

Madison Borrelli

Curriculum Vitae

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Georgia Institute of Technology, School of Earth and Atmospheric Sciences, Atlanta, GA 30332

RESEARCH INTERESTS

Volcanism Impact Craters Lithospheric Flexure Terrestrial Planets Icy Satellites

PROFESSIONAL APPOINTMENTS

2024–present Postdoctoral Fellow, Georgia Institute of Technology

EDUCATION

2019–2024 Ph.D. in Geological Sciences, Arizona State University
Thesis: Surface Features as a Probe into the Lithosphere: Volcanoes on Venus and Craters on Uranian Satellites

2018 B.A. in Physics, Wheaton College Massachusetts

HONORS, AWARDS, AND FELLOWSHIPS

2022 Chateaubriand Fellowship, Embassy of France

2022 Amelia Earhart Fellowship, Zonta International

2022 Physical Volcanology Intern, University of the Azores

2022 Graduate Excellence Award, ASU College of Liberal Arts and Sciences

2021 GSA Graduate Research Grant, Geological Society of America

2021 Honorable Mention, NSF GRFP

2021 Nininger Student Travel Award

2021-2022 Leadership Scholarship, ASU Graduate and Professional Student Association

2020–2021 Student Leader, ASU College of Liberal Arts and Sciences

2020–2021 Leadership Scholarship, ASU Graduate and Professional Student Association

2020 Patti Grace Smith Scholarship, Commercial Spaceflight Federation

2020 ASU GPSA Travel Grant

2014–2018 Trustee Scholar, Wheaton College Massachusetts

2014–2018 May Fellow, Wheaton College Massachusetts

PUBLICATIONS

2025 **Borrelli, M. E.**, C. Michaut., J. G. O’Rourke, “Formation of Pancake Domes on Venus as Viscous Flows Over an Elastic Lithosphere,” *Journal of Geophysical Research: Planets* XXX, X.

2025 **Borrelli, M. E.**, C. J. Bierson, J. G. O’Rourke, “Simple-To-Complex Crater Transition for the Uranian Satellites Ariel and Miranda,” *Journal of Geophysical Research: Planets* 130, 1. <https://doi.org/10.1029/2024JE008507>

2024 Ghail, R., S. E. Smrekar, **M. E. Borrelli**, P. Byrne, A. Gülcher, R. F. Garcia, R. Herrick, T. Gerya, J. G. O’Rourke, A. Davaille, E. Mulyukova, T. Rolf, I. Plesa, G. Shellnutt, M. Ivanov, “Volcanic and Tectonic Constraints on the Evolution of Venus,” *Space Sci Rev* 220, 36. <https://doi.org/10.1007/s11214-024-01065-2>

- 2023 Blaske, C. H., J. G. O'Rourke, S. J. Desch, **M. E. Borrelli**, "Meteors may masquerade as lightning in the atmosphere of Venus," *Journal of Geophysical Research: Planets*, 128, 9. <https://doi.org/10.1029/2023JE007914>.
- 2023 O'Rourke, J. G., C. F. Wilson, **M. E. Borrelli**, P. K. Byrne, C. Dumoulin, R. Ghail, A. J. P. Gülcher, S. A. Jacobson, O. Korablev, T. Spohn, M. J. Way, M. Weller, F. Westall, "Venus, the Planet: Introduction to the Evolution of Earth's Sister Planet," *Space Science Reviews*, 219, 10. <https://doi.org/10.1007/s11214-023-00956-0>
- 2021 **Borrelli, M. E.**, O'Rourke, J. G., Smrekar, S. E., & Ostberg, C. M. "A global survey of lithospheric flexure at steep-sided domical volcanoes on Venus reveals intermediate elastic thicknesses". *Journal of Geophysical Research: Planets*, 126, 7. <https://doi.org/10.1029/2020JE006756>
- 2020 **Borrelli, M. E.**, and Collins, G. C., "Testing the Cryovolcanism and Plate Bending Hypotheses for Charon's Smooth Plains," *Icarus*, doi: 10.1016/j.icarus.2020.113717

INVITED TALKS

- 2025 University of Georgia, Geology Colloquium
- 2025 Georgia Institute of Technology, Solid Earth Seminar
- 2025 Organization for Venus Early-Career Networking, Early Career Seminar
- 2024 Georgia Institute of Technology, Planetary Science & Astrobiology Seminar
- 2020 NASA New Horizons Science Team Meeting

