



*The* UNIVERSITY *of* OKLAHOMA

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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SUBCOMMITTEE ON THE ENVIRONMENT

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Associate Director, Oklahoma Climatological Survey

The University of Oklahoma

Norman, OK 73072

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16 May 2019

My name is Christopher Fiebrich and I am the Executive Director of the Oklahoma Mesonet. I am also Adjunct Faculty in the University of Oklahoma's School of Meteorology. I want to thank Chair Fletcher, Ranking Member Lucas, and Members of the Committee for the invitation to speak to you today.

The Oklahoma Mesonet was established 25 years ago, both to address the needs of our state's citizens to have improved warnings when severe weather strikes, and to improve our ability to research and better understand the weather. It is our state's network of 120 environmental monitoring stations that transmit atmospheric and soil observations every five minutes around the clock. We have one or more stations in each of our 77 counties so that no matter where you are in Oklahoma, we have local, real-time observations within ten miles of your location. The "power" of any Mesonet is driven by the high spatial density of its observations, and the goal of our Mesonet is to provide timely and useful weather information to Oklahoma's citizens and decision makers.

The Mesonet is a unique partnership between our state's two largest Universities - the University of Oklahoma in Norman and the Oklahoma State University in Stillwater. Our operational home is at the National Weather Center on the OU campus where we share both intellectual and physical space with OU's School of Meteorology and five NOAA facilities. This gives our students the opportunity to work side-by-side with NOAA's Storm Prediction Center, the National Weather Service (NWS), and the National Severe Storms Laboratory, providing unique benefits to both the students and the NWS. Our OU School of Meteorology is the largest

program in the nation and has produced hundreds of graduates that work in the National Weather Service. Two additional OU Research Centers that stand out with regard to their engagement with the NWS are the Advanced Radar Research Center (ARRC) and the Center for the Analysis and Prediction of Storms (CAPS). The ARRC and CAPS are actively developing the prototypes for the next generation of weather radar systems and testing new weather models, forecast techniques, and forecast delivery systems in NOAA's Hazardous Weather Testbed.

My primary expertise is the Oklahoma Mesonet, which I oversee at OU. When the Mesonet began 25 years ago, we knew we'd fall short of our potential if all we did was collect weather observations. We knew we needed to synthesize the data into useful products and tools for citizens, first responders, and the state's key economic sectors.

Over the years, we've worked with over 250 K-12 schools and over 390 teachers to enhance science and math curriculum in Oklahoma schools, and we've hosted hundreds of students at meteorology summer camps. Mesonet data have been used to advance the scientific understanding of the atmosphere as detailed in over 1000 peer reviewed journal articles and over 400 theses and dissertations.

In the area of fire forecasting and preparedness, we've trained more than 1600 wildland fire managers on weather's impact on wildfire suppression, prescribed burning, and smoke management. Many aspects of wildland fire behavior can be modeled with real-time Mesonet observations. We use the Mesonet's observations to predict the likelihood a fire will ignite, how

fast it will spread if ignited, and how high the flames will be given the observed winds, temperatures, solar radiation, and moisture. Since a large fraction of the state's agriculture sector relies on prescribed burning, we help those folks burn in the safest manner given accurate observations of wind and humidity to ensure the burn is successful and effective.

Mesonet data are also used to improve production and optimize inputs for crops and livestock. The occurrence of many plant pests and diseases can be successfully predicted given observations of mesoscale weather conditions. The number of cumulative hours above a certain temperature readily predicts the prospect of alfalfa weevil, likewise the number of hours above a certain humidity can ascertain the growth of scab on pecan trees or black rot on grapes. Using the latest agricultural scientific research coupled with real-time Mesonet observations allow growers and producers to make efficient decisions on spraying for pests and diseases, as well as smart irrigation decisions to get moisture to critical root zones while at the same time conserving water resources. The cumulative economic benefits for agricultural production in Oklahoma from utilizing Mesonet information are estimated at \$20 million each year<sup>1</sup>.

