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Effect of distance on the measurement of multiplicity and peak currents of lightning direction finding systems

Two lightning locating systems were utilised in obtaining the cloud-to-ground flash characteristics in Sri Lanka and in the surrounding area of the Indian Ocean. A total of 5189 cloud to ground (CG) flashes for 39 days in the months of February, May, June, August, September and October in 1999 were used for this study.

Data shows a clear reduction in the multiplicity when thunderstorms are far from the measuring stations. It was observed that the average multiplicity can be represented by the relationship ax-b where a = 7.83, b = -0.25 and x is the distance. When the distance is within 10-20 km, we get a multiplicity value of 4.5, which agrees well with the previously reported measurements carried out with transient recorders. The reduction in average multiplicity with the distance can be attributed to the attenuation of EM radiation when travelling long distances over the finitely conducting ground plane.

Opposite trend (larger the distance, higher the peak current values) was seen for average peak current values when studied against the distance. This effect can be easily explained in terms of attenuation due to finite ground conductivity and trigger thresholds in electronic circuits that effects the filtering process of the lightning ground flashes. A average peak current value of 22 kA was observed for distances 10-50 km.