

Studies on variation characteristics of the Jovian synchrotron radiation

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The Jovian synchrotron radiation (JSR) is a radio wave emitted from the relativistic electrons in the Jovian radiation belt, which has information of dynamics of high-energy particles and electromagnetic disturbances in the Jovian inner magnetosphere. The intensity variation of JSR, however, has been little understood in its timescale and origin especially at low frequencies of a few hundreds MHz. We have observed JSR at 327 MHz for several months a year since 1994 to reveal characteristics of the flux variations especially at the time scale of days to months (short-term) and years (long-term). The regular observations have been made by using parabolic cylinder antennas of the Solar Terrestrial Environment Laboratory, Nagoya University at Kiso, Japan. As the observation result, we could obtain characteristics of short-term and long-term JSR flux variations at a frequency for 1994 - 2005.

About the short-term variations, the JSR flux shows large amplitude variations of 2 - 9 Jy typically and varies 2 - 3 Jy within a few days. These amplitude variations are much larger than those at 2295 MHz for the same observation terms. Additionally, it has been suggested that the JSR short-term flux variation is related to solar F10.7 flux at 2295 MHz, however, it seems that the relation between the JSR flux and solar F10.7 flux variations isn't obvious at 327 MHz particularly at low F10.7 flux, and this is the same for solar wind variations. This result suggests that some causalities other than solar / solar wind variations generate the large and rapid flux variations of several MeV electrons radiating the JSR at 327 MHz.

About the long-term observation, yearly average fluxes roughly show a decreasing trend from 1994 to 1998 and an increasing trend from 1999 to 2004. The JSR flux observations at 2295 MHz for 1994 - 2001 also indicated similar trends to those at 327 MHz. A simple correlation analysis between the JSR flux and solar F10.7 / solar wind parameters infers that the both factors influence on the JSR flux variations at least when either factor is intense enough to cause the variations.

In the presentation, we will introduce characteristics of the JSR flux variations and discuss causalities of the variations.