N. Chanover, D. Voelz, D. Glenar, X. Xiao, R. Tawalbeh, K. Uckert, P. Boston, S. Getty, W. Brinkerhoff, P. Mahaffy and X. Li, “Results from an integrated AOTF-LDTOF spectrometer suite for planetary surfaces” *IEEE Aerospace Conference*, 1-14, IEEE, Big Sky MT (2013).

On future landed missions to Mars and small solar system bodies, efficient sample prescreening will be necessary to select interesting targets for further analysis by analytical instruments with very limited time and power resources. Near infrared spectroscopy is well suited for rapid and non-invasive identification of mineral classes, and for determining the possible presence of organic molecules. Here we describe a miniature acousto-optic tunable filter (AOTF) point spectrometer that is tunable from ~1.6 - 3.6 µm. It identifies minerals associated with aqueous environments at sample scales of ~1 mm, as well as organic molecules and volatiles. The AOTF point spectrometer was integrated with a laser desorption time-of-flight (LDTOF) mass spectrometer developed at NASA's Goddard Space Flight Center, and can be used to prescreen samples for evidence of organics before the laser desorption step and subsequent mass spectrometer measurement. The LDTOF mass spectrometer provides pulsed-laser desorption and analysis of refractory organic compounds up to 150,000 Da on a spatial scale of 50-100 µm, determined by the laser spot size at the target. The recent integration of the two instruments allowed for coincident spectral measurements of geologic samples; follow-up measurements from the LDTOF were taken from an identical region on the samples of interest, allowing for a direct comparison between the two complementary data sets. We present measurements of a standard sample suite consisting of sulfates, carbonates, clay minerals, and iron oxides. We also compare AOTF and LDTOF spectra of calcite, as well as gypsum doped with phthalic acid and valine, and discuss the relationship between reflectance spectra acquired by the AOTF and the LDTOF mass spectra. Finally, we discuss measurements made of irradiated ices such as those found in areas of high astrobiological interest like Europa.