Haleigh E. Nyberg

NSF Graduate Research Fellow • Zonta Amelia Earhart Fellow
Ph.D. Candidate, Department of Earth, Atmospheric, and Planetary Sciences
Purdue University

Note: Publications prior to 2025 may appear under Haleigh E. Brown.

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EDUCATION

Ph.D., Astrobiology Aug 2023 – May 2028
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences
Advisor: Dr. Stephanie Olson
Status: Ph.D. Candidate (ABD), advanced to candidacy April 2026
Dissertation Focus: Computational Modeling of Exoplanetary Habitability and the Origin of Life
Current GPA: 3.93/4.0

B.A., Computational Physics (Summa Cum Laude) Aug 2019 – May 2023
University of Montana Missoula, Department of Physics and Astronomy
Minors: Computer Science, Mathematics
Thesis: Advanced High-Altitude Balloon Trajectory Prediction
GPA: 3.91/4.0

ACADEMIC AWARDS AND FELLOWSHIPS

⋆ **Zonta Amelia Earhart Fellowship** 2026 – 2027
⋆ **National Science Foundation Graduate Research Fellowship** 2024 – 2029
⋆ **Indiana NASA Space Grant Consortium Travel Grant** (up to $1,500) 2025
⋆ **Ross Fellowship**, Purdue Planetary Sciences Department 2023 – 2024
⋆ **Dean's and President's List**, University of Montana 2019 – 2023
⋆ **Montana University System Honors Scholarship** (Full Tuition Coverage) 2019 – 2023
⋆ **Shallenberger Physics Scholarship**, University of Montana 2019, 2022
⋆ **John Pohl Musician's Scholarship**, University of Montana 2019
⋆ **Valedictorian**, Sentinel High School 2019
⋆ **Buddy DeFranco Improvisation Award** 2018

RESEARCH EXPERIENCE

Graduate Research Assistant Aug 2023 – Present
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences
Advisor: **Dr. Stephanie Olson**

- Run over 1,500 three-dimensional ExoPlaSim climate simulations across planetary obliquity, rotation rate, and stellar host to find which worlds sustain the wet-dry cycling that concentrates prebiotic chemistry toward an origin of life.
- Build pixel-wise machine learning models that predict ocean-current patterns from continental configuration, turning expensive circulation-model output into a fast surrogate for habitability screening.

Lead Data Science Researcher Jan 2025 – Present
Purdue University, The Data Mine
Corporate Partner: **Barrios Technology**

- Direct two 16-member, multi-university student teams as scrum master, building a dynamic Unreal Engine desktop and VR visualization tool for NASA's Lunar Gateway.

Machine Learning Researcher Aug 2024 – Dec 2024
Purdue University, The Data Mine
Corporate Partner: **John Deere**

– Built multivariate time-series forecasting models (ARIMA, LSTM) for John Deere demand planning, benchmarking methods to recommend a forecasting strategy they could put into production.

Undergraduate Research Intern and Peer Leader May 2021 – Aug 2022
NASA Montana Space Grant Consortium, University of Montana
Advisor: **Dr. Jennifer Fowler**

– Cut balloon-launch training costs by $283 per launch by adding dynamic drag-coefficient calculations to the trajectory-prediction software and rebuilding the campaign training procedure around it.

PUBLICATIONS

[2] Mingsuwan, C., Desano, L., Garcia, B., Agarwal, J., Ong, J., Sanchez, A., Xu, C., Cawthon, S., Lian, C., **Nyberg, H.E.** (2025). "Foundations of a Visualization Tool for NASA Gateway and Lunar Surface Operations." *The 6th Augmented, Virtual, and Mixed Realities (AR/VR) Workshop, IEEE Space Mission Challenges for Information Technology / Space Computing Conference (SMC-IT/SCC 2025).* (Accepted).

[1] **Brown, H.E.**, Capirala, A., Fifer, L. M., Laflèche, É. A., Nyberg, D., Payne, R., Sneed, E., Wong, M. L. (2025). "Strengthening Community Across Artists and Scientists in Astrobiology." *NASA DARES Request for Information.* (Accepted).

