



Kate Hendrickson, M.S., Ph.D. Candidate

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EDUCATION

- In progress:* Ph.D. Earth and Planetary Sciences – Rutgers University – GPA: 4.0
- ◆ Dissertation Title: “Machine Learning Applications for Mineral Substitution Chemistry, Predictive Prospecting, and Deposit Detection”
 - ◆ Passed qualifying examinations and advancement to candidacy
- 2026 M.S. Earth and Planetary Sciences – Rutgers University – GPA: 4.0
- ◆ “Martian Mineral Association Analysis: Applying the Earth MED Model to Mineral Predictions in Gale Crater, Mars.” Master's thesis, Rutgers University, 2026. <https://doi.org/doi:10.7282/t3-2gpv-kq78>
- 2022 B.S. Physics Education – Brigham Young University – GPA: 3.9
- ◆ Thesis in Astronomy: “Modeling the Mutual Inclinations of Exoplanets”
 - ◆ Minor: Business

RESEARCH EXPERIENCE

- 2025–Present **NASA: Mars Science Laboratory Mission (Curiosity Rover)** – Science Team Member and CheMin Payload Uplink/Downlink Lead (PUDL)
- ◆ Contributor to mission operations of the CheMin instrument on MSL
 - ◆ Collaborator on scientific data analysis and strategic mission planning
- 2024–Present **Rutgers University** – Doctoral Researcher – Advisor: Dr. Shaunna M. Morrison
- ◆ Planetary Mineralogy, Remote Sensing, Data Science, Mineral Chemistry
 - ◆ Current Projects:
 - ◇ Network analysis of mineral chemistry and ionic substitutability in nature
 - ◇ Mineral Association Analysis for predicting minerals in Gale Crater, Mars
 - ◇ Locating economic minerals via remote sensing and multimodal learning
- 2026 **Lithium Africa** – Economic Geology Research Intern
- ◆ Developing multimodal machine learning techniques for deposit detection
 - ◆ Researching potential methodologies for combining in situ XRF with orbital data
 - ◆ Performing work towards dissertation on Li-Pegmatite detection and evaluation
 - ◆ Collecting samples and identifying minerals during field work in South Africa
- 2025 **Smithsonian Institution: National Air & Space Museum** – Research Intern
- ◆ Participated in summer research with the Center for Earth and Planetary Studies
 - ◆ Developed mineralogical maps of fluvial areas of interest on the martian surface
 - ◆ Interpreted CRISM VNIR data to identify minerals from geospatial intelligence
- 2020–2021 **BYU Physics & Astronomy** – Research Assistant – Advisor: Dr. Darin Ragozzine
- ◆ Machine Learning, DEMCMC, N-body integration, Transit Duration Variations
 - ◆ Measured the most precise mutual inclination for the Kepler-18 system known
 - ◆ Wrote a senior thesis titled “Modeling the Mutual Inclinations of Exoplanets”
 - ◆ Worked on detecting exoplanets using TTVs in a 2019 class research project

MANUSCRIPTS IN REVIEW OR PREPARATION

- ♦ Rampe, E.B., Bristow, T.F., Blake, D.F., Chipera, S.J., Vaniman, D.T., Grotzinger, J.P., Peretyazhko, T.S., Simpson, S.L., Berger, J.A., O'Connell-Cooper, C., Yen, A.S., Sheppard, R., Szczerba, M., Treiman, A.H., Tutolo, B., Downs, R.T., Morrison, S.M., Meusbürger, J.M., Ming, D.W., Morris, V.V., Tu, V.M., Thorpe, M.T., Pandey, A., Des Marais, D.J., Hazen, R.M., Castle, N., Craig, P.I., Hausrath, E.M., **Hendrickson, K.**, Achilles, C.N., Burt, D.G., Clark, J.V., Edgar, L.A., Fedo, C.M., Frydenvang, J., Nikolajsen, K.W., Coronado, M., Downs, G.W., Rapin, W., Sutter, B., Fraeman, A.A., (2026). *A Complex History of Environmental Change and Diagenesis Recorded within the Clay-, Sulfate-, and Carbonate-Bearing Units in Gale Crater, Mars* [**Manuscript under review**].
- ♦ **Hendrickson, K.**, Yee, F., Prabhu, A., Sheppard, R., Hazen, R. M., Jibrin, Z., Rampe, E. B., Thorpe, M. T., Bristow, T. F., Blake, D. F., Tutolo, B. M., Downs, R. T., Vaniman, D. T., Des Marais, D., Yen, A. S., Meusbürger, J. M., Treiman, A. H., Ming, D. W., Morris, R. V., Craig, P. I., Castle, N., & Morrison, S. M. (2026). *Expanded Mineralogy in Gale Crater: Predictions from Martian Mineral Association Analysis* [**Manuscript in preparation; target submission 9/2/2026**].

