

E1-36 The polarity of thunder clouds observed in Sri Lanka

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The knowledge of the arrangement of charges inside the thunder cloud is important in order to identify the mechanism or mechanisms responsible for the electrification of thunderstorms and the occurrence of lightning. It is generally considered that there is an arrangement of charges with the concentration of one sign higher up in the cloud than that of the opposite sign. Such a cloud is called 'bipolar'. When the cloud has positive charge uppermost, the cloud is said to be of positive polarity, and in the reverse case negative polarity. In addition to the simple bipolar charge structure of positive polarity clouds, some of the clouds contain a relatively small charge concentration of positive charge in the base. The results reported here describe the polarity of thunder clouds observed in Colombo.

The potential gradient at ground level was measured continuously using a field mill coupled to a x-t pen cart recorder. The field mill was hung at a open space with its sensor palates at about 2m above the ground level and calibrated. The response time of the field mill was 50ms and the maximum sensitivity limit was 5Vm^{-1} . By adjusting the amplifier gains, the field mill can be used to measure potential gradients from near zero to about 40kVm^{-1} .

The records of electrostatic field changes at ground level caused by 45 passing by thunder clouds observed during the period December 1996 - May 1997 were used in this study. Analysis was made using the point charge model of a thunder cloud.

Results indicate that only 9% of the thunder clouds have the simple bipolar structure of charge distribution and out of those, 25% are of positive polarity type. Out of the 45 thunderstorms, 16% are of tripolar type with additional positive charge in the base and 75% of the clouds were of complex multipolar type.

The maximum positive and negative electric field values recorded at ground level under thunderstorm conditions during this period were 16850Vm^{-1} and -8630Vm^{-1} respectively.

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