

Owen Hughes

PHD STUDENT · CLIMATE SCIENCE

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Education

University of Michigan, Department of Climate and Space Sciences and Engineering.

Ann Arbor, MI

PHD CLIMATE SCIENCE

09/2022 - present

- Advisor: Dr. Christiane Jablonowski

University of Michigan

Ann Arbor, MI

BS MATHEMATICS

09/2017 - 04/2022

- Concentration: Applied and computational mathematics

Professional Experience

April

2025-July 2025 **Graduate visitor**, Advisor: Dr. Peter Lauritzen. National Center for Atmospheric Research, Boulder, CO

2022-

present

Graduate student research assistant, Advisor: Professor Christiane Jablonowski. Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor MI

2020-2022

Undergraduate research assistant, Advisor: Professor Christiane Jablonowski. Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI

June

2019-July

2019

Undergraduate Research Program fellow, Advisor: Professor Tatiana Engel. Computational Neuroscience Program, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

2017-2018

Undergraduate research assistant, Advisor: Professor Ram Vasudevan. Robotics Program, University of Michigan, Ann Arbor, MI

Publications

PUBLISHED

Hughes, O. K., and C. Jablonowski (2023), "A Mountain-Induced Moist Baroclinic Wave Test Case for the Dynamical Cores of Atmospheric General Circulation Models", *Geosci. Model Dev.*, 16, 6805-6831, <https://gmd.copernicus.org/articles/16/6805/2023/>

Tang, Q., J.-C. Golaz, L. P. Van Roekel, M. A. Taylor, W. Lin, B. R. Hillman, P. A. Ullrich, A. M. Bradley, O. Guba, J. D. Wolfe, T. Zhou, K. Zhang, X. Zheng, Y. Zhang, M. Zhang, M. Wu, H. Wang, C. Tao, B. Singh, A. M. Rhoades, Y. Qin, H.-Y. Li, Y. Feng, Y. Zhang, C. Zhang, C. S. Zender, S. Xie, E. L. Roesler, A. F. Roberts, A. Mametjanov, M. E. Maltrud, N. D. Keen, R. L. Jacob, C. Jablonowski, **O. K. Hughes**, R. M. Forsyth, A. V. Di Vittorio, P. M. Caldwell, G. Bisht, R. B. McCoy, R. L. Leung, and D. C. Bader (2023), "The fully coupled regionally refined model of E3SM version 2: overview of the atmosphere, land, and river results." *Geosci. Model Dev.* 16, 3953-3995, <https://doi.org/10.5194/gmd-16-3953-2023>, 2023.

Genkin, M., **Hughes, O. K.** and Engel, T.A. "Learning non-stationary Langevin dynamics from stochastic observations of latent trajectories." *Nat Commun* 12, 5986, 2021.

H. O. Jacobs, **O. K. Hughes**, M. Johnson-Roberson, and R. Vasudevan, "Real-Time Certified Probabilistic Pedestrian Forecasting" in *IEEE Robotics and Automation Letters*, vol. 2, no. 4, pp. 2064-2071, 2017.

IN PREPARATION

Hughes, O. K., Guba, O., Taylor, M. A., and Jablonowski, C., "The Deep Atmosphere Extension of the Non-hydrostatic HOMME Dynamical Core", To be submitted to *Geosci. Model Dev.* in early 2026

