***CASSINI* VIMS 1-5 µM SPECTRA OF THE SMALL SATURNIAN SATELLITES: RELATIONSHIPS WITH OTHER SMALL BODIES.** B. J. Buratti[1] M. D. Hicks[1], J. M. Bauer[1], R. N. Clark[2], R. H. Brown[3], K. H. Baines[1], P. D. Nicholson[4], D. P. Cruikshank[5], G. Filacchione[6], J. A. Mosher[1], [1]Jet Propulsion Laboratory, California Institute of Technology (bonnie.buratti@jpl.nasa.gov), [2]United States Geological Survey, [3]University of Arizona, [4]Cornell University, [5]Carnegie Institute of Washington, [6]INAF-IASF.

Introduction: The small satellites of Saturn are a family of objects with unique properties. They include the coorbitals Janus and Epimetheus, Pan with an orbit within the main ring system, Atlas, which orbits directly outside the A-ring, and the remote captured small satellites. One of the most important questions surrounding these bodies is their relationship to the other small objects in the Solar System, including asteroids, comets, and KBOs. The focused study afforded by the nominal four year tour of the *Cassini* spacecraft has enabled new sets of data spanning spectral ranges, viewing geometries, and temporal coverage never seen before. Due to the difficulty of observing the distant small satellites, the observations have focused on the inner small satellites (although a targeted encounter with Phoebe produced observations suggesting it was a captured KBO [1].

VIMS Observations: The *Cassini* Visual Infrared Mapping Spectrometer is a 2-channel imaging spectrometer developed jointly by NASA and ESA. 352 spectral channels span the 0.35-5.1 spectral range with spatial resolution of up to 0.25 mradians in the infrared. Spectra in the 1-5 µm spectral range were obtained for the first time for 10 small satellites described below. In addition, spectra of Phoebe and Hyperion were obtained.

Table 1 – Small satellites with VIMS spectra [2]

Name	Distance[1]	Radius (km)	Albedo
Janus	1.51	90	0.6
Epimetheus[2]	1.51	58	0.5
Helene	3.77	16	0.6
Telesto	2.95	12	1.0
Calypso	2.95	9.5	0.7
Atlas	1.38	10	0.4
Prometheus	1.39	47	0.6
Pandora	1.42	41	0.5
Pan	1.34	13	0.5
Pallene	2.12		

[1]10^5 km from Saturn [2]See spectrum in [3]

Results: Examples of the spectra obtained by VIMS are shown in the figure. Most of the spectra extracted so far suggest that the surfaces of these satellites are composed almost entirely of water ice. This finding is consistent with their high geometric albedos. The surfaces of the small inner saturnian satellites may have been coated with fresh ice particles from the E-ring, which in turn is supplied by Enceladus. On the other hand, Hyperion and Phoebe have spectra exhibiting chemical similarities to primitive asteroids, Centaurs, and KBOs, including the likely presence of complex organic species [1,4,5,6].

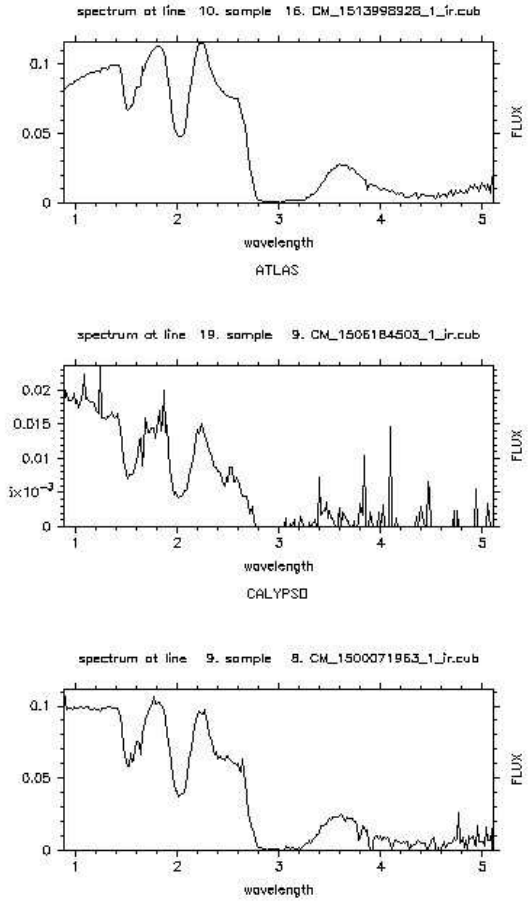

Figure. Preliminary I/F values between 1 and 5 µm for Atlas, Calypso and Epimetheus.

References: [1] Buratti, B. J. et al. (2008) *Icarus, 193,* 309-322. [2] ssd.jpl.nasa.gov. [3] Filacchione, G. et al. (2007) *Icarus, 186,* 259-290. [4] Clark, R. et al. (2005) *Nature, 435,* 66-69. [5] Cruikshank, D. P. et al. (2007) *Nature, 448,* 54-56. [6] Cruikshank, D. P. et al. (2008) *Icarus, 193,* 334-343.

Acknowledgements: This work was performed at the Jet Propulsion Laboratory California Institute of Technology under contract to NASA.