FUNDING & AWARDS

- ♦ (\$3,497) The William & Grace Sparks Graduate Student Research Award – Rutgers University Department of Earth and Planetary Sciences (May 2026)
- ♦ (\$1,048) MSA Student Travel Grant – MSA Annual Meeting (January 2026)
- ♦ (\$200) Geoinformatics and Data Science Division Student Travel Grant – Geological Society of America (October 2025)
- ♦ (\$1,398) On To the Future (OTF) travel award – Geological Society of America (August 2025)
- ♦ (\$3,200) GSA Graduate Student Research Grant – Geological Society of America (June 2025)
- ♦ (\$750) The George Rowe Award – Rutgers University Department of Earth and Planetary Sciences (May 2025)
- ♦ (\$500) Pre-Conference Workshop: Professional Development and Networking Event Stipend – Lunar and Planetary Science Conference (February 2025)
- ♦ (~\$60,000) Excellence Fellowship – Rutgers Department of Earth and Planetary Sciences (2024 – 2025)
- ♦ (\$100) BYU Student Research Conference Division Winner (February 2021) [link](#)
- ♦ (~\$25,000) Full Tuition Academic Scholarship – Brigham Young University (Fall 2017 – Spring 2020)
- ♦ Dean's List – BYU (Spring 2020, Fall 2019, Winter 2019, Fall 2018, Winter 2018, Fall 2017)

MEETING ABSTRACTS & PRESENTATIONS (*mentee)

- ♦ (Invited) **Hendrickson K.**, *Yee F, Prabhu A, Sheppard R, Hazen RM, Jibrin Z, Rampe EB, Thorpe MT, Morrison SM (2026) “Using the Mineral Evolution Database and the Apriori Algorithm to Predict Mineral Phases on Mars,” Session title: Geoinformatics advances scientific discoveries: Machine Learning, Cyberinfrastructure, and Open Data in the digital geological era, GSA Connects – 2026, Abstract #20436. <https://gsameetings.secure-platform.com/connects26/solicitations/103015/sessiongallery/schedule/items/96377/application/20436>
- ♦ **Hendrickson K.**, *Yee F, Prabhu A, Sheppard R, Hazen RM, Jibrin Z, Rampe EB, Thorpe MT, Morrison SM (2026) “Additional Mineral Phases at CheMin localities in Gale Crater Predicted from Association Rule Mining,” GSA Connects – 2026, Abstract #20525 <https://gsameetings>.

secure-platform.com/connects26/solicitations/103015/sessiongallery/schedule/items/96255/application/20525

