Joseph Hollowed
University of Michigan
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CV of Joseph Hollowed

EDUCATION

University of Michigan: Ann Arbor MI
Attended September 2019 – May 2025
PhD in Physics awarded May 2025
Dissertation Defense completed January 2025

DePaul University: Chicago IL
Attended September 2013 – August 2017
B.S. in Physics; ***Minor in Computer Science*** awarded August 2017

RESEARCH EXPERIENCE

University of Michigan Physics & Climate and Space Sciences Departments
Postdoctoral Researcher, October 2025–Present
University of Michigan
- Research related to the role of atmospheric transport in carbon flux inversion estimates

University of Michigan Physics & Climate and Space Sciences Departments
Postdoctoral Researcher, May 2025–October 2025
University of Michigan
- Wrote and published dissertation research related to volcanic perturbation of stratospheric dynamics
- Research related to validation of new treatments of thermodynamics and moist processes in the DOE E3SM coupled climate model

Climate Systems Group
Research Intern, May 2023–August 2023
Sandia National Laboratories
- Worked on implementation of passive tracers species in the DOE E3SM coupled climate model, designed for assessment of the general circulation of the stratosphere

University of Michigan Physics & Climate and Space Sciences Departments
Graduate Student, January 2021–May 2025
University of Michigan
- Research related to stratospheric dynamics, global transport of trace gasses, and perturbations to the

general circulation of the Earth by stratospheric aerosols
- Work on modeling subgrid physics related to volcanic aerosol injections of the stratosphere and aerosol radiative forcing in the DOE E3SM coupled climate model

University of Michigan Physics Department
Graduate Student, September 2019–January 2021
University of Michigan
- Worked on weak-lensing simulation support for galaxy-cluster cosmology, developing a software package for the generation of synthetic weak-lensing signals from sets of simulated galaxy cluster observations

Cosmological Physics and Advanced Computing Group
Argonne Associate, September 2017–July 2019
Argonne National Laboratory
- Contributed to development of cosmological simulation components and processing tools
- Contributed to generation and validation of synthetic galaxy catalogs
- Worked on weak-lensing simulation support for galaxy-cluster cosmology

Cosmological Physics and Advanced Computing Group
Research Aide, June 2016–September 2016; December 2016–September 2017
Argonne National Laboratory
- Performed analysis of South Pole Telescope data against simulated analogues, working toward probes of cosmology using galaxy cluster velocity-dispersion observables

X-Ray Science Microscopy Group
Research Aide, June 2015–September 2015; December 2015
Argonne National Laboratory
- Developed image segmentation software for use with X-Ray fluorescence microscopy data

DePaul AstroPhysics Working Group
Research Member, March 2015 – June 2015
DePaul University Physics Department
- Founded the Working Group with a small team of students and faculty
- Worked on exoplanet detection/confirmation via Kepler Space Telescope data

PUBLICATIONS

Submitted Journal Papers

Hollowed, J., Jablonowski, C., Ehrmann, T., Bull, D., Wagman, B., & Hillman, B. (submission 2025). **Volcanic Aerosol Modification of the Stratospheric Circulation in E3SMv2 Part II: Brewer-Dobson Circulation**. *Atmospheric Chemistry and Physics [preprint].* https://doi.org/10.5194/egusphere-2025-4598

Refereed Journal Papers

Hollowed, J., Jablonowski, C., Ehrmann, T., Bull, D., Wagman, B., & Hillman, B. (2025). **Volcanic Aerosol Modification of the Stratospheric Circulation in E3SMv2 Part I: Wave–Mean Flow Interaction**. *Atmos. Chem. Phys.,* 25, 11025–11049, https://doi.org/10.5194/acp-25-11025-2025, 2025.

