

Curriculum Vitae - Jacob D. Carstens

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Education

7/2022 **Ph.D.**, Florida State University, Meteorology.
5/2019 **M.S.**, Florida State University, Meteorology.
5/2017 **B.S.**, Florida State University, Meteorology.

Experience

8/2024-Present **Assistant Professor** - Department of Atmospheric Sciences, University of North Dakota.
9/2023-Present **Consultant** - Supporting Florida Building Resilience Against Climate Effects ([FL BRACE](#)) Program.
8/2022-7/2024 **Postdoctoral Scholar** - Department of Meteorology and Atmospheric Science, Pennsylvania State University. Mentored by Anthony Didlake, Jr. and Colin Zarzycki.
5/2021-8/2021 **Researcher** - Department of Geography, Florida State University. Supported FL BRACE Program, led by Christopher Uejio.
8/2017-7/2022 **Graduate Research Assistant** - Department of Earth, Ocean, and Atmospheric Science, Florida State University. Advised by Allison Wing. (Graduate Teaching Assistant in 2020-2021)

10/2015-5/2017 **Undergraduate Research Assistant** - Center for Ocean-Atmospheric Prediction Studies (COAPS). Responsible for quality control of research vessel sea surface temperature and wind data. Also produced an Honors thesis, advised by Vasu Misra.

Awards and Honors

Charles Hosler Diversity, Equity, and Inclusion Postdoctoral Award - Penn State College of Earth and Mineral Sciences (2024)

Early Career Leadership Academy - American Meteorological Society (2024)

Max A. Eaton Student Prize - Awarded for oral presentation at the 35th Conference on Hurricanes and Tropical Meteorology (2022)

James and Sheila O'Brien Graduate Fellowship - Florida State University Department of Earth, Ocean, and Atmospheric Science (2022)

Student Travel Award - Grant awarded for research presented at the 34th Conference on Hurricanes and Tropical Meteorology (2021)

Best Lightning Talk - Midwest Student Conference on Atmospheric Research (2020)

Local Chapter of the Year - American Meteorological Society (2020, President)

Local Chapter Honor Roll - American Meteorological Society (2017, Vice President)

Orville Family Endowed Scholarship - American Meteorological Society (2016)

Member of the Year - North Florida Chapter of the American Meteorological Society/National Weather Association (AMS/NWA, 2016)

Membership in Professional Organizations

- American Geophysical Union
- American Meteorological Society
- Chi Epsilon Pi Meteorology Honor Society
- National Weather Association
- Royal Meteorological Society

Publications (*italicized and underlined denotes student I have mentored*)

Refereed Journal Articles

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki (2024). Tropical cyclone wind shear-relative asymmetry in reanalyses. *J. Climate*, in press, doi:10.1175/JCLI-D-23-0628.1.

Carstens, J. D., & A. A. Wing (2023). Regimes of convective self-aggregation in convection-permitting beta-plane simulations. *J. Atmos. Sci.*, **80**, 2187-2205, doi:10.1175/JAS-D-22-0222.1.

Carstens, J. D., & A. A. Wing (2022). Simulating dropsondes to assess moist static energy variability in tropical cyclones. *Geophys. Res. Lett.*, **49**, e2022GL099101, doi:10.1029/2022GL099101.

Carstens, J. D., & A. A. Wing (2022). A spectrum of convective self-aggregation based on background rotation. *J. Adv. Model. Earth Syst.*, **14**, e2021MS002860, doi:10.1029/2021MS002860.

Carstens, J. D., & A. A. Wing (2020). Tropical cyclogenesis from self-aggregated convection in numerical simulations of rotating radiative-convective equilibrium. *J. Adv. Model. Earth Syst.*, **12**, e2019MS002020, doi:10.1029/2019MS002020.

Journal Articles in Review, Revision, or Preparation

Kopelman, M. V., A. A. Wing, & **J. D. Carstens**. Spatial variability of dropsonde-derived moist static energy in North Atlantic tropical cyclones. *Geophys. Res. Lett.*, in revision.

Carstens, J. D., C. M. Zarzycki, A. C. Didlake, Jr., & C. A. Purdy. Tropical cyclone asymmetry in a variable-resolution global climate model. In prep.

