

Development of Wideband Digital Radio Wave Receiver On-board a Spacecraft to Jupiter

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The purpose of this study is to develop wideband, light and low electric power consumption digital radio receiver for observation of Jovian radio emissions, which is to be installed on-board a spacecraft to Jupiter. One target of this digital radio receiver is to observe Jovian decametric radio emissions in Jovian magnetosphere. The observation of radio emissions of decametric range by using present receiver will provide much more detail information of the Jovian magnetosphere than the previously observed by Voyager1, and 2 spacecrafts. The observation has aimed to realize the identification of the source of Jovian decametric radio emissions, effects of Galilean satellites, effects of solar wind variations through the interaction with the Jovian magnetosphere. Another target of this radio receiver is to realize observation of plasma waves and plasma wave bursts in the Jovian magnetosphere.

One of the most important character of this receiver is over all usage of digital technologies. A similar receiver with same data analysis architecture has been developed for low frequency range below 1MHz, however it has not been developed for high frequency range more than 10 MHz. Required performances for the present receiver are light, low electric consumption, capability to observe dynamic spectrum of Jovian radio emissions from below 10kHz to 40MHz, and also capability to identify the Pointing vector of the Jovian radio emissions.

This development has been carried out as the developments of instruments on-board spacecrafts promoted by ISAS/JAXA. This development is ongoing started from 2005 and to be completed in 2007. In this paper, the data from experiments using basic instrumentation with the frequency range from 0 to 24MHz is introduced.