

Curriculum Vitae - Jacob D. Carstens

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Professional Experience

- 9/2023-Present **Consultant** - Supporting Florida Building Resilience Against Climate Effects ([FL BRACE](#)) Program. Continuation of 2021 work to publish a manuscript reviewing the effects of climate change on tropical cyclones, and interact with communities and public health officials to promote weather and climate literacy.
- 8/2022-Present **Postdoctoral Scholar** - Department of Meteorology and Atmospheric Science, Pennsylvania State University. Mentored by Anthony Didlake, Jr. and Colin Zarzycki.
- 8/2017-7/2022 **Graduate Research Assistant** - Department of Earth, Ocean, and Atmospheric Science, Florida State University. (Graduate Teaching Assistant during the 2020-2021 academic year)
- 5/2021-8/2021 **Researcher** - Department of Geography, Florida State University. Supported FL BRACE Program, led by Christopher Uejio.

Education

- 7/2022 **Doctor of Philosophy**, Florida State University, Meteorology. Advised by Allison Wing.
- 5/2019 **Master of Science**, Florida State University, Meteorology.
- 5/2017 **Bachelor of Science**, Florida State University, Meteorology.

Additional Research Training

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

Awards

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

Publications

Refereed Journal Articles

Carstens, J. D., & A. A. Wing (2023). Regimes of convective self-aggregation in cloud-resolving 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

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki. Tropical cyclone wind shear-relative asymmetry in reanalyses. *J. Climate*, submitted.

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

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.

Kopelman, M. V., A. A. Wing, & J. D. Carstens. Dropsonde-derived moist static energy variability in Atlantic hurricanes. In prep.

Theses and Other Articles

Carstens, J. D. (2022). The sensitivity of convective self-aggregation and tropical cyclogenesis to planetary rotation. [Doctoral 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.](#)

Presentations

Conference Presentations

Carstens, J. D. (2024). Controls of rotation on tropical convection in idealized simulations. Abstract submitted to 104th American Meteorological Society Annual Meeting, Baltimore, Maryland.

Carstens, J. D., A. C. Didlake, Jr., & C. M. Zarzycki (2024). Tropical cyclone-wind shear interactions under global warming scenarios in a variable-resolution climate model. Abstract submitted to 104th American Meteorological Society Annual Meeting, Baltimore, Maryland.

Kopelman, M. V., A. A. Wing, & J. D. Carstens (2024). Moist static energy structure of tropical cyclones derived from dropsonde observations. Abstract submitted to 104th American Meteorological Society Annual Meeting, Baltimore, Maryland.

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). Abstract submitted to the 104th American Meteorological Society Annual Meeting, Baltimore, Maryland.

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, Wisconsin.

- 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, New York.
- 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, Colorado.
- 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, Illinois.
- 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, Massachusetts.
- 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, Louisiana.
- 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, Louisiana. (**Award 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, Louisiana.
- 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. Oral presentation at the 4th Midwest Student Conference on Atmospheric Research, Urbana, Illinois. (**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, Massachusetts.
- 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, Arizona.
- 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, Washington.
- 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

- Carstens, J. D. (31 March 2023). Organized tropical convection in idealized models, observations, and climate models. Mississippi State University Geosciences Seminar.
- Carstens, J. D. (19 October 2022). Radiative-convective equilibrium and tropical deep convection. Penn State University Climate Dynamics Seminar.
- Carstens, J. D. (26 August 2021, 12 April 2022, and 18 November 2022). Hurricanes and climate change. Presented as Florida BRACE webinar, at Florida A&M University's Energy Water Food Nexus, and to University of Florida's Indian River Research and Education Center. ([Link to recording](#))
- Carstens, J. D. (21 January 2021). A spectrum for convective self-aggregation based on background rotation. Florida State University Meteorology Seminar.

Other Presentations

Carstens, J. D. (2020-2022). What goes into a hurricane forecast? City of Tallahassee Hurricane PREP Workshop.

Carstens, J. D. (24 April 2021). Tips for the atmospheric science graduate school experience. Northeastern Storm Conference.

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

Advising and Teaching

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).

Students Co-Mentored

Michael Kopelman (Florida State University, B.S. 2024) – FSU Undergraduate Research Opportunity Program. Project: A Climatology of Tropical Cyclone Moist Static Energy Derived from Dropsonde Observations (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).

Primary Instructor

MET 2507 - Weather Analysis and Forecasting (Spring 2021). Course description: An introduction to meteorological observations, data, codes, and scalar analysis practices. Weather applications software systems and computing environments for meteorological analysis and weather forecasting techniques are examined.

Teaching Assistant

MET 4301 - Atmospheric Dynamics I (Fall 2020). Course description: Atmospheric dynamics is the study of motion in the atmosphere. Understanding the basic nature of atmospheric flow is critical to understanding the origin and evolution of all weather

and climate phenomena. In this course, students learn how to apply fundamental principles of mechanics and thermodynamics (e.g., conservation of momentum, mass, and energy) to derive a set of equations governing atmospheric flow. Students learn how use these governing equations in order to gain insight into the basic nature of atmospheric flow, including the dynamics of vorticity and circulation.

Guest Lecturer

Graduate Courses - METEO 597 (Tropical Meteorology, Fall 2022); METEO 521 (Dynamic Meteorology, Spring 2023)

Undergraduate Courses - METEO 005 (Severe and Unusual Weather, Summer and Fall 2023); METEO 422 (Advanced Atmospheric Dynamics, Fall 2023)

Service

Department Service

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

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

Host, Hurricane Specialist, and Short-Range Forecaster - "Weather World" TV show (2022-Present)

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

Member - Penn State 16th Postdoctoral Research Symposium Planning Committee (2023-Present)

Chairperson - Penn State Postdocs of EMS (PoEMS, 2022-Present)

Mathematics, Physics, Environmental Science, and Meteorology Tutor - FSU Student-Athlete Academic Services (SAAS, 2017-2019)

Mathematics and Physics Tutor - FSU Libraries (2015)

External Service

Secretary - AMS Board for Early Career Professionals (2023-Present)

Outreach Scientist - Skype a Scientist (2022-Present)

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

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

Reviewer - *Journal of the Atmospheric Sciences*, *Journal of Advances in Modeling Earth Systems*, *Geophysical Research Letters*, *Weather*, *Climate Dynamics*, *Atmospheric Science Letters*

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

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

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/