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JEM-GLIMS及びTARANIS衛星搭載フォトメタの開発

Development of photometers onboard the JEM-GLIMS and the TARANIS

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Lightning-associated transit luminous events (TLEs), sucah as sprites, elves, and blue jets, are discovered in 1990s. As a generation mechanism of sprites quasi-electrostatic field model (QE model) is proposed and is a most supported model. However, most of observational characteristics can not be explained by the QE model perfectly. Recently it is suggested that horizontal lightning currents will play important role in the generation mechanism. In order to specify, the generation mechanism, nadir observation of spatial distribution and temporal evolution of sprites is essential. Terrestrial gamma-ray flashes (TGFs) have been discovered in 1994. Since the occurrence distribution of TGFs is highly correlated with that of lightning discharge, it is suggested that TGFs is excited by lightning discharge. However, it is not obvious that which lightning discharge process generate TGFs.
In order to solve these problems, JEM-GLIMS (Global Lightning and sprIte MeasurementS on JEM-EF) and TARANIS has been planned. JEM-GLIMS is a space mission to observe TLEs and TGFs. Optical and electromagnetic observation of JEM-GLIMS will be carried out at the Exposure Facility (EF) of the Japanese Experiment Module (JEM) at International Space Station (ISS) in 20 11. On the other hand, TRANIS (Tool for the Analysis of RAdiations from lightNIngs and Sprites) is a micro satellite mission, will be launched in 2013. We are developing photometers onboard the JEM-GLIMS and the TARANIS. The photometers consist of six channels, which have each band-pass to measure absolute intensity of lightning and sprites. In order to fix the detailed design of proto-flight model of photometers, we have carried out mainly three experiments; (1) sensitivity calibration, (2) drift characteristics measurements, and (3) health check test under the high temperature. For these experiments, we used bread board model (BBM) which has be developed already. Based on the results of these experiments, we have changed the BBM design slightly to fulfill the requirements for the photometer and have fixed the final design of the proto-flight model of the photometer. We have finished the fabrication of the photometer and started the performance check tests. We will present preliminal results of the experiments mode in detail.

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