AOGS 2005

Space Weather Mission of SmartSat Program - Instrumentation and Experiment Plan -

TSUTOMU NAGATSUMA[1], MAKI AKIOKA[1], WATARU MIYAKE[1], KAZUHIRO OHTAKA[1], TATEO GOKA[2], HARUHISA MATSUMOTO[2], and HIDEKI KOSHIISHI[2]

[1]*National Institute of Information and Communications Technology*
[2]*Japan Aerospace Exploration Agency*

We are planning to launch a small satellite, called "SmartSat". This satellite is being developed under the collaborative program of government agencies (NICT and JAXA), and a private company (Mitsubishi Heavy Industry) in Japan. This program is an orbital demonstration in near earth orbit before the future L5 mission. The space weather experiment of the SmartSat program consists of wide field imager for CME tracking (WCI), space environment data acquisition equipment (SEDA), and mission processor (MP). These instruments will be principal components of the future L5 mission. We hope to launch the SmartSat around 2008.

The brightness of CME in interplanetary space is weaker than that of zodiacal light (1/200 at the Earth's orbit). The total brightness of CME is quickly decreasing with increasing the distance from the Sun. Therefore, two imagers (WCI-N FOV: 42 deg., WCI-W FOV: 84 deg.) are designed for high sensitivity, large dynamic range, low-noise, and low stray light imagers to track CME image from the Sun to the Earth, continuously.

For space weather alert, autonomous identification of space weather events based on the onboard data processing (noise reduction, event detection, tracking, and data compression, etc.) is one of the key experiments of this program. We plan to carry high performance MP with COTS CPU and commercial real time OS, QNX for onboard data processing. Several algorism of data processing will be tested during the operation of this satellite.

Since the orbit of SmartSat is geostationary transfer orbit, the particle signature of radiation belt can be monitored. SEDA consists of two-electron sensor and three-ion sensor to measure the wide energy range of particles (electron: 30keV-20MeV proton: 400keV-500MeV). These data will be used for studying the generation and loss process of the radiation belt particles.

Although the main purpose of this program is an orbital demonstration, we expect several space weather studies can be done under this program. We will report instrumentations of the space weather experiment and scientific issues of this experiment using SmartSat.