

Zoë A. Zibton

zzibton@gmail.com • ORCID: 0000-0002-0294-1432

Research Interests

Predictability of extreme weather · Synoptic and mesoscale meteorology · Tropical cyclones · Numerical modeling · Adjoint and sensitivity analysis · Data assimilation · Machine learning for atmospheric prediction

Education

Ph.D., Atmospheric and Oceanic Sciences May 2022

Minor Focus: Teaching and Mentoring Pedagogy

University of Wisconsin–Madison

B.S., Atmospheric and Oceanic Sciences (Honors) May 2017

Minor: Environmental Studies

University of Wisconsin–Madison

Research and Professional Appointments

National Research Council Postdoctoral Fellow Aug 2022 – Present

Naval Research Laboratory

Supervisor: Dr. James Doyle

Analyzed the drivers of tropical cyclone rapid intensification by designing and executing adjoint sensitivity derived ensemble experiments with the U.S. Navy's COAMPS model; automated data processing and visualization workflows on HPC systems using Python and shell scripting.

Postdoctoral Research Associate June 2022 – Jul 2022

University of Wisconsin–Madison

Advisor: Dr. Michael C. Morgan

Evaluated the sensitivity of adjoint response functions using both traditional and novel metrics for tropical cyclone intensity to investigate the evolution of influential physical processes.

Graduate Research Assistant Aug 2017 – May 2022

University of Wisconsin–Madison

Advisor: Dr. Michael C. Morgan

Investigated tropical cyclone intensity sensitivity to initial dynamic and thermodynamic conditions using WRF/WRFPLUS adjoint analysis, automating storm-relative diagnostic and visualization pipelines on HPC systems with Python and shell scripting.

Consulting Meteorologist Aug 2018, 2019 & 2021

Reebok CrossFit Games

Delivered daily weather forecasts and monitored real-time severe weather hazards to ensure operational safety for the Reebok CrossFit Games competition.

Senior Honors Thesis Sep 2016 – May 2017

University of Wisconsin–Madison

Advisor: Dr. Michael C. Morgan

Developed a novel forecast post-processing system for a custom WRF ensemble by integrating machine learning (e.g., adaptive learning, regression) with traditional methods like the Kalman filter to enhance forecast adaptability.

NSF Funded Climate Science REU May – Aug 2016

Pennsylvania State University

Advisor: Dr. Sukyoung Lee

Investigated the impact of CERES satellite-derived radiative energy fluxes on Southern Hemisphere jet stream position and intensity using statistical analysis and composite mapping with NCL.

Publications

Zibton, Z. A., and Doyle, D., 2025: Elucidating rapid intensification triggers with an ensemble of adjoint sensitivities. *Mon. Wea. Rev.*, in review

Zibton, Z. A. and Morgan, M., 2025: Deconstructing tropical cyclone intensification pathways using adjoint-based perturbations. *Mon. Wea. Rev.*, in prep

Presentations

Zibton, Z. A., and Doyle, J., 2025: Assessing the application of an adjoint-derived ensemble on tropical cyclone rapid intensification, *AMS 21st Conference on Mesoscale Processes*. Oral presentation.

Zibton, Z. A., and Doyle, J., 2024: Analyzing the onset of tropical cyclone rapid intensification with an adjoint-derived ensemble, *20th Cyclone Workshop*. Oral presentation.

Zibton, Z. A., and Doyle, J., 2024: Assessing the application of an adjoint-derived ensemble, *12th Workshop on Meteorological Sensitivity Analysis and Data Assimilation*. Oral presentation.

Zibton, Z. A., and Doyle, J., 2024: Analyzing the onset of tropical cyclone rapid intensification with an adjoint-derived ensemble, *AMS 36th Conference on Hurricanes and Tropical Meteorology*. Oral presentation.

Zibton, Z. A., and Doyle, J., 2023: Sensitivity of tropical cyclone rapid intensification onset using an adjoint model, *AMS 32nd Conference on Weather Analysis and Forecasting*. Poster presentation.

Zibton, Z. A., and Doyle, J., 2023: Application of adjoint-derived ensemble for tropical cyclones rapid intensification, *AMS 28th Conference on Numerical Weather Prediction*. Poster presentation.

