

DIFFERENCES IN THE CHARACTERISTICS OF THE FIRST AND SINGLE STROKES OF NEGATIVE AND POSITIVE CLOUD-TO-GROUND LIGHTNING FLASHES

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ABSTRACT

The reason why a lightning flash have more than one stroke is still unknown. Approximately 80% of the negative cloud-to-ground (-cg) lightning flashes are composed by more than one stroke. 75% of the positive cloud-to-ground (+cg) flashes, however, have only one stroke. Although negative single-stroke flashes and positive flashes are usually followed by long continuing current, the first stroke of a multiple-stroke -cg is usually not. In the present work we combine high-speed video recordings (obtained by two different cameras, Red Lake Motion Scope 8000S and Photron Fastcam 512 PCI, operating at frame rates ranging from 1000 or 8000 frames per second) with slow and fast electric field measurements (obtained through the use of capacitive antennas) to investigate parameters of the first stroke of a multiple-stroke -CG, of the negative single-stroke, and of the first stroke in a +CG. The -CG and +CG flashes analyzed were collected between 2003 and 2011 in Brazil and in USA. Through this analysis, we hope to find some reasons for some of these marked differences in -CG and +CG flashes.

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