ULTRAVIOLET VIEWS OF ENCELADUS, TETHYS AND DIONE. C. J. Hansen[1] and A. R. Hendrix[2], [1]JPL, 4800 Oak Grove Dr., Pasadena, CA 91109, Candice.j.Hansen@jpl.nasa.gov, [2]JPL, 4800 Oak Grove Dr., Pasadena, CA 91109, Amanda.Hendrix@jpl.nasa.gov.

Introduction: The Cassini Ultraviolet Imaging Spectrograph (UVIS) has collected ultraviolet observations of many of Saturn's icy moons since Cassini's insertion into orbit around Saturn. We will report on results from Enceladus, Tethys and Dione, orbiting in the Saturn system at distances of 3.95, 4.88 and 6.26 Saturn radii, resp.

Icy satellite science objectives of the UVIS include investigations of surface age and evolution, surface composition and chemistry, and tenuous exospheres. We address these objectives by producing albedo maps, and reflection and emission spectra, and observing stellar occultations. UVIS has four channels: EUV: Extreme Ultraviolet (55 nm to 110 nm), FUV: Far Ultraviolet (110 to 190 nm), HSP: High Speed Photometer, and HDAC: Hydrogen-Deuterium Absorption Cell. The EUV and FUV spectrographs image onto a 2-dimensional detector, with 64 spatial rows by 1024 spectral columns. To-date we have focused primarily on the far ultraviolet data acquired with the low resolution slit width (4.8 Å spectral resolution).

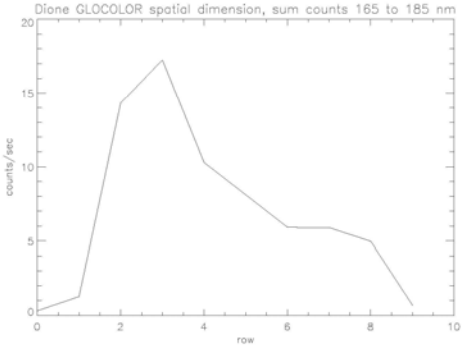
Enceladus: Results from Cassini's close flybys of Enceladus on February 17 (closest approach distance = 1179 km) and March 9, 2005 (closest approach distance = 500 km) will be discussed. Given Enceladus' geologically young surface [1] and its position at the densest region of the E ring [2] it has been speculated that resurfacing activity could be present [3]. An occultation of lambda Scorpius on February 17 offered the opportunity to search for a tenuous atmosphere and test this hypothesis, and/or to put upper limits on the potential column density of a sputtered or sublimated atmosphere.

Ultraviolet images of Enceladus' albedo will be compared to qualitative surface ages derived from crater counts. The case has been made that old surfaces are gradually darkened by radiation [4]. We will look for this correlation. Specifically, how do the young regions compare to the older regions? Is there a discernible difference in ultraviolet albedo?

The spectrum of water is very dark at wavelengths < ~165 nm, then has a distinct upturn. The precise wavelength at which water ice becomes much more reflective is a function of grain size. Enceladus' spectra will be evaluated to see how grain size of the water ice compares regionally on its surface and to the other icy satellites.

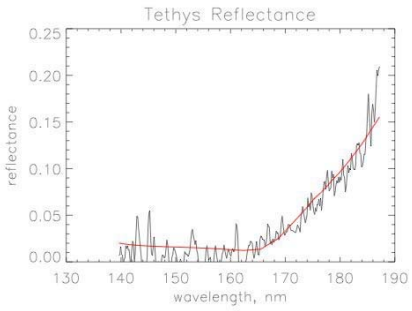
Dione: Cassini flew by Dione at a range of ~80,000 km on December 15, 2004. At this moderate distance UVIS was able to resolve Dione (9 pixels were filled). One outstanding question lingering after the Voyager flybys was "What is the nature of the bright streaks on Dione?" A plot of Dione's ultraviolet reflectivity, shown in Figure 1, compared to images acquired at the same time shows that the streaks are also bright in the ultraviolet. Possible reasons that these streaks would be bright at ultraviolet wavelengths as well as the visible will be discussed.

Figure 1. Dione ultraviolet reflectivity. The bright limb is on the left, the terminator is on right.



Tethys: A distant flyby of Tethys on October 28 at a range of 255,000 km completes this discussion of Saturn's trio of icy satellites which orbit in the E ring. Comparisons of the three will allow us to compare and contrast in particular grain sizes on their surfaces – has the E ring covered them all with a coating of similar size particles? Is correlation of surface age with albedo possible if they have been coated? Figure 2 shows a spectrum of Tethys with a compositional model of water ice plus dark material shown for comparison.

Figure 2. Tethys FUV spectrum (black) compared to model composition (red).



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