HUNTER VANNIER

hvannier@purdue.edu

EDUCATION

Purdue University, West Lafayette, IN — August 2025
Doctor of Philosophy, Major: Planetary Science, GPA: 4.0
From Lab to Orbit: Spectral Analyses of Igneous Rocks and their Implications for Martian and Lunar Surface Compositions

Wesleyan University, Middletown, CT — May 2020
Bachelor of Arts (High Honors), Major: Astronomy, Minor: Planetary Science, GPA: 3.54
Mapping the Local Interstellar Medium: Using Hubble to Look Back at the ISM Along the Sun's Historical Trajectory

RESEARCH EXPERIENCE

Postdoctoral Researcher, Purdue University — Sept 2025-Feb 2026
Department of Earth, Atmospheric, and Planetary Sciences, Advisor: Briony Horgan, PhD

- Manage laboratory NIR/VSWIR laboratory and field instruments to analyze mineralogy of igneous rocks and contextualize remotely sensed planetary data.

Graduate Research Assistant, Purdue University — Aug 2020-Aug 2025
Department of Earth, Atmospheric, and Planetary Sciences, Advisor: Briony Horgan, PhD
Thesis defense completed on June 5, 2025
Thesis deposited and accepted on July 21, 2025

- Use VIS/NIR data from the *Moon Mineralogy Mapper* spacecraft to create mineralogical maps of volcanic features on the surface of the Moon to constrain their nature and composition.
- Use laboratory VNIR and TIR instruments to analyze mineralogy of igneous rocks and contextualize remotely sensed planetary data.
- Extensive experience using handheld instrumentation (VNIR, XRF) in planetary analog settings including Iceland, Canary Islands, Hawaii, and Arizona.

Undergraduate Research Assistant, Wesleyan University — July 2017-Aug 2020
Department of Astronomy, Advisor: Seth Redfield, PhD

- Used high resolution UV data from *Hubble Space Telescope* to reconstruct the morphology of the local interstellar medium
- Fit interstellar absorption features in stellar spectra using IDL programming language to characterize the galactic environment surrounding our solar system.

Undergraduate Researcher, Wesleyan University, University of Bridgeport — April 2017-February 2020
Department of Astronomy, Advisor: Seth Redfield, PhD
School of Engineering, Advisor: Jani Pallis, PhD

- Co-lead a project that aimed to build, design, and launch a high altitude payload which is funded through NASA and CT Space Grant Consortium.
- Presented multiple stages of design reviews to a NASA advisory board in order to attain continued funding

Undergraduate Research Assistant, Wesleyan University — May 2018-August 2020
College of the Environment, Advisor: Helen Poulos, PhD

- Conducted fire ecology fieldwork/research in the Chiricahua National Monument to measure agave mortality in response to wildfire and controlled burns

RELEVANT EXPERIENCE

Commander, Crew Geologist, Analog Astronaut Simulation December 2023, 2024
Mars Desert Research Station (MDRS), Utah

- Led a multidisciplinary analog astronaut crew in a simulated Mars mission environment, directing pre-mission planning, overseeing daily mission operations, field operations, and resource management.
- Managed scheduling of extravehicular activities (EVAs), laboratory work, and team communications with MDRS Mission Support, maintaining adherence to strict operational protocols.

Documentarian, NASA SPARX Science Definition Team (SDT) January 2025-present
NASA South PoleAitken Basin Sample Return & Exploration (SPARX) Mission

- Collaborate with a 17-member interdisciplinary team to define high-priority science goals, implementation strategies, and mission architecture for a proposed lunar sample return mission from the Moons South PoleAitken Basin.

PUBLICATIONS

H. Vannier, B. Horgan, R. Greenberger, M. Eddy, M. Phillips, A. Udry (2026). Assessing plagioclase feldspar detectability limits in whole-rock VNIR spectra with application to Mars (*submitted to JGR: Planets*

H.V. Bhatt, T.D. Glotch, E.G. Rivera-Valentin, **H. Vannier**, H.A. Meyer (2025). Compositional and morphological variations of effusive lava flows and explosive pyroclastic deposits at the Gardner shield volcano on the Moon. *Journal of Geophysical Research: Planets*, 130, e2024JE008692. https://doi.org/10.1029/2024JE008692

