-2 dataset. *Remote Sensing* 13, 5074, <https://doi.org/10.3390/rs13245074>.
24. Flanagan, P.X., R. Mahmood, T. Sohl, M. Svoboda, **B. Wardlow**, M. Hayes and E. Rappin. 2021. Atmospheric response to four projected land use-land cover change scenarios for 2050 in the North Central United States. *Earth Interactions* <https://doi.org/10.1175/EI-D-20-0019.1>.
25. Mazis, T., T. Awada, J.A. Fowler, J. Hiller, Y. Zhou, **B.D. Wardlow** and D. Wedin. 2021. Changes in ecophysio-optical traits of semiarid Nebraskag grasslands with *Juniperus virginiana* and *Pinus ponderosa* encroachment. *Ecological Indicators* 131, <https://doi.org/10.1016/j.ecolind.2021.108159>.
26. Wang, R., J.A. Gamon, R. Moore, A.I Zyguelbaum, T.J. Arkebauer, R. Perk, B. Leavitt, S. Cogliatti, **B. Wardlow** and Y. Qi. 2021. Errors associated with atmospheric correction methods for airborne imaging spectrometry: implications for vegetation indices and plant traits. *Remote Sensing of Environment* 265:112663 <https://doi.org/10.1016/j.rse.2021.112663>.
27. Zeng, L., **B.D. Wardlow**, S. Hu, Z. Zhang, G. Zhou, G. Peng, D. Xiang, R. Wang, R. Meng and W. Wu. 2021. A novel strategy to reconstruct daily time-series NDVI from MODIS multi-temporal composite products. *Remote Sensing* 13(7):1397, <https://doi.org/10.3390/rs13071397>.
28. Asoka, A., **B. Wardlow**, T. Tadesse, M. Huber and V. Mishra. 2021. A satellite-based assessment of the relative contribution of hydroclimatic variables on vegetation growth in global agricultural and non-agricultural regions. *Journal of Geophysical Research: Atmospheres*, 126 <https://doi.org/10.1029/2020JD033228>.
29. Benedict, T.D., J.F. Brown S.P. Boyte, D.M Howard, B.A. Fuchs, **B.D. Wardlow**, T. Tadesse and K.A. Evenson. 2021. Exploring VIIRS continuity with MODIS in an expedited capability for monitoring drought-related vegetation conditions. *Remote Sensing*, 13(6), 1210 <https://doi.org/10.3390/rs13061210>.
30. Kulkarni, S.S., **B.D. Wardlow**, Y.A. Bayissa, T. Tadesse, M.D. Svoboda, and S.S. Gedam. 2020. Developing a remote sensing-based combined drought indicator approach for agricultural drought monitoring over the Marathwada, India. *Remote Sensing* 12(13), 2091 <https://doi.org/10.3390/rs12132091>.
31. Zeng, L., **B.D. Wardlow**, D. Xiang, S. Hu and D. Li. 2020. A review of vegetation phenological metrics extraction using time-series multispectral satellite data. *Remote Sensing of Environment* 237, <https://doi.org/10.1016/j.rse.2019.111511>.
32. Tadesse, T., D. Hollinger, Y. Bayissa, M. Svoboda, B. Fuchs, B. Zhang, G. Demisse, **B. Wardlow**, G. Bohrer, K. Clark, L. Gu, A. Noormets, K. Novick and A. Richardson. 2020. Forest Drought Response Index (ForDRI): a new combined model to monitor forest drought in the eastern United States. *Remote Sensing* 12(21), 3605; <https://doi.org/10.3390/rs12213605>.
33. Li, Y., K. Guan, B. Peng, T. Franz, **B.Wardlow** and M. Pan. 2020. Irrigation-induced cooling contributes to maize yield in the Midwest U.S. *Global Change Biology* <https://doi:10.1111/gcb.15002>.
34. Zhou, W., K. Guan, B. Peng, J. Shi, C. Jiang, **B. Wardlow**, M. Pan, J. Kimball, T. Franz, P. Gentine, M. He and J. Zhang. 2020. Connections between the hydrological cycle and crop yield in the rainfed U.S. Corn Belt. *Journal of Hydrology*, 590 <https://doi:10.1016/j.jhydrol.2020.125398>.

35. Donovan, V.M., D. Twidwell, D.R. Uden, T. Tadesse, **B.D. Wardlow**, C.G. Bieliski, M.O. Jones, B.W. Allred, D.E. Naugle and C.R. Allen. 2020. The resilience of a grassland biome to large, 'catastrophic' wildfire. *Earth's Future*. 8, e2020EF001487 <https://doi.org/10.1029/2020EF001487>.
36. Bandaru, V., R. Yaramasu, K. PNVR, J. He, S. Fernando, R. Sahajpal, **B.D. Wardlow**, A. Suyker and C. Justice. 2019. PhenoCrop: an integrated satellite-based framework to estimate physiological growth stages of corn and soybeans. *International Journal of Applied Earth Observation and Geoinformation*, 92 <https://doi.org/10.1016/j.jag.2020.102188>.
37. Franz, T.E., S. Pokal, J.P. Gibson, Y. Zhou, H. Gholizadeh, F.A. Tenorio, D. Rudnick, D. Heeren, M. McCabe, M. Ziliani, Z. Jin, K. Guan, M. Pan, J. Gates and **B. Wardlow**. 2020. The role of topography, soil and remotely sensed vegetation condition towards predicting subfield-scale crop yield. *Field Crops Research*, 252 <https://doi.org/10.1016/j.fcr.2020.107788>.
38. Barker, J.B., W.E. Woldt, **B.D. Wardlow**, C.M.U. Neale, M.S. Maguire, B.C. Leavitt and D.M. Heeren. 2020. Calibration of a common shortwave multispectral camera systems for quantitative agricultural applications. *Precision Agriculture* 21:922–935 <https://doi.org/10.1007/s11119-019-09701-6>.
39. Yoon, D.-H, W.-H. Nam, H.-J. Lee, E.-M. Hong, **B.D. Wardlow**, T. Tadesse, M.D. Svoboda, M.J. Hayes and D.-E. Kim. 2020. Satellite-based drought assessment using the Evaporative Stress Index (ESI) as an indicator of agricultural drought in East Asia. *Remote Sensing* 12:444, <https://doi.org/10.3390/rs12030444>.
40. Podebradska, M., B.K. Wylie, M.J. Hayes, **B.D. Wardlow**, D.J. Bathke, N.B. Bliss and D. Dahal. 2019. Monitoring drought impact on annual forage production in semi-arid grasslands: a case study of Nebraska Sandhills. *Remote Sensing* 11(18), 2106; <https://doi.org/10.3390/rs11182106>.
41. Hua, L., H. Wang, H. Sui, **B. Wardlow**, M.J. Hayes and J. Wang. 2019. Mapping the spatial-temporal dynamics of vegetation responses lag to drought in semi-arid region. *Remote Sensing* 11(16):1873, <https://doi.org/10.3390/rs11161873>.
42. Jeffries, G.R., T.S. Griffin, D.H. Fleisher, E.N. Naumova, M. Koch and **B.D. Wardlow**. 2019. Mapping sub-field maize yields in Nebraska, USA by combining remote sensing imagery, crop simulation models, and machine learning. *Precision Agriculture*, <https://doi.org/10.1007/s11119-019-09689-z>.
43. Zhang, X., N. Chen, H. Sheng, C. Ip, L. Yang, Y. Chen, Z. Sang, T. Tadesse, T.P.Y. Lim, A. Rajabifard, C. Buetti, L. Zeng, **B. Wardlow**, S. Wang, S. Tang, Z. Xiong, D. Li and D. Niyogi. 2019. Urban drought challenge to 2030 sustainable development goals. *Science of the Total Environment*, <https://doi.org/10.1016/j.scitotenv.2019.07.342>.
44. Bumann, E. T. Awada, **B. Wardlow**, M. Hayes, J. Okalebo, C. Helzer, A. Mazis, J. Hiller and P. Cherubini. 2018. Assessing response of *Betula papyrifera* to climate variability in a remnant population along the Niobrara River Valley in Nebraska U.S. through dendroecological and remote sensing techniques. *Canadian Journal of Forest Research* 49:423-433, <https://doi.org/10.1139/cjfr-2018-0206>.
45. Mariano, D.A., C.A.C. Santos **B.D. Wardlow**, M.C. Anderson, A.V. Schiltmeyer, T. Tadesse and M.D. Svoboda. 2018. Use of remote sensing to assess the effects of drought and human-induced land degradation on ecosystem health in northeastern Brazil. *Remote Sensing of Environment* 213:129-143, <https://doi.org/10.1016/j.rse.2018.04.048>.
46. Bayissa, Y.A., T. Tadesse, M. Svoboda, **B. Wardlow**, C. Poulsen, J. Swigart and S.J. Van Andel. 2018. Developing a satellite-based combined drought index to monitor historic drought: a case study

- for Ethiopia. *GIScience and Remote Sensing* <http://doi:10.1080/15481603.2018.1552508>, <https://doi.org/10.1080/15481603.2018.1552508>.
47. Trnka, M., M. Hayes, F. Jurecka, L. Bartosova, M. Anderson, R. Brazdil, J. Brown, J.J. Camarero, P. Cudlin, P. Dobrovolny, J. Eitzinger, S. Feng, T. Finnessey, G. Gregoric, P. Havlik, C. Hain, I. Holman, D. Johnson, K. Kersebaum, F. Ljungqvist, J. Luterbacher, F. Micale, C. Hartl-Meier, M. Mozny, P. Nejedlik, J. Olesen, M. Ruiz-Ramos, R. Roetter, G. Senay, S. Vincente-Serrano, M. Svoboda, A. Susnikda, T. Tadesse, A. Vizina, **B. Wardlow**, U. Buntgen, and Z. Zalud. 2018. Priority questions in multidisciplinary drought research. *Climate Research* 75:241-260, <https://doi.org/10.3354/cr01509>.
 48. Yang, Y., M.C. Anderson, F. Gao, B. Wardlow, C.R. Hain, J. Otkin, J. Alfieri, Y. Yan, L. Sun and W. Dulaney. 2018. Field-scale mapping of evaporative stress indicators of crop yield: an application over Mead, NE. *Remote Sensing of Environment* 210:387-402, <https://doi.org/10.1016/j.rse.2018.02.020>.
 49. Cai, Y., K. Guan, J. Peng, S. Wang, C. Seifert, B. Wardlow and Z. Li. 2018. A high-performance and in-season classification system of field-level crop types using time-series Landsat data and a machine learning approach. *Remote Sensing of Environment* 210:35-47, <https://doi.org/10.1016/j.rse.2018.02.045>.
 50. Bijaber, N., D. El Hadani, M. Saidi, M.D. Svoboda, **B.D. Wardlow**, C.R. Hain, C. Poulsen, M. Yessef, and A. Rochdi. 2018. Developing a remotely sensed drought monitoring indicator for Morocco. *Geosciences* 8(55), <https://doi.org/10.3390/geosciences8020055>.
 51. Nam, W.-H., T. Tadesse, **B.D. Wardlow**, M.J. Hayes, M.D. Svoboda, and E.-M. Hong. 2018. Developing the Vegetation Drought Response Index for South Korea (VegDRI-SKorea) to assess the vegetation condition during drought events. *International Journal of Remote Sensing* 39:5: 1548-1574, <https://doi.org/10.1080/01431161.2017.1407047>.
 52. Zambrano, F., **B. Wardlow**, T. Tadesse, M. Lillo-Saavedra, and O. Lagos. 2017. Evaluating satellite-derived long-term historical precipitation datasets for drought monitoring in Chile. *Atmospheric Research* 186:26-42, <https://doi.org/10.1016/j.atmosres.2016.11.006>.
 53. Tadesse, T., **B.D. Wardlow**, G.B. Demisse, Y.A. Bayissa, C. Champagne, T.A. Hadwen, and J.F. Brown. 2017. Building the Vegetation Drought Response Index for Canada (VegDRI-Canada) to monitor agricultural drought. *GIScience and Remote Sensing* 54(2):230-257, <https://doi.org/10.1080/15481603.2017.1286728>.
 54. Aegerter, C., J. Wang, C. Ge, S. Irmak, R. Oglesby, **B. Wardlow**, H. Yang, J. You, and M. Shulski. 2017. Mesoscale modeling of the meteorological impacts of irrigation during the 2012 Central Plains drought. *Journal of Applied Meteorology and Climatology* 56(5):1259-1283, <https://doi.org/10.1175/JAMC-D-16-0292.1>.
 55. Demisse, G., T. Tadesse, A. Atnafu, S. Hill, **B.D. Wardlow**, Y. Bayissa, and A. Shiferaw. 2017. Information mining from heterogeneous data sources: a case study on drought predictions. *Information* 8(79), <https://doi.org/10.3390/info8030079>.
 56. Zeng, L., **B. Wardlow**, R. Wang, J. Shan, T. Tadesse, M.J. Hayes, and D. Li. 2016. A hybrid approach for detecting corn and soybean phenology with time-series MODIS data. *Remote Sensing of Environment* 181:237-250, <https://doi.org/10.1016/j.rse.2016.03.039>.
 57. Ambika, A.K., **B. Wardlow**, and V. Mishra. 2016. Remotely sensed high resolution (250 m) irrigated area mapping in India (2000-2015). *Scientific Data* 3:160118, <https://doi.org/10.1038/sdata.2016.118>.
 58. Otkin, J.A., M.C. Anderson, C. Hain, M. Svoboda, D. Johnson, R. Mueller, T. Tadesse, **B. Wardlow**, and J. Brown. 2016. Assessing the evolution of soil moisture and vegetation conditions during the

- 2012 United States flash drought. *Agricultural and Forest Meteorology* 218-219:230-242, <https://doi.org/10.1016/j.agrformet.2015.12.065>.
59. Wang, J. A.L. Kessner, C. Aegerter, A. Sharma, L. Judd, **B. Wardlow**, J. You, M. Shulski, S. Irmak, A. Kilic, and J. Zeng. 2016. A multi-sensor view of the 2012 Central Plains drought from space. *Frontiers in Environmental Science* 4:45, <https://doi.org/10.3389/fenvs.2016.00045>.
 60. Otkin, J., M. Shafer, M. Svoboda, **B. Wardlow**, M.C. Anderson, C. Hain, and J. Basara. 2015. Facilitating the use of drought early warning information through interactions with stakeholders. *Bulletin of the American Meteorology Society (BAMS)* 96(7):1073-1078, <https://doi.org/10.1175/BAMS-D-14-00219.1>.
 61. AghaKouchak, A., A. Farahmand, F.S. Melton, M.C. Anderson, J. Teixeira, **B.D. Wardlow**, and C.R. Hain. 2015. Remote sensing of drought: progress, challenges, and opportunities. *Reviews of Geophysics* 53:452-480, <https://doi.org/10.1002/2014RG000456>.
 62. Zeng, L., **B.D. Wardlow**, T. Tadesse, J. Shan, M.J. Hayes, and D. Li. 2015. Estimating daily maximum and minimum air temperature using both daytime and nighttime MODIS land surface temperature products over the Corn Belt in US. *GIScience and Remote Sensing* 7(1):951-970, <https://doi.org/10.3390/rs70100951>.
 63. Tadesse, T., **B.D. Wardlow**, J.D. Brown, and K. Callahan. 2015. Assessing the vegetation condition impacts of the 2011 drought across the U.S. Southern Great Plains using the Vegetation Drought Response Index (VegDRI). *Journal of Applied Meteorology and Climatology* 54(1):153-169, <https://doi.org/10.1175/JAMC-D-14-0048.1>.
 64. Nam, W.-H., T. Tadesse, **B. Wardlow**, M.-W. Jang, and S.-Y. Hong. 2015. Satellite-based hybrid drought assessment using Vegetation Drought Response Index in South Korea (VegDRI-SKorea). *Journal of the Korean Society of Agricultural Engineers* 57(4):1-9, <https://doi.org/10.5389/KSAE.2015.57.4.001>.
 65. Trnka, M., R. Brazdil, M. Mozny, P. Stepanek, P. Dobrovolny, P. Zahradnicek, J. Balek, D. Semaradova, M. Dubrovsky, P. Hlavinka, J. Eitzinger, **B. Wardlow**, M. Svoboda, M. Hayes. 2015. Soil moisture trends in the Czech Republic between 1961 and 2012. *International Journal of Climatology* 35: 3733–3747, <https://doi.org/10.1002/joc.4242>.
 66. **Wardlow, B.D.** and K. Callahan. 2014. Landscape and field level accuracy assessment of the MODIS irrigated agriculture data set over Nebraska. *GIScience and Remote Sensing* 51(5):575-592, <https://doi.org/10.1080/15481603.2014.952546>.
 67. Harms, S., T. Tadesse, and **B. Wardlow**. 2014. Improving drought risk modeling: using multiple periods of satellite data with ensembles of data mining algorithms. *International Journal of Society, Systems, and Science* 6(2):143-158, <https://doi.org/10.1504/IJSSS.2014.062438>.
 68. Hunt, E.D., M. Svoboda, **B. Wardlow**, K. Hubbard, M. Hayes, and T. Arkerbauer. 2014. Monitoring the effects of rapid onset of drought on non-irrigated maize with agronomic data and climate-based drought indices. *Agricultural and Forest Meteorology* 191:1-11, <https://doi.org/10.1016/j.agrformet.2014.02.001>.
 69. Swain, S., **B.D. Wardlow**, S. Narumalani, D. Rundquist, and M. Hayes. 2013. Relationships between vegetation indices and root zone soil moisture under maize and soybean canopies in the U.S. Corn Belt: a comparative study using close-range sensing approach. *International Journal of Remote Sensing*, 34(8):2814-2828, <https://doi.org/10.1080/01431161.2012.750020>.
 70. Trnka, M., C. Kersenbaum, J. Eitzinger, M. Hayes, P. Hlavinka, M. Svoboda, M. Dubrovsky, D. Semaradova, **B. Wardlow**, E. Pokorny, M. Mozny, D. Wilhite, W. Waltman, and Z. Zalud. 2013.

