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: Analyze/optimize the implementation of radar signal processing
techniques to improve radar data quality, 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

- Analyze data quality impact of radar signal processing techniques while improving temporal resolution
- Quantify early-detection benefits of various scan and data processing techniques for a phased array, rapid-scan weather radar
- 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
- 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   01/11 – 01/13
- 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 Fourier 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, Shell (batch scripting), Github (git), Weather Research and Forecasting (WRF) model, 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
- 2019 Weathernews International (WNI) Scholarship — 10/19
- 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
- ARRC Student Journal Paper Award (2x) — 04/17 & 05/18
- 1st place, AMS EIPT Student Presentation Competition — 01/18
- 1st place, OU Graduate Student Research & Creativity Day — 03/16
- Dean's Scholars Honors Program for College of Natural Sciences — 08/10 – 05/14

ACADEMIC SERVICE

- Reviewer, *Two academic journals (IEEE-GRSL, RMetS-ASL) & 2019 IEEE Radar Conference*
- 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 & 4th ISEC Conference*

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

Three lead-author manuscripts are in preparation to be submitted by 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.