Madison Turner

Postdoctoral Fellow
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Education

Johns Hopkins University, Baltimore, Maryland
Ph.D., Planetary Science
September 2018-October 2023

University of Maryland, College Park, Maryland
B.S., Geology
Departmental Honors
January 2014-August 2018

Research Experience

January 2026—present

- Postdoctoral Research Fellow with Dr. Ross Beyer and Dr. Andrew Annex
- Survey Lunar and Martian planetary surfaces for syn- and post-formational impact craters to constrain surface processes
- Analyze orbital imagery of the Martian surface to better understand global morphological trends
- Study the geology seen at Gale crater, Mars as a Science Team Member of NASA's Mars Science Laboratory (MSL) mission
- Participate in rover planning activities and generate science plans for uplink to the rover as a Geology Keeper of the Plan

Projects: "Constraining the evolution of Mars through Bayesian inference of impact craters above and below Medusae Fossae Formation"; "Centimeter-scale polygonal terrain on Mars: constraints on polygonal ground formation from *Curiosity* Rover"

October 2023—December 2025

- Postdoctoral Research Fellow with Prof. Edwin Kite
- Analyze orbital imagery of the Martian surface to better understand global morphological trends
- Study the geology seen at Gale Crater, Mars as a Science Team Member of NASA's Mars Science Laboratory (MSL) mission
- Participate in rover planning activities and generate science plans for uplink to the rover as a Geology Keeper of the Plan

Projects: "Early thinning, late persistence, diachronous boundaries, and a regional dichotomy in Mars' young sedimentary rocks", published in *Nature Communications Earth & Environment*; "Pacing Early Mars Sedimentary Rock Formation", published in *Geophysical Research Letters.*

September 2018—October 2023
Johns Hopkins University, Baltimore, MD

- Graduate Research Assistant with Prof. Kevin Lewis

- Study the geology seen at Gale Crater, Mars as a Science Team Member of NASA's Mars Science Laboratory (MSL) mission
- Utilize orbital and in situ imagery, from the Curiosity rover's cameras, to analyze stratigraphic and morphologic characteristics
- Participate in rover planning activities and generate science plans for uplink to the rover as a Geology Keeper of the Plan
- Plan and execute field research studying Quaternary Loess deposits in Nebraska, USA
- Collect, process, and analyze multiple epoxy peel samples for analyses of grainsize variations with stratigraphy

January 2017-May 2018
University of Maryland, College Park, MD

- Conducted undergraduate research in the Sulfur Isotope Laboratory with Dr. James Dottin under Prof. James Farquhar
- Studied mass dependent and mass independent fractionation of sulfur isotopes in ocean island basalts (OIBs) and CM chondrite meteorites
- Participated in laboratory sample preparation and analysis including full extraction of different sulfur components (sulfates, elemental sulfur, acid volatile sulfur (AVS)) and characterization using isotope ratio mass spectrometry (IRMS)

May 2015- July 2015
University of Notre Dame, South Bend, IN

- Conducted REU research in the Research for Chemical Actinides Laboratory under doctoral candidates Tyler Spano and Ewa Dzik, Dr. Peter C. Burns, and Dr. Ginger E. Sigmon
- Studied Uranyl Vanadate mineral synthesis and structure.
- Participated in laboratory sample preparation and analysis using inductively coupled plasma- optical emission spectrometry (ICP-OES), x-ray fluorescence (XRF) and powder and single crystal x-ray diffraction (XRD).

Publications

- Madison Turner; Sabrina Y Khan; Axel Noblet; Kevin Lewis; Edwin S Kite "Early thinning, late persistence, diachronous boundaries, and a regional dichotomy in Mars' young sedimentary rocks" *Nature Communications Earth & Environment.* (2025) 6.
- Madison Turner Edwin Kite "Pacing Early Mars Sedimentary Rock Formation" *Geophysical Research Letters. (2026)* 53.
- Madison Turner; Aster C Cowart; Steve G Banham; Frances Rivera-Hernández; William Rapin; Edwin S Kite "Centimeter-scale polygonal terrain on Mars: constraints on polygonal ground formation from the *Curiosity* Rover" **In Prep.**
- Edwin S Kite; Benjamin M Tutolo; Madison Turner; Heather Franz; David G Burtt; Thomas F Bristow; Woodward W Fischer; Ralph E Milliken; Abigail A Fraeman; Daniel Zhou "Carbonate formation and fluctuating habitability on Mars" *Nature*. (2025) 643.
- Daniel Y Zhou; Madison Turner; William Rapin; Juergen Schieber; Amelie L Roberts; Aster C Cowart; Megan E Hoffman; Bernard Hallet; Steve G Banham; Deirdra Fey; Kevin W Lewis; Sanjeev Gupta; Claire E Newman; Ashwin R Vasavada; Cathy M Weitz; William E Dietrich; John A Grant; Daniel Viúdez-Moreiras; Edwin S Kite "How does topography affect wind abrasion on Mars? Recently observed shifts in ventifact orientation at Gale crater" *Icarus*. (2025) 437.
- Madison Turner; Leafia Sheraden-Cox; Sabrina Y Khan; Kevin Lewis "Explorations of the Quaternary Peoria Loess: A Terrestrial Analog for Martian Dust Deposition" *Journal of Geophysical Resarch: Planets.* **Submitted**.

