We thank Ashot Chilingarian for careful reading of the manuscript and for his helpful comments and suggestions. We responded to all of them and revised the manuscript accordingly. (The line numbers are related to the manuscript with tracked changes.)

Responses to Reviewer (in blue) with Reviewer´s comments in black.

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.
As direct measurements of electrification in the thundercloud are extremely rare they are of course not available for our case. We therefore have to rely on realistic assumptions based on previous measurements, namely that the bottom of the thundercloud determines the position of the lower edge of LPCR (Rakov & Uman, 2003) and that the bottom of the thundercloud corresponds to the lifted condensation level (Daidzic, 2019). We also have other indirect indications of a strong LPCR at a low altitude above the observatory: the presence of strong corona discharges (Nag & Rakov, 2009; Chauzy & Soula, 1999), an increased occurrence of inverted IC lightning, a suppressed occurrence of CG lighting (Nag & Rakov, 2009), as stated on lines 527-531. To bring better arguments and to express better the limitation of our measurements we reworded the sentence in the summary on lines 546-548 which now reads as follows:

"The meteorological situation allowed for a formation of a strong lower positive charge region with its lower edge located close to the observatory (only 180 m above it during the storm B assuming the lower edge of the LPCR is located at the cloud base (Rakov and Uman, 2003))."

"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].
As suggested, we added an explanation how the radon and its decay chain appear in the air and added the reference [1]. The text now reads as follows on lines 55-58:

„The origin of radon and its progeny in the air was explained (Chilingarian et al., 2020a) by their attaching to charged aerosols after being lifted by the near surface electric field to the air. Their radiation then can be registered by particle detectors simultaneously with the TGE particles. Rain quickly returns some of the isotopes back to the ground. In the absence of rain, the radiation from the air can continue for 1-2 hours till radon progeny finally decays."

"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.
The hypothesis on the asymmetry in the electron/positron component of the secondary cosmic rays was introduced by Zhou et al. (2016) and later developed by Bartoli et al. (2018) using their TGE

observation at an altitude of 4300 m a.s.l. in Tibet, with a support of their Monte Carlo modelling. We did not observe any TGE during the positive near surface electric field periods, so we limit ourselves to briefly mentioning such observations (Kudela et al., 2016; Bartoli et al, 2018, Chum et al., 2020) which are unrelated to our case. The sentence on line 84 ow reads as follows:

"TGEs were occasionally detected also during positive electric fields (Zhou et al. 2016; Kudela et al., 2016; Bartoli et al., 2018, Chum et al., 2020)."

"…but sometimes they are terminated abruptly by a nearby lightning discharge", I recommend stronger expression, not sometimes, but quite often, see [3].
We changed the expression to "quite often" on line 86 and added the suggested reference [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?
We added a more detailed description of the properties of pulses which might be generated by corona discharges. The wording on line 111-116 is now as follows:

"Electromagnetic pulses emitted by corona discharges might be identified in fast electromagnetic recordings from their microsecond duration, unipolarity, and random distribution (Arcanjo et al., 2021). Unipolar microsecond scale pulses themselves were also found to accompany in-cloud processes as dart leaders or K-changes, but these appeared in several hundred microsecond long pulse trains with regular inter-pulse intervals (Rakov et al., 1992; Kolmašová and Santolík, 2013). Therefore, these pulse can be distinguished from the characteristic radiation from local corona discharges observed in electromagnetic recordings."

"*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.
We added (lines 513-514) a sentence stating the limitations of our SEVAN setup to recognize short TGEs.

"*We cannot exclude that there were short duration (a few tens of seconds) TGE events terminated by a lightning stroke, as these would not be recognizable in the 1-min cadence SEVAN data*."

"*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?
The observatory staff did not report any sparkling, but we did not expect them to see anything, as the thunderstorm occurred during the day. We added a sentence on line 520:

"Note that visible sparks were not expected to be reported by the observatory staff during the daytime."

"*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?

This hypothesis is based on the pulse properties (duration, unipolar character of pulses, random time distribution, see above, Arcanjo et al., 2021) and on findings of Nag & Rakov (2009) and Chauzy & Soula (1999), who proposed the corona discharges as an additional hypothetical source of positive charge for the LPCR. We rephrased the statement on line 530, which now read as follows:

"….c. a presence of irregularly distributed narrow unipolar pulses linked to strong corona discharges which might have been contributing to the delivery of additional positive charge to the cloud base.

"*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.
By "*the bottom thundercloud dipole*", we meant the whole dipole formed by the LPCR and the main negative charge region, not only the bottom of the dipole. We changed the wording from "*the bottom thundercloud dipole*" to "*the lower thundercloud dipole between the LPCR and the main negative charge region"* on lines 32, 535 and 550.

Using our radar data, we are able to distinguish types of hydrometeors in the cloud and based on that we can suggest areas where cloud electrification occurred. Our radar is a cloud profiler (1D data) contrary to standard weather radars, which rotate (2D to 3D). The cloud profiler is not a fully polarimetric radar and does not measure the quantities KDP (Differential Reflectivity) or ZDR (Specific Differential Phase), which were used for example by Biggerstaff et al. (2017) together with the lightning mapping array data (which we don't have for our case) to estimate the charge distribution in the thundercloud. We explain the limitation of the radar used in our study in the instrumentation section on lines 189-194:

" Based on this classification we can suggest areas where cloud electrification occurred but our radar does not directly measure the charge structure of the cloud. It is not a fully polarimetric radar and does not measure the quantities like KDP (Differential Reflectivity) or ZDR (Specific Differential Phase), which were used, together with the lightning mapping array data, for example by Biggerstaff et al. (2017) to retrieve the locations of charge centres."

To soften our statement we reworded the sentence (on lines 534-537) as follows:
"LPCR inside the thundercloud is probably responsible for an adequately high electric field in the lower thundercloud dipole between LPCR and the main negative charge region extending over at least 2 km, as we can estimate it from the hydrometeor classes observed by the cloud radar. This extended charge structure was probably capable to accelerate seed electrons and, as a result, we observed significant long-lasting bremsstrahlung."

We also added estimates of the published strengths of the in-cloud electric fields in the introduction section on lines 78-80:

„Using the observed enhancements of photon and electron fluxes measured by the upper scintillator of SEVAN at Lomnicky stit (altitude 2 634 m) and their comparison with the simulations of the RREA Chillingarian et al. (2021) showed, that the potential difference present in in the thunderous atmosphere might reach approximately 500 MV."

“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.

As written above we assume that base of the cloud corresponds to the position of the lower edge of LPCR (Rakov & Uman, 2003) and that the bottom of the thundercloud corresponds to the lifted condensation level (Daidzic, 2019). To express better the limitation of our measurements we reworded lines 546-548:

“The meteorological situation allowed for a formation of a strong lower positive charge region with its lower edge located close to the observatory (only 180 m above it during the storm B assuming the lower edge of the LPCR is located at the cloud base).“

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