Carstens, J. D., J. Jung, C. K. Uejio et al. Tropical cyclones and climate change: An overview for the public health community. In prep.

Trujillo-Falcón, J. E., **J. D. Carstens**, E. Grow Cej, V. Alonso, J. Martucci, and E. C. Wolff. #WxTwitter, #ClimateTok, and the emergence of digital meteorology. *Bull. Amer. Met. Soc.*, in prep.

Theses and Other Articles

- Carstens, J. D.** (2022). The sensitivity of convective self-aggregation and tropical cyclogenesis to planetary rotation. [Dissertation at Florida State University](#).
- Carstens, J. D.**, C. K. Uejio, & A. A. Wing (2021). Understanding past, present, and future tropical cyclone activity. [Available on Florida Climate Center website](#).
- Carstens, J. D.** (2019). Tropical cyclogenesis from self-aggregated convection in numerical simulations of rotating radiative-convective equilibrium. [Master's thesis at Florida State University](#).
- Carstens, J. D.** (2017). North Atlantic and Northeast Pacific tropical cyclone intensity comparison using integrated kinetic energy. [Undergraduate honors thesis at Florida State University](#).

Grants

Approved For Funding

Didlake, Jr., A. C., C. M. Zarzycki, & **J. D. Carstens**. Asymmetric tropical cyclone processes in high-resolution climate models. Modeling, Analysis, Predictions, and Projections, NOAA. (2024-2027, **Co-PI, estimated \$420,000 to UND**)

Presentations

Conference Presentations

- Carstens, J. D.**, J. E. Trujillo-Falcón, E. Grow Cej, V. Alonso, J. Martucci, and E. C. Wolff (2025). Digital meteorology in the classroom: Building a comprehensive course. Abstract submitted for the 105th American Meteorological Society Annual Meeting, New Orleans, LA.
- Carstens, J. D.**, S. Killingsworth, B. Abramowitz, and M. Ennes (2025). An atmospheric Scientist in Every Florida School. Abstract submitted for the 105th American Meteorological Society Annual Meeting, New Orleans, LA.
- Carstens, J. D.** (2024). Controls of rotation on convective self-aggregation onset. ePoster presentation at the 104th American Meteorological Society Annual Meeting, Baltimore, MD.

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki (2024). Tropical cyclone asymmetry and wind shear interactions under global warming in a variable-resolution climate model. Oral presentation at the 104th American Meteorological Society Annual Meeting, Baltimore, MD. Poster presentation at the 36th Conference on Hurricanes and Tropical Meteorology, Long Beach, CA.

Kopelman, M. V., A. A. Wing, & **J. D. Carstens** (2024). Dropsonde-derived moist static energy variability in Atlantic hurricanes. Oral presentation at the 104th American Meteorological Society Annual Meeting, Baltimore, MD. Poster presentation at the 36th Conference on Hurricanes and Tropical Meteorology, Long Beach, CA.

Purdy, C. A., **J. D. Carstens**, K. M. Nardi, B. S. Rojas, N. R. Barron, A. C. Didlake, Jr., & C. M. Zarzycki (2024). Asymmetric structure of tropical cyclones in the Community Atmosphere Model 5 (CAM5). Poster presentation at the 104th American Meteorological Society Annual Meeting, Baltimore, MD.

Carstens, J. D., C. M. Zarzycki, & A. C. Didlake Jr. (2023). Asymmetric tropical cyclone structures and processes in reanalyses and climate models. Oral presentation at the American Meteorological Society 20th Conference on Mesoscale Processes, Madison, WI.

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki (2023). Asymmetric tropical cyclone structures and processes in reanalyses and climate models. Oral presentation at the 10th Northeast Tropical Workshop, Albany, NY.

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki (2023). Tropical cyclone shear-induced asymmetry in reanalyses and climate models. Oral presentation at the 103rd American Meteorological Society Annual Meeting, Denver, CO.

Carstens, J. D., M. V. Kopelman, & A. A. Wing (2022). Tropical cyclone moist static energy structure in idealized simulations and dropsonde observations. Oral presentation at the American Geophysical Union Fall Meeting, Chicago, IL.

