

Emileigh S. Shoemaker

Contact Information

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Education

2018- Present, PhD, Planetary Sciences, Lunar and Planetary Laboratory, **University of Arizona**, Working Dissertation Title: “*Orbital and Ground Penetrating Radar Investigations of Volcanic Environments on Mars and Earth*,” Advisor: Lynn M. Carter, **Anticipated Completion Date: August 4, 2023**

2021, MSc, Planetary Sciences, **University of Arizona**

2017, BSc, Physics, Astrophysics Concentration, **Towson University**, Capstone: “*Quasar Absorption Lines and SDSS Galaxies*,” Advisor: Jennifer E. Scott

Research and Teaching Experience

2018-Present, Graduate Research Associate, **Lunar and Planetary Laboratory**, University of Arizona

Fall 2021, Graduate Teaching Associate, **Lunar and Planetary Laboratory**, University of Arizona, The Universe and Humanity (PTYS 170B2)

Summer 2020, Intern, **NASA Goddard Space Flight Center**

- Advisor: Jacob A. Richardson, Project: “*Mapping Buried Ice Deposits with Ground-Penetrating Radar at Askja Volcano, Northern Iceland*”

August 2017- June 2018, Post-Baccalaureate Research Intern, **NASA Goddard Space Flight Center; University of Maryland College Park**

- Advisor: W. Brent Garry, Project: “*SHARAD and MARSIS Radar Sounder Investigations of the Subsurface in the Tharsis Volcanic Province*”

Summer 2017, Intern, **NASA Goddard Space Flight Center**

- Advisor: David M. Hollibaugh Baker, Project: “*Investigating the Open Basin Lakes in the Southern Highlands of Mars using the SHARAD radar sounder*”

Summer 2016, Intern, **NASA Goddard Space Flight Center**

- Advisors: Lynn M. Carter, David M. Hollibaugh Baker, Project: “*Investigating the Open Basin Lakes in the Southern Highlands of Mars using the SHARAD radar sounder*”

2015-2017, Undergraduate Research Assistant, **Towson University**, Towson, Maryland

- Advisor: Jennifer E. Scott

2015-2017, Teaching Assistant, **Towson University**, Towson, Maryland, Introduction to Astronomy I: Lecture and Laboratory (ASTR 161)

Publications in Progress

Shoemaker, E. S., Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Carter, L. M., Whelley, P. L., and Young, K. E. (*In Prep.*) Mapping Buried Ice and Pyroclasts Using Ground-Penetrating Radar at Askja Volcano, Northern Iceland. *Planned Submission to Journal of Geophysical Research: Planets*.

Casademont, T., Eide, S., Hamran, S-E., **Shoemaker, E. S.**, Liu, Y., Nunes, D., Russell, P., Dypvik, H., Amundsen, H., and Berger, T. (*In Review*). RIMFAX Ground Penetrating Radar Reveals Dielectric Permittivity and Rock Density of Shallow Martian Subsurface. *Journal of Geophysical Research: Planets*.

Peer-Reviewed Publications

Eide, S., Casademont, T. M., Berger, T., Dypvik, H., **Shoemaker, E. S.**, & Hamran, S. E. (2022). Radar Attenuation in the Shallow Martian Subsurface: RIMFAX Time-Frequency Analysis and Constant-Q Characterization over Jezero Crater Floor. *Geophysical Research Letters*, e2022GL101429. doi: 10.1029/2022GL101429

Shoemaker, E. S., Carter, L. M., Garry, W. B., Morgan, G. A., and Plaut, J. J. (2022). New Insights into Subsurface Stratigraphy Northwest of Ascraeus Mons, Mars, Using the SHARAD and MARSIS Radar Sounders. *Journal of Geophysical Research: Planets*, 127(6), e2022JE007210. doi: 10.1029/2022JE007210

Scott, J. E., **Shoemaker, E. S.**, and Hamill, C. D. (2021). Identifying Circumgalactic Medium Absorption in QSO Spectra: A Bayesian Approach. *The Astrophysical Journal*, 923(1), 44. doi: 10.3847/1538-4357/ac2954

Shoemaker, E. S., Baker, D. M. H., and Carter L. M. (2018). Radar Sounding of Open Basin Lakes on Mars. *Journal of Geophysical Research: Planets*, 123(6), 1395-1406. doi: 10.1029/2018JE005591.

