

Importance of the solar wind observation at upstream of Jovian magnetosphere

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Jupiter has the huge intrinsic magnetic field and rapid rotation. In addition, Jupiter locates far from the Sun as compared to the Earth. Thus it is thought that the effect of solar wind to the Jovian magnetosphere is much weak in early days. In the Galileo era, a lot of magnetospheric phenomena were observed and theoretical analyses have been done. Then the understanding of Jovian magnetosphere made progress and the effects of solar wind to Jovian magnetosphere were appeared more and more. However, there are some outstanding problems which include the difficulty to distinguish whether the dynamics come from Jovian internal process or interaction of the solar wind. For example, Joy et al. [2002] indicated the bimodal distribution of the magnetopause and bow shock location using all observation results of Jupiter in those days and they cannot divide these distributions are come from whether internal or external effects. In other case, Woch et al. [2002] reported that in the Jovian magnetotail the periodic plasma burst was occurred with 2, 3 days interval. Some (Kronberg et al., 2005, etc) said that these periodic phenomena were caused by the only internal processes, no external effects. On the other hands, Fukazawa et al. [2006] suggested that the periodic phenomena were controlled by the configuration of Jovian magnetosphere which was dominated by the Jovian internal characters and the solar wind. Recently similar phenomena are observed by the New Horizon spacecraft. The high energy structures were observed in distant magnetotail repeatedly. MacComas et al. [2007] suggested that these were plasmoid which had been observed by Galileo. While, Hill et al. [2009] indicated that those were magnetic flux not plasmoid. Recently we confirm those structures from simulations and we obtain both the similar configurations. Thus we cannot conclude which theory is right. From these examples, it is appeared that we need both information of the solar wind and magnetosphere to understand the Jovian magnetospheric dynamics in detail.