While Mesonets like the one we have in Oklahoma provide significant value to numerous economic sectors such as agriculture, tourism and renewable energy, the greatest value that weather observation and prediction systems provides is for protecting lives and livelihoods.

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<sup>1</sup> ‡ *Journal of the Science of Food and Agriculture* 98(13): 4945-4954

We've trained over 1450 emergency preparedness managers, police, fire, and public health professionals to use our products and critical tools to keep Oklahomans safe. Oklahoma, as you know, is subjected to many forms of destructive weather, most of which occur on the very short time scale of minutes to hours. These are threats that include damaging winds from tornadoes and thunderstorms, flooding rains, and crippling ice storms. The Oklahoma Mesonet has proven its worth in this role by significantly advancing the special form of forecasting known as nowcasting. Nowcasting is the prediction of critical weather details in the next 0 to 6 hours that are often difficult to resolve through numerical weather prediction models. Subtle atmospheric features revealed by the Mesonet in real-time show the location of fronts, drylines, and moisture plumes that allow forecasters to pinpoint areas most likely for convective initiation. These local, real-time data are critical for National Weather Service forecasts and warnings.

On the national scale, the Oklahoma Mesonet is part of NOAA's National Mesonet Program, comprising 30 such university/state Mesonets and additional partners. The National Mesonet Program has proven to be a successful public/private partnership model in which the federal government can leverage tens of thousands of additional real time weather observations from across the nation without having to maintain and operate them. The National Mesonet Program ensures that all observations are quality controlled and in the correct format for the NWS's Meteorological Assimilation Data Ingest System (MADIS). This allows forecasters to use these additional data to improve weather models and every community's weather forecast. Therefore, it is essential that this Congress and the Administration vigorously support and

expand funding for the National Mesonet to insure that local forecasters and the communities in which they serve have access to this highly localized weather data so they can continue to protect lives and enhance the livelihood of communities that are heavily dependent upon stewardship of our precious natural resources. The University is proud to play a role in providing scientific credibility and fundamental research on weather forecast models via these programs, and I look forward to answering any questions you have about our efforts in Oklahoma.

**Dr. Christopher A. Fiebrich**  
The University of Oklahoma  
Oklahoma Mesonet- Oklahoma Climatological Survey  
fiebrich@ou.edu

**Education:**

University of Oklahoma, Meteorology, Ph. D., 2007  
University of Oklahoma, Meteorology, M.S., 2000  
University of Oklahoma, Meteorology, B.S. (magna cum laude), 1998

**Dissertation:**

Transitioning the historical climate archives to data from newly automated sites--  
Maintaining continuity in the temperature climate record. University of Oklahoma,  
169 pp. (Awarded the Dissertation Medal in Applied Climatology for 2009 from the  
American Association of State Climatologists)

**Professional Appointments:**

**Executive Director, Oklahoma Mesonet, Norman, OK 2016-Present**

Oversee all activities of the Oklahoma Mesonet, including sensor calibrations, field operations, technology and software development, outreach, data and climate services, research, and strategic planning.

**Adjunct Faculty, University of Oklahoma School of Meteorology, Norman, OK, 2015-Present**

Collaborate with University faculty, supervise and mentor School of Meteorology students.

**Associate Director, Oklahoma Climatological Survey, Norman, OK, 2010-Present**

Responsibilities include the supervision of over 50 staff including System Administrators, Software Developers, Outreach Managers, Technical Scientists, Climatologists, Research staff, and Administrative staff; administer personnel actions including hiring, promoting and terminating staff; administer federal, state, and international grants and contracts; oversee the Oklahoma Climatological Survey budget of over \$4M.

**Manager, Oklahoma Mesonet, Norman, OK, 2001-2016**

Responsibilities include the management of all purchasing, fabrication, testing, calibration, deployment, and maintenance of all sensors and related equipment at 191 weather stations, 34 repeaters, and 52 bases across Oklahoma; oversees the operation and scientific integrity of the sites, sensors, and data quality of the Oklahoma Mesonet and the OKC and USDA-ARS Micronets; conduct and publish research.

