



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.