

## SPRITES PRODUCED BY POSITIVE AND NEGATIVE LIGHTNING DISCHARGES ABOVE HAITI/DOMINICAN REPUBLIC THUNDERSTORMS

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In August-September 2001 an experimental campaign has been conducted in Puerto Rico to perform correlative studies of lightning and lightning-induced ionospheric effects. The campaign, which was sponsored by a Small Grant for Exploratory Research from the National Science Foundation to Penn State University, had a broad range of scientific goals including studies ionospheric effects of thunderstorms, studies of VHF-quiet positive leaders and studies of large scale optical phenomena above ocean thunderstorms in tropics. As part of this program we conducted night time video recordings of lightning and large scale luminous phenomena above thunderstorms using a SONY DCR TRV 730 CCD video camera equipped with a blue extended ITT Night Vision GEN III NQ 6010 intensifier with 40 deg field of view. The intensifier provided a monochrome (predominantly green) image output. The video system was deployed at the Lidar Laboratory on the grounds of Arecibo Observatory, Puerto Rico (18.247 deg N, 66.754 deg W, elevation 305 m above the sea level).

We report here low light video and ELF recordings of 8 sprite events observed above a Haiti/Dominican Republic thunderstorm from Arecibo Observatory, Puerto Rico between 01:10 and 02:51 UT on September 3, 2001. The sprite producing thunderstorm system was located approximately 700 km from the observational site and had the cloud area exceeding  $10^4$  km<sup>2</sup>. Morphological features of the observed events closely resemble those observed in other parts of the globe and include, in particular, isolated columns, groups of two or more columns, 'dancing sprites', and small impulsive glows confined to higher altitudes. ELF recordings, performed at Duke University, at Rhode Island MIT site, and at Palmer (Stanford University) and Syowa (Tohoku University) Antarctic stations, identified the 7 of the observed events as to be clearly associated with positive cloud to ground lightning discharges (+CGs) involving the vertical charge moment changes ranging between +143 C km to +2520 C km. The observed QL=143 C km for the weakest sprite event is consistent with the experimentally established 120 C km minimum lightning charge moment change required for the initiation of a sprite [Hu et al., GRL, 29, 10.1029/2001GL014593, 2002]. One sprite event (02:05:49.561 UT) was confirmed in ELF records collected at all four observational sites as being produced by an impulsive CG lightning with negative polarity. The associated vertical charge moment change was estimated to be -278 C km in 1.2 ms.