EPSC Abstracts
Vol. 7 EPSC2012-388 2012
European Planetary Science Congress 2012

Photoelectrons in the plume of Enceladus

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Abstract

The E19 encounter on 2 May 2012 executed a sideways trajectory through the Enceladus plume with a closest approach of 65km. The CAPS field of view was oriented well away from the spacecraft ram direction, allowing different populations than cluster ions (Coates et al., 2010) or charged nanograins (Jones et al., 2009, Hill et al., 2012) to be distinguished. During the energetic particle shadow, when particles from Saturn's radiation belts are shielded by Enceladus itself, a low energy magnetospheric electron population was observed with a short reduced density interval very near to closest approach, possibly associated with flow stagnation (Tokar et al., 2009) or with ice grain charging. In addition to this population, a distinctive photoelectron peak was observed, similar to those seen in Saturn's ring environment (Coates et al., 2005 and references therein), at Titan (Coates et al., 2007, 2012, Wellbrock et al., 2012) and in the magnetosphere near Enceladus (Schippers et al., 2009) as well as at Mars and Venus (Coates et al., 2008, 2011 and references therein). We interpret these as photoelectrons from ionization of the gas and dust species in Enceladus' plume ionosphere. We will compare the observations of ionospheric photoelectrons at different locations within the Saturn system, as well as with models for photoelectrons produced in the plume region (Ozak et al., 2012).

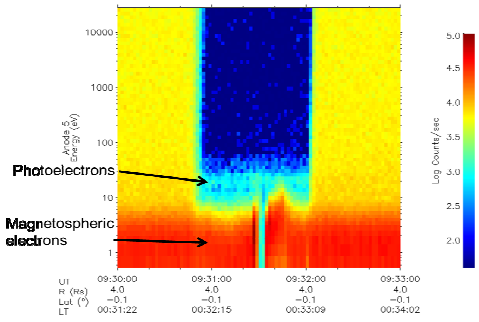

Figure 1: CAPS ELS data from the E19 encounter.

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