

# Curriculum Vitae

Dr. Andrew E. Mercer

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Department of Geosciences, Mississippi State University  
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## **Education:**

Ph.D. (Meteorology), The University of Oklahoma, Dec. 2008

- Dissertation entitled *Discrimination of Tornadic and Non-tornadic Severe Weather Outbreaks* (Dr. Michael B. Richman, major professor)

M.S. (Meteorology), The University of Oklahoma, May 2005

- Thesis entitled *Analysis of Three Synoptic Storm Tracks in the United States* (Dr. Michael B. Richman, major professor)

B.S. (Meteorology), The University of Oklahoma, May 2002

- Minor in Mathematics

## **Current Research Interests:**

Artificial intelligence applications in meteorology, statistical modeling of atmospheric processes, severe weather meteorology, synoptic meteorology, numerical weather prediction, statistical climatology, climatology of large-scale processes

## **Experience:**

- Mississippi State University, Starkville, MS, Department of Geosciences, August 2015 – present. *Associate Professor*
- Mississippi State University, Starkville, MS, Department of Geosciences, August 2012 – August 2015. *Assistant Professor*
- Mississippi State University, Starkville, MS, Department of Geosciences/Northern Gulf Institute, August 2009 – July 2012. *Assistant Professor*
- School of Meteorology, University of Oklahoma, Norman, OK, May 2009 – July 2009. *Lecturer*
- Cooperative Institute of Mesoscale Meteorological Studies, University of Oklahoma, Norman, OK, January 2009 – May 2009. *Post-doctoral Research Associate*
- Cooperative Institute of Mesoscale Meteorological Studies, University of Oklahoma, Norman, OK, January 2003 – December 2008. *Research Associate*
- Department of Science and Engineering, Oklahoma State University, Oklahoma City, OK, June 2008 – December 2008. *Adjunct Instructor*

- Weatherbank, Inc., Edmond, OK, December 2003 – February 2008. *Assistant Shift Supervisor/Forecaster*
- School of Meteorology, University of Oklahoma, Norman, OK, May 2009 – July 2009. *Teaching Assistant*

### **Research Activities:**

### **Refereed Publications:**

1. Mercer, A., A. Grimes, and K. Wood, 2020: Application of unsupervised learning techniques to identify Atlantic tropical cyclone rapid intensification environments. *J. Appl. Meteor. Climo.*, in review.
2. Mercer, A., 2020: Dominant U.S. cold-season surface temperature anomaly patterns derived from kernel methods. *Atmos.*, in review.
3. Guzman, S., J. Paz, M. Tagert, and A. Mercer, 2020: Groundwater forecasting using machine learning: principles of input variable selection in humid environments. *Trans. ASABE*, in review.
4. Elcik, C., C. Fuhrmann, S. Sheridan, A. Mercer, and K. Sherman-Morris, 2020: Relationship between synoptic weather type and emergency department visits for different types of pain across the triangle region of North Carolina. *Int. J. Biometeorology*, in review.
5. Mercer, A., 2019: Predictability of common atmospheric teleconnection indices using machine learning. *Proc. Comp. Sci.*, in press.
6. Sankar, M., P. Dash, Y. Lu, A. Mercer, G. Turnage, C. Shoemaker, and R. Moorhead, 2020: Land use and land cover control on the spatial dispersal of dissolved organic matter across 41 lakes in Mississippi, USA. *Hydrobiologica*, **1**.
7. Sankar, M., P. Dash, Y. Lu, V. Paul, A. Mercer, Z. Arslan, J. Varco, and J. Rodgers, 2019: Dissolved organic matter and trace element variability in a blackwater-fed bay following precipitation. *Estuarine, Coastal and Shelf Science*, **231**, 16 pp.
8. Mercer, A., and A. Bates, 2019: Meteorological differences characterizing tornado outbreak forecasts of varying quality. *Atmos.*, **10**, 16 pp.

9. \*MacDonald, C., and A. Mercer, 2019: STUDENT PAPER: Using Blue Waters to assess tornadic outbreak forecast capability by lead time. *J. Comp. Sci. Education*, **11**, 23-28.
10. Guzman, S., J. Paz, M. Tagert, A. Mercer, and J. Pote, 2019: Evaluation of seasonally classified inputs for the prediction of daily groundwater levels: NARX Networks vs. support vector machines. *Env. Modeling & Assessment*, 1-12.
11. Sankar, M., P. Dash, Y. Lu, S. Singh, S. Chen, and A. Mercer, 2019: Effect of photo-biodegradation and biodegradation on the biogeochemical cycling of dissolved organic matter across diverse surface water bodies. *J. Environ. Sciences*, **77**, 130-147.
12. Mercer, A., A. Grimes, and K. Wood, 2018: Multidimensional kernel principal component analysis of false alarms of rapidly intensifying Atlantic tropical cyclones. *Procedia Comp. Sci.*, **140**, 359-366.
13. Guzman, S., J. Paz, M. Tagert, A. Mercer, and J. Pote, 2018: An integrated SVR and crop model to estimate the impacts of irrigation on daily groundwater levels. *Ag. Systems*, **159**, 248-259.
14. \*Prislovsky, T., and A. Mercer, 2017: STUDENT PAPER: Using Blue Waters to Assess non-Tornadic Outbreak Forecast Capability by Lead Time. *J. Comp. Sci. Education*, **8**, 30-35. (part of undergraduate student internship program)
15. Mercer, A., and A. Grimes, 2017: Atlantic Tropical Cyclone Rapid Intensification Probabilistic Forecasts from an Ensemble of Machine Learning Methods. *Procedia Comp. Sci.*, **114**, 333-340.
16. Elcik, C., C. Fuhrmann, A. Mercer, and R. Davis, 2017: Relationship between air mass type and emergency department visits for migraine headache across the Triangle of North Carolina. *Int. J. Biometeorol.*, 1-10.
17. \*Smith, M., and A. Mercer, 2017: STUDENT PAPER: Blue Waters Supercomputing Applications in Climate Modeling with the WRF Model. *J. Comp. Sci. Ed.*, **8**, 36-43. (part of undergraduate internship program).
18. Mercer, A., and A. Grimes, 2016: Importance of Model-Resolution on Discriminating Rapidly and Non-Rapidly Intensifying Atlantic Basin Tropical Cyclones. *Procedia Comp. Sci.*, **95**, 223-228.
19. Grimes, A., and A. Mercer, 2016: Diagnosing Rapid Intensification through Rotated Principal Component Analysis. Chapter, Recent Developments in Tropical Cyclone Dynamics, Prediction, and Detection. *Intech Publishing*, p. 25-49. (invited book chapter)

