



Negative cloud-to-ground lightning properties and lightning network detection efficiency from high-speed video observations

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From analysis of digital high-speed video records of 233 negative cloud-to-ground (CG) lightning flashes associated to 27 thunderstorms in southeastern Brazil, various lightning properties have been determined. The analysis of the video records showed that although 20% of them were single-stroke flashes and the average number of strokes per flash was 3.8, a significant variation was observed in these parameters from storm to storm. In a smaller subset containing 138 flashes, 70 (51%) had multiple terminations on ground. 138 flashes produced 235 different strike points; therefore, the average number of strike points per CG flash was 1.70. Considering that in this study the missing of strokes is practically negligible, we can say from the average multiplicity and from the average number of strike points per flash, that each ground contact point is, in average, struck 2.2 times. 608 time intervals between strokes of 186 negative multiple-stroke flashes presented a geometric mean value of 61 ms. A strong positive correlation between the number of subsequent strokes in a flash and the flash minimum duration may indicate that some processes concerning the time requisite for the channel decay and for the positive leader in the cloud to provide more charges for the next stroke, do not permit multiple strokes occur under a certain minimum time duration. Flash and stroke detection efficiency of the Brazilian lightning location system is discussed.