Short term variations of Jupiter's synchrotron radiation derived from VLA data analysis

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Observation of Jupiter's synchrotron radiation (JSR) is important to investigate dynamics of Jupiter's inner magnetosphere. JSR is the emission from relativistic electrons in the magnetic field, so it is the most effective prove for remote sensing of Jupiter's radiation belt from the Earth. Although JSR has been thought to be stable for a long time, observations for JSR have been intensively made after the collisions of comet P/SL9 to Jupiter, and short term variations of JSR on time scale of days to weeks have been confirmed by several groups.

Brice and McDonough (1973) proposed a scenario for the short term variations: i.e. the solar UV/EUV heating for Jupiter's upper atmosphere drives neutral wind perturbations and then the induced dynamo electric field leads to enhancement of radial diffusion [1]. Miyoshi et al. (1999) showed that short term variation event at 2.3GHz is well correlate to solar UV/EUV flux variations [2]. Tsuchiya et al. (2009) showed that JSR at 325MHz, 785MHz and 2.3GHz have short term variation [3]. Santos-Costa et al. (2009) reported that radio images at 5GHz showed longitudinally asymmetric short term variations from VLA (Very Large Array) interferometer observation between October and December 2002 [4]. However, the mechanisms which cause the short term variations and the relationship with solar UV/EUV activity have not been revealed well.

In order to evaluate the effect of solar UV/EUV activity on JSR more precisely, we have made radio image analysis using the NRAO (National Radio Astronomy Observatory) archived data of the VLA [∗]. We have selected the data observed quasi-continuously for more than several days and compared a series of the reduced radio images with solar UV/EUV activities. A preliminary analysis for the data observed at 1.5GHz in May, 1997 shows that a radio flux enhancement in about 10% occurred within a week in spite of almost constant solar UV/EUV flux. We will introduce the radio image analysis and discuss causalities of the short term variations.

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