- Consequences of climate change for the soil climate in central Europe and central U.S. *Global Change Biology*, 120:405-418, <https://doi.org/10.1007/s10584-013-0786-4>.
71. Anderson, M.C., C. Hain, J. Otkin, X. Zhan, K. Mo, M. Svoboda, **B. Wardlow**, and A. Pimstein. 2013. An intercomparison of drought indicators based on thermal remote sensing and NLDAS-2 simulations. *Journal of Hydrometeorology*, 14:1035-1056, <https://doi.org/10.1175/JHM-D-12-0140.1>.
 72. Sakamoto, T., A.A. Gitelson, A.L. Nygun-Robertson, T.J. Arkebauer, **B.D. Wardlow**, A.E. Suyker, S.B. Verma, and M. Shibayama. 2012. An alternative method using digital cameras for continuous monitoring of crop status. *Agriculture and Forest Meteorology*, 154-155:113-126, <https://doi.org/10.1016/j.agrformet.2011.10.014>.
 73. Sakamoto, T., A.A. Gitelson, **B.D. Wardlow**, T.J. Arkebauer, S.B. Verma, A.E. Suyker, and M. Shibayama. 2012. Application of day and night digital photographs for estimating maize biophysical characteristics. *Precision Agriculture*, 13:285-301, <https://doi.org/10.1007/s11119-011-9246-1>.
 74. Sakamoto, T., A.A. Gitelson, A.L. Nguy-Robertson, T.J. Arkebauer, **B.D. Wardlow**, A.E. Suyker, S.B. Verma, and M. Shibayama, 2011. Estimating daily gross primary production of maize based only on MODIS WDRVI and shortwave radiation data. *Remote Sensing of Environment*, 115:3091-3101, <https://doi.org/10.1016/j.rse.2011.06.015>.
 75. Swain, S., D. Rundquist, T. Arkebauer, S. Narumalani, and **B. Wardlow**. 2011. Non-invasive estimation of relative water content in soybean leaves using infrared thermography. *Israel Journal of Plant Sciences*, 60:25-36, <https://doi.org/10.1560/IJPS.60.1-2.25>.
 76. Swain, S., **B.D. Wardlow**, S. Narumalani, T. Tadesse, and K. Callahan. 2011. Assessment of vegetation response to drought in Nebraska using Terra-MODIS land surface temperature and normalized difference vegetation index. *GIScience and Remote Sensing* 48(3):432-455, <https://doi.org/10.2747/1548-1603.48.3.432>.
 77. Sakamoto, T., **B.D. Wardlow**, and A.A. Gitelson. 2011. Detecting region-based corn phenology in the U.S. Corn Belt using MODIS WDRVI data. *IEEE Transactions on Geoscience and Remote Sensing* 49(6):1926-1936, <https://doi.org/10.1109/TGRS.2010.2095462>.
 78. Anderson, M.C., C. Hain, **B. Wardlow**, A. Pimstein, J.R. Mecikalski, and W.P. Kustas. 2011. Evaluation of a drought index based on thermal remote sensing of evapotranspiration over the continental U.S. *Journal of Climate* 24:2025-2044, <https://doi.org/10.1175/2010JCLI3812.1>.
 79. Albright, T.P., A.M. Pidgeon, C.D. Rittenhouse, M.K. Clayton, **B.D. Wardlow**, C.H. Flather, P.D. Culbert, and V.C. Radeloff. 2010. Combined effects of heat waves and droughts on avian communities across the conterminous United States. *Ecospheres* 1(5), <https://doi.org/10.1890/ES10-00057.1>.
 80. Sakamoto, T., **B.D. Wardlow**, A.A. Gitelson, S.B. Verma, A.E. Suyker, and T.J. Arkebauer. 2010. The two-step filtering approach for detecting maize and soybean phenology with time-series MODIS data. *Remote Sensing of Environment* 114(10):2146-2159, <https://doi.org/10.1016/j.rse.2010.04.019>.
 81. Masialetti, I., S.Egbert, and **B.D. Wardlow**. 2010. A comparative analysis of phenological curves for major crops in Kansas. *GIScience and Remote Sensing* 47(2):241-259, <https://doi.org/10.2747/1548-1603.47.2.241>.
 82. **Wardlow, B.D.** and S.L. Egbert. 2010. A comparison of MODIS 250-m evi and ndvi data for crop mapping in the U.S. Central Great Plains. *International Journal of Remote Sensing* 31(3):805-830, <https://doi.org/10.1080/01431160902897858>.

83. Tadesse, T., **B.Wardlow**, M. Hayes, M. Svoboda, and J. Brown. 2010. The Vegetation Outlook (VegOut): a new method for predicting vegetation seasonal greenness. *GIScience and Remote Sensing* 47(1):25-52, <https://doi.org/10.1109/ICDMW.2007.36>.
84. Albright, T., A. Pidgeon, C. Rittenhouse, M. Clayton, C. Flather, P. Culbert, **B. Wardlow**, and V. Radeloff. 2010. Effects of drought on avian community structure. *Global Change Biology* 16, 2158–2170, <https://doi.org/10.1111/j.1365-2486.2009.02120.x>.
85. Gu, Y., E. Hunt, **B.D. Wardlow**, J.B. Basara, J.F. Brown, and J.P. Verdin. 2008. Evaluation and validation of MODIS NDVI and NDWI for vegetation drought monitoring using Oklahoma mesonet soil moisture data. *Geophysical Research Letters* 35:L22401, <https://doi.org/10.1029/2008GL035772>.
86. Tadesse, T., M. Haile, G. Senay, C. Knutson, and **B.D. Wardlow**. 2008. Building integrated drought monitoring and food security systems in sub-Saharan Africa. *Natural Resources Forum* 32:265-279, <https://doi.org/10.1111/j.1477-8947.2008.00211.x>.
87. Brown, J.F., **B.D. Wardlow**, T. Tadesse, M.J. Hayes, and B.C. Reed. 2008. The Vegetation Drought Response Index (VegDRI): a new integrated approach for monitoring drought stress in vegetation. *GIScience and Remote Sensing* 45(1):16-46, <https://doi.org/10.2747/1548-1603.45.1.16>.
88. **Wardlow, B.D.** and S.L. Egbert. 2008. Large-area crop mapping using time-series MODIS 250 m NDVI data: an assessment for the U.S. Central Great Plains. *Remote Sensing of Environment* 112:1096-1116, <https://doi.org/10.1016/j.rse.2007.07.019>.
89. Gitelson, A.A., **B.D. Wardlow**, G.P. Keydan, and B. Leavitt. 2007. An evaluation of MODIS 250-data for green LAI estimation in crops. *Geophysical Research Letters* 34:L20403, <https://doi.org/10.1029/2007GL031620>.
90. **Wardlow, B.D.**, S.L. Egbert, and J.H. Kastens. 2007. Analysis of time-series MODIS 250-meter vegetation index data for crop discrimination in the U.S. Central Great Plains. *Remote Sensing of Environment* 108:290-310, <https://doi.org/10.1016/j.rse.2006.11.021>.
91. Gu, Y., J.F. Brown, J.P. Verdin, and **B.D. Wardlow**. 2007. A five-year analysis of MODIS NDVI and NDWI for grassland drought assessment over the Central Great Plains of the United States. *Geophysical Research Letters* 34:L06407 <https://doi.org/10.1029/2006GL029127>.
92. Brown, J.C., W. Jepson, J. Kastens, **B. Wardlow**, J. Lomas, and K. Price. 2007. Multi-temporal, moderate spatial resolution remote sensing of modern agricultural production and land modification in the Brazilian Amazon. *GIScience and Remote Sensing* 44(2):L1-32, <https://doi.org/10.2747/1548-1603.44.2.117>.
93. **Wardlow, B.D.**, J.H. Kastens, and S.L. Egbert. 2006. Using USDA crop progress data for the evaluation of greenup onset date calculated from MODIS 250-meter data. *Photogrammetric Engineering and Remote Sensing* 72(11):1225-1234, <https://doi.org/10.14358/PERS.72.11.1225>.
94. **Wardlow, B.D.** and S.L. Egbert. 2003. A state-level comparative analysis of the GAP and NLCD land cover data sets. *Photogrammetric Engineering and Remote Sensing* 69(12):1387-1397, <https://doi.org/10.14358/PERS.69.12.1387>.

Refereed Journal Articles (In Review)

1. Shehab, H., M. Khorchani, A. Mazis, J. Hiller, G.E. Erickson, M. Schmer, **B. Wardlow**, A. Suyker, X. Sun, A. Freidenreich, G. Birru, V. Jin and T. Awada. *Bromus Inermis* forage production and quality under long-term rotational grazing and nutrient enrichment in eastern Nebraska, U.S. *Journal TBD*.

2. Akpejelu, P., D.R. Uden, M. Douglass, **B. Wardlow**, B. Davies, R.N. Kinyanjui, E. Ndiema and D. Braun. Multi-scale remote sensing reveals vegetation greenness differences in abandoned pastoral settlements and their surrounding landscapes in northern Kenya. *Rangeland Ecology and Management Journal*.
3. Dizkova, P., L. Bartosova, M. Blahova, D. Semeradova, M. Podebradska, M. Fischer, **B.D. Wardlow**, M. Hayes, J. Balek, L. Hajkova, Z. Zalud and M. Trnka. Changes in the spatiotemporal variability in the growing season in Europe. *Global Change Biology*.
4. Rani, A., V.K. Sehgal, R. Kaur, R.N. Sahoo, V.K. Prajapati, C. Neale, M. Hayes, M. Svoboda, T. Tadesse, **B. Wardlow** and J. Swigart. Remote sensing derived high resolution multivariate composite index for spatio-temporal monitoring of agricultural drought over India. *Environment, Development and Sustainability*.
5. Atker, S., G. Birru, T. Tadesse, M. Schmer, V.L. Jin, **B. Wardlow**, A. Freidenreich and M. Khorchani. Assessing long-term patterns of corn yield and yield stability under a changing climate at Eastern Nebraska's U.S. Corn Belt. *Agriculture, Ecosystems & Environment*.
6. Mariano, D., C.A.C. dos Santos, **B.D. Wardlow**, J. Tomasella, C.M.U. Neale and M.D. Svoboda. Early detection of agricultural drought in Southern Brazil. *Remote Sensing of Environment*.
7. **Wardlow, B.D.**, M.S. Svoboda, C. Hain, M.A. Anderson, T. Tadesse, J.F. Brown and D. Mocko. Quick Drought Response Index – A Short-term Dryness Indicator for Drought Monitoring. *GIScience and Remote Sensing*.
8. Masialetti, I., **B. Wardlow** and S. Egbert. Agricultural ground reference data set creation and refinement. *GIScience and Remote Sensing*.
9. Hunt, E., **B. Wardlow**, K. Hubbard, and T. Arkebauer. A soil water climatology of a rainfed field in eastern Nebraska. *International Journal of Climatology*.

Refereed Book Chapters (Published)

1. Ferguson, R., **B. Wardlow**, J. Stansell, G. Jha, L. Bastos, G. Balboa and S. Kumari. 2026. Remote Sensing for Site-Specific Crop Management. Chapter 14, *Precision Agriculture Basics, Second Edition*.
2. **Wardlow, B.D.**, M.A. Anderson, T. Tadesse, M. Svoboda, B. Fuchs, C. Hain, W. Crow, and M. Rodell. 2024. Remote Sensing of Drought: Satellite-Based Monitoring Tools for the United States. Chapter 3, *Remote Sensing Handbook Vol. III: Water Resources, Disasters, and Urban: Monitoring, Modeling, and Mapping*, 2nd edition, ed. P. Thenakenbail, Boca Raton, FL: CRC Press.
3. **Wardlow, B.D.**, M. Anderson, C. Hain, W. Crow, J. Otkin, T. Tadesse, and A. AghaKouchak. 2017. Advancements in Satellite Remote Sensing for Drought Monitoring. Chapter 10, *Drought and Water Crisis*, 2nd Edition. Boca Raton, FL: CRC Press, 223-249.
4. **Wardlow, B.D.**, M. Anderson, T. Tadesse, C. Hain, W. Crow, and M. Rodell. 2015. Remote sensing of drought: emergence of a satellite-based toolkit for the United States. Chapter 15, *Remote Sensing Handbook Vol. III: water Resources, Disasters, and Urban: Monitoring, Modeling, and Mapping*, 1st edition, ed. P. Thenakenbail, Boca Raton, FL: CRC Press, 367-399.
5. Domingo, C., X. Pons, J. Cristobal, M. Ninyerola, and **B. Wardlow**. 2015. Integration of climate time series and MODIS data as an analysis tool for forest drought detection. Chapter 13 in *Drought Research and Science-Policy Interfacing*, eds. J. Adreu-Alvarez, A. Solera, J. Paredes-Arquiola, D. Haro-Monteagudo, and H. van Lanen, Boca Raton, FL: CRC Press, 97-104.
6. **Wardlow, B.D.**, T. Tadesse, J.F. Brown, K. Callahan, S. Swain, and E. Hunt. 2012. The Vegetation Drought Response Index (VegDRI): an integration of satellite, climate, and biophysical data. In

- Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow, M.A. Anderson, and J. Verdin, Boca Raton, FL:CRC Press, 51-74.
7. **Wardlow, B.D.**, M.A. Anderson, J. Sheffield, B. Doorn, J.P. Verdin, X. Zhan, M. Rodell. 2012. Future opportunities and challenges in remote sensing of drought. In *Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow. M.A. Anderson, and J.P. Verdin, Boca Raton, FL:CRC Press, 389-409.
 8. Tadesse, T., **B.D. Wardlow**, M. Hayes, and M. Svoboda. 2012. The Vegetation Outlook (VegOut): a new method for predicting vegetation seasonal greenness. In *Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow. M.A. Anderson, and J.P. Verdin, Boca Raton, FL:CRC Press, 75-94.
 9. Nghiem, S.V., **B.D. Wardlow**, D. Allured, M.D. Svoboda, D. LeComte, M. Rosencrans, S.K. Chan, and G. Neumann. 2012. Microwave remote sensing of soil moisture – science and applications. In *Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow. M.A. Anderson, and J.P. Verdin, Boca Raton, FL:CRC Press, 197-226.
 10. Hayes, M., M. Svoboda, **B.D. Wardlow**, M.C. Anderson, and F. Kogan. 2012. Drought monitoring: historical and current perspectives. In *Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow. M.A. Anderson, and J.P. Verdin, Boca Raton, FL:CRC Press, 1-22.
 11. Anderson, M.C., C. Hain, **B.D. Wardlow**, A. Pimstein, J.R. Mecikalski, and W.P. Kustas, 2012. A drought index based on thermal remote sensing of evapotranspiration. In *Remote Sensing of Drought: Innovative Monitoring Approaches*, eds. B.D. Wardlow. M.A. Anderson, and J.P. Verdin, Boca Raton, FL:CRC Press, 145-168.
 12. Harms, S., T. Tadesse, and **B. Wardlow**. 2009. Algorithm and feature selection for VegOut: a vegetation condition prediction tool. In *Discovery Science: Lecture Notes in Computer Science*, eds. J. Gama et al., Berlin/Heidelberg, Germany:Springer, 107-120.
 13. Tadesse, T., **B. Wardlow**, and M. Hayes. 2008. The application of data mining for drought monitoring and prediction. *Data Mining Applications for Empowering Knowledge Societies*, New York, NY: Idea Group Publishers, 280-291.

Books Edited

1. **Wardlow, B.D.**, M.C. Anderson, and J.P. Verdin. 2012. *Remote Sensing and Drought: Innovative Monitoring Approaches*. Boca Raton, FL:CRC Press.

