Investigation of ion density and velocity variations of Saturn's inner magnetosphere - Cassini RPWS/LP observations

Madeleine Holmberg (1, 2), Jan-Erik Wahlund (1), Michiko Morooka (2)
(1) Swedish Institute of Space Physics, Uppsala, Sweden
(2) Tohoku University, Sendai, Japan

We use Radio and Plasma Wave Science (RPWS) Langmuir probe (LP) plasma measurements data from 129 Cassini orbits to map the structure and dynamics of the inner plasma disk of Saturn, from magnetic L shell 2.5 to 12. The focus is on the ion density and velocity. The derived ion densities are used to map the shape of the inner plasma torus of Saturn, showing a maximum along the orbit of Enceladus. The estimated ion velocities are found to be below corotation speed, in a statistical sense. We investigated ion density variations due to SLS4 south but could not detect any clear trend. We also investigate ion density and velocity variations where a clear minimum close to noon could be detected, both for the density and the velocity data. Our mapping will be useful for numerical model attempts in the future and can serve as a reference model for the inner plasma disk