Hollowed, J., Jablonowski, C., Brown, H., Hillman, B., Bull, D., & Hart, J. (2024). **HSW-V v1.0: localized injections of interactive volcanic aerosols and their climate impacts in a simple general circulation model**. *Geoscientific Model Development.* 17. 15. 10.5194/gmd-17-5913-2024

Korytov, D., Rangel, E., Bleem, L., Frontier, N., Habib, S., Heitmann, K., **Hollowed, J.**, & Pope, A. (2023). **Modeling the Galaxy Distribution in Clusters using Halo Cores**. *The Open Journal of Astrophysics.* 6. 24. 10.21105/astro.2302.04194

LSST Dark Energy Science Collaboration. (2021). **The LSST DESC DC2 Simulated Sky Survey**. *The Astrophysical Journal Supplement Series*. 253. 31. 10.3847/1538-4365/abd62c

Korytov, D., Hearin, A., Kovacs, E., Larsen, P., Rangel, E., **Hollowed, J.**, ... & Chang, C. (2019). **CosmoDC2: A Synthetic Sky Catalog for Dark Energy Science with LSST**. *The Astrophysical Journal Supplement Series.* 245. 26. 10.3847/1538-4365/ab510c

Heitmann, K., Uram, T., Finkel, H., Frontiere, N. Habib, S., Pope, A., Rangel, E., **Hollowed, J.**, Korytov, D., Larsen, P., ... & Foster, I. (2019). **HACC Cosmological Simulations: First Data Release.** *The Astrophysical Journal Supplement Series.* 244. 17. 10.3847/1538-4365/ab3724

Technical Reports

Ehrmann, T., Wagman, B., Bull, D., Hillman, B., **Hollowed, J.,** Brown, H., Peterson, K., Swiler, L., Watkins, J. & Hart, J. (2024). **Identifying Northern Hemisphere Stratospheric and Surface Temperature Responses to the Mt. Pinatubo Eruption within E3SMv2-SPA**. *Sandia Report. SAND2024-12730. Sandia National Laboratories.* 10.2172/2462901

Bull, D., Peterson, K., Shand, L., Swiler, L., Tezaur, I., ... **Hollowed, J.,** ... (2024**). CLimate Impact: Determining Etiology thRough pAthways (CLDERA)**. *Sandia Report. SAND2024-13423R. Sandia National Laboratories.* 10.2172/2480139

LSST Dark Energy Science Collaboration. (2021). **DESC DC2 Data Release Note**. *arXiv preprint. arXiv:2101.04855*

Hollowed, J. (2019). **Lightcone Construction for HACC Cosmological Simulations with LANTERN**. *arXiv e-prints*. arXiv:1906.08355

Doctoral Dissertation

Hollowed, J. (2025). **Modifications of Stratospheric Dynamics and Circulation by Volcanic Eruptions**, Doctoral Dissertation, University of Michigan, Ann Arbor, March 2025

Candidacy Prospectus

Hollowed, J. (2022). **A Simplified Sub-grid Parameterization for Volcanic Aerosol Injections of the Stratosphere in E3SMv2 in Support of the DOE CLDERA Project**, Candidacy Prospectus, University of Michigan, Ann Arbor, July 2022

PRESENTATIONS

How Volcanic Eruptions Modify the Earth's Climate (1/10/25)
Ph.D. Dissertation Defense, *University of Michigan, Ann Arbor, MI*

Quantifying Global Atmospheric Circulation Changes in Response to Stratospheric Volcanic Aerosols (8/1/24)
Sandia FROCEE Summer Research Symposium**,** *Virtual*

Dynamically Identifying Circulation Changes by Volcanic SAIs with the E90 Passive Tracer (10/16/23)
DOE CLDERA All-Hands Meeting**,** *Sandia National Laboratories, Albuquerque NM*

Atmospheric Forcing by Volcanic Aerosols Identified by Dynamic Tracer Constituents (8/3/23)
Sandia FROCEE Summer Research Symposium**,** *Virtual*

Simulating the Climate Forcing of Volcanic Aerosols with a Simplified Interactive Model (4/2/23 and 12/5/23)
European Geosciences Union General Assembly 2023 (poster)**,** *Austria Center Vienna, Vienna, Austria*
American Geophysical Union Fall Meeting 2023 (poster)**,** *Mascone Center, San Francisco, CA*