Carstens, J. D., & A. A. Wing (2022). Regimes of convective self-aggregation in convection-permitting beta-plane simulations. Poster presentation at Tropical Cyclones, Convection, and Climate: A Symposium in Honor of Kerry Emanuel, Cambridge, MA.

Kopelman, M. V., **J. D. Carstens**, A. A. Wing, M. E. O'Neill, J. P. Dunion, & D. R. Chavas (2022). Estimation of tropical cyclone moist static energy variability from dropsonde data. Oral presentation at the 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, LA.

Carstens, J. D., & A. A. Wing (2022). Convective self-aggregation, equatorial waves, and tropical cyclones in idealized beta-plane simulations. Oral presentation at the 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, LA. (**Max A. Eaton Student Prize Winner**)

Carstens, J. D., & A. A. Wing (2022). Simulating dropsondes to assess moist static energy variability in tropical cyclones. Poster presentation at the 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, LA.

Carstens, J. D., M. V. Kopelman, & A. A. Wing (2021). Estimating moist static energy and surface enthalpy flux variance in a mature hurricane: Modeling and an observational case study. Virtual presentation at the 34th Conference on Hurricanes and Tropical Meteorology.

Carstens, J. D., & A. A. Wing (2021). Tropical cyclogenesis mechanisms in radiative-convective equilibrium simulations of varying rotation. Virtual presentation at the 34th Conference on Hurricanes and Tropical Meteorology.

Carstens, J. D., & A. A. Wing (2020). A spectrum for convective self-aggregation based on background rotation. Virtual presentation at the 4th Midwest Student Conference on Atmospheric Research. (**Best Lightning Talk Award Winner**)

Carstens, J. D., & A. A. Wing (2020). Pathways to tropical cyclogenesis in rotating radiative-convective equilibrium simulations. Poster presentation at the 100th American Meteorological Society Annual Meeting, Boston, MA.

Carstens, J. D., & A. A. Wing (2019). Tropical cyclogenesis from self-aggregated convection in idealized numerical simulations: Sensitivity to planetary vorticity. Poster presentation at the 99th American Meteorological Society Annual Meeting, Phoenix, AZ.

Carstens, J. D., & V. Misra (2017). North Atlantic and East Pacific tropical cyclone intensity comparison with integrated kinetic energy. Poster presentation at the 97th American Meteorological Society Annual Meeting, Seattle, WA.

Carstens, J. D., S. R. Smith, M. A. Bourassa, & J. J. Rolph (2016). Examination of SAMOS sea temperature biases. Poster presentation at the Fourth International Workshop on the Advances in the Use of Historical Marine Climate Data (MARCDAT-IV), National Oceanography Centre, Southampton, UK.

Invited Seminars

A tropical meteorologist walks into a corn field. University of Nebraska, 29 April 2024.

Hurricane asymmetry in a warming climate: Capturing the mesoscale in global climate models. University of Louisiana at Monroe, 27 March 2024.

New insights on hurricanes from emerging modeling and observational tools. University of North Dakota, 27 February 2024.

Process-level understanding of hurricanes and tropical convection in models and observations. Salisbury University, 4 December 2023.

Organized tropical convection in idealized models, observations, and climate models. Mississippi State University, 31 March 2023.

Radiative-convective equilibrium and tropical deep convection. Penn State University, 19 October 2022

A spectrum for convective self-aggregation based on background rotation. Florida State University Meteorology, 21 January 2021

Other Presentations

Writing an effective abstract for the AMS Student Conference. AMS Board on Student Affairs Webinar, 12 August 2024.

Hurricane forecasting tips and tools. Presented at 2023-2024 Penn State Weather Camps, and at Central Pennsylvania AMS Chapter Meeting, 28 May 2024.

Getting 1% better: Reflecting on 10 years since enrolling at Florida State. North Florida AMS/NWA Chapter Banquet, 20 April 2024.

Climate change and extreme weather. WPSU Student Climate Day, Panel Discussion on Climate Science, 2 April 2024.

Hurricanes and climate change. Presented several times from August 2021-March 2024, most recently at Vermont State University. ([Link to original recording](#))

What goes into a hurricane forecast? Tallahassee Hurricane PREP Series, 2020-2022.

