

# Martin Satrio, Ph.D.

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## Education

- 2019–2023    📖 **Ph.D. Meteorology**, University of Oklahoma  
Dissertation: *A Kinematic and Thermodynamic Analysis of the 17 May 2019 McCook / Farnam, Nebraska Tornadoic Supercell*  
General Exam: *A Proposed Observation Network to Investigate Deep Convection Initiation and Early Evolution of Supercells in the Great Plains and Southeast*  
Advisors: Dr. Michael Coniglio and Dr. Erik Rasmussen
- 2017–2019    📖 **M.S. Meteorology**, University of Oklahoma  
Thesis: *The Effects of Terrain on an Idealized Tornado using a Large-Eddy Simulation*  
Advisors: Dr. David Bodine and Dr. Anthony Reinhart
- 2013–2017    📖 **B.S. Meteorology & B.A. in Mathematics**, University of Oklahoma  
GPA: 4.0 / 4.0  
Capstone: *The Effects of Veer-Back-Veer Wind Profiles on Storm Mode*

## Professional Experience

- 2025–...    📖 **Meteorological Radar Scientist**, Rainmaker Technology Corporation, Norman, OK
- Engineering radar data processing and QPE validation workflows to deliver accurate precipitation insights that directly inform Rainmaker’s cloud seeding strategies for sustainable water resource management.
  - Developing and refining algorithms for radar-based precipitation estimation, storm structure analysis, and target cloud identification, advancing ground-breaking techniques to enhance rainfall and support conservation goals.
  - Designing visualization tools and applying advanced quality control methods to translate complex radar datasets into actionable intelligence, enabling more effective cloud seeding missions and measurable impact on water availability.
- 2023–2025    📖 **Post-Doctoral Research Associate**, Cooperative Institute for Severe and High-Impact Weather Research & Operations (CIWRO), Norman, OK
- Leading research project with two graduate students to examine the impact of backing winds within the effective inflow layer on supercell evolution and the development of tornado-like vortices using CM1 simulations.
  - Integrated multi-Doppler wind and reflectivity syntheses into a diabatic Lagrangian framework to retrieve thermodynamic data for observed supercells.
  - Enhanced Python and FORTRAN processing scripts to improve radar quality control, objective analysis, and multi-Doppler synthesis workflows.
  - Conducted detailed case studies of low-level supercell dynamics using kinematic and thermodynamic syntheses alongside in-situ measurements from TORUS supercell observations.
  - Compiled and analyzed multi-Doppler wind syntheses from TORUS field campaign data, including ground-based, airborne radar, and WSR-88D observations, to evaluate internal boundaries and updraft characteristics in supercells.
  - Collaborated with the Warn-on-Forecast (WoFS) team to assimilate quality-controlled radar observations from the 22 May 2023 field campaign into WoFS modeling efforts.
  - Participated in DELTA (2024) and LIFT (2024 & 2025) field campaigns, contributing to the collection of low-level flow observations in tornadic thunderstorms via mobile mesonet, windsonde, and LiDAR platforms.

