Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05377, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05377
EGU General Assembly 2008

SPRITE-SAT mission for sprites and TGFs studies

Y. Takahashi (1), T. Sakanoi (1), M. Sato (2), S. Kondo (1), K. Yoshida (3), Y. Sakamoto (3), E. Ujiie (3), T. Takashima (4), U. Inan (5) and D. Smith (6)

(1) Graduate School of Science, Tohoku University, Japan, (2) Graduate School of Science, Hokkaido University, Japan, (3) Graduate School of Engineering, Tohoku University, Japan, (4) Japan Aerospace Exploration Agency (5) STAR Lab, Stanford University, USA, (6) Department of Physics, University of California, Santa Cruz
(yukihiro@pat.geophys.tohoku.ac.jp / Fax: +81-22-795-5775 / Phone: +81-22-795-5775)

Although extensive studies on sprites have been made since the first discover in 1989, we cannot fully explain even the fundamental mechanisms for characteristics of sprites. The quasi electrostatic (QE) model proposed in the 1990s is considered as a standard model for sprite generation. However, the simple QE model is not enough to explain the time and spatial variations of sprites, such as the long time delay and horizontal displacement from parent cloud-to-ground discharge (CG), and the horizontal distribution and number of columns in a sprite event. One of the candidates for the key to solve the problems would be the electro-magnetic pulses (EMPs) radiated from the parent lightning discharges and/or the associated intra-cloud discharges. In order to examine these possibilities, we need to know the horizontal structures of sprites and the properties of EMPs, however, no clear measurement of horizontal structure of sprites has been done due to the difficulties in nadir imaging from space or in triangulation from ground. Lightning discharges are also suggested to produce gamma-ray radiation from the Earth, called terrestrial gamma ray flashes (TGFs). Concurrent measurements of lightning discharges and TGFs from space are important to understand the relationship between these phenomena. Nadir observations of sprites and TGF-related lightning are, therefore, significant for understanding of the generation mechanisms both of sprites and TGFs, if it is successful.

The SPRITE-SAT, a 50-kg class micro-satellite, equipped with three nadir-looking cameras, a VLF receiver and a gamma-ray detector, has been developed in-house by

the Tohoku University team. SPRITE-SAT is planned to be launched in 2008 as a piggyback satellite of JAXA s HIIA launch. We report the latest status of development and discuss the possible contribution to other future full-scale missions such as TARANIS, ASIM and GLISM on ISS.