



## Composition of Pickup Ions at Titan Observed by the Cassini Plasma Spectrometer

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Pickup ions have been observed in Saturn's rotating magnetosphere near Titan by the Cassini Plasma Spectrometer (CAPS) instrument during the Cassini orbiter's recent flybys of the moon. A preliminary analysis of the CAPS Time of Flight (TOF) spectra of the pickup ions observed during the TA flyby indicated the presence of  $H^+$ ,  $H_2^+$ ,  $N^+/CH_2^+$ ,  $CH_4^+$ , and  $N_2^+$  [1]. These ions slow down Saturn's magnetospheric plasma beyond Titan's ionosphere through mass loading. Because of its relatively high mass and high concentration,  $CH_4^+$  is the dominant mass loading ion. The other ions make negligible contributions to the mass loading process except for  $N_2^+$  just above the ionopause, where its concentration becomes important. With the exception of  $CH_2^+$ , the pickup ion sources are the neutral exosphere constituents H,  $H_2$ , N,  $CH_4$ , and  $N_2$ , where  $CH_2^+$  is a fragment of the parents  $CH_4$  and  $CH_4^+$ . A more detailed analysis of CAPS TOF spectra and empirical cracking patterns is carried out to determine the relative concentrations of  $N^+$  and  $CH_2^+$ . Although, the 28 amu ion was identified as  $N_2^+$ , consistent with the dominance of its neutral source,  $N_2$ , just above the ionopause, the ionospheric ion  $HCNH^+$  may also be present. The possible "leakage" of this and other ionospheric ions such as  $CH_5^+$  into the pickup ion /mass loading region is also examined by further analysis of the corresponding TOF spectra.

[1] Hartle et al., Geophys. Res. Lett., in press, 2006.