Ph.D. Dissertation

2. **Wardlow, B.D.** 2005. *An Evaluation of Time-Series MODIS 250-Meter Vegetation Index Data for Crop Mapping in the U.S. Central Great Plains*. Ph.D. Dissertation, University of Kansas, Lawrence, KS.

Master's Thesis

1. **Wardlow, B.D.** 1996. *Temporal Monitoring of Suspended Sediment Patterns Using Landsat Thematic Mapper Imagery – A Study of Tuttle Creek Reservoir, Kansas*. Master's thesis, Kansas State University, Manhattan, KS.

Other Refereed Publications and Conference Proceedings

1. Gamon, J., G. Hmimina, G. Miao, K. Guan, K. Springer, R. Wang, H. Ghaolizadeh, R. Moore, E. Walter-Shea, T. Arkebauer, A. Suyker, T. Franz, **B. Wardlow** and D. Wedin. 2018. Imaging spectrometry and fluorometry in support of FLEX: what can we learn from multi-scale experiments? *IEEE Geoscience and Remote Sensing Society Symposium (IGARSS)*, Valencia, Spain July 23-27.

2. Zambrano, F., **B. Wardlow** and T. Tadesse. 2016 Evaluating satellite-derived long-term historical precipitation datasets for drought monitoring in Chile. *Proceedings of SPIE, Remote Sensing for Agriculture, Ecosystems and Hydrology XVIII*. 999823, doi: 10.1117/12.2241032.
3. Semeradova, D., M. Trnka, P. Hlavinka, J. Balek, T. Tadesse, M. Hayes, **B. Wardlow**, V. Lukas and Z. Zalud. 2015. Utilization of remote sensing data in agricultural drought monitoring. *Towards Climate Services Conference*, Nitra, Slovakia, Sept. 15-18.
4. Lawford, R., D. Toll, B. Doorn, J. Entin, D.M. Mocko, M. Svoboda, M. Rodell, R. Koster, S. Shubert, X.-Z. Liang, X. Cai, **B. Wardlow**, Y. Xia, J. Verdin, and M. Ek. 2014. On the use of NASA Earth observations to characterize the 2012 U.S. Drought. *Global Energy and Water Exchanges (GEWEX) News*, World Climate Research Program 23(2): 13-16.
5. Semeradova, D., M. Trnka, P. Hlavinka, J. Balek, R. Bohovic, T. Tadesse, M. Hayes, B. Wardlow and Z. Zalud. 2014. Detection of drought events using combination of satellite data and soil moisture modeling. *Mendel and Bioclimatology*, Masaryk University, Brno, Czech Republic, 403-412.
6. Semeradova, D., P. Hlavinka, M. Trnka, L.V. Bohovic, T. Tadesse, **B. Wardlow**, M. Hayes, and Z. Zalud. 2013. Remotely sensed NDVI as an indicator of drought stress on the vegetation. *Environmental Changes and Adaptation Strategies Conference*, Sholica, Slovakia, September 9-11, 3 pp.
7. Hlavinka, P., D. Semeradova, M. Trnka, V. Lukas, R. Bohovic, J. Balek, **B. Wardlow**, M. Hayes, T. Tadesse, and Z. Zalud. 2013. Remotely sensed NDVI as a support tool for agricultural drought assessment. *International Global Change and Resilience Conference*, Brno, Czech Republic, May 22-24.
8. Sivakumar, M.V.K., R. Stone, P.C. Sentelhas, M. Svoboda, P. Omondi, J. Sarkar, and **B. Wardlow**. 2011. Agricultural drought indices: summary and recommendations. *Proceedings of the WMO/UNISDR Expert Group Meeting on Agricultural Drought Indices*, 2-4 June 2-1-, Murcia, Spain: Geneva, Switzerland: World Meteorological Organization, AGM-11, WMO/TD No. 1572; WOAB-2011, 157-182.
9. Hain, C.R., M.C. Anderson, X. Zhan, M. Svoboda, **B. Wardlow**, K. Mo, J.. Meckalski, W.P. Kustas, and J. Brown. 2011. A GOES thermal-based drought early warning index for NIDIS. *Science and Technology Infusion Climate Bulletin*, 36th NOAA Annual Climate Diagnostics and Prediction Workshop, Fort Worth, TX, October 3-6.
10. Houborg, R., M. Rodell, J. Lawrimore, B. Li, R. Reichle, R. Heim, M. Rosencrans, R. Tinker, J. Famiglietti, M. Svoboda, **B. Wardlow**, and B. Zaitchik. 2010. Using enhanced GRACE water storage data to improve drought detection by the U.S. and North American drought monitors. *IEEE International Geoscience and Remote Sensing Symposium*, Honolulu, HI, July 25-30.
11. **Wardlow, B.D.**, M.J. Hayes, M.D. Svoboda, T. Tadesse, and K.H. Smith. 2009. Sharpening the Focus on Drought – New Monitoring and Assessment Tools at the National Drought Mitigation Center. *Earthzine*. Available online at: <http://www.earthzine.org/2009/03/30/sharpening-the-focus-on-drought-%e2%80%93-new-monitoring-and-assessment-tools-at-the-national-drought-mitigation-center/>.
12. **Wardlow, B.D.**, T. Tadesse, J.F. Brown, and Y. Gu. 2008. The Vegetation Drought Response Index (VegDRI): a new drought monitoring approach for vegetation. *National Integrated Drought Information System (NIDIS) Knowledge Assessment Workshop – Contributions of Satellite Remote Sensing to Drought Monitoring*, Boulder, CO, February 6-7.
13. Tadesse, T., **B.D. Wardlow**, and J.H. Ryu. 2008. Identifying time-lag relationships between vegetation condition and climate to produce vegetation outlook maps and monitor drought.

14. Tadesse, T. and **B Wardlow**. 2007. The Vegetation Outlook (VegOut): a new tool for providing outlooks of general vegetation conditions using data mining techniques. *Seventh IEEE International Conference on Data Mining*, Omaha, NE, October 28-31

Non-Refereed Conference Proceedings

1. Kulkarni, S., **B. Wardlow**, S. Gedam, T. Tadesse, Y. Bayissa and M. Svoboda. 2020. Remotely sensed assessment of droughts using combined index approach over the semi-arid region of India. *IEEE International Geoscience and Remote Sensing Symposium*, Waikaloa, HI, July 19-24.
2. Burdette, B.J., M.S. McGuire, W.E. Woldt, C.M.U. Neale, **B.D. Wardlow**, J.A. Gamon, B.C. Leavitt and D.M. Heeren. 2018. Calibration of unmanned aircraft mounted shortwave multispectral camera system for use in evapotranspiration modeling. *American Society of Agricultural and Biological Engineers Annual International Meeting*, Detroit, MI July 29-August 1.
3. **Wardlow, B.D.**, T. Tadesse, J.F. Brown, M. Svoboda, M. Hayes, K. Callahan, C. Poulsen, C. Hain, M. Anderson, M. Rodell, and D. Mocko. 2015. A satellite-based composite index approach for agricultural drought monitoring – current work and future directions. *3rd Inter-drought Summer School Proceedings*, Mikulov, Czech Republic, June 8-10.
4. Tadesse, T., T. Haigh, N. Wall, M.J. Hayes, B. Zaitchik, and **B. Wardlow**. 2015. Lessons learned in monitoring and predicting hydroclimatic extremes in the Greater Horn of Africa. *3rd Inter-drought Summer School Proceedings*, Mikulov, Czech Republic, June 8-10.
5. Semeradova, D., M. Trnka, P. Hlavinka, J. Balek, R. Bohovic, T. Tadesse, M. Hayes, B. Wardlow, E. Pohankova, V. Luka, and Z. Zalud. 2015. Agricultural drought and remote sensing. *4th Annual Conference on Global Change: A Complex Challenge*, Brno, Czech Republic, March 23-24.
6. Brown, J.F., **B. Wardlow**, T. Tadesse, D. Howard, K. Callahan, and C. Poulsen. 2014. Satellite data continuity for drought monitoring in VegDRI and QuickDRI models and products. *Pecora 19: Sustaining Land Imaging: UAS to Satellites*, Denver, CO, November 17-20.
7. Hlavinka, P., D. Semeradova, M. Trnka, V. Lukas, R. Bohovic, J. Balek, B. Wardlow, M. Hayes, T. Tadesse, and Z. Zalud. 2013. Remotely sensed NDVI as a support tool for agricultural drought assessment. *International Global Change and Resilience Conference*, Brno, Czech Republic, May 22-24.
8. Hlavinka, P., M. Trnka, D. Semeradova, P. Dobrovolny, J. Balek, M. Mozny, P. Stepanek, M. Hayes, M. Svoboda, **B. Wardlow**, and Z. Zalud. 2012. Using remotely sensed NDVI for drought impact assessment within selected crops. *BioClimate 2012 – Bioclimatology of Ecosystems*, Labem, Czech Republic, August 29-31.
9. Zalud, Z., D. Semeradova, M. Trnka, P. Hlavinka, J. Balek, M. Svoboda, M. Hayes, **B. Wardlow**, M. Dubrovsky, J. Eitzinger, M. Mozny, and K.C. Kersebaum. 2011. Soil hydric regimes under climate change scenarios in Czech Republic. *BioClimate 2011 – Source and Limit of Social Development International Scientific Conference*, Topolcianky, Slovakia, September 6-9.
10. Brown, J., T. Miura, **B. Wardlow**, and Y. Gu. 2010. Merging climate and multi-sensor time-series data in real-time drought monitoring across the USA. *34th International Symposium on Remote Sensing of Environment*, Sydney, Australia, April 10-15.
11. **Wardlow, B.D.** 2010. Emerging remote sensing applications for drought monitoring. *Proceedings of the Inter-Regional Workshop on Drought Indices and Early Warning Systems for Drought*, Lincoln, NE, December 8-11, 2009.

12. Houborg, R., M. Rodell, B. Li, R. Reichle, R. Heim, J. Lawrimore, M. Rosencrans, R. Tinke, J.S. Famiglietti, M. Svoboda, **B. Wardlow**, and B.F. Zaitchik. 2010. Toward integrating enhanced terrestrial water storage data into the U.S. and North American drought monitors. American Meteorological Society 90th Annual Meeting, Atlanta, GA, January 18-21.
13. Brown, J.F., S. Pervez, **B. Wardlow**, T. Tadesse, and K. Callahan. 2008. Assessment of 2006 and 2007 drought patterns in the Vegetation Drought Response Index across Nebraska. *Proceedings, Pecora 17*, Denver, CO, November 18-20.
14. Tadesse, T., **B.D. Wardlow**, and J.H. Ryu. 2008. Identifying time-lag relationships between vegetation condition and climate to produce vegetation outlook maps and monitor drought. 88th American Meteorological Society Annual Meeting, New Orleans, LA, January 20-24.
15. Brown, J.F., S. Maxwell, S. Pervez, **B. Wardlow**, and K. Callahan. 2008. National irrigated lands mapping via an automated remote sensing based methodology. 88th American Meteorological Society Annual Meeting, New Orleans, LA, January 20-24.
16. Brown, J. Christopher, J.H. Kastens, **B.D. Wardlow**, W. Jepson, A.C. Coutinho, A. Venturieri, J. Lomas, K. Price. 2007. Using MODIS to detect cropping frequency variation in mechanized agriculture in Amazonia. *XIII Brazilian Symposium of Remote Sensing*, Florianópolis, Santa Catarina, Brazil. April 21-26.
17. **Wardlow, B.D.** and S.L. Egbert. 2005. State-level crop mapping in the U.S. Central Great Plains agroecosystem using MODIS 250-meter NDVI data. *Proceedings, Pecora 16*, Sioux Falls, SD, October 23-27.
18. **Wardlow, B.D.** and S.L. Egbert. 2002. Discriminating cropping patterns in the U.S. Central Great Plains region using time-series MODIS 250-meter NDVI data – Preliminary Results. *Proceedings, Pecora 15 and Land Satellite Information IV Conference*, Denver, CO, November 10-15.
19. **Wardlow, B.D.** and S.L. Egbert. 2001. A comparison of the GAP and USGS NLCD land cover data sets for the state of Kansas – classification systems, methods, and results. *Proceedings, 2001 American Society of Photogrammetry and Remote Sensing*, St. Louis, MO, April 23-27.

White Papers

1. **Wardlow, B.** 2011. *New and Emerging Remote Sensing Approaches for Drought Monitoring*. Submitted to United Nation (UN) Foreign Agricultural Organization (FAO), Ankara, Turkey office.
2. **Wardlow, B.** 2011. *Introduction to Satellite Remote Sensing for Drought Monitoring*. Submitted to United Nation (UN) Foreign Agricultural Organization (FAO), Ankara, Turkey office.
3. **Wardlow, B.**, M. Hayes, M. Svoboda, and T. Tadesse. 2010. *Opportunities for Integrating NASA Data into Drought Applications: A Prospectus from the National Drought Mitigation Center (NDMC)*. Submitted to NASA Water Resources Applied Sciences Program.

Other Publications

1. *The Vegetation Drought Response Index (VegDRI) brochure*. 2011. National Drought Mitigation Center, University of Nebraska-Lincoln.
2. Drought Monitoring with VegDRI. 2010. *U.S. Geological Survey Fact Sheet*, 2010–3114, 2 p.

Abstracts for Professional Meetings (for Presentation or Poster)

1. Li, H., K. Gribben, J.D. Berman, Y. Gwon, A. Abadi, **B. Wardlow**, D. Tong and J.E. Bell. 2025. A multi-indicator quantitative analysis of drought effects on PM_{2.5} in the U.S. *American Geophysical Union (AGU) Annual Meeting*, New Orleans, LA, December 15-19.

2. Tuyambaze, S., R. Wang, J.A. Gamon and **B. Wardlow**. 2025. Monitoring productivity of terrestrial ecosystems using hyperspectral satellite data. *American Geophysical Union Annual Meeting*, New Orleans, LA, December 15-19.
3. Shehab, H., M. Khorchani, J. Hiller, M. Schmer, A. Suyker, V. Jin, A. Mazis, G. Erickson, **B. Wardlow**, X. Sun, G. Birru and T. Awada. 2025. *Bromus Inermis* forage production and quality under long-term rotational grazing and nutrient enrichment in eastern Nebraska, US. *American Geophysical Union (AGU) Annual Meeting*, New Orleans, LA, December 15-19.
4. Bell, J.E., J.D. Berman, Y. Gwon, **B. Wardlow**, D. Tong, A. Abadi, Z. Tao and R. Lookadoo. 2024. Identifying public health applications of satellite-derived drought indicators. *American Geophysical Union Chapman Conference*, Honolulu, HI, February 13-16.
5. Atker, S., G. Birru, T. Tadesse, M. Schmer, V. Jin, A.S. Freidenreich, A. Zoller, T.P. Kharel and B. Wardlow. 2023. Impact of management systems on corn yield and yield stability under a changing climate. *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, December 11-15.
6. Berkowitz, N., **B. Wardlow**, D. Uden, A. Basche and T.E. Franz. 2023. Investigation in remotely field dynamics: estimated perspectives of enhanced insights. . *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, December 11-15.
7. Shifrew, A., G. Birru, T. Tadesse, V.L. Jin, M. Schmer and B. Wardlow. 2023. Adapting cover crop management to current climate conditions in continuous corn systems in eastern Nebraska. *ASA, CSSA and SSSA Annual International Meeting*, St. Louis, MO, October 29-November 1.
8. Zhao, B., Y. Shi, M. Stephenson, T. Awada, **B. Wardlow**, J. Hiller, A. Watson and X. Yioing. 2023. Forage biomass estimation for smooth brome grass using drone-based remote sensing to evaluate effects of treatments with nitrogen fertilization and cattle nutrient supplement. *Society of Rangeland Management Annual Meeting*, Sparks, NV, January 8-February 1.
9. Birru, B., A. Shiferaw, V.L. Jin, M. Schmer, T. Tadesse, **B. Wardlow** and T. Awada. 2022. Cover crop performance under a changing climate in continuous maize system over Nebraska. *ASA, CSSA and SSSA Annual International Meeting*, Baltimore, MD, November 6-9.
10. Shiferaw, A., G. Birru, **B. Wardlow**, T. Tadesse, M. Schmer, V. Jin, T. Awada and K. Koehler-Cole, K., 2021. Optimizing cover crop decisions for enhanced climate change adaptation, mitigation, and agro-ecosystem benefits. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 13-17.
11. Podebradska, M., B.K. Wylie, M.J. Hayes, **B.D. Wardlow**, D.J. Bathke, C. Dahal and Y.A. Bayissa. 2020. Combining seasonal climate scenarios with forage production models to inform drought decision-making. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 7-11.
12. Flanagan, P.X., R. Mahmood, T. Sohl, M. Svoboda, **B. Wardlow**, M. Hayes and E. Rappin. 2019. Impacts of future land-use and land-cover on boundary layer development in the north-central United States. *American Meteorological Society 100th Annual Meeting*, Boston, MA, January 13-17.
13. Li, Y., K. Guan, B. Peng, T.E. Franz, **B. Wardlow** and M. Pan. 2019. Assessing the contribution of cooling and water supply to yield benefits due to irrigation. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 9-13.
14. Podebradska, M., B.K. Wylie, M.J. Hayes, **B.D. Wardlow** and D.J. Bathke. 2019. Monitoring drought impacts on annual forage production in semi-arid grasslands. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 9-13.

