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Name of task: NASA ISFM GIFT and GCD LuNaMaps Support/698.004

Role in task/ what they do for CRESST: AS a Visiting Associate Research Scientist, I work as a field geologist and geospatial analyst in the Planetary Geology, Geophysics and Geochemistry Laboratory at NASA Goddard Space Flight Center. I study surface processes, volcanology and geomorphology of the Earth, Mars and the Moon using remote sensing, geophysics and field investigations of planetary analogs. I am a Co-I on NASA SSW, MDAP, and PSTAR projects, including the Remote In Situ and Synchrotron Studies for Science and Exploration (RISE II), a SSERVI project, and the ISFM Goddard Instrument Field Team (GIFT). In my research of Mars, I use image analysis for geological studies of volcanic, aeolian and fluvial landforms to better understand a planet's climate and geologic history. With the Artemis missions underway, the Moon has peaked my interest and I am now involved with the NASA GCD Program project called Lunar Navigation Maps (LuNaMaps). I am utilizing terrestrial analog observations to help improve the accuracy and realism of digital elevation models (DEMs). This has been an opportunity to build software tools and DEM products that will improve the testing and simulation of hazard detection instruments during entry, descent, and landing of spacecraft, hopefully improving space exploration missions. In the field on our home planet, I use remote sensing data, or I build my own portable field equipment prototypes to gather data and assist my colleagues. This includes color, UV and thermal infrared cameras, LiDAR, magnetometers, and GPS. My most recent prototype is an active UV illumination and imaging system we used to map mineral deposits on the interior of lava tube walls.

Background/ Autobiography: I became a scientist after a youth science fair in Ohio where I found a lifelong source of encouragement, chances to travel, and blue ribbons. I received a plaque from my middle school principle, the late Mr. Doug Castle, at an awards assembly. The plaque in my office that reads "Simpson's Super Scientist" now motivates me and reminds me of my career's earliest origins. Much later, I earned a degree in environmental science and did graduate work in geological sciences, and I got my first real taste of fieldwork doing coastal research in Saudi Arabia (2002). Remote sensing struck a chord. For the first time, I could see the big picture, literally from the Quickbird satellite, and I was fascinated how whole natural Earth systems worked. I survived a year doing grunt work for an environmental firm until I enrolled and completed my PhD at the University of Pittsburgh analyzing thermal IR satellite imagery and doing FTIR spectroscopy in the lab to study aeolian systems. I transitioned to planetary science when I took a postdoctoral position at CEPS within the Smithsonian Institute. I saw more of the Earth, as well as Mars. I learned to operate drones working at University of Arizona's LPL to collect my own remote sensing data, which we used to study planetary analogs of Mars in Iceland. Life brought me be back to the East Coast, and now I feel at home working with colleagues at NASA GSFC on a lot of cool projects.

Favorite part of being a CRESST Scientist? It's a dream to work with NASA as a scientist and field geologist, but it's also an exciting time to watch history unfold with each new space mission, especially to the Moon and Mars.

Highlight of research as a CRESST Scientist? Human space exploration is a theoretical idea for many people. When I do planetary analog research, it might be at the edge of a lava flow, on top of a sand dune, or underground in a lava tube. I stop and think about what a rover, a drone, or a person will do, sense, measure, and understand about another world. This perspective in the moment in the field is always a highlight. That theoretical experience could become a real experience for someone in space.

Selected Presentations

Scheidt SP, SX Hudziak, T Sweeny, CI Restrepo, JA Richardson, MK Barker, NE Petro, J Hurtado, PL Whelley, K Young, T Glotch (2023). Sharpening our tools: building lander-scale synthetic DEMs using analogs to prepare for exploration at the lunar south pole. NASA Exploration Science Forum, July 17-20, 2023, College Park, MD.

Scheidt SP, DA Crown, DC Berman, DA Williams, H Bernhardt (2023). Mapping fluvial systems on martian volcanoes: investigating of Alba Mons and Amphitrites Patera. Lunar and Planetary Institute Science Conference Abstracts, Lunar Planet. Sci., LIV, abstract #2872.

Scheidt SP, Z Morse, DM Bower, C Achilles, BP Theiling (2023). Illuminating the invisible: a planetary exploration strategy in a lava tube at Mauna Loa, Hawaii: Ultraviolet-induced fluorescence imaging. Lunar and Planetary Institute Science Conference Abstracts, Lunar Planet. Sci., LIV, abstract #2786.

Richardson, JA, ER Bell, **SP Scheidt**, Y Ng, JR Espley, DA Sheppard, Y Martos (2023). Pit crater magnetic surveys. NASA Exploration Science Forum, July 17-20, 2023, College Park, MD.

Scheidt SP, SX Hudziak, JA Richardson, MK Barker, NE Petro, CI Restrepo, E Mazarico (2022). Application of Earth-analog sites for lunar simulated digital elevation models, 3rd Space Imaging Workshop, Atlanta, GA, 0-12 October 2022.

Recent Articles

Crown DA, **SP Scheidt**, DC Berman (2022). Distribution and morphology of lava tube systems on the western flank of Alba Mons, Mars, *Journal of Geophysical Research-Planets*, 127, 6. https://doi.org/10.1029/2022JE007263.

Voigt JRC, CW Hamilton, G Steinbrügge, and **SP Scheidt** (2022) Surface roughness characterization of the 2014–2015 Holuhraun lava flow-field in Iceland: Implications for facies mapping and remote sensing, *Bulletin of Volcanology, 83, 82. https://doi.org/10.1007/s00445-021-01499-4.*

Hamilton CW, **SP Scheidt**, MM Sori, AP de Wet, JE Bleacher, PJ Mouginis-Mark, S Self, JR Zimbelman, WB Garry, PL Whelley, LS Crumpler (2020). Lava-rise plateaus and inflation pits in the McCartys lava flow-field, New Mexico: An analog for pāhoehoe-like lava flows on planetary surfaces, *Journal of Geophysical Research – Planets*, https://doi.org/10.1029/2019JE005975.

To learn more about Stephen's work or for collaboration, he can be reached at: stephen.scheidt@nasa.gov or see stephenpscheidt.com