Investigation of the unusual enhancement of the Jovian synchrotron radiation at a frequency of 327MHz

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The Jovian synchrotron radiation (JSR) is a radio wave emitted from the relativistic electrons in the Jovian radiation belt, which have 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. We have observed JSR 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 at a frequency of 327MHz by using parabolic cylinder antennas of the Solar Terrestrial Environment Laboratory, Nagoya University at Kiso and Fuji, Japan.

As the observation result, we confirmed existence of an unusual radio flux enhancement for the direction of Jupiter in the data of July 14, 1998. This enhancement was observed just around the local southing of Jupiter at both Kiso and Fuji, which are mutually apart at about 100km. The flux is about 8 times larger than the usual JSR flux and the duration is less than 2 days. There is no such enhancement for 1994-2003. It is suggested that the short-term variation of JSR flux was correlated to the variation of the solar F10.7 but the enhancement of the solar F10.7 was not found at that period. Concerning the other solar activity, a flare event happened on this day at 12hUT, though the degree was not so unusually prominent (M class flare). The activity level of Jupiter's inner magnetosphere events, such as HOM and aurora, seems to be comparatively high and middle magnetosphere observations of Galileo seems active, however the level is also in the usual range. Then, if it was an enhancement of Jupiter origin, it is considered that phenomenal processes operated especially at Jupiter's inner magnetosphere within at most 2 days caused this unusual enhancement of JSR. In our presentation, we will introduce characteristics of the unusual radio flux enhancement and discuss expected physical processes.