Mackenzie Michelle Mills

mackenziemills@email.arizona.edu
(253) 225-3895 (cell)

EDUCATION

The University of Arizona, Lunar and Planetary Laboratory Tucson, AZ

- Doctor of Philosophy in Planetary Sciences (Advisor: Alfred McEwen) Expected May 2025
  - Minor in Geosciences
  - Cumulative GPA: 4.0
  - Europa Clipper Graduate Affiliate (2020-)

Honors

- National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Honorable Mention, 2021

Johns Hopkins University, Krieger School of Arts and Sciences Baltimore, MD

- Bachelor of Arts in Earth and Planetary Sciences, with honors May 2020
  - Minor in Physics
  - Cumulative GPA: 3.66, Major GPA: 3.85
  - Honors thesis: Using Structure to Probe Potential Deposition Mechanisms of the Medusae Fossae Formation on Mars (Advisor: Kevin Lewis)

Honors

- Fulbright Scholar, 2020-21 (selected for grant award, unable to participate due to COVID-19)
- National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Honorable Mention, 2020
- William A. Tarr Award, 2020 recipient
- Maryland Space Grant Recipient, 2018-20
- Mildred McColl Scholarship Recipient, 2016-17, 2018-20
- Johns Hopkins University Dean's List, 6 semesters in 2017-2020
- William and Stella Margolies Scholar, 2017-20
- California Institute of Technology Summer Undergraduate Research Fellow, 2018, 2019

Field Experience

- Ediacaran Sedimentary Geologic Work, 2018, led by Emmy Smith (JHU) Death Valley, CA
  - Measured stratigraphic sections of Ediacaran-Cambrian strata
  - Identified and collected Ediacaran tubular fossils along with shale and siltstone samples for geochemical analysis
  - Mapped lateral changes of stromatolite morphology
- Oceanographic Field Work, 2019, led by Anand Gnanadesikan (JHU) St George's, Bermuda
  - Collected 24-hour hourly samples of a shallow tidal region in order to study diurnal and nocturnal fluctuations in water composition
  - Assisted in phytoplankton drags and population density counts, and coral respiration studies collaborating with the Bermuda Institute of Ocean Sciences (BIOS)
- Regional Field Geologic Work, 2019, led by Kevin Lewis (JHU) Baltimore, MD
  - Implemented geophones, gravimeters, and ground penetrating radar to map subsurface topography for studying historic sites in Baltimore City
- Geologic Field Camp, 2020, led by Emmy Smith (JHU) Nopah Range, CA
  - Practiced analog sampling methods to be utilized in spacecraft mission sample returns
  - Collaborated on a student team to map a 15 km^2 section of the Nopah Range and produce a detailed stratigraphic column of the strata
  - Digitized a geologic map of the produced 15 km^2 section using QGIS

RESEARCH AND PROFESSIONAL EXPERIENCE

Undergraduate Research Assistant, Johns Hopkins University Lewis Lab Baltimore, MD

Advisors: Drs. Kevin Lewis and Lujendra Ojha; (10 hours/week) Sept 2017-2020

- Acquired and analyzed HiRISE images using HiView for sizes and abundances of Recurring Slope Lineae in Palikir Crater on Mars as evidence of seasonal groundwater percolation
- Mapped local and regional layers of the Medusae Fossae Formation on Mars in ArcGIS to understand its structure by using MATLAB functions to calculate strike and dip trends
- Created MATLAB functions to determine layer thicknesses of Martian global geologic units

Undergraduate Research Intern, Jet Propulsion Laboratory Pasadena, CA

Advisors: Drs. Robert Pappalardo and Mark Panning; (10 weeks, 40 hours/week) June-Aug. 2018, 2019

- Used USGS software to georeference spacecraft images and construct mosaics of planetary surfaces
- Mapped high-resolution geomorphologic sites on icy satellites using ArcGIS
- Measured surface dimensions and displacement-to-length ratios of tectonic features on icy satellites
- Derived theoretical geometric corrections for spacecraft ground imaging distortions
- Created MATLAB functions to calculate seismic quake magnitudes using fault measurements
- Produced numerical seismic attenuation models using AxiSEM/Instaseis to understand effects of seismicity on mass wasting of icy satellites

Graduate Assistant, Lunar and Planetary Laboratory, University of Arizona Tucson, AZ

Advisor: Dr. Alfred McEwen Aug. 2021-

- Created geomorphologic maps in ArcGIS of a 4°x4° area of the Martian surface containing the landing site of Tianwen-1 and the Zhurong rover (see Publications)
- Defined geomorphologic features and surface units based on developed mapping criteria
- Developed a numerical model for subsurface fluid reservoirs erupting fluids and sediments on the surface to generate observed Martian cone morphologies

Graduate Research Intern, Jet Propulsion Laboratory Pasadena, CA

Advisors: Drs. Erin Leonard and Robert Pappalardo (10 weeks, 40 hours/week) June-Aug. 2021-

- Created geomorphologic maps in ArcGIS of sites on Europa at high-resolutions (12-25 m/pixel) and intermediate resolutions (43 m/pixel)
- Defined geomorphologic features and surface units based on developed mapping criteria

Teaching Assistant, Lunar and Planetary Laboratory, University of Arizona Tucson, AZ

Course: Astrobiology 214, Professor Dante Lauretta Aug.-Dec. 2021

- Designed and delivered hour-long lectures about past and future Earth planetary analogs, the movement of life between planetary bodies, ocean worlds in the solar system, and the geologic history and evolution of Mars

PUBLICATIONS

- Mills M. M. et al. (2021), "A Preliminary Regional Geomorphologic Map in Utopia Planitia of the Tianwen-1 Zhurong Landing Region," *Geophysical Research Letters*, 48, 18, e2021GL094629. doi:10.1029/2021GL094629.

