

木星シンクロトロン放射の電波源分布・スペクトル同時観測速報

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A preliminary report of simultaneous Interferometer and multi-frequency survey 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). Variation of JSR is, therefore, an important probe to investigate generation and dissipation processes of the relativistic electrons and deformation of their global distribution in JRB. 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 inner magnetosphere (Galopeau et al., 1997; Miyoshi et al., 1999; Bolton et al., 2002). Now it's the time to investigate details of variation characteristics and their causalities.

A program of simultaneous interferometer and multi-frequency observations for JSR had been made from the middle of May to the end of June, 2007 over a solar rotation period. A series of interferometer observations for JSR tells us information of spatial distribution and its variation of pitch angle and/or radial distribution of relativistic electrons around Jupiter ($-3R_j$). 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, which consists of 30 steerable parabolic dishes of 45m diameter covering a baseline range of about 25km. We had made the interferometer observation mainly at 235 and 610MHz once a few days when some specific Jupiter's magnetic longitude faced to the earth. This is the second GMRT observation for Jupiter: the first one was made in 2003 for about a week (Bhardwaj et al., 2005) In the multi-frequency observations, three observation frequencies have been adopted; i.e., 325MHz and 785MHz observations made at Tohoku Univ., Japan, and 2.25GHz observations at NICT, Japan. The observations by Tohoku Univ. had been made regularly during the period, while those by NICT had been made partly in June. JSR at the frequency range is generated from the relativistic electrons at the energy from 6 to 20MeV in JRB.

In the observation period, the solar F10.7 value showed gradual increase and decrease at the amount of about 30%. Since F10.7 is considered to be a possible indicator inferring the existence of JSR variations (Brice and McDonough, 1973; Miyoshi et al., 1999), it is expected that there might be some JSR variations in the spatial distribution and at some frequencies. We will make a general introduction of the simultaneous observations and show preliminary results. Details of the interferometer and multi frequency observations will be reported by accompanying papers by Tsuchiya et al. and Imai et al.

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