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JEM-GLIMS 光学機器で観測されたスプライト・エルブスの特徴
Characteristics of Sprites and Elves Measured by JEM-GLIMS Optical Instruments

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JEM-GLIMS is a space mission to observe lightning and lightning-associated Transient Luminous Events (TLEs) from the International Space Station (ISS). The main goal of this mission is to identify the spatiotemporal relationship between TLEs and their parent lightning discharges based on the nadir optical and electromagnetic observations of JEM-GLIMS. For this purpose JEM-GLIMS equips two sets of optical instruments (LSI: CMOS camera, and PH: spectrophotometers) and two sets of radio wave receivers (VLFR: VLF receiver, and VITF: VHF interferometer). As all these instruments are installed at the bottom plane of the bus module facing to the Earth, JEM-GLIMS can carry out the nadir observations continuously. JEM-GLIMS was launched by HTV3 and was successfully installed at the exposed facility of the Japanese Experiment Module (JEM) on August 9, 2012. After the initial checkout operations, JEM-GLIMS finally started continuous observations on November 20, 2012. In the period from November 20, 2012 to January 31, 2014, totally 3,130 transient optical events related to lightning flashes and/or TLE emissions were detected by the optical instruments. In 1,062 of these events, both LSI and PH detected clear transient optical signals well above the noise level. In order to derive sprite events from the detected transient optical events, we analyzed PH light-curve data and estimated the intensity ratio between PH channels. We also analyzed LSI image data to clarify the morphological properties of the optical emission. In a transient optical event detected at 19:50:40.306 UT on September 28, 2013, the intensity ratio between PH2 (337 nm) and PH4 (600-900 nm) and between PH6 (392 nm) and PH4 were estimated to be 26 and 25, respectively. This fact implies that the light sources exist not only in the troposphere but also in the mesosphere. At the image data obtained by the narrow-band filter camera (LSI-2), transient optical emission whose shape differs from the lightning emission was confirmed. Thus, we attributed the transient optical emission in LSI-2 image to sprite streamers. At the presentation, we will show the results derived from LSI and PH data analysis and the charge moment change (CMC) of the parent lightning discharges derived from ELF magnetic filed waveform data and will discuss the spatial and temporal characteristics of sprites more in detail.

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