PRESENTATIONS

- Mills M. M.*, Pappalardo R. T., and Panning M. P. (2018), Moonquake-Triggered Mass Wasting Processes on Icy Worlds. Presented at the American Geophysical Union Fall Meeting 2018, Walter E. Washington Convention Center, Washington D.C. (Poster presentation)
- Mills M. M.*, Pappalardo R. T., and Panning M. P. (2019), Moonquake-Triggered Mass Wasting Processes on Icy Worlds. Presented at the Lunar and Planetary Science Conference (LPSC) 2019, The Woodlands Waterway Convention Center, The Woodlands, TX. (Poster presentation)
- Mills M. M.*, Pappalardo R. T., and Panning M. P. (2019), Moonquake-Triggered Mass Wasting Processes on Icy Worlds. Presented at the Jet Propulsion Laboratory, in the Icy Worlds Collaboration Exchange (ICE) Seminar Series, Pasadena, CA. (Oral presentation)

- Mills M. M.*, Pappalardo R. T., and Panning M. P., Leonard E. J., Howell S. M. (2020), Moonquake-Triggered Mass Wasting Processes on Icy Worlds. Abstract accepted at the Lunar and Planetary Science Conference (LPSC) 2020, The Woodlands Waterway Convention Center, The Woodlands, TX. Conference cancelled due to COVID-19.
- Mills M. M.*, McEwen A. S., and Okubo C. H. (2021), A Preliminary Regional Geologic Map of Utopia Planitia in the Potential Tianwen-1 Landing Region, abstract #7015. Presented at the 2021 Annual Meeting of Planetary Geologic Mappers. (Oral Presentation)
- Mills M. M.*, McEwen A. S., and Okubo C. H. (2021), A Preliminary Regional Geomorphologic Map in Utopia Planitia of the Tianwen-1 Zhurong Landing Region, abstract #830428. Presented at the American Geophysical Union Fall Meeting 2021, Ernest N. Morial Convention Center, New Orleans, LA (Poster presentation)
- Mills M. M.*, Leonard E.J., and Pappalardo R.T. (2021), At the Cutting Wedge: Producing Geomorphologic Maps in the Argadnel Regio Region of Europa, abstract #830749. Presented at the American Geophysical Union Fall Meeting 2021, Ernest N. Morial Convention Center, New Orleans, LA (eLightning presentation)

*Presenting author

PROFESSIONAL ACTIVITIES

Project-Based Learning Opportunities and Exploration of Mentorship (Project POEM) Tucson, AZ
University of Arizona 2021-

- Mentored visually-impaired middle and high school students in introductory planetary cratering studies and presenting skills

Chapter President, Alpha Kappa Chapter of Sigma Gamma Epsilon Baltimore, MD
Johns Hopkins University 2019-20

- Organized and moderated career and research panels with JHU faculty and Baltimore professionals in the earth and planetary sciences
- Coordinated events to raise interest in and funds for the earth and planetary sciences: movie screenings with accompanying talks by JHU faculty and staff, fundraisers for local nonprofit organizations such as Blue Water Baltimore, and planning introductory geology courses for Baltimore high school students as part of JHU@Splash
- Collaborated with departmental and university student organizational staff
- Directed weekly chapter meetings

Treasurer, Alpha Kappa Chapter of Sigma Gamma Epsilon Baltimore, MD
Johns Hopkins University 2018-19

- Balanced the chapter budget and allocated funds appropriately for chapter events
- Collaborated with departmental and university financial staff
- Organized and procured materials for chapter events and weekly meetings
- Collected Chapter dues and created an annual membership roster each semester

Chair of Philanthropy, Pi Beta Phi Fraternity for Women Baltimore, MD
Johns Hopkins University 2017-19

- Directed principal philanthropy fundraiser, *Pi Phi Gives You Wings*, for *Read Lead Achieve*, an initiative supporting childhood literacy
- Tutored for *Champions Are Readers*, a weekly volunteer group helping elementary students improve their literacy skills, at Margaret Brent Elementary School in Baltimore City

Academic Tutor, Johns Hopkins Tutorial Project Baltimore, MD
Johns Hopkins University 2016

- Designed bi-weekly lesson plans of academic exercises for elementary students
- Mentored Baltimore City students in their reading and mathematical skills

SKILLS AND CERTIFICATIONS

- Open Water SCUBA Certification (cert. 2015)
- Private Pilot License (cert. 2017)
- Intermediate French language ability; elementary German language ability
- Intermediate proficiency in MATLAB, basic proficiency in Python
- Supercomputer experience on the Maryland Advanced Research Computing Center