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

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Jupiter's synchrotron radiation (JSR) is the emission from relativistic electrons in the strong magnetic field of the inner magnetosphere, 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 in 1994, 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. Miyoshi et al. (1999) showed that a short term variation event at 2.3GHz is well correlate to solar UV/EUV flux variations. Tsuchiya et al. (2010) showed that JSR at 325MHz and 785MHz have short term variation. Santos-Costa et al. (2009) reported that radio images at 5GHz showed longitudinally asymmetric short term variations from the VLA (Very Large Array) interferometer observation made from October to December, 2002. 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 from January 28 to February 5, 2000 at 327MHz. During the period, solar UV/EUV flux expected on Jupiter showed monotonic decrease. A preliminary analysis shows that a radio flux variation occurred corresponding to solar UV/EUV variations density and radio images also show variations of dawn-dusk asymmetry. We will introduce the local time dependence or magnetic longitude dependence of the brightness distribution variations and discuss causalities of the short term variations.

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