Titan Interaction with Saturn’s Magnetosphere: Mass Loading and Ionopause Location

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Summary

• Revisit analysis by Hartle et al. (1982)
  – Upstream Parameters Reviewed.
  – Flow and ion gyro-radii of ambient plasma and pickup ions composition dependent.
  – Voyager 1 PLS ion data consistent with pickup ions.
  – Ring distributions were used to model pickup ions.
  – Finite gyro-radius effects evident in Voyager 1 PLS ion data.
  – Used exosphere model with H and N\(_2\).

• 3D Exosphere Model for Titan interaction being developed to extend original work by Hartle and co-workers.

• Have added H\(_2\), N\(^*\) and CH\(_4\) to Hartle et al. (1982) exosphere model.

• Looked into local time variations in exospheric temperature.

• Revised mass loading calculations show that CH\(_4^+\) pickup ions could be important and may provide an important source of carbon to Saturn’s magnetosphere.

• Height of ionopause critical for Titan Nitrogen Torus source strength. Ionopause thickness ~ ion gyro-radii of plasma.