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Ion Composition of Titan's Ionosphere Observed during T9 Magnetotail Crossing

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In a recent paper, Sittler et al., (2010) presented new results on the T9 encounter by the Cassini spacecraft when it passed through Titan's induced magnetotail. Two crossings were observed, but the first crossing, event 1, is thought to be out flowing ionosphere plasma. T9 is ideal for CAPS IMS probing of the ionosphere, since the ion densities at the higher altitudes of the T9 flyby $\sim 10,000$ km, allows measurements to be made down to 1 eV without saturating its detectors. Sittler et al., (2010) reported possible detection of NH_4^+ ions, but favored the detection of CH_5^+ and C_2H_5^+ ions. In this report we investigate both the medium mass resolution (straight through (ST)) and high mass resolution (linear electric field (LEF)) composition data from the Cassini Plasma Spectrometer (CAPS) Ion Mass Spectrometer (IMS). We present a more in depth analysis of the composition data and make comparisons with ionospheric models including nitrogen chemistry such as that by Vuitton et al. (2007). The LEF data does not support NH_4^+ identification, but favors a CH_5^+ and C_2H_5^+ identification, but also molecular ions C_2N^+ and CH_2NH_2^+ are chemically allowed possibilities.

References:

1. Sittler, E. C. Jr., et al., Saturn's magnetospheric interaction with Titan as defined by Cassini encounters T9 and T18: New results, PSS, vol. 58, 327-350, 2010
2. Vuitton, V. et al., Ion chemistry and N-containing molecules in Titan's upper atmosphere, Icarus, vol. 191, 722-742, 2007.