Infrared spectroscopy of Mercury with SpeX

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We have obtained spectra of several positions on the disk of Mercury with the SpeX instrument on the IRTF at an observing run in August 2003 during excellent daytime observing conditions. A low-resolution prism mode was used for the short (0.8-2.5 micrometer) wavelength range, and a high-resolution cross dispersed mode was used for the long (2.1–5.5 micrometer) wavelength range. The observed longitudes of 140–180 degrees are located on the hemisphere observed by Mariner 10.

A very important aspect of this data set is that the spectra of Mercury are verifiable with near-simultaneous observation of locations on the Moon. These were selected both for their compositional difference (Copernicus central peak, olivine rich lithology with approximately 5 wt% FeO) and probable similarity to the average mercurian crust (Mersenius C, anorthosite rich lithology with undetectable FeO mineralogy).

The obtained spectra will be used to infer the surface composition from a spectral region that has been poorly observed previously. We are searching for weak absorption features due to a compositionally heterogeneous surface probably containing low- or no-iron pyroxenes, plagioclase feldspars and ultramafic basalt rock types, based on the results of previous thermal infrared (e.g., Sprague et al. 2002, Meteorit. Planet. Sci. 37:1255) and optical (Warell 2003, Icarus in press) studies. Though mineralogical features may not be as prominent in the present wavelength range as in the thermal infrared where the frequencies of fundamental mineralogic absorptions are located, it should present better opportunities to verify the surface composition than the optical region.

In this poster presentation we will report on the latest results of the present study, as well as those based on a similar data set obtained with SpeX in June, 2002. The latter spectra show no detectable presence of spectral absorption features in the 0.8 to 5.5 micrometer wavelength range other than those attributable to telluric water. This may indicate a surface that is highly vitrified and mature (0.8 – 2.5 micrometers) and that the mixing of thermal and reflected components mask spectral features (2.5 – 5 micrometers).