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Heavy Ion Formation in Titan's Ionosphere, Magnetospheric Introduction of Free Oxygen and Source of Titan's Aerosols?

E. Sittler (1), R. Hartle (1), J. Cooper (1), R. Johnson (2) and A. Coates

(1) NASA Goddard Space Flight Center, Greenbelt, MD, USA, (2) University of Virginia,
Charlottesville, VA, USA, (3) Mullard Space Science Laboratory, UK
(Edward.c.sittler@nasa.gov / Fax: 301-286-1433 / Phone: 301-286-9215)

With the recent discovery of heavy ions, positive and negative, by the Cassini Plasma Spectrometer (CAPS) instrument in Titan's ionosphere [Coates et al., 2007], it reveals new possibilities for aerosol formation at Titan and the introduction of free oxygen to the aerosol chemistry from Saturn's magnetosphere with Enceladus as the primary oxygen source. One can estimate whether the heavy ions in the ionosphere are of sufficient number to account for all the aerosols, under what conditions are favorable for heavy ion formation and how they are introduced as seed particles deeper in Titan's atmosphere where the aerosols form and eventually find themselves on Titan's surface where unknown chemical processes can take place. Finally, what are the possibilities with regard to their chemistry on the surface with some free oxygen present in their seed particles?

Coates, et al., GRL, vol. 34, L22103, 2007