ABSTRACTS AND CONFERENCE PRESENTATIONS

[20] **Nyberg, H.E.**, Olson, S.L., Pearce, B.K.D., Bryant, R.N. (2026). Effects of Planetary Obliquity on Wet-Dry Cycles, Pond Organics, and Urability. *The Astrobiology Science Conference (AbSciCon) 2026*, Madison, WI, USA. 213-09. (**eLightning**)

[19] **Nyberg, H.E.**, Capirala, A., Fifer, L. M., Laflèche, É. A., Nyberg, D., Payne, R., Sneed, E., Wong, M. L. (2026). PALLAS: Strengthening Community Across Artists and Scientists. *The Astrobiology Science Conference (AbSciCon) 2026*, Madison, WI, USA. 325-369. (**Poster Presentation**)

[18] **Nyberg, H.E.**, Nyberg, D., Capirala, A., Fifer, L. M., Laflèche, É. A., Payne, R., Sneed, E., Wong, M. L. (2025). Planetary Obliquity and Origin of Life Potential in Warm Little Ponds: Earth and Beyond. *AGU Fall Meeting 2025*, New Orleans, LA, USA. (**Invited Speaker**)

[17] **Nyberg, H.E.**, Nyberg, D., Capirala, A., Fifer, L. M., Laflèche, É. A., Payne, R., Sneed, E., Wong, M. L. (2025). PALLAS: Bridging the Art-Science Divide for Enhanced Scientific Communication. *AGU Fall Meeting 2025*, New Orleans, LA, USA. (**Poster Presentation**)

[16] **Nyberg, H.E.**, Olson, S.L., Pearce, B.K.D., Bryant, R.N. (2025). Quantifying Planetary Origin of Life Potential: Connecting Global Climate to Local Wet Dry Cycling on Volcanic Islands. *Midwestern Geo-biology 2025 Conference*, West Lafayette, IN, USA. (**Oral Presentation**)

[15] Capirala, A., Fifer, L.M., Laflèche, É.A., Nyberg, D., **Nyberg, H.E.**, Payne, R.C., Sneed, E.L., Wong, M.L. (2025). PALLAS: Building a Network of Artists & Scientists. *Goldschmidt 2025 Conference*, Prague, Czech Republic.

[14] **Nyberg, H.E.**, Olson, S.L., Pearce, B.K.D., Bryant, R.N., Chavas, D.R. (2025). Planetary Obliquity Impacts Wet-Dry Cycling and the Potential for an Origin of Life in Warm Little Ponds. *Goldschmidt 2025 Conference*, Prague, Czech Republic. (**Oral Presentation**)

[13] Batra, K., Hammond, T., **Nyberg, H.E.** (2025). Climatic Impacts of Orbital and Surface Processes on Exoplanet Habitability. *Goldschmidt 2025 Conference*, Prague, Czech Republic.

[12] **Brown, H.E.**, Olson, S.L., Pearce, B.K.D., Chavas, D.R. (2024). Elucidating Planetary Scenarios That May Lead to an Origin of Life in Warm Little Ponds. *AGU Fall Meeting 2024*, Washington D.C., USA. P11D-3004. (**Poster Presentation**)

[11] Calatayud, S., Capirala, A., **Brown, H.E.**, Jernigan, J., Olson, S.L. (2024). Exploring the Effects of Diverse Continental Configurations on Climate and Habitability. *AGU Fall Meeting 2024*, Washington D.C., USA. P11D-2999.

[10] **Brown, H.E.**, Olson, S.L., Pearce, B.K.D., Bryant, R.N., Chavas, D.R. (2024). Planetary features of Earth-Like Exoplanets: Implications for an Origin of Life in Warm Little Ponds. *Exoplanets In*

Our Backyard III, New Haven, CT, USA. (**Poster Presentation**)

[9] **Brown, H.E.**, Olson, S.L., Pearce, B.K.D., Bryant, R.N., Chavas, D.R. (2024). Planetary Features and a Wet-Dry Cycling Origin of Life. *Astrobiology Graduate Conference (AbGradCon) 2024*, Ithaca, NY, USA. (**Oral Presentation**)

[8] Olson, S.L., Capirala, A., **Brown, H.E.** (2024). Continents Shape the Spatiotemporal Patterns of Marine Oxygen. *The Astrobiology Science Conference (AbSciCon) 2024*, Providence, RI, USA. 224-031.

