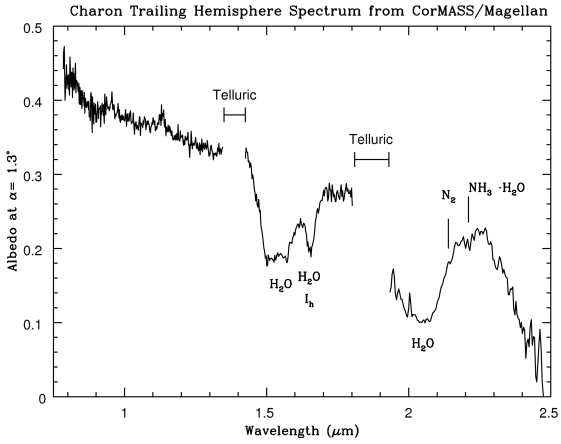
SOLID NITROGEN AND SIMPLE HYDROCARBONS ON CHARON. A. J. Verbiscer [1], D. E. Peterson[1], M. F. Skrutskie[1], M. Cushing[1], M. J. Nelson[1], J. D. Smith[2], and J. C. Wilson[1] [1]University of Virginia, P.O. Box 400325, Charlottesville VA 22904 (verbiscer@virginia.edu), [2] Steward Observatory, University of Arizona, Tucson AZ 87512.

Introduction: A near-infrared spectrum 0.8 – 2.5 μm of Pluto's satellite Charon (Fig. 1) suggests the presence of solid N_2 ice on its surface. The spectrum was 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. The phase angle at the time of these observations was 1.3° and the sub-Earth point was in the southern trailing hemisphere at latitude -36° longitude 303°. The resolution ($R = \lambda/\Delta\lambda$) of these spectra (R ~ 300) exceeds that of previously obtained spectra of the same region on Charon [2-3], although higher resolution spectra (R ~ 600 have been obtained of the sub-Pluto and anti-Pluto hemispheres [4]. The wavelength range covers the rarely observed region 0.8 – 1.3 μm.

The spectrum is dominated by the features of crystalline H_2O ice I_h 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 $NH_3{\cdot}H_2O$ on the trailing hemisphere of Charon. As it has been observed on the sub and anti-Pluto hemispheres [4] as well as the leading hemisphere [5], ammonia hydrate $NH_3{\cdot}H_2O$ appears on all sides of Pluto's satellite.

A narrow feature at 2.14 μm suggests the presence of solid N_2 ice on the surface. Solid nitrogen ice undergoes a phase change from cubic α nitrogen to hexagonal β nitrogen at 35.6 K [6]. This feature in our Charon spectrum is too narrow to be fit by by β N_2 suggesting that regions must be below 35 K, possibly on a south polar cap. We model the spectrum of Charon using a Hapke model [7] with an areal mixture in which 20% of the surface is covered by solid N_2 3mm thick, 30% by a dark neutral abosorber, and the remaining 50% by an intimate mixture of crystalline H_2O ice particles 25 μm in diameter and ammonia hydrate (3% $NH_3{\cdot}H_2O$) particles 100 μm in diameter. Additionally, we are investigating the incorporation of simple hydrocarbons such as C_2H_4 and C_2H_6 diluted in solid N_2 at 21 K [8] to explain absorption features longward of 2.2 μm that are present in this CorMASS spectrum of Charon.



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