A Simple Model of Volcanic Aerosol Forcing Against an Idealized Climatological Background in Support of the DOE CLDERA Project (12/12/22)
American Geophysical Union Fall Meeting 2022**,** *McCormick Place Convention Center, Chicago IL*

CLDERA Tiered Verification: HSW++ Idealized Volcanic Aerosol Forcing (7/7/22 and 7/27/22)
Preliminary Exam**,** *University of Michigan, Ann Arbor MI*
DOE CLDERA All-Hands Meeting**,** *Sandia National Laboratories, Albuquerque NM*

Mt. Pinatubo-Inspired Idealized Climate Data Sets with Embedded Pathways (5/16/22)
DOE CLDERA All-Hands Meeting, *Virtual*

Modeling Systematics in Galaxy Cluster Mass Estimation (5/21/19)
Young Scientist Symposium Series, *Argonne National Laboratory, Lemont IL*

Cluster Weak Lensing Simulations (2/26/19)
LSST Dark Energy Science Collaboration Meeting, *University of California, Berkeley, Berkeley CA*

Simulation Calibration of Cluster WL Mass Measurements (6/25/18 and 7/26/18)
South Pole Telescope Cluster Face to Face*, University of Chicago, Chicago, IL and*
LSST Dark Energy Science Collaboration Meeting, *Carnegie Mellon University, Pittsburgh, PA*

Validation of Synthetic Sky Catalogs (11/7/2017 and 11/14/2017)
American Physical Society Prairie Session Fall Meeting*, University of Illinois at Chicago, Chicago IL*
Young Scientist Symposium Series, *Argonne National Laboratory, Lemont IL*

Cluster Cosmology from Velocity Dispersions (8/31/2016 and 11/4/2016)
Internal Group Presentation, *Argonne National Laboratory, Lemont IL*
DePaul Undergraduate Science Showcase, *DePaul University, Chicago IL*

Image Segmentation of X-Ray Fluorescence Data (9/4/2015 and 11/6/2015)
Internal Group Presentation, *Argonne National Laboratory, Lemont IL*
DePaul Undergraduate Science Showcase (poster), *DePaul University, Chicago IL*

FELLOWSHIPS

Michigan Institute for Computational Discovery and Engineering Fellowship: Awarded Spring 2018
DePaul Dean's Undergraduate Fellowship: Summer 2015

AWARDS AND HONORS

National Science Foundation Graduate Research Fellowship Program Honorable Mention: Fall 2019
Argonne High Energy Physics Pacesetters Award: Summer 2018
Physics Student of the Year/Most Outstanding Graduating Senior in Physics Award: Spring 2017
DePaul University graduating honors: *magna cum laude:* Spring 2017
DePaul College of Science and Health Dean's List: All quarters of attendance
DePaul College of Computing and Digital Media Dean's List: All quarters of attendance
Dean's Scholarship of $11,000 per year at DePaul University: 2013-2017

PROFESSIONAL MEMBERSHIP

American Geophysical Union Member (AGU)
European Geosciences Union Member (EGU)
American Physical Society Member (APS)

TEACHING

Physics & Astronomy:
Electromagnetism, Optics, and Radiation (Laboratory); Fall 2019 (UM), undergraduate course
Electromagnetism, Optics, and Radiation (Laboratory); Winter 2020 (UM), undergraduate course
Introduction to Astrobiology; Fall 2020 (UM), undergraduate course
Alien Skies: A Tour Through the Universe; Fall 2020 (UM), undergraduate course

Climate & Earth Science:
Atmospheric Dynamics I; Winter 2025 (UM), graduate course (grader)
Geophysical Fluid Dynamics; Fall 2023 (UM), undergraduate course (grader)
Earth and Space System Dynamics; Winter 2023 (UM), undergraduate course (grader)
Climate & Climate Change; Winter 2021 (UM), undergraduate course