[7] **Brown, H.E.**, Chavas, D.R., Pearce, B.K.D., Olson, S.L. (2024). Impacts of Planetary Obliquity on Wet-Dry Cycling: Early Earth and Beyond. *The Astrobiology Science Conference (AbSciCon) 2024*, Providence, RI, USA. 325-035. (**Poster Presentation**)

[6] Olson, S.L., Jernigan, J., Laflèche, É.A., **Brown, H.E.** (2024). Exploring Origin of Life Chemistry and Exoplanet Biosignatures with GCMs. *EGU General Assembly 2024*, Vienna, Austria. EGU24-14161.

[5] **Brown, H.E.** (2023). Balloon Trajectory Prediction: Improving Calculation-based Techniques. *Senior Seminar (PHSX 499), University of Montana Department of Physics and Astronomy*, Missoula, MT, USA. (**Oral Presentation**)

[4] **Brown, H.E.**, Jetton, S., Hovenkotter, R., Rugg, H., Spangrude, C. (2022). Improving Calculation-based Balloon Trajectory Prediction. *Montana Space Grant Consortium Summer Research Symposium, Missoula Public Library*, Missoula, MT, USA. (**Seminar**)

[3] Jetton, S., **Brown, H.E.**, Hovenkotter, R., Rugg, H., Spangrude, C. (2022). Balloon Trajectory Prediction: Improving Calculation-based Techniques. *AGU Fall Meeting 2022*, Chicago, IL, USA. P55D-1604. (**Poster Presentation**)

[2] **Brown, H.E.**, Jetton, S., Hovenkotter, R., Rugg, H., Spangrude, C. (2021). Eclipse Campaign Simulation: Affordable Radiosonde Launches Using the Phantom 4. *Montana Space Grant Consortium Summer Research Symposium, Missoula Public Library*, Missoula, MT, USA. (**Seminar**)

[1] **Brown, H.E.**, Reece, K., Spangrude, C., Covitt, B., Bernards, M., Fowler, J. (2021). Radiosonde Eclipse Campaign Education: Increasing Accessibility Through Adaptability and Affordability. *AGU Fall Meeting 2021*, New Orleans, LA, USA. ED15E-0558. (**Poster Presentation**)

TEACHING AND MENTORING EXPERIENCE

Graduate Mentor, Amelia Earhart Leadership for Space Careers Aug 2024 – Aug 2025
Purdue University, Honors College

- Facilitate discussions between senior space-industry professionals and undergraduate students on women's leadership in space exploration and science, both remotely and in person through visits to NASA sites including Johnson Space Center.

Fellowship Writing Coach Aug 2024 – Present
Purdue University, Office of Graduate Student Professional Success Fellowships Office

- Coach graduate and postdoctoral researchers across disciplines in securing fellowship funding (NSF GRFP, NDSEG, NIH F31/F32, Hertz, Ford Foundation), advising more than 40 applicants one-on-one on application strategy and grant writing.
- Advisees include a 2026 NSF Graduate Research Fellowship recipient, along with nominees for the Apple Scholars and Google PhD Fellowship programs.
- Trained and onboarded an incoming fellowship writing coach, shadowing her first review sessions to expand the program's coaching capacity.

Invited Funding Workshop Facilitator Aug 2024 – Present
Purdue University, Graduate School

- Designed more than a dozen distinct fellowship and funding workshops, including a three-part NSF GRFP series alongside dedicated NDSEG, NIH, SROP, Bridge, and computational-sciences funding sessions, and delivered them more than 80 times across six Purdue trainee and fellowship programs since 2024.

