

ELEANOR L. MORELAND

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EDUCATION

Doctor of Philosophy in Earth, Environmental, and Planetary Science

Expected 2026

Rice University, Houston, TX

Advisor: Dr. Kirsten Siebach

Bachelor of Arts in Geology

May 2021

Washington University in St. Louis, St. Louis, MO

Cum Laude with Thesis and Highest Distinction in Earth and Planetary Sciences

Thesis: Mineralogy of Aeolian Deposits in Gale Crater, Mars: The Bagnold Dunes to Glen Torridon

Advisor: Dr. Raymond E. Arvidson

RESEARCH EXPERIENCE

Rice University

Siebach Laboratory

Aug. 2021 – *ongoing*

Graduate Student; Advisor: *Prof. Kirsten Siebach*

- Develop a working mineral identification algorithm (Mineral Identification by Stoichiometry) to analyze chemical data returned from the Planetary Instrument for X-ray Lithochemistry (PIXL) instrument on the Mars 2020 Perseverance rover.
 - Utilized HTML to develop a website to host a public version of algorithm (mist.rice.edu).
- Work with the Mars 2020 Science and Engineering Teams as the PIXL science payload uplink lead for strategic planning of rover operations.
- Adapt an Earth-based lake model for use in modeling Paleo-Mars lake conditions.

Washington University in St. Louis

Remote Sensing Laboratory

Jan. 2020 – Dec. 2021

Research Assistant; Advisor: *Prof. Raymond E. Arvidson*

- Processed and interpreted orbital and ground-based datasets to understand aeolian dynamics in Gale Crater.

Aqueous Geochemistry & Mineralogy Laboratory

Jan. 2019 – Dec. 2019

Undergraduate Research Assistant; Advisor: *Prof. Jeffrey G. Catalano*

- Investigated the stoichiometric capability of chlorate to oxidize Fe(II) and form Fe(III)-bearing minerals in Mars-relevant fluids and potential effects of lower temperature.

PEER-REVIEWED PUBLICATIONS

1. 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
2. **Moreland, E. L.**, Arvidson, R. E., Morris, R. V., Conduis, 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
3. 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 °C) and Implications for Mars Geochemistry. *ACS Earth and Space Chemistry*, 6(2). doi:10.1021/acsearthspacechem.1c00379
4. 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

CONFERENCE ABSTRACTS

1. **Moreland, E.L.**, Siebach, K.S., Costin, G., Jiang, Y., Tice, M., Kizovski, T.V., Liu, Y., and Brown, A.J., 2023, Crystal Chemistry of Primary and Secondary Minerals in the Jezero Crater Floor. In 54th LPSC, Abstract ID #2196.
2. **Moreland, E.L.**, Siebach, K.S., 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).
3. Siebach, K.S., Costin, G., **Moreland, E.L.**, Jiang, Y., 2022, MIST: an Online Tool Automating Mineral Identification by SToichiometry in Geochemical Datasets. In *AGU Fall Meeting 2022* (V42A-04).
4. Siebach, K., Costin, G., **Moreland, E.**, Jiang, Y., 2022, MIST: An Algorithm for Automating Mineral Identification by SToichiometry. In *23rd General Meeting of the International Mineralogical Association*, IMA2022-1686.
5. **Moreland, E.L.**, Arvidson, R.E., 2021, Compositional Variance of Aeolian Deposits in Gale Crater, Mars. In 52nd LPSC, Abstract ID #2397

