



Gamma ray and fair weather electric field measurements during thunderstorms: indications for TGEs?

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We report coincidences of ground-level gamma-ray enhancements with strong electric fields typical of lightning discharges, measured at a mountainous site in northern Israel. High-energy emissions detected on the Earth's surface during thunderstorms supposedly initiate Thunderstorm Ground Enhancements (TGEs) of fluxes of electrons, neutrons and gamma rays that can last tens of minutes. Such enhancements are thought to be related to Extensive Cloud Showers (ECSs) initiated between the main negative charge center and the lower positive charge pocket in mature thunderstorms (Chilingarian et al., 2015). The Cosmic Ray and Space Weather Center located at Mt. Hermon hosts a gamma ray detector alongside a continuous multi-parametric array consisting of a Global Navigation Satellite Systems (GNSS) geodetic receiver (for measuring Precipitable Water Vapor (PWV) and ionospheric Total Electron Content (TEC)), vertical atmospheric electric field (E_z) and current (J_z) and a neutron super monitor (for cosmic ray measurements). The diurnal variations in fair-weather conditions exhibit a clear 24-hour periodicity, related to the diurnal variation of atmospheric parameters. During several severe thunderstorms that occurred over Israel and near the Mt. Hermon station in October and November 2015, we recorded several instantaneous enhancements in the counts of Gamma rays, which lasted ten of minutes, and that coincided with peaks in the vertical electric field and current. Lightning data obtained from the Israeli Lightning Detection Network (ILDN) show that these peaks match the occurrences of close-by CG lightning discharges. This talk will present correlations between the properties of parent flashes and the observed peaks, and discuss possible mechanisms.