Research Mentor for Silene Calatayud (Undergraduate) Jan 2024 – Present
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences

– Mentor in astrobiology research methodologies, co-authoring an AGU 2024 abstract with my mentee.

Physics Lab Teacher (PHSX 205N, PHSX 206N) Jan 2022 – Jan 2023
University of Montana, Department of Physics and Astronomy

– Independently instructed introductory physics lab sessions (College Physics I and II) for up to 24 undergraduate students per session.

LEADERSHIP AND SERVICE

Session Co-convener, Goldschmidt 2026 Conference Jul 2026
Session Title: *Chemistry and Climate of Exoplanets*

Peer Reviewer, Planetary Science Journal (AAS) Apr 2026 – Present

Application Reviewer, Google PhD Fellowship Program 2025, 2026
Purdue nominee selection, reviewing alongside faculty panelists.

Application Reviewer, Purdue Graduate Grant Competitions 2026
A.H. Ismail Interdisciplinary Graduate Grant and Frederick N. Andrews Environmental Travel Grant.

Reviewer, Purdue Postdoctoral Travel Award 2025
Scored applicant submissions across two funding cycles.

Founding Treasurer, Purdue Golden Z Club Aug 2025 – Present
Co-founded Purdue's chapter of Zonta International's student service organization.
Co-organized the Zonta Says NO! to Violence Against Women awareness walk (Nov 2025).

Session Co-organizer, Goldschmidt 2025 Conference Jul 2025
Session Title: *Chemistry and Climate of Exoplanets*

Executive Secretary, NASA Exoplanets Research Program (XRP) Review Panel 2026
Coordinated panel logistics and review synthesis (Panel Week 3).

Panel Reviewer, NASA Habitable Worlds Program 2024, 2025
Served as a prime reviewer in 2024.

Co-Founder / Website Developer, PALLAS May 2024 – Present
PortAL Linking Artists and Scientists. pallas.gallery

– Designed and built the organization's website and visual identity.
– Helped secure an AAS Education and Professional Development mini-grant for a two-speaker pilot program (2025).
– Co-organized "Envisioning Joint Futures in Art and Astronomy" (Apr 2026) and the AbSciCon 2026 Art and Science Mixer (May 2026).

PROFESSIONAL MEMBERSHIPS

Student Member, American Geophysical Union (AGU) 2021, 2022, 2024, 2025

Member, American Association for the Advancement of Science (AAAS) 2026 – 2027
Student member; includes a subscription to *Science*.

HIGHLIGHTED SKILLS

⋆ **Programming Languages:** Python (NumPy, SciPy, Pandas, Matplotlib, Seaborn, TensorFlow, PyTorch, Keras, scikit-learn, xarray), R, Java, MATLAB, Fortran

⋆ **Data Science and Machine Learning:** General Circulation Model Analysis, Convolutional Neural Networks, Bayesian Statistics, Multivariate Time Series Forecasting (ARIMA, LSTM), Principal Component Analysis, Logistic/Linear Regression, Random Forest, k-means Clustering, Gradient Descent, Algorithm Design, Data Structures, Data Mining, Data Visualization.

⋆ **Climate and Planetary Modeling:** ExoPlaSim, WRF, PlaSim; GCM data analysis (NetCDF) atmospheric dynamics, radiative transfer.

⋆ **Software and Technologies:** Git/GitHub, Linux/Unix, Jupyter Notebooks/Lab, Overleaf (LaTeX), SLURM/HPC, Unreal Engine, AutoCAD, Microsoft Office Suite, Google Workspace.

⋆ **Professional Skills:** Agile/Sprint Project Management, Scientific Writing and Presentation, Grant Proposal Writing, Interdisciplinary Collaboration, Peer Review, Public Speaking, Curriculum Development, Mentoring.

⋆ **Certifications:** Responsible Conduct of Research (RCR), CITI Program, 2024; Research Security (NSPM-33), 2025; Data Science Sprint, The Data Mine, 2025; Data Handling and FERPA, 2024 to 2025.
