SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Small Space Science Missions (2)

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DEVELOPMENT OF THE MICROSATELLITE RISING-2 BY TOHOKU UNIVERSITY AND HOKKAIDO UNIVERSITY

Abstract

The development of 50-kg microsatellite RISING-2 started in July, 2009 by Tohoku University and Hokkaido University. The primary mission is earth observation with a resolution of about 5 meters, and the design method of RISING (SPRITE-SAT) launched in January, 2009 is inherited. In this presentation, a summary of mission and system design is reported. The RISING-2 is the microsatellite which mass is about 50kg and the size is about 500x500x500mm. The orbit is sun synchronous and the altitude of circular orbit is planned from 600 to 800 km. The launch rocket and date is not decided, but the development will be finished until March, 2011, and the launch opportunity after April, 2011 is scheduled. The primary mission is the earth observation with a resolution of 5 meters by using a Cassegrain reflector telescope which diameter is about 10 cm and the focus distance is about 1 meter. The visible infrared and multi spectral images of cumulonimbus clouds can be observed by using a liquid crystal tunable filter (LCTF) as well as usual color images. Continuously observing the cloud images with an interval of about 10ms, the detail structure of cumulonimbus clouds in multi spectrum can be constructed. This resolution is higher than images obtained by conventional satellites such as TRMM, which have 2-km resolution, and ground radar observatories. These observations are expected to solve a mechanism of guerilla heavy rain and contribute to the establishment of basic technology for weather forecasting. The RISING-2 also observes the horizontal structure of sprite which is one of lightning discharge phenomena. In the same years, several similar missions such as TARANIS, ASIM, and JEM-GLIMS are scheduled. The multiple observations in several missions will have the marvelous influence on the science of atmospheric electricity in the meteorology, the space and terrestrial physics, and the gamma-ray astronomy. The RISING-2 can observe the designated position around the earth by using the three-axis attitude control system which consists of reaction wheels, star sensors and gyro sensors. The almost instruments of attitude control

system including a central control unit, attitude sensors and wheels are newly developed in this project. The fine pointing control using wheels, gyro, and star sensors is carried out for 15 minutes in sunshine and 15 minutes in eclipse each. In the coarse control mode, the almost instruments about attitude control and earth observation are powered off to save the average power consumption.