Kris Laferriere

Curriculum Vitae

klaferri@purdue.edu

EDUCATION

Purdue University, West Lafayette, IN Expected: Summer 2025
PhD in Planetary Science; Department of Earth, Atmospheric, and Planetary Science
Thesis: Exploring volatile mass balance under a variety of conditions through observations and modeling on the Moon and Mars

University of Maryland, College Park, MD May 2020
B.S. in Astronomy (High Honors) and Physics GPA : 3.46
Honors Thesis: Exploring Spatial and Temporal Changes in Hydration across the Lunar South Pole

RESEARCH EXPERIENCE

Purdue University, Department of Earth, Atmospheric, and Planetary Science Fall 2020 - Present
Planetary Science PhD
Advisor: Ali Bramson

Projects [1, 2] MDAP: The Mass Balance of Polar Ice on Mars from the Migration of Spiral Troughs
Projects [3, 4] LDAP: Sources and Replenishment of Lunar Hydration on Diurnal Timescales

University of Maryland, Department of Astronomy Fall 2019 - Fall 2020
Academic Honors Thesis
Advisor: Lori Feaga and Jessica Sunshine

Project Title: Evolution of hydration signatures from the Lunar South Pole utilizing Deep Impact HRI-IR

NASA Marshall Space Flight Center Summer 2019
Meteoroid Environment Office (Code EV44)
Advisor: Althea Moorehead

Project Title: Survey of low speed meteor showers using NASA All Sky Fireball Network

University of Maryland, Department of Astronomy Spring 2018 - Spring 2019
Advisor: Lori Feaga and Jessica Sunshine

Project Title: Exploring the morphology of the CO_2 and dust coma of Comet 9P with DCT and Spitzer-IRAC

PAPERS

1. **Laferriere, K. L.**, Bramson, A. M., Smith, I. B., (2024) Mars' North Polar Spiral Trough Migration Paths as revealed through 3D Radar Mapping, *in review*
2. Izquierdo, K., Bramson, A. M., McClintock, T., **Laferriere, K. L.**, Byrne, S., Bapst, J., Smith, I. B., (2023) Local Ice Accumulation and Retreat Rates at the North Pole of Mars from Bayesian Fit to Trough Migration Paths, *JGR Planets* 128, doi:10.1029/2023JE007964
3. **Laferriere, K. L.**, Sunshine, J. M., Feaga, L. M., (2022) Variability of Hydration across the Southern Hemisphere of the Moon as observed by Deep Impact, *JGR Planets*, 127, doi:10.1029/2022JE007361

CONFERENCE ABSTRACTS

1. **Laferriere, K. L.**, Bramson, A. M., Izquierdo, K., Mchlintock, T. (2024), Regional Variability in Ice Mass Balances Rates from North Polar Trough Migration Paths on Mars, *8th Mars Polar*, 6022
2. **Laferriere, K. L.**, Bramson, A. M., Gleason, A., (2024), Transport and Retention of Lunar Hydration on Diurnal Timescales, *55th LPSC*
3. **Laferriere, K. L.**, Izquierdo, K., Bramson, A. M., Smith, I. B., McClintock, T. (2024), Lateral Variability in Ice Mass Balance Rates Along a Polar Trough on Mars, *55th LPSC*
4. Li, S., Sunshine, J. M., **Laferriere, K. L.**, Feaga, L. M., (2024) Understanding the Speciation of Lunar Surface Hydration through Skewed-Gaussian Deconvolution of the 3-Micron Absorption of the Deep Impact Data, *(*55th LPSC)
5. **Laferriere, K. L.**, Izquierdo, K., Bramson, A. M., Smith, I. B., McClintock, T. (2023), Inferring past climate on Mars through mapping and simulating trough migration paths recorded in polar ice stratigraphy, *55th DPS*
6. Gleason, A., **Laferriere, K. L.**, Bramson, A. M., (2023) Effects of Roughness on Diurnal Hydration Transportation on the Lunar Surface, *55th DPS*
7. Izqueirdo, K., **Laferriere, K. L.**, Bramson, A., McClintock, T., Byrne, S., Bapst, J., Smith, I. B., (2023) A Bayesian modeling approach applied to migrating polar troughs to infer ice deposition rates on Mars, *55th DPS*
8. **Laferriere, K. L.**, Bramson, A., Izquierdo, K., McClintock, T. (2023) Mars' polar paleoclimate as revealed through thermophysical modeling of trough migration, *Talk, TherMoPS IV*
9. **Laferriere, K. L.**, Bramson, A., Gleason, A. (2023), Temperature Driven Transport of Lunar Hydration on Diurnal Timescales, 1047, *Talk, 54th LPSC*
10. Kring, D., Bamber, E., Blance, A., Brezfelder, J., Faucher, J., Flom, A., Lehman Franco, K., Harris, E., Jhoti, E., **Laferriere, K.**, Martin, A., Meyer, M., Pamerleau, I., Plan, A., Roberts, E., Shubham, S., Slumba, K., Zimmermann, N., Barrett, T., (2023) Cascading Boulder and Boulder Track Experiment at Barringer Meteorite Crater (AKA Meteor Crater), Arizona, 2186, *54th LPSC*
11. Sori, M. M., **Laferriere, K. L.**, Burkman, K. S., Herring, J., Klidaras, A., Manelski, H. T., McGlasson, R. A., Menten, S. M., Pamerleau, I. F., Pérez-Cortés, S. L., (2023) Hollows as a Source for Mercury's Polar Organics, 1103, *54th LPSC*
12. **Laferriere, K. L.**, Bramson, A. M., Smith, I. B. (2022), Mars North Polar Spiral Trough Migration Paths Variations Revealed by 3D Radar Mapping, 1452, *Poster, 53rd LPSC*
13. Izquierdo, K., Bramson, A. M., McClintock, T., **Laferriere, K. L.**, (2022), Mass Balance of Martian Polar Ice from Bayesian Fit to Trough Migration Paths, 1706, *53rd LPSC*
14. **Laferriere, K. L.**, Bramson, A. M., Smith, I. B. (2021), Mars' North Polar Spiral Trough Migration Paths as Revealed through 3D Radar Mapping, *Poster, AGU Fall Meeting*
15. **Laferriere, K. L.**, Sunshine, J. M., Feaga, L. M. (2021), Spatial and temporal variability of lunar hydration across the southern hemisphere as observed by Deep Impact, *Poster, AGU Fall Meeting*
16. **Laferriere, K. L.**, Bramson, A. M., Smith, I. B., (2021), 3D Mapping of Migration Paths of Mars' North Polar Spiral Troughs, 1631, *Poster, 52nd LPSC*
17. **Laferriere, K.**, Moorhead, A., (2019), Survey of low speed meteor showers, *NASA Marshall Space Flight Center Poster Expo*