Service

October 2021-Present, Mars 2020 *Perseverance* Rover RIMFAX GPR Science Team Member

Spring/Summer 2022, Advised University of Arizona Astronomy Undergraduate Student
Alessandro Bressani. Project: “*Mapping the Subsurface Near Pavonis and Arsia Mons Volcanoes, Mars, using SHARAD Radar Sounder Data*”

Fall 2022-Present, Graduate Student Representative to the Faculty

Field Experience

2023, US Naval Arctic Submarine Laboratory “ARCEX” Exercise on sea ice, Prudhoe Bay, AK

- GPR Specialist, Advising University of Maryland, College Park graduate student Mariam Naseem in the field

2022, NASA Goddard Space Flight Center, Goddard Instrument Field Team campaign to Lava Beds National Monument and Medicine Lake Volcano, Northern California

- GPR Team Lead

2021, NASA Goddard Space Flight Center, Goddard Instrument Field Team campaign to Askja Volcano, Iceland

- GPR Specialist

2019, NASA Goddard Space Flight Center, Goddard Instrument Field Team campaign to 2014-2015 Holuhraun eruption site and Askja Volcano, Iceland

- GPR Specialist

2019, Planetary analogs and geophysical field methods trip to the Zuni-Bandera Volcanic Field, New Mexico

2019, Planetary analogs field trip to the Flagstaff area, Arizona

2018, Volcanology field methods trip to the Superstition Mountains, Arizona

2018, Planetary analogs field trip to Canyon de Chelly, Painted Desert, and Petrified National Forest, Arizona

Awards and Scholarships

2022, Zonta International Amelia Earhart Fellow

2022, Curson Education Plus Fund in Planetary Sciences and Lunar and Planetary Laboratory Travel Grant

2022, University of Arizona Galileo Circle Scholar

2022, University of Arizona Graduate and Professional Student Council Travel Grant

2021, NASA Goddard Space Flight Center Internal Scientist Funding Model Field Work Proposal to Lava Beds National Monument and Medicine Lake, CA, Science PI: Emileigh Shoemaker, Sponsoring PI: Jacob Richardson (NASA GSFC)

2020, John C. Mather Nobel Scholar

2017, Society of Physics Students Marsh W. White Outreach Award, Project Lead, Outreach Proposal: "*Science After Hours*"

2016, Towson University, Pelham Award, Physics Junior of the Year

2013-2017, Towson University Department of Physics, Astronomy, and Geosciences Scholarship

2013-2017, Towson University Provost Scholarship

Invited Talks

- February 2023, Zonta International Nogales, Arizona “Z-Club” guest lecturer. Talk Title: “From Field to Flight: Investigating Terrestrial Planets using Radar.”
- February 2023, University of Arizona Osher Lifelong Learning Institute Astronomy and Geosciences course guest lecturer. Talk Title: “From Field to Flight: Investigating Terrestrial Planets using Radar.”
- March 2022, Goddard Space Flight Center Solar System Exploration Division Internal Scientist Funding Model (ISFM) Virtual Seminar Series. Talk Title: “Ground-Penetrating Radar Ice Detection in the Field (Askja, Northern Iceland).”
- October 2020, Towson University Department of Physics, Astronomy, and Geosciences Colloquium Series. Talk Title: “Prospecting Buried Ice Preserved Beneath Pyroclastics using Ground-Penetrating Radar at Askja, Northern Iceland.”
- September 2020, Goddard Space Flight Center, NASA HQ End of Year Review of the Goddard Instrument Field Team, Talk Title: “Mapping Ice Preserved by Pyroclastics using Time-Frequency Analyses of GPR Data, Askja, Iceland.”

