

MSD004-07

Room:301A

Time:May 27 15:45-16:00

Current Status of JEM-GLIMS onboard ISS and Expected Science Outputs

Mitsuteru Sato^{1*}, Tomoo Ushio², Takeshi Morimoto², Makoto Suzuki³, Atsushi Yamazaki³, Masayuki Kikuchi⁴, Ryohei Ishida⁵, Yukihiko Takahashi¹, Inan Umran⁶, Yasuhide Hobara⁷, Yuji Sakamoto⁸, Haruka Ishikawa⁸

¹Hokkaido University, ²Osaka University, ³ISAS/JAXA, ⁴NIPR, ⁵Osaka Prefecture University, ⁶STAR Lab., Stanford University, ⁷University of Electro-Communications, ⁸Tohoku University

In order to study the generation mechanism and occurrence condition of Transient Luminous Events (TLEs), global occurrence rates and distributions of lightning and TLEs, and the relationship between lightning, TLEs and Terrestrial Gamma-ray Flashes (TGFs), we will carry out the lightning and TLE observation at Exposed Facility of Japanese Experiment Module (JEM-EF) of International Space Station (ISS). In this mission named JEM-GLIMS (Global Lightning and sprite MeasurementS on JEM-EF) two kinds of optical instruments and two sets of radio receivers will be integrated into the Multi mission Consolidated Equipment (MCE) which is the bus system and will be installed at JEM-EF finally. The optical instruments consist of two wide FOV CMOS cameras (LSI) and six-channel spectrophotometer (PH), and all these optical instruments are pointed to the nadir direction. LSI uses a STAR-250 CMOS device as a detector, which has 512x512 pixels and 25x25 μm pixel size, and has 28.3x28.3 deg. FOV. LSI-1 equips a wide band optical filter (730-830 nm) and mainly measures lightning emission, while LSI-2 equips a narrowband optical filter (766 \pm 6 nm) and mainly measures TLE emission. Five of six PH channels have 42.7 deg. FOV and use photomultiplier tube (PMT) as a photon detector. They equip band-pass filters (150-280 nm, 316 \pm 5 nm, 337 \pm 5 nm, 392 \pm 5 nm, and 762 \pm 5 nm) for the absolute intensity measurement of the TLE emission. One of six photometers equips a wide-band filter (600-900 nm) to detect lightning occurring within 86.8 deg. FOV. These output signals will be recorded with the sampling frequency of 20 kHz with a 12-bit resolution. In order to detect whistler wave in the VLF range excited by lightning discharges, one VLF receiver (VLFR) is installed. VLFR consists of one VLF receiver that can record waveform data with a sampling frequency of 100kHz with 14-bit resolution and of 15cm monopole antenna that is directing nadir direction and is attached at the base plate of MCE. In addition to this, VHF interferometer (VITF) which measures VHF pulses emitted by lightning discharges is installed. VITF consists of two patch-type antennas installed at the base plate of MCE and separated by 1.5m and of one receiver which records pulse data with a sampling frequency of 200MHz with 8-bit resolution. JEM-GLIMS will be launched by H-IIB F3 on 20 January 2012. We have finished the fabrication of GLIMS instruments and all the environmental tests (EMC, vibration, and thermal vacuum) and have delivered GLIMS instruments to the system side. All functional and environmental tests of MCE carried by system side will be finished and be delivered it to the launch site in this summer. We will present the status of the JEM-GLIMS mission and discuss the expected science outputs derived from this mission more in detail.

Keywords: lightning, sprite, International Space Station