20. Mercer, A., and A. Grimes, 2015: Diagnosing Tropical Cyclone Rapid Intensification using kernel methods and reanalysis datasets. *Procedia Comp. Sci.*, **61**, 422-427.  
<http://dx.doi.org/10.1016/j.procs.2015.09.179>
21. Sparrow, K., and A. Mercer, 2015: Predictability of US Tornado Outbreak Seasons Using ENSO and Northern Hemisphere Geopotential Height Variability. *Geosci. Frontiers*,  
<http://dx.doi.org/10.1016/j.gsf.2015.07.007>
22. Dyer, J., A. Mercer, J. Rigby, and A. Grimes, 2015: Identification of recharge zones in the lower Mississippi River Alluvial Aquifer using high-resolution precipitation estimates. *J. Hydrology Special Issue: Radar Hydrology*, **531**, 360-369..  
<http://dx.doi.org/10.1016/j.jhydrol.2015.07.016>
23. Grimes, A., and A. Mercer, 2015: Synoptic-Scale Precursors to Tropical Cyclone Rapid Intensification in the Atlantic Basin. *Adv. Meteorology*, **1**.  
<http://dx.doi.org/10.1155/2015/814043>
24. Chen, H., S. Zhang, C. Wei, H. Mei, J. Zhang, Mercer, A., Liang, R., and H. Qu, 2015: Uncertainty-aware multidimensional ensemble data visualization and exploration. *IEEE Trans. Viz and Comp. Graphics*, **21**, 1072-1086.  
<http://dx.doi.org/10.1109/TVCG.2015.2410278>
25. Mercer, A., and J. Dyer, 2014: A new scheme for daily peak wind gust prediction using machine learning. *Procedia Comp. Sci.*, **36**, 593-598.  
<http://dx.doi.org/10.1016/j.procs.2014.09.059>
26. Dixon, P., A. Mercer, W. Cooke, and K. Grala, 2014: Objective identification of tornado seasons and ideal spatial smoothing radii. *Earth Interactions*, **18**, 1-15.  
<http://dx.doi.org/10.1175/2013EI000559.1>
27. Dyer, J., and A. Mercer, 2013: Assessment of spatial rainfall variability in the lower Mississippi River alluvial valley. *J. Hydrometeorology*, **14**, 1826-1843.  
<http://dx.doi.org/10.1175/JHM-D-12-0163.1>
28. Mercer, A., J. Dyer, and S. Zhang, 2013: Warm-season thermodynamically-driven rainfall prediction with support vector machines. *Procedia Comp. Sci.*, **20**, 128-133.  
<http://dx.doi.org/10.1016/j.procs.2013.09.250>
29. Richman, M. B., A. E. Mercer, L. M. Leslie, C. A. Doswell, and C. M. Shafer, 2013: High dimensional data compression using principal components. *Open J. Statistics*, **5**, 356-366. <http://dx.doi.org/10.4236/ojs.2013.35041>

30. Mercer, A. E., and M. B. Richman, 2012: Assessing atmospheric variability using kernel principal component analysis, *Procedia Comp. Sci.*, **7**, 288-293.  
<http://dx.doi.org/10.1016/j.procs.2012.09.071>
31. Shafer, C. M., A. E. Mercer, M. B. Richman, L. M. Leslie, and C. A. Doswell III, 2012: An assessment of areal coverage of severe weather parameters for severe weather outbreak diagnosis. *Wea. Forecasting*, **27**, 809-831. <http://dx.doi.org/10.1175/WAF-D-11-00142.1>
32. Mercer, A. E., C. M. Shafer, C. A. Doswell III, L. M. Leslie, and M. B. Richman, 2012: Synoptic Composites of Tornadic and Nontornadic Outbreaks. *Mon. Wea. Rev.*, **140**, 2590-2608. <http://dx.doi.org/10.1175/MWR-D-12-00029.1>
33. Richman, M.B. and A.E. Mercer, 2012: Identification of intraseasonal modes of variability using rotated principal components. *Chapter 12. Atmospheric Model Applications*, I. Yucel, Ed., Intech, 273-296. <http://dx.doi.org/10.5772/35364>
34. Dixon, P. G., and A. E. Mercer, 2012: Reply to "Comments on 'Tornado Risk Analysis: Is Dixie Alley an Extension of Tornado Alley?'" , *Bull. Amer. Meteor. Soc.*, **93**, 408-410.  
<http://dx.doi.org/10.1175/BAMS-D-11-00219.1>
35. Mercer, A. E., L. M. Leslie, and M. B. Richman, 2011: Identification of severe weather outbreaks using kernel principal component analysis. *Procedia Comp. Sci.*, **6**, 231-236.  
<http://dx.doi.org/10.1016/j.procs.2013.09.250>
36. Dixon, P. G., A. E. Mercer, J. Choi, J. S. Allen, 2011: Tornado Risk Analysis: Is Dixie Alley an Extension of Tornado Alley?. *Bull. Amer. Meteor. Soc.*, **92**, 433-441.  
<http://dx.doi.org/10.1175/2010BAMS3102.1>
37. Sanyal, J., Zhang, S., Dyer, J., Mercer, A., Amburn, P., and R. J. Moorhead II, 2010: Noodles: A Tool for Visualization of Numerical Weather Model Ensemble Uncertainty. *IEEE Transactions on Visualization and Computer Graphics*, 1421-1430.  
<http://dx.doi.org/10.1109/TVCG.2010.181>
38. Shafer, C. M., A. E. Mercer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2010: Evaluation of WRF model forecasts of tornadic and nontornadic outbreaks occurring in the spring and fall. *Mon. Wea. Rev.*, **138**, 4098-4119.  
<http://dx.doi.org/10.1175/2010MWR3269.1>
39. Mercer, A. E., C. M. Shafer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2009: Objective classification of tornadic and non-tornadic severe weather outbreaks. *Mon. Wea. Rev.*, **137**, 4355-4368. *Paper featured in Papers of Note in the Bulletin of the American Meteorological Society* <http://dx.doi.org/10.1175/2009MWR2897.1>