6. Condu, T., Arvidson, R.E., **Moreland, E.L.**, 2021, CRISM-Derived Modal Mineralogy and Thermal Inertia for Oxia Planum. In 52nd LPSC, Abstract ID #1670.
7. **Moreland, E.L.**, Arvidson, R.E., Christian, J.R., 2020, Windblown Basaltic Sands on the Northern Slopes of Mount Sharp and Adjacent Plains, Gale Crater, Mars. In *AGU Fall 2020* (EP018-0004).
8. Mitra, K., **Moreland, E.L.**, Ledingham, G.J., Arvidson, R.E. and Catalano, J.G., 2020, Manganese Oxide Formation by Oxyhalogens: Faster Alternatives to Oxygen as Mn Oxidants on Mars. In *AGU Fall 2020* (P041-03).
9. Christian, J.R., Arvidson, R.E., O’Sullivan, J.A., **Moreland, E.L.**, 2020, High Spatial Resolution Thermal Inertia Mapping of Mount Sharp and Northern Plains, Gale Crater, Mars. In *AGU Fall 2020* (P069-0013).
10. **Moreland, E.L.**, Mitra, K., and Catalano, J.G., 2020, Stoichiometric Efficiency of Iron Oxidation by Chlorate on Mars. In 51st LPSC, Abstract ID #1033.
11. Mitra, K., **Moreland, E.L.**, Ledingham, G.J., Arvidson, R.E. and Catalano, J.G., 2020, Dissolved Manganese Oxidation by Bromate and Chlorate: An Alternate Hypothesis of Manganese Oxide Formation on Mars. In 51st LPSC, Abstract ID #1068.
12. Mitra, K., **Moreland, E.L.**, and Catalano, J.G., 2020, Fe(II) Oxidation and Fe(III) Mineral Production by Chlorate at Mars-Relevant Temperatures: Reaction Rates & Mineral Products. In 51st LPSC, Abstract ID #1069.

TEACHING EXPERIENCE

- **Teaching Assistant**, “Remote Sensing”, Rice University. Fall 2022.
- **SEPM Conference Coastal Processes Field Trip Co-Lead**; Galveston, TX. Spring 2022.
- **Teaching Assistant**, “What’s the Curiosity Rover Doing this Week?”, Washington University in St. Louis. Spring 2021.
- **Teaching Assistant**, “Earth and the Environment”, Washington University in St. Louis. Spring 2020.

AWARDS

Harold Levin Award , Washington University in St. Louis Outstanding Job as Assistant to the Instructor	May 2021
Courtney Werner Memorial Prize , Washington University in St. Louis Outstanding Achievement in Earth and Planetary Sciences	May 2021
Dean’s List , Washington University in St. Louis Semester GPA \geq 3.60	Dec. ’17, ’19, ’20; May ’18, ’19, ’20, ’21

Academic All-American, University Athletic Association

Dec. 2018, 2019, 2020

Summer Undergraduate Research Award, Washington University in St. Louis

May 2019

Award of \$4,000 to conduct summer research in Earth and Planetary Sciences

ACADEMIC PRESENTATIONS

- **Graduate Interdisciplinary Earth Science Symposia**, Rice University, Fall 2022. “Jezero Crater Floor Mineral Identifications in PIXL Data using the Automated MIST Algorithm”.
- **Earth and Planetary Sciences Colloquia**, Washington University, Senior Theses Presentations and Awards, Spring 2021. “Mineralogy of Aeolian Deposits in Gale Crater, Mars: The Bagnold Dunes to Glen Torridon”.
- **Washington University Undergraduate Research Symposium**, 2019. “Efficiency of Fe(II) Oxidation by Chlorate on Mars”.
- **Brown Bag Series**, Washington University Earth & Planetary Sciences Department, 2019. “Our Trip to Patagonia”.

OUTREACH

- **GeoUnion Outreach Chair**, Rice University. Spring 2022 – present.
- **Girl Scouts Climate Challenge Event Planner and Workshop Co-Lead**, Rice University. Fall 2022.
- **Mars2020 Blogger**, “A Broken Rock Won’t Break Our Team”. Fall 2022.
- **Youth Science Workshop Co-Officer**, Rice University. Fall 2022.
- **Washington University Geology Club Co-President**. 2019 – 2021.

FIELD EXPERIENCE

Arkansas Ouachita Mountains (2022); Colorado Plateau, Utah (2020); Johnson Shut-Ins, Missouri (2019); Patagonia, Argentina (2019)