Eleanor (Ellie) L. Moreland

she/her

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EDUCATION

Ph.D. Earth, Environmental, and Planetary Science, Rice University *Expected Fall 2026*
Advisor: Dr. Kirsten Siebach, Assistant Professor

B.A. Geology, Washington University in St. Louis May 2021
Cum Laude with Thesis and Highest Distinction in Earth and Planetary Sciences
Advisor: Dr. Raymond Arvidson, James S. McDonnell Distinguished University Professor Emeritus
Thesis: *Mineralogy of Aeolian Deposits in Gale Crater, Mars: The Bagnold Dunes to Glen Torridon*

PUBLICATIONS

Peer-Reviewed Manuscripts

1. **Moreland, E.L.**, Dee, S., Jiang, Y., Bischof, G., Mischna, M., Hartigan, N., Russell, J., Moores, J., and Siebach, K. (2026). Seasonal ice cover could allow liquid lakes to persist in a cold Mars paleoclimate. *AGU Advances*, 7, e2025AV001891. doi:10.1029/2025AV001891
2. **Moreland, E. L.**, Siebach, K. L., Costin, G., Tice, M. M., Hurowitz, J. A., Treiman, A. H., et al. (2025). Multiple episodes of fluid alteration in Jezero crater indicated by MIST mineral identifications in PIXL XRF data from the first 1100 sols of the Mars 2020 mission. *Journal of Geophysical Research: Planets*, 130, e2024JE008797. doi:10.1029/2024JE008797
3. Hurowitz, J.A., Tice, M.M., Allwood, A.C., … , **Moreland, E.L.** et al. Redox-driven mineral and organic associations in Jezero Crater, Mars. *Nature* 645, 332–340 (2025). doi:10.1038/s41586-025-09413-0
4. Siebach, K. L., **Moreland, E. L.**, Costin, G., & Jiang, Y. (2025). MIST: An Online Tool Automating Mineral Identification by Stoichiometry. *Computers & Geosciences* 206(106021). doi:10.1016/j.cageo.2025.106021
5. Seelos, F.P., Seelos, K.D., Murchie, S.L., …, **Moreland, E.L.** et al. (2023). The CRISM Investigation in Mars Orbit: Overview, History, and Delivered Data Products. *Icarus*. doi:10.1016/j.icarus.2023.115612.
6. Mitra, K., **Moreland, E.L.**, Ledingham, G.J., and Catalano, J.G. (2022). Formation of manganese oxides on early Mars due to active halogen cycling. *Nature Geoscience*. doi:10.1038/s41561-022-01094-y.
7. **Moreland, E. L.**, Arvidson, R. E., Morris, R. V., Condus, T., Hughes, M. N., Weitz, C. M., & VanBommel, S. J. (2022). Orbital and in situ investigation of the Bagnold dunes and Sands of Forvie, Gale crater, Mars. *Journal of Geophysical Research: Planets*, *127*(e2022JE007436). *In Special Issue "The Curiosity Rover's Investigation of Glen Torridon and the Surrounding Area."* doi:10.1029/2022JE007436.
8. Mitra, K., **Moreland, E.L.**, Knight, A., and Catalano, J.G. (2022). Rates and Products of Iron Oxidation by Chlorate at Low Temperatures (0 to 25 ºC) and Implications for Mars Geochemistry. *ACS Earth and Apace Chemistry*, *6*(2). doi:10.1021/acsearthspacechem.1c00379.
9. Mitra, K., **Moreland, E.L.**, and Catalano, J.G. (2020). Capacity of chlorate to oxidize Ferrous Iron: Implications for Iron Oxide Formation on Mars. *Minerals*, *10*(9). *Feature Paper in Special Issue "Expanding Views of Clays, Oxides, and Evaporites on Aquaplanets in the Solar System."* doi:10.3390/min10090729.

