Andrew Mahre

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EDUCATION

University of Oklahoma, Norman, OK	
Doctor of Philosophy, Meteorology	05/20 (expected)
Research focus: Experimental radar technology applications	GPA: 3.75
Dissertation focus: Optimizing the implementation of radar scanning strategies to	
improve rapid-scan data quality and assess tradeoffs using developed simulators	
Master of Science, Electrical and Computer Engineering (ECE)	05/18
Coursework focus: Weather radar theory/applications, radar signal processing,	
digital signal processing, digital image processing	
Master of Science, Meteorology	08/16
Thesis focus: High-resolution radar data analysis of cold front structure	
University of Texas at Austin, Austin, TX	
Bachelor of Science, Honors Physics, cum laude	05/14
B.S. thesis focus: Development of computational model of friction at the atomic level	GPA: 3.80

RESEARCH EXPERIENCE

University of Oklahoma, Norman, OK

Graduate Research Assistant: Doctoral Research, Department of Meteorology 08/16 – Present

- Quantify the benefits of various scan and data processing techniques for a phased array, rapid-scan weather radar
- Analyze the data quality impact of multiple radar scan techniques while improving temporal resolution
- Create/modify multiple radar simulators (C/C++ and MATLAB-based) to test scanning strategies
- Present oral and written quarterly status reports on research progress for funding sponsors

AIR Convective Field Project: Researcher, Driver, & Radar Engineer 01/15 – Present

- Process and analyze rapid-scan weather radar data for publications, with emphasis on tornado dynamics and radar signatures
- Troubleshoot/operate the radar and provide forecast input via written and oral discussions
- Set up, repair, and maintain RAIDs and Network Attached Storage (NAS) for data storage and processing (total of 148TB across 5 RAIDs)
- Collaborate with researchers from other universities and organizations

Graduate Research Assistant: Master's Research, Department of Meteorology 08/14 - 08/16

- Obtained data from cold fronts and outflow boundaries using the Atmospheric Imaging Radar (AIR) at high spatial and temporal resolution and analyzed data in MATLAB
- Wrote MATLAB scripts to perform calibration, pulse compression, digital beamforming, and quality control (QC) on raw radar data

• Wrote and successfully defended master's thesis: "Observations of Cold Front Features at High Spatiotemporal Resolution Using the Atmospheric Imaging Radar"

NOAA National Severe Storms Laboratory (NSSL), Norman, OK

Research Experiences for Undergraduates (REU) Intern

05/13 - 07/13

01/11 - 01/13

- Used spectral analysis techniques to determine ideal sampling rate for sonic anemometers
- Created quality control algorithm to identify sections of data which could contain instrument error
- Created data analysis program in R and data logging/analysis program in Python

University of Texas at Austin, Austin, TX

Undergraduate Research Assistant: Thesis Research, Department of Physics 08/13 - 05/14

- Created Python-based simulation to model friction at the atomic level to calculate friction coefficients
- Developed graphical user interface (GUI) for simulation using VPython
- Performed statistical analysis of data in R

Undergraduate Research Assistant, Department of Physics

- Created thin depositions of permalloy and superconducting samples for NMR Force Microscopy
- Repaired and maintained laboratory test equipment, including Electron Gun, Ultra-High Vacuum (UHV) chamber, and NMR spectrometer
- Advised and mentored 8-10 incoming students to Freshman Research Initiative (FRI) program

SKILLS AND PROGRAMMING LANGUAGES

- Research experience in spectral analysis, bistatic/multistatic radar, error analysis and quantification, optimization & machine learning, Monte Carlo simulations, parallel computing, time-series analysis, and signal processing algorithms (e.g., digital beamforming, morphological image processing)
- Proficient in MATLAB, Python, R, Linux/Unix (bash), LaTeX, and Microsoft Office
- Experience with C/C++, Fortran, Weather Research and Forecasting (WRF) model, Shell (batch scripting), Github (git), SQL, HTML, CSS, Mathematica, Apache Spark (PySpark API), and VHDL
- Experience in working with large datasets (Big Data) from radar output and computer models, as well as data in .mat, NetCDF, and grib and grib2 formats
- Completed Introduction to Big Data and Scalable Machine Learning through edX
- Extensive technical writing & presentation experience (13 lead-author conference presentations)
- Conversational level of Spanish

TEACHING/MENTORING EXPERIENCE

•	Advisor/mentor for undergraduate student in 2019 REU Internship Program	05/19 -	07/19
•	Grader for graduate-level radar theory course	08/17 -	12/17
•	Designed hands-on signal processing assignments for graduate-level radar theory course	;	10/16
•	Graduate Teaching Assistant for junior-level Thermodynamics	08/14 -	12/14
•	Graduate Teaching Assistant for Orientation to Professional Meteorology	08/14 -	12/14

