Natural Hazards and Earth System Sciences Discussions

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Comment on nhess-2021-12

Anonymous Referee #1

Referee comment on "Global ground strike point characteristics in negative downward lightning flashes – Part 1: Observations" by Dieter R. Poelman et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-12-RC1, 2021

General comments:

This paper presents a comprehensive study of negative downward lightning flashes based on high-speed video camera recordings of negative cloud-to-ground lightning in several regions around the globe. This study presents solid statistics that help improve the current lightning protection standard (change from flash density to ground-strike point density). The subject is suitable for this journal. Several comments follow. I recommend this paper be accepted after minor revisions.

Specific Comments:

- Did the authors include upward lightning in South Africa dataset? If yes, I think those upward lightning contradicts your title (negative downward flashes). If not, please state so in the paper.
- "Note that in Austria two flashes are observed whereby a new GSP is created by the tenth stroke in the flash, while the channel belonging to the previous GSP was used four and seven times, respectively." It would be interesting to know the interstroke interval preceding the 10^{th}
- Flash characteristic studies solely relying on high-speed cameras have limitations. I hope the authors could discuss those limitations and how those limitations could possibly influence the statistics presented. Two limitations that I can think of: (1) strokes creating a new termination could be missed by the camera (e.g., the stroke can occur at the back of cameras or simply out of view). (2) It is likely camera record length is not long enough to cover the entire flash. I see that length for SA dataset is only 1s with manual trigger setup (not sure what's the pre-trigger and post-trigger during manual trigger setup), maybe this partially explains why most SA flashes are single-stroke flash. Simultaneous electric/magnetic field measurements/LLS data might help mitigate some of those limitations. They could be used to see if there are additional strokes in the vicinity but outside the field of view of camera or outside the

duration of the camera records.

- "It follows that the channel creating a GSP is re-used by a factor of 2.3" I think the word "re-used" is ambiguous. Sounds like the termination created by a previous stroke will be re-struck by 2.3 subsequent return strokes on average. Your statement "A ground contact point is struck 2.35 times on average" in Line 166 is more accurate.

Minor editorial suggestions:

- Line 65: "Hence, the role of high-speed camera observations." This Is not a complete sentence.
- Line 70, enable us to determine
- L127, 150 m