Zibton, Z. A., and Morgan, M., 2022: How does tropical cyclone intensity respond to partitioned adjoint-informed perturbations?, *AMS 35th Conference on Hurricanes and Tropical Meteorology*. Oral presentation.

Zibton, Z. A., Hoffman, Alicia, and Desai, A., 2022: Increasing the transparency in graduate hidden curriculum, *102nd AMS Annual Meeting*. Oral presentation.

Zibton, Z. A., and Morgan, M., 2022: Sensitivity of tropical cyclone intensity: Evaluation of sensitivities and perturbation evolution, *102nd AMS Annual Meeting*. Poster presentation.

Zibton, Z. A., and Morgan, M., 2021: Adjoint response functions for tropical cyclone intensity: Evaluation of sensitivities and perturbation evolution, *AMS 34th Conference on Hurricanes and Tropical Meteorology*. Oral presentation.

Zibton, Z. A., and Morgan, M., 2021: The Role of the upper and lower troposphere on tropical cyclone intensity, *101st AMS Annual Meeting*. Oral presentation.

Chasteen, M. B., Galarneau, T. J., Krocak, M. J., and **Brooke Zibton, Z. A.**, 2020: Environmental Nuances and Convective Morphology during the 30 April 2017 Tornado Outbreak in the Southeastern United States, *100th AMS Annual Meeting*

Zibton, Z. A., and Morgan, M., 2019: Evaluation of adjoint response functions for tropical cyclone intensity, *19th Cyclone Workshop*. Oral presentation.

Chasteen, M.B., **Brooke Zibton, Z. A.**, and Krocak, M., 2019: The 30 April 2017 tornadic QLCS in the Southeast, *ASP Summer Colloquium, National Center for Atmospheric Research*. Oral presentation.

Zibton, Z. A., Morgan, M., and Hoover, B. T., 2019: Diagnosis of the influence of adjoint-derived perturbations on tropical cyclone intensity, *Atmospheric and Oceanic Sciences Department Seminar*. Oral

presentation.

Zibton, Z. A., Morgan, M., and Hoover, B. T., 2019: Impact of adjoint-derived optimal perturbations on tropical cyclone intensity forecasts, *Atmospheric Oceanic and Space Sciences Poster Reception*. Poster presentation.

Zibton, Z. A., Morgan, M., and Hoover, B. T., 2019: Impact of adjoint-derived optimal perturbations on tropical cyclone intensity forecasts, *99th AMS Annual Meeting*. Poster presentation.

Zibton, Z. A., Morgan, M., and Hoover, B. T., 2018: Adjoint sensitivity diagnosis of the intensification of Hurricane Harvey (2017), *11th Workshop on Sensitivity Analysis and Data Assimilation in Meteorology and Oceanography*. Oral presentation.

Zibton, Z. A., Morgan, M., and Hoover, B. T., 2018: Adjoint sensitivity diagnosis of the intensification of Hurricane Harvey (2017), *AMS 33rd Conference on Hurricanes and Tropical Meteorology*. Oral presentation.

Zibton, Z. A., and Morgan, M., 2017: Adaptive regression model post-processing using an ensemble Kalman filter, *University of Wisconsin-Madison's Letters & Science Senior Honors Thesis Symposium*. Oral presentation.

Zibton, Z. A., Lee, S, and Li, Q., 2017: Link between CERES radiative energy flux and Southern Hemisphere jet stream variability, *97th AMS Annual Meeting*. Poster presentation (*Best Student Poster Award*)

Teaching and Mentoring Experiences

Co-Investigator

Sep 2021 – Dec 2022

University of Wisconsin–Madison and Inclusive Graduate Education Network

PI: Dr. Ankur Desai, Co-I: Zoë Zibton and Alicia Hoffman

Co-initiated, developed, and taught a project evaluating the hidden curriculum in graduate education, which was successfully transitioned into a formal university seminar course.

Founder and Mentor

Jan 2020 – May 2022

AOS Mentorship Program, University of Wisconsin–Madison

Developed and coordinated a peer mentorship program connecting graduate mentors with undergraduates across all stages of their degree; collaborated with 10+ graduate organizers and faculty; established a handbook and website to ensure program sustainability.

Mentored 3 undergraduate students, with a focus on self-efficacy and science identity; led group professional development workshops (e.g., resume building, networking).

Instructor of Record

Fall 2019

ATM OCN 100/101, University of Wisconsin–Madison

Taught three times weekly, created homework and tests, and managed two teaching assistants.