15. Podebradska, M., B.K. Wylie, M.J. Hayes, **B.D. Wardlow** and D.J. Bathke. 2019. Developing a tool to monitor drought impacts on Nebraska Sandhills grasslands. *Society for Rangeland Management Annual Meeting*, Minneapolis, MN February 10-14.
16. Gamon, J.A., A. Suyker, E.A. Walter-Shea, T.J. Arkebauer, A.I. Zygierbaum, T. Franz, T. Awada, **B. Wardlow**, G. Hmimina, H. Gholizadeh, R. Yu, A. Mazis, K. Guan, G. Miao, T. Avenson, J.A. Berry, D. Wedin, A. Kornfeld and R. Moore. 2018. The Nebraska SIF campaign – a multi-scale field experiment. *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, Dec. 10-14.
17. Tadesse, T., Y.A. Bayissa, B. Fuchs, M.D. Svoboda and **B. Wardlow**. 2018. A PCA-based objective drought indicator (ODI) blends using climate and satellite datasets to improve the United States Drought Monitor (USDM). *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, Dec. 10-14.
18. Hain, C., M. Anderson, J. Otkin, F. Gao, T. Holmes, M.D. Svoboda, **B. Wardlow** and R.L. Terault. 2018. Development of a global evaporative stress index based on thermal and microwave LST towards improved monitoring of agricultural drought. *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, Dec. 10-14.
19. Yang, Y., M. Anderson, F. Gao, C. Hain, J. Otkin, **B. Wardlow**, Y. Yang, L. Sun, J.G. Alfieri and W. Dulaney. 2018. Satellite-based mapping of field-scale stress indicators for crop yield forecasting: an application across the Corn Belt, USA. *American Geophysical Union (AGU) Annual Meeting*, Washington, DC, Dec. 10-14.
20. Podebradska, M. B.K. Wylie, M.J. Hayes, B. D. Wardlow and D.J. Bathke. 2018. Developing a tool to monitor drought impacts on Sandhills grasslands using an ecosystem performance approach. *Great Plains Grassland Summit*, Denver, CO, April 10-11.
21. Mariano, D.A., C.A. Costa dos Santos and **B. Wardlow**. 2017. Detecting drought and human-induced land degradation using time series trend analysis in northeastern Brazil drylands. *American Geophysical Union (AGU) Annual Meeting*, New Orleans, LA, Dec. 11-15.
22. Yang, Y., M.C. Anderson, F. Gao, **B. Wardlow**, C. Hain, J. Otkin, L. Sun and W. Dulaney. 2017. Satellite-based mapping of field-scale stress indicators for crop yield forecasting: an application over Mead, NE. *American Geophysical Union (AGU) Annual Meeting*, New Orleans, LA, Dec. 11-15.
23. Tadesse, T., Y.A. Bayissa, G.B. Demisse and **B. Wardlow**. 2017. Predicting the vegetation condition of the 2015-16 drought across the Great Horn of Africa (GHA): model evaluation and preliminary results. *American Geophysical Union (AGU) Annual Meeting*, New Orleans, LA, Dec. 11-15.
24. Tadesse, T., G. Demisse, Y.A. Bayissa, and **B. Wardlow**. 2017. Vegetation Outlook for the Greater Horn of Africa (VegOut-GHA): a seasonal prediction model. *NASA IDS Seasonal Prediction of Hydro-Climatic Extremes in the Greater Horn of Africa 3rd Participatory Research Workshop*, Addis Abba, Ethiopia, Oct. 25-26.
25. Bumann, E., T. Awada, **B. Wardlow**, M. Hayes, C. Helzer, J. Hiller and P. Cherubini. 2017. Assessing climatic responses of *betula papyrifera* (paper birch) in a remnant population along the Niobrara River in Nebraska through dendroecological and remote sensing techniques. *Ecological Society of America Annual Meeting*, Portland, OR, August 6-11.
26. Sanchez, N., A. Gonzalez-Zamora, J. Martinez-Fernandez, M. Piles, M. Pablos, **B. Wardlow**, T. Tadesse and M. Svoboda. 2017. Preliminary assessment of an integrated SMOS and MODIS application for global agricultural drought monitoring. *IEEE International Geoscience and Remote Sensing Symposium*, Fort Worth, TX, July 23-28.

27. Tadesse, T., G.B. Demisse, Y.A. Bayissa and **B.D. Wardlow**. 2017. Vegetation outlook for the Greater Horn of Africa (VegOut-GHA): a seasonal prediction model. *International Agro-meteorology Conference*, Addis Abba, Ethiopia, July 3-5.
28. Mariano, D. and **B. Wardlow**. 2017. Timing and magnitude assessment of drought indicators for crops in the Midwestern U.S. *2017 Water for Food Global Conference*. Lincoln, NE April 10-12.
29. Bumann, E., T. Awada, B. Wardlow, M. Hayes, C. Helzer, J. Hiller and P. Cherubini. 2017. Assessing annual growth response to climate variability in birch trees (*Betula Papyrifera*) along the Niobrara River valley of NE using dendroecological and remote sensing techniques. *2017 Water for Food Global Conference*. Lincoln, NE April 10-12.
30. Geli, H.M.E., T. Jedd, M. Svoboda, B. Wardlow, M.J. Hayes, C.M.U. Neale, C. Hain and M.C. Anderson. 2016. Evaluation of the performance of multiple drought indices for Tunisia. *American Geophysical Union (AGU) Fall General Assembly*, San Francisco, CA December 12-14.
31. Stafford, T., B. Wardlow, M. Vaitkus, B. Leavitt, and R. Perk. 2015. Comparison of PhenoCam and Landsat greenness signals for two tallgrass prairies. *AAG Great Plains/Rocky Mountain Division Meeting*, Kearney, NE, October 9-10.
32. Brown, J.F., **B. Wardlow**, T. Tadesse, D. Howard, K. Callahan, and C. Poulsen. 2014. Satellite data continuity for drought monitoring in VegDRI and QuickDRI models and products. *Pecora 19: Sustaining Land Imaging: UAS to Satellites*, Denver, CO November 17-20.
33. Aegerter, C., J. Wang, C. Ge, A. L. Kessner, A. Sharma, L. Judd, **B. Wardlow**, J. You, M. Shulski, S. Irmak, and A. Kilic. 2014. Modeling and satellite remote sensing of the meteorological effects of irrigation during the 2012 Central Plains drought. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 14-18.
34. Hunt, R., A. Gitelson, and **B. Wardlow**. 2014. The comparison of evaporative demand and evapotranspiration to soil moisture over maize fields during a flash drought. *American Geophysical Union (AGU) Annual Meeting*, San Francisco, CA, Dec. 14-18.
35. Domingo, C., M. Ninyerola, X. Pons, **B. Wardlow**, and J. Cristobal. 2014. Integration of MODIS and Climate Time Series as an Analysis Tool for Forest Drought Detection, *Global vegetation Monitoring and Modeling International Conference*, Avignon, France, February 3-7.
36. Frels, K., M. Gutteri, L. Doetterer, F. Al-Aboud, R. Perk, B. Leavitt, **B. Wardlow**, and P. Baenziger. 2013. Evaluation of airborne hyperspectral imaging for us in nitrogen use efficiency phenotyping of hard winter wheat. *ASA-CSSA-SSSA International Meeting*, Tampa, FL, November 3-6.
37. Hunt, E., **B. Wardlow**, M. Svoboda, K. Hubbard, T. Arkebauer. 2012. Use of standardized drought indices to monitor the rapid onset of agricultural drought at a non-irrigated maize site. *ASA-CSSA-SSSA International Meeting*, Cincinnati, OH, October 20-24.
38. Hunt, E., **B. Wardlow**, M. Svoboda, K. Hubbard, and T. Arkebauer. 2012. Comparison of standardized drought indices to monitor rapid onset agricultural drought at Mead, NE: a case study of the 2003 growing season. *Water for Food Conference*, Lincoln, NE, May 30 – June 1.
39. **Wardlow, B.**, M. Hayes, T. Tadesse, K. Callahan, and M. Svoboda. 2012. National Drought Mitigation Center – delivering drought information services to the world. *Using Satellites for Better Water and Environment Management, Joint Training Session by the World Bank and U.S. Government Agencies Working in Remote Sensing*, Washington, DC, February 29.
40. Sakamoto, T., A. Gitelson, A.L. Nguy-Robertson, T.J. Arkebauer, **B. Wardlow**, and M. Shibayama. 2011. Using digital cameras for continuous monitoring of crop status. *American Geophysical Union Annual Meeting*, San Francisco, CA, December 5-9.

41. Albright, T.P., A. Pidgeon, V. Radeloff, **B. Wardlow**. 2011. Identifying thermally challenging landscapes and time periods for wildlife using remote sensing. *American Geophysical Union Annual Meeting*, San Francisco, CA, December 5-9.
42. **Wardlow, B.D.** 2011. New directions in satellite remote sensing for drought monitoring. *International Workshop on Water-related Disaster Prediction and Reduction*, Hohai University, Nanjing, China, November 28-December 1.
43. Sakamoto, T., M. Shibayama, **B.D. Wardlow**, A.A. Gitelson, S.B. Verma, A.E. Suyker, T.J. Arkebauer, E. Takada, K. Morita, W. Takahashi, and S. Miura. 2011. Application of digital camera for logging seasonal changes in crop growth and estimating bio-physical parameters. *51st Autumn Conference of the Remote Sensing Society of Japan*, Hiroaki, Aomori, Japan, November 10-11.
44. Brown, J., D. Howard, **B. Wardlow**, K. Callahan, and C. Poulsen. 2011. Monitoring drought stress across multiple vegetation types within the Upper Colorado River Basin. *World Climate Research Programme Open Science Conference – Climate Research in Service to Society*, Denver, CO, October 24-28.
45. Hunt, E.H., **B. Wardlow**, K. Hubbard, and T. Arkebauer, T. 2011. An analysis of eight years of soil moisture over three agroecosystems at Mead, NE. *American Society of Agronomy-Crop Science Society of America-Soil Science Society of America International Annual Meetings*, San Antonio, TX, October 16-19.
46. Albright, T., C. Rittenhouse, A. Pidgeon, P. Culbert, M. Clayton, C. Flather, **B. Wardlow**, and V. Radeloff. 2011. Timing and geography structure of heat wave and drought effects on avian community dynamics. *NASA Carbon Cycle and Ecosystems Joint Science Workshop*, Alexandria, VA, October 3-7.
47. Hunt, E.H., **B. Wardlow**, K. Hubbard, T. Schimelfenig, G. Roebke. 2011. An analysis of eight years of soil moisture over three agroecosystems at Mead, NE. *2011 Water For Food Conference*, Lincoln, NE, May 2-4.
48. **Wardlow, B.D.** 2011. Vegetation Drought Response Index (VegRI): a tool for agricultural drought monitoring, *NASA Global Drought Monitoring Workshop*, Silver Springs, MD, April 11-12.
49. Swain, S., S. Narumalani, B. Wardlow, D. Rundquist, and M.J. Hayes. 2011. Relationships among vegetation indices, canopy temperatures, and root-zone soil moisture in the U.S. Corn Belt: a close-range sensing approach. *Association of American Geographers Annual Meeting*, Seattle, WA, April 12-16.
50. Albright, T.P., C.D. Rittenhouse, A.M. Pidgeon, M.L. Clayton, P.D. Culbert, V.R. Radeloff, C.H. Flather, and **B.D. Wardlow**. 2011. Timing and geography structure heat wave and drought effects on avian community dynamics. *5th International Conference of the International Biogeography Society*, Irakleio Crete, Greece, January 7-11.
51. Sakamoto, T., M. Shibayama, **B.D. Wardlow**, A.A. Gitelson, S.B. Verma, A.E. Suyker, T.J. Arkebauer, E. Takada, and K. Morita. 2010. Application of low-cost digital image camera data for monitoring and recording seasonal changes in crop growth. *American Society of Photogrammetry and Remote Sensing Annual Meeting*, San Diego, CA, April 26-30.
52. Brown, J.F., **B.D. Wardlow**, and T. Tadesse. 2010. Advantages of real-time satellite data for operational drought monitoring: the utility of MODIS and AVHRR. *Association of American Geographers Annual Meeting*, Washington, DC, April 14-18.
53. Swain, S., S. Narumalani, **B.D. Wardlow**, T. Tadesse, and K. Callahan. 2010. Evaluating drought-induced changes in grassland and cropland cover types in southwestern Nebraska using Terra-MODIS LST and NDVI. *Association of American Geographers Annual Meeting*, Washington, DC, April 14-18.
54. Callahan, K., **B.D. Wardlow**, J.F. Brown, Y. Gu, S. Pervez, and S. Maxwell. 2010. Accuracy assessment of the 2000 MODIS irrigated agriculture dataset. *Association of American Geographers Annual Meeting*, Washington, DC, April 14-18.

55. Tadesse, T., **B.D. Wardlow**, K. Callahan, and C.C. Poulsen. 2010. Integrating satellite, climate, oceanic, and biophysical information to predict the general vegetation condition. *Association of American Geographers Annual Meeting*, Washington, DC, April 14-18.
56. Albright, T., C. Rittenhouse, A. Pidgeon, C. Flather, M. Clayton, **B. Wardlow**, P. Culbert, and V. Radeloff. 2010. Birds under stress: effects of heat waves and drought on U.S. avian communities. *Association of American Geographers Annual Meeting*, Washington, DC, April 14-18.
57. Tadesse, **B. Wardlow**, M. Hayes, M. Svoboda, J. Li, K. Callahan, and C.C. Poulsen. 2010. Scenario-based Vegetation Outlook (S-VegOut): predicting general vegetation condition using different scenarios over the central United States. *90th Annual American Meteorological Society Annual Meeting*, Atlanta, GA, January 17-21.
58. Sakamoto, T., **B.D. Wardlow**, A.A. Gitelson, S.B. Verma, A.E. Suyker, and T.J. Arkebauer. 2009. Detecting crop growth stage of maize and soybeans using time-series MODIS data. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18.
59. Brown, J.F., M.A. Anderson, and **B.D. Wardlow**. 2009. Remote sensing techniques for monitoring drought hazards: an intercomparison. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18.
60. Svoboda, M., M. Hayes, C. Knutson, and **B. Wardlow**. 2009. A look into the National Drought Mitigation Center: providing 15 years of drought services. *American Geophysical Union Fall Meeting*, San Francisco, CA, December 14-18.
61. Sakamoto, T. and **B.D. Wardlow**. 2009. Developing a simple algorithm for early identification of corn and soybean fields in Nebraska with MODIS time-series imagery. *4th Global Vegetation Workshop*, Missoula, MT, June 15-19.
62. Tadesse, T. and **B.D. Wardlow**. 2009. Predicting vegetation conditions by integrating climate, satellite, oceanic, and environmental data – a case study for the central U.S. *4th Global Vegetation Workshop*, Missoula, MT, June 15-19.
63. **Wardlow, B.D.** and T. Tadesse. 2009. A hybrid-based remote sensing approach for predicting vegetation conditions – results from the central U.S. *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27.
64. Brown, J., **B. Wardlow**, T. Tadesse, K. Callahan, and S. Pervez. 2009. Monitoring recent drought effects on corn yields across the corn belt with the Vegetation Drought Response Index. *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27.
65. Swain, S., S. Narumalani, **B. Wardlow**, and T. Tadesse. 2009. An integrated approach for drought induced vegetation stress assessment in Nebraska using remote sensing and GIS. *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27.
66. Albright, T.P., C.D. Rittenhouse, A.M. Pidgeon, C.D. Flather, P.D. Culbert, M.K. Clayton, **B.D. Wardlow**, and V.C. Radeloff. 2009. Diverse responses of avian communities to heat waves. *Association of American Geographers Annual Meeting*, Las Vegas, NV, March 22-27.
67. Tadesse, T., **B.D. Wardlow**, and J.H. Ryu. 2009. Discovering the spatial and temporal relationships between vegetation condition and climate in monitoring drought. *Climate Prediction Applications Science Workshop*, Norman, OK, March 23-25.
68. Brown, J.F. and **B.D. Wardlow**. 2008. Improving decision support for drought using new geospatial models and online tools. *A Conference on Ecosystem Services (ACES)* Naples, FL, December 8-11.
69. Swain, S., S. Narumalani, **B. Wardlow**, and T. Tadesse. 2008. An assessment of vegetation response to drought in Nebraska using Terra-MODIS land surface temperature and normalized difference

