3 Years of RAMMER Network – What we have got so far

Lightning Physics

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Three high-speed, monochromatic and GPS time stamped cameras, which are automatically triggered by the lightning transient luminosity, compose the RAMMER Network. It was designed to observe natural cloud-to-ground flashes in the region of São José dos Campos, São Paulo (Southeastern Brazil). The cameras were assembled in weather proof boxes with all equipment necessary to the automatic trigger and are positioned in secure facilities covering a total area of ~1000 km^2 and a common area of ~70 km^2. This project was conceived in mid-July 2010 and, from then on, the network operated during the summer seasons of 2011/2012 and 2012/2013. In the summer season of 2011/2012 the network participated in the CHUVA-GLM Vale do Paraíba campaign. During this first campaign, only two sensors were operational. In the next campaign (2012/2013), three sensors were installed on fixed locations and a fourth one (with an identical camera except for the color feature) operated mobile. The objective of this work is to show the most relevant scientific achievements obtained by the use of the RAMMER network during the first two observation campaigns. The most relevant scientific works produced by the RAMMER data were: a) First observation of two bipolar flashes simultaneously by high-speed cameras, VHF data (LMA) and multiple LF networks. Besides de amount of lightning data available, one key factor was that, in both cases, the inception mechanisms that formed the subsequent negative strokes happened below cloud base, allowing a proper understanding of the overall processes; b) Some recoil leader phenomenology analyses, such as some estimates of their peak currents and their behavior as attempted leaders producing return strokes; and c) Due to the relatively large amount of flashes recorded per day, several works could also be done, such as, the first statistical study of visible lightning properties per day, study of the behavior of forked strokes over the observation area, measurements of location accuracy of the local LLS networks using natural cloud-to-ground flashes and a critical overview of the lightning observations by high-speed cameras using lightning data recorded by more than one camera.