Implemented inclusive practices, such as a variety of modes of assessment.

Graduate Teaching Assistant

Spring 2019

ATM OCN 311, University of Wisconsin–Madison

Lab TA for the atmospheric and oceanic geophysical fluid dynamics a second semester core course for undergraduate majors; created, implemented, and graded laboratory exercises.

Delta Teaching Intern

Jan 2019 – May 2019

University of Wisconsin–Madison

Advisors: Dr. Michael C. Morgan and Dr. Devin Wixon

Developed and implemented a Teaching-As-Research project to investigate the role of metacognition on problem-solving in new contexts within an undergraduate geophysical fluid dynamics course.

Graduate Teaching Assistant

Fall 2017

ATM OCN 101, University of Wisconsin–Madison

Taught weekly lectures for a supplemental lab component of introductory weather and climate course; created and graded lab assignments.

Educational Assistant

June – July 2017

Intro to Atmospheric Science, Wisconsin Center for Academically Talented Youth

Assisted instructor in a college level introductory atmospheric science course.

Guest-lectured on numerical prediction and mesoscale meteorology (4 classes).

Physics Peer-Mentor-Tutor

Jan 2015 – May 2017

Physics Learning Center, University of Wisconsin–Madison

Tutored for algebra and calculus based general physics.

Honors and Awards

Student Travel Grant	Fall 2017, 2018, 2020, 2021
----------------------	-----------------------------

Department of Atmospheric and Oceanic Sciences, University of Wisconsin–Madison

Research Accelerator Grant Program Recipient (Co-I, \$5000)	Fall 2021–2022
--	----------------

Inclusive Graduate Education Network

Department Leadership Award	Spring 2021
-----------------------------	-------------

Department of Atmospheric and Oceanic Sciences, University of Wisconsin–Madison

ASP Summer Colloquium Participant: “Quantifying and Communicating Uncertainty”	Summer 2019
--	-------------

National Center for Atmospheric Research

First-Year Graduate Student Award for academic performance	Spring 2018
--	-------------

Department of Atmospheric and Oceanic Sciences, University of Wisconsin–Madison

Student Travel Award	Spring 2017
----------------------	-------------

AMS 33rd Conference on Hurricanes and Tropical Meteorology

Best Student Poster	Spring 2017
---------------------	-------------

AMS 29th Conference on Climate Variability and Change

Excellence in Service and Achievement Award	Spring 2017
---	-------------

Center for Academic Excellence, University of Wisconsin–Madison

Trewartha Honors Senior Thesis Grant	Fall 2016
--------------------------------------	-----------

College of Letters & Science Honors Program, University of Wisconsin–Madison

Sunkel Award for exceptional scholarly potential	Spring 2016
--	-------------

Department of Atmospheric and Oceanic Sciences, University of Wisconsin–Madison

Community Environmental Scholars Program Scholarship	2015–2017
--	-----------

Nelson Institute for Environmental Studies, University of Wisconsin–Madison

Dean’s List	2013–2017
-------------	-----------

University of Wisconsin–Madison

Shinners Family Scholarship	2013–2017
-----------------------------	-----------

Summer Collegiate Experience, University of Wisconsin–Madison

Professional Affiliations, Leadership, Service, and Outreach

Volunteer, ESWN – Professional Development and Networking Committee	July 2025–present
---	-------------------

Volunteer, AMS Presentation Judge	July 2025
-----------------------------------	-----------

Pen Pal, <i>Letters to A Pre-Scientist</i>	Sept 2023–present
Member, AOS Diversity, Equity, and Inclusion Committee	2021
Member, AOS Colloquium Committee	Fall 2019–Spring 2022
Faculty Liaison, AOS Graduate Student Association	Fall 2018–Spring 2020
Seminar Chair, AOS Graduate Student Association	Fall 2018–Spring 2019
Graduation Chair/Lead Organizer, AOS Graduate Student Association	Spring 2019 & 2020
Outreach Volunteer, AOS Graduate Student Association	Fall 2017–Spring 2022
Founder and Mentor, AOS Mentorship Program	Fall 2017–Spring 2022
Member, American Meteorological Society (AMS)	2016–present
Officer and Chair, AMS Student Chapter, University of Wisconsin–Madison	2015–2017