

Review of: **Improving radar-based rainfall nowcast by a nearest neighbour approach: Part I – Storm Characteristics** by Bora Shehu and Uwe Haberlandt

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Dear authors, dear Bora and Uwe,

Thank you for the responses to my and the other reviewer's comments. You have done a tremendous amount of work and the manuscript has improved considerably. I only have a few minor suggestions, see below in blue.

I am looking forward to seeing the paper in its final form.

Sincerely,

Ruben Imhoff

Responses on authors comments

"Visualization of an extreme event from reviewer1. It was not included because the nearest neighbour is not in its final form. The storm characteristics predictions are still to be integrated with the rainfall structure at fine temporal and spatial scales (1km² and 5min). Moreover, all the events selected are not normal ones, as they have been selected for urban flood purposes. Also, reviewer 2 recommended to explain better the limitations of the k-NN methods for predicting extreme behaviour and how this behaviour is underestimated in case of extreme events (and how the sample size is affecting this prediction). But this is already indirectly included in the calculation of the results, as the dataset is based on extreme events. Lastly, the paper is already too long, and we would like to include this example in the follow up paper. However, if the reviewers think this is very relevant to the study, we could include a small section 4.6 discussion a very extreme event and the data size influence on the performance of the probabilistic 3ONNs."

I do like the idea of a part 2 of this work, so it makes sense to me to include those examples then and I'm looking forward to seeing them then.

"No comments were made inside the manuscript about the size of the database, and the processing time, because, as already said, the kNN method its still not introduced in the final form. I would prefer to discuss these technical issues once the full kNN is operational, and also to mention what are the running time and memory depending on different cases: for instance, if a single storm or many storms are simultaneously present in the radar image."

The information the authors provided on the size of the database, run times, etc. in the author response, was valuable in my opinion. That said, I'm okay with including it in the part 2 paper of this work.

As response to Lines 146 – 152: How is the storm duration defined? - *"The storm is a group of radar pixels that have an intensity higher than a fixed threshold. The duration of the storm is then the lifetime of the radar pixels group as dictated by the threshold used to recognize them and the tracking algorithm that decides if the same storm is observed at continuous time steps."*

The authors provide useful information in line 200 and further, but can I ask to also include the given response (see above) in the text? Perhaps something is already there and I've missed it, but if not, I think it is useful information to include.

As response to Lines 367 – 369: Do you have any idea why the result is different for the Total Lifetime? – *"My understanding, is that the duration is an easier target to be analysed, which means the values are not zero (because we consider here the total lifetime) and its distribution is not as heavy tailed as the distribution of the other variables. The other variables, depending on the lead time, have more zeros included and have an asymptotic density function. On personal experience, when zeros are not present (or at least not in the frequency of the 4 variables here) the PIC is able to represent quite well the important predictors."*

This response may be an interesting discussion point to add to the paper.

Specific comments

Lines 70 – 71: "the focus in this study is on object-based nowcast as they are more convenient for convective storms that typically cause urban pluvial floods.": *I agree, but feel free to even mention that field-based nowcasting approaches generally have trouble capturing and forecasting this well, which would stress even more the reason to focus on object-based nowcasting methods.*

Figure font sizes and overall size:

The authors have, indeed, increased the font size of the figures. For some figures, the font size can still be considered somewhat small. Nevertheless, this is also a process of typesetting later on. A suggestion that I would like to make, is to sometimes consider placing the figures (e.g., but not limited to, figures 7 and 8) on multiple rows. That would allow for using larger figures and that would solve the problem, too.

Technical corrections

Title - "Improving radar-based rainfall nowcast by a nearest neighbour approach: Part I – Storm Characteristics": *I would suggest changing nowcast in nowcasting.*

Lines 59 – 60 "object-oriented nowcast (herein as object-based to avoid the confusion with the programming term) and field-based nowcast": *in both cases, I think 'nowcast' should be nowcasting*

Line 64 "an unique": *a unique*