REFLECTANCE SPECTRA OF RARER METEORITE TYPES. T. H. Burbine[1], M. D. Dyar[1], and T. Hiroi[2], [1]Department of Astronomy, Mount Holyoke College, 50 College Street, South Hadley, MA 01075, USA (tburbine@mtholyoke.edu), [2]Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI 02912, USA.

Introduction: Reflectance spectra of meteorites are the best spectral analogs for asteroids. However, many of the "rarer" meteorite types are not well represented in spectral databases. To remedy this situation, we are obtaining reflectance spectra of a number of "rarer" meteorite types. This project supports a broader study using machine learning to build an asteroid taxonomy using meteorite spectra for training [1-3]. Linking asteroids to particular meteorite groups will allow the cosmochemical significance of the taxonomic distribution of main belt asteroid classes [4] to be better understood.

For machine learning methods to "learn" to predict meteorite classes, multiple meteorite spectra of every meteorite class are necessary to train models. To increase the number of meteorite spectra available for our machine-learning project, we have acquired over 100 Antarctic meteorite chips from the Meteorite Working Group (MWG). We here discuss spectral properties of some of the "rarer" meteorites in our sample with the least amount of terrestrial alteration.

Data: Chips of a few hundred milligrams were requested. All the meteorite chips were lightly crushed by hand and then sieved to particle sizes less than 125 µm and sent to the Keck/NASA Reflectance Experiment Laboratory (RELAB) at Brown University. Reflectance spectra were measured from 0.32 to 2.55 µm at a sampling interval of 0.01 µm. The incidence angle was 30° and the emission angle was 0°.

Discussion: A relatively large number of the measured enstatite-rich meteorites have reflectance spectra that appear mostly unweathered (**Figure 1**). All of the spectra appear relatively "flat" and "featureless" due to their virtually FeO-free silicates. Some spin-forbidden bands in the visible are present in some of the spectra.

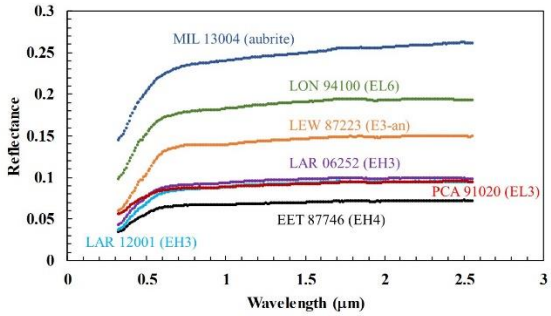

Figure 1. Visible and near-infrared reflectance spectra of the enstatite-rich meteorites.

A relatively large number of carbonaceous chondrites of petrologic types 3 to 6 also appears relatively unweathered (**Figure 2**). All of the meteorites have absorption features of varying strength due to olivine. A few of the meteorites have weak pyroxene features centered at ~1.9-2.0 µm.

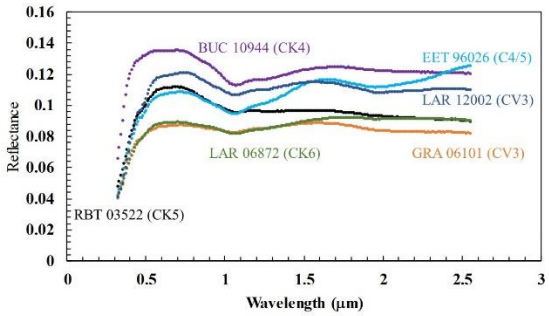

Figure 2. Visible and near-infrared reflectance spectra of the carbonaceous chondrites of petrologic types 3 through 6.

Conclusions: We are in the process of acquiring more meteorite spectra for a machine-learning project to mineralogically classify asteroids. The spectra presented here show the range of spectral properties of enstatite-rich meteorites and carbonaceous chondrites of petrologic types 3 to 6.

Acknowledgments: THB and MDD would like to thank the Remote, In Situ, and Synchrotron Studies for Science and Exploration 2 (RISE2) Solar System Exploration Research Virtual Institute (SSERVI) for support. This research utilizes spectra acquired at the NASA RELAB facility at Brown University. We also thank the Meteorite Working Group for allocating the samples.

References: [1] Wallace S. M. et al. (2019) *LPS 50*, Abstract #1097. [2] Wallace S. M. et al. (2020) *LPS 50*, Abstract #1036. [3] Dyar M. D. et al. (2020) *LPS 50*, Abstract #1037. [4] DeMeo F. E. and Carry B. (2013) *Icarus, 226*, 723-741.