E1-37 Multiplicity of negative return strokes of lightning flashes observed in Colombo

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Negative cloud-to-ground lightning flashes were analysed to obtain the statistics of the multiplicity of return strokes such as relative amplitudes of subsequent strokes and inter stroke intervals. This information plays a major role in understanding the processes of lightning in the tropics.

Measurements were conducted in Colombo during two convective thunderstorms in May, 1997. The vertical electric field was sensed by a flat plate antenna. After passing through a buffer amplifier, the signal was directly fed through a coaxial cable to a LeCroy Oscilloscope having 1 Megabyte memory. The sampling time used was 0.5μs in all cases and the pre-trigger delay time was 100 ms. 57 negative ground flashes were recorded which include 174 individual strokes.

79% (45 flashes) of the negative flashes analysed in this study consist of more than one return stroke. Out of these 45 multiple stroke flashes, 44% contain at least one subsequent stroke with amplitude greater than that of the first return stroke. When we consider the entire number of subsequent strokes (120 strokes), 29% have amplitudes greater than that of the first return stroke. In the extreme case, a 5th stroke of a 5 stroke flash had the amplitude which is 260% of that of the first stroke. When the flashes with more than 2 strokes were concerned, in 58% of the cases, the longest interstroke interval was followed by the subsequent stroke with the largest amplitude.

As 44% of the subsequent strokes in lightning flashes observed in Colombo possess peak electric fields that are greater than that of the first stroke, one has to be careful not to let the first stroke bypass the protective gates, in selecting sensitivity thresholds in surge protection.

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