HONORS AND DISTINCTIONS

• Bullard Dissertation Completion Fellowship	08/19 - 05/20
• ARRC Student Conference Paper Award	09/19
• 3rd place, AMS Int'l Conf. on Radar Meteorology Student Competition	09/19
• OU Graduate College Robberson Award	12/18
• AMS Phased Array Radar Symposium Travel Award	11/18
• ARRC Student Journal Paper Award (2x)	$04/17 \ \& \ 05/18$
• OU Gallogly College of Engineering Conference Grant	02/18
• 1st place, AMS EIPT Student Presentation Competition	01/18
• 1st place, OU Graduate Student Research & Creativity Day	03/16
• Undergraduate degree received with cum laude equivalent	05/14
• Dean's Scholars Honors Program for College of Natural Sciences	08/10 - 05/14
College of Natural Sciences College Scholar	08/11 - 05/14
• University Honors Distinction	01/11 - 12/13

ACADEMIC SERVICE

- Reviewer, IEEE Geoscience & Remote Sensing Letters
- Reviewer, 2019 IEEE Radar Conference
- Reviewer, Atmospheric Science Letters
- Selection Committee Member, 2019 OU REU Internship Program
- Planning Committee Member, 19th Annual AMS Student Conference
- Student Competition Judge, 18th Annual AMS Student Conference
- Student Volunteer/Assistant, 37th AMS Radar Conference
- Student Volunteer/Assistant, 4th International Symposium on Earth-Science Challenges

MEMBERSHIPS & COMMUNITY SERVICE

• Institute of Electrical and Electronics Engineers (IEEE), Student Member	2016 - Present
• American Meteorological Society (AMS), Student Member	2013 - Present
• Country Roads Animal Rescue Society, Volunteer Dog Foster	2018
• Society of Physics Students (SPS), University of Texas Chapter	2011 - 2014
• Freshman Leadership Organization, Community Service Committee	2010 - 2011

PEER-REVIEWED PUBLICATIONS

** Cover/featured article

Mahre, A., T.-Y. Yu, and D. J. Bodine, 2019: A Comparison of Scan Speedup Strategies and Their Effect on Rapid-Scan Weather Radar Data Quality. *Journal of Atmospheric and Oceanic Technology*, to be submitted in October 2019.

Mahre, A., T.-Y. Yu, D. J. Bodine, and L. Orf, 2019: Assessing the Benefits of a Simulated Rapid-Scan Weather Radar for Severe Storm Observations. *Journal of Atmospheric and Oceanic Technology*, to be submitted in Fall 2019.

Mahre, A., T.-Y. Yu, and D. J. Bodine, 2019: An Assessment of Adaptive Scanning for a Simulated Rapid-Scan Weather Radar. *Journal of Atmospheric and Oceanic Technology*, to be submitted in late 2019 or early 2020.

Griffin, C. B., D. J. Bodine, J. M. Kurdzo, A. Mahre, and R. D. Palmer, 2019: High-temporal Resolution Observations of the 27 May 2015 Canadian, Texas, Tornado Using the Atmospheric Imaging Radar. *Monthly Weather Review*, **147** (3), 873-891.

Mahre, A., J. M. Kurdzo, D. J. Bodine, C. B. Griffin, R. D. Palmer, and T.-Y. Yu, 2018: Analysis of the 16 May 2015 Tipton, Oklahoma, EF-3 Tornado at High Spatiotemporal Resolution Using the Atmospheric Imaging Radar. *Monthly Weather Review*, **146** (7), 2103-2124.

**Mahre, A., T.-Y. Yu, R. D. Palmer, and J. M. Kurdzo, 2017: Observations of a Cold Front at High Spatiotemporal Resolution Using an X-Band Phased Array Imaging Radar. *Atmosphere*, 8 (2), 30.

Kurdzo, J. M., F. Nai, D. J. Bodine, T. A. Bonin, R. D. Palmer, B. L. Cheong, J. Lujan, A. Mahre, and A. D. Byrd, 2017: Observations of Severe Local Storms and Tornadoes with the Atmospheric Imaging Radar. *Bulletin of the American Meteorological Society*, **98 (5), 915-935.

CONFERENCE PRESENTATIONS

 $\dagger Award won$

[†]**Mahre, A.**, T.-Y. Yu, and D. J. Bodine, 2019: Assessing the Benefits of a Rapid-Scanning Phased Array Weather Radar. 39th International Conference on Radar Meteorology, Nara, Japan, **P2.08**.

