

# Observation of Variations in Cosmic Ray Shower Rates During Thunderstorms and Implications for Large-Scale Electric Field Changes

*Monday 19 July 2021 18:00 (12 minutes)*

This work presents the first observation by the Telescope Array Surface Detector (TASD) of the effect of thunderstorms on the development of the cosmic ray showers. Observations of variations in the cosmic ray showers, using the TASD, allows us to study the electric field inside thunderstorms on a large scale without dealing with all the limitation of narrow exposure in time and space using balloons and aircraft detectors. In this work, observations of changes in the cosmic ray shower intensity  $\Delta N/N$  using the TASD, was studied and found to be on average at the 1–3% level. These observations were found to be both negative and positive in polarity. They were also found to be correlated with lightning but also with thunderstorms. The size of the footprint of these variations on the ground ranged from 4–24 km in diameter and lasted for 10s of minutes. The dependence of  $\Delta N/N$  on the electric field inside thunderstorms, in this work, is derived from Monte Carlo CORSIKA simulations and will also be presented.

## Keywords

EAS rate variation, Thunderstorms, Electric field.

## Collaboration

Telescope Array

## other Collaboration

## Subcategory

Experimental Results

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