Alyssa C. Mills

Doctoral Candidate
Department of Geosciences,
Baylor University
Baylor Sciences Building, D.
409 Waco, TX, 76798
alyssa_mills1@baylor.edu (443) 752- 9896

Education

Current	**Ph.D. (expected 2027)**: Department of Geosciences, Baylor University, Waco, TX, USA. Advisor: Associate Professor Peter B. James
2018	**B.S. Geology (with honors)**: Department of Geology, University of Maryland, College Park, MD, USA. Thesis: Elastic Flexure Models for Sputnik Planitia on Pluto Advisor: Professor Laurent G.J. Montési
2018	**B.S. Astronomy**: Department of Astronomy, University of Maryland, College Park, MD, USA.
2018	**Geological Field Camp**: School of Earth and Environmental Science, University of St. Andrews, St, Andrews, Scotland, UK.

Professional Experience

May 2025- July 2025: **APL Visiting Researcher**
Johns Hopkins' Applied Physics Laboratory- Laurel, MD
Supervisor: Dr. James Roberts

- Revising CitcomS convection model to fit Europa to understand the role of convection in Europa's ice shell heat distribution
- Modeling the gravity anomalies associated with convection upwellings and downwellings through dirty ice

May 2024- July 2024: **NASA Graduate Intern**
NASA Goddard Space Flight Center- Greenbelt, MD
Supervisors: Dr. Connor Nixon

- Test aging theory of chaos based on degree of rounding, angularity, and jaggedness of chaos blocks
- Produce correlation matrices and analysis of various metrics like those listed above and in Leonard et al. (2022) to find if any new correlations exist to find any hints towards the chaos formation mechanism enigma

June 2023- Aug 2023: **NASA Graduate Intern** *NASA Goddard Space Flight Center- Greenbelt, MD*
Supervisors: Dr. Connor Nixon

- Reconstruct Europan chaos block movements through geospatial techniques
- Provide consultation on geological interpretation on machine learning algorithm results and lead a manuscript's geology implications of the machine learning model

Aug 2022- : **Graduate Teaching Assistant**
Department of Geosciences, Baylor University- Waco, TX

Supervisor: Sharon Browning

- Instructor for 2 sections of Geo1401 lab for Fall 2022, teaching students introductory topics of geological hazards with hands-on lab work

June 2022- Aug 2022: **NASA Graduate Intern**
NASA Goddard Space Flight Center- Greenbelt, MD
Supervisors: Dr. Connor Nixon

- Create training datasets for a machine learning algorithm that identifies ice blocks in chaos regions of Europa
- Provide geological expertise to the team and lead a manuscript of the team project

Jan 2022- May 2022: **JPL Graduate Year-Round Intern**
NASA Jet Propulsion Laboratory (JPL)- Pasadena, CA
Supervisors: Dr. Robert Pappalardo and Dr. Erin J. Leonard

- Map and interpret surface features (primarily chaos terrain) on Europa with Galileo spacecraft images, using Geographical Information Systems (GIS) software, specifically ArcGIS
- Understand linear fabric contribution on chaos terrain fracturing on Europa
- Modeling of surface–subsurface exchange processes on Europa in Matlab to explain chaos terrain formation

Jan 2022- May 2022: **Graduate Research Assistant**
Department of Geological Sciences, The University of Alabama- Tuscaloosa, AL
Supervisor: Dr. Alain Plattner

- Develop software and documentation for Slepian functions as part of NSF grant: *Reproduceable Research and Educational Software for Geoscience Data Analysis in Spherical and Planar Geometry*
  See github: https://github.com/Slepian/Slepian

Aug 2021- Dec 2021: **Graduate Teaching Assistant**
Department of Geological Science, The University of Alabama- Tuscaloosa, AL
Supervisor: Dr. Julia Cartwright

- Instructor for 3 sections of Geo101 lab for Fall 2021, teaching students introductory topics of geology with hands-on lab work

Jan 2020- Aug 2021: **Graduate Research Assistant**
Department of Geological Sciences, The University of Alabama- Tuscaloosa, AL
Supervisor: Dr. Alain Plattner

- Create magnetic field inversion models for Ganymede to understand connections to the interior and estimate the depth to sources
- Provide ideal spacecraft trajectories for determination of field characteristics of Ganymede

July 2021- Aug 2021: **JPL Graduate Summer Intern**
NASA Jet Propulsion Laboratory (JPL)- Pasadena, CA
Supervisors: Dr. Robert Pappalardo and Dr. Erin J.
Leonard

