

An objective cross-validation framework for mapping rainfall hazard based on rain gauge data

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The manuscript proposes an objective framework for mapping rainfall hazard in an area. It aims at both evaluating the best statistical distribution at station location and assessing the best mapping method. The authors propose the adoption of a unique distribution for the full distribution paying a particular attention to the tails. A small catchment in France is used for assessing the potentialities of the proposed techniques.

The manuscript significantly improved compared to the first version, but I think some of the key-points underlined from both Reviewer#1 and Reviewer#2 are still open, and require to be more carefully assessed for making the manuscript ready for publication.

MAJOR COMMENT

The major issue is related to the aim of the manuscript.

In the answers to the reviewers (R#1 answer 1, R#2 answer 1), and in the manuscript itself (e.g., P1L1), the authors declare that the aim of their work is not to assess the best probability distribution or mapping method in the Ardèche catchment they are analysing, but to propose an effective operational framework for choosing the best approach for mapping rainfall hazard.

Despite this, the results and conclusions sections are not focused on assessing the efficiency of the method in discriminating and choosing the best distribution-mapping method pair for a certain region, but on the description of the results for the case study. As the case study is related to a unique region, and that no-other selection approach or regional study is proposed as comparison and feedback, I can not understand how the author can assess the efficiency of the proposed framework.

I strongly agree with R#2, when he says (answer1) that the authors should do a better work in underlying and demonstrating that the proposed framework is a really significant step forward compared to the state-of-the-art in hazard-mapping. The authors are stating their aim is not to propose a new way of mapping rainfall hazard, but at least, considering that the proposed framework is not particularly innovative from the methodological point of view (as it consists in chaining two standard cross-validation procedures using some regional statistics to verify the combination that provides the best score), I think it's quite important to analyse the common approach adopted for this operation in the literature, and assess the improvement provided by the author's methodology.

Even the effects of one of the stronger assumption adopted from the author in their methodology (the use of an unique function for the full distribution) are not effectively assessed and just based on some consideration derived from the literature (R#1 answer2).

Concluding, I think the authors should more strongly stress the improvements that their framework and the hypothesis they set, can provide. This could be done by comparing it with the classical "not coupled" methodologies, commonly adopted for selecting separately the best distribution and the best mapping method or trying to verify the effect of different configurations of the framework (e.g., adopting hybrid distributions) on the results on their case study. If it is not feasible, they should at least test the technique on other basins, to provide evidence of the ability of the technique to effectively distinguish the best distribution-mapping technique pairs, according to the different characteristics of the basin.

MINOR ISSUES

I think the manuscript still require a final proofread by a native speaker as a number of language mistakes still arises. E.g.:

- P1L6 – I think “inhomogeneities” is more appropriate than “disparities” when refers to spatial distributions.
- P1L18 - “fields” → “field”
- P2L4 – I don’t think “learning” is the correct word.
- P2L11 – “methods are able” → “method is able”
- P3L3 – “lower elevated Rhnoe Valley” → Incorrect, please rephrase
- P5L6 – “they are not be considered” → “they are not considered”
- P6L19 – “distribution is an unsupervised way” → “distribution in an unsupervised way”
- P9L11 – I don’t think “#” can be used as variable.
- P14L9 and across the manuscript – “450mm...1mm” separate the measurement units from the number “450 mm... 1 mm”