Variation Features of Jupiter's Synchrotron Radiation

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Jupiter's synchrotron radiation (JSR) is generated by the relativistic electrons trapped in Jupiter's inner radiation belt (JRB) where direct observations are difficult due to the too high particle energy. JSR is, therefore, an important probe to investigate dynamic processes in the deep inner magnetosphere. Regular and systematic JSR observations have been made by several groups including us and revealed the existence of short-term variations at a time scale of several days to weeks inferring some global electro-magnetic activities in the JRB.

A campaign of simultaneous interferometer and multi-frequency observations for JSR had been made in 2007 and 2008. A series of interferometer observations tells us information of spatial distribution and its variation of pitch angle and/or radial distribution of relativistic electrons around Jupiter (～3Rj). While the JSR spectrum measurements give us information of energy dependent variations of the relativistic electrons. In this program, the interferometer observation was made with the Giant Metrewave Radio Telescope (GMRT) in India. We had made the interferometer observations at 610MHz once a few days when some specific Jupiter's magnetic longitude faced to the earth. In the multi-frequency observations, three observation frequencies have been adopted; i.e., 325, 785 and 2250MHz. The 325 and 785MHz observations had been made regularly during the period, while those at 2250MHz had been made partly in June, 2007. JSR at the frequency range is generated from 6 to 20MeV electrons. In the observation periods, the solar F10.7 value showed gradual increase and decrease at the amount of about 30% in 2007, while showed almost no variation in 2008. Since solar F10.7 well correlates with solar UV/EUV flux, and the UV/EUV flux is considered to be a possible causality of JSR variations [1], it is expected that the campaigns were good opportunities to examine the effect of the solar flux on JSR. We will introduce the simultaneous observations and discuss the source and loss processes of the JRB particles.

Acknowledgement: We thank Dr. C. H. Ishwara-Chandra and all the staff of the GMRT who have made these observations possible. GMRT is run by the National Centre for Radio Astrophysics of the Tata Institute of Fundamental Research.

References

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