- Map and interpret surface features (primarily chaos terrain) on Europa with Galileo spacecraft images, using Geographical Information Systems (GIS) software, specifically ArcGIS
- Comparative analysis of chaos terrains through the solar system

July 2020-Aug 2020 **Graduate Research Assistant**
Department of Geological Sciences, The University of Alabama- Tuscaloosa, AL
Supervisor: Dr. Alain Plattner

- Develop software and documentation for Slepian functions as part of NSF grant: *Reproduceable Research and Educational Software for Geoscience Data Analysis in Spherical and Planar Geometry*
- See github: https://github.com/Slepian/Slepian

May 2020- July 2020: **JPL Graduate Summer Intern**
NASA Jet Propulsion Laboratory (JPL)- Pasadena, CA
Supervisors: Dr. Robert Pappalardo and Dr. Erin J. Leonard

- Map and interpret chaos regions (<1 km in diameter) on Europa using Geographical Information Systems software (ArcGIS) on the Galileo spacecraft images of Europa, comparing block size and orientations between regions
- Perform statistical analysis to determine any correlations/ patterns between chaos regions and icebergs on Earth

Aug 2019- Dec 2019: **Graduate Teaching Assistant**
Department of Geological Science, The University of Alabama- Tuscaloosa, AL
Supervisor: Dr. Delores Robinson

- Instructor for 3 sections of Geo101 lab for Fall 2019, teaching students introductory topics of geology with hands-on lab work

June 2019- Aug 2019: **Research Assistant**
NASA Goddard Space Flight Center- Greenbelt, MD
Supervisor: Dr. Lynnae C. Quick

- Obtained topographic profiles of cryolava domes on Europa from Galileo data in ArcGIS to determine elastic thickness and heat flux
- Determined existence of local thinning due to cryovolcanism on Europa

Jan 2019- June 2019: **Physical Research Scientist**
Center for Earth and Planetary Studies, Smithsonian Institution- District of Columbia
Supervisor: Dr. Lynnae C. Quick

- Compiled a detailed database with ArcGIS that includes the locations, dimensions, shapes, and geological settings of domes on Europa that formed from extrusive cryovolcanism

Jan 2015-Feb 2019: **Agronomy Field Trials Research Assistant**
University of Maryland- College Park, MD
Supervisor: Dr. Jason P. Wight

- Assisted in monitoring, planting, harvesting, and analyzing Maryland variety trials, a Misted Nursery, an Aragonite study, and other various studies that incorporate corn, soybeans, and wheat
- Prepare weather summaries for the Agronomy program of the Western and Eastern Shores of Maryland

June 2017- Aug 2017: **NASA Intern**
NASA Goddard Space Flight Center- Greenbelt, MD
Supervisors: Dr. Chris Orville St. Cyr and Dr. Lynn B. Wilson

- Conducted a research project on the potential of a positive correlation between prominent

meteor showers to the elevated dust impacts detected by the Wind spacecraft, using Matlab
- Explored possible explanations of the flux in dust impact counts Wind experienced, mostly looking at comet dust streams and interstellar dust

Publications

Plattner, A.M., Johnson, C.L., Styczinski, M., Vance, S., and **Mills, A.C.** (2023). On Ganymede's Magnetic Quadrupole Strength. *Planetary Science Journal*, 4:134. doi: 10.3847/PSJ/acde7f

Leonard, E.J., Howell, S., **Mills, A.**, Senske, D.A., Patthoff, D.A., Hay, H.C.F.C., and Pappalardo, R.T. (2022). Finding Order in Chaos: Quantitative Predictors of Chaos Terrain Morphology on Europa. *Geophysical Research Letters*, 49 (8). doi: 10.1029/2021GL097309

Mills, A.C. and Montesi, L.G.J. (*in prep*). Evidence of a High Heat Flux around Sputnik Planitia on Pluto. *Nature Geoscience* (planned).

Abstracts and Conference Proceedings

Mills, A.C.* and Roberts, J.H., *Churning Europa's Ice: Assessing Convection-Induced Melts Lens Formation in Europa's Ice Shell*, Abstract #1882513, American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, December 2025.

Mills, A.C.* and Roberts, J.H.., *Churning Europa's Ice: Assessing Convection-Induced Melts Lens Formation in Europa's Ice Shel,* Texas Area Planetary Science Meeting 2025. (e-Lightening and poster)

Mills, A.C.* and James, P.B., *Nature of Rifting on Venus Revealed by Gravity-Derived Crustal Thickness*, Abstract #763, European Geophysical Union Conference 2025.

