



EGUsphere, author comment AC1
<https://doi.org/10.5194/egusphere-2022-379-AC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on RC1

Jakub Kákona et al.

Author comment on "In situ ground-based mobile measurement of lightning events above central Europe" by Jakub Kákona et al., EGU Sphere,
<https://doi.org/10.5194/egusphere-2022-379-AC1>, 2022

The paper by Kákona et al. deals with the ground measurements of thunderstorm activity using set of instruments placed on measuring cars. The combination of optical measurement with a high-speed camera and a UHF receiver was successfully used to determine the mean lightning duration. With further evolution of the measuring set, it will be possible to map the development of lightning in more detail.

We would like to thank you for your time and for reviewing our manuscript so thoughtfully. Please, find below the response to all your comments.

The correlation of the VLF signal with the data from the Blitzortung.org network is not very convincing. Problems with triggering other instruments also confirm that. One of the reasons for the poor function of the receiver can be seen in the horizontal location of the antenna, just above the conductive roof of the vehicle. Alternatively, the signal from the EFM could also be used to trigger other devices.

We found out that there are captions swapped between Figures 12 and 13. We apologize for the typesetting error.

The problem with the trigger in CAR0 mentioned in the article referred to a different trigger method using the AMS AS3935 chip, which we used two storm seasons ago. The problems mentioned are not related to the data used in our article. CAR1 used a different trigger system using VLF antennas, which proved to be reliable. As seen in the examples this system was able to trigger lightning in the immediate vicinity of the observation site that was not recorded by the Blitzortung.org network, because we have a video recording of lightning not recorded by Blitzortung.org. A manual trigger method was left in CAR0 in order to exclude a possible selection bias of the VLF antenna trigger method.

I can't identify the EFM and some of the other instruments in Figure 1. Do you have a picture with a description of all devices?

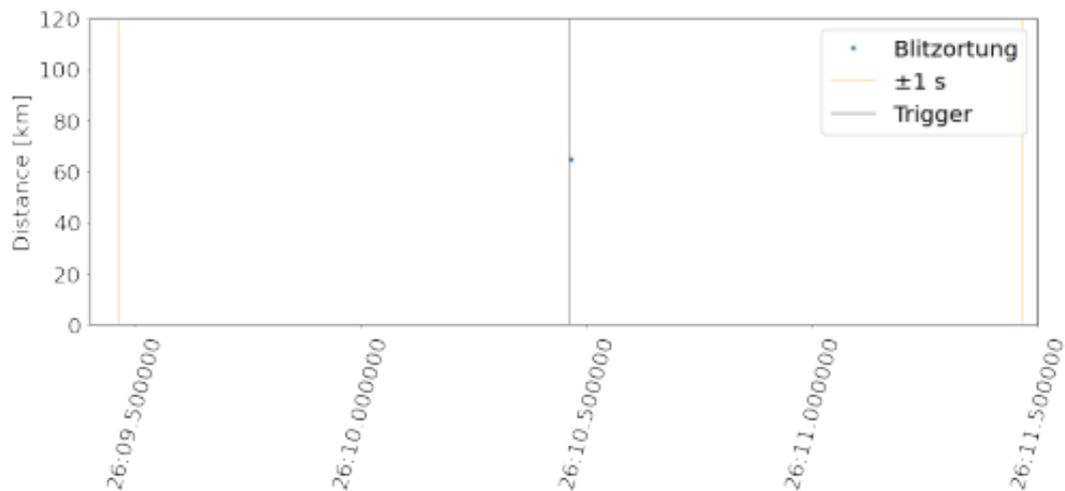
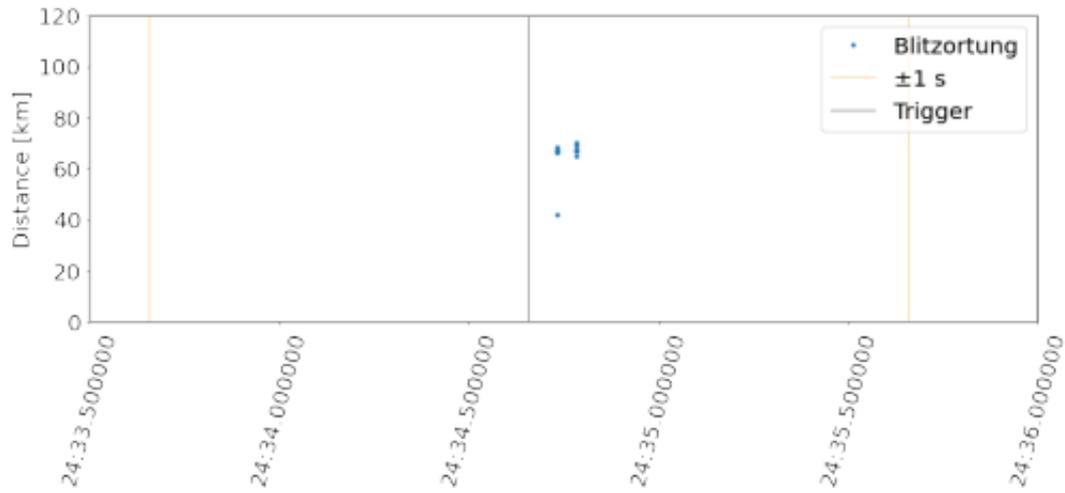
Figure 1 shows CAR0 which was not equipped with the EFM. EFM was mounted only on CAR1, but unfortunately, we are missing a photo of the entire measuring system including the electric field mill, as it was taken off the roof on a regular basis due to its susceptibility to damage. That is why we include a photograph of the whole assembly on the car roof together with a detailed view of the EFM location during measuring campaigns.



