

Review of: **Quantitative rainfall analysis of the 2021 mid-July flood event in Belgium** by Michel Journée et al.

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Summary

I would like to thank the authors for the work they have put in the revisions. I think the manuscript has significantly improved and I am quite satisfied with the changes as made by the authors, based on the suggestions from the reviewers. Especially the emphasis on the new methods and the addition of extra analyses within the areal averages section make the work seem stronger.

Regarding the structure of the manuscript with methods sometimes throughout the results section, I understand the point of view of the authors, and although it is not my preference for readability, I think it works as is.

Overall, I have only a few minor comments left at this point and I am looking forward to seeing the work in its published form.

Minor comments (in blue, italic are the responses from the authors)

Rainfall product description: I would like to thank the authors for the extensive description they have added to the appendix. I am aware that the full method is too long to describe, but the proposed additions are more than sufficient, thanks. As a final remark regarding this point, can I ask the authors to clearly emphasize in the appendix the addition described in lines 136 – 137 “A new method has been developed to keep values as actual precipitation if they are significantly larger than the maximum expected clutter level.”? **This is just a minor remark, but good to point out the significance of this change for the dataset in the appendix as well.**

Lines 123 – 124: What was considered abnormal or unrealistic, i.e. was there a threshold or is this qualitative? *“The clutter removal techniques are extensively described in Goudenhoofd and Delobbe (2016). Concerning the identification based on the vertical profile of reflectivity, the technique is based on thresholds and it is described in the reference paper as follows : “A measurement at a given elevation is considered as clutter if the gradient between its value and the corresponding (horizontally) interpolated value on a higher (lower) elevation exceeds in magnitude -20 dBZ km⁻¹ (+10 dBZ km⁻¹). Because of variations from signal fluctuations, a minimum absolute difference of 5 dBZ between two corresponding values at different elevations is required for clutter identification”.*

Although I am happy with the answer, I cannot find it back in the adjusted text. If I did not miss it by accident, could the authors still add it?

Figure 10a: The sub panel is showing the difference between the rank-3 NMF and RADFLOOD21 data, right? This is not yet clear from the caption. In addition, from the figure and the corresponding text it is not directly clear to me if a difference is good or bad and how big of a difference is

considered acceptable. As mentioned earlier, I am not familiar with the NMF method, so that definitely plays a role too. Is a small difference and indication that with (just) three ranks, and corresponding regions, you capture most of the rainfall in space and time, or should I interpret it differently? *“The caption of Figure 10a has been clarified. Since NMF provides an approximation of the initial data, there is a difference on the 3-day total between the rank-3 NMF and RADFLOOD21 data, as shown on Figure 11a. The map on Figure 11a indicates where the discrepancies between both is the largest. In particular, there is a zone in central Belgium where the rank-3NMF approximation underestimates the 3-day total by up to 50mm. This is a pattern not captured by the rank-3 NMF, but where total rainfall amounts remain rather moderate (i.e., lower than 100mm over the 3 days).”*

Could the authors also add the last sentence “but where total rainfall amounts remain rather moderate” of their explanation to the main text? I think this will be insightful for the readers.

Figure 14 and A2: Thanks for adding both figures! The used rainbow color map may not be the best choice for colorblind people. The authors may consider a different color scheme, see e.g. Crameri et al. (2020).

References

Crameri, F., Shephard, G.E. & Heron, P.J. The misuse of colour in science communication. *Nature Communications* 11, 5444 (2020). <https://doi.org/10.1038/s41467-020-19160-7>