

On relationships between the multiplicity and duration of negative cloud to ground lightning flashes and the horizontal extent of the inferred negative charge region

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ABSTRACT: Negative cloud-to-ground lightning is important because of its frequency and destructive characteristics. We have been investigating how the physical parameters of negative flashes vary from region to region in different seasons in order to understand better if and how the parameters depend on the local meteorological environment. Here, we will show how the multiplicity and total duration of negative flashes, as measured by high-speed cameras and comparable lightning locating systems (BrasilDAT and the NLDN) depend on their geographical location. Three observation campaigns were conducted, two in Sao Jose dos Campos, SP, Brazil, and one in Tucson, AZ, USA. Radar images were used to obtain information about the parent thunderstorms such as the area enclosed by the 35 dBZ reflectivity contours at the level of the -10 °C isotherm. This area was considered to be an estimate of the horizontal extent of the main negative charge region within the parent thunderstorm. We found good correlations between multiplicity and duration of negative flashes with the areas of the 35 dBZ contours at -10 °C, and we will propose a conceptual model to explain this relationship.

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