- vegetation index. *AAG Great Plains-Rocky Mountain Regional Meeting*. Grand Forks, ND, September 12-13.
70. Gu, Y., E. Hunt, **B. Wardlow**, J.B. Basara, J.F. Brown, and J.P. Verdin. 2008. Evaluation and validation of MODIS NDVI and NDWI for vegetation drought monitoring over the Central Great Plains of the United States. *XXI Congress for the International Society for Photogrammetry and Remote Sensing (ISPRS)*, Beijing, China, July 3-11.
 71. **Wardlow, B.D.**, T. Tadesse, J.F. Brown, Y. Gu, and K. Callahan. 2008. The Vegetation Drought Response Index (VegDRI) – Zooming in to a Local Scale to Meet the Needs of the Drought Monitoring Community. *Association of American Geographers Annual Meeting*, Boston, MA, April 15-19.
 72. Albright, T.P., A.M. Pidgeon, M.K. Clayton, C.H. Flather, C.D. Rittenhouse, **B.D. Wardlow**, and V.C. Radeloff. 2008. Characterization and influence of drought on avian abundance and diversity in the Great Plains, USA. *US Regional Association of the International Association of Landscape Ecology Annual Meeting*, Madison, WI, April 6-10.
 73. Brown, J.F., Pervez, S., **Wardlow, B.**, Tadesse, T. and Callahan, K.. 2008. Assessment of 2006 and 2007 drought patterns in the Vegetation Drought Response Index across Nebraska. *Pecora 17 Symposium*, Denver, CO, November 16-18.
 74. Tadesse, T., **B.D. Wardlow**, and J.H. Ryu. 2008. Monitoring and predicting general vegetation condition using climatic, satellite, oceanic, and biophysical data. *Climate Prediction Applications Science Workshop (CPASW)*, Chapel Hill, NC, March 4-7.
 75. Gitelson, A.A., D.C. Rundquist, J.G. Masek, **B.D. Wardlow** and G.P. Keydan. 2007. Quantitative Remote Estimation of Land Surface Biophysical Characteristics Using ETM+ Landsat and 250-m MODIS Data. *AGU Fall Meeting*, San Francisco, CA, December 10-14.
 76. Gu, Y., J.F. Brown, J.P. Verdin, and **B. Wardlow**. 2006. A five-year analysis of MODIS NDVI and NDWI for rangeland drought assessment: preliminary results. *EOS Transactions AGU Fall Meeting Supplement*, 87(52), Abstract GC41A-1038, San Francisco, CA, December 11-15.
 77. Brown, J., J. Verdin, T. Tadesse, and **B. Wardlow**. 2006. Remote sensing tools for improving drought decision support. *Managing Drought and Water Scarcity in Vulnerable Environments – Creating a Roadmap for Change in the United States Meeting*, The Geological Society of America, Longmont, CO, September 18-20.
 78. **Wardlow, B.D.**, T. Tadesse, J. Brown, M. Hayes, D. Wilhite, and M. Svoboda. 2006. The Vegetation Drought Response Index: a new drought monitoring tool integrating climate, satellite, and biophysical data. *Global Vegetation Workshop*, University of Montana, Missoula, MT, August 8-10.
 79. **Wardlow, B.D.**, and S.L. Egbert. 2006. An evaluation of multi-temporal MODIS 250-meter vegetation index data for crop mapping in the U.S. Central Great Plains. *Global Vegetation Workshop*, University of Montana, Missoula, MT, August 8-10.
 80. Gu, Y. J.F. Brown, and **B.D. Wardlow**. 2006. A 5-year analysis of MODIS NDWI/NDVI for rangeland drought assessment. *Global Vegetation Workshop*, University of Montana, Missoula, MT, August 8-10.
 81. **Wardlow, B.D.** and S.L. Egbert. 2004. Regional scale crop mapping using a decision tree classifier. *Association of American Geographers 100th Annual Meeting*, Philadelphia, PA, March 14-19.
 82. **Wardlow, B.D.** and S.L. Egbert. 2003. Crop mapping in the U.S. Central Great Plains region using time-series MODIS 250-meter data: a case study of Southwest Kansas. *30th International Symposium on Remote Sensing of Environment*, Honolulu, HI, November 10-14.
 83. **Wardlow, B.D.** and S.L. Egbert. 2003. An agricultural land use/land cover (LULC) mapping protocol for the U.S. Central Great Plains region. *Association of American Geographers 99th Annual Meeting*, New Orleans, LA, March 5-8.

84. **Wardlow, B.D.** and S.L. Egbert. 2002. Discrimination of cropping patterns in Kansas using time-series MODIS 250-meter NDVI data. *MODIS Vegetation Workshop*, University of Montana, Missoula, MT, August 16-18.

GRANTS

Current Grants (\$8.2 million total)

1. UNL Grand Challenges Catalyst Proposal: Advancing Development of Assessments, Practices, and Tools (ADAPT) to Produce Climate Smart Beef in Grazing Systems. G. Erickson, C. Allen, E. Athanassopoulos, M. Drewnoski, J. Gamon, M. Khorchani, M. Stephenson, A. Suyker, J. MacDonald, G. Meredith, Y. Pan, Y. Shi, D. Uden, J. Volesky, B. Wang, R. Wang, **B. Wardlow**, S. Weller, and Y. Xiong. University of Nebraska-Lincoln Office of Research and Economic Development Grand Challenges, \$4,997,068 (10/01/2024 – 09/30/2029), Investigator.
2. USDA Support of the U.S. Drought Monitor and Hub Activities 2024-2025. M. Svoboda, B. Fuchs, R. Rimsaite, K. Smith, T. Tadesse, C. Knutson, T. Haigh and **B. Wardlow**. *USDA Office of Chief Economist*, \$1,275,00 (10/01/2024 – 09/30/2025), Investigator.
3. Contributing to a UAS/UAV Fleet Management System and Imagery Data Management System with USDA-ARS and Partnerships for Data Innovations (PDI). B. Wardlow and J. Gamon. *USDA ARS Cooperative Agreement*, \$33,738 (10/2023-09/2025), Principal Investigator.
4. StateView Program Development and Operations for the State of Nebraska - 2024. B. Wardlow and I. Ratcliffe. *USGS AmericaView Program*, \$25,500 (10/01/2024-09/30/2025), Principal Investigator.
5. Building a Global Composite Drought Indicator (GCDI) Hot Spot Early Warning and Information System. M. Svoboda, **B. Wardlow**, D. Bathke, B. Fuchs, T. Haigh, C. Knutson, T. Roy, K. Smith and T. Tadesse. *Department of Air Force Commercial Weather Data Pilot II Program*, \$2,598,161 (10/01/2021-02/27/2023), Co-Principal Investigator.
6. Identifying Public Health Applications of Satellite-derived Drought Indicators: Improved Monitoring for Respiratory Health. J. Bell and B. Wardlow. NASA Earth Science Applications: Health and Air Quality Program, \$520,740 (05/13/2022-05/12/2026), Investigator.
7. Optimizing Cover Crop Decisions for Enhanced Productivity, Profitability, Resilience and Environmental Sustainability under Variable and Changing Climate Using Big Data, Artificial Intelligence and Machine Learning Approach. **B. Wardlow**, *USDA ARS Non-Assistance Cooperative Agreement* \$187,874 (08/01/2021-09/30/2023) Principal Investigator.
8. Early Detection Strategies for Healthy Forests. J. Gamon, S. Russo, R. Wang, **B. Wardlow** and Y. Qi. *USDA McIntire-Stennis Research Program*, \$358,500 (07/01/2021-06/30/2026), Investigator.

Previous Grants (\$21.1 million total)

1. Providing Drought Risk Management Services to World Bank. M. Svoboda, D. Bathke, B. Fuchs, M. Hayes, C. Knutson, K. Smith, T. Tadesse, and B. Wardlow. World Bank \$299,994 (05/2020-09/30/2023), Investigator.
2. USDA Support for Enhancements to the U.S. Drought Monitor and engaging the USDA Climate Hubs 2022-2023. M. Svoboda, B. Fuchs, T. haigh, C. Knutson, K. Smith, D. Bathke, T. Tadesse, R. Rimsaite, **B. Wardlow** and T. Mieno. *USDA Office of Chief Economist*, \$1,325,000 (10/01/2022-09/30/2023), Investigator.

3. StateView Program Development and Operations for the State of Nebraska - 2023. B. Wardlow and I. Ratcliffe. *USGS AmericaView Program*, \$25,500 (10/01/2023-09/30/2024), Principal Investigator.
4. Building a Composite Drought Indicator and Monitoring/Early Warning System for Peru. M. Svoboda, **B. Wardlow**, T. Tadesse and B. Fuchs. *USDA FAS Global Programs*, \$74,974 (12/2021-11/2023), Investigator.
5. Forest Density and Management Practices Effects on Soil and Vegetation Resilience in Nebraska. T. Awada, R. Drijber, J. Herr, M. Kaiser, **B. Wardlow**, C. Neale, W. Schacht and S.D. Choudhury *McIntire-Stennis Cooperative Forestry Research Program* \$250,000 (10/01/2018-09/30/2023) Investigator.
6. Developing a Tool to Monitor Drought Impacts on Semi-Arid U.S. Grasslands using an Ecosystem Performance Approach. M. Hayes, B.D. Wardlow, M. Svoboda, D. Bathke and M. Podebradska. *USGS Cooperative Agreement, Great Plains Cooperative Ecosystem Studies Unit* \$273,995 (03/2019-09/2023), Investigator.
7. StateView Program Development and Operations for the State of Nebraska - 2022. **B. Wardlow** and I. Ratcliffe. *USGS AmericaView Program*, \$23,500 (10/2022-08/2023).
8. Developing a Statewide Community Tree Canopy Map in Nebraska. Y. Qi, E. North and **B. Wardlow**. *Nebraska Environmental Trust Grant*, \$95,725 (06/2020-05/2023), Investigator.
9. USDA Support for Enhancements to the U.S. Drought Monitor 2021-2022. Fuchs, B., D. Bathke, T. Haigh, C. Knutson, T. Mieno, R. Rimsaite, K. Smooth, M. Svoboda, T. Tadesse and **B. Wardlow**. *USDA Department of the Chief Economist*, \$1,325,000 (10/2021 – 09/2022), Investigator.
10. Drought Risk Management in southern Africa. M. Svoboda, B. Wardlow. *World Bank Group*, \$40,000 (06/2019-05/2022), Investigator.
11. Impact of Conservation Reserve Program (CRP) Lands on Ecosystem Health: Biodiversity from Soils to Landscapes. R. Keller, J. Gamon, **B. Wardlow**, D. Schachtman, S. Russo, Z. Tang and G. Pec. *University of Nebraska Collaboration Initiative Grant* \$39,989 (07/2021-06/2022), Investigator.
12. Drought Information Services and Research for Agriculture Across the United States. B. Fuchs, D. Bathke, T. Haigh, C. Knutson, T. Mieno, R. Rimsalte, K. Smith, M. Svoboda, T. Tadesse and **B. Wardlow**. *USDA Cooperative Agreement* \$800,000 (10/01/2020-09/30/2021), Investigator.
13. Development of a Global Evaporative Stress Index Based on Thermal and Microwave LST towards Improved Monitoring of Agricultural Drought. C. Hain, M. Anderson, T. Homes, F. Gao, J. Otkin, M. Svoboda, **B. Wardlow**, X. Zhan, I. Becker-Reshef, B. Barker, and R. Terrault. *NASA Earth Science Applications: Water Resources* \$687,987 (1/2017 – 03/2020), Investigator.
14. NDMC Technical Assistance on Drought Preparedness in Botswana and Eswatini. M. Svoboda, B. Fuchs, M. Hayes, C. Knutson, T. Tadesse and **B. Wardlow**. *World Bank* \$40,000 (05/2019-04/2020), Principal Investigator.
15. Integrating GRACE and GRACE Follow On Data into Flood and Drought Forecasts for the Continental U.S. M. Rodell, B. Zaitchik, E. Nelsen, T. Bertschi, P. Restrepo, **B. Wardlow**, M. Svoboda, S. Bettadpur, S. Kumar, and R. Reichle. *NASA Earth Science Applications: Water Resources* \$1,637,284 (11/2014 – 12/2019), Investigator.
16. Improving Water Management, Agricultural Production and Food Security in Drought-Prone Areas. C. Neale, R. Kaur, M. Hayes, M. Svoboda, T. Tadesse, **B. Wardlow**, A. Kilic, D. Heeren, D. Martin, K. Callahan, M. Khanna, M. Singh, N. Patel, R. Sahoo, V. Sehgal, A. Sarangi, and S. Kumar. *Indo-US 21st Century Knowledge Initiative, U.S.-India Educational Foundation* \$62,175 (1/2017-12/2019), Investigator.

17. Downscaling of GRACE Terrestrial Water Storage Observations and Application to Global Drought Monitoring. M. Rodell, R. Reichle, R. Houborg, **B. Wardlow**, and B. Zaitchik. *NASA Terrestrial Hydrology Program*, \$614,518 (01/2015-12/2019), Investigator.
18. Development of the Middle East-North Africa (MENA) Regional Drought Management System. R. McDonnell, M. Hayes, C. Neale, D. Wilhite, M. Svoboda, **B. Wardlow**, M. Anderson, and C. Hain. *U.S. Agency for International Development (US AID) Middle East Program*, \$3,959,242 (02/2016 – 9/2018), Investigator.
19. Seasonal Prediction of Hydro-Climatic Extremes in the Greater Horn of Africa Under Evolving Climate Conditions to Support Adaptations Strategies. T. Tadesse, **B. Wardlow** *NASA* \$1,625,032 (1/2014-2/2018), Investigator.
20. Planning Grant for a Conference on Remote Sensing and Spatial Analysis for Agricultural Productivity and Sustainability. J. Taylor, N. Bickford, R. Dasgupta, N. Mueller, H. Sharif, **B. Wardlow**, and W. Woldt. *Food for Health Initiative Planning Grant, University of Nebraska System*, \$75,000 (06/2016-07/2017); Investigator.
21. High-Plains Earth System Modeling Complex (HP-ESMC) – Toward Integrated Assimilation of Satellite Remote Sensing and Ground-based Observations. J. Wang, C. Rowe, R. Oglesby, Q. Hu, M. Anderson, A. Houston, M. Van Den Broeke, J. Zeng, X-H. Chen, **B. Wardlow**, T. Tadesse, M. Shulski, J. You, T. Awada, H. Yang, D. Swanson, H. Yu, S. Irmak, and A. Kilic. *University of Nebraska-Lincoln Office of Research and Economic Development Big Ideas Accelerator Seed Grant*, \$100,000 (1/2015 – 12/2017); Investigator.
22. Irrigated Lands Mapping for the State of Nebraska. B. Wardlow, K. Callahan, and M. Vaitkus. *Nebraska Department of Natural Resources* \$75,000 (2015 – 2016); Principal Investigator.
23. Ecological Spectral Information System (ESIS): Integration of Spectral Data with Measurements of Vegetation Functional Traits. Townsend, P., S. Ustin, D. Roberts, S. Serbin, J. Gamon, A. Zyguelbaum, **B. Wardlow**, R. Green, S. Hook, T. Kampe, and S. Petroy. *NASA Terrestrial Ecology* \$939,730 (2013 – 2016); Investigator.
24. Monitoring Phenology in the North Central Region of the U.S. R. Landenberger, R. Lawrence, K. Dobbs, M. O'Neill, B. Rundquist, M. Viatkus, and **B. Wardlow**. *U.S. Department of the Interior, North Central Climate Center Program*, \$23,000 (2013 – 2015); Investigator.
25. Center for Integrated Earth Observation and Modeling (CIEOM): Needs, Strategic Plans, and Funding Outlooks. Wang, J., C. Rowe, R.J. Oglesby, G. Hu, M. Shulski, **B. Wardlow**, H. Yang, and H. Yu. *Pathway to Interdisciplinary Research Centers, Phase 1 Planning Grant, Office of Research and Economic Development, University of Nebraska-Lincoln* \$10,000 (2013 – 2015); Investigator.
26. Facilitating Adaptive Management under Conditions of Rapid Drought Onset using GOES-based Evaporative Stress Index. J. Otkin, M. Schafer, M.C. Anderson, J. Basara, M. Svoboda, and B. Wardlow. *NOAA Climate and Societal Interactions (CSI) Competition Sectoral Applications Research Program (SARP)* \$290,000 (2013 – 2015); Investigator.
27. The Quick Drought Response Index (QuickDRI): An Integrated Approach for Rapid Response Agricultural Drought Monitoring. **B. Wardlow**, M. Svoboda, J. Brown, M. Anderson, M. Rodell, M. Hayes, T. Tadesse, D. Mocko, M. Brewer, C. McNutt, and C. Hain. *NASA Earth Science Applications: Water Resources*, \$1,509,768 (8/2012 – 8/2016), Principal Investigator.
28. Development of a Multi-Scale Remote Sensing Based Framework for Mapping Drought over North America. C.R. Hain, M.C. Anderson, X. Zhan, G. Gao, M. Svoboda, **B. Wardlow**, R. Mueller, L. Beard, I. Laszlo, J.R. Mecikalski, and I. Mladenova. *NASA Earth Science Applications: Water Resources*, \$1,300,000 (8/2012 – 8/2016); Investigator.
29. Developing VegDRI-Canada-Phase 2. T. Tadesse and **B. Wardlow**. *Agriculture and Agri-Food Canada – Agri-Environment Services Branch*, \$24,453 (2012 – 2014); Co-Principal Investigator.
30. Evapotranspiration and Drought Monitoring Using GOES-R Products for NIDIS. **B. Wardlow** and M. Svoboda. *NOAA GOES-R Risk Reduction Program*, \$8,897 (2012 – 2013); Principal Investigator.

