SIMULTANEOUS SPATIALLY-RESOLVED NEAR-INFRARED SPECTRA OF PLUTO AND CHARON.
A. J. Verbiscer¹, D. E. Peterson¹, M. F. Skrutskie¹, M. Cushing¹, M. J. Nelson¹, J. D. Smith², and J. C. Wilson¹ ¹University of Virginia, P.O. Box 400325, Charlottesville VA 22904 (verbiscer@virginia.edu), ²Steward Observatory, University of Arizona, Tucson AZ 87512.

Introduction: We present near-infrared spectra 0.8 – 2.5 μm of Pluto (Fig. 1) and its satellite Charon (Fig. 2) obtained with the CorMASS [1] spectrometer while it was a visiting instrument at the 6.5-m Magellan telescope at Las Campanas, Chile in May 2005. Normally a difficult observation without adaptive optics, Pluto and Charon were spatially resolved in the CorMASS slit because they were near maximum elongation in their orbit (0.7") and Magellan had excellent seeing (0.4") at the time of data acquisition. Although the resolution (R = λ/Δλ) of these spectra (R ~ 300) does not exceed that of previously obtained spectra [2-4], the wavelength range covers the rarely observed region 0.8 – 1.3 μm. The phase angle at the time of these observations was 1.3° and the sub-Earth latitude on each body was -36°.

Pluto: Centered on longitude 123°, the spectrum of Pluto, obtained simultaneously in five orders (each displayed in a different color to show regions of overlap), includes the prominent absorption features of CH₄, CO, and N₂ ice. The positions of most methane bands are shifted, commensurate with methane diluted in solid N₂ [5]. Regions of noise near 1.8 μm are attributed to telluric absorption by atmospheric water vapor. Detail of CorMASS spectrum between 2.3 and 2.5 μm (Fig. 1b) shows the region where pure ethane (C₂H₆) has narrow absorptions at 2.314, 2.405, and 2.461 μm [5]. While possible absorptions can be seen at 2.405 and 2.461 μm (as reported by [6]), no absorption is evident at this spectral resolution at 2.314 μm.

Charon: Although Pluto and Charon were spatially resolved in the CorMASS slit, Charon's spectrum is minimally contaminated by flux from Pluto. To remove this contamination, we subtracted 2.5% of Pluto's flux from that of Charon. Centered on longitude 303°, the spectrum shows the trailing side of the satellite dominated by the features of crystalline H₂O ice Ih with prominent absorptions at 1.5, 1.65, and 2.0 μm. In addition, an absorption band at 2.21 μm clearly shows the presence of ammonia hydrate NH₃H₂O on the trailing hemisphere of Charon. As it has been observed on the sub and anti-Pluto hemispheres [2] as well as the leading hemisphere [7], ammonia hydrate appears uniformly distributed on Charon's surface.

Spectral modeling. We model the spectrum of Charon (red line in Fig. 2) using a Hapke model [8]
which is an areal mixture of 50 K crystalline H₂O ice particles 25 μm in diameter and ammonia hydrate (3% NH₃·H₂O) particles 600 μm in diameter. The best fit model indicates that ammonia hydrate covers 20% of the observed portion of Charon’s surface.