Spectral Properties of Potrillo Volcanic Field, New Mexico Terrestrial Analog Site and Assessment of Portable Infrared Spectral Imaging into Planetary Geological Field Work

Gen Ito,[1] A.Deanne Rogers,[1] Kelsey E. Young[2], Jacob E. Bleacher[2], Christopher S. Edwards[3], and Timothy D. Glotch[1]

[1] *Department of Geosciences, Stony Brook University, Stony Brook, NY 11790*
[2] *NASA Goddard Space Flight Center, Greenbelt, MD 20771*
[3] *Department of Physics and Astronomy, Northern Arizona University, Flagstaff 86011*
Contact. gen.ito@stonybrook.edu

Abstract. During geological work in future planetary missions, portable/hand-held infrared spectral imaging instruments have the potential to benefit science objectives by providing valuable information that is not easily observable by the human eye. Previously, as part of the Remote, In Situ, and Synchrotron Studies for Science and Exploration (RIS^{4}E), we have assessed how well ground-based infrared spectral imaging can be incorporated into geological field work in a planetary setting through a series of field campaigns at an analog site of Kilauea Volcano, Hawaii. We now conduct a similar study at another analog site, Potrillo Volcanic Field, New Mexico. As with Kilauea, Potrillo Volcanic Field is a basaltic terrain comparable to the Moon and some differentiated near-Earth asteroids. However, the basalt composition is alkalic, as opposed to tholeiitic for Kilauea, and Portrillo Volcanic Field also contains mantle xenoliths that cannot be found at Kilauea, therefore, assessments here will likely provide additional, unique insights. Furthermore, visible and infrared spectroscopic characterizations of geologic materials at Potrillo Volcanic Field is lacking. For this reason, we have two main objectives in this study. First, we characterize the visible/near-infrared and mid-infrared spectral properties of the geologic materials found at Potrillo Volcanic Field. This will be done through laboratory spectral measurements of samples and ground-based spectral imaging as demonstrated by works previously conducted at Kilauea. Spectral imaging utilizes emission spectroscopy in the 8 – 12 μm wavelength range as this is sensitive to major silicate spectral features and covers the terrestrial atmospheric window. Second, with the assistance of the acquired spectral knowledge, we assess the incorporation of ground-based, portable spectral imaging into sampling strategies for future human planetary missions. Our work provides foundations for spectroscopic studies at Potrillo Volcanic Field and further contributes to the assessment of the incorporation of portable infrared spectral imaging into planetary geological field work.