

## Global Survey of TLEs from ISUAL onboard the FORMOSAT-2 Satellite

H.T. Su<sup>1</sup>, R.R. Hsu<sup>1</sup>, Alfred B. Chen<sup>1</sup>, H. U Frey<sup>2</sup>, S.B. Mende<sup>2</sup>, Y. Takahashi<sup>3</sup> and L.C. Lee<sup>4</sup>

<sup>1</sup> National Cheng Kung University, Taiwan

<sup>2</sup> University of California-Berkeley, U.S.A.

<sup>3</sup> Tohoku University, Japan

<sup>4</sup> National Science Council, Taiwan

ISUAL (Imager of Sprites and Upper Atmospheric Lightning; Chern et al., 2003] onboard the FORMOSAT-2 satellite, is a space experiment dedicated to a long-term and global survey of TLEs. ISUAL contains three bore-sighted sensors: an intensified CCD Imager with six selectable bandpass filters that cover the optical emissions of major atmospheric species, a six-channel spectrophotometer (SP) measuring photon fluxes at six pre-selected bands (FUV to red), and a 16-anode array photometer (AP) providing light variation at different vertical heights.

The FORMOSAT-2 spacecraft moves along a Sun-synchronized orbit at 890 km altitude and ISUAL is configured with an eastward view observing TLEs over a region which is at a distance of 2,300 to 4,000 km away and close to local midnight. For the northern summer, the ISUAL surveyed area roughly spans the region between 45-degree south and 25-degree north latitude; whereas for the northern winter, the ISUAL survey region covered 25-degree south to 45-degree north. The South Atlantic Anomaly region was excluded for the safety of the instruments. The known summer TLE hot zone of the US High Plains is also not included in this survey.

Since July of 2004, ISUAL has observed more than 8000 TLEs and established elves as the dominant type of TLEs, with sprites/halos as a distant second. This talk will present the global TLE distributions and the inferred rates based on the ISUAL data. The possible impacts of TLEs on the Earth's environment will also be discussed.

---

Works performed at NCKU were partially supported by research grants from NSPO and NSC in Taiwan.