THE SATURN SYSTEM AS OBSERVED BY CASSINI'S ULTRAVIOLET IMAGING SPECTROGRAPH.

L. W. Esposito[1], C. J. Hansen[2], J. Colwell[1], A. R. Hendrix[2], W. E. McClintock[1], D. E. Shemansky[3], A. I. F. Stewart[1], Janet Hallett[3], R. A. West[2], [1]University of Colorado at Boulder, Laboratory for Atmospheric and Space Physics (LASP), 1234 Innovation Dr., Boulder, CO 80303, [2]Jet Propulsion Laboratory (JPL), 4800 Oak Grove Dr., Pasadena, CA 91109, [3]Department of Aerospace Engineering, University of Southern California, 854 W. 36th Pl., Los Angeles, CA 90089.

The Cassini Ultraviolet Imaging Spectrograph (UVIS) has major new findings in all aspects of Saturn science: Saturn, its rings, Titan and the icy satellites, and the Saturn magnetosphere. Dynamic interactions between neutrals, ions, rings, moons and meteoroids produce a highly structured and time variable Saturn system. Highlights and outstanding new results will be reported, focusing on Saturn's moons and their interaction with their environment.

The UVIS is one of Cassini's suite of remote sensing instruments. The UVIS instrument includes channels for extreme UV (55 to 110 nm) and far UV (110 to 190 nm) spectroscopic imaging, high speed photometry of stellar occultations, solar EUV occultation, and a hydrogen/deuterium absorption cell.

UVIS has detected products of water dissociation, neutral oxygen and OH, which dominate the Saturn inner magnetosphere, in contrast to Jupiter, and H fills the entire magnetosphere apparently extending through the magnetopause at far greater density than the ion population. The O and OH and a fraction of the H are probably the products of water physical chemistry, and derived ultimately from water ice. Observed fluctuations indicate close interactions with plasma sources. Sputtering from the satellites' water ice surfaces is insufficient to supply the observed mass. Stochastic events in the E ring may be the ultimate source.

Prior to Cassini's orbit insertion at Saturn UVIS detected the spectral signature of water ice on Phoebe and in Saturn's rings, mixed non-uniformly with darker constituents. Recent observations of Enceladus, Tethys, Dione, Rhea and Iapetus allow us to begin to compare the surfaces of Saturn's icy satellites. We are able to model the grain size and distribution of water ice on their surfaces via the shape of their ultraviolet spectra and albedo maps. The dark side of Iapetus and Phoebe do not look alike at ultraviolet wavelengths, possibly refuting the hypothesis that the dark side of Iapetus has been coated with material from Phoebe. The spectra of Enceladus, Tethys and Dione may be affected by their interaction with the E ring. Very close flybys of Enceladus allow us to map its ultraviolet reflectivity for comparison to surface ages derived from crater counts. With Enceladus' combination of very old and very young terrain the hypothesis that ice is darkened in the ultraviolet with age can be tested.

Titan emissions show atomic, molecular and ionized nitrogen. Haze layers have been detected in reflected light from Titan's atmosphere, and show a difference in structure between the equator and the poles. The spacecraft made a close flyby of Titan on 13 December 2004 and stellar occultations of alpha Virgo (Spica) and lambda Scorpius were observed. High resolution data on the structure and composition of Titan's atmosphere as a function of altitude were collected. By confirming the Titan atmosphere engineering model, Titan stellar occultation data was instrumental in the Cassini project decision to release the Huygens probe. We do not see evidence for a Titan nitrogen torus.