

## Seasonal Dependence of Global Distribution of Elves and Their Optical Characteristics Obtained by the FORMOSAT-2/ISUAL

# Shogo Chikada[1]; Hiroshi Fukunishi[1]; Yukihiro Takahashi[1]; Toru Adachi[2]; Akihiro Yoshida[1]; 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] RISH, Kyoto Univ.; [3] Cheng Kung Univ.; [4] U.C.Berkeley; [5] NSPO

One of transient luminous events (TLEs) called elves is optical emission phenomenon in the lower ionosphere above thunderstorm induced by lightning discharges. Since the first discovery of elves in 1995, many observations have been carried out on the ground, however, the global distribution of elves has not been investigated yet because the ground-based measurements are conducted in limited areas. Recently, long-term global observation from space by the ISUAL (Imager of Sprites and Upper Atmospheric Lightning) onboard the FORMOSAT-2 satellite can enable us to examine the global distributions of elves and their seasonal dependence.

Purposes of this study are to investigate global distributions of elves and their seasonal and regional dependences, to investigate the diameters of elves statistically and to identify the parameters of lightning discharges producing elves.

The ISUAL has observed 924 elve events in the period from July 2004 to June 2005. It is found that a large number of elve events occurred over the Caribbean Sea and Southeast Asia. Comparing the global distributions of elves observed by the ISUAL with the global lightning activity obtained by the Tohoku University ELF network [Yoshida et al., 2006], it is found that high occurrence regions of elves are correspondent to the regions where the ratios of negative CGs are high. This result suggests that elves are likely to be induced by negative CGs.

Time constants and EMP amplitudes of parent lightning discharges, which produce elves, sprite halo and sprite streamer, are estimated based on the ISUAL AP (Array Photometer) data. It is found that the average rise time of parent lightning discharges for elve events is shortest among the three TLEs and that EMP amplitudes of elve-inducing lightning discharges are largest of the three.