

# Authors' response to Editor decision

[hess-2021-628]

*We thank the editor for the opportunity to revise the manuscript again and addressed the reviewers' additional comments as indicated below. Thanks to the reviewers for continuously improving our manuscript.*

*In this version we have:*

- *Extended the section in the discussion about the numbering of the P events*
- *clarified figures (Fig.4 d) and captions (Fig. 5)*
- *made some technical changes based on the reviewer's comments*

## Authors' response to Reviewer 3

*We thank the reviewer for taking the time to review our manuscript and support us with further helpful comments (hess-2021-628). Below we address the reviewer's comments (full text) indented by arrows and coloured in blue.*

### General comments

The authors sufficiently addressed my previous comments and I especially appreciate the work they put into to creating the supplementary figures. It is clear the authors put a lot of time into revising this manuscript and it shows. Overall, I think this a nice study that is close to being ready for publication.

However, I still do have one remaining issue, though this could be an issue of opinion. In their response about how they count multiple hours of precipitation as separate events, the authors responded, "There would have to be a major temporal and spatial gap ( $> 1/2$  h,  $> 2$  grid cells = 2 km) in the intense precipitation to make them count as two events. In this case the first would "only" contribute to the pre-event moisture according to our definition and the one closest to the flood event caused the flood. By looking at the few floods individually we did not find discrepancies regarding this."

I do not think  $1/2$  h is a major temporal gap, as storms like back-building thunderstorms or long duration storms like the Colorado floods of 2013 (Gochis et al. 2015) could result in precipitation gaps  $> 1/2$  h. Therefore, I do not think it is fair to count these as separate events. Thus, the number of precipitation events might be inflated. Yet, only counting the precipitation event closest to the flood mitigates an artificially high number of precipitation induced floods. I do not think the authors have to change their method, but a note about this caveat in the discussion section would be helpful.

- *In comparison to American or Mediterranean flash floods, events in temperate Europe occur on a much smaller scale. As indicated by the low DLS, most events occur during slow-moving*

*single cell thunderstorms. Back-building storms might not be sufficiently counted as a connected event, yet they also only present a minority of events. We agree that we might count more P events and that P events might appear too “small” to cause a flash flood, if it is not the P event itself leading to the flood, but a combination of storms. We will add this to the discussion.*

## Specific comments

Line 95: Replace “focussing” with “focusing”

→ *Thank you.*

Line 126: I suggest replacing “apprehension” with “understanding” for greater clarity.

→ *Okay, we will revise this.*

Figure 4d: Can you change the y-axis of this figure so that the bottom tails of the boxplots can be seen? As it is currently plotted, the tails are not visible.

→ *The tails are all around 40 mm/h according to the lower limit of the selection method. We will adjust the axis length to make the tails visible.*

Figure 5 caption: How did you determine the time before flash flood events? Is it the start of the triggering P event you describe in the methods?

→ *Yes, it is the time respective to the onset of the P event for P and the triggering P event for FF. We will clarify this further in the method section, line 245, as well as in the mentioned caption.*

Line 435–437: Please add Dougherty and Rasmussen (2019) to the list of citations here:

Dougherty, E. and K. L. Rasmussen, 2019: Climatology of flood-producing storms and their associated rainfall characteristics in the United States. *Mon. Wea. Rev.*, 147, 3861–3877, doi: <https://doi.org/10.1175/MWR-D-19-0020.1>.

→ *Thank you for the reference. We will add it.*

Line 481: Replace “sheer” with “shear”.

→ *Thank you.*