



## **Saturn's magnetosphere interaction with Titan for T9 encounter. Pickup ion velocity distribution: 3D hybrid simulation and comparison with CAPS's observations**

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We discuss the results of the hybrid simulation of Titan's environment in case of T9 encounter. The simulations are based on recent analysis of the Cassini Plasma Spectrometer (CAPS) ion measurements during the T9 flyby through the induced magnetic tail of Titan [1]. In our model the background ions, all pickup ions, and ionospheric ions are considered as particles, whereas the electrons are described as a fluid. Inhomogeneous photoionization, electron-impact ionization and charge exchange are included in our model. The temperature of the background electrons and pickup electrons was also included into the generalized Ohm's law. We also take into account the collisions between the ions and neutrals. The current simulation shows that mass loading by pickup ions  $H^+$ ,  $H_2^+$ ,  $CH_4^+$  and  $N_2^+$  is stronger than in the previous simulations. We consider three models for the upstream composition: (a) only magnetospheric  $H^+$  ions, (b) only  $H^+$  ions, (c) only  $H^+$  and  $H_2^+$  pickup ions. In our hybrid simulations we use Chamberlain profiles for the exosphere's components. We also include a simple ionosphere model with  $M = 28$  ions that were generated inside the ionosphere. The moon is considered as weakly conducting body. Special attention will be paid to comparing simulated pickup ion velocity distribution with CAPS's T-9 observations.

### **References**

[1] Sittler, et al., Saturn's Magnetospheric Interaction with Titan as Defined by Cassini Encounters T9 and T18: New Results, Planet. Space Sci., doi.10.1016/j.pss.2009.09.017.