KOSEN-1 CubeSat mission for Jupiter's radio science

*Kazumasa Imai[1], Nobuto Hirakoso[2], Taku Takada[1], Kentarou Kitamura[3], Masafumi Imai[4], KOSEN-1 Team[5], Charles A. Higgins[6], James R. Thieman[7], NASA Radio JOVE Team[8]

1. Department of Social Design Engineering, National Institute of Technology, Kochi College, 2. Department of Mechanical Engineering, National Institute of Technology, Gunma College, 3. Department of Mechanical and Electrical Engineering, National Institute of Technology, Tokuyama College, 4. University of Iowa, 5. KOSEN-1 Team, 6. Middle Tennessee State University, 7. University of Maryland Baltimore County, 8. NASA Radio JOVE Team

Since the discovery of Jupiter's decametric radio emissions in 1955, important details of its radiation mechanism have not yet been elucidated. In order to investigate the beaming structure of Jupiter's radio emission to clarify aspects of the emission mechanism, we plan to launch a 2U-size CubeSat for observation of Jupiter's radio waves and observe simultaneously in outer space and on the ground. The purpose of this project is to measure the emission delay time by using a correlation analysis method. The delay time can be measured by the correlation analysis of waveform data obtained by simultaneous observations of Jupiter's radio S-bursts between this satellite and the ground. If the beam of Jupiter's radio S-bursts is moving together with the rotation of Jupiter, we can calculate a time difference of about 70 milliseconds at the baseline length of 8000 km. Using the proposed simultaneous observations, it is possible to test whether the Jovian S-bursts are emitted like a 'beacon', rotating with Jupiter's magnetic field and sweeping by the Earth, or like a 'flashlight', an instantaneous emission with a 0 millisecond time delay. This information is very important to determine the nature of the Jupiter's radio emission mechanism.

Our application for the launch of a 2U-CubeSat named KOSEN-1 by a JAXA Epsilon rocket was selected on Dec. 12, 2018, as a CubeSat candidate for JAXA's innovative satellite technology demonstration program. This rocket launch including our KOSEN-1 project is scheduled at the end of 2020. The worldwide ground-based observations together with the KOSEN-1 satellite will be supported by the NASA Radio JOVE project, an education and outreach program for planetary radio astronomy.

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