

# Emileigh S. Shoemaker

## Contact Information

---

Address: Lunar and Planetary Laboratory, University of Arizona, Kuiper Space Sciences Building, 1629 E University Blvd., Tucson, AZ 85721

Email: [eshoemaker@arizona.edu](mailto:eshoemaker@arizona.edu)

## 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 8, 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, Teaching Experience, and Service

---

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

- 2021-Present, Graduate Student Team Member, Mars 2020 Perseverance Rover Radar Imager for Mars’ Subsurface Experiment (RIMFAX) ground-penetrating radar instrument
- Spring/Summer 2022, Advised University of Arizona Undergraduate Student Alessandro Bressani. Project: “*Mapping the Subsurface Near Pavonis and Arsia Mons Volcanoes, Mars, using SHARAD Radar Sounder Data*”
- 2022-2023, Graduate Student Representative to the Faculty

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. (*Submitted*) Mapping Buried Ice and Pyroclasts Using Ground-Penetrating Radar at Askja Volcano, Northern Iceland. *Submitted to Geophysical Research Letters*.

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., Berger, T., Dypvik, H., **Shoemaker, E. S.**, and Hamran, S-E. (*Accepted, December 2022*). Radar Attenuation in the Shallow Martian Subsurface: RIMFAX Time-Frequency Analysis and Constant-Q Characterization over the Jezero Crater Floor. *Geophysical Research Letters*. 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.

### **Field Experience**

---

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

- GPR Team Lead

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**

---

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.,** 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. 19<sup>th</sup> 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. 53<sup>rd</sup> 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., Esmaili, 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 Ascreaus Mons, Mars. 51st LPSC Meeting, Abstract 2752.

**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.