**Quality Assurance Manager, Oklahoma Mesonet, Norman, OK, 1998-2001**

Responsibilities included both daily and long-term quality control of data from the Oklahoma Mesonet and associated Micronets; communicated findings to Mesonet technicians when stations needed repairs; prepared reports of instrument repairs and problems for use by the research community; developed algorithms and research methodology for quality control software.

**Intern, National Weather Service Headquarters, Silver Spring, MD, 1997-1998**

Developed Model Output Statistics software; provided forecast verification for National Weather Service offices; researched and developed algorithms to quality control weather station data.

**Notable Awards, Honors, Memberships, and Activities**

**Graduate Committees:** Brian Greene (M.S., 2018), Tyler Bell (M.S., 2018), Dorothy Na-Yemeh (Ph.D.), Monica Mattox (Ph.D.), Brian Greene (Ph.D), Tyler Bell (Ph.D.)

**External Advisory Committee, Center for Analysis and Prediction of Storms, 2018-Present**

**Steering Committee Member, American Association of State Climatologists Mesonet Committee, 2017-Present**

**Review Panel, NOAA Air Resources Laboratory, 2016**

**Scientific Advisory Board for NSF Project “Algorithms and Cyberinfrastructure for High-Precision Automated Quality Control of Hydro-Meteo Sensor Networks”, Oregon State University, 2015-2018**

**Hired as consultant to work on World Bank-sponsored modernization of meteorological services in Yemen, 2014-2017**

**Certified Consulting Meteorologist, American Meteorological Society, 2014-Present.**

**Presented at World Meteorological Organization Technical Conference on Meteorological and Environmental Instruments and Methods of Observations, Brussels, Belgium, October 2012**

**Presented at Canadian Meteorological and Oceanographic Society, Montreal, Canada, May 2012.**

**Member, Cooperative Institute for Mesoscale Meteorological Studies Assembly of Fellows, 2012-2015.**

**Invited Presentation to the Korea Meteorological Administration, Seoul, Korea: “Quality Assurance Procedures for Mesoscale Meteorological Data: An Essential Ingredient to Become a Top Tier Federal Weather Service”, Oct 2010.**

**Awarded the Dissertation Medal in Applied Climatology from the American Association of State Climatologists, 2009.**

**Hired to review Korea Meteorological Administration weather network and develop a roadmap for modernization through on-site visits to Seoul, Jeju Island, Busan, Daegu, Andong, and Daegwallyeong, Nov 2009**

**Member, American Meteorological Society Committee on Measurements, 2008-2014.**

**Associate Member, American Association of State Climatologists, 2007-Present**

**Served on National Ecological Observing Network Design Review Panel, Boulder, CO, 2006-2009.**

**Served on National Ecological Observing Network Technical Working Group, 2011-2017.**

**Served on American Nuclear Society’s Meteorology and Wildland Fires Standard Working Group, 2017-Present.**

**Attended Swiss Climate Research Summer School, Grindelwald, Switzerland, Aug 2006**



**Member, American Society for Testing and Materials International Committee on Meteorology, 2003-2010.**

**Member, American Meteorological Society, 1998-Present.**

**Served on U.S. Climate Reference Network Science Review Panel and Test Review Panel, National Climatic Data Center, Asheville, NC, 2003-2006.**

**Organized Mesonet 2002 Institute** with over 25 states and countries represented, Oklahoma City, June 2002.

**Awarded David James Shellberg Memorial Scholarship, 2000.**

**Awarded Graduate Fellowship, National Science Foundation, 1998-2000.**

**Awarded WeatherData, Inc., Scholarship for Excellence in Weather Forecasting, 1996.**

**Recipient of University of Oklahoma Award of Excellence, 1993.**

### **Volunteer Work**

**Monroe Elementary WatchD.O.G.S.** volunteer one day per month during the school year, 2007-2019.

**Monroe Elementary Outdoor Classroom** Committee Chair, 2014-2019

**Cleveland County Habitat for Humanity**, construction of the 833 S.W. 10th St, Moore, Oklahoma home, 2014.

### **Publications**

Hocker, J.E., A.D. Melvin, K.A. Kloesel, C. A. Fiebrich, R. W. Hill, R. D. Smith, and S. F. Piltz, 2018: The evolution and impact of a meteorological outreach program for public safety officials: An update on the Oklahoma Mesonet's OK-First program. *Bull. Amer. Meteor. Soc.*, **99**, 2009-2024.

