木星磁気圏ダイナミクスに関する研究：内部磁気圏へのエネルギー輸送プロセス

水口 岳宏 [1]; 三澤 浩昭 [2]; 土屋 史紀 [1]; 小原 隆博 [3]; 笠原 慧 [4]
[1] 東北大・理・惑星プラズマ大気; [2] 東北大・理・惑星プラズマ大気研究センター; [3] 東北大・惑星プラズマセンター; [4] ISAS/JAXA

Study of dynamics of the Jovian magnetosphere: energy transportation process to the inner magnetosphere

Takahiro Mizuguchi[1]; Hiroaki Misawa[2]; Fuminori Tsuchiya[1]; Takahiro Obara[3]; Satoshi Kasahara[4]
[1] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [2] PPARC, Tohoku Univ.; [3] PPARC, Tohoku University; [4] ISAS/JAXA

We have researched response of the Jovian inner magnetosphere to the substorm-like event which occurred in the night side of the middle/outer magnetosphere. The transport of magnetic flux tube is one of important issues in the global dynamics of the Jovian magnetosphere [Kivelson et al., 2005]. The magnetic flux tubes are carried outward from the Io plasma torus with the slowly outflowing plasma. As they move outward, alternative flux tubes should be returned to the torus through rapid inflow of lower-dense flux tubes. Goal of this study is to reveal the role of the substorm-like event in the transport of magnetic flux tube in the Jovian magnetosphere.

In this study, substorm-like events were identified by using the in-situ observation data obtained by the Plasma Wave Subsystems (PWS), Energetic Particle Detector (EPD) and Magnetometer (MAG) onboard the Galileo orbiter. X-line where the substorm-like events are thought to start was located at around 60-80 R_J [Woch et al., 2002]. Narrowband KilOMetric radiation (nKOM) which was remotely observed by PWS was used to find response of the inner magnetosphere to the substorm-like event. The source of nKOM is located at the outer edge of the Io torus (8-10 R_J) (Reiner et al., 1993).

In the preceding studies, Louarn et al. (2001) reported nKOM correlated with Jovian substorm-like event reported by Woch et al.(1998) and Krupp et al.(1998). These reports imply that the generation mechanism of nKOM relate with the return of magnetic flux tube. However, it has not been revealed well yet how inner and outer magnetospheres couple each other during substorm-like event.

We have analyzed several inward flow events which are expected to relate with tail reconnection and nKOM radiation by using data obtained by Galileo. In the presentation, we will show preliminary results on mutual relations of the electro-magnetic phenomena in Jupiter’s global magnetosphere.