Griffin, C. B., D. J. Bodine, A. Mahre, J. Lujan, J. M. Kurdzo, and R. D. Palmer, 2019: High-Temporal Resolution Observations of Tornadogenesis Using the Atmospheric Imaging Radar. 39th International Conference on Radar Meteorology, Nara, Japan, 12A.02.

Shapiro, A., J. G. Gebauer, N. A. Dahl, D. J. Bodine, **A. Mahre**, and C. K. Potvin, 2019: Spatially Variable Advection Correction of Doppler Radial Velocity Data. *39th International Conference on Radar Meteorology*, Nara, Japan, **17A.03**.

Gebauer, J. G., A. Shapiro, C. Potvin, N. Dahl, D. Bodine, A. Mahre, M. Biggerstaff, and A. Alford, 2019: Impact of Rapid-Scan Radar Data on Vertical Velocity Retrievals from Dual-Doppler Analysis. 39th International Conference on Radar Meteorology, Nara, Japan, P3.51.

Yu, T.-Y., A. Mahre, and D. J. Bodine, 2019: Assessing the Benefits of Rapid Scan for Severe Storm Warning with Multifunction Radar. 41st Photonics and Electromagnetics Research Symposium (PIERS), Rome, Italy, **3A1.5**.

Mahre, A., T.-Y. Yu, and D. J. Bodine, 2019: Assessment of the Benefits of Rapid Scanning for an MPAR/SENSR System. 35th Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Phoenix, AZ, USA, **7A.2**.

Mahre, A., C. B. Griffin, D. J. Bodine, J. M. Kurdzo, R. D. Palmer, and T.-Y. Yu, 2019: Using the Atmospheric Imaging Radar to Study Vortex Dynamics and Debris Processes. *Phased Array Radar Symposium*, *AMS Annual Meeting*, Phoenix, AZ, USA, **740**. Mahre, A., C. B. Griffin, Z. B. Wienhoff, H. B. Bluestein, J. L. Houser, J. C. Snyder, and D. J. Bodine, 2019: A Study on Oscillations in Low-Level Tornado Couplet Intensity. 35th Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Phoenix, AZ, USA, 825.

Bodine, D. J., J. M. Kurdzo, C. B. Griffin, A. Mahre, J. Lujan Jr., R. D. Palmer, T.-Y. Yu, and B. M. Isom, 2019: Overview of the Atmospheric Imaging Radar and Seven Years of Phased Array Radar Field Experiments. *Phased Array Radar Symposium, AMS Annual Meeting*, Phoenix, AZ, USA, 1.5.

Griffin, C. B., D. J. Bodine, A. Mahre, J. M. Kurdzo, J. Lujan Jr., and R. D. Palmer, 2019: High-Temporal Resolution Observations of Tornadogenesis and Tornado Decay Using the Atmospheric Imaging Radar. *Phased Array Radar Symposium, AMS Annual Meeting*, Phoenix, AZ, USA, **736**.

[†]**Mahre, A.**, T.-Y. Yu, and D. J. Bodine, 2018: Development of Scanning Strategies to Meet Operational Needs of the Multimission Phased Array Radar. 34th Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Austin, TX, USA, 857.

Mahre, A., J. M. Kurdzo, D. J. Bodine, C. B. Griffin, R. D. Palmer, and T.-Y. Yu, 2018: Analysis of the 16 May 2015 Tipton, Oklahoma EF-3 Tornado at High Spatiotemporal Resolution Using the Atmospheric Imaging Radar. 34th Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Austin, TX, USA, 12.4.

Griffin, C. B., D. J. Bodine, J. Lujan, A. Mahre, J. M. Kurdzo, and R. D. Palmer, 2018: High-Temporal Resolution Observations from the 2017 Atmospheric Imaging Radar Field Campaign. 19th Symposium on Meteorological Observation and Instrumentation, AMS Annual Meeting, Austin, TX, USA, 9.7.

Griffin, C. B., D. J. Bodine, J. M. Kurdzo, A. Mahre, and R. D. Palmer, 2018: High-Temporal Resolution Observations from the 27 May 2015 Canadian, Texas, Tornado Using the Atmospheric Imaging Radar. 34th Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Austin, TX, USA, 12.5.

Mahre, A., J. M. Kurdzo, D. J. Bodine, C. B. Griffin, R. D. Palmer, and T.-Y. Yu, 2017: Analysis of the 16 May 2015 Tipton, Oklahoma EF-3 Tornado at High Spatiotemporal Resolution Using the Atmospheric Imaging Radar. *College of Atmospheric and Geographic Sciences Research Fair*, Norman, OK, USA, 18.