31. NASA Workshop on Remote Sensing for Drought Monitoring and Water Resources Applications. M. Svoboda and **B. Wardlow**. *NASA Topical Workshops, Symposia, and Conferences*, \$25,701 (2012-2013); Co-Principal Investigator.
32. Dual Assimilation of Microwave and Thermal-Infrared Satellite Observations of Soil Moisture into NLDAS for Improved Drought Monitoring. Zhan, X., M.C. Anderson, C. Hain, M. Ek, M. Svoboda, **B. Wardlow**, W. Crow, J.R. Mecikalski, and W.P. Kustas. *NOAA Modeling, Analysis, Predictions, and Projections (MAPP) Competition*, \$592,374 (2011 – 2014); Investigator.
33. Developing VegDRI-Canada-Phase 1. **B. Wardlow** and T. Tadesse. *Agriculture and Agri-Food Canada – Agri-Environment Services Branch*, \$24,000 (2011– 2012); Co-Principal Investigator.
34. Use of Satellite Data and Model Products in Improving the Categorization, Delineation, and Mitigation of Agricultural Drought. McNider, R.T., J.R. Christy, G. Hoogenboom, M.D. Svoboda, A.S. Limaye, J.J. O'Brien, **B.D. Wardlow**, J.R. Mecikalski, D.F. Zierden, and D.E. Stooksbury. *NASA Gulf of Mexico*, \$20,383 (2010 - 2012); Investigator.
35. Drought Mitigation Nebraska Project 2010. Hayes, M., M. Svoboda, **B. Wardlow**, and C. Knutson. *USDA NIFA*, \$558,441 (2010 – 2011); Investigator.
36. A GOES Thermal-Based Drought Early Warning Index for NIDIS. Anderson, M.C., K.C., Mo, M. Svoboda, **B. Wardlow**, X. Zhan, J.R. Mecikalski, W.P. Kustas, and J.F. Brown. *NOAA Climate Dynamics and Experimental Prediction (CDEP) Competition*, \$592,864 (2009 – 2012); Investigator.
37. Drought Mitigation Nebraska Project 2009. Hayes, M., M. Svoboda, **B. Wardlow**, and C. Knutson. *USDA CSREES*, \$437,243 (2009 – 2010); Investigator.
38. Integrating Enhanced GRACE Water Storage Data into the U.S. and North American Drought Monitors. Rodell, M., J. Lawrimore, J.S. Famiglietti, R. Heim, R. Reichle, M. Svoboda, **B. Wardlow**, B. Zaitchik, and A. Pinheiro. *NASA ROSES Decision Support through Earth Science Research Results*, \$597,000 (2008-2010); Investigator.
39. Drought Mitigation Nebraska Project 2008. Hayes, M., M. Svoboda, **B. Wardlow**, and C. Knutson. *USDA CSREES*, \$347,246 (2008 – 2009); Investigator.
40. Incorporating Remote Sensing Information into the U.S. Drought Monitor. Svoboda, M., **B. Wardlow**, T. Tadesse, and D. Wilhite. *U.S Geological Survey Unsolicited Proposal Award*, \$152,598 (2007-2009); Investigator.
41. The Development of a Near Real-Time Mapping and Monitoring Protocol for the U.S. Great Plains Agro-ecosystem Using Time-Series MODIS 250-Meter Data. **Wardlow, B.** *NASA Earth System Science Graduate Research Fellowship*, \$72,000 (2002-2005); Investigator.

Other Funded Grants and Contracts (\$426k total)

1. StateView Program Development and Operations for the State of Nebraska (2021). **B. Wardlow** and Y. Qi. *USGS AmericaView Program*, \$23,500 (2020-2021).
2. Assessment of Remote Sensing for Emerald Ash Borer (EAB) Detection in the City of Lincoln, NE. **B. Wardlow** (PI), R. Wang and Y. Qi. City of Lincoln Department of Parks and Recreation \$24,768 (2020).
3. StateView Program Development and Operations for the State of Nebraska (2020). **B. Wardlow** and M. Vaitkus. *USGS AmericaView Program*, \$23,500 (2019–2020).
4. High Resolution Land Cover for Nebraska and Windbreak Assessments for the Northern Plains. **B. Wardlow** (PI) and M. Vaitkus. *U.S. Forest Service* \$107,902 (2016-2018).
5. CALMIT GIS Support for Agricultural Monitoring. **B. Wardlow** (PI) and M. Vaitkus. *Nebraska Department of Agriculture* \$50,000 (2013-2020).
6. StateView Program Development and Operations for the State of Nebraska (2019). **B. Wardlow** (PI) and M. Vaitkus. *USGS AmericaView Program*, \$23,500 (2018 –2019).
7. StateView Program Development and Operations for the State of Nebraska (2015). **B. Wardlow** (PI) and M. Vaitkus. *USGS AmericaView Program*, \$96,000 (2013 –2017).

8. Comparison of Crop Type Classification Products for the COHYST Region. **B. Wardlow** (PI), K. Callahan, and M. Vaitkus. *Nebraska Department of Natural Resources* \$25,000 (2014–2015).
9. Global Positioning System (GPS) and Internal Navigation System (INS) Upgrade for CALMIT Aircraft Remote Sensing Program. **B. Wardlow** (PI), C. Neale, and A. Zygielbaum, *UNL Agricultural Research Division (ARD) Strategic Funding*, \$30,000 (2015).
10. 2013 Protected Area Database -US State Data Steward Grant. **B. Wardlow** (PI), M. Vaitkus, and K. Callahan. *USGS GAP Stewardship Program*, \$20,000 (2013–2014).
11. University of Nebraska-Lincoln Institute of Agriculture and Natural Resources (IANR) Research Travel Grant, **B. Wardlow** (PI) \$800 (2010).
12. Kansas EPSCoR Graduate Student Travel Grant, **B. Wardlow** (PI) \$500 (2003).
13. University of Kansas Graduate School Conference Travel Grant, **B. Wardlow** (PI) \$500 (2002).

INVITED PRESENTATIONS

1. Advancement of Remote Sensing and Operational Tools for Drought Monitoring. *NSF/AGU Bringing Land, Ocean, Atmosphere and Ionosphere Data to the Community for Hazard Alerts Workshop*, virtual meeting, May 24–28, 2021.
2. Quick Drought Response Index – A Short-Term Indicator of Landscape Dryness. *USDA Rangeland Technology Summit*, virtual meeting, April 5–7, 2021.
3. Tracking Drought Here and Abroad: Tools of the Trade. *University of Nebraska-Lincoln School of Natural Resources Fall Seminar Series*, Lincoln, NE, 2019.
4. New Drought Monitoring Tool Opportunities in Remote Sensing. *Bilateral Workshop on Building an Operational Composite Drought Index for India*, New Delhi, India, 2019.
5. An Overview of CALMIT Research Activities at the Eastern Nebraska Research and Extension Center (ENREC). *ENREC Research Summit*, Ithaca, NE, 2019.
6. Quick Drought Response Index – Transition from Research to Operations. *2018 North American Drought Monitor Forum*, Calgary, Alberta, Canada, 2018.
7. Quick Drought Response Index – Characterizing Short-Term Dryness Conditions *NASA Water Resources Applied Science Meeting*, Pasadena, CA, 2017.
8. QuickDRI – A Composite Index for Monitoring Short-term Drought Conditions. *Tenth Biennial U.S. Drought Monitor Forum*, Keystone, SD, 2017.
9. Quick Drought Response Index (QuickDRI) *North American Fire, Drought, and Climate Services Forum*, Fort Worth, TX, 2016.
10. Recent Operational, Satellite-based Agricultural Drought Monitoring Tools – Examples from the United States and North America. *World Meteorological Organization's Task Team on the Use of Remote Sensing Data for Climate Monitoring Meeting*, Pretoria, South Africa, 2015.
11. Development of Remote Sensing-based Composite Drought Indices for Agricultural Drought Monitoring. *2015 Inter-drought Summer School*, Mikulov, Czech Republic, 2015.
12. Drought Response Index (QuickDRI) – A Composite Index for Monitoring Rapid-Onset Agricultural Drought. *NASA Applied Sciences Program: Water Resources Meeting*, College Park, MD, 2015.
13. Drought Chasing from Space – Advances in Monitoring and Early Warning. *University of Nebraska at Kearney Geography Awareness Week Plenary Session*, Kearney, NE, 2015.
14. Remote Sensing: An Introduction and Options for Entomology, *Department of Entomology seminar series*, University of Nebraska-Lincoln, Lincoln, NE, 2014.

15. An Overview of the Center for Land Management Information Technologies (CALMIT) and Opportunities for Spatial Analysis Tools for Human Health Applications, *University of Nebraska Research Retreat on Water, Food, and Health*, Ashland, NE, 2014.
16. Remote Sensing of Agriculture and Natural Resources at Field to Landscape Scales: Activities and Innovations at CALMIT, *InterDrought Workshop on Remote Sensing Tools in Drought Monitoring*, Brno, Czech Republic, 2014.
17. Drought Monitoring and Precipitation Data – A U.S. Perspective on Current Uses and Needs, *NASA Global Precipitation Mission (GPM) Applications Workshop*, College Park, MD, 2013.
18. Drought Chasing from Space – Recent Innovations in Satellite-based Remote Sensing Tools, *University of Kansas GIS Day*, Lawrence, KS, 2013.
19. VegDRI – A Hybrid-based Agricultural Drought Monitoring Tool for the CONUS, *ASA-CSSA-SSSA Annual Meeting*, Tampa, FL, 2013.
20. VegDRI to QuickDRI: Evolution of Operational Agricultural Drought Monitoring Tools for the CONUS, *NASA Applied Science Water Resources Program Annual Meeting*, Lincoln, NE, 2013.
21. Remote Sensing of Drought: Advances for Operational Drought Monitoring and Early Warning, *Czech Inter-Drought Project Summer School*, Telc, Czech Republic, 2013.
22. U.S. Drought Monitor (USDM): Overview, Applications, and Recent Efforts to Enhance Through Remote Sensing, *Water Cycles Group Seminar, NASA Jet Propulsion Laboratory (JPL)*, Pasadena, CA, 2012.
23. An Emerging Remote Sensing Toolkit for Drought Monitoring – Recent Efforts to Improve the U.S. Drought Monitor, *California Water Resources Remote Sensing Workshop*, San Diego, CA, 2012.
24. Incorporating Operational Remote Sensing Products into the USDM, University of Alabama-Huntsville, Huntsville, AL, 2012.
25. Vegetation Drought Response Index (VegDRI) – An Introduction and Prospects for Mexico, *North American Drought Monitor Forum*, Cancun, Mexico, 2012.
26. Time-Series Vegetation Index Data – Concepts and Applications for Monitoring Agricultural Landscapes, *School of Natural Resources teaching seminar*, University of Nebraska-Lincoln, Lincoln, NE, 2012.
27. Vegetation Drought Response Index (VegDRI) – A Hybrid Remote Sensing Approach for Drought Monitoring, *School of Natural Resources research seminar*, University of Nebraska-Lincoln, Lincoln, NE, 2012.
28. Satellite Remote Sensing of Drought – New Monitoring Options, *International Workshop on Water-Related Disaster Prediction and Reduction*, Nanjing, China, 2011.
29. Emerging Remote Sensing Tools for Drought Monitoring: Activities at the National Drought Mitigation Center, *National Hydrologic Warning Council Conference*, San Diego, CA, 2011.
30. New and Emerging Remote Sensing Tools for Drought Monitoring, *UN/FAO Drought Monitoring Tools and Practices Workshop*, Ankara, Turkey, 2011.
31. Introduction to Satellite Remote Sensing for Drought Monitoring, *UN/FAO Drought Monitoring Tools and Practices Workshop*, Ankara, Turkey, 2011.
32. Vegetation Drought Response Index (VegDRI): Recent Accomplishments and Activities, *2011 U.S. Drought Monitor Forum*, Fairfax, VA, 2011.
33. Vegetation Drought Response Index (VegDRI): An Overview and Prospects for Canada, *Canadian Drought Monitor Meeting*, Regina, Saskatchewan, 2010.
34. Remote Sensing and Drought Monitoring: Current and Future Directions, *Argentina Congress of Animal Production, Drought Early Warning System Working Group*, Viedma, Argentina, 2010.
35. GIScience Activities at the National Drought Mitigation Center, *USDA National Agricultural Statistics Service (NASS)*, Fairfax, VA, 2010.

36. An Overview of Remote Sensing Activities at the National Drought Mitigation Center, *Hydrology and Remote Sensing Laboratory, USDA Agricultural Research Service (ARS)*, Beltsville, MD, 2010.
37. The U.S. Drought Monitor, NIDIS, and Opportunities for Remote Sensing. *NASA Hydrologic Applications Branch, NASA Headquarters*, Washington, DC, 2010.
38. The Future of Remote Sensing Applications for Drought Monitoring, *World Meteorological Organization (WMO) Drought Workshop*, Lincoln, NE, 2009.
39. Vegetation Drought Response Index (VegDRI): 2009 Update and Ongoing Activities, *2009 U.S. Drought Monitor Forum*, Austin, TX, 2009.
40. Remote Sensing and Drought – An Overview and Opportunities for Mali, *WMO Drought Workshop*, Bamako, Mali, 2009.
41. Remote Sensing and Drought Monitoring - New Tools and Future Directions, *National Hydrologic Warning Council Conference*, Vail, CO, 2009.
42. VegDRI – A New Hybrid Drought Index for Monitoring Vegetation in the U.S., *U.S.-Canada GEO Bilateral Workshop on Ice and Water*, National Science Foundation (NSF), Arlington, VA, 2008.
43. Vegetation Drought Response Index (VegDRI): A Hybrid-Based Approach for Vegetation Drought Monitoring, *2008 North American Drought Monitor Workshop*, Ottawa, Canada, 2008.
44. The Vegetation Drought Response Index (VegDRI) – An Update on Progress and Future Research Activities. *U.S. Drought Monitor Forum*, Portland, OR, 2008.
45. Geospatial Tools for Environmental Monitoring in a Changing World. Presentation at the USGS and UNL Workshop on Climate Change – Partnerships in Climate Change Science, University of Nebraska-Lincoln, Lincoln, NE, 2007.
46. Remote Sensing Activities at the NDMC – Bridging the Drought Monitoring Gaps. Presentation at the School of Natural Resources Research Colloquium, University of Nebraska- Lincoln, Lincoln, NE, 2007.
47. New NDMC Tool Development Update: Working to Meet the Needs of Drought Monitor, RMA, and NIDIS End Users, *2007 U.S. Drought Monitor Forum*, Portland, OR, 2007.
48. Evaluation of MODIS 250-Meter Vegetation Index Data for Regional-Scale Crop Mapping – Results from the State of Kansas. Presentation to Geographic Information Science Center of Excellence, South Dakota State University, Brookings, SD, 2006.
49. Regional-Scale Crop Mapping in the U.S. Central Great Plains Using MODIS 250-Meter NDVI Data – Results and Future Directions for Drought Monitoring. Presentation to the National Drought Mitigation Center, School of Natural Resources, University of Nebraska-Lincoln, Lincoln, NE, 2005.
50. An Evaluation of MODIS 250-Meter Vegetation Index Data for Regional-Scale Crop Characterization in the U.S. Central Great Plains. Presentation to the Science and Application Branch, USGS EROS Data Center, Sioux Falls, SD, 2005.
51. Regional-Scale Crop Mapping in the U.S. Central Great Plains Using MODIS 250-Meter Vegetation Index Data: Results and Future Research Directions. Presentation to the Department of Geography, Oklahoma State University, Stillwater, OK, 2005.
52. An Overview of Crop Mapping Activities Using Time Series MODIS 250 Meter Data. Presentation to the Science and Applications Branch, USGS EROS Data Center, Sioux Falls, SD, 2003.
53. A State-Level Crop Mapping and Monitoring Prototype for Kansas. Presentation to the KansasView State and Local Government (SLG) Remote Sensing Applications Workshop, University of Kansas, Lawrence, KS, 2003.
54. Proposal Strategies for the NASA Earth System Science (ESS) Graduate Research Fellowship. Presentation at the Mt. O'Read Geospatial Technologies Club Scholarship/Grant Writing Workshop, University of Kansas, Lawrence, KS, 2002.
55. USGS EROS Data Center: Remote Sensing Science for a Changing World and the Multi Resolution Land Cover Characterization Land Cover Mapping Project. Presentation to the Department of Geography, Kansas State University, Manhattan, KS, 1998.