Selected Conference Contributions

- Shoemaker, E. S.**, Carter, L. M., Casademont, T. M., Russell, P., Eide, S., Amundsen, H. E. F., Dypvik, H., Hamran, S.-E., Brovoll, S., Berger, T., (2023). Revisiting the Subsurface Stratigraphy of the Jezero Crater Floor using the RIMFAX GPR. *54th LPSC Meeting, Abstract 2064*.
- Shoemaker, E. S.**, Baker, D. M. H., Richardson, J. A., Carter, L. M., Young, K. E., Whelley, P. L., Schmerr, N., Wike, L., Coonan, J., Kruse, S., (2022). Ground-Penetrating Radar as a Tool for Prospecting Buried Lunar Ice. *Lunar Surface Science Workshop 17. Abstract 5045*.
- Shoemaker, E. S.**, Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Carter, L. M., Whelley, P. L., Young, K. E., (2022) A Multi-Frequency Investigation of Buried Ice Deposits at Askja Volcano, Northern Iceland. *19th International Conference on Ground-Penetrating Radar*.
- Shoemaker, E. S.**, Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Carter, L. M., Whelley, P. L., Young, K. E., (2022). Multi-Frequency Ground-Penetrating Radar Surveys of Tephra and Buried Ice at Askja Volcano, Northern Iceland. *53rd LPSC Meeting, Abstract 2699*.
- Shoemaker, E. S.**, Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Whelley, P., Carter, L. M., & Young, K. E., (2021). A Multi-Frequency Ground Penetrating Radar Investigation of Buried Ice Beneath Pyroclastic Deposits at Askja Volcano, Northern Iceland. *AGU Fall Meeting 2021*.
- Shoemaker, E. S.**, Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Whelley, P., & Carter, L. M., (2020). Investigating Buried Ice at Askja Volcano, Northern Iceland using Ground Penetrating Radar: A Planetary Analog Perspective. *AGU Fall Meeting 2020*.
- Richardson, J. A., Esmaeili, S., Baker, D. M. H., **Shoemaker, E. S.**, Kruse, S., Jazayeri, S., Whelley, P. L., Garry, W. B., Bell, E., Young, K. E., Carter, L. M., Schmerr, N., (2020). Prospecting Buried Resources with Ground Penetrating Radar. *Lunar Surface Science Workshop 2020. Abstract 5134*.

Shoemaker, E. S., Carter, L. M., Garry, W. B. & Morgan, G. A., (2020). Radar Sounding of Lava Flows Northwest of Ascraeus Mons, Mars. *51st LPSC Meeting, Abstract 2752*.

Richardson, J. A., Baker, D. M. H., **Shoemaker, E. S.**, Scheidt, S. P., Whelley, P. L., Young, K. E., Graff, T. G., Achilles, C. N., Carter, L. M., Hamilton, C. W., (2020). Prospecting Buried Ice with Ground Penetrating Radar at Askja Volcano, Northern Iceland. *51st LPSC Meeting, Abstract 2326*.

Shoemaker, E. S., Baker, D. M. H., Richardson, J. A., Scheidt, S. P., Whelley, P. L. & Carter, L. M., (2020). Subsurface Structure of the 1961 Lava Flows at Askja, Iceland. *51st LPSC Meeting, Abstract 2741*.

Shoemaker, E. S., Carter, L. M., Garry, W. B., (2019). Radar Sounding of Lava Flows in the Tharsis Province, Mars. *50th LPSC Meeting, Abstract 2611*.

Shoemaker, E. S., Baker, D.M.H., Carter, L.M., (2018). Radar Sounding of Open Basin Lakes on Mars, *49th LPSC Meeting, Abstract 1612*.

Shoemaker, E. S., Baker, D.M.H., Carter, L.M., (2017). SHARAD Radar Survey of Ancient Basin Stratigraphy on Mars, *48th LPSC Meeting, Abstract 1658*.