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Negative ion and dust grain charge in Titan's ionosphere: multi-instrument case study

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Abstract

The Cassini s/c *in-situ* plasma measurements of Titan's ionosphere by Radio and Plasma Wave Science (RPWS) Langmuir Probe (LP), Cassini Plasma Spectrometer (CAPS) Electron (ELS) and Ion Beam (IBS) spectrometers are combined for selected flybys (T16, T20, T29, T40 and T56) to further constrain plasma parameters of ionosphere below 1400 km.

1. Introduction

Lower region of Titan's ionosphere has been shown to be populated by negative ions [*1-6*] and dusty plasma [*5, 7*], playing important role in the complex organic chemistry of the moon [*8, 9*]. In previous statistical studies the altitude vs solar zenith angle maps of ion charge densities [*5*] and altitude dependencies of different neg. ion mass groups were presented [*6*], but the major factor in these measurements, the charge of the neg. ions and dust grains, has so far only been predicted theoretically [*10*]. Here we determine the average neg. ion and dust grain charge and derive more detailed plasma ion and dust densities. This is achieved by combining datasets from RPWS/LP (ion densities, electron density), CAPS/ELS (neg. ion mass group densities) and CAPS/IBS (positive ion mass abundances) instruments for selected flybys (T16, T20, T29, T40 and T56).

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