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Influence of Atmospheric Electricity on the recovered parameters of primary cosmic rays

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The problem of thundercloud electrification is of the most difficult ones in the atmospheric physics. The structure of electric fields in the cloud escapes from the detailed in situ measurements; few balloon flights revealed rather complicated structure that is much more sophisticated than a simple dipole or tripole models. To get insight into the problem of charge structure of thundercloud we use new key evidence –the fluxes of particles from thundercloud, the so-called Thunderstorm Ground Enhancements –TGEs. TGEs originate from electron acceleration and multiplication processes in the strong electric fields in the thundercloud, and the intensity and energy spectra of electrons and gamma rays as observed on the Earth's surface are directly connected with the intracloud electric field. Discovery of Long Lasing Low energy TGEs pose new challenges for revealing structures in the thundercloud responsible for hours-extending gamma–ray fluxes. The atmospheric electric fields prolonged for many hours can influence the parameters of primary cosmic rays acquired Extensive air showers (EAS) and amount of Cherenkov light measured by large surface detectors and telescopes. In the presented report, we demonstrate that experimentally measured intensities and energy spectra of the "thundercloud"particles give clues for understanding charge structures embedded in the thundercloud. Rather short and intensive "runaway"process above detector site, which is consistent with tripole structure of the cloud electrification, is changing to much less energetic emission extended for hours. Measurements of particle fluxes and electric fields are supported by the simulation experiments with CORSIKA and GEANT4 codes.

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