40. Shafer, C. M., A. E. Mercer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2009: Evaluation of tornadic and nontornadic outbreaks when initialized with synoptic scale input. *Mon. Wea. Rev.*, **137**, 1250-1271 <http://dx.doi.org/10.1175/2008MWR2597.1>
41. Mercer A. E., M. B. Richman, H. B. Bluestein, and J. M. Brown, 2008: Statistical modeling of downslope windstorms in Boulder, Colorado. *Wea. Forecasting*: **23**, 1176-1194. <http://dx.doi.org/10.1175/2008WAF2007067.1>
42. Mercer, A. E., and M. B. Richman, 2007: Statistical differences of quasigeostrophic variables, stability, and moisture profiles in North American storm tracks. *Mon. Wea. Rev.*, **135**, 2312-2338. <http://dx.doi.org/10.1175/MWR3395.1>

### **Conference presentations:**

1. A. Mercer, K. Wood, and A. Grimes, 2020: An Updated Machine Learning Ensemble for Atlantic Tropical Cyclone Rapid Intensification Forecasting. *74<sup>th</sup> Interdepartmental Hurricane Conference*, Lakeland, FL.
2. Mercer, A., A. Grimes, and K. Wood, 2020: An updated Atlantic Basin tropical cyclone rapid intensification scheme using machine learning and operational forecast data. *19<sup>th</sup> Conference on Artificial Intelligence for Environmental Science, AMS Annual Meeting*, Boston, MA, January 15, 2020.
3. MacDonald, C., M. Brown, B. Gutter, and A. Mercer, 2020: Color inconsistencies across hazardous weather watches and warnings: can standardized visual representation of risk improve public safety? *19<sup>th</sup> Annual Student Conference, AMS Annual Meeting*, Boston, MA, January 12, 2020.
4. Sankar, M. P. Dash, Y. Lu, A. Mercer, Z. Arslan, L. Sanders, S. Wickramarathna, R. Ragland, S. Chen, and R. Moorhead, 2019: Variation in dissolved organic matter, trace metals, and acidification parameters in the western Mississippi Sound. *CERF-2019*, Mobile, Alabama.
5. Sankar, M., P. Dash, Y. Lu, A. Mercer, G. Turnage, C. Shoemaker, and S. Chen, 2019: Influence of land use and land cover on dissolved organic matter composition across 41 lakes in Mississippi. *MS Academy of Sciences 2019 Summer Student Science Symposium*, Starkville, MS.
6. Mercer, A., A. Grimes, and K. Wood, 2019: An Updated Machine-Learning Ensemble for Atlantic Tropical Cyclone Rapid Intensification Forecasting. *18<sup>th</sup> Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting*, Phoenix, AZ, January 7, 2019.
7. Mercer, A., A. Grimes, and K. Wood, 2019: An Updated Machine-Learning Ensemble for Atlantic Tropical Cyclone Rapid Intensification. *73<sup>rd</sup> Tropical Cyclone Operations and Research forum*, Miami, FL, March 13, 2019.

8. Grimes, A., and A. Mercer, 2019: Atlantic Basin RI Prediction Enhancement through NWP Spatial Information. 1st Workshop on Leveraging AI in the Exploitation of Satellite Earth Observations & Numerical Weather Prediction, College Park, MD.
9. Grimes, A., A. Mercer, and K. Wood, 2018: Evaluation of machine-learning based rapid intensification forecast performance during the 2017 Atlantic hurricane season. *334<sup>th</sup> Conference on Hurricanes and Tropical Meteorology*, Ponte Vedra, FL.
10. Mercer, A., A. Grimes, and K. Wood, 2018: Transition of machine-learning based rapid intensification forecasts to operations. *72<sup>nd</sup> Interdepartmental Hurricane Conference*, Miami, FL.
11. Mau, A., and A. Mercer, 2018: Obtaining a climatology of extratropical transition tornado events associated with Atlantic Basin US landfalling tropical cyclones. *National Weather Association Annual Meeting*, St. Louis, MO.
12. Elmore, M., A. Mercer, J. Dyer, C. Fuhrmann, and M. Brown, 2017: Sensitivity of physical parameterization schemes to stochastic initial conditions in WRF tornado outbreak simulations. *28<sup>th</sup> Conference on Weather and Forecasting/24<sup>th</sup> Conference on Numerical Weather Prediction, AMS Annual Meeting*, Seattle, WA.
13. Zhang, F., S. Zhang, and A. Mercer, 2016: Visualizing Ensemble Data in Scale Space. *IEEE Vis 2016 Poster Session*, Baltimore, MD.
14. Elmore, A., and A. Mercer, 2016: Nocturnal Tornado Outbreak Climatology. *National Weather Association 41<sup>st</sup> Annual Meeting*, Norfolk, VA.
15. Guzman, S., J. Paz, M. L. Tagert, A. Mercer, and J. Pote, 2016: Evaluating the Effects of Input Data Layers on the Performance of Artificial Intelligence Techniques to Forecast Daily Groundwater Levels. *Mississippi State Graduate Student Research Symposium*
16. Thead, E., A. Mercer, and J. Dyer, 2016: Impacts of Physics Parameterization and Data Assimilation on Synoptic Feature Modeling in Severe Weather Outbreaks. *23rd Conference on Probability and Statistics in the Atmospheric Sciences, AMS Annual Meeting*, New Orleans, LA.
17. Thead, E., A. Mercer, and J. Dyer, 2016: Impacts of Microphysics and PBL Physics Schemes on Tornado Outbreak Prediction. *23rd Conference on Probability and Statistics in the Atmospheric Sciences, AMS Annual Meeting*, New Orleans, LA.
18. Elmore, M., 2016: Sensitivity of Physical Parameterization Schemes to Stochastic Initial Conditions of WRF Tornado Outbreak Simulations. *Student Poster Session, AMS Annual Meeting*, New Orleans, LA.

