

Science Instruments Onboard JEM-GLIMS

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In order to study the occurrence characteristics, spatial distributions, and occurrence conditions of Transient Luminous Events (TLEs), lightning and TLE observations named JEM-GLIMS (Global Lightning and sprIte MeasurementS on JEM-EF), which will be carried out at Exposed Facility of Japanese Experiment Module (JEM-EF) of International Space Station (ISS), will start this year. In this mission two kinds of optical instruments and two sets of radio receivers are employed and installed into the Multi mission Consolidated Equipment (MCE), which is the bus system and will be installed at JEM-EF. The optical instruments consist of two wide FOV CMOS cameras (LSI) and six-channel spectrophotometer (PH). 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 um pixel size, and has 28.3x28.3 deg. FOV. LSI-1 equips a wide band optical filter (766-832 nm) and mainly measures lightning emission, while LSI-2 equips a narrowband optical filter (762+/-7 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+/-5 nm, 337+/-5 nm, 392+/-5 nm, and 762+/-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 a 15cm monopole antenna directing nadir direction and attached at the base plate of MCE and consists of a VLF receiver that records waveform data with a sampling frequency of 100kHz with 14-bit resolution. VHF interferometer (VITF) that 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-GIMS will be launched this year by HTV carrier cargo for ISS. In 2010 all the fabrications of GLIMS instruments and the environmental tests were completed. In 2011 all the function check tests and system environment tests were also finished. Now, MCE was delivered to the launch site in order to install MCE into HTV and to construct the rocket system. We will present the detailed specification and functions of JEM-GLISM instruments and discuss the expected science outputs derived from this mission.

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