JEM-GLISM mission

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In order to study the generation mechanism 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 Exposure Facility of Japanese Experiment Module (JEM-EF) of International Space Station (ISS). In this mission named JEM-GLISM (Global Lightning and Sprite Measurement on JEM-EF) three kinds of optical instruments and two sets of VHF receivers will be integrated into the common port module and will be installed at JEM-EF finally. The optical instruments consist of two wide field-of-view (FOV) CMOS cameras with band-pass filters, two wide FOV photometers with band-pass filters and one spectro-imager which uses a grism in the optics. All these instruments will be mounted at JEM-EF to look the nadir direction. CMOS cameras use the STAR-250 device as a detector, which has 512x512 pixels and 25x25 um pixel size, and have 40 deg. FOV. Since one CMOS camera equips a wideband filter (730-830 nm), it measures mainly lightning emission. On the other hand, another CMOS camera equips a narrowband filter (766+/-6 nm) and measures mainly TLE emission because the lightning emission will be absorbed by the atmosphere below TLEs. These CMOS images will be acquired with the frame rate of 29 fps. Two photometers have also wide FOV and use photomultiplier tube (PMT) as a photon detector. The output signals from PMT will be recorded with the sampling frequency of 100 kHz. A spectro-imager measures the spectrum of lightning and TLE emissions in the wavelength range of 300-400 nm with the wavelength resolution of 2 nm and the time resolution of 1 ms. Two sets of VHF receiver will be also installed at JEM-EF. Each receiver will be installed at the bottom side of the common port module by separating 1.8 m and will receive VHF waves independently. Thus, these sensors works as an interferometer. The VHF sensors employ a patch-type antenna which can detect electromagnetic waves in the frequency range of 30-100 MHz and which has +/-15 deg. directional characteristics. The output signals will be digitally sampled with 200 MHz sampling frequency and 8-bit resolution. In order to launch the JEM-GLISM instruments in 2011, we have started the detailed designing and flight model development. We will report the development status of the JEM-GLISM mission and discuss the possibility of the cooperative observation with other missions such as ASIM and TARANIS.