

## **An Overview of Lightning and Thunderstorm Studies with the LMA**

### Lightning and Thunderstorm Electrification

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The New Mexico Tech Lightning Mapping Array (LMA) has undergone substantial development in the past several years. The current version of the LMA operates on a complete standalone basis utilizing solar power and cell phone data links into the internet. This has enabled networks to be relatively easily deployed and has enabled participation in a number of field programs. These have included studies in northern Colorado with Colorado State University and the CSU-CHILL dual-polarization radar during the Deep Convective Clouds and Chemistry experiment (DC3), in southern France during the HyMeX study of the meteorology of fall Mediterranean storms, and at Langmuir Laboratory as part of the DARPA-sponsored NIMBUS program of lightning studies. In addition a portable 'sitetest' network has been developed that has been operated in several month-long campaigns at Kennedy Space Center in Florida, wind farm studies in northern Kansas, and in conjunction with the high energy cosmic ray Telescope Array Project with the University of Utah.

In this presentation we will give an overview of results from the various studies, including a) features of anomalously electrified storms in Colorado, b) comparisons with persistently normal polarity storms in New Mexico and in southern France, c) observations of precursor and volume-filling small discharges in storms, and d) a review observations suggesting that freezing of mixed-phase precipitation kickstarts the electrification process in storms.