19. Mercer, A., 2016: Composite Parameterization Ensemble Simulations of Static Stability in East Coast Winter Storms Using Kernel Principal Component Analysis. 14th Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting, New Orleans, LA
20. Mercer, A., 2016: WRF. 15th Annual Student Conference, AMS Annual Meeting, New Orleans, LA. *Invited Presentation to Student Conference*
21. Guzmán, S. M., Paz, J. O., Tagert, M. L. M, & Mercer, A., 2015: Artificial Neural Networks and Support Vector Machines: Contrast Study for Groundwater level prediction. ASABE Paper 152181983. ASABE Annual International Meeting. July 26-29, 2015. New Orleans, Louisiana.
22. Mercer, A., and A. Grimes, 2015: Diagnosing tropical cyclone intensification composite variability using reanalysis. *13<sup>th</sup> Conference on Artificial Intelligence, AMS Annual Meeting*, Phoenix, AZ.
23. Grimes, A., and A. Mercer, 2015: Diagnosing tropical cyclone using support vector machine classification. *13<sup>th</sup> Conference on Artificial Intelligence, AMS Annual Meeting*, Phoenix, AZ.
24. Sparrow, K., and A. Mercer, 2014: Using teleconnection Indices to Predict Seasonal Tornado Outbreak Frequency in the United States. *12<sup>th</sup> Annual Southeast Severe Storms Symposium, Mississippi State University*, Mississippi State, MS.
25. Bates, A., and A. Mercer, 2014: Contrasting Environments Associated with Storm Prediction Center Tornado Outbreak Forecasts using Synoptic-Scale Composite Analysis. *12<sup>th</sup> Annual Southeast Severe Storms Symposium, Mississippi State University*, Mississippi State, MS.
26. Grimes, A., and A. Mercer, 2014: The Importance of Synoptic-Scale Processes in Diagnosing Tropical Cyclone Rapid Intensification in the Atlantic Basin. *12<sup>th</sup> Annual Southeast Severe Storms Symposium, Mississippi State University*, Mississippi State, MS.
27. Grimes, A., and A. Mercer, 2014: On the Use of Synoptic Composites for Distinguishing Rapid and non-Rapid Intensification in Tropical Cyclones. *Southeastern Coastal & Atmospheric Processes Symposium*, Mobile, AL.
28. Mercer, A., and J. Dyer, 2014: Formulating Model Output Statistics using Support Vector Regression. *12<sup>th</sup> Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting*, Atlanta, GA.



29. Thead, E., A. Mercer, and J. Dyer, 2014: Assimilation of POES Radiance Observations and NCEP Conventional Observations in GSI for Tornado Outbreak Prediction. *22<sup>nd</sup> Conference on Weather Analysis and Forecasting/22<sup>nd</sup> Conference on Numerical Weather Prediction, AMS Annual Meeting, Atlanta, GA.*
30. Bates, A., and A. Mercer, 2014: Assessing Storm Prediction Center Tornado Outbreak Forecasts using Synoptic-Scale Composite Analysis. *13<sup>th</sup> Annual Student Conference, AMS Annual Meeting, Atlanta, GA.*
31. Grimes, A., and A. Mercer, 2014: On the Use of Synoptic Composites for Distinguishing Rapid and non-Rapid Intensification in Tropical Cyclones. *13<sup>th</sup> Annual Student Conference, AMS Annual Meeting, Atlanta, GA.*
32. Sparrow, A., and A. Mercer, 2014: Using Teleconnection Indices to Predict Seasonal Tornado Outbreak Frequency. *13<sup>th</sup> Annual Student Conference, AMS Annual Meeting, Atlanta, GA.*
33. Shafer, C., C. Doswell, L. Leslie, M. Richman, A. Mercer, M. Rowell, and S. Hitchcock, 2013: On the identification of synoptic-scale controls associated with the presence or absence of tornado outbreaks. *7<sup>th</sup> European Conference on Severe Storms, Helsinki, Finland.*
34. Bates, A. V. and A. E. Mercer, 2013: Climatology of null severe outbreak events. *11<sup>th</sup> Annual Southeast Severe Storms Symposium, Starkville, MS.*
35. Mercer, A., C. Shafer, M. Richman, C. Doswell, and L. Leslie, 2013: A Multi-Class Classification Scheme for Severe Weather Outbreaks. *11<sup>th</sup> Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting, Austin, TX.*
36. Mercer, A., and J. Dyer, 2013: Assessing Numerical Weather Prediction Uncertainty in Warm-Season Rainfall Ensemble Simulations, *Symposium on the Role of Statistical Methods in Weather and Climate Prediction, AMS Annual Meeting, Austin, TX.*
37. Dyer, J., and A. Mercer, 2013: Assessment of Warm-Season Rainfall Variability and Trends over the Lower Mississippi River Alluvial Valley. *27<sup>th</sup> Conference on Hydrology, AMS Annual Meeting, Austin, TX.*
38. Dixon, G., A. Mercer, K. Grala, and W. Cooke, 2012: Identification of Ideal Smoothing Radii and Appropriate Seasonal Applications for Tornado Climatology Research. *26<sup>th</sup> Conference on Severe Local Storms, Nashville, TN.*