Manuscripts Submitted & In Review

1. Orenstein, B.J., Flannery, D.T., Jones, M.W., **Moreland, E.L.**, Siebach, K.L., Tice, M.M., Treiman, A.H., et al. (2026). Igneous and sedimentary origins of Jezero crater units from X-ray crystal mapping on Mars. In review at *Communications Earth & Environment* (submitted May 2025).
2. Bedford, C.C., Ravanis, E., Weins, R.C., Clavé, E., Forni, O., Aramendia, J.M.M., **Moreland, E.**, et al. (2026). Investigating the origin and lake-associated alteration of the olivine-rich Margin unit in Jezero crater, Mars. *Communications Earth & Environment* (submitted November 2025).
3. **Moreland, E.L.**, Bramble, M., Siebach, K.L., Pascuzzo, A.C., Morris, M., VanBommel, S.J., Jones, M., Siljeström, S., Srivastava, A., Treiman, A.H., Hurowitz, J. (2026). Alteration of a mantle-derived dunite boulder in Jezero Crater, Mars. *Geophysical Research Letters* (submitted December 2025).

SELECT CONFERENCE TALKS

Oral Presentations

1. **Moreland, E.**, Siebach, K., Costin, G., Tice, M., Hurowitz, J., Treiman, A., Simon, J., Liu, Y., Jiang, Y. Stoichiometric Minerals in PIXL Data from the Mars 2020 Mission. In *Geological Society of America Connects* 2025. doi:10.1130/abs/2025am-10307
2. **Moreland, E. L.**, Dee, S., Jiang, Y., Bischof, G., Mischna, M., Hartigan, N., Russell, J., Moores, J., Siebach, K. Persisting Lakes on a Cold Mars: the Potential Role of Seasonal Ice Cover. In *Geological Society of America Connects* 2025. doi:10.1130/abs/2025am-10282
3. Moreland, E. L., Siebach, K. L., Hurowitz, J. A. , Bedford, C. C. , Treiman, A. H. (2025). “Stoichiometric Mineral Identifications and Uncertainties from Sols 900-1400 of the Mars 2020 Mission with PIXL and MIST.” In *56th Lunar and Planetary Science Conference* (2474).
4. **Moreland, E. L.** (2024). “Identifying Minerals on Mars”. For *Rice Natural Sciences 'Science in a Flash' Research Highlight.* Selected via department chair nomination.
5. **Moreland, E. L.**, Dee, S., Jiang, Y., Bischof, G., Mischna, M., Hartigan, N., Russell, J., Siebach, K. (2023). “An Intermediate-Complexity Model for Simulating Lacustrine Environments on Early Mars.” In *AGU Fall Meeting 2023* (EP53B-08).
6. **Moreland, E. L.**, Siebach, K. L., Costin, G., Jiang, Y., VanBommel, S., Kizovski, T., Hurowitz, J., Liu, Y., Tice, M. (2022). “Stoichiometric Mineral Identifications in Mars 2020 Perseverance PIXL Data using the Automated MIST Algorithm.” In *AGU Fall Meeting 2022* (P55A-06).

RESEARCH & WORK EXPERIENCE

Mars 2020 Planetary Geology, Graduate Student, Rice University *2021 – present*

Advisor: Dr. Kirsten Siebach, Assistant Professor and Mars2020 PIXL Co-Investigator

- Developing the novel Mineral Identification by Stoichiometry (MIST) algorithm (mist.rice.edu)
- Performing mineral identifications in geochemical data from the Planetary Instrument for X-ray Lithochemistry (PIXL) onboard the Perseverance rover
- One of ~13 scientists supporting Mars2020 PIXL uplink operations

Planetary Geology & Climate, Graduate Student, Rice University 2022 – 2025

Advisor: Dr. Sylvia Dee, Assistant Professor and Climate Scientist

- Adapted a new, open-source, intermediate-complexity lake model for simulating paleolakes sites on Mars to connect the geologic record to paleoclimate reconstructions
- Initiated collaboration with Dr. Michael Mischna at the NASA Jet Propulsion Laboratory to obtain MarsWRF GCM climate data for model input

NASA Planetary Science Summer School Internship, NASA JPL Summer 2025

- Selected to participate in the 3-month intensive mission design program with scientists and engineers to design a science-driven robotic planetary mission concept to Enceladus.
- Directed the interdisciplinary team as Project Manager, coordinating interpersonal relations, scope, schedule, and deliverables for the duration of the program.
- Led the proposal strategy as a last-minute replacement Capture Strategist, ensuring a winning message was conveyed to the NASA review panel while working with NASA Team-X.

