

TOBI HAMMOND

Ph.D. Student || Lafayette, IN || tobih12@purdue.edu

Research Interests: Exoplanet Climate, Long-term Habitability, Surface Geology

EDUCATION

Ph.D., Planetary Science September 2024 – Present
Purdue University, Department of Earth, Atmospheric, and Planetary Science
Advisor: Stephanie Olson

B.S. Astronomy, Minor in Planetary Science September 2020 - December 2023
University of Maryland, Department of Astronomy
Graduated with Departmental Honors

AWARDS

NASA FINESST Fellowship January 2026

Maryland Space Grant Scholarship May 2021 – December 2023

Deans List, 5 Semesters September 2020 – December 2023

Presidential Academic Scholarship August 2020 – December 2023

Alyce Tucceri Community Service Award June 2020

Eva J. Barnfather – Community Harvest Scholarship June 2020

RESEARCH EXPERIENCE

Ph.D. Student August 2024 – Present
Advisor: Dr. Stephanie Olson
Purdue University

- ☆ Investigating the habitability of M-dwarf exoplanets with various continent configurations using ExoPlaSim simulations to analyze planetary atmospheres and surface conditions.

Post-Baccalaureate Researcher January 2024 – July 2024
Advisor: Dr. Ravi Kopparapu, Dr. Avi Mandell
NASA Goddard Space Flight Center

- ☆ Led research to assess the detectability of emission spectra from nearby, non-transiting exoplanets which resulted in a first author paper.
- ☆ Simulated 21 3D exoplanet atmospheres using ExoCAM and post-processed them using the Planetary Spectrum Generator to generate emission spectra.

Undergraduate Researcher June 2023 – September 2023
Advisors: Dr. Tad Komacek, Dr. Dan Chavas
University of Maryland

- ☆ Simulated 12 high- and low-resolution 3D atmospheric simulations using ExoCAM to investigate the dynamics of hurricane formation in exoplanet atmospheres.

Honors Undergraduate Researcher

October 2021 – December 2023

Advisor: Dr. Tad Komacek

University of Maryland

- ☆ Led research on TRAPPIST-1e’s climate dynamics to analyze the effects of atmospheric composition and obliquity using 3D ExoCAM models. Work resulted in a first author paper.
- ☆ Ran 20 low resolution 3d models in ExoCAM. Developed code to post process output using the Python package Iris.

Analyzing Magnitude Conversion Systems

December 2022 – June 2023

Advisor: Dr. Melissa Hayes-Gehrke

University of Maryland

- ☆ Developed code to extract and analyze stellar magnitude data from various databases. Converted between the Zwicky Transient Facility and Sloan Digital Sky Survey magnitude systems.
- ☆ Investigated the period-luminosity relationship of Classical Cepheid Stars in various databases.

FIRE: Simulating Particle Detection

September 2020 – December 2021

Professor: Dr. Muge Karagoz

University of Maryland

- ☆ Collaborated on a two-semester research project investigating the performance of CMS’s high granularity calorimeter using simulated data. Resulted in a symposium poster presentation in November 2021.

IceCUBE Research Group

November 2020 – June 2021

Advisor: Dr. Michael Larson

University of Maryland

- ☆ Developed code to approximate the density of the Earth’s core from simulated atmospheric neutrino data.

PUBLICATIONS

- [3] **Hammond T.**, Komacek T. D., Kopparapu R. K., Fauchez T. J., Mandell A. M., Wolf E. T., Kofman V., Kane S. R., Johnson T. M., Desai A., Arney G., Crouse J. S. (2025) “The climates and thermal emission spectra of prime nearby temperate rocky exoplanet targets.” *The Astrophysical Journal*, 984(2), 181.
- [2] Johnson T. M., Kelahan C., Mandell A. M., Dhahbi A., **Hammond T.**, Barclay T., Kostov V. B., Villanueva G. (2025) “The VSPEC Collection: A suite of utilities to model spectroscopic phase curves of 3D exoplanet atmospheres in the presence of stellar variability.” *Astronomy and Computing*, 50.
- [1] **Hammond T.**, Komacek T. D. (2024) “The Coupled Impacts of Atmospheric Composition and Obliquity on the Climate Dynamics of TRAPPIST-1e.” *The Astrophysical Journal*, 968(1), 43.

