

Mackenzie Michelle Mills

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EDUCATION

Johns Hopkins University, Krieger School of Arts and Sciences

Baltimore, MD

May 2020

- Bachelor of Arts in Earth and Planetary Sciences (GPA: 3.66, Major GPA: 3.85)
- Minor in Physics

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
- William and Stella Margolies Scholar, 2017-20
- California Institute of Technology Summer Undergraduate Research Fellow, 2018, 2019

Relevant Coursework – Completed: Differential Equations and Applications, Earth & Planetary Fluids, Remote Sensing of the Environment, Planetary Interiors, Space Weathering, Exoplanets and their Atmospheres, Planetary Surface Processes, Cosmochemistry, Seminar in Regional Field Geology, Structural Geology, Topics in Planetary Exploration, Planetary Atmospheres, Math Methods: Earth & Planetary Sciences

Field Experience

- Ediacaran Sedimentary Geologic Work, 2018 Death Valley, CA
 - Mapped local stratigraphy and geologic units of the Wood Canyon Formation
 - Collected shale samples for geochemical analysis
 - Searched for and documented occurrences of Ediacaran fossil beds within the Wood Canyon Formation
- Oceanographic Field Work, 2019 Bermuda Institute of Ocean Sciences, Bermuda
 - Collected 24-hour hourly samples of a shallow tidal region in order to study diurnal and nocturnal fluctuations in water composition
 - Assisted in conducting phytoplankton drags and population density counts
 - Assisted in coral respiration studies with varying species and light exposure
- Regional Field Geologic Work, 2019 Baltimore, MD
 - Implemented geophones, gravimeters, and ground penetrating radar to map subsurface topography for studying historic sites in Baltimore City
- Geologic Field Camp, 2020 Death Valley, CA
 - Performing stratigraphic mapping of local geologic units of Ediacaran rock outcrops
 - Practicing planetary analog sampling methods that would be utilized in planetary mission sample returns

RESEARCH OBJECTIVE

Utilize spacecraft data and remote sensing to understand planetary surface processes and morphologies, the effect of interior processes on surface geologic expressions, and evolution of such surfaces over time, focusing on the Tharsis Region of Mars and icy satellites of the outer solar system.

RESEARCH AND PROFESSIONAL EXPERIENCE

Undergraduate Research Assistant, Johns Hopkins University Lewis Lab

Baltimore, MD

Sept 2017-2020

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

- 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
- Generated geochemical concentrations, namely sulfur values, in Excel for analysis of Martian dust origins

- Created MATLAB functions to determine layer thicknesses of Martian geologic units based off the current Martian global geologic map
- 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
- Currently writing an honors thesis to identify deposition mechanisms and potential sediment sources of the Medusae Fossae Formation
- Applied to the Fulbright Program and the NSF Graduate Research Fellowships Program to fund future research, 2019

Undergraduate Research Intern, NASA Jet Propulsion Laboratory, California Institute of Technology Pasadena, CA

Advisors: Drs. Robert Pappalardo and Mark Panning; (10 weeks, 40 hours/week)

June-Aug. 2018, 2019

- Acquired planetary spacecraft data and used USGS software to georeference images and construct global geologic maps of icy satellites: Ganymede, Europa, and Enceladus
- Implemented ArcGIS and USGS software to map high-resolution geologic features and determine surface units to understand processes of deformation
- Measured surface dimensions of tectonic features, specifically normal fault populations
- Collaborated with JPL postdoctoral scholars to measure and compile displacement-to-length ratios of measured faults
- Derived theoretical geometric corrections for spacecraft ground imaging distortions
- Created MATLAB functions to calculate potential seismic quake magnitudes using tectonic data
- Produced numerical seismic attenuation models using AxiSEM/Instaseis to understand effects of seismicity on mass wasting of icy satellites

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.

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.
Scheduled presentation on expanded research for LPSC 2020.

Mills, M. M.*, Pappalardo, R.T., and Panning, M.P., (2019) Moonquake-Triggered Mass Wasting Processes on Icy Worlds. Presented verbally twice at the NASA Jet Propulsion Laboratory, California Institute of Technology, in the Icy Worlds Collaboration Exchange (ICE) Seminar Series, Pasadena, CA.

Howell, S.M.*, Mills, M. M., Hughson, K., Panning, M.P., and Pappalardo, R.T., (2019) Ocean World Rifting: Geomechanical Inferences from Normal Fault Populations on Icy Bodies. Presented at the American Geophysical Union Fall Meeting 2019, Moscone Center, San Francisco, CA.

*Presenting author

PROFESSIONAL ACTIVITIES

Chapter President, Alpha Kappa Chapter of Sigma Gamma Epsilon

Baltimore, MD
2019-20

Johns Hopkins University

- Organized and moderated panels with JHU faculty and Baltimore professionals through career and research panels, allowing undergraduate students to learn about potential career paths and research fields within 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 postdoctoral scholars, 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
- Organized and hosted bi-monthly social events to strengthen club friendships
- Collaborated with departmental and university student organizational staff
- Directed weekly chapter meetings

Treasurer, Alpha Kappa Chapter of Sigma Gamma Epsilon

Baltimore, MD
2018-19

Johns Hopkins University

- Balanced the chapter budget and allocated funds appropriately for 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
2017-19

Johns Hopkins University

- 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

Johns Hopkins Tutorial Project

Baltimore, MD
2016

Academic Tutor, *Johns Hopkins University*

- 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, Java, and Fortran
- Supercomputer experience on the Maryland Advanced Research Computing Center
- Intermediate proficiency with Excel, ArcGIS, and USGS Integrated Software for Imagers and Spectrometers