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Energy estimates for lightning flashes

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The energy released by a lightning flash is related to ΔQ , the charge transferred by the flash, and the electric potential, $V(z)$, in the storm due to the thundercloud charges. The energy of the flash can be estimated directly from the product, $(\Delta Q)(\Delta V)$, where ΔV is voltage difference that the lightning charge is transferred between. Using in-cloud lightning electric field change data from balloons, ground-based field change data, and Lightning Mapping Array data, we estimated ΔQ of thirteen intracloud (IC) and five cloud-to-ground (CG) lightning flashes from four thunderstorms that occurred in 1999 above a mountaintop in New Mexico, USA. From the balloon soundings of electric field, we also deduce the vertical V profile through these storms. In this presentation, we will show how we combine these measurements to obtain energy estimates for 13 IC and 5 CG flashes.