TEACHING AND MENTORING

Co-Instructor Summer 2024
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences
EAPS105 - The Planets

Teaching Assistant Spring 2023
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences
EAPS100 - Planet Earth (online)

Teaching Assistant Fall 2020
Purdue University, Department of Earth, Atmospheric, and Planetary Sciences
EAPS111 - Physical Geology 120 (2 Lab sections)

Academic Peer Mentor Fall 2019
University of Maryland, Department of Astronomy
ASTR120 - The Solar System (Majors course)

Astronomy Peer Mentor (APM Program) Fall 2018 - Spring 2018
University of Maryland, Department of Astronomy

HONORS AND AWARDS

- EAPS EXPO 3 Min Talk (Spring 2024)
- LPI Career Development Award (Spring 2023)
- Purdue Graduate Student Government Travel Award (Spring 2023)
- Certificate in College Teaching, (Spring 2022), *Purdue University*
- Department Teaching Honor Roll, (Fall 2020, Spring 2023), *Department of Earth, Atmospheric, and Planetary Science, Purdue University*
- High Honors in Astronomy, (Spring 2020), *Department of Astronomy, University of Maryland, College Park*

PROPOSALS

Named Student Member:

Sources and Replenishment of Lunar Hydration on Diurnal Timescales, PI: Ali Bramson, funded by NASA's Lunar Data Analysis Program (LDAP)

UNDERGRADUATES ADVISED

- Matthew Scheer, Kamden Maddox, Arunima Saha, Jessica Cyr. *Fall 2024 - Spring 2025*
- Alex Gleason (Purdue PHYS), **Main Advisor: Ali Bramson**, *Fall 2022 - Spring 2023*
- Ashwin Nomi (Purdue AAE), **Main Advisor: Ali Bramson**, *Fall 2021 - Spring 2022*

SERVICE

Conference Session Moderator:

- 8th Mars Polar 2024, "Modern Climate Plus"

- LPSC 2024, "Lunar Polar Volatiles: A Remote Sensing Perspective"
- LPSC 2022, "The Martian Cryosphere: A Frozen Red Planet"

Reviewer:

- Reviewer: Planetary Science Journal, Journal of Geophysical Research: Planets.

Department Service:

- EAPS Graduate Committee Representative, *Purdue EAPS*, Fall 2024 - Spring 2025
- EAPS Graduate Student Association President, *Purdue EAPS*, Fall 2022 - Spring 2023
- Equity, Diversity, and Inclusion Committee (Grad Rep.), *Purdue EAPS*, Fall 2021 - Spring 2022
- Diversity, Equity, and Inclusion Committee (Undergrad Rep.), *UMD Astronomy*, 2017-2020

OUTREACH

- *Apr 30 2024:* Guest lectures (4 classes) at High School, Auburn, MA
- *Apr 2017-Spring 2020:* Panelist for 10 CMNS Open Houses as a CMNS Recruitment Ambassador
- *Fall 2018-Spring 2020:* Met with 5 prospective students in Physics and Astronomy at UMD
- *Apr 19 2019:* Held Q&A with middle school students from Chapel Hill-Carrboro City Schools NC on STEM at UMD
- *Summer 2018*: Residential Counselor (TA, Tutor, Mentor) Upward Bound Math and Science and Fitchburg State University
- *Spring 2018*: Public Talk at UMD, *Metallicity of Open Star Clusters Using Beat Cepheids*, with C. Bambic, V. Carvajal, and C. Hinrichs.
- *Fall 2017*: Public Talk at UMD Observatory, *Exploring the Cepheid PM-Relation in M31 with iPFT*, with C. Harada and M. Sitaram.

SKILLS

Programming: Python, C, IDL, MatLab, LaTeX

Software: Microsoft Office, SAO DS9, SeisWare, ENVI

Methods: N-Body Numerical Integration (ex. Euler, RK4), Monte Carlo Integration, Image Calibration, Data Visualization