- Madison Turner Kevin Lewis "The Geologic Structure of the Vera Rubin Ridge, Gale Crater, Mars" *Journal of Geophysical Research: Planets.* (2023) 128.
- Melissa J Meyer; Ralph E Milliken; Kathryn M Stack; Lauren A Edgar; Elizabeth B Rampe; Madison Turner; Kevin W Lewis; Edwin S Kite; Gwénaël Caravaca; Ashwin R Vasavada; William E Dietrich; Alexander B Bryk; Olivier Gasnault; Stéphane Le Mouélic; Christina H Seeger; Rachel Y Sheppard "Geological context and significance of the clay-sulfate transition region in Mount Sharp, Gale crater, Mars: An integrated assessment based on orbiter and rover data" *GSA Bulletin.* (2024).
- Rob Sullivan Mariah M Baker; Claire Newman; Madison Turner; Juergen Schieber; Catherine Weitz; Bernard Hallet; Douglas Ellison; Michelle Minitti "The Aeolian Environment in Glen Torridon, Gale crater, Mars" *Journal of Geophysical Research: Planets*. (2022) 127, 8.
- Lyle L Nelson; Jahandar Ramezani; John E Almond; Simon A F Darroch; Wendy L Taylor; Dana C Brenner; Ryan P Furey; Madison Turner; Emmy F Smith "Pushing the boundary: A calibrated Ediacaran-Cambrian stratigraphic record from the Nama Group in northwestern Republic of South Africa" *Earth and Planetary Science Letters*. (2022) 580.
- Ben T Cardenas; John P Grotzinger; Mike P Lamb; Christopher Fedo; Alex Bryk; William Dietrich; Nathaniel Stein; Kevin Lewis; Madison Turner "Fluvial barform deposits of the Carolyn Shoemaker formation, Gale crater, Mars" *Journal of Sedimentary Research*. (2022) 92, 12.
- Tyler L Spano; Ewa A Dzik; Melika Sharifironizi; Megan K Dustin; Madison Turner; Peter C. Burns "Thermodynamic investigation of uranyl vanadate minerals: Implications for structural stability" *American Mineralogist*. (2017) 102, 6.
- Katlyn Turner Dylan R Rittman; Rachel A Heymach; Cameron L Tracy; Madison L Turner; Antonio F Fuentes; Wendy L Mao; Rodney C Ewing "Pressure-induced structural modifications of rare-earth hafnate pyrochlore" *Journal of Physics, Condensed Matter*. (2017) 29, 25.

Conference Presentations

- *Understanding Martian Macrostratigraphy.* **(Invited)** GSA Fall meeting, Fall 2025. San Antonio, Texas.
- *Centimeter-Scale Polygonal Terrain on Mars: Constraints on Polygonal Ground Formation from the Curiosity Rover.* GSA Fall meeting, Fall 2025. San Antonio, Texas.
- *Mars' Sedimentary Clock: Accumulation Rates and Timescales Tracked from Syndepositional Craters.* 56th Annual Lunar and Planetary Science Conference (LPSC), Spring 2025. The Woodlands, Texas.
- *Mars Sedimentation in Space and Time.* 55th Annual Lunar and Planetary Science Conference (LPSC), Spring 2024. The Woodlands, Texas.
- *Explorations of the Quaternary Peoria Loess: A Terrestrial Analogue for Martian Aeolian Dust Deposition*. GSA Fall meeting, Fall 2022. Denver, Colorado.
- *Geologic Structure of the Vera Rubin Ridge, Gale Crater, Mars*. Mars Science Laboratory (MSL) Science Team meeting, Fall 2019. Pasadena, California.

Invited Seminars and Colloquia

Georgia Institute of Technology, Feb. 2026
Johns Hopkins Applied Physics Laboratory (APL), Brown Bag Lunch Seminar April 2025

Awards, Honors and Fellowships

- NSF IUSE GEOPaths Outreach Fellow 2022-2023 (JHU)

- Lewis and Clark Fund for Exploration and Field Research 2021 (JHU)
- Nathaniel Boggs, Jr. Ph.D., Memorial Fellowship September 2018-2020 (JHU)
- United States Mineralogical Society Undergraduate award 2016 (UMD)
- Marc Lipella Scholarship 2016 (UMD)
- Honors Geology program 2016 (UMD)

Field Experience

- (JHU) Led Field Campaigns to North Platte, NE. May 2021, September 2022.
- (JHU) Field Assistant to Ph.D. candidate Lyle Nelson, Orange River, Namibia and South Africa. June 2019-July 2019.
- (JHU) Regional Field Geology in Death Valley, Esmeralda Co. Nevada and Tecopa, California. March 2019.
- (Miami University) Geology Field Camp, Idaho, Wyoming, Montana. June 2018-July 2018.

Advanced Computing Experience

- **Computer Languages and Software:** MATLAB, ArcGIS, Python, Unix, MSLICE, VICAR.

Teaching, Leadership and Mentorship

- NSF IUSE GEOPaths Outreach Fellow 2022-2023
- Graduate student peer-mentor JHU (2021-2023)
- JHU EPS Buddy System co-lead (2021- 2023)
- Soccer by Rachel youth soccer coach (2021)
- Graduate Student Teaching Assistant (Fall, 2020)
- University of Maryland women's soccer team (2014-2018; captain 2017-2018)
- Member of the AGU Talent Pool Task Force (2017)