Presentations

- Ong, H., **Hughes, O. K.**, Herrington, A., Jablonowski, C., Lauritzen, P. H., and Yang, D. (2026), **ITCZ and the nontraditional Coriolis terms**, AMS 106th Annual Meeting 2026, 25th Conference on Atmospheric and Oceanic Fluid Dynamics, Houston, TX, USA, Jan. 25-29, 2026
- Hughes, O. K.**, H. Ong, P. H. Lauritzen, O. Guba, M. A. Taylor, and C. Jablonowski (2025), **Examining the Contribution of Deep-Atmosphere Dynamical Cores to Mitigating Double ITCZ Bias in Aquaplanets**, AGU Annual Meeting, New Orleans, LA, USA, December 15-19, 2025
- H. Ong, **O. K. Hughes**, A. Herrington, C. Jablonowski, P. H. Lauritzen, and D. Yang (2025), **ITCZ and the nontraditional Coriolis terms**, AGU Annual Meeting, New Orleans, LA, USA, December 15-19, 2025
- Jablonowski, C., T. Andrews, **O. K. Hughes**, G. Limon, N. Androski, A. Johnson, A. Chen, N. Forcone, T. O'Brien, J. Elms, P. H. Lauritzen, A. Herrington, J. Truesdale, M. Taylor, P. Bosler, O. Guba, C. Zarzycki, D. Dazlich, and T. Bendall (2025), **Insights from the 2025 Dynamical Core Model Intercomparison Project (DCMIP-2025)**, 30th Annual CESM Workshop 2025, Boulder, CO, USA, June 9-11, 2025
- Hughes, O. K.**, C. Jablonowski, O. Guba, and M. A. Taylor (2025), **A prototype deep-atmosphere version of the HOMME (SE-NH) dynamical core**, 30th Annual CESM Workshop 2025, Boulder, CO, USA, June 9-11, 2025
- Jablonowski, C., **O. K. Hughes**, T. Andrews, and N. Androski (2025), New Idealized Test Cases for the Dynamical Cores of General Circulation Models, Partial Differential Equations on the Sphere Workshop, São Paulo, Brazil, May 12-16, 2025
- Hughes, Owen K.**, Jablonowski, Christiane, Taylor, Mark A., and Guba, Oksana. A novel deep-atmosphere variant of the HOMME dynamical core for the E3SM climate model. Partial Differential Equations on the Sphere, São Paulo, Brazil. May 12-16, 2025
- Hughes, Owen K.**, Jablonowski, Christiane, Taylor, Mark A., and Guba, Oksana. 2024. **A novel deep-atmosphere variant of the HOMME dynamical core for the E3SM climate model**. American Geophysical Union Annual Meeting, Washington D.C., U.S.A, December 9-13, 2024
- Schwartz, E, **Hughes, O. K.**, May, T., Muccio, D., and Liemohn, M. W. **Justice-Based Education within Climate and Space Sciences**. American Geophysical Union Annual Meeting, Washington D.C., U.S.A, December 9-13, 2024
- Guba, O., **O. K. Hughes**, C. Jablonowski, and M. A. Taylor (2024), **Deep atmosphere formulation of HOMME**, DoE EESM PI meeting, Rockville, MD, USA, August 6-9, 2024
- Hughes, O. K.**, C. Jablonowski, O. Guba, and M. A. Taylor (2024), **Results of idealized test cases from a deep-atmosphere variant of the HOMME dynamical core**, DoE EESM PI meeting, Rockville, MD, USA, August 6-9, 2024
- Hughes, O. K.**, C. Jablonowski, O. Guba, and M. A. Taylor (2024), **A conservative deep-atmosphere configuration for the HOMME dynamical core**, 29th Annual CESM Workshop 2024, Boulder, CO, USA, June 10-12, 2024
- Jablonowski, C., **O. K. Hughes**, G. Danabasoglu, P. H. Lauritzen, B. Medeiros, T. Hauser, F. Judt, P. Chang, R. Saravanan, O. Guba, and M. A. Taylor (2024), **Upcoming Innovations for CAM's Spectral Element Dynamical Core and CESM: Non-hydrostatic and Deep-Atmosphere Modeling**, CESM Atmosphere Model Working Group (AMWG) Meeting, Boulder, CO, USA, February 12-14, 2024
- Jablonowski, C., J. Hollowed, L. Nguyen, **O. K. Hughes**, T. Ehrmann, B. Wagman, and B. Hillman (2023), **A Closer Look at E3SM's Stratosphere: Circulation Biases, Transport, Tracers**, DoE CLDERA All-Hands Meeting, Albuquerque, NM, USA, Oct 17-19, 2023
- Hughes, O. K.**, C. Jablonowski, O. Guba, and M. Taylor (2023), **A Prototype Deep-Atmosphere Configuration of HOMME: Design and First Results**, E3SM All-Hands Meeting, Denver, CO, USA, June 26-28, 2023
- Hughes, Owen K.**, Jablonowski, Christiane, Taylor, Mark A., and Guba, Oksana. **Test Results from the Deep-atmosphere Configuration of the HOMME Dynamical Core**. Oral presentation: Partial Differential Equations on the Sphere, Grenoble, France. July 3-7, 2023.
- Jablonowski, C., O. K. Hughes, G. Limon (2023), **Causes and Effects of Dissipation in Dynamical Cores**, PDEs on the Sphere Workshop, Grenoble, France, July 3-7, 2023
- Hughes, O. K.**, C. Jablonowski, O. Guba, and M. Taylor (2023), **A conservative deep-atmosphere configuration for the HOMME dynamical core**, CESM Workshop 2023, Boulder, CO, USA, June 12-14, 2023
- Jablonowski, C. and **O. K. Hughes**, **Assessing the interaction between dissipation and physical processes in FV3-based GCMs via idealized test cases**, Workshop on Physics-Dynamics Coupling (PDC) in Weather & Climate Models, Princeton, NJ, USA, June 1-3, 2022