Duchon, C.E., C. A. Fiebrich, and B. G. Illston, 2017: Observing the May 2015 record rainfall at Norman, Oklahoma using various methods. *J. Hydromet.* **18**, 3043-3049. DOI: <https://doi.org/10.1175/JHM-D-17-0137.1>

Wang, T., Q. Liu, T.E. Franz, R. Li, Y. Lang, C.A. Fiebrich, 2017: Spatial patterns of soil moisture from two regional monitoring networks in the United States. *Journal of Hydrology*, **552**, 578-585.

Martens, B. V., B. G. Illston, and C. A. Fiebrich, 2017: The Oklahoma Mesonet: A case study of the diverse state of environmental sensor data citations. *Data Sci. J.*, **16**:47, 1-15. DOI: <https://doi.org/10.5334/dsj-2017-047>

Illston, B., and C. Fiebrich, 2017: Horizontal and vertical variability of observed soil temperatures. *Geosciences Data Journal*, **4**, 40-46.

Mahmood, R., R. Boyles, K. Brinson, C. Fiebrich, S. Foster, K. Hubbard, D. Robinson, J. Andresen, and D. Leathers, 2016: Mesonets: meso-scale weather and climate observations for the U.S. *Bull. Amer. Meteor. Soc.*, **98**, 1349-1361. DOI: <http://dx.doi.org/10.1175/BAMS-D-15-00258.1>

- Ziolkowska, J.R., C.A. Fiebrich, J.D. Carlson, A.D. Melvin, A.J. Sutherland, K.A. Kloesel, G.D. McManus, B.G. Illston, J.E. Hocker, and R. Reyes, 2017: Benefits and beneficiaries of the Oklahoma Mesonet: a multisectoral ripple effect analysis. *Wea. Climate Soc.*, **9**, 499-519.
- Lin, X., R.A. Pielke Sr., R. Mahmood, C.A. Fiebrich, and R. Aiken, 2015: Observational evidence of temperature trends at two levels in the surface layer. *Atmos. Chem. Phys.*, **16**, 827-841, doi:10.5194/acp-16-827-2016.
- Guzman, J. A., M.L. Chu, P.J. Starks, D.N. Moriasi, J.L. Steiner, C.A. Fiebrich, and A.G. McCombs, 2014: Upper Washita River experimental watersheds: Data screening procedure for data quality assurance. *J. Environ. Qual.*, **43**, 1250-1261.
- Duchon, C., C. Fiebrich, and D. Grimsley, 2014: Using high-speed photography to study undercatch in tipping-bucket rain gauges. *J. Atmos. Ocean. Tech.*, **31**, 1330-1336.
- Starks, P.J., C.A. Fiebrich, D.L. Grimsley, J.D. Garbrecht, J.L. Steiner, J.A. Guzman, and D.N. Moriasi, 2014: Upper Washita River experimental watersheds: Meteorologic and soil climate measurement networks. *J. Environ. Qual.*, **43**, 1239-1249.
- Scott, B.L., T.E. Ochsner, B.G. Illston, C.A. Fiebrich, J.B. Basara, and A. Sutherland, 2013: New soil property database improves Oklahoma Mesonet soil moisture estimates, *J. Atmos. Ocean. Tech.*, **30**, 2585-2595.
- Illston, B. G., C. A. Fiebrich, D. L. Grimsley, and J. B. Basara, 2013: Evaluation of a heat dissipation sensor for in situ measurement of soil temperature. *Soil Sci. Soc. Of Amer. J.*, **77** (3), 741-747.
- McManus, G., T. W. Schmidlin, and C. A. Fiebrich, 2013: A new minimum temperature record for Oklahoma. *Bull. Amer. Meteor. Soc.*, **94**, 469-470.
- Basara, J. B., B. G. Illston, C. A. Fiebrich, P. D. Browder, C. R. Morgan, A. McCombs, J. P. Bostic, R. A. McPherson, A. J. Schroeder, and K. C. Crawford, 2010: The Oklahoma City Micronet. *Meteorological Applications*, **18**, 252-261.
- Fiebrich, C. A., C. R. Morgan, A. G. McCombs, P. K. Hall, Jr., and R. A. McPherson, 2010: Quality assurance procedures for mesoscale meteorological data. *J. Atmos. Oceanic Technol.*, **27**, 1565-1582.
- Fiebrich, C. A., and K. C. Crawford, 2009: Automation: A step toward improving the quality of daily temperature data produced by climate observing networks. *J. Atmos. Oceanic Technol.*, **26**, 1246-1260.
- Basara, J. B., B. G. Illston, T. E. Winning, and C. A. Fiebrich, 2009: Evaluation of rainfall measurements from the WXT510 sensor for use in the Oklahoma City Micronet.