## Professional Experience (continued)

- 2019–2023     **Graduate Research Assistant**, CIWRO & OU School of Meteorology, Norman, OK
- Analyzed supercell dynamics using multi-Doppler and diabatic Lagrangian techniques with TORUS research radar data from the 17 May 2019 event.
  - Collaborated on a project investigating the dissipation of the 10 December 2021 long-track tornado by comparing tree-fall observations with large-eddy simulated (LES) vortex behavior over similar terrain.
  - Examined the relationship between cell mergers and supercell evolution through manual analysis of WSR-88D data using GR2 Analyst, contributing as a co-author to a formal publication in *Monthly Weather Review*.
  - Participated in the collaborative PERiLS, TORUS, and TORUS-LiTE field campaigns, collecting supercell observations across diverse geographical regions in the United States.
- 2017–2019     **Graduate Research Assistant**, Advanced Radar Research Center & OU School of Meteorology, Norman, OK
- Enhanced FORTRAN code for toy-model vortex simulations to enable variations in translational velocities, surface roughness lengths, and terrain features.
  - Conducted comprehensive analyses on the effects of surface characteristics, including systematic variations in terrain, on vortex dynamics, resulting in a first-authored publication in the *Journal of Atmospheric Sciences*.
  - Coordinated field experiments utilizing the Atmospheric Imaging Radar to sample supercell structures across the Great Plains.
- 2015– . . . .     **Teaching Experience / Mentoring**, OU School of Meteorology, Norman, OK
- Lead instructor for Atmospheric Dynamics III in Fall 2024 and 2023
  - Mentor for Senior Capstone Group in Fall 2023 and 2022
  - Teaching Assistant for Atmospheric Dynamics III in Fall 2022, 2021, 2020, and 2019
  - Teaching Assistant for Atmospheric Dynamics II in Spring 2022 and 2021
  - Teaching Assistant for Intro to Weather & Climate in Spring 2020
  - Teaching Assistant for Intro to Meteorology Lab I in Spring 2017 and Fall 2016
  - Teaching Assistant for Programming for Meteorology in Spring 2017 and Spring 2015
  - University of Oklahoma Athletic Tutor for Mathematics in Fall 2015

## Research Publications

### Journal Articles

- 1 **M. A. Satrio**, M. C. Coniglio, E. N. Rasmussen, C. L. Ziegler, D. M. Stechman, and A. E. Reinhart, “On the Low-Level Mesocyclone Evolution of the 17 May 2019 McCook / Farnam, Nebraska Tornadoic Supercell Observed during TORUS,” *Mon. Wea. Rev.*, 2025.
- 2 M. Wagner, M. C. Coniglio, E. N. Rasmussen, D. Candela, **M. A. Satrio**, and E. Tirone, “Harnessing UAS Imagery to Better Characterize High-Wind Damage and Understand Tornado Evolution,” *Bull. Amer. Meteor. Soc.*, 2024.
- 3 M. E. Anderson et al., “Terrain Effects on the 13 April 2018 Mountainburg, Arkansas EF2 tornado,” *J. Operational Meteor.*, vol. 10, pp. 18–29, 2022. [DOI: 10.15191/nwajom.2022.1002](https://doi.org/10.15191/nwajom.2022.1002).
- 4 M. D. Flournoy, A. W. Lyza, **M. A. Satrio**, M. R. Diedrichsen, M. C. Coniglio, and S. Waugh, “A Climatology of Cell Mergers with Supercells and their Association with Mesocyclone Evolution,” *Mon. Wea. Rev.*, vol. 150, pp. 451–461, 2022. [DOI: 10.1175/MWR-D-21-0204.1](https://doi.org/10.1175/MWR-D-21-0204.1).
- 5 **M. A. Satrio**, D. J. Bodine, A. E. Reinhart, T. Maruyama, and F. T. Lombardo, “Understanding how Complex Terrain Impacts Tornado Dynamics using a Suite of High-Resolution Numerical Simulations,” *J. Atmos. Sci.*, vol. 4, pp. 3277–3300, 2020. [DOI: 10.1175/JAS-D-19-0321.1](https://doi.org/10.1175/JAS-D-19-0321.1).

