Short-term variation of Jupiter's synchrotron radiation associated with solar-wind-driven electric field: a simulation study

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Radiation belt is a layer of energetic particles (~few tens MeV) held by geomagnetic fields, ranging up to several planetary Radii in distance. Jovian Radiation Belt, where in-situ measurement is limited, Jupiter's synchrotron radiation (JSR) observation is a key tool for determining physical process therein, and various diffusion models have been proposed to account for observed JSR's short-term and long-term variations as well as the steady profile of it. As for the short-term variation, where the toal JSR flux density varies by a few % over a few days or weeks, it is theoretically backed by fluctuating dynamo electric field at Jupiter's upper atmosphere correlated with solar UV/EUV flux [Brice and Mcdonough, 1973], supported by a number of researches. Amid the situation, Extreme ultraviolet spectroscope HISAKI has found evidence of another type of electric field - solar-wind-driven convection electric field inside Jupiter's magnetosphere [G. Murakami et al. 2016], from which one can expect enhanced radial diffusion inside the magnetosphere too.
In this research, I show the result of my numerical calculation on radial diffusion driven by the estimated convection electric field correlated with solar wind dynamic pressure and synchrotron radiation variation resulted therefrom and suggest that observed short-term variation in the past can be explained by solar-wind-driven convection electric field as well.

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