39. Shafer, C., A. Mercer, C. Doswell, L. Leslie, and M. Richman, 2012: Probabilistic Techniques in the Diagnosis of Severe Weather Outbreaks. *26<sup>th</sup> Conference on Severe Local Storms*, Nashville, TN.
40. Shafer, C., M. Stanford, M. Richman, L. Leslie, C. Doswell, and A. Mercer, 2012: Probabilistic Techniques in the Diagnosis of Severe Weather Outbreaks. *26<sup>th</sup> Conference on Severe Local Storms*, Nashville, TN.
41. Bates., A., and A. Mercer, 2012: Climatology of Null Severe Outbreak Events. *26<sup>th</sup> Conference on Severe Local Storms*, Nashville, TN.
42. Mercer, A., and M. Richman, 2012: Redefining Atmospheric Teleconnectivity using Kernel Methods. *1<sup>st</sup> Joint Session of Bridging the Gap Between Artificial Intelligence and Statistics in Applications to Environmental Science, AMS Annual Meeting*, New Orleans, LA.
43. Dixon, P. G., A. E. Mercer, and W. S. Ashley, 2012: Assessing Vulnerability to Weather and Climate Hazards in the Contiguous United States. *7<sup>th</sup> Conference on Policy, AMS Annual Meeting*, New Orleans, LA.
44. Thomas, E. and A. E. Mercer, 2012: Composite Maps of East Coast Bomb and Ordinary Cyclogenesis and Associated Quasigeostrophic Analyses. *21<sup>st</sup> Conference on Probability and Statistics, AMS Annual Meeting*, New Orleans, LA.
45. Shafer, C. M., J. Hollingsworth, C. A. Doswell III, A. E. Mercer, L. M. Leslie, and M. B. Richman, 2012: Climatology of Severe Weather Outbreaks. *21<sup>st</sup> Conference on Probability and Statistics, AMS Annual Meeting*, New Orleans, LA.
46. Mercer, A., and J. Dyer, 2011: Identification of Synoptic-Scale Hurricane Intensification Factors using Advanced Statistics. *Northern Gulf Institute Annual Conference*, Mobile, AL.
47. Sanyal, J., S. Zhang, P. Amburn, J. Dyer, A. Mercer, and R. Moorhead, 2011: Uncertainty visualization of weather ensembles. *Northern Gulf Institute Annual Conference*, Mobile, AL.
48. Mercer, A. E., and J. Dyer, 2011: Physical Assessment of Hurricane Rapid Intensification using Kernel Principal Component Analysis, 36th Annual Meeting, National Weather Association, Birmingham, AL.
49. Dixon, P. G., A. E. Mercer, and W. S. Ashley, 2011: Tornado Vulnerability of Metropolitan Areas in the United States. 19th International Congress of Biometeorology, International Society of Biometeorology, Auckland, New Zealand.

50. Dixon, P. G., A. E. Mercer, and J. A. Milar, 2011: Classification of Tornado Seasons Based on Storm Characteristics. 36th Annual Meeting, National Weather Association, Birmingham, AL.
51. Sanyal, J., S. Zhang, J. Dyer, A. Mercer, P. Amburn, and R. J. Moorhead, 2010: Uncertainty Visualization of Ensemble Weather Forecasts, Bays and Bayous Symposium, Mobile, AL.
52. Shafer, C. M., A. Mercer, M. Richman, L. Leslie, and C. Doswell, 2010: Comparing techniques and reanalysis datasets when diagnosing the relative severity of convective outbreaks. *Severe Local Storms Conference*, Denver, CO.
53. Dixon, P. G., A. Mercer, J. Choi, and J. Allen, 2010: An analysis of spatial tornado density: does Dixie Alley really exist? *Severe and Local Storms Conference*, Denver, CO.
54. Mercer, A. E., C. Babineaux, and M. Brown: Using Artificial Intelligence to Predict Mississippi Lightning. *Severe and Local Storms Conference*, Denver, CO.
55. Mercer, A. E., C. M. Shafer, C. A. Doswell III, M. B. Richman, and L. M. Leslie, 2010: Synoptic composites of severe weather and tornado outbreaks. *Severe and Local Storms Conference*, Denver, CO.
56. Dixon, P. G., A. Mercer, J. Choi, and J. Allen, 2010: Are there other "Tornado Alleys?" A spatial-statistics analysis of tornado paths in the United States. *Southeast Severe Storms Symposium*. Mississippi State, MS.
57. Mercer, A., and M. E. Brown, 2010: Using Artificial Intelligence to Predict Mississippi Lightning. *Southeast Severe Storms Symposium*, Mississippi State, MS.
58. Sydejko, J., Mercer, A., and M. Brown, 2010: An Artificial Intelligence Lightning Threat Algorithm. *Northern Gulf Institute Annual Conference*. Mobile, AL.
59. Shafer, C. M., A. E. Mercer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2009: Using support vector machines to determine the utility of severe weather parameters in the discrimination of tornadic and nontornadic outbreaks when analyzing reanalysis data. *25th Annual IIPS conference, AMS Annual Meeting*, Phoenix, AZ.
60. Shafer, C. M., A. E. Mercer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2009: The utility of basic parameters in the evaluation of WRF forecasts of tornadic and nontornadic outbreaks when initialized with synoptic-scale input. *25th Annual IIPS conference, AMS Annual Meeting*, Phoenix, AZ.

