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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Space-time analysis of rainfall extremes in Italy: clues from a reconciled dataset" *by* Andrea Libertino et al.

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We greatly appreciate the insightful comments from the reviewer. The comments from the reviewer have been reproduced in italic below, interspersed with our responses.

This technical note presents a unified database of precipitation extremes over Italy. There is no doubt that such efforts aiming to gather, "clean up" and finally provide all the available information in "one place" are very useful for hydrological design. Of course in this specific case these efforts are undermined by the fact that the final database is not actually freely available. In the open-access era this is a serious drawback which however, if I understood correctly, it is not authors' fault but a restriction for the Italian

authorities.

The reviewer is right. As we have previously stated in the answers to the reviewer 1 open data availability is one of our main concerns. However, this only affects the fact that data are not all available in one place. In essence, as the data owners want to supervise their use and we have the permission to use them for purposes connected to our project, we can provide the full database access only to research individuals or groups who join our project. Nevertheless, we can redistribute most regional databases upon evidence of permission received by the relevant agencies. Taking into account these limitations, clarifications on the procedure to access the data that we have merged and harmonized in the I-RED will be added in the revised version of the manuscript.

There are a few minor comments and suggestions that I would like to make hoping to be helpful in improving this technical note.

Major Comments:

1. Figure 2: There is not any official abbreviation of years as "Y" so probably it would be more clear instead of t(Y) to write just "Years". Panels b and c: please decrease the size of fonts in the X-axis so it can be read more easily and also change the label to "Length (years)" or something similar as no.years is confusing (also check the panel d: do you mean years or data?). This suggestion is for any other Figure, e.g., for Figure 5 where "t(Y)" is used.

The figures will be corrected in the revised version of the manuscript, according to the suggestion of the reviewer.

2. Analysis presented in Figure 4. There is a dense network, more than sufficient to provide kriging estimates for the whole Italy. It would much more useful in my opinion not only because dots may overlap but because you will provide estimates also in places where there is no information. So, I would suggest to construct kriging maps of

the statistics analyzed.

Considering the exploratory nature of our analysis we did prefer to provide point statistics, which –at this stage- indicate the main features of rain variability at the country scale but do not address the goal of providing robust estimates in ungauged areas. This is a very important research objective to address. However, considering the many problems we have faced in the regional analysis in the North-West of Italy (Libertino et al, 2018) the uneven distribution of the rain gauges in space and the high variability of record length make the whole kriging analysis a challenge deserving a separate work. In partially following the reviewer's suggestion, however, interpolated maps will be added as supplementary material to more clearly represent rainfall indices variability over space.

3. Mean is quite robust in general, yet here you prefer only the median. Of course, it can be affected by outliers yet common methods of fitting distributions, e.g., product moments or L-moments are using mean values. So, in my opinion you should provide also the maps of the mean value.

The reviewer is right: most of the common methods of fitting distributions consider the mean as best descriptor of the central tendency. However, in this descriptive phase we wanted to represent the variability of the central tendency of the series as unbiased as possible with respect to the outliers. On the other hand, we admit information of the mean can be of interest for the readers: therefore, we