Mills, A.C.* and James, P.B., *Nature of Rifting on Venus Revealed by Gravity-Derived Crustal Thickness*, Abstract #2390, Lunar Planetary Science Conference 2025.

Mills, A.C.*, James, P.B., and Roberts, J.H., *Unveiling Europa's Seafloor Structures: A Machine-Learning Approach for Inferring Europa's Seafloor Characteristics through Gravity*, Abstract #1699976, American Geophysical Union (AGU) Fall Meeting, Washington, DC, December 2024. (oral)

Mills, A.C.* and James, P.B., *A Machine-Learning Approach for Inferring Europa's Seafloor Characteristics,* Abstract #TAPS2024-49, Texas Area Planetary Science Meeting 2024. (e-Lightening and poster)

Mills, A.C.*, James, P.B., and Roberts, J.H., *A Machine-Learning Approach for Inferring Europa's Seafloor Characteristics*, Abstract #2425, Lunar and Planetary Science Conference 2024.

Mills, A.C.*, *Piecing Together the Chaos Puzzle on Europa*, Abstract #TAPS2023-57, Texas Area Planetary Science Meeting 2023. (e-Lightening and poster)

Nixon, C.A., Yahn, Z., Duncan, E., Neidel, I., **Mills, A.C.**, Seignovert, Benoît, Larsen, A., Gansler, K., Liles, C., Walker, C.C., Trent, D.M., Santerre, J., *Feature Extraction and Classification from Planetary Science Datasets Enabled by Machine Learning*, IEEE Aerospace Conference 2023.

Mills, A.C.*, Duncan, E., Nixon, C., Trent, D., Santerre, J., Neidel, I., Larsen, A., and Walker, C., *Piecing Together the Chaos Puzzle: A Machine Learning Model for Chaos Block Identification on Europa*, Abstract #2295, Lunar and Planetary Science Conference 2023. (oral)

Mills, A.C.*, Duncan, E., Nixon, C., Trent, D., Santerre, J., Neidel, I., Larsen, A., and Walker, C., *Piecing Together the Chaos Puzzle: Preliminary Results and Implications of Europan Block Identification Using Machine Learning*, Abstract #P45E-2513, American Geophysical Union (AGU) Fall Meeting, Chicago, IL, December 2022.

Plattner, A.M.*, **Mills, A.C.**, Johnson C.L., Styczinski, M., and Vance, S., *Revisiting Constraints on Ganymede's Dynamo from Spacecraft Magnetic Field Data*, Abstract #P44C-02, American Geophysical Union (AGU) Fall Meeting, Chicago, IL, December 2022.

Leonard, E.J.*, Howell, S.M., **Mills, A.**, Senske, D.A., Patthoff, D.A., Hay, H., and Pappalardo, R.T., *Finding Order to Chaos: Quantitative Predictors of Chaos Terrain Morphology on Europa*, Abstract #EP35B-04, American Geophysical Union (AGU) Fall Meeting, Chicago, IL, December 2022.

Plattner, A.M**., Mills, A.C.***, and Johnson C.L., *How Dipole-Dominant is Ganymede's Core Field Really?*, Abstract #1111, Lunar and Planetary Science Conference 2022. (oral)

Mills, A.C.*, Leonard, E.J., Howell, S.M., Skjetne, H., and Pappalardo, R.T., *Sizing up Chaos: An Investigation of Chaos Block Size Distributions on Europa, Pluto, and Mars at the Regional Scale*, Abstract #869067, American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, December 2021. (oral)

Howell, S.M.*, Leonard, E.J., Lovelace-Sims, K., **Mills, A.C.**, Pappalardo, R.T., Senske, D.A., and Patthoff, D.A., *Formation of Europa's Chaotic Terrains by Porosity Compaction without the Prescence of Liquid Water*, Abstract #P51C-04, American Geophysical Union (AGU), New Orleans, L.A., December 2021.

Mills, A.C.*, Leonard, E.J., Howell, S.M., Skjetne, H., and Pappalardo, R.T., *Investigating Size Distributions of Chaos Blocks on Europa, Pluto, and Mars,* Abstract #368970, Geological Society of America Annual Conference, Portland, OR, October 2021. (oral)

Leonard, E.J.*, Howell, S.M., **Mills, A.**, Senske, D.A., Patthoff, D.A., and Pappalardo, R.T., *Bringing Order to Chaos: Insights on the Formation of Chaos Terrain from Geologic Mapping of Europa at the Regional Scale*, Abstract #2269, Lunar and Planetary Science Conference 2021.

