Referee comments on the paper: " Continental Thunderstorm Ground Enhancement observed at an exceptionally low altitude" by Ivana Kolmašová, Ondřej Santolík, Jakub Šlegl et al.

The paper presents one of the first observations of the TGE at considerably low altitude with the same particle detector used in earlier experiments for the detection of numerous TGEs at high-mountain observatories on Aragats, Musala, and Lomnicky Stit. It is another confirmation that TGE is a universal physical phenomenon, that established high-energy physics in the atmosphere as a new synergetic scientific direction between Cosmic Ray and Atmospheric physics. The presented evidence is very important as particle measurements were accompanied by the measurements of atmospheric parameters, such as near-surface electric field disturbances, lightning detection, hydrometeor location with radars, and broadband magnetic field measurements. Analysis of these multivariate data demonstrates the emergence of low located LPCR, which leads to electron acceleration by the strong electric field between the main negatively charged layer in the middle of the thundercloud and low located transient LPCR.

I recommend the paper for publication after answering my questions below.

Most important is to demonstrate with better Figures and better arguments that the LPCR height is about 200 m, as was declared in the paper.

"The main complications for observations of TGEs were (a) emissions originating in the decay chain of the radon washed out from the air by rain. "

Sure, radiation of 226Rn progeny (mostly 214Br and 214Pb) can be overwhelming for the low energy (up to 1.5-2 MeV) energies. However, this sentence does not explain how the Radon and its progeny occurred in the air. Experiments on Aragats show that Radon and its progeny are after attaching to charged aerosols are lifted by the near-surface electric field (NSEF) to the air and their radiation is registered by particle detectors simultaneously and long after the TGE particles. If it is rainy, the rain will return some of the isotopes back to the ground, if not, as usually during TGEs, the radiation from the air will be continued for 1-2 hours till Radon progeny finally decays [1].

"TGEs were rarely detected also during positive electric fields. This can be explained by the asymmetry in the electron/positron component of the secondary cosmic rays (Zhou et al., 2016)."

Please, add some explanations for how this asymmetry influences the polarity of the electric field. If NSEF is positive for several minutes, it means a large positive charge above (LPCR) that "screened" a larger main-negative charge in the middle of the cloud (MN), see scenarios of TGE origination in [2], Fig.1

"…but sometimes they are terminated abruptly by a nearby lightning discharge",

I recommend stronger expression, not sometimes, but quite often, see [3].

" Electromagnetic pulses emitted by corona discharges might be identified in fast electromagnetic recordings. "

Can you, please, make additional clarifications? Your argument is "microsecond duration unipolar pulses emitted by corona discharges" only or something additionally?

"none of which, however, abruptly terminated the TGE flux."

At very intense lightning activity TGEs are lasing a few tens of seconds before being interrupted by the lightning flash. The 1-minute time series smooths the count rate surges, which are seen only on 1-s time series of count rate.

"can be attributed to corona-type discharges occurring at close metallic objects near the receiving antenna in high local electric fields below the thundercloud."

Can you localize where these discharges occurred? Do you have any report from staff seeing the corona discharges? Is it possible?

"c. a presence of strong corona discharges which might have been contributing to the delivery of additional positive charge to the cloud base. "

This conclusion comes from the "the unipolar character of pulses "only?

"LPCR inside the thundercloud is probably responsible for a high electric field in the bottom thundercloud dipole, which accelerated seed electrons and as a result, we observed significant long-lasting bremsstrahlung."

Why you emphasize the bottom of dipole and not the whole dipole between Main Negative layer and LPCR?

Have you estimated the MN height from the radar data? The extension of strong electron accelerating field should be 1-2 km for TGE initiation. Please, give an estimate of the extent of the" high electric field" you mentioned. It will be good if you estimate roughly the size of the lower dipole between MN and LPCR.

"The meteorological situation allowed for a formation of a strong lower positive charge region located close to the observatory (only 180 m above it during the storm B). "

Please, explain in more detail how you obtain the estimate of 180 m., please, give the height in limits, usually, LPCR extension is several hundred meters and it is a transient phenomenon, changing and finally escaping with graupel fall.

References

1. Chilingarian, A., Hovsepyan, G., & Sargsyan, B. (2020). Circulation of Radon progeny in the terrestrial atmosphere during thunderstorms. *Geophysical Research Letters*, *47*, e2020GL091155. https://doi. org/10.1029/2020GL091155.
2. A. Chilingarian, G. Hovsepyan, E. Svechnikova, and M. Zazyan, Electrical structure of the thundercloud and operation of the electron accelerator inside it, Astroparticle Physics 132 (2021) 102615 https://doi.org/10.1016/j.astropartphys.2021.102615
3. Soghomonyan, Suren; Chilingarian, Ashot ; Khanikyants, Yeghia (2021), "Dataset for Thunderstorm Ground Enhancements terminated by lightning discharges", Mendeley Data, V1, doi: 10.17632/p25bb7jrfp.1