

Jovian magnetosphere-ionosphere coupling system controlled by three-dimensional neutral dynamics

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Jupiter is a planet whose dominant energy source of the magnetosphere is the fast planetary rotation. The energy from the quasi-corotating neutral atmosphere is transported to the ionosphere through ion-neutral collisions, and toward the magnetosphere. On the contrary, the dynamics in the thermosphere and the ionosphere is largely affected by the magnetosphere through a coupling process. Axisymmetry model including the interaction have showed that the thermospheric wind dynamics contributes to a several 10s% reduction in the electric field as compared to the rigid neutral corotation case in the main oval region.

In order to investigate the effect of the ion-neutral wind dynamics on the coupling system including three-dimensional atmospheric dynamics and magnetic field distribution, we have developed the three-dimensional Jovian thermosphere model and evaluated the effect. The model includes the main physical and chemical processes in this region. As a result, we obtained neutral wind dynamics caused by polar heating and ion drag. The conservation of the current provides distribution of the field-aligned current. In this presentation, we would like to discuss the longitudinal distribution of the current relating the oval position obtained in our model and propose for the future mission.