

High-Speed Video, Mapping and Broadband Electric Field Recordings of Lightning

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New Mexico Tech's Langmuir Laboratory for Atmospheric Research, situated in the southwest-central mountains of New Mexico in the USA, recently acquired a Vision Research Phantom v7.3 high-speed video camera to make video recordings of lightning leaders. The video camera is typically operated at 6400 frames per second and is GPS-synchronized via IRIG-B. A Lightning Mapping Array (LMA) is deployed at and around the mountaintop laboratory and operates in a high time-resolution mode where RF sources from lightning are located as often as once every 10 microseconds, providing detailed images of lightning leaders.

In addition to LMA data and video recordings we also record broadband electric field waveforms from lightning at up to 100 MHz in bandwidth, together with 63 MHz log-RF waveforms and 'slow' and 'fast' electric field-change waveforms. The broadband waveforms are recorded in a triggered mode by deep-memory digitizers for a duration of 1.34 seconds, allowing us to capture lightning events in their entirety.

These instruments are a comprehensive tool for studying lightning leader processes in great detail. In this paper we will show some nice examples of cloud-to-ground lightning from the summer of 2008.

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