61. Shafer, C. M., A. E. Mercer, C. A. Doswell, M. B. Richman, and L. M. Leslie, 2009: Evaluation of WRF forecasts of tornadic and nontornadic outbreaks occurring in the spring and fall when initialized with synoptic-scale input. *25th Annual IIPS conference, AMS Annual Meeting*, Phoenix, AZ.
62. Mercer, A. E., C. M. Shafer, C. A. Doswell, L. M. Leslie, and M. B. Richman, 2008: Composite analysis of severe weather outbreaks. *24th Conference on Severe and Local Storms*, Savannah, GA.
63. Mercer, A. E., M. B. Richman, H. B. Bluestein, and J. M. Brown, 2008: Application of statistical models to Boulder windstorm prediction. *13<sup>th</sup> Conference on Mountain Meteorology*, Whistler, British Columbia.
64. Mercer, A. E., C. M. Shafer, C. A. Doswell, L. M. Leslie, and M. B. Richman, 2008: Statistical modeling of tornadic and non-tornadic severe weather outbreaks. *19th Conference on Probability and Statistics and 6th Conference on Artificial Intelligence Applications to Environmental Science*, AMS Annual Meeting, New Orleans, LA.
65. Shafer, C. M., A. E. Mercer, L. M. Leslie, M. B. Richman, and C. A. Doswell, 2008: Finding the sources of inaccurate WRF forecasts of tornadic and nontornadic outbreaks when initialized with synoptic scale input, *24<sup>th</sup> conference on IIPS, AMS Annual Meeting*, New Orleans, LA.
66. Leslie, L. M., M. B. Richman, C. A. Doswell, A. E. Mercer, and C. M. Shafer, 2008: Detecting synoptic scale precursors of tornado outbreaks. *24<sup>th</sup> Conference on IIPS, AMS Annual Meeting*, New Orleans, LA.
67. Shafer, C. M., A. E. Mercer, L. M. Leslie, M. B. Richman, and C. A. Doswell, 2008: Evaluation of WRF forecasts for tornadic and nontornadic outbreaks when initialized with synoptic-scale input. *24<sup>th</sup> Conference on IIPS, AMS Annual Meeting*, New Orleans, LA.
68. Mercer, A. E., C. M. Shafer, C. A. Doswell, L. M. Leslie, and M. B. Richman, 2008: Composites of tornadic and non-tornadic severe weather outbreaks. *19th Conference on Probability and Statistics, AMS Annual Meeting*, New Orleans, LA.
69. Mercer, A. E., C. M. Shafer, C. A. Doswell, L. M. Leslie, and M. B. Richman, 2007: A principal component analysis of tornado outbreaks. *23rd Conference on IIPS, AMS Annual Meeting*, San Antonio, TX.
70. Shafer, C. M., A. E. Mercer, L. M. Leslie, M. B. Richman, and A. E. Richman, 2007: Analysis of WRF and MM5 mesoscale model forecasts to distinguish tornado outbreaks from primarily nontornadic severe weather outbreaks. *23<sup>rd</sup> Conference on IIPS, AMS Annual Meeting*, San Antonio, TX.

71. Shafer, C. M., A. E. Mercer, L. M. Leslie, M. B. Richman, and A. E. Richman, 2006:  
Analysis of WRF and MM5 mesoscale model forecasts to distinguish tornado outbreaks from primarily nontornadic severe weather outbreaks. 23<sup>rd</sup> Conference on Severe Local Storms, St. Louis, Missouri.

**Funded Projects (external):**

National Oceanic and Atmospheric Administration (2019) [co-PI]

- Title: “Developing New Capabilities and Research Applications for the National Water Model over the Southeastern US.”
- Amount awarded: \$1,477,676
- Project length: 2 years (October 1, 2019 – September 30, 2021)

National Oceanic and Atmospheric Administration Atlantic Oceanographic and Meteorological Laboratory (2019) [PI]

- Title: “Toward an Enhanced Seasonal Landfalling Hurricane Outlook for the US East Coast and Gulf of Mexico”
- Amount awarded: \$245,141
- Project length: 2 years (October 1, 2019 – September 30, 2021)

National Oceanic and Atmospheric Administration Joint Hurricane Testbed (2017) [PI]

- Title: “Transition of Machine-Learning Based Rapid Intensification Forecasts to Operations”
- Amount awarded: \$203,373
- Project length: 3 years (July 2017 – June 2020)

National Oceanic and Atmospheric Administration Atlantic Oceanographic and Meteorological Laboratory (2014) [PI]

- Title: “Diagnosing Atlantic Basin Tropical Cyclone Rapid Intensification with Artificial Intelligence and Compositing Techniques.”
- Amount awarded: \$148,748
- Project length: 2 years (September 2014 – August 2016)

Mississippi Water Resources Research Institute (2012) [co-PI]

- Title: "Analysis of Precipitation Variability and Related Groundwater Patterns over the lower Mississippi River Alluvial Valley."
- Amount awarded: \$62,423
- Project length: 1 year (March 2012 – February 2013)
- Collaborators: Jamie Dyer (PI)

National Science Foundation (2011) [co-PI]

- Title: "Quantification and Visualization of Ensemble Uncertainty."
- Amount awarded: \$475,174
- Project length: 3 years (September 2011 – August 2014)
- Collaborators: Song Zhang (PI), Jamie Dyer (co-PI), Edward Swann (co-PI), Justin Shows (co-PI)

Gulf of Mexico Research Initiative (2011) [co-PI]

- Title: Long-term Study of the Impact of the Deepwater Horizon Oil Spill on the Health and Productivity of Gulf Coast Salt Marshes."
- Amount awarded: \$80,000
- Project length: 0.75 years (June 2011 – February 2012)
- Collaborators: Deepak Mishra (PI), William Cooke (co-PI), Karen McNeal (co-PI)

National Oceanic and Atmospheric Administration/Northern Gulf Institute

Mississippi State University (2011) [co-PI]

- Title: "Comprehensive Study of the Impact of the Deepwater Horizon Oil Spill on the Health and Productivity of Gulf Coast Salt Marshes."
- Amount awarded: \$ 193,775
- Project length: 1.5 years (March 2011 – August 2012)
- Collaborators: Deepak Mishra (PI), William Cooke (co-PI), Karen McNeal (co-PI)

**Internal Funding Received**

*Mississippi State University Office of Research and Economic Development Undergraduate Research Program (2017) [PI] (funded)*

- Title: "Obtaining a climatology of extratropical transition tornado events associated with Atlantic Basin US landfalling tropical cyclones"
- Amount requested: \$2,000
- Project length: 1 year
- MSU Collaborators: None