Tips for the atmospheric science graduate school experience. Northeastern Storm Conference, 24 April 2021.

On the 2020 hurricane season... And enduring it as a TC-focused grad student. West Central Florida AMS Chapter Meeting, 21 January 2021.

Graduate Students Advised

Mark McGarry, Jr. - M.S., University of North Dakota

Sydney Walters - M.S., University of North Dakota

Committee Member

Ana Bolivar - Ph.D., Penn State University

Michael Kopelman - M.S., Florida State University

Undergraduate Students Mentored

Chase Purdy (Florida State University, B.S. 2024) - Penn State Climate Science REU. Project: Asymmetric Tropical Cyclone Structure in the Community Atmosphere Model (with Kyle Nardi, Bruno Rojas, Nicholas Barron, Anthony Didlake, and Colin Zarzycki).

Michael Kopelman (Florida State University, B.S. 2024) - FSU Undergraduate Research Opportunity Program. Project: Dropsonde-Derived Moist Static Energy Variability in North Atlantic Tropical Cyclones (with Allison Wing).

Cameron Chuss (Penn State University, B.S. 2023) - Project: The Diurnal Cycle of Rainfall over Taiwan During the PRECIP Campaign (with Anthony Didlake).

Teaching

Instructor of Record (Florida State) - MET 2507 (Weather Analysis and Forecasting, Spring 2021)

Instructor of Record (North Dakota) - ATSC 530 (Numerical Weather Prediction, Spring 2025); ATSC 310 (Introduction to Weather Forecasting, Spring 2025); ATSC 315 (Broadcast Meteorology, Fall 2025)

Teaching Assistant (Florida State) - MET 4301 (Atmospheric Dynamics I, Fall 2020)

Graduate Course Guest Lectures (Penn State) - METEO 597 (Tropical Meteorology, Fall 2022); METEO 521 (Dynamic Meteorology, Spring 2023)

Undergraduate Course Guest Lectures (Penn State) - METEO 005 (Severe and Unusual Weather, Summer and Fall 2023); METEO 422 (Advanced Atmospheric Dynamics, Fall 2023)

Service

Department Service

Faculty Advisor - UND Weather Update, University of North Dakota Department of Atmospheric Sciences (2024-Present)

Member - Sustainability Green Team, Penn State Department of Meteorology and Atmospheric Science (2023-2024)

Educator - Weather Outreach and Education Club, Penn State Department of Meteorology and Atmospheric Science (2022-2024)

Host, Hurricane Specialist, and Forecaster - "Weather World" (2022-2024)

Member - Unlearning Racism in the Geosciences (URGE), Penn State Department of Meteorology and Atmospheric Science Committee on Belonging (2022-2023)

President - North Florida Chapter of the AMS/NWA (2019-2020)

President - Chi Epsilon Pi Meteorology Honor Society, FSU Chapter (2018-2020)

Local Manager (FSU) - WxChallenge National Forecasting Contest (2017-2022)

Team Leader - "FSU Weather" TV show (2016-2017). On air talent from 2015-2022.

Vice President - North Florida Chapter of the AMS/NWA (2016-2017)

University Service

Postdoc Representative - PSU EMS Graduate Student Leader Roundtable (2024)

Poster Session and Outreach Chair - PSU 16th Postdoctoral Research Symposium Planning Committee (2023)

Chairperson - PSU Postdocs of EMS (PoEMS, 2022-2024)

Tutor - FSU Student-Athlete Academic Services (SAAS, 2017-2019)

Tutor - FSU Libraries (2015)

External Service

Member - AMS Board on Continuing Professional Development (2024-2030)

Member - AMS Board for Early Career Professionals (2023-2029)

Outreach Scientist - Skype a Scientist (2022-Present)

Outreach Scientist - Scientist in Every Florida School (2020-Present)

Member - AMS Student Conference Planning Committee (2021-2023)

Associate Editor - *Weather* (Royal Meteorological Society, 2024-Present)

Reviewer - *Journal of the Atmospheric Sciences*, *Journal of Advances in Modeling Earth Systems*, *Geophysical Research Letters*, *Weather*, *Climate Dynamics*, *Atmospheric Science Letters*, *Monthly Weather Review*, *Journal of Geophysical Research - Atmospheres*, *Quarterly Journal of the Royal Meteorological Society*

