

Plasma density and temperature in Saturn's ionosphere

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An average electron density in Saturn's mid-latitude ionosphere obtained from radio occultations by Cassini spacecraft was about 10^4 cm^{-3} at the altitude of 2000 km where density had a peak and gradually decreased with the increasing altitude. It was about 100 cm^{-3} at the altitude of 10000 km. The topside temperature is about 650 K. Plasma densities calculated by some models also were similar to the observations. However, electron densities from those models were calculated at the altitude below 4000 km. We have developed a plasma density-temperature model of Saturn's mid-latitude ionosphere including the magnetospheric effects. We used the magnetospheric plasma density and temperature as outer boundary conditions. The ion density is about 10^4 cm^{-3} at the altitude of 2000 km. It is similar to the densities from radio occultations. On the other hand, temperature is 2000 K or higher at the altitude of 2000 km. The higher temperature is necessary if the density is about 100 cm^{-3} at the altitude of 10000 km. In this presentation, we will also discuss how the magnetospheric ion is affected by ionospheric environments (e.g. ionospheric conductivity and temperature).

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