56. Temporal Monitoring of Suspended Sediment Patterns Using Landsat Thematic Mapper Imagery, Presentation to the Science and Applications Branch, USGS EROS Data Center, Sioux Falls, SD, 1996.

MEDIA INTERVIEWS

1. Growing Season Series II – VegDRI. *Nebraska CropWatch Podcast* (<https://www.podbean.com/eas/pb-rnnbc-1600df3>) May 2, 2024.
2. Measuring Groundwater from 300 Miles Above. *Farm Progress* (<https://www.farmprogress.com/technology/measuring-groundwater-300-miles-above>) April 6, 2020.
3. New Global Groundwater Maps and U.S. Drought Forecasts. *NASA Earth Science News* (<https://www.nasa.gov/feature/goddard/2020/nasa-university-of-nebraska-release-new-global-groundwater-maps-and-us-drought-forecasts>) March 31, 2020.
4. GRACE-FO Will Help Monitor Droughts. *NASA Jet Propulsion Laboratory NEWS* (<https://www.jpl.nasa.gov/news/news.php?feature=7123>) May 14, 2018.
5. NASA Soil Moisture Active Passive Early Adopter Update Video. *NASA Jet Propulsion Laboratory* (<https://smap.jpl.nasa.gov/resources/96/smap-2018-ea-update-short-version/>) May 2018.
6. What's the Criteria for Identifying Flash Droughts? New Warning System Identifies Flash Drought Quickly. *Weather Nation* (<http://www.weathernationtv.com/news/whats-criteria-identifying-flash-droughts-new-warning-system-identifies-flash-drought-quickly/>) February 27, 2018.
7. Data Analytics Show 'Flash Drought's' Impact on U.S. Wheat Crops. *Digital Journal* (<http://www.digitaljournal.com/tech-and-science/technology/data-analytics-show-flash-drought-s-impact-on-usa-wheat-crops/article/499371>) August 6, 2017.
8. NASA Soil Moisture Active Passive (SMAP) Early Adopters Video. *NASA Jet Propulsion Laboratory* (<https://www.youtube.com/watch?v=e6WGTRmsPVg&feature=youtu.be>) January 2015.
9. Drought or glut? Health of Water Resources Depend on How Deep You Look. *MinnPost* (<https://www.minnpost.com/earth-journal/2012/01/drought-or-glut-health-water-resources-depends-how-deep-you-look>) January 9, 2012.
10. NASA's Grace Help Monitor U.S. Drought. *NASA Jet Propulsion Laboratory NEWS* (<https://www.jpl.nasa.gov/news/news.php?release=2011-365>) November 30, 2011.

INTERNATIONAL ACTIVITIES

- | | |
|------|---|
| 2024 | <p>Czech Republic. Hosted Ph.D. student from Mendel University to work on phenology research for central Europe applying satellite remote sensing to identify changes in growing season patterns.</p> <p>Global. Completed operational GCDI tool and beta version of global 'hot spot' index tool for U.S. DoD applications and began work on a hydrologic-related GCDI.</p> |
| 2023 | <p>South Korea. Worked with researchers at Hankyong National University to assess satellite-based remote sensing tools for operational drought monitoring for the Korean peninsula.</p> <p>Global. Completed beta version of a global composite drought index (GCDI) for the U.S. Department of Defense and began integration of GCDI with social indicators for a global 'hot spot' index.</p> |
| 2022 | <p>Peru. Co-lead a USDA Foreign Agricultural Service (FAS) supported project to work with the government of Peru to develop a national, agricultural drought monitoring indicator tool.</p> |

- Global Composite Drought Indicator and Hotspot Detection.** Co-PI on a Department of Defense (DoD) supported project to develop tools the characterize drought conditions and impacts globally in support of military intelligence.
- 2021 **Estwatime and Zimbabwe.** Provide support for the validation of the composite drought indicator for both countries for the development and implement of this indicator in national drought monitoring efforts.
- 2020 **India.** Hosted Fulbright doctoral student from Indian Institute of Technology (IIT) Punjab to investigate the use of satellite remote sensing for drought monitoring and risk assessment for the state of Maharashtra, India.
- 2019 **India.** Hosted doctoral student from Indian Institute of Technology (IIT) Ghandinanger to investigate the inter-relationship of remotely sensed hydrological parameters and drought over pan-India and globally.
Estwatime and Zimbabwe. Provide technical training and scientific oversight to scientists to development of a remote sensing-based composite drought indictor for southern Africa.
- 2018 **India.** Worked with scientists at the Indian Institute of Technology (IIT) Ghandinanger to develop a remote sensing-based irrigation mapping methodology for pan-India.
- 2017 **Tunisia.** Provide technical training session in Tunis, Tunisia to scientists and technical staff from various Tunisian governmental ministries on the development and implementation of a remote sensing-based composite drought indicator for the country.
India. Hosted scientists from the Indian Agricultural Research Institute (IARI) to develop conceptual framework towards the development of an operational, remote sensing-based composite drought indicator for India. Hosted IARI Ph.D. students to begin research and development of the indicator.
Spain. Worked with researchers at the University of Salamanca to investigate the application of an integrated, remote sensing-based agricultural drought indicator, the Soil Moisture Agricultural Drought Index (SMADI).
- 2016 **India.** Hosted a faculty member from the Indian Institute of Technology to investigate the development of a regional-scale, remote sensing-based composite drought indicator for India and collaborate on irrigation mapping research.
Middle East/North Africa (MENA). Worked on a US AID-funded project to develop a remote sensing-based composite drought indicator for the MENA region with scientists from the International Center for Biosaline Agriculture (ICBA) in Dubai, UAE. Provided expert input for decision maker engagement meetings in Jordan, Morocco and Tunisia.
Chile. Hosted a Ph.D. student from the University of Concepcion to investigate the use of satellite-based precipitation data sets for drought monitoring in Chile.
Canada. Worked with scientists at Agriculture and Agri-Food Canada to develop a VegDRI drought monitoring tool for Canada that was similar to the version for the United States in support of the North American Drought Monitor.
China. Hosted a faculty member from HuaZhong Agricultural University to investigate the use of various time-series data analysis techniques to identify drought signals in long-term satellite image data records.
- 2015 **Morocco.** Conducted a Composite Drought Indicator Workshop in Rabat to complete the development of this indicator developed as part of a World Bank project.

- United Arab Emirates.** Worked with scientists from the International Center for Biosaline Agriculture (ICBA) in Dubai, UAE to scope an agricultural drought composite index approach for the Middle East/North Africa (MENA) and develop a proposal to U.S. American International Development (US AID) to support the development of this index.
- 2014 **Morocco.** Worked with the Royal Center for Remote Sensing to develop a composite agriculture drought index for Morocco that integrates various types of remote sensing observations and products.
The Netherlands. Invited expert peer reviewer and moderator of drought monitoring session at the a World Bank Water Partnership Program entitled ‘Workshop for Understanding Water through Space – How to Navigate through Remotely Sensed Data and Applications for Improved Water Resources Management’ in the Hague.
Czech Republic. Co-organizer and invited speaker at the InterDrought Workshop on Remote Sensing Tools in Drought Monitoring in Brno.
- 2013 **Spain.** Hosted Ph.D. student specializing in remote sensing and GIS from Barcelona Autonomous University to develop and apply satellite-based tools and products for drought monitoring over the Iberian Peninsula.
Czech Republic. Invited speaker at the Inter-Drought Summer School sponsored by the CzechGlobe Group in Telc and conducted exploratory research collaborations with faculty at Mendel University in Brno.
Canada. Provided consultation on the development of a VegDRI-Canada tool with researchers from Agriculture and AgriFood Canada.
China. Hosted and supervised a Ph.D. student from Wuhan University on the development and application of satellite-based remote sensing for vegetation phenology and drought monitoring.
India. Worked with scientists from the Indian Agricultural Research Institute (IARI) on technological transfer and development of a prototype VegDRI tool for the country.
- 2012 **Mexico.** Participated as an invited speaker in the North American Drought Monitor Forum in Cancun. Worked with scientists at the Servicio de Informacion Agroalimentaria y Pesquera (SIAP) to develop a proof-on-concept VegDRI tool for Mexico.
- 2011 **China.** Participated in the International Workshop on Water-related Disaster Prediction and Prevention held in Nanjing.
The Netherlands. Participated in developing a collaborative graduate-level, remote sensing research opportunity between UNL/Water for Food Institute and IHE Institute for Water Education in Delft.
Turkey. Participated in the UN FAO Drought Monitoring Tools and Practices Workshop held in Ankara.
Czech Republic. Hosted scientists from the Institute of Agricultural Systems and Bioclimatology, Mendel University in Brno for training to develop a proof-of-concept VegDRI tool for central Europe.
- 2010 **Argentina.** Participated in discussions with researchers from the Argentina Congress of Animal Production about developing a regional drought early warning system for the Patagonia region and the potential role of remote sensing.
Canada. Hosted scientists from Agriculture and Agri-Food Canada for training to develop a VegDRI-like tool for Canada.

Japan. Hosted visiting scientist, Toshihiro Sakamoto, from the National Institute for Agro-Environmental Sciences (NIAES) to conducted remote sensing of phenology research for crops across the U.S. Corn Belt and Great Plains.

2009 **Mali.** Participated in a World Meteorological Organization (WMO) Drought Monitoring Tools Workshop for West Africa in Bamako.

2008 **Canada:** Participated in the North American Drought Monitor Forum in Ottawa.

International Students and Scientists Hosted

1. Petra Džžková, Mendel University and Czech Globe, Brno, Czech Republic, 2024
2. Sneha Kulkarni, Indian Institute of Technology (IIT), Bombay, India, *U.S.-India Educational Foundation (USIEF) Fulbright-Kalam Climate Fellow*, 2019-2020
3. Saran Aadhar, Indian Institute of Technology (IIT), Gandhinagar, India, 2019
4. Akarsh Kumar, Indian Institute of Technology (IIT), Gandhinagar, India, 2018
5. Alka Rani, Indian Council of Agricultural Research (ICAR) Indian Agricultural Research Institute (IARI), New Delhi, India, 2017
6. Vijay Prajapati, Indian Agricultural Research Institute (IARI), Indian Council of Agricultural Research (ICAR) Indian Agricultural Research Institute (IARI), New Delhi, India, 2017
7. Rigghi Singh, Indian Institute of Technology (IIT), Hyderabad, India, 2017
8. Vimal Mishra; Indian Institute of Technology (IIT), Gandhinagar, India, 2016
9. Francisco Zambrano; Universidad de Concepcion, Chile, 2016
10. Hu Lia; HuaZhong Agricultural University; China, 2016-2017
11. Linglin Zeng; Wuhan University; China, 2013-2014
12. Cristina Domingo; Universitat Autònoma de Barcelona, Spain, 2013
13. Toshihiro Sakamoto; National Institute for Agro-Environmental Sciences, Japan, 2009 – 2011

NDMC WORKSHOPS

- 2024 USDA Southeast Climate Hub: May 18 (virtual) ^
 USDA Northeast Climate Hub: June 5 (virtual) ^
 USFS Rocky Mountain Region: July 24 (virtual) ^
 USDA Pacific Northwest Climate Hub September 13(virtual) ^
- 2010 Raleigh, NC: April 1^
 Boise, ID: July 27^#
- 2009 Bastrop, TX: February 11^
 Coalinga, CA: February 24^#
 Woodland, CA: February 26^#
 Kearney, NE: August 10^#
- 2008 Wolf Point/Fort Peck, MT: March 12^#
 San Angelo, TX: April 24^
 Walla Walla, WA: November 11^#
 Cheney, WA: November 12^#
- 2007 Bismarck, ND: April 27^
- 2006 Roswell, NM: May 23^

^ participated

organized

UNIVERSITY SERVICE

1. **Faculty Working Group Member** (invited), STRATCOM Science and Technology Working Group, National Strategic Research Institute (NSRI), University of Nebraska, 2025
2. **Faculty Advisory Group Member**, Nebraska State Climate Report, 2024
3. **Search Committee Member**, Environmental spatial scientist faculty position, School of Natural Resources, University of Nebraska-Lincoln, 2022
4. **Search Committee Member**, Geospatial technician II staff position, National Drought Mitigation Center, University of Nebraska-Lincoln, 2022
5. **Faculty Fellow**, National Strategic Research Institute (NSRI), 2021-present
6. **University Representative**, Universities Space Research Association (USRA), 2019-present
7. **Faculty Member**, Plant Phenomics Consortium (PPC), University of Nebraska-Lincoln, 2019-present
8. **IANR Director Leadership Council Member**, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 2018-present
9. **University Delegate**, University Consortium for Geographic Information Science (USGIS), 2016-present
10. **Search Committee Chair**, Spatial scientist faculty position, School of Natural Resources, University of Nebraska-Lincoln, 2016-2017
11. **Search Committee Member**, Remote sensing faculty position, School of Natural Resources, University of Nebraska-Lincoln, 2017
12. **Board of Governors**, Center for Great Plains Studies, 2015-2018
13. **Member**, Nominating Committee, Center for Great Plains Studies, 2015-2018
14. **Member**, University of Nebraska Unmanned Aerial Systems (UAS) policy working group, 2015
15. **Steering Committee Member**, Doctorate of Plant Health Program, University of Nebraska-Lincoln, 2014-present
16. **Faculty Fellow**, Daugherty Water for Food Institute (DWFI), University of Nebraska-Lincoln, 2014-present
17. **Conference Organizing Committee Member**, Daugherty Water for Food Institute (DWFI) Water for Food Conference, 2014
18. **Member**, Long-Term Agricultural Research (LTAR) Leadership Team at the University of Nebraska, 2014-present
19. **Courtesy Associate Professor**, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, 2013-present
20. **Faculty Area Leader**, Geography and GIScience, School of Natural Resources, University of Nebraska-Lincoln, 2013-2022
21. **Principal Investigator**, NebraskaView program, 2013-present
22. **Reviewer**, IANR Dinsdale Family Faculty Award, University of Nebraska-Lincoln, 2013-2014
23. **Faculty Fellow**, National Drought Mitigation Center (NDMC), University of Nebraska-Lincoln, 2012-present
24. **UNL Faculty Leader**, University of Nebraska Geospatial Technologies Retreat, 2012
25. **Faculty Task Force** for Principles of Faculty Excellence, College of Agricultural Sciences and Natural Resources/Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 2011
26. **Faculty Advisor**, Gamma Theta Upsilon (GTU) student chapter, University of Nebraska-Lincoln, 2010-2013
27. **Finance and Personnel Committee**, Center for Great Plains Studies, University of Nebraska-Lincoln, 2009-2012
28. **Faculty Advisor**, Geography Student Organization (GSO), University of Nebraska-Lincoln, 2008-2013
29. **Faculty Fellow**, Center for Great Plains Studies, University of Nebraska-Lincoln, 2008-present

30. **Graduate Committee**, Geography Program, University of Nebraska-Lincoln, 2008–present
31. **Search Committee Member**, Spatial scientist staff position search, National Drought Mitigation Center, University of Nebraska-Lincoln, 2008
32. **Faculty Fellow**, Center for Advanced Land Management and Information Technologies (CALMIT), University of Nebraska-Lincoln, 2007-2012
33. **Graduate Faculty**, Geography, University of Nebraska-Lincoln, 2006-present
34. **Courtesy Graduate Faculty**, Department of Geography, University of Kansas, 2007-2009

Post-Doctoral Research Advisor

1. Hatim Gali, 2016

UNL UCARE Program Undergraduate Advisor

1. Lydia Regier, Plant Science, 2022

Graduate Committees

Ph.D. Completed

1. Hugh Ellerman, School of Natural Resources, University of Nebraska-Lincoln, May 2025 (*Advisor*)
2. Beichen Zhang, School of Natural Resources, University of Nebraska-Lincoln, May 2024
3. Laura Thompson, Agronomy and Horticulture, University of Nebraska-Lincoln, May 2024
4. Biquan Zhao, School of Natural Resources, University of Nebraska-Lincoln, December 2023 (*Co-advisor*)
5. Andualet Shiferaw, School of Natural Resources, University of Nebraska-Lincoln, December 2023
6. Wenqi Ou, School of Natural Resources, University of Nebraska-Lincoln, May 2023
7. Zachary Rystrom, Doctorate of Plant Health Program, University of Nebraska-Lincoln, May 2022
8. Marketa Podebradska, School of Natural Resources, University of Nebraska-Lincoln, August 2021
9. Anastasios Mazis School of Natural Resources, University of Nebraska-Lincoln, August 2021
10. Saran Aadhar, Civil Engineering, Indian Institute of Technology (IIT) Gandhinagar, India, December 2020
11. Denis Mariano, School of Natural Resources, University of Nebraska-Lincoln, August 2019 (*Advisor*)
12. Benjamin Loseke, Agronomy and Horticulture, University of Nebraska-Lincoln, May 2018
13. Gabriel Torres, Earth and Atmospheric Sciences, University of Nebraska-Lincoln, December 2017
14. Humphrey Kalibo, Geography, University of Nebraska-Lincoln, May 2016
15. Eric Hunt, Natural Resources, University of Nebraska-Lincoln, August 2015 (*Advisor*)
16. Anthony Nguy-Robertson, Natural Resources, University of Nebraska-Lincoln, August 2013
17. Sharmistha Swain, Geography, University of Nebraska-Lincoln, August 2012 (*Co-advisor*)
18. Roberto Bonifaz, Geography, University of Nebraska-Lincoln, August 2011
19. Iwake Masialeti, Fulbright student in the Department of Geography, University of Kansas, August 2008

Ph.D. Students in Progress

1. Alec Piper, 2025-present. Student in School of Natural Resources, University of Nebraska-Lincoln. Coursework in progress.
2. Katie Bathke, 2025-present. Student in Complex Biosystems, University of Nebraska-Lincoln. Coursework in progress. (*Co-advisor*)
3. Tithira Lakkana, 2024-present. Student in School of Natural Resources, University of Nebraska-Lincoln. Coursework in progress.

