Oral | Symbol P (Space and Planetary Sciences) | P-CG Complex & General

[P-CG38_1PM2]Planetary atmosphere, ionosphere and magnetosphere

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Thu. May 1, 2014 4:15 PM - 6:00 PM 423 (4F)

Studies of planetary atmospheres, ionospheres and magnetospheres will be presented and discussed. Results of ground-based observations, plans of spacecraft missions, and theoretical studies are welcome.

5:30 PM - 5:45 PM

[PCG38-P10_PG]Estimation of the ion acceleration in the Ganymede polar magnetosphere by the Galileo spacecraft observation

3-min talk in an oral session

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Keywords:Ganymede, magnetosphere, outflow, acceleration

Ganymede is one of the Jovian moons and is known as the only satellite that has an intrinsic magnetic field [Gurnett et al., 1996]. Since Ganymede is located in the Jovian magnetosphere, corotating magnetospheric plasma always blows toward Ganymede's magnetosphere [e.g. Kivelson et al., 1998]. Since the spatial scale of Ganymede's magnetosphere is comparable to the Larmor radius of magnetospheric ions, the characteristic plasma environment around Ganymede is formed due to the interaction between Ganymede's magnetosphere and Jovian magnetospheric plasma. Although previous studies discussed the morphology of Ganymede's magnetosphere and its plasma environment, most of them are still unknown and understanding of the interaction is necessary to reveal processes occurring in Ganymede's magnetosphere.In the present study, we discuss the plasma environment observed in Ganymede's polar region by the Galileo spacecraft. First, we have identified Upper-Hybrid Resonance (UHR) frequency by the Plasma Wave Subsystem (PWS) and have analyzed the electron density at the point of observation. We have analyzed four Ganymede encounters including those on orbits G01 and G02 which have been analyzed in the previous study. Since the most dominant ion in Ganymede's magnetosphere is O+ [Vasyliunas and Eviatar, 2000], we assumed that the O+ density equals the electron density. Based on the results of this analysis, we have plotted the distribution of O+ density in the altitude range from 264 km to 5262 km and have revealed that the number density decreases rapidly with distance from Ganymede. Next, we have discussed the ion outflow from Ganymede's polar region. Based on the obtained distribution, we have found that the density distribution can be expressed by r^-5.98, where r is the distance from Ganymede. Assuming that the flux is conserved along the path of the ion outflow and that the cross section of the flux tube of outflow is proportional to r^2 and r^3, we have estimated that the ion velocity reaches 17.3 km/s and 14.5 km/s, respectively, at the distance of

500 km from Ganymede. This result is consistent with the previous study which suggested the outflow O+ velocity is 18 km/s from observations of the Galileo PLS instrument [Vasyliunas and Eviatar, 2000]. We also discuss candidate mechanisms for the ion outflow from Ganymede's polar region and report the current status of a simulation code which we are developing so as to discuss the outflow process quantitatively.