Mahre, A., J. M. Kurdzo, D. J. Bodine, C. B. Griffin, R. D. Palmer, and T.-Y. Yu, 2017: Analysis of the 16 May 2015 Tipton, Oklahoma EF-3 Tornado at High Spatiotemporal Resolution Using the Atmospheric Imaging Radar. 38th Conference on Radar Meteorology, Chicago, IL, USA, 142.

Griffin, C. B., D. J. Bodine, J. M. Kurdzo, **A. Mahre**, and R. D. Palmer, 2017: High-Temporal Resolution Observations of the 27 May 2015 Canadian, Texas Tornado Using the Atmospheric Imaging Radar. 38th Conference on Radar Meteorology, Chicago, IL, USA, **139**.

Mahre, A., T.-Y. Yu, R. D. Palmer, and J. M. Kurdzo, 2017: Observations of a Cold Front at High Spatiotemporal Resolution Using an X-Band Phased Array Imaging Radar. 33rd Conference on Environmental Information Processing Techniques, AMS Annual Meeting, Seattle, WA, USA, 8A.1.

Griffin, C., D. J. Bodine, J. M. Kurdzo, A. Mahre, R. D. Palmer, J. Lujan, and A. D. Byrd, 2017: High-Temporal Resolution Observations of Severe Convective Storms Using the Atmospheric Imaging Radar. Special Symposium on Severe Local Storms: Observation Needs to Advance Research, Prediction, and Communication, AMS Annual Meeting, Seattle, WA, USA, 929.

Kurdzo, J. M., D. J. Bodine, A. Mahre, F. Nai, C. Griffin, and R. D. Palmer, 2017: Filling the Vertical Gap in Severe Local Storms Research: New Opportunities Using Vertically Continuous Radar Imaging. *Special Symposium on Severe Local Storms: Observation Needs to Advance Research, Prediction, and Communica*- tion, AMS Annual Meeting, Seattle, WA, USA, 925.

Kurdzo, J. M., A. Mahre, D. J. Bodine, R. D. Palmer, and T.-Y. Yu, 2016: X-Band Radar Observations of the 16 May 2015 Tipton, Oklahoma EF3 Tornado using the Atmospheric Imaging Radar. 28th Conference on Severe Local Storms, Portland, OR, USA, 154.

Griffin, C. B., D. J. Bodine, J. M. Kurdzo, **A. Mahre**, R. D. Palmer, J. Lujan, and A. D. Byrd, 2016: High-Temporal Resolution Observations of Severe Convective Storms Using the Atmospheric Imaging Radar. 28th Conference on Severe Local Storms, Portland, OR, USA, **156**.

[†]**Mahre, A.**, T.-Y. Yu, R. Palmer, and J. Kurdzo, 2016: Observations of Kelvin-Helmholtz Instabilities Behind a Cold Front at High Spatiotemporal Resolution. *OU Graduate Student Research and Creativity Day*, Norman, OK, USA.

Mahre, A., T.-Y. Yu, R. D. Palmer, and J. M. Kurdzo, 2016: A Study of High Temporal and Spatial Resolution RHIs Through Outflow Boundaries and Squall Lines Using the Atmospheric Imaging Radar. 32nd Conference on Environmental Information Processing Techniques, AMS Annual Meeting, New Orleans, LA, USA, 533.

Kurdzo, J. M., F. Nai, D. J. Bodine, R. D. Palmer, B. L. Cheong, J. Lujan, A. Mahre, and A. D. Byrd, 2016: High-Resolution X-band Volumetric Observations of Spring 2015 Tornadoes with the Atmospheric Imaging Radar. 32nd Conference on Environmental Information Processing Techniques, AMS Annual Meeting, New Orleans, LA, USA, **12A.5**.

Kurdzo, J. M., F. Nai, D. J. Bodine, R. D. Palmer, B. L. Cheong, J. Lujan, **A. Mahre**, and A. D. Byrd, 2015: High Temporal and Spatial Resolution X-band Observations of Tornadoes with the Atmospheric Imaging Radar. 4th International Symposium on Earth-Science Challenges (ISEC), Norman, OK, USA.

Mahre, A., and G. Creager, 2014: Determining the Optimal Sampling Rate of a Sonic Anemometer Based on the Shannon-Nyquist Sampling Theorem. 13th Annual Student Conference, AMS Annual Meeting, Atlanta, GA, USA, S164.

Mahre, A., S. Young, I. Manzanera, and J. T. Markert, 2012: Electron-Beam Deposition of Permalloy onto Cantilevers. 2012 Undergraduate Research Forum, Austin, TX, USA.