Howell, S.M.*, Leonard, E.J., Lovelace-Sims, K., **Mills, A**., Pappalardo, R.T., Senske, D.A., and Patthoff, D.A., *Fomenting Chaos: Formation on Europa Through Dry Porous Compaction*, Abstract #2423, Lunar and Planetary Science Conference 2021.

Mills, A.C.*, Leonard, E.J., Pappalardo, R.T., *Chaos Blocks on Europa: An Analysis of Orientation and Size Distributions*, Abstract #753884, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 2020. (oral)

Mills, A.C.* and Plattner, A.M., *Regional Power Spectral Estimation with Application to Galileo Data of Ganymede*, Abstract #2264, Lunar and Planetary Science Conference 2020.

Mills, A.C.* and Montesi, L.G.J., *Elastic Flexure Around Sputnik Planitia, Pluto, and Evidence for a Very High Heat Flux*, Abstract #7030, Pluto Systems After New Horizons 2019.

Mills, A.C.* and Montesi, L.G.J., *Elastic Flexure Around Sputnik Planitia, Pluto, and Evidence for a Very High Heat Flux*, Abstract #1995, Lunar and Planetary Science Conference 2019.

Mills, A.C.* and Montesi, L.G.J., *Determining the Elastic Thickness of Sputnik Planitia on Pluto and its Surrounding Using Topography and Inverse Theory*, Abstract #441608, American Geophysical Union (AGU) Fall Meeting, Washington, DC, December 2018.

St. Cyr, O.C.*, Wilson, L.B., Rockcliffe, K., **Mills, A.**, Nieves-Chinchilla, T., Adrian, M.L., and Malaspina, D., *Investigations of Wind/WAVES Dust Impacts*, Abstract #SH23D-2682, American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, December 2017.

*Presenting author

Meetings and Workshops (Attendee Only)

Aug 2025	Europa Clipper PSG-15, In-person.
Oct 2024	Europa Clipper PSG-14, In-person.
June 2024	Europa Clipper Gravity and JUICE 3GM Joint Rome Meeting, In-person.
Nov 2023	Europa Clipper PSG-13, In-person.
Mar 2022	Europa Clipper PSG-11, In-person.
June 2021	Europa Clipper PSG-10, Virtual.
Sept 2020	Europa Clipper PSG-9, Virtual.
Apr 2020	In Situ Sciences and Instrumentation Workshop for the Exploration of Europa and Ocean Worlds (postponed due to Covid-19).
May 2019	Ocean Worlds 4 Meeting, Laurel, Maryland
Apr 2019	NASA Outer Planet Assessment Group Meeting (OPAG), Washington, District of Columbia.

Mission Experience

Feb 2023-	Graduate affiliate on NASA Europa Clipper mission, G/RS team

Scientific Service

2020-2024	Executive Secretary and panelist, NASA ROSES Review Panel (x7)
Mar. 12, 2024	Moderator of LPSC Session, *Juno's Rivals: Galilean Moons Exposed!*, Lunar and Planetary Science Conference, The Woodlands, TX
Dec. 12-16, 2022	Convenor and chair of AGU Sessions, P52B, P54D, and P55G: *Ice and Ocean Worlds: Geology, Oceanography, Chemistry, Habitability*, American Geophysical Union (AGU) Fall Meeting, Chicago, IL.
Dec. 12-16, 2022	Chair of AGU Sessions, P43B: *Geology and Geophysics of Active Satellites and Small Bodies*, American Geophysical Union (AGU) Fall Meeting,

	Chicago, IL.
Dec. 13-17, 2021	Chair of AGU Sessions, *P44A, P45D, P51C, and P54B: Ice and Ocean Worlds: Geology, Oceanography, Chemistry, Habitability*, American Geophysical Union (AGU) Fall Meeting, New Orleans, LA.
Dec. 7-11, 2020	Convenor and chair of AGU Session, *P075, P076, P083, and P086: Ice and Ocean Worlds: Geology, Oceanography, Chemistry, Habitability*, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.