4. Thomas Wilbur Davis, 2024-present. Student in the Doctoral Plant Health Program, University of Nebraska-Lincoln. Coursework in progress.
5. Noah Berkowitz, 2022-present. Student in School of Natural Resources, University of Nebraska-Lincoln. ABD. (*Co-advisor*)
6. Megan Baldisarra, 2021-present. Student in School of Natural Resources, University of Nebraska-Lincoln. ABD.
7. Alfonso De Lara Aldalur. 2021-present. Student in Agronomy and Horticulture, University of Nebraska-Lincoln. Coursework in progress.
8. Qianqian Li, 2019-present. Student in Department of Environmental, Agricultural and Occupational Health, University of Nebraska Medical Center. Coursework in progress.
9. Qiao Hu, 2018-present. Student in School of Natural Resources, University of Nebraska-Lincoln. Coursework in progress.
10. Ahmed Jasmin, 2016-present. Student in Agronomy and Horticulture, University of Nebraska-Lincoln. Coursework in progress.
11. Yi Wang, 2014-present. Student in Earth and Atmospheric Science, University of Nebraska-Lincoln. Coursework in progress.

Master's. Completed

1. Alec Piper, School of Natural Resources, University of Nebraska-Lincoln, May 2025
2. Christian Nielsen, School of Natural Resources, University of Nebraska-Lincoln, August 2024 (*Advisor*)
3. Mercy Kipenda, School of Natural Resources, University of Nebraska-Lincoln, August 2024
4. Tanessa Morris, School of Natural Resources, University of Nebraska-Lincoln, May 2024
5. Hassan Shehab, School of Natural Resources, University of Nebraska-Lincoln, December 2023
6. Paul Akpejelu, School of Natural Resources, University of Nebraska-Lincoln, December 2023
7. Reece Allen, School of Natural Resources, University of Nebraska-Lincoln, August 2022
8. Lingzi Zhang, Geography, University of Nebraska-Lincoln, December 2021
9. Amanda Shine, Agronomy and Horticulture, University of Nebraska-Lincoln, December 2019
10. Beichen Zhang, School of Natural Resources, University of Nebraska-Lincoln, August 2019
11. Karl Merchant, Geography, University of Nebraska-Lincoln, May 2019
12. Tony Mucia, School of Natural Resources, University of Nebraska-Lincoln, August 2018
13. Paul Merani, School of Natural Resources, University of Nebraska-Lincoln, August 2018
14. Evan Bumann, School of Natural Resources, University of Nebraska-Lincoln, December 2017
15. Xiaochen Dong, School of Natural Resources, University of Nebraska-Lincoln, December 2017
16. Joseph Lehnert, School of Natural Resources, University of Nebraska-Lincoln, August 2017 (*Co-advisor*)
17. Maria Ana Mulet Jalil, Biological Systems Engineering, University of Nebraska-Lincoln, August 2016
18. Adam Smith, School of Natural Resources, University of Nebraska-Lincoln, May 2016
19. Brian Baskerville, Geography, University of Nebraska-Lincoln, December 2013
20. Wendy Austin, Geography, University of Nebraska-Lincoln, August 2013 (*Advisor*)
21. Martha Isabel Posada, Geography, University of Nebraska-Lincoln, December 2012
22. Nicole Wayant, Geography, University of Nebraska-Lincoln May 2011
23. Jeff Nothwehr, School of Natural Resources, University of Nebraska-Lincoln, August 2007

Master's.in Progress

1. Serge Tuyambaze, 2025-present. Student in School of Natural Resources, University of Nebraska-Lincoln.

PROFESSIONAL ORGANIZATION SERVICE

Professional Working Group Membership

1. USDA Long-Term Agroecosystem Research (LTAR) Remote Sensing and GIS Working Group
2. NASA Soil Moisture Active Passive (SMAP) Early Adopter
3. NASA Soil Moisture Active Passive (SMAP) Applications Working Group
4. National Phenology Network (NPN) Land Surface Phenology and Remote Sensing Working Group
5. NASA Soil Moisture Active Passive (SMAP) Satellite Applications Working Group
6. U.S. – Canada Group on Earth Observations (GEO) Drought Definitions and Indices Study Team
7. U.S. – Canada Group on Earth Observations (GEO) Prairie Region Test bed Study Team

Manuscript Reviewer for the Following Professional Journals:

1. Advances in Space Research
2. Advances in Water Resources
3. Agronomy Journal
4. African Journal of Environmental Science and Technology
5. Agricultural and Forest Meteorology
6. Agricultural Systems
7. Applied Earth Observation and Geoinformation
8. Applied Geography
9. Applied Remote Sensing
10. Applied Vegetation Science
11. Biofuels, Bioproducts, and Biorefining
12. BIOTROPIA
13. British Journal of Environment and Climate Change
14. Canadian Journal of Remote Sensing
15. Climate Change
16. Disaster Prevention and Management
17. Field Crops Research
18. Geomatics, Natural Hazards and Risk
19. GeoCarto International
20. GIScience and Remote Sensing
21. Great Plains Research
22. Environmental Monitoring and Assessment
23. Environmental Research Letters
24. EOS, Transactions, American Geophysical Union
25. Hydrology and Earth System Science
26. IEEE Geoscience and Remote Sensing Letters
27. IEEE International Geoscience and Remote Sensing Symposium (abstracts)
28. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS)
29. IEEE Transactions on Geoscience and Remote Sensing
30. International Journal of Applied Earth Observation and Geoinformation
31. International Journal of Climatology
32. International Journal of Digital Earth
33. International Journal of Hydrology Science and Technology
34. International Journal of Remote Sensing
35. ISPRS Journal of Photogrammetry and Remote Sensing
36. Journal of Agricultural Science and Technology
37. Journal of Agronomy
38. Journal of Applied Meteorology and Climatology
39. Journal of Applied Remote Sensing

40. Journal of Environmental Management
41. Journal of Geophysical Research - Atmospheres
42. Journal of Hydrology
43. Journal of Hydrometeorology
44. Journal of Land Use Science
45. Journal of Natural Resources and Development
46. Landscape and Urban Planning
47. Natural Hazards
48. Nature Climate Change
49. Pedosphere
50. PeerJ
51. Photogrammetric Engineering and Remote Sensing
52. PLOS ONE
53. Rangelands
54. Remote Sensing
55. Remote Sensing Applications: Society and Environment
56. Remote Sensing of Environment
57. Science of the Total Environment
58. Sensors
59. Theoretical and Applied Climatology
60. Water Resources Research

External Reviewer for:

1. University of Maryland-College Park faculty tenure and promotion file, Department of Geographical Science, 2025
2. Routledge book proposal reviewer, 2025
3. National Science Foundation (NSF) EPSCoR Centers of Research Excellence in Science and Technology (CREST) Program, 2024-2025
4. NASA SERVIR Applied Sciences Team proposals, 2024
5. University of South Dakota faculty promotion file, Department of Biology, 2024
6. NASA Postdoctoral Program (NPP) proposals, 2011, 2012, 2022 and 2024
7. Institut National de Sciences Appliquées (INSA) Rouen Normandie (France)/ Fundação Cearense de Apoio ao Desenvolvimento Científico e Tecnológico (FUNCAP) (Brazil) Collaborative Scientific Program proposal, 2022
8. USDA Agricultural Research Service (ARS) Science Project Plan, 2021
9. United States-India Educational Foundation (USIEF) Fulbright-Nehru Fellowship proposals, 2021
10. Austrian Science Fund (FWF) Elise Richter Program proposal, 2021
11. Universities Space Research Association (USRA) Distinguished Undergraduate Award Committee, 2020 - 2023
12. U.S.-Israel Binational Agricultural Research and Development (BARD) Fund proposal, 2020, 2022 and 2024
13. Earth Observation Science and Applications for Risk Reduction and Enhanced Resilience in Hindu Kush Himalaya Region: A Decade of Experience from SERVIR book proposal and chapter review, 2020
14. Indian Institute of Technology (IIT) Gandhinagar, Department of Civil Engineering, doctoral thesis review, 2020.
15. Poland National Science Centre Earth System Science Program proposal, 2019
16. NASA Water Resources Applied Research Program proposals, 2018
17. *Indicators* journal proposal, Elsevier Publishers, 2018

18. Oak Ridge Associated Universities (ORAU) Ralph E. Powe Junior Faculty Enhancement Award, 2018
19. The Netherlands Organization for Scientific Research Innovative Research Incentives Scheme Vidi Program, 2018
20. Great Plains Institutional Development Award for Clinical and Transitional Research (IDeA-CTR) Grant Program, 2018
21. Netherlands Space Office User Support Program Space Research proposal review, 2013 and 2017
22. Columbia University Press, Drought: An Interdisciplinary Perspective book review, 2017
23. USDA Agricultural Research Service (ARS) senior scientist position evaluation, 2017
24. CRC Press, Data Analytics Applications for Smart Cities, book chapter review, 2017
25. USDA Agricultural Research Service (ARS) Scientific Program Plan, 2016
26. White House Office of Science and Technology Policy Earth Observation Assessment 2016
27. NASA Terrestrial Water Program Soil Moisture Active Passive (SMAP) proposals, 2016
28. United Nations Food and Agricultural Organization (UN FAO) Strategic Framework for Drought Management and Enhancing Resilience in Africa white paper, 2016
29. National Science Foundation (NSF) Geography and Spatial Sciences (GSS) Program, 2015
30. Water Advanced Research and Innovation (WARI) Fellowship Program, 2015-2016
31. CRC Press Book Proposal; 2014, 2015, and 2016
32. World Bank Water Partnership Program (WPP) Global Initiative on Remote Sensing for Water Resources Management report, invited peer reviewer, 2014
33. University of California-Santa Barbara, Department of Geography faculty promotion file, 2014
34. Illinois State University, Department of Geography faculty tenure and promotion file, 2014
35. University of Maryland, Earth System Science Interdisciplinary Center (ESSIC) research scientist promotion evaluation file, 2013
36. USDA Agricultural Research Service, Senior scientist promotion file, 2012
37. NASA MEASURES program proposals, 2012
38. UNESCO-IHE Institute for Water Education, Ph.D. student proposal, Delft, the Netherlands, 2012
39. USDA Agricultural Research Service (ARS) senior research scientist promotion evaluation, 2011
40. U.S. EPA Greenhouse Gas Emission Lifecycle Analysis (land use change component) report, 2009
41. NOAA Coastal Restoration and Enhancement through Science and Technology (CREST) Program proposals, 2009
42. U.S.-Central Asian Research Travel Grant Competition, U.S. Civilian Research and Development Foundation proposals, 2008 and 2010

Professional Organization Positions and Meetings Service

1. **Expert (invited)**, Global Drought Tracker Development for the Earth Observation Training, Education, and Capacity Development Network, *Committee on Earth Observation Satellites (CEOS)*, 2021
2. **Editorial board (invited)**, *Geomatics* (journal of MDPI), 2020-present
3. **Editorial board (invited)**, *Environmental and Sustainability Indicators* (journal of Elsevier Publishers), 2019-present
4. **Editorial board (invited)**, *Remote Sensing* (journal of MDPI), 2019-present
5. **Expert**, NASA Mass Change Community Workshop, Washington, DC, 2019
6. **Guest editor (invited)**, Remote Sensing for Drought Monitoring special issue, *Remote Sensing*, Open access journal by MDPI, 2018
7. **North American Leader and Global Co-Leader (invited)**, Climate Monitoring and Assessment Task Team on the Use of Remote Sensing Data for Climate Monitoring, Commission for Climatology, World Meteorological Organization (WMO), 2014-present

8. **Judge (invited)**, Student poster competition for the Water for Food Conference, Lincoln, NE, 2016 and 2017
9. **Expert (invited)**, Second National Earth Observations Assessment (EOA 2016), White House Office of Science and Technology, 2015-2016
10. **Co-organizer**, Planning Workshop on Remote Sensing and Spatial Analysis of Agricultural Productivity, University of Nebraska System, Omaha, NE, 2016
11. **Organizing Committee**, Center for Great Plains Studies' 2017 Central Great Plains Symposium, 2016
12. **Expert (invited)**, Committee on Earth Observation Satellites (CEOS) Water Constellation Feasibility Study, 2016
13. **Director**, Remote Sensing Specialty Group, Association of American Geographers, 2011-2015
14. **Associate Editor**, *Earthzine*, Agriculture and Remote Sensing section, 2009 – 2014
15. **Session Chair**, Methodological Advances in the Remote Sensing of Drought, 3rd InterDrought Summer School; Mikulov, Czech Republic, 2015
Session Chair, Remotely Sensed Drought Indicators, 2014 North American Drought Monitor Workshop, Toronto, Canada, 2014
16. **Co-organizer**, Remote Sensing Tools in Drought; CzechGlobe InterDrought Workshop, Brno, Czech Republic, 2014
17. **Planning Committee Member**, 2014 Water for Food Global Conference; Seattle, WA, 2014
18. **Judge (invited)**, Student poster competition for the Water for Food Conference, Lincoln, NE, 2013
19. **Reviewer (invited)**, Association of American Geographers' Remote Sensing Specialty Group Best Paper Award Competition for Early Career Scholar, 2012
20. **Judge (invited)**, Remote Sensing Specialty Group Student Paper Competition, Annual Meeting, Association of American Geographers, New York, NY, 2012
21. **Session Chair**, Contributions of Data Assimilation Products and Models in Monitoring and Predicting Drought, NASA Global Drought Monitoring Workshop, Silver Springs, MD, 2011
22. **Breakout Session Chair**, Scientific and Technical Issues and Considerations for Earth Observations and Models in the Development of Global Drought Monitoring Systems, NASA Global Drought Monitoring Workshop, Silver Springs, MD, 2011
23. **Breakout Session Chair**, Global Drought Monitoring System Needs, Global Drought Assessment Workshop, Asheville, NC, 2010
24. **Session Organizer and Chair**, Remote Sensing and Drought, Annual Meeting of Association of American Geographers, Washington, DC, 2010
25. **Session Chair**, Remote Sensing, Annual Meeting, Great Plains-Rocky Mountain Division / West Lakes Division, American Association of Geographers, Lincoln, NE, 2006
26. **Session Chair**, Land Cover Change, Pecora 16 Symposium, Sioux Falls, SD, 2005
27. **Session Chair**, Remote Sensing: Agriculture and Fractals, Annual Meeting of Association of American Geographers, Philadelphia, PA, 2004
28. **Judge (invited)**, Remote Sensing Specialty Group Student Paper Competition, Annual Meeting, Association of American Geographers, New Orleans, LA, 2003
29. **Session Chair**, Macro Land Cover Mapping, Annual Meeting, American Society of Photogrammetry and Remote Sensing, St. Louis, MO, 2001
30. **Vice-President**, Mount O'Read Geospatial Technologies Club and American Society of Photogrammetry and Remote Sensing Student Chapter, University of Kansas, Lawrence, KS, 2002–2006.
31. **Liaison**, AmericaView MODIS Database Representative for the State of Kansas, 2001-2006

MEMBERSHIPS

1. Association of American Geographers (AAG)

2. American Society of Photogrammetry and Remote Sensing (ASPRS)
3. American Geophysical Union (AGU)
4. Gamma Theta Upsilon (GTU) International Geographic Honor Society
5. Sigma Gamma Epsilon National Honor Society for the Earth Sciences