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The variability of planetary ionospheres can be caused by several intrinsic and extrinsic influences, such as the varying solar EUV input over the solar cycle, the influence of the solar wind dynamic pressure, and the dynamics of the neutral upper atmosphere. For Venus and Mars, with no intrinsic magnetic fields, short term variability of the ionopause is controlled by solar wind dynamics. For Jupiter and Saturn, the influx of magnetospheric particles and upper atmosphere circulation changes are the primary sources of variability.

The Titan ionosphere has been investigated with the NASA Cassini spacecraft, which continues to orbit Saturn since 2005. These investigations are being carried out both with radio occultation techniques (RSS, c.f. *A.J. Kliore, et al., Space Sci. Rev. 2004),* , and by *in situ* probing with a suite of on-board instruments, including the Langmuir probe of the RPWS (*D.A. Gurnett, et al., Space Sci. Rev. 2004)* and the INMS mass spectrometer (*J.H. Waite, ., Space Sci. Rev. 2004)* .

The Cassini radio science (RSS) provided 13 occultation electron density profiles of Titan during the period of 2006 and 2009. These occultation observations showed that ten of the observed electron density profiles are similar, but three are significantly different. The number of observations is relatively small for meaningful statistical conclusions, but it has been shown, using the corresponding measured electron spectra, that the three anomalous profiles in the ionospheric peak regions are likely to be the result of unusually intense magnetospheric electron precipitation events. (*A.J. Kliore, et al., J. Geophys. Res.-Space Phys., 2011)*

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