

## Global lightning location estimated by ELF magnetic field observations network

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

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

Optical emissions such as sprites in the mesosphere and elves in the lower ionosphere are called Transient Luminous Events (TLEs). We are observing ELF waves in the frequency range 1-100Hz at 3 sites in the world, Syowa station (69.0S, 39.6E) in the Antarctic, Onagawa (38.4N, 141.5E) in Japan, and Esrange (97.9N, 21.1E) in Sweden. The ELF electromagnetic waves generated by lightning discharges propagate the Earth-ionosphere cavity with an extremely low attenuation rate. The source location of ELF electromagnetic wave can be estimated by the arrival direction of the ELF pulse at each site, and the arrival time. However, it is difficult to examine how accurately the source location is determined.

The FORMOSAT-2 satellite was launched in May 2004 and the on-board ISUAL instrument has measured TLEs by an imager, an array photometer, and a spectrophotometer. We have compared the locations of sprites observed by the ISUAL with the locations of parent lightning discharges producing sprites estimated from the ELF data. We have found that there are differences between the locations determined by two methods about sprite events over Africa. A tendency that the locations estimated from ELF data shift southward about 1500 km. We have also compared the lightning locations estimated from ELF data with those determined by ISUAL data in the regions of Central America and Southeast Asia. The cause of these differences in determined source locations will be discussed.