*The Open Atmospheric Science Journal*, **3**, 39-47. Doi: 10.2174/1874282300903010039.

Fiebrich, C.A., 2009: History of surface weather observations in the United States. *Earth-Science Reviews*, **93**, 77-84.

Illston, B. G., J. B. Basara, D. K. Fisher, R. Elliott, C. A. Fiebrich, K. C. Crawford, K. Humes, and E. Hunt:, 2008: Mesoscale monitoring of soil moisture across a statewide network. *J. Atmos. Oceanic Technol.*, **25**, 167-182.

Fiebrich, C. A., 2007: Transitioning the historical climate archives to data from newly automated sites-- Maintaining continuity in the temperature climate record. Ph. D. Dissertation, University of Oklahoma, 169 pp.

McPherson, R. A., C. A. Fiebrich, K. C. Crawford, R. L. Elliott, J. R. Kilby, D. L. Grimsley, J. E. Martinez, J. B. Basara, B. G. Illston, D. A. Morris, K. A. Kloesel, S. J. Stadler, A. D. Melvin, A.J. Sutherland, and H. Shrivastava, 2007: Statewide Monitoring of the Mesoscale Environment: A Technical Update on the Oklahoma Mesonet. *J. Atmos. Oceanic Technol.*, **24**, 301-321.

Fiebrich, C. A., D. L. Grimsley, R. A. McPherson, K. A. Kesler, and G. R. Essenberg, 2005: The value of routine site visits in managing and maintaining quality data from the Oklahoma Mesonet. *J. Atmos. Oceanic Technol.*, **23**, 406-416.

Fiebrich, C. A., J. E. Martinez, J. A. Brotzge, and J. B. Basara, 2003: The Oklahoma Mesonet's skin temperature network. *J. Atmos. Oceanic Technol.*, **20**, 1496-1504.

Fiebrich, C. A., and K. C. Crawford 2001: The impact of unique meteorological phenomena detected by the Oklahoma Mesonet and ARS Micronet on automated quality control. *Bull. Amer. Meteor. Soc.*, **82**, 2173-2187.

Shafer, M. A., C. A. Fiebrich, D. S. Arndt, S. E. Fredrickson, and T. W. Hughes, 2000: Quality assurance procedures in the Oklahoma Mesonet. *J. Atmos. Oceanic Technol.*, **17**, 474-494.

### **Conference Preprints:**

Roche-Rivera, Z., C. Fiebrich, and K. Brewster, 2019: Analysis of solar insolation and solar energy production at an Oklahoma Mesonet site. *18<sup>th</sup> Annual Student Conference of the Amer. Meteor. Soc.*, Phoenix, AZ, January 2019.