Jablonowski, Christiane and **O. K. Hughes**, Numerical **Characteristics of CAM's FV3 dynamical core**, CESM Atmosphere Model Working Group (AMWG) Meeting, Boulder, CO, USA, virtual, Feb. 7-10, 2022

Hughes, Owen K., Jablonowski, Christiane. **Extending the Dynamical Core Test Case Hierarchy: Moist Baroclinic Waves with Topography**. Partial Differential Equations on the Sphere, Offenbach, Germany [online]. May 17-21, 2021.

Jablonowski, Christiane, **Hughes, Owen K.** 2021. **Insights into the Physical and Numerical Impact of Topographic Barriers on the Atmospheric Circulation**. Partial Differential Equations on the Sphere, Offenbach, Germany [online]. May 17-21, 2021.

Jablonowski, Christiane and **Hughes, Owen K.**, **Extending the Dynamical Core Test Case Hierarchy: Moist Baroclinic Waves with Topography**, CESM Atmosphere Model Working Group (AMWG) Meeting, Boulder, CO, USA, virtual, Feb. 8-12, 2021

Hughes, Owen K., Jacobs, Henry O., Johnson-Roberson, Matthew, Vasudevan, Ram. **Real-Time Certified Probabilistic Pedestrian Forecasting**. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Vancouver, B.C., Canada. September 24–28, 2017

Awards, Fellowships, & Grants

2025	Graduate Visitor Program Fellowship , National Center for Atmospheric Research	<5% acceptance rate
2022	NSF Graduate Research Fellowship Program, Honorable Mention Award , National Science Foundation	
2019	Cold Spring Harbor Laboratory Undergraduate Research Program , Cold Spring Harbor Laboratory	<3% acceptance rate

Teaching Experience

Fall 2021	MATH 463, Mathematical Biology , Teaching Assistant	University of Michigan
Fall 2019, 2020	MATH 568, Mathematical Neuroscience , Grader	University of Michigan

Outreach & Professional Development

SERVICE AND OUTREACH

- June 2-6,
2025

**Dynamical Core Model Intercomparison Project (DCMIP) Summer School:
Non-Hydrostatic Weather and Climate Models and Machine Learning Emulators,**
Co-organizer, lecturer, mentor
- 2023-2025

Departmental Social Justice Journal Club, Curriculum development and co-organizer
- 2021

Michigan Math and Science Scholars , Teaching assistant

*National
Center for
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Research,
Boulder, CO,
USA
Department
of Climate
and Space
Science and
Engineering,
University of
Michigan
Department
of
Mathematics,
University of
Michigan*

PROFESSIONAL SOCIETIES

- 2024-

American Geophysical Union, Member
- 2017-2018

IEEE Robotics and Automation Society, Member