Jupiter's synchrotron radiation observed by Iitate Planetary Radio Telescope during the spectrum and imaging observation campaign

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Continuous observations of Jupiter's synchrotron radiation (JSR) at the frequencies of 325 MHz with Iitate Planetary Radio Telescope (IPRT) are carried out from March 2007 as a part of simultaneous spectrum and imaging observations of JSR. Regular observations at 785 MHz with IPRT also started on May, 2007. In this presentation, initial results of the absolute total flux measurement of the JSR and their short term variations are presented. Details of the simultaneous observation campaign are reported by accompanying papers by Misawa et al. and Imai et al.

Ground-based observation of JSR is a useful tool to study structure and dynamics of Jupiter's electron radiation belt. One of the topics on the observation of JSR is the short term variation in time scale of a few days to weeks. Recent observations of JSR at higher frequency range of 2 GHz, which corresponds to the emissions from higher energy electrons, show the correlation between the short term variations and the solar F10.7 flux. This correlation has been interpreted as the result of enhanced radial diffusion driven by the neutral wind in the Jupiter's upper atmosphere (Santos-Costa et al. 2007; Miyoshi et al. 1999). While the radial diffusion process in the Jupiter's radiation belt does not have strong energy dependence (Brice and McDonough, 1973), loss processes, such as absorption by satellites and rings, synchrotron radiation loss, and scattering by wave-particle interaction, are expected to have strong energy dependence (Santos-Costa et al. 2001). Observations of the low frequency part of JSR with IPRT along with that of higher frequency are expected to provide key information on what processes are responsible for the short term variation.

A radio telescope receives not only JSR but also galactic radiation behind Jupiter. Because amplitudes of small scale structures of the galactic components become comparable to or grater than that of JSR in the low frequency range, it is necessary to subtract the galactic background component from observational signal of JSR. This makes the routine analysis of JSR at low frequency range difficult. Results of preliminary analysis show that the flux density of JSR at 325 MHz shows short term variations which also have correlations with the solar F10.7 flux. While it is reported that the enhancement of JSR at 2 GHz occurs immediately after the increase of F10.7 (Mioyshi et al. 1999), it is found that the enhancements at 325 MHz sometimes show time delay of a few days. After the careful analysis of the subtraction, we will show the variation of JSR during the simultaneous observations and the correlations with some parameters associated with the sun and the solar wind, and discuss about the physical process which causes the short term variation of JSR.