Stadler, S.J., and C. Fiebrich, 2018: Use of Oklahoma's Mesonet and Severe Environmental Events. *Great Plains Rocky Mountain American Association of Geographers*, Manhattan, Kansas, October 2018.

- Greene, B., P. B. Chilson, A. R. Segales, W. Doyle, B. Wolf, C. Fiebrich, S. Duthoit, S. Waugh, and S. E. Fredrickson, 2018: Observations of morning PBL transitions using rotary-wing unmanned aircraft systems. *23<sup>rd</sup> Symposium on Boundary Layers and Turbulence*, Oklahoma City, OK, Amer. Meteor. Soc., June 2018.
- Chilson, P.B., A. R. Segales Espinosa, B. Greene, J. Salazar, A. Umeyama Matsumoto, C. A. Fiebrich, R. Huck, J. Grimsley, M. B. Yeary, R. D. Palmer, M. E. Weber, K. Carson, and S. Teja Kanneganti, 2018: Development of an autonomous UAV atmospheric profiling system: Initial implementation and first results. *19<sup>th</sup> Symp. On Meteorological Observation and Instrumentation*, Austin, TX, Amer. Meteor. Soc., January 2018.
- Greene, B., P.B. Chilson, J. Salazar, S. Duthoit, A. Segales, C. Fiebrich, W. Doyle, B. Wolf, S. Waugh, S.E. Fredrickson, S.P. Oncley, L. Tudor, and S. Semmer, 2018: Optimaztion of rotary-wing UAS as an atmospheric sensing platform. *19<sup>th</sup> Symp. On Meteorological Observation and Instrumentation*, Austin, TX, Amer. Meteor. Soc., January 2018.
- Chilson, P.B., C. A. Fiebrich, R. Huck, J. Grimsley, J. Salazar-Cerreno, K. Carson, K and J. Jacob, 2017: The 3D Mesonet Concept: Extending Networked Surface Meteorological Tower Observations Through Unmanned Aircraft Systems, *Atmospheric Sciences Program AGU*, New Orleans, LA, December 2017.
- Greene, B., P. Chilson, J. Salazar-Cerreno, S. Duthoit, B. Doyle, B. Wolf, A. Segales, C. A. Fiebrich, S. Waugh, S. Fredrickson, S. Oncley, L. Tudor, and S. Semmer, 2017: Development of Rotary-Wing UAS for Use in Atmospheric Sensing of Near-Storm Environments, *Atmospheric Sciences Program AGU*, New Orleans, LA, December 2017.
- Chilson, P., C. Fiebrich, R. Huck, J. Grimsley, J. Salazar-Cerreno, K. Carson, J. Jacob, B. Greene, A. Segales, A.Y. Umeyama, S. Duthoit, and J. Martin, 2017: The 3D Mesonet concept: Extending networked surface meteorological tower observations through unmanned aircraft systems. *Int'l Symp on Earth-Science Challenges*, Kyoto, Japan, October 2017.
- Greene, B. P. Chilson, J. Salazar-Cerreno, S. Duthoit, B. Doyle, B. Wolf, T. Segales, C. Fiebrich, S. Waugh, and S. Fredrickson, 2017: Calibration and Validation of Weather Sensors for Rotary-Wing UAS. *5th Conf. of the Int'l Society for Atmospheric Research using Remotely-piloted Aircraft*, Oban Scotland, May 2017.
- Tate, R.A., D.L. Grimsley, and C.A. Fiebrich, 2016: New All In One Sensors- Looking Into the Future of Meteorological Instrumentation Packages, *18th Symposium on Observations and Instrumentation*, New Orleans, LA, Amer. Meteor. Soc., January 2016.

