

Variation of electron density in the Jovian magnetosphere: Comparison between ground-based and Galileo observations

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The satellite, Io, is known as the major plasma source of the Jovian magnetosphere and to give large effects to the electromagnetic environment in the magnetosphere. Therefore, variability in plasma environment around Io is thought to influence those of the middle and outer magnetosphere. We obtained observational data of [SII] 673.1, 671.6 nm emissions from the Io plasma torus (IPT) to study the Jovian plasma environment since 1997. According to our results, [SII] emission intensity showed a gradual decrease in recent years. This phenomenon means a decrease of electron density in the IPT.

We compared these ground-based observations with plasma wave data observed with PWS onboard the Galileo orbiter. From the dynamic spectra of these data, we obtained electron density profiles in the IPT from the upper hybrid resonance emission and those in the middle and outer magnetosphere from lower cutoff frequency of the trapped continuum radiation. As results of these procedures, we obtained the same tendency in the electron density with the ground-based observations, that is, electron density in the IPT and Jovian middle magnetosphere showed gradual decrease with time.