Honors and Awards

Spring 2025-	Texas Space Grant Consortium Fellowship
Summer 2024	Texas Space Grant Consortium Scholarship
Summer 2022	John Mather Nobel Scholar
Fall 2020	AGU Virtual Student Travel Grant
Fall 2020	GSA On to the Future Award (deferred to Fall 2021 Annual Meeting)
Summer 2020	Alabama Space Grant Consortium Scholarship
Spring 2020	Travel Funding for 2020 In Situ Sciences and Instrumentation Workshop for the Exploration of Europa and Ocean Worlds
<u>Awarded at Baylor University</u>	
Summer 2024	Graduate School Doctoral Research Support Award
Summer and Fall 2024	Geosciences' GRG-E Award
Fall 2023	Teaching Excellence Award (Geosciences Department)
Spring 2023	Dr. Steven G. Driese Outstanding Grant Proposal Award
Fall 2022-Spring 2024	Geosciences and Graduate School Travel Award (x5)
Fall 2022-Spring 2023	Graduate School Fellowship
<u>Awarded at The University of Alabama</u>	
Spring 2020-Fall 2021	Conference and Research Funding Grant (x2)
Fall 2019-Spring 2021	Lindahl Scholarship
<u>Awarded at University of Maryland</u>	
Awarded Dec 2018	Department Honors (Geology)
Fall 2017-Winter 2018	Maryland Space Grant Consortium Scholarship (x2)

Fall 2018	Jeffrey and Lily Chen Scholarship
Summer 2018	CMNS Undergraduate Summer Research, Travel, and Educational Enrichment Award
Summer 2018	Geology Department Field Camp Support Scholarship
Fall 2017-Spring 2018	Mary and Robert Ross Scholarship
Fall 2016-Spring 2017	Dean's List at University of Maryland
Fall 2015-Spring 2018	College of Computer Science, Mathematics, and Natural Sciences Scholarship (x4)
Fall 2014	President's List at Harford Community College

Public Outreach

Oct 2023, 2024	Sic' Em Science Day volunteer
May 2024	Mayborn Gala volunteer
Oct 2022	Girl Scout Star Party Host
Mar 2022	Official microblogger for Lunar Planetary Science Conference
Oct 2019, 2021	Alabama Alumni Day volunteer
Mar 2021	University of Alabama's Undergraduate Research and Creative
Activity	Conference judge
Mar 2020	Official microblogger for Lunar Planetary Science Conference
Mar 2020	University of Alabama's Undergraduate Research and Creative Activity Conference judge
Feb 2020	Alabama Science Olympiad judge
Nov 2018	Pop-Up Exhibit, "Grain Elevator". Smithsonian American History Museum. 4th Annual Smithsonian Food History Weekend. 2018.
Fall 2018	Peer mentored two 6th grade students from Palm Springs, CA
Mar 2018	Geology Maryland Day volunteer
Dec 2016	Guest speaker at University of Maryland Observatory, presented on identifying flares and temperature of dM and dMe stars and possible correlation, using the iPTF database

Skills

Programing:	Matlab (advanced), Python (beginner), Java (beginner), C (beginner)
Software:	CitcomS, GMT, ArcGIS, Google Earth Engine, ANOVA, IDL
Equipment:	Electron Probe, Optical Petrography Microscope, Laser Ablation ICP-MS, Dickey John
Technical:	inverse theory modeling, elastic theory modeling, magnetic field modeling, signal processing, aperture photometry, CCD image calibration/ image processing, geological mapping (e.g. stratigraphic columns, cross sections), NASA database navigation
Other training:	Portal to the Public (museum training)

Interviews and Press Releases

June 2021 — Guest host on Cosmic Companion Season 4 Finale
Link: https://www.youtube.com/watch?v=AgmPvdXZJtQ

Oct. 2022. — John Mather Nobel Scholar Award Baylor Press Release
Link: https://blogs.baylor.edu/artsandsciences/2022/10/11/alyssa-mills/#comments

Nov. 2022 — Baylor Proud Interview on Europa Work and John Mather Nobel Scholar Award
Link:https://www2.baylor.edu/baylorproud/2022/11/baylor-phd-students-work-studying-one-of-jupiters-moons-earns-national-honor/

July 2023 — Baylor Graduate School Press on Driese Outstanding Grant Proposal Award
Link: https://graduate.baylor.edu/student-resources/funding-award-opportunities/fellowships-awards/dr-steven-g-driese-outstanding

Oct. 2024 — Baylor Media and Public Relations Press on Europa Clipper Launch and Involvement
Link: https://news.web.baylor.edu/news/story/2024/baylor-researcher-explores-ocean-moon-jupiter-through-innovative-machine-learning

Oct. 2024 — Baylor's Presidential Perspective Highlight
Link: https://president.web.baylor.edu/news/story/2024/presidential-perspective-october-24-2024

Affiliations

American Geophysical Union (AGU), European Geophysical Union (EGU), Geological Society of America (GSA), Alpha Sigma