L.C. Chaves, M.S. Thompson, C.A. Dukes, M.J. Loeffler, M.F. Martinez-Motta, **H. Vannier**, B.H.N. Horgan, N. Smith, K. Ardrey (2025). Experimental simulations of space weathering on pentlandite. Meteorit Planet Sci. https://doi.org/10.1111/maps.14371

Vannier H, Redfield S, Wood B E, Mueller H R, Linsky J L, Frisch P (2025). Mapping the Local Interstellar Medium: Using Hubble to Look Back at the ISM Along the Sun's Historical Trajectory. *The Astrophysical Journal*, 981, 2, doi:10.3847/1538-4357/adb033

Vannier H, Horgan, B., Stopar, J. D., Henderson, M. (2024). Constraining formation hypotheses for irregular mare patches on the Moon with orbital reflectance spectra. *JGR: Planets*, 129, e2023JE008108.

Wood B E, Mller H R, Redfield S, Konow F, **Vannier, H**, Linsky J, et al. (2021). New Observational Constraints on the Winds of M dwarf Stars. *The Astrophysical Journal*, 915, 37, doi:10.3847/1538-4357/abfda5.

Carleo I, Youngblood A, Redfield S, Barris N C, Ayres T R, **Vannier H,** et al. (2021). A Multi-wavelength Look at the GJ 9827 system: No Evidence of Extended Atmospheres in GJ 9827 b and d from HST and CARMENES data. *The Astronomical Journal*, 161, 3, doi:10.3847/1538-3881/abdb2f

PRESENTATIONS

56th Lunar and Planetary Science Conference, March, 2025
Oral presentation
Evaluating rock types on the Gruithuisen domes from laboratory measurements of silicic-mafic mixtures in a simulated lunar environment
10th International Conference on Mars, July 2024

Poster Presentation
Interpreting plagioclase detections in igneous rock spectra: felsic rocks and plagioclase-rich basalt are similar to Mars detections
11 first-author abstracts presented at professional conferences (2019-2025).

AWARDS AND HONORS

The Honor Society of Phi Kappa Phi — March 2022-Present
Awarded to top 10% across all Purdue graduate programs

Bernard Ray Hawke Next Lunar Generation Career Development Award — September 2025

NASA Indiana Space Grant Consortium Graduate Scholarship ($12,000) — May 2023

Goddard Instrument Field Team Proposal (Co-I) — July 2022, May 2023

Gerald H. Krockover Graduate Fellowship Award in K-12 Outreach — April 2021

Mobile Graduate Fellowship Award in Geologic Mapping — April 2021

NASA Connecticut Space Grant Consortium Undergraduate Research Grant ($5000) — November 2018

NASA Connecticut Space Grant Consortium Undergraduate Scholarship ($5000) — September 2017

Wesleyan College of the Environment Internship Program ($4000) — May-July 2018

Wesleyan Research in the Sciences Summer Fellowship ($4100) — May-July 2017, 2019

PROGRAMMING SKILLS

Proficient in IDL/ENVI; Experienced in Python, Davinci; Familiar with ArcGIS Pro, C, Matlab, Arduino, Mathematica, and R

EXTRA-CURRICULAR ACTIVITIES

Next Generation of Lunar Scientists and Engineers, Treasurer — May 2023-present

NASA Community College Network, Subject Matter Expert — January 2023-present

URGE Team Member, Purdue University — January 2021-August 2022
Meet bi-weekly with group of graduate students to collaborate on anti-racist policy and actionable items to implement in our geosciences department, improving diversity and inclusion in the geosciences.

GSA Treasurer, Purdue University — September 2020-August 2022
Manage spending and allocate funds for the Graduate Student Assembly (*2 hours/week*)

Varsity Ice Hockey, Wesleyan University — September 2016-March 2020
Participate in off-ice training, daily practices, weekend games and video sessions (*30 hours/week*)

REFERENCES

Briony Horgan, PhD
Associate Professor
Department of Earth, Atmospheric, and Planetary Sciences, Purdue University
bhorgan@purdue.edu
765-494-3258

Michelle Thompson, PhD
Associate Professor
Department of Earth, Atmospheric, and Planetary Sciences, Purdue University

mthompson@purdue.edu
765-494-8677

Seth Redfield, PhD
Associate Professor of Astronomy
Department of Astronomy, Wesleyan University
sredfield@wesleyan.edu
860-685-3669