

Rebuttal letter of “The role of morphology on the spatial distribution of short-duration rainfall extremes in Italy” by Mazzoglio et al.

Dear Editor,

we uploaded the revised manuscript titled “The role of morphology on the spatial distribution of short-duration rainfall extremes in Italy”.

We revised our manuscript according to the comments received in the Editor report and from the reviewers. A point-by-point reply to all the comments of the reviewers was posted in the open discussion in the previous phase of the revision. In this new phase we do not have new comments to add. Please refer to <https://doi.org/10.5194/hess-2021-503-AC2> for the reply on RC1 and to <https://doi.org/10.5194/hess-2021-503-AC1> for the reply on RC2.

According to the email received from the editorial support team, we also checked the document for typos, missing co-authors and their affiliations, terminology, updates of data in tables, or updates of variables in equations.

In the following we summarize the modifications that we performed in the revised manuscript.

- We rephrased a few sentences in the abstract to make it more clear, according also to comment n°3 of reviewer n°1.
- Following comment n°2 of reviewer n°2, we replaced (in the abstract and in the manuscript) the word “extremes” with “annual maximum rainfall depths” or with “index rainfall” when we introduce the average of the annual maxima, according to the literature standards.
- Section 1 (Introduction and background) has been expanded including also other relevant studies performed to investigate the spatial variability of rainfall extremes with rain gauge data.
- As requested in comment n°3 of reviewer n°2 we added in Section 2.2 a sentence about the fitting of the four simple regression models. We mentioned that we added them in Supplement S1.
- We followed the comment n°4 of reviewer n°2 and we changed the symbol of the minus that we used in most of the figures: Figures 2, 4, 5, S3, S4 and S5 have been updated.
- Section 3.1 has been expanded to provide additional information about the methods that we used.
- We corrected Equation 7 according to comment n°7 of reviewer n°2 and to the email of the editorial team.
- We replaced Z with z in Equation 9 and following according to the comment received from reviewer n°1.
- Section 4.2 has been expanded in order to compare our results with previous studies.
- While checking the data that we copy-pasted in the tables as requested by the editorial team, we spotted a minor error in Tables 3-4: all the numbers reported in the second column are multiplied by a 10^{-3} that we forgot to copy. So, in essence, they are zero, according also to what we reported in Table 2 for the national-scale multiple regression model. In the revised version we corrected this in Table 4 and also in Table 5 (that summarizes the results of Table 2 to 4). In the caption of Table 5 we added a sentence to clarify it.
- Section 6 (i.e. the Discussion) has been expanded, in order to provide some additional comments related to the physical reasons behind what is found.
- In Section 7 we added a sentence to highlight one of the novelties of our approach.

- We also checked the reference section and we updated it by inserting the new articles that we mentioned.
- In the Supplementary material we added the fitting of the four simple regression models as Supplement S1 (as requested in comment n°3 of reviewer n°2).
- Supplement n°2 has been updated replacing Z with z .
- In Supplement n°3 we reduced the interval of the colorbar to make the Figures S2a-b more understandable.
- As mentioned before, the figures in Supplement 4 and 5 have been updated to correct the minus symbol. We also corrected the letters of the subplots in the captions.

Best regards,

Paola Mazzoglio on behalf of all the co-authors