Remote Sensing, Undergraduate Student, Washington University in St. Louis Jan. 2020 – Dec. 2021
Advisor: Dr. Raymond Arvidson, Director Emeritus of NASA Planetary Data System Geosciences Node

- Processed and interpreted orbital and ground-based datasets to understand dynamics, sorting, and geochemistry of aeolian deposits in Gale Crater, Mars
- Collaborated with Dr. Richard Morris at the Johnson Space Center ARES division to support spectroscopic observations of basaltic glass samples

Mars Geochemistry, Undergraduate Student, Washington University Jan. 2019 – Jan. 2020
Advisor: Dr. Jeffery Catalano, Professor and Director of Environmental Studies

- Performed experiments, measurements, and calculations to investigate the stoichiometric capability of chlorate to oxidize Fe(II) and form Fe(III)-bearing minerals in Mars-relevant fluids and the effects of low temperature on the kinetic efficiency

AWARDS, HONORS, & FELLOWSHIPS

Texas Area Planetary Science Conference Travel Grant September 2025
Geological Society of America South Central Section Travel Grant September 2025
Douglas and Martha Lou Broussard Fellowship May 2025
Support for a graduate student with high academic records and outstanding qualifications for advanced studies
Texas Space Grant Consortium Graduate Fellowship January 2025
Awarded with consideration of excellence in academics, interest in space, and recommendations
Women in Natural Sciences Travel Grant, Rice University June 2024
Best Poster Presentation Award, Rice Industry Geoscience Series April 2023
Alison Henning Teaching Award, Rice University May 2023
Awarded to an outstanding graduate teaching assistant
Harold Levin Award, Washington University in St. Louis May 2021
Awarded to undergraduate students who have done outstanding jobs as assistants to the instructor
Courtney Werner Memorial Prize, Washington University in St. Louis May 2021
Awarded to a senior student who has demonstrated outstanding academic achievement
Summer Undergraduate Research Award, Washington University in St. Louis May 2019

TEACHING EXPERIENCE

Undergraduate Research Mentor, Rice University Spring 2023 – 2024

- Undergraduate mentee presentation at the 2025 Rice Natural Sciences Undergraduate Research Symposium (NSURS): “Expanding a Hierarchical Monte Carlo Unmixing Approach for Complex Geochemical Datasets”

Graduate Teaching Assistant, Rice University, “Remote Sensing” Fall 2022

- Assisted Dr. Kirsten Siebach in designing course materials and homework assignments
- Tutored 25 students during office hours and review sessions
- Taught a class about spectroscopic observations on Mars

- Awarded the Alison Henning Teaching Award

SEPM Conference Coastal Processes Field Trip Co-Lead, Galveston TX Spring 2022

- Led a group of 15 industry professionals on a tour of Galveston coastal sedimentology and geomorphology with a fellow graduate student and adjunct professor Dr. Erick Scott

Undergraduate Teaching Assistant, Washington University, "What's the Curiosity Rover Doing This Week" Spring 2021

- Partnered with Dr. Raymond Arvidson to develop & teach new, unique course materials, content, and homework assignments for students to understand Curiosity Rover operations, including simulating operation assignments on the Curiosity rover science team
- Facilitated collaboration of 20 college students in group work settings and learning operations
- Awarded the Harold Levin Award

Undergraduate Teaching Assistant, Washington University, "Earth and the Environment" Spring 2020

OUTREACH & SCIENCE COMMUNICATION

Mars 2020 *Perseverance* Rover Blog, Blogger *Fall 2022 – present*

- "Over Soryoa Ridge & Onward!", August 2025
- "Continuing the Quest for Clays", July 2025
- "Searching for the Dark in the Light", April 2025
  > Reposted on *SpaceDaily.com* and highlighted in *Rice Dateline*
- "Gardens on Mars? No, Just Rocks!", February 2025
- "Looking Out for 'Lookout Hill'", December 2024
- "Just Keep Roving", October 2024
- "A Bright New Abrasion", June 2024
- "Bunsen Peak Piques Interest", Feb. 2024
- "Perseverance's Parking Spot", Nov. 2023
- "New Milestones Despite Tricky Boulders", Sept. 2023
- "If at First You Don't Succeed… Persevere!", June 2023
- "What's So Special About Large Grains on Mars?", May 2023
- "Look at All Those Boulders!", April 2023
- "The First in the Universe, but What's Next?", Feb. 2023
- "A Broken Rock Won't Break Our Team", Sept. 2022