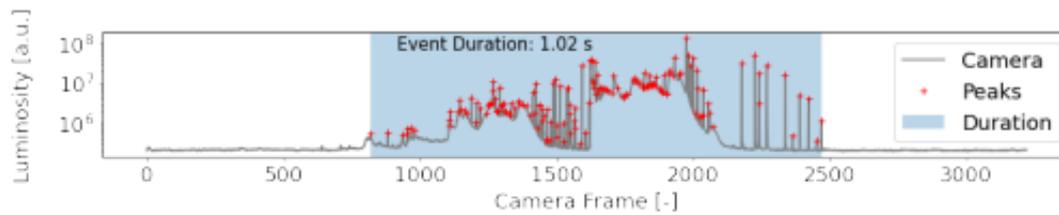
The EFM is mounted inside a can serving as protection against damage and increasing EFM's weather resistance. The can is open at the bottom - that's why EFM measures in a downward direction.

In Figure 9 and 10, the interval marked around the vertical lines is relatively wide. How accurate was the correlation with the Blitzortung.org network data in this case?

The correlation interval in Figures 9 and 10 were chosen ± 1 s, approximately twice the lightning duration median. We attach pictures with details of the correlation. Trigger time accuracy is ± 1 ms (the duration of one camera frame is $620.2 \mu\text{s}$). The duration of the described lightning at 18:24:48 determined by our method is 1.02 s.



We attach a graph with the determination of the duration of the given lightning from the camera recording. Please, watch the video of the lightning 1627302288.9546976.mp4. The part that was probably recorded by the Blitzortung.org network is above a northwestern horizon at time $T=+0.226$ s (1:08).



The procedure for determining the duration of the lightning does not take into account the number of strokes in it. The average duration will be affected by the proportion of recorded single and multiple stroke lightning strikes.

We include multiple strokes in the lightning duration because, based on our observations, the individual strokes are only a part of the whole lightning phenomena. Furthermore, it is important to note that during the measuring campaign we recorded less than 10% cloud-to-ground strokes, so these repeated strokes into the ground had only a negligible impact on statistics. Moreover, between individual CG strokes, the lightning also develops in other (distant) regions, so we consider it correct to include the entire recorded time development in statistics.

Please also note the supplement to this comment:

<https://egusphere.copernicus.org/preprints/2022/egusphere-2022-379/egusphere-2022-379-AC1-supplement.zip>