Geophysical Research Abstracts
Vol. 12, EGU2010-12860, 2010
EGU General Assembly 2010

Possible remnant interplanetary magnetic field in Titan's ionosphere during Cassini's T39 flyby

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Cassini's 39th close flyby of Titan occurred on the 20th December 2007 around 11.33 hours of Saturn local time. Closest approach (CA) took place at 2256:41 UTC at an altitude of 970 km above Titan's surface as Cassini was flying outbound from Saturn. Although the encounter occurred well inside Saturn's magnetosphere, high solar wind pressure conditions a few hours before CA made the Kronian magnetopause to recede inside the orbit of the moon, exposing it to the shocked interplanetary magnetic field (IMF) for more than an hour.
Although the external layers of draped magnetic field within Titan's induced magnetosphere have polarities compatible with Kronian fields, the magnetic field within the moon's collisional ionosphere coincides with the expected draped IMF fossil lines. In this work we discuss the origin and lifetime of these ionospheric fields and compare these results with those obtained during the T32 flyby, when fossil fields were first reported.