

On the relation between return stroke peak current provided by lightning location systems and its peak luminosity obtained from high-speed video cameras

Preliminary results

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Abstract

The present work consists of an analysis of two bipolar cloud-to-ground flashes recorded with the help of one high-speed digital camera during the CHUVA (Cloud processes of the main precipitation systems in Brazil: A contribution to cloud resolving modeling and to the Global Precipitation Measurement) Vale do Paraíba Campaign. The events were selected because of two main factors: (i) the channel of all their subsequent negative strokes were visible below cloud base; and (ii) the images corresponding to the maximum luminosity value did not present any saturated pixels. Python code has been implemented in order to open, manipulate and visualize the raw image files provided by a Phantom v9.1 camera set to operate at 2500 frames per second with a 1200 x 504 pixels spatial resolution. It was possible to visualize the frames with false colors and remove the background scenario, allowing the generation of a detailed “mask” that represents the geometry of the lightning channel. Through a scatter diagram of luminosity (estimated through the pixel intensity values) *versus* estimated peak current (provided by the BrasilDAT network), it was shown that both physical quantities are linearly related. Future analyses will also consider peak current estimates obtained by other lightning location systems, in addition to estimates of the minimum measurable current and a linear regression to the continuing current period.