Geophysical Research Abstracts
Vol. 19, EGU2017-10580, 2017
EGU General Assembly 2017

Magnetospheric particle precipitation at Titan

Emilie Royer (1), Larry Esposito (1), Frank Crary (1), and Jan-Erik Wahlund (2)

(1) LASP, University of Colorado, Bouder, CO, Uniates States (emilie.royer@lasp.colorado.edu), (2) Swedish Institute of Space Physics, Uppsala, Sweden

Although solar XUV radiation is known to be the main source of ionization in Titan's upper atmosphere around 1100 km of altitude, magnetospheric particle precipitation can also account for about 10% of the ionization process. Magnetospheric particle precipitation is expected to be the most intense on the nightside of the satelllite and when Titan's orbital position around Saturn is the closest to Noon Saturn Local Time (SLT). In addition, on several occasion throughout the Cassini mission, Titan has been observed while in the magnetosheath. We are reporting here Ultraviolet (UV) observations of Titan airglow enhancements correlated to these magnetospheric changing conditions occurring while the spacecraft, and thus Titan, are known to have crossed Saturn's magnetopause and have been exposed to the magnetosheath environnment.

Using Cassini-Ultraviolet Imaging Spectrograph (UVIS) observations of Titan around 12PM SLT as our primary set of data, we present evidence of Titan's upper atmosphere response to a fluctuating magnetospheric environment. Pattern recognition software based on 2D UVIS detector images has been used to retrieve observations of interest, looking for airglow enhancement of a factor of 2. A 2D UVIS detector image, created for each UVIS observation of Titan, displays the spatial dimension of the UVIS slit on the x-axis and the time on the y-axis.
In addition, data from the T32 flyby and from April 17, 2005 from in-situ Cassini instruments are used. Correlations with data from simultaneous observations of in-situ Cassini instruments (CAPS, RPWS and MIMI) has been possible on few occasions and events such as electron burst and reconnections can be associated with unusual behaviors of the Titan airglow.
CAPS in-situ measurements acquired during the T32 flyby are consistent with an electron burst observed at the spacecraft as the cause of the UV emission. Moreover, on April 17, 2005 the UVIS observation displays feature similar to what could be aTitan aurora on the north pole, linked to a very fluctuating magnetospheric environment. CAPS data taken this same day indicates that the spacecraft crossed the magnetopause and provide evidence for possible reconnection events.