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Statistics on the occurrence of continuing current in cloud-to-ground lightning flashes based on high-speed video records

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Abstract

Several studies have tried to infer the occurrence of long continuing current according to some physical characteristics of the preceding return strokes. They all used high resolution lightning flash video records coupled with an electric field waveform datalogger and lightning data collected by Lightning Locating Systems. A pattern in the initiation of such continuing current was found to related to electrical parameters of individual return stroke like the peak current and the inter-stroke interval. Indeed, the first strokes in either negative single or multi-stroke flashes are unlikely to be followed by a continuing current. On the contrary, all the positive return strokes and the negative return strokes exhibiting a peak current less than 20 kA (absolute value) or with a small inter-stroke interval are prone to initiate long continuing currents.

Météorage has launched a project aiming at finding a method able to infer the presence of a continuing current based on the analysis of CG flashes characteristics as they are collected by a Lightning Locating System. This new attempt of identifying a pattern leading to continuing currents prediction does not rely on the regular lightning flash parameters only, but also considers the "conducting channel data" as a possible discriminant information. As a result, we expect to improve the prediction of the occurrence of continuing currents particularly in negative cloud-to-ground flashes.

In this paper we will present preliminary results giving some statistics on the occurrence of continuing currents based on the analysis of 260 high-speed video record analyses. We define different type of lightning flashes in respect with their physical parameters like the polarity, the number of ground strike points and the number of return strokes in the flash. Based on these different classes we determine a probability of occurrence of continuing current. The results are compared to those that are published in the literature.

Topic Areas

Lightning Physics, Characteristics and Measurements

Submission Format

No preference