ELECTRICAL DISCHARGE FROM A THUNDERCLOUD TOP TO THE LOWER IONOSPHERE

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In this talk we report a unique video recording of a direct electrical discharge between a thundercloud and the lower ledge of the Earth's ionosphere [1]. The reported video recording was obtained during nighttime observations using a SONY DCR TRV 730 CCD video camera equipped with a blue extended ITT Night Vision GEN III NQ 6010 intensifier with a 40 degrees circular field of view. The camera was deployed at the Lidar Laboratory of Arecibo Observatory, Puerto Rico (18.347 deg N, 66.754 deg W, elevation 305 m above the sea level). The event was observed starting at 03:25:0.782 UT on September 15, 2001, when a cluster of thunderstorm cells developed at approximately 200 km range north-west of the observational site, and lasted a total of 24 video frames. The initial stage of the observed phenomena closely resembles general geometrical shapes and propagation speeds of previously documented blue jets [2-4] and we can therefore speculate that it can be effectively classified as a blue jet, which propagated upward beyond the previously documented altitude. The subsequent dynamics of the upper part of the phenomena closely resembles some of the features often observed in sprites [5-7] (i.e., the shape of branching discharge trees, the diffuse termination of the breakdown branches on the lower ionospheric boundary, the evolution of the discharge trees into hot spots, the high propagation speed). However, some other features of the observed phenomena, like its long duration, the altitude extent, and no apparent association with a positive cloud to ground lightning discharge, do not match those typical for sprites. This program was supported by a Small Grant for Exploratory Research of the National Science Foundation to the Pennsylvania State University. The GEN III intensifier was provided by ITT Night Vision Industries. We are indebted to S. Gonzalez, Q. Zhou, M. Sulzer, C. Tepley, J. Friedman, E. Robles, A. Venkataraman and E. Castro for support of our observations at Arecibo Observatory.

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