

CHARACTERISTICS OF LIGHTNING ASSOCIATED WITH ISUAL-DETECTED TLES

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Much of what is known about the characteristics of lightning that produces transient luminous emissions (TLEs) in the mesosphere comes from measurements made over many years in the U.S. High Plains. Some measurements in other regions suggest that these characteristics may be different in different geographic regions. For example, the MEIDEX space shuttle experiment recorded video observations of a number of sprites and elves that occurred with a surprising lack of extremely low frequency (ELF) transients (C. Price and Y. Yair, personal communication) that are typically associated with large cloud to ground lightning strokes. The ISUAL instrument on ROCSAT-2 is steadily recording TLEs over much of the globe and offers a unique opportunity to systematically investigate with a reasonably large database whether TLEs are produced by the same kind of lightning independent of location. Two sets of magnetic field sensors spanning the entire <1 Hz to 30 kHz frequency range have been operating at Duke University continuously since March 2004 and thus cover the initial months of ISUAL operations. Focusing primarily on TLEs observed in the Americas and Africa, which are close enough to the sensors that direct VLF signals are usually detectable from large lightning strokes, we estimate and analyze lightning parameters such as charge moment change, peak current moment, and current moment rise time in an effort to determine whether the TLE-lightning relationship is geographically variable. In particular, these parameters will be compared to those derived for U.S. High Plains TLEs from magnetic field observations using the same set of sensors.

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