Houston Communicating Science Conference (ComSciCon)

Advisory Co-Chair *May 2025 – present*

Co-Chair July 2024 – May 2025

- Collaborated with 7 other co-chairs to organize the 9th Houston Communicating Science Conference
- Planned day-of science communication events and activities
- Coordinated all funding initiatives as Financial Chair: ensured adequate fundraising efforts, tracked and organized over $13,000 of incoming funds, managed over $9,000 in outgoing expenses
- As Speaker Coordinator, located, invited, organized, and managed the eight invited communication experts from across the nation
- As Advisory Co-Chair, manage the new group of organizers to ensure a successful conference

Association for Women Geoscientists Rice U. Student Chapter, *Spring 2024 – present*
President

- Organize events for women geoscientists at Rice and fundraise for future AWG-sponsored events
- Collaborated with other Rice clubs to organize an industry-focused career panel

- Coordinated with AWG staff to organize the inaugural Distinguished Lecturer Program

Girl Scouts Climate Challenge, Event Planner and Workshop Co-Lead Fall '22, '23, '24, Spring '26

- Designed teaching materials and activities for a group of 20 K–5th to learn the differences between climate and weather and the impacts of climate change
- Taught 15 6th – 12th graders how to communicate facts of climate change

NASA Here to Observe (H2O) Early Career Panel March 2025

- Shared career experience and answered questions from students at Kutztown University, the M2020 H2O partner institution

Rice Undergraduate Research Symposium and Shapiro Showcase April 2025

- Evaluated poster presentations at the Undergraduate Research Symposium
- Judged Shapiro Showcase presentation and Q&A from top undergraduate researchers at Rice

PIXL Team Early Career Liaison June 2024 – Dec. 2024

- Relay information from Early Career scientists on the PIXL team to team leadership
- Hold early career meetings and attend weekly leadership meetings to share information

Unlearning Racism in the Geosciences Rice University Pod

Co-Leader Spring 2024 – 2025
Pod Member Fall 2021 – 2025

- Nationwide initiative to develop materials and participate in implanting anti-racist policies and procedures in geoscience departments
- Work with members to revise the EEPS Code of Conduct, generate a departmental resource map, institute gender-neutral bathroom facilities, and write the department DEI statement

Houston ISD Middle School Planetary Exploration Day May 2024

- With ~50 total middle school students rotated in groups of 4, led one of 13 stations where students constructed a model of the MAVEN spacecraft using McDonald's boxes (McMAVEN)

Houston ISD Teacher Professional Development April 2024

- Gave an introductory talk to ~20 elementary, middle, and high school teachers
- Worked with high school teachers on methods to teach students about planetary exploration

Girl Scouts of San Jacinto "Rock Stars" Geology Day, Volunteer Scientist April 2024

- Worked with other volunteers to plan the Rock Stars event for ~100 Girl Scouts
- Led the Rock Cycle station for 4 groups of 20 Girl Scouts using hand samples and visual aids

Klein Independent School District Girls In STEM, Keynote Panelist March 2024

- Spoke to and answered questions from a group of ~150 middle and high school girls and their families about personal female experiences in the STEM field

EEPS News Science Writer Variable

- "EEPS Inaugural AWG Distinguished Lecturer: Dr. Marjorie Chan", January 2025
- "The 'hotly' debated history of the largest volcano in the solar system", August 2023

Rice University GeoUnion, Outreach Chair Fall 2022 – Fall 2023

Youth Science Workshop, Co-Officer Fall 2022

- Communicated my Ph.D. project to a group of 6 middle and high school students; coached & advised students through presenting the project to peer groups

Washington University Geology Club, Co-President Fall 2019 – Fall 2021