- Duchon, C.E., C.A. Fiebrich, and B.G. Illston, 2016: Ground Level and Aboveground Observations of Record Rainfall in May 2015 in Oklahoma. *22<sup>nd</sup> Conf. on Applied Climatology*, New Orleans, LA, Amer. Meteor. Soc., January 2016.
- Sellers, M.A., C.A. Fiebrich, and C.R. Luttrell, 2016: A Comparison Of 20 Years Of Automated And Manual Rainfall Observations At Over 250 Locations Across Oklahoma. *22<sup>nd</sup> Conf. on Applied Climatology*, New Orleans, LA, Amer. Meteor. Soc., January 2016.
- Sallee, B.M., T.E. Ochsner, C. Fiebrich and C. Neel, 2014: Estimating Groundwater Recharge Using the Oklahoma Mesonet. *Oklahoma Water Research Symposium*, Oklahoma City, Oklahoma. October 2014.
- Sallee, B.M., T.E. Ochsner, C. Fiebrich and C. Neel, 2014: Estimating Groundwater Recharge Using the Oklahoma Mesonet. *ASA-CSSA-SSSA International Annual Meeting*, Long Beach, California. November 2014.
- King, Jonathan, and C. Fiebrich, 2015: Enhancing the rainfall archive of the Oklahoma Mesonet by installing dual gauges. *14<sup>th</sup> Annual Student Conference*, Phoenix, AZ, Amer. Meteor. Soc., January 2015.
- Tomaszewski, Jessica M., and C. Fiebrich, 2015: Operating a surface mesonet during extreme weather events. *14<sup>th</sup> Annual Student Conference*, Phoenix, AZ, Amer. Meteor. Soc., January 2015.
- Stalker, S. L., M. K. Corbett, K. A. Kloesel, C. A. Fiebrich, J. Hocker, A. Melvin, and D. Mattox, 2014: How weather decisions are made in schools: the first step in weather ready schools. *23<sup>rd</sup> Symposium on Education*, Atlanta, GA, Amer. Meteor. Soc., February 2014.
- Corbett, M. K., S. L. Stalker, K. A. Kloesel, C. A. Fiebrich, J. Hocker, A. Melvin, 2014: Weather ready schools and weather education: what are our students being taught? *23<sup>rd</sup> Symposium on Education*. Atlanta, GA, Amer. Meteor. Soc., February 2014.
- Morrissey, M., P., Masale, C. Fiebrich, J. S. Greene, and S. Postawko, 2014: Pacific climate services capacity building in cooperation with Pacific Island Country Meteorological Offices and NOAA, a case study in the country of Vanuatu. *26<sup>th</sup> Conf. on Climate Variability and Change*. Atlanta, GA, Amer. Meteor. Soc., February 2014.
- McCombs, A. G., A. J. Ilk, and C. A. Fiebrich, 2014: Effects of nearby irrigation on Oklahoma Mesonet observations. *18<sup>th</sup> Conf. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface*. Atlanta, GA, Amer. Meteor. Soc., February 2014.

