

## **E1-05: Number of thunder days per year and other lightning occurrence characteristics in Colombo thunderstorms**

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Lightning occurrence characteristics of a particular part of the world is an essential requirement for the development of lightning protection technology suitable for that region. These lightning data differ from region to region due to the effect of topography on flash discharge mechanisms. A commonly used method for presenting lightning occurrence data is the mapping of isokeraunic level (number of thunderstorm days per month or year) for different regions of a particular country. It is customary to avoid the regions with high isokeraunic level in constructing industrial sites and in laying of new power and telecommunication networks to minimize the hazards due to lightning.

In this paper, the number of negative ground flashes (NGF), positive ground flashes (PGF) and cloud flashes (CF) which occurred within 14 km radius from the measuring site at Colombo University, recorded daily for a period of one year are presented. The number of distant flashes (DF) occurring between 14 km and 40 km radius is also presented together with cloud flash to ground flash ratio and the isokeraunic level.

The CGR3 Mackerras type lightning flash counter was used for the recording of event occurrence of different lightning flashes. The CGR3 lightning flash counter system consists of 3 parts viz. vertical antenna, detector unit and the register unit. The instrument has the ability to count the approximate numbers of cloud flashes, negative ground flashes and positive ground flashes within a radius of 14 km.

The vertical antenna set-up was constructed in Colombo with dimensions: height of the metal antenna rod 3.3 m, height of the base stand 1.7 m and diameter of the antenna rod 50 mm. The rod and the stand were isolated by a 1.25 mm perspex gap. The top of the antenna was covered by a conducting sphere to prevent corona discharge prevailing under thunderstorm conditions. The metal base stand of the antenna was connected to the ground by a 2 mm thick earth wire. The antenna set up was mounted at the flat roof top of the New Physics Building, University of Colombo. The height of the building was 14 m. The detector unit of the CGR3 instrument was located close to the antenna and connected to the antenna using a 50  $\Omega$  coaxial cable of length 2.5 m. The register unit was placed at a room in the ground floor of the Physics building. The register unit and the detector unit were connected using an eight-wire cable which included  $\pm 13$  V power supply to the electronics. The observations were made during one full year period from June 1994 to May 1995. Throughout the experiment the error detection tests have been conducted periodically to verify the accuracy of the instrumentation.

A total of 88929 flashes has been recorded during the period of one year within a radius of 40 km from the measuring site. Thunderstorms prevailed only on 197 days during this period. However, when considering the local activity of thunderstorms within 14 km radius, the isokeraunic level in Colombo was found to be 133 days. The result indicates a Cloud Flash to Ground Flash Ratio of 0.56 during the period of measurement. The ratio of negative ground flashes to positive ground flashes is at least as high as 31.

Similar low cloud flash to ground flash ratios have been detected using modern flash counters in several other countries in the recent past.

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