*Mississippi State University Office of Research and Economic Development Undergraduate Research Program (2018) [PI] (funded)*

- Title: “Verification of the 2019 Joint Hurricane Testbed AI Rapid Intensification Prediction Experiment”
- Amount requested: \$2,000
- Project length: 1 year
- MSU Collaborators: None

**Graduate Student Advising:**

- Ph.D. Students
  - Currently Advising – 1 student
  - Graduated – 2 students
    - Erin Thead - currently employed at NOAA Climate Center
    - Alex Grimes - currently employed at Naval Meteorological Center in Gulfport
  - Graduate Committee Service – 11 students
- MS Students
  - Graduated – 11 students
    - Evan Thomas – Employed at NASA Wallops Island
    - Erin Thead – Employed at NOAA Climate Center
    - Alex Grimes – Employed at Naval Meteorological Center in Gulfport
    - Kent Sparrow – Employed at National Water Center
    - Alyssa Bates – Employed at NOAA Warning Decision Training Branch
    - Michelle Elmore – Ph.D. student at St. Louis University
    - Alex Elmore – Recent Ph.D. graduate from St. Louis University
    - Patrick Pierce –
    - Jonathan Weaver – Employed at Indiana Climate Office
    - Jacob Wiley – Ph.D. candidate at Mississippi State
    - Megan Williams – Employed at National Weather Service Slidell LA
  - Currently Advising – 4 students
  - Graduate Committee Service – 25 students
- MS non-thesis advising/committee work
  - Served as adviser for capstone projects for many students in the Applied Meteorology Distance Learning Program
  - Served on committees for 12 non-thesis M.S. students

**Research Honors, Awards, and Certifications:**

- Geosystems Research Institute research fellow
- Office of Research and Economic Development Cross-College Research Grant for Water Research Working Group, Fall 2010, \$2000.

- Mercer et al. (2009) results featured in “*Papers of Note*” in the Bulletin of the American Meteorological Society, August 2011
- NWA presentation research featured in the NWA newsletter as a *Paper of Note*, February 2012
- Poster entitled “Climatology of null severe outbreak events” won the best poster award for the 11<sup>th</sup> Annual Southeast Severe Storms Symposium, March 2013
- Nominated for Eminent Scholar Award, College of Arts & Sciences, Fall 2018
- Paper received Best Paper Runner Up Award, Complex and Adaptive Systems Conference, Fall 2015
- Awarded four Blue Waters Supercomputing Center Research Internships for Undergraduates. Each was worth a stipend of \$5000 plus travel funds for each student to attend the Blue Waters Supercomputing Workshop. Starred papers in the list of publications were from these students. Funded students included:
  - Morgan Smith (2015) – works for Dow Chemical
  - Taylor Prislovsky (2016)– currently a graduate student, Mississippi State University
  - Caroline MacDonald (2017) – currently a graduate student, Mississippi State University
  - Lauren Pounds (2018) – currently a graduate student, University of Oklahoma



### **Teaching Activities:**

### **Teaching Publications:**

Co-authored a lab manual to complement the 4<sup>th</sup> edition of the H. de Blij physical geography textbook entitled *Physical Geography: The Global Environment*. Primarily responsible for meteorology/climatology content in the manual. Citation provided below.

- Miller, D., and A. Mercer, 2016: *Physical Geography Laboratory Manual. 2<sup>nd</sup> edition* Oxford University Press, New York, 192 pp. ISBN# 978-0190246877

### **Courses taught:**

- Physical Meteorology – Spring 2010, Spring 2011, Spring 2012, Spring 2013, Spring 2014, Spring 2016, Spring 2017, Spring 2018, Spring 2019, Spring 2020
- Dynamics II – Spring 2015
- Physical Geography – Fall 2009, Spring 2010, Fall 2010
- Statistical Climatology – Fall 2012, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2019
- Synoptic Meteorology – Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018
- Weather Analysis I – Fall 2015
- Advanced Statistical Climatology – Fall 2009, Fall 2010, Fall 2011, Fall 2012
- Quantitative Analysis in Climatology – Spring 2014, Summer 2014 (for the Applied Meteorology Distance Learning Program), Spring 2015, Summer 2015, Spring 2016, Summer 2016, Spring 2017, Summer 2017, Spring 2018, Summer 2018, Spring 2019, Summer 2019, Spring 2020
- Research Methods (for the Applied Meteorology Distance Learning Program) – Summer 2011, Summer 2012, Summer 2013, Summer 2014, Summer 2015
- Research Readings and Techniques – Fall 2013
- Applied Climatology – Spring 2013, Fall 2013
- Climate Change – Fall 2013
- World Geography – Summer 2010

### **Teaching Awards:**

Recipient of the College of Arts & Sciences Natural Science Teaching Award, Spring 2018

Mississippi State University Schillig Special Teaching Projects Program [PI]

- Title: "Using Global Climate Models and Meteorological Instrumentation to Enhance Undergraduate Understanding of Physical Meteorology and Climatology
- Amount awarded: \$2,516
- Project length: 1 year (April 2011 – March 2012)
- Funds used to purchase additional instrumentation to supplement instruments currently held by the department. Funds were also used to purchase climate modeling software to allow students to experiment with different impacts on global climate.

Nominated for the College of Arts & Sciences Oldham Mentorship Award, Spring 2017 and Fall 2019

### **Teaching Service:**

- Science Content Review for:
  - Living Physical Geography – Gervais
  - Physical Geography Tomorrow –
  - Weather, a Concise Introduction – Hakim and Patoux
  - The Atmosphere: An Introduction to Meteorology – Lutgens and Tarbuck
- Authored PowerPoint lecture summary slides and clicker questions for Pearson Education for the Hess and McKnight *Physical Geography: A Landscape Appreciation, 10<sup>th</sup> edition* and *Physical geography: A Landscape Appreciation 11<sup>th</sup> edition.*
- Authored an answer key to the chapter questions for Pearson Education for the Hess and McKnight *Physical Geography: A Landscape Appreciation, 10<sup>th</sup> edition*
- Panel Member – Center for Teaching and Learning Teaching Award Panelists for Large Lecture Sections, Spring 2020

### **Undergraduate Advising:**

- Currently serve or have served as an undergraduate adviser for 67 undergraduates in professional and broadcast meteorology.

