Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05926, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05926
EGU General Assembly 2008

Dynamics of Saturnian stream particles in interplanetary space

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The discovery of high velocity streams of nanometer-sized dust originating from the Saturnian system was one of the major findings during the approach of the Cassini spacecraft to Saturn. Based on the impact signals caused by the Saturnian stream particles recorded by the Cassini dust detector as well as by numerical simulations, those grains were found to have similar properties with Jovian stream particles (radii ranging between 2 and 25 nm, speeds $>$100km/s). The dynamics of the stream particles is shown to be dominated by the interplanetary magnetic field (IMF). Forward simulations of stream particles provide a more complete picture of the IMF-interaction. However, the relevance of the obtained parameters is difficult to assess. Thus, we analyzed the dynamics of the streams numerically by backward tracing the registered particles from the spacecraft to the source. Using in-situ IMF and solar wind speed measurements by Cassini spacecraft, we perform both forward and backward simulations to examine their physical properties and to provide constrains for the source of the Saturnian dust streams.