- Illston, B. G., C. A. Fiebrich, and D. Grimsley, 2013: Utilizing a Campbell Scientific 229 matric potential sensor as an operational soil temperature sensor. *3<sup>rd</sup> Conf. on Transition of Research to Operations*, Austin, TX, Amer. Meteor. Soc., January 2013.
- Hocker, J., A. Melvin, K. Kloesel, and C. Fiebrich, 2013: Oklahoma's OK-First weather education program for emergency managers: 15 years of lessons learned and a look towards the future. *22<sup>nd</sup> Symposium on Education*. Austin, TX, Amer. Meteor. Soc., January 2013.
- Fiebrich, C. A., K. Kloesel, D. Grimsley, G. McManus, A. McCombs, and C. Luttrell, 2013: The Oklahoma Mesonet: Evolution from real-time weather network to climate network. *20<sup>th</sup> Conf. on Applied Climatology*. Austin, TX, Amer. Meteor. Soc., January 2013.
- Illston, B. G., N. E. Bain, C. A. Fiebrich, J. B. Basara, R. Jabrzemski, and B. Vassmer, 2013: Leveraging decadal averages of mesoscale observations from the Oklahoma Mesonet to provide decision-makers enhanced tools. *20<sup>th</sup> Conf. on Applied Climatology*. Austin, TX, Amer. Meteor. Soc., January 2013.
- Duchon, C., C. A. Fiebrich, and D. L. Grimsley, 2013: Using high-speed photography to study undercatch in tipping-bucket rain gauges. *European Geosciences Union General Assembly*, Vienna, Austria, April 2013.
- Taylor, J.R., H. Luo, E. Ayres, C. Fiebrich, S. Berukoff, and H. W. Loescher, 2011: Data flows for NEON's fundamental instrument unit: Quality assurance and quality control approaches. *96<sup>th</sup> ESA Conference*, Austin, TX, August 2011.
- Morgan, C. R., G. R. Essenberg, K. C. Crawford, and C. A. Fiebrich, 2007: Improved accuracy in measuring precipitation with the NERON network in New England. *14<sup>th</sup> Symposium on Meteorological Observations and Instrumentation*, San Antonio, TX, Amer. Meteor. Soc., January 2007.
- Fiebrich, C. A., R. A. McPherson, C. C. Fain, J. R. Henslee, and P. D. Hurlbut: An end-to-end quality assurance system for the modernized COOP network. *15<sup>th</sup> Conference on Applied Climatology*, Savannah, GA. Amer. Meteor. Soc., June 2005.
- Martinez, J. E., C. A. Fiebrich, and R. A. McPherson: The value of weather station metadata. *15<sup>th</sup> Conference on Applied Climatology*, Savannah, GA, Amer. Meteor. Soc., June 2005.
- Martinez, J. E., C. A. Fiebrich, and M. A. Shafer: The value of a quality assurance meteorologist. *14<sup>th</sup> Conference on Applied Climatology*, Seattle, WA, Amer. Meteor. Soc., January 2004.

Illston, B. G., J. B. Basara, C. A. Fiebrich, M. Wolfinbarger, G. McManus, and D. Arndt: Real-time soil moisture information for drought monitoring and assessment. *14<sup>th</sup> Conference on Applied Climatology*, Seattle, WA, Amer. Meteor. Soc., January 2004.

Fiebrich, C. A., D. L. Grimsley, and S. J. Richardson: The impact of a major ice storm on the operations of the Oklahoma Mesonet. *18<sup>th</sup> International Conference on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology*, Orlando, FL, Amer. Meteor. Soc., January 2002.

Fiebrich, C. A., and R. A. McPherson: An examination of the impact of harvested winter wheat fields on summer air temperature in Oklahoma. *The 98<sup>th</sup> Association of American Geographers Annual Meeting*, Los Angeles, CA, March 2002.

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### **Referee Activities**

*Weather and Forecasting; Journal of Applied Meteorology; Journal of Atmospheric and Oceanic Technology; Journal of Geophysical Research; Journal of Hydrologic Engineering; Atmospheric Research; Open Atmospheric Science Journal; Bulletin of the American Meteorological Society; Vadose Zone; Arctic; Journal of Applied Meteorology and Climatology; Acta Geophysica; National Science Foundation*

## **Dr. Christopher A. Fiebrich (pronounced Fee-brick)**

### **Bio**

Christopher A. Fiebrich is the Executive Director of the Oklahoma Mesonet and Associate Director of the Oklahoma Climatological Survey at the University of Oklahoma (OU). He is also Adjunct Faculty with the School of Meteorology at OU. He has published 26 peer reviewed articles on mesoscale meteorology and climatology, meteorological instrumentation, and applied meteorology and climatology. He oversees all activities of the Oklahoma Mesonet, including sensor calibrations, field operations, technology and software development, data and climate services, research, and outreach to emergency managers, fire fighters, farmers, and K-20 educators.

He earned his B.S. in 1998, M.S. in 2000, and Ph.D. in Meteorology in 2007 from the University of Oklahoma. His dissertation was awarded the Dissertation Medal for 2009 from the American Association of State Climatologists (AASC). He is a Steering Committee member of the AASC Mesonet committee and a Certified Consulting Meteorologist of the American Meteorological Society.