## **Service Activities:**

### **Public Service:**

- Public Education Outreach
  - Slime Science Fair Night – Cook Elementary, Columbus, MS Fall 2018, Fall 2019
  - Career Day – Caledonia Middle School, Caledonia, MS – Spring 2014
  - “Wild Weather” – Cook Elementary School, Columbus, MS – Spring 2014
  - “Is Meteorology the Career for Me?” – Guilford High School, Rockford, IL – Fall 2013
  - Science Day – Caledonia Elementary School – Spring 2012
  - Lecture on Climate Change for Mississippi Geoscience Teachers, Mississippi State, MS – Spring 2012
  - “Wild Weather” – Caledonia Elementary School – Fall 2011
- Interviews/features with the media:
  - *Science News* – “Understanding Storm Spin-offs”, 2010
  - *Clarion Ledger, Jackson, MS* – “Smith County twister capital, MSU study says”, 2011
  - Dixon et al. (2011) featured in numerous media outlets, including CNN, USA Today, Christian Science Monitor, the Wall Street Journal, the Associated Press, and the Washington Post
  - WJTV, Jackson, MS – “Mystery Monday, Debunking the Chemtrail Conspiracy”, 2014
  - KTBS, Shreveport, LA – “Hurricane Predictions”, 2014
  - MS Public Broadcast Radio – Interviewed about impacts of Obama Climate Change report on MS, 2014
  - Anniston Star – Tornado Frequency, 2015
- Invited Lecture, Winter Based on Projected Teleconnections, Radiant Energy Conference, Fall 2018
- Invited Panel Discussion on Climate Change, Spring 2019, Mississippi State University
- Invited Panel Discussion, MSU Green Week Climate Talk, Mississippi State University, Fall 2017
- Invited Lecture, Climate Change, Weatherly Heights Baptist Church, Huntsville, AL, Fall 2017
- Invited Panel Discussion Lecture, Expecting More from Wind Flow Models, American Wind Energy Association, Fall 2016
- Invited Lecture, Climate Change, Winona, MS Rotary Club, Fall 2015

- Workshop on tropical meteorology, severe weather meteorology, and winter weather meteorology forecasting tips for the Louisiana and Mississippi Association of Broadcasters convention, New Orleans, LA, Spring 2014
- Interviewed by Cameron Gralka, high school student from Broomfield, Colorado, about being a meteorologist, 2014
- Invited panel member for climate change discussion for “In the News” program – Peterson Meadows Retirement Home, Rockford, IL, Fall 2013

#### University service (Mississippi State):

- Undergraduate Coordinator, Department of Geosciences (Fall 2017 – present)
  - Responsible for all orientation sessions for the department
  - Oversee student recruitment efforts
  - Completed institutional effectiveness reports annually for the department
  - Organized and facilitated an undergraduate and graduate departmental graduation ceremony
- Department of Geosciences Curriculum Committee Chair (Fall 2017 – present)
- Department of Geosciences Building and Infrastructure Committee (Fall 2015 – present)
- Faculty Mentor – College of Arts & Sciences Faculty Mentorship Program (Fall 2019 – present)
- College of Arts & Sciences Curriculum Committee (Fall 2013 – Fall 2016)
- College of Arts & Sciences Promotion and Tenure Committee (Fall 2015 – Fall 2018)
- College of Arts & Sciences Grievances Committee (Fall 2017 - present)
- University Honor Council (Fall 2015 – present)
- Served as a reviewer for the Henry Family Research proposal submission, Spring 2012
- Job search committee for Meteorology Position for the Department of Geosciences, Spring 2014
- Job search committee for Department Head of the Department of Geosciences, Spring 2014
- Department of Geosciences Meteorology Team Member, Fall 2009 - present

#### Professional service:

##### Editing activities

- Associate editor for the National Weather Association Journal of Operational Meteorology, Fall 2013 - present
- Associate editor for American Meteorological Society Journal Monthly Weather Review, Spring 2014 – Spring 2017

##### Reviewing activities

- National Science Foundation Reviewer

- 4 Proposals Reviewed (including 1 CAREER proposal)
- 2 Panel Reviews (1 virtual, 1 in-person)
  
- Served as a reviewer for the following journals (21 total journals):
  - Atmospheric Science Letters
  - PLOS One
  - Atmosphere
  - Climate
  - Expert Systems with Applications
  - Geophysical Research Letters
  - Electronic Journal of Operational Meteorology
  - Weather and Forecasting
  - Monthly Weather Review
  - International Journal of Biometeorology
  - Procedia Computer Science
  - Acta Geophysica
  - Environmental Research Letters
  - Advances in Space Research
  - Operations Research Perspectives
  - Science Advances
  - Geosciences
  - Water
  - Advances in Atmospheric Sciences
  - Journal of Applied Meteorology and Climatology
  - Climate Dynamics
  - Journal of Climate
  
- Technical program committee membership for the following journals/conferences/symposia (primary duties included reviewing papers):
  - International Journal of Computing and Digital Systems
  - 2014 International Conference on Industrial Automation, Information and Communications Technology
  - 2013 International Conference on Robotics, Biomimetics, and Intelligent Computational Systems
  - International Symposium on Control, Automation, Industrial Informatics and Smart Grids 2013
  - 2012 IEEE Conference on Control, Systems, and Industrial Informatics

Other Professional Service

- Session Chair, 12<sup>th</sup> conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting, 2014

- Session co-Chair, 11<sup>th</sup> Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, AMS Annual Meeting, 2013
- Blue Waters Graduate Student Fellowship reviewer

**Professional Affiliations:**

- American Meteorological Society, 2008 – present
- National Weather Association, 2010 – present