Examination of the relation between Jupiter's inner magnetosphere and magnetic reconfiguration events

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It is known that Jupiter's synchrotron radiation (JSR) has information on dynamics of the deep inner magnetosphere. We have made JSR observations in the decimeter radio wavelength more than a decade, and has showed that JSR generally shows short term variations by more than several tens percent with the time scale of days to weeks. A plausible causality of such the short term variations is due to solar UV/EUV variations; i.e., the solar UV/EUV heating for Jupiter's upper atmosphere drives neutral wind perturbations, and the induced dynamo electric field leads to enhancement of radial diffusion of relativistic electrons in the inner magentosphere. and then JSR shows variations. This scenario was initially proposed by Brice and McDonough [1973] and observationally confirmed by Miyoshi et al. [1999], Tsuchiya et al. [2011] and Kita et al., [2013] which is so to speak, an externally driving process. However, this scenario cannot be always applicable to any short term JSR variations, particularly fast variations with the time scale within a few days, and any other processes are required (Kita, 2015; Tsuchiya et al., 2019).
As a process which might explain such a fast variation in Jupiter's magnetosphere, an internally driving process, so-called 'substorm like event', is known (see Louarn et al., 2014). This phenomena is interpreted as a magnetic reconfiguration event occurred in the Jupiter's magnetotail region. Although it is revealed that major magnetic reconfiguration events generally affect the whole magnesphere from 10 to 80-120 Rj (Jupiter's radii), however, it has not been known whether the events affect the inner magnetosphere within 2 Rj.
In order to reveal unknown dynamics of the fast variations in JSR, we have tried to examine relationship between the fast variations and magnetic reconfiguration events. In this study we have used the plasma data explored by the Galileo orbiter in Jupiter's magnetosphere and also Jupiter's particular radio wave component in the hectrometer wave range (see Misawa et al., 2018) for searching magnetic reconfiguration events, and we have compared them with the daily JSR monitoring data at 327MHz observed with the radio telescopes of ISEE, Nagoya University, Japan. In the presentation, we will show results of the examination and discuss a linkage possibility between Jupiter's inner magnetosphere and magnetotail region.

Keywords: Jupiter, radiation belt, fast variation, magnetic reconfiguration