Review Panelist - NASA (2024)

Co-Chair - Student Award Committee, 36th AMS Conference on Hurricanes and Tropical Meteorology (2024)

Session Chair - 13th AMS Conference for Early Career Professionals (2025; Seeking Bluer Skies: Making a Career Transition as an Early-Career Professional)

Session Chair - 12th AMS Conference for Early Career Professionals (2024; Communication, Professionalism, and Best Practices When Using Social Media)

Session Chair - 10th Northeast Tropical Workshop (2023; TC Intensity and Structure II)

Features in News Articles

The Associated Press - "Misleading claims downplay climate change's effect on hurricanes". 6 October 2022. <https://apnews.com/article/fact-checking-307309528789>

The Weather Channel - "Watch: The 2020 hurricane season summed up in 76 seconds". 24 November 2020. <https://weather.com/storms/hurricane/video/the-2020-hurricane-season-summed-up-in-76-seconds>

The Houston Chronicle - "Watch 2020's record-breaking hurricane season unfold in 76 seconds". 23 November 2020. <https://www.chron.com/weather/article/Houston-hurricane-maps-forecast-2020-15748011.php>

CBS - "The record-shattering 2020 hurricane season, explained". 20 November 2020. <https://www.cbsnews.com/news/atlantic-hurricane-season-2020-record-breaking/>

CNN - "This relentless Atlantic hurricane season has put nearly every mile of coastline from Texas to Maine on alert". 13 November 2020. <https://www.cnn.com/2020/11/13/weather/2020-hurricane-season-records-texas-to-maine/index.html>

Eos - "Storms interact but rarely merge into bigger tempests". 26 August 2020. <https://eos.org/articles/storms-interact-but-rarely-merge-into-bigger-tempests>

Forbes - "2 tropical storms aren't going to merge into a megastorm - here's why". 22 August 2020. <https://www.forbes.com/sites/marshallshepherd/2020/08/22/2-tropical-storms-arent-going-to-merge-into-a-megastormheres-why/?sh=50f5cc74744d>

Florida State University News - "Hurricanes from scratch: FSU researchers find even small disturbances can trigger catastrophic storms". 13 May 2020. <https://news.fsu.edu/news/science-technology/2020/05/13/hurricanes-from-scratch-fsu-researchers-find-even-small-disturbances-can-trigger-catastrophic-storms/>

National Science Foundation Research News - "Even small disturbances can trigger catastrophic hurricanes, researchers find". 19 May 2020. https://nsf.gov/discoveries/disc_summ.jsp?cntn_id=300610&org=GEO&from=news

WCTV Tallahassee - "Federal meteorologists unable to attend annual meeting due to shutdown". 11 January 2019. <https://www.wctv.tv/content/news/The-government-shutdown-had-a-ripple-effect-Federal-meteorologists-missed-out-on-large-annual-meeting-504239331.html>

WCTV Tallahassee - "FSU grad student attempting to solve the mystery of hurricane formation". 22 May 2020. <https://www.wctv.tv/content/news/FSU-grad-student-attempting-to-solve-the-mystery-of-hurricane-formation-570700901.html>

Other Media

Carolina Weather Group - Episode on experiences of a meteorology student (2021). Available at <https://www.youtube.com/watch?v=Lcnb2YEBaUk&t=20s>

American Meteorological Society - Clear Skies Ahead Podcast, discussing responsibilities, challenges, and benefits of graduate school (2021). Available at https://blubrry.com/clear_skies Ahead/81204574/jake-carstens-graduate-research-assistant-at-florida-state-university-in-tallahassee/

WeatherBrains - Brief cameo describing experience in AMS Early Career Leadership Academy (2024), along with others in cohort. Available at https://www.youtube.com/watch?v=leOxykgZw_Y&t=3730s

Seasoned Chaos Blog - Guest article discussing subseasonal hurricane forecasting tools. Available at <https://seasonedchaos.github.io/Opening-Your-Toolbox-for-Subseasonal-Hurricane-Forecasting/>