CONTRIBUTED TALKS

- 2025 Borrelli, M. E., I. Ganesh, "Formation of Crater Outflows on Venus: Insights from Remote Sensing and Modeling", LPSC 2025, #1166
- 2024 Borrelli, M. E., C. Michaut, J. G. O'Rourke, "Formation of Pancake Domes on Venus as Viscous Flows Over an Elastic Lithosphere", Committee on Space Research 2024, #33825
- 2023 Borrelli, M. E., C. Michaut, J. G. O'Rourke, "Formation of Pancake Domes on Venus as Viscous Flows Over an Elastic Lithosphere", Venus as a System, #8008
- 2022 Borrelli, M. E., C. J. Bierson, J. G. O'Rourke, "Using Crater Statistics to Place Constraints on Resurfacing and Historic Heat Flux of Uranian Satellites Ariel and Miranda", AGU 2022, #1121085
- 2021 Venus Exploration Analysis Group Virtual Colloquium, *invited*
- 2021 Borrelli, M.E., J. G. O'Rourke, S. E. Smrekar, and C. M. Ostberg, "Global Survey of Pancake Domes Reveals Intermediate Elastic Thickness", Lunar and Planetary Science Conference, #1250
- 2021 Borrelli, M.E., J. G. O'Rourke, S. E. Smrekar, and C. M. Ostberg, "Global Survey of Pancake Domes Reveals Intermediate Elastic Thickness", Volcanic and Magmatic Studies Group Conference
- 2020 Borrelli, M. E., J. G. O'Rourke, S. E. Smrekar, and C. M. Ostberg, "A Global Survey of Lithospheric Flexure and Elastic Thickness at Steep-Sided Domes on Venus", VEXAG 2020, #8042

CONTRIBUTED POSTERS

- 2023 Borrelli, M. E., C. Michaut, J. G. O'Rourke, "Formation of Pancake Domes on Venus as Viscous Flows Over an Elastic Lithosphere", AGU 2023, #1286722
- 2022 Borrelli, M.E., D. A. Williams, J. G. O'Rourke, Investigating the Formation of Lava Channels on Venus with New Models and New Topography, LPSC 2022, #1699
- 2022 Borrelli, M. E., C. J. Bierson, J. G. O'Rourke, Crater Statistics on Ariel and Miranda Using Newly Processed Imagery and Topography, LPSC 2022, #1649
- 2021 Borrelli, M. E., D. A. Williams, J. G. O'Rourke, Investigating the Formation of Lava Channels on Venus with New Models and New Topography, VEXAG 2021, #8014
- 2020 Borrelli, M. E., J. G. O'Rourke, S. E. Smrekar, and C. M. Ostberg, "Lithospheric Thickness and Heat Flow on Venus: Results from a Global Survey of Flexure at Steep-Sided Domes", AGU Fall Meeting, #742176
- 2020 Borrelli, M. E., J. G. O'Rourke, and S. E. Smrekar, "Venus: Are Elastic Thicknesses Inferred at Coronae Globally Representative?", LPSC 2020, #2580
- 2018 Borrelli, M. E. and Collins, G. C., "Testing the Cryovolcanism Hypothesis for Vulcan Planum, Charon," Cryovolcanism Workshop, Lunar and Planetary Science Institute
- 2018 Borrelli, M. E. and Collins, G. C., "Volcanism in Vulcan Planum: Topographic Tests for the Emplacement of Smooth Plains on Charon," LPSC 2018, #2874

ATTENDED WORKSHOPS

- 2022 Planetary ReaCH Workshop, Hosted by the Lunar and Planetary Institute at ASU, Tempe, Arizona
- 2021 "Venus Evolution Through Time", International Space Science Institute, Bern, Switzerland, *invited*
- 2018 Cryovolcanism in the Solar System, Lunar and Planetary Institute, Houston, Texas

TEACHING, COMMUNITY SERVICE, AND POLICY

- Spring 2024 Teaching Assistant, Geology 103, Prof. Christy Till
Answered emails, adjusted grades, and assisted online students in a class with primarily non-majors
- Spring 2024 Teaching Assistant, Introduction to Stars, Galaxies, and Cosmology, Prof. Teresa Ashcraft
Created study materials and assisted ~700 online students in a class with both majors and non-majors
- Fall 2023 Teaching Assistant, Solar System Astronomy, Prof. Jacqueline Monkiewicz
Held office hours and assisted ~400 online students in a class with both majors and non-majors.
- 2021-2022 Chief of Staff, ASU Graduate and Professional Student Association
Assist the President in implementing the Advocacy Agenda, and manage the three directors comprising the GPSA Public Relations Team. Purchase supplies for the organization, approve expenditures, and plan and execute events.
- 2020-2021 Director of Advocacy, ASU Graduate and Professional Student Association
Advocate for institutional-level changes on behalf of the graduate student community to both administration and federal legislators
- 2020-2021 Secretary, SESE Graduate Council

Elected to serve as a liaison between graduate students and department faculty and administration

2020–2021 Graduate Student Peer Mentor, SESE
Provide support and mentorship to a first-year graduate student

2020-2021 Co-founder and facilitator, Facilitators for Inclusion
Run peer-led workshops on bystander intervention. This program was awarded a Justice, Equity, Diversity, and Inclusion (JEDI) Seed Grant

2020–2021 Instructor and Course Designer, SESE Prison Education Program
Create and implement curricula on geology and planetary science for incarcerated individuals at Eyman State Prison

Fall 2020, 2019 Teaching Assistant, Introduction to Geology, Prof. Julia Johnson
Taught laboratory sections and graded assignments for three laboratory sections of ~30 students each.

Summer 2020 ASU Sexual Violence Prevention Leadership Program
Participated in a workshop focused on gaining leadership skills and sexual harassment intervention/prevention techniques

Summer 2017 Lloyd V. Berkner Space Policy Intern, Space Studies Board, National Academy of Sciences
Wrote highlights on SSB reports for wide distribution, provided meeting minutes for the Planetary Science Decadal Survey Midterm Review