## Conference Proceedings (Oral or Poster Presentation Given)

- 1 **M. A. Satrio**, M. C. Coniglio, C. L. Ziegler, D. M. Stechman, and M. B. Wilson, "Observed Updraft Characteristics Using Multi-Doppler Analyses from the TORUS Field Campaign," in *41<sup>st</sup> International Conference on Radar Meteorology*, Toronto, ON, Canada, 2025.
- 2 **M. A. Satrio**, M. C. Coniglio, E. Rasmussen, C. L. Ziegler, D. M. Stechman, and A. E. Reinhart, "On the Low-Level Mesocyclone Evolution of the 17 May 2019 McCook / Farnam, Nebraska Tornadoic Supercell Observed during TORUS," in *31<sup>st</sup> Conf. on Severe Local Storms*, Virginia Beach, VA, 2024.
- 3 **M. A. Satrio**, R. A. Saba, T. J. Pardun, and M. C. Coniglio, "The Effects of Backing Winds within the Effective Inflow Layer on Supercell and Tornado-Like Vortices Using CM1," in *31<sup>st</sup> Conf. on Severe Local Storms*, Virginia Beach, VA, 2024.
- 4 **M. A. Satrio**, D. M. Stechman, M. C. Coniglio, C. L. Ziegler, A. E. Reinhart, and C. C. Weiss, "A Multi-Doppler Analysis of the 23 May 2022 Morton, TX Tornadoic Supercell Sampled during TORUS," in *31<sup>st</sup> Conf. on Severe Local Storms*, Virginia Beach, VA, 2024.
- 5 **M. A. Satrio**, M. C. Coniglio, E. N. Rasmussen, C. Z. Ziegler, and D. M. Stechman, "A Triple-Doppler Analysis of the 17 May 2019 McCook / Farnam, NE Tornadoic Supercell," in *40<sup>th</sup> Conference on Radar Meteorology*, Minneapolis, MN, 2023.
- 6 D. J. Bodine et al., "Understanding Complex Terrain Effects on Tornado Dynamics Using Tree-Fall Observations and High-Resolution Simulations," in *30<sup>th</sup> Conf. on Severe Local Storms*, Santa Fe, NM, 2022.
- 7 **M. A. Satrio**, E. N. Rasmussen, M. C. Coniglio, C. Z. Ziegler, and D. M. Stechman, "Analysis of the 17 May 2019 McCook / Farnam, NE Tornadoic Supercell Observed during TORUS through a Triple-Doppler Retrieval and Diabatic Lagrangian Analysis Approach," in *30<sup>th</sup> Conf. on Severe Local Storms*, Santa Fe, NM, 2022.
- 8 **M. A. Satrio**, D. J. Bodine, A. E. Reinhart, T. Maruyama, and F. T. Lombardo, "Understanding How Complex Terrain Impacts Tornado Dynamics Using a Suite of High-Resolution Numerical Simulations," in *Mesoscale Processes Across Scales, AMS 101<sup>st</sup> Annual Meeting*, New Orleans, LA (Virtual), 2021.
- 9 **M. A. Satrio**, E. N. Rasmussen, M. C. Coniglio, C. Z. Ziegler, and D. M. Stechman, "Multi-Doppler Analysis of the 17 May 2019 McCook / Farnam, NE Tornadoic Supercell during TORUS," in *Student and Early Career Severe Local Storms Conference*, Virtual, 2021.
- 10 **M. A. Satrio**, D. J. Bodine, A. E. Reinhart, T. Maruyama, and F. T. Lombardo, "Understanding How Complex Terrain Impacts Tornado Dynamics Using a Suite of High-Resolution Numerical Simulations," in *Severe Local Storms Symposium, AMS 100<sup>th</sup> Annual Meeting*, Boston, TX, 2020.
- 11 **M. A. Satrio**, D. J. Bodine, A. E. Reinhart, and T. Maruyama, "The Effects of Translation and Surface Roughness on Tornado Structure and Flow," in *17<sup>th</sup> Annual Student Conference, AMS 98<sup>th</sup> Annual Meeting*, Austin, TX, 2018.
- 12 **M. A. Satrio**, D. J. Bodine, A. E. Reinhart, and T. Maruyama, "The Effects of Varying Surface Roughness, Translational Velocity and Swirl Ratio on an Idealized Tornado," in *29<sup>th</sup> Conf. on Severe Local Storms*, Stowe, VT, 2018. [URL: https://ams.confex.com/ams/29SLS/webprogram/Manuscript/Paper348604/ExtAbstract.pdf](https://ams.confex.com/ams/29SLS/webprogram/Manuscript/Paper348604/ExtAbstract.pdf).