- ◆ E. B. Rampe, T. F. Bristow, D. F. Blake, S. J. Chipera, D. T. Vaniman, J. P. Grotzinger, T. S. Peretyazhko, S. L. Simpson, J. A. Berger, C. O’Connell-Cooper, A. S. Yen, R. Sheppard, M. Szczerba, A. H. Treiman, B. Tutolo, R. T. Downs, S. M. Morrison, D. W. Ming, R. V. Morris, V. M. Tu, M. T. Thorpe, A. Pandey, D. J. Des Marais, R. M. Hazen, N. Castle, P. I. Craig, E. M. Hausrath, **K. Hendrickson**, C. N. Achilles, D. G. Burt, J. V. Clark, L. A. Edgar, C. M. Fedo, J. Frydenvang, K. W. Nikolajsen, M. Coronado, G. W. Downs, W. Rapin, B. Sutter, A. A. Fraeman (2026) “In-Situ Mineralogy of the Orbitally Defined Clay- and Sulfate-Bearing Units in Gale Crater, Mars,” GSA Connects – 2026 <https://gsameetings.secure-platform.com/connects26/solicitations/103015/sessiongallery/schedule/items/96255/application/19310>
- ◆ **Hendrickson K**, *Yee F, Prabhu A, Sheppard R, Rampe EB, Jibrin Z, Thorpe MT, Morrison SM (2026) “Using the Apriori Algorithm on to Predict Minerals on Mars using Mineral Association Analysis,” International Mineralogical Association 24th General Meeting, Session 7.2 #6, (oral)
- ◆ **Hendrickson K**, *Yee F, Prabhu A, Sheppard R, Rampe EB, Jibrin Z, Thorpe MT, Morrison SM (2026) “Evaluating Clay Mineral Species in Gale Crater, Mars, and MAA Model Clay Predictions,” Clay Mineral Society Annual Meeting (oral)
- ◆ **Hendrickson K** (2026) “Project Updates from Dissertation Chapters 1 and 2,” Rutgers Department of Earth and Planetary Science Annual Awards Picnic (poster)
- ◆ **Hendrickson K**, Prabhu A, Downs RT, Jibrin Z, Morrison SM (2026) “Computational Networks for Comparing Ionic Substitutions across Different Mineral Formational Groups,” Mineralogical Society of America Annual Meeting (oral)
- ◆ Morrison SM, **Hendrickson K**, Prabhu A, *Yee F, Downs RT, Ralph J (2026) “Mineral Association Analysis (MAA): Predicting mineral occurrence on Earth and Mars via mineral association rule mining,” Mineralogical Society of America Annual Meeting (poster)
- ◆ **Hendrickson K** (2025) “CRISM Fan Interpretations: Summer Research at the Smithsonian National Air and Space Museum,” Grad Student Seminar – Rutgers EPS Department (oral)
- ◆ (Invited) **Hendrickson K**, Prabhu A, Downs RT, Jibrin Z, Zobrist BN, Morrison SM (2025) “Network Analysis of Mineral Substitutions across Structural and Planetary Subsets,” Session T160 Advancing Mineral Science and Exploring Planetary Surfaces: In Honor of MSA Dana Medalist, Elizabeth B. Rampe, Part I, GSA Connects – 2025 (oral)
- ◆ **Hendrickson K**, Prabhu A, Downs RT, Jibrin Z, Zobrist BN, Morrison SM (2025) “Network Analysis of Ion Substitutions across Mineral Paragenetic Modes,” GSA Connects – 2025, Abstract #10773, v. 57, no. 6, <https://doi.org/10.1130/abs/2025AM-10773> (oral)
- ◆ *Yee F, **Hendrickson K**, Morrison SM, Prabhu A (2025) “Applying Earth’s Mineral Association Rules to Predict Martian Mineral Occurrences in Gale Crater,” GSA Connects – 2025, Abstract #10742, v. 57, no. 6, <https://doi.org/10.1130/abs/2025AM-10003> (oral)
- ◆ Morrison SM, Prabhu A, Hazen RM, Downs RT, **Hendrickson K**, Ralph J, Ma X (2025) “Mineral Informatics: Data-driven advances in mineralogical and planetary sciences,” GSA Connects – 2025, Abstract #10742, v. 57, no. 6, <https://doi.org/10.1130/abs/2025AM-10742> (oral)
- ◆ **Hendrickson K** (2025) “Mars Rocks! NASM Internship – Center for Earth and Planetary Studies” National Air and Space Museum Summer Intern Series (oral)
- ◆ **Hendrickson K** (2025) “Mineral Site Substitution Networks and Associated Exploration Approaches,” Rutgers Department of Earth and Planetary Sciences Colloquium (oral)

