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

PUBLICATIONS

2025 Trussell A. R., J. G. O'Rourke, D. A. Williams, I. T.W. Flynn, B. A. Black, **M.E. Borrelli**, "The Importance of Carbonatite Lavas in Outgassing Venus's Modern-Day Atmosphere", *Science Advances* 11, eadw1621 (2025). https://doi.org/10.1126/sciadv.adw1621

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* 130, 5. https://doi.org/10.1029/2024JE008571

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 is not Determined by Impact Angle", VEXAG 2025, #8009

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, S. M. Howell, "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, LSPC 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?", Lunar and Planetary Science Conference, #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," Lunar and Planetary Science Conference, #2874

ATTENDED WORKSHOPS & SUMMER SCHOOLS

2025 Planetary Science Summer School, JPL, Pasadena, California. Role: Objective Lead

2022 Culturally Inclusive Planetary Engagement Workshop, Planetary ReaCH (Resources and Content Heroes), Hosted by the Lunar and Planetary Institute at ASU, Tempe, Arizona

2021 Venus: Evolution Through Time Workshop, International Space Science Institute, Bern, Switzerland

2018 Cryovolcanism in the Solar System Workshop, Lunar and Planetary Institute, Houston, Texas

TEACHING, COMMUNITY SERVICE, AND POLICY

2025-present NASA Review Panelist
Served as a panelist to assess proposals to LDAP and MDAP

2023-present Reviewer
Provided reviews for manuscripts submitted to Journal of Geophysical Research: Planets and Icarus

Spring 2024 Teaching Assistant, Geology 103, Prof. Christy Till

	Answered student questions, 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 *Assisted the President in implementing the Advocacy Agenda, and managed the three directors comprising the GPSA Public Relations Team*
Fall 2021	Field Assistant, SSERVI Toolbox for Research and Exploration (TREX) *Assisted the TREX team on two field studies in Arizona. Prepared equipment (UV, NIR, X-ray spectrometers), and assisted in taking measurements*
2020–2021	Director of Advocacy, ASU Graduate and Professional Student Association *Advocated 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 *Provided support and mentorship to a first-year graduate student*
2020-2021	Co-founder and facilitator, Facilitators for Inclusion *Ran 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 *Created and implemented 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 sessions 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*