PRESENTATIONS

- [11] **Hammond T.**, Olson S. (2026) Influence of Land Distribution on the Climate of Synchronously Rotating M-Dwarf Exoplanets, *AbSciCon 2026 Conference*, Wisconsin, USA. (**Oral Presentation**)
- [10] **Hammond T.**, Olson S. (2025) Geologic Factors Influencing Long-term Habitability on M-Dwarf Exoplanets, *AGU Fall 2025 Conference*, Louisiana, USA. (**Poster Presentation**)
- [9] **Hammond T.**, Olson S. (2025) Geologic Factors Influencing Long-term Habitability on M-Dwarf Exoplanets, *Goldschmidt 2025 Conference*, Prague, Czech Republic. (**Poster Presentation**)
- [8] Anmol D., **Hammond T.**, Johnson T., Mandell A., Kopparapu R., Wolf E. T., Komacek T. D. (2025) Investigating Mission and Instrument Requirements for Studying M-Earths in the Mid Infrared, *AAS 245th Meeting*, Washington D.C., USA (**Poster Presentation**)
- [7] Komacek T. D., **Hammond T.**, Kopparapu R., Mandell A., Wolf E. T., Kofman V., Fauchez T., Arney G. N., Crouse J., Kane S. (2024) Simulating the climates and thermal emission of prime nearby temperate rocky exoplanet candidates, *AGU Fall Meeting 2024*, Maryland, USA. (**Poster Presentation**)
- [6] Smith C., **Hammond T.**, Komacek T. D., Chavas D. R. (2024) Tracking tropical cyclones in high-resolution GCM simulations of TRAPPIST-1e: Dependence on atmospheric CO₂, *AGU Fall Meeting 2024*, Maryland, USA. (**Poster Presentation**)
- [5] **Hammond T.**, Kopparapu R. K., Komacek T. D., Mandell A. M., Kofman V., Wolf E. T., Johnson T. M. (2024) Modeling emission spectra of non-transiting rocky exoplanets, *The Consortium on Habitability and Atmospheres of M-dwarf Planets (CHAMPs)*. (**Oral Presentation, Seminar**)
- [4] **Hammond T.**, Kopparapu R. K., Komacek T. D., Mandell A. M., Kofman V. (2024) Modeling emission spectra of non-transiting rocky exoplanets, *SEEC Symposium: Pathways to Characterizing Non-Transiting Planets*, Maryland, USA. (**Poster Presentation**)
- [3] **Hammond T.**, Komacek T. D. (2024) Varying the Obliquity and Atmospheric Composition of TRAPPIST-1e, *AAS 223rd meeting*, Louisiana, USA. (**Oral Presentation**)
- [2] **Hammond T.**, Komacek T. D. (2022) The Coupled Impacts of Atmospheric Composition and Obliquity on the Climate Dynamics of TRAPPIST-1e, *American Geophysical Union Fall Meeting*, Illinois, USA. (**Poster Presentation**)
- [1] **Hammond T.**, Kalepu S., Pacheco M., Guillen A. (2021) Investigating the CMS muon detector output, *The FIRE Summit, University of Maryland*, Maryland, USA. (**Poster Presentation**)

UNIVERSITY OF MARYLAND TEACHING EXPERIENCE

ASTR 101 FC: Introduction to Astronomy

Fall Sem. 2023

☆ Independently led a two hour weekly introductory astronomy lab class for 12 students.

Astronomy Dept. Tutor Fall Sem. 2021 - Spring Sem. 2023

- ☆ Held one-hour weekly open tutoring sessions for students in any of the introductory astronomy courses; average 3 students per session.

ASTR 330: Solar System Astronomy Spring Sem. 2023

- ☆ Graded and held office hours for an elective astronomy class on the exploration of the solar system.

ASTR 100 FC: Introduction to Astronomy Fall Sem. 2022

- ☆ Co-led a weekly lecture and discussion introductory astronomy session for up to 28 students.

ASTR 100 FC: Introduction to Astronomy Fall Sem. 2022

- ☆ Co-led a weekly lecture and discussion introductory astronomy session for up to 28 students.

ASTR 120: Introductory Astrophysics I Fall Sem. 2021

- ☆ Assisted TA in answering student questions during discussion sessions.

LEADERSHIP AND OUTREACH

Early Career Convener, AbSciCon 2026 Conference May 2026

- ☆ Session Title: Climates of Potentially Habitable Rocky Exoplanets

Letters to a Pre-Scientist September 2025 – May 2026

- ☆ Acted as a STEM pen pal to a middle school student for the 2025-26 academic year.

Session Co-Organizer, Goldschmidt 2025 Conference July 2025

- ☆ Session Title: Chemistry and Climate of Exoplanets

Treasurer, Cooperative Housing University of Maryland August 2021 – August 2024

- ☆ Managed the accounts and distribution of money for expenses. Responsible for ensuring taxes and non-profit documentation was up to date.

Secretary, AstroTerps January 2021 – December 2023

- ☆ Organized undergraduate research informational panel for Astronomy students.

Organizer, Space Summit DC September 2023

- ☆ Helped to organize and facilitate event; <https://www.spacesummitdc.org/>

NASA Proposal Writing & Evaluation Academy June 2023 – September 2023

- ☆ 12 week interactive academy on writing and scoring NASA proposals

SKILLS

☆ **Software:** Python (Iris, Xarray, AstroPy), MatLab, FORTRAN

☆ **Platforms:** Windows, MacOS, Unix, HPC/Slurm, Google Cloud

☆ **Tools:** Jupyter Notebook, LaTeX (Overleaf), Git