

# Sprites observed by ROCSAT-2/ISUAL and characteristics of their parent lightning discharges estimated by ELF magnetic field data

# Katsura Yamamoto[1]; Mitsuteru Sato[2]; Hiroshi Fukunishi[3]; Yukihiro Takahashi[3]; Toru Adachi[3]; Rue-Ron Hsu[4]; Han-Tzong Su[4]; Alfred Bing-Chih Chen[4]; H.U. Frey[5]; S.B. Mende[5]; Lou-Chuang Lee[6]

[1] Dept. of Geophysics, Tohoku Univ.

; [2] RIKEN; [3] Dept. of Geophysics, Tohoku Univ.; [4] Cheng Kung Univ.; [5] U.C.Berkeley; [6] NSPO

The ROCSAT-2 satellite, launched into a polar orbit with an altitude of 891 km and an inclination of 99.1 degrees on May 20, 2004, carries the ISUAL (Imager of Sprites/ Upper Atmospheric Lightning) instrument as only one scientific payload, and observations of transient luminous events (TLEs) are being successfully carried out. The ISUAL consists of three subsystems: imager, spectrophotometer and array photometer. The ISUAL instrument surveys TLEs globally once a day. Distinct 67 sprite events were observed for the period of May 20, 2004 to November 20, 2004.

Most of sprites occur associated with positive cloud-to-ground lightning discharges due to quasi-electrostatic fields generated by lightning discharges. Charge moment values, one of the parameters of lightning discharge processes are in proportion with the quasi-electrostatic field intensity. In order to investigate the relationship between the luminosity of sprites observed by the ISUAL and the charge moment of their parent lightning discharges, we analyzed ELF magnetic field waveform data obtained at Syowa station (69.0S, 39.6E) in the Antarctic, Onagawa observatory (38.4N, 141.5E) in Japan and ESRANGE (67.9N, 21.1E) in Sweden. It is possible for us to determine the locations of lightning discharges using these multipoint observation data of ELF magnetic field perturbations. We can also estimate the charge moment values of the lightning discharges using each three ELF magnetic field waveform data. Scattering in charge moment values independently derived from three ELF magnetic field observation data would be related to the distances of propagation paths between lightning locations and observation sites and ionospheric conditions. We will also investigate whether such a scattering is related to the characteristics of parent lightning discharges.