- ◆ **Hendrickson K**, Morrison SM, Prabhu A, Downs RT, Jibrin Z, Zobrist BN (2025) “Mineral Site Occupancy and Chemical Substitutability as an Area of Interest for Martian Mineral Analyses,” Lunar and Planetary Science Conference 2025, Abstract #2641 <https://www.hou.usra.edu/meetings/lpsc2025/pdf/2641.pdf> (oral)
- ◆ **Hendrickson K** (2024) “Data Visualization of Empirical Site Substitutions Across All Minerals with RRUFF Microprobe Analyses,” 2nd Annual Rutgers Department of Earth and Planetary Sciences Petrology Poster Session (poster)
- ◆ (Award Received) **Hendrickson K** and Ragozzine DR (2021) “Modeling the Mutual Inclinations of Exoplanets,” Brigham Young University Student Research Conference, Physics & Astronomy Division 6A, <https://src.byu.edu/abstract/detail/5747> (oral)
- ◆ **Hendrickson K** and Ragozzine DR (2020) “Determining the Mutual Inclinations of Exoplanets,” NASA Exoplanet Science Institute Exoplanet Demographics, Architectures of Systems: Observations, <https://nexsci.caltech.edu/conferences/exodem/posters.shtml> (poster)

PROFESSIONAL SERVICE

- ◆ Division Officer: Student Representative – Geological Society of America: Geoinformatics and Data Science Division (April 2025 – present)
- ◆ Co-Convener, “Geoinformatics and Data Science: A Showcase In Undergraduate and Graduate Student Research,” GSA Connects 2026, Denver, CO, October 2026. (Co-convended with Burges J, Prabhu A, Quinn D, Wen T, Shaheen S, Alam MMT.)
- ◆ Reviewer: American Mineralogist (2 reviews) (June 2026 – present)
- ◆ Award Judge – GSA Geoinformatics and Data Science Division Student Poster Competition – GSA Connects 2025 (October 2025)
- ◆ Invited Panelist – Rutgers Geology Club – Finding Success in Graduate School and Applications (November 2024, 2025)
- ◆ Guiding Coalition Appointee – Copper Hills High School – Developed and initiated coordinated strategies for implementing Standards Referenced Grading procedures throughout a diverse teaching body (September 2023 – May 2024)
- ◆ Student Mentor – Copper Hills High School – Helping prepare high school students, including first generation college students, for applications and success in college (2022 – 2024)
- ◆ Volunteer – Hearts and Hands for Humanity – Drilling wells in Tanzania (July 2022)
- ◆ Peer Mentor – Foundations of Leadership – Fostered leadership skills and initiative in incoming college freshmen (2017 – 2020)
- ◆ Section President – The Relief Society – Administering to the needs of the local community (September 2018 – April 2019)

OUTREACH

- ◆ Rutgers University 4-H Teen Café, Piscataway, New Jersey (2026). “Mars Rocks: Studying Minerals with the Curiosity Rover”
- ◆ Provo High School–Latinos in Action, Provo, Utah (2025). “Planetary Scientists: Detectives of the Solar System”
- ◆ Copper Hills High School, West Jordan, Utah (2025). “Chemistry on the Red Planet: Analyzing the Elements from Rovers”

SKILLS

- ◆ **Programming Languages:** Python, C++, UNIX/Bash, R, MatLAB, IDL, JavaScript, LaTeX
- ◆ **Software Experience:** ArcGIS Pro, MSLICE, ENVI, Git, Excel, Jupyter, JMARS, Mathematica
- ◆ **Database Experience:** RRUFF, NASA PDS, NASA Earthdata, NASA Exoplanet Archive, Mindat
- ◆ **Technical Skills:** Mathematical Analysis, Data Management, Data Parsing, PyTorch, RegEx
- ◆ **Career Skills:** Technical Writing, Proposal Preparation, Curriculum Development, Leadership

TEACHING EXPERIENCE

- 2026 **Rutgers University** – Instructor of Record – EPS 222: Planet Mars (*scheduled Fall 2026*)
- 2025–2026 **Rutgers University** – Teaching Assistant – EPS 302: Petrology, EPS 201: Earthquakes and Volcanos
- 2022–2024 **Copper Hills High School** – High School Teacher – Physics & Astronomy
- 2022 **Springville High School** – Student Teacher – Standard Physics, AP Physics 1 & 2
- 2020–2022 **Private** – Tutor – Math and Science at both High School and College levels
- 2018–2021 **BYU** – Teaching Assistant – Physical Science 100: Physics, Chem, Geology, Astronomy

SELECTED COURSEWORK

Rutgers University

- ◆ EPS 302: Petrology, EPS 527: Remote Sensing, EPS 565: Atom Struc Minerals, EPS 621: Sem Geochemistry, EPS 630: Sem Planetary Sci, CS 501: Mathematical Foundations of Data Science

Portland State University

- ◆ G410: Python for the Natural Sciences, G346: Exploring Mars

Brigham Young University

- ◆ MATH 334: Ordinary Differential Equations, MATH 314: Multivariable Calculus, PHY S 377: Teaching Methods & Instruction, PHSCS 416: Writing in Physics, PHSCS 310: Mechanics

PROFESSIONAL DEVELOPMENT

- ◆ Mineral Informatics Datathon – Rutgers University (November 18–19 2025)
- ◆ Hands-on Training in Artificial Intelligence/Deep Learning – Rutgers Artificial Intelligence and Data Science Collaboratory (February 18th, 2025 – April 31st, 2025)
- ◆ Introduction to Java Mission-planning and Analysis for Remote Sensing (JMARS) – Arizona State University (April 22, 2025)
- ◆ Lunar Surface Science Workshop 26 – Uncrewed Science with the Pressurized Rover (April 9–10, 2025)
- ◆ Phenom XL G2 Desktop SEM (Scanning Electron Microscope) Training – Rutgers University (January 31, 2025)
- ◆ 32nd Meeting of the NASA Small Bodies Assessment Group (SBAG) (January 7–9, 2025)
- ◆ Mineral Informatics Datathon – Rutgers University (November 25–26 2024)
- ◆ JEOL JXA 8200 Electron Microprobe Training – Rutgers University (November 21, 2024)
- ◆ LPI Mars Exploration Program Analysis Meeting #18 (November 6–7 2024)

INSTRUCTIONAL DEVELOPMENT

- ◆ Supporting Multilingual Students – Virtual Course – ELLEVATION (April 2023)
- ◆ Energy in the Classroom PD – Utah Science Teachers Association (February 2023)

- ◆ Teaching Science in the Multiverse – Utah Science Teachers Association (October 2022)
- ◆ Jordan School District Professional Development – Mountain America Expo (August 2022)

CURRICULUM DEVELOPMENT

Petrology	Improved and organized labs	Rutgers University, EPS Dept. (Fall 2025)
Astronomy B	Launched new course	Copper Hills High School (August 2023)
Astronomy A	Introduced research	Copper Hills High School (August 2022)
Physics	Developed exercises	Copper Hills High School (August 2022)
Physics	Restructured testing	Springville High School (January 2022)
AP Physics 1	Reworked labs	Springville High School (January 2022)
Phy S 100 Lab	Prepared lectures	Brigham Young University (2018 – 2020)

ACTIVITIES

- ◆ Member of the Geological Society of America. Divisions: Energy Geology; Geoinformatics and Data Science; Mineralogy, Geochemistry, Petrology and Volcanology; Planetary Geology (January 2025 – present)
- ◆ Member of the Association for Women Scientists. (November 2025 – present)
- ◆ High School Girls Tennis Head Coach, ESports Coach, and Ballroom Coach (August 2022 – April 2024)
- ◆ American Folk Ensemble – Performance Ambassador to Malopolska Folk Festival in Poland (July 2023)
- ◆ Kickball Team Manager and Captain at Stonewall Sports SLC (Summer 2023)
- ◆ BYU Ballroom Dance Company – Ensemble III Dancer (August 2019 – April 2020)
- ◆ Studied abroad in Israel, Palestine, Greece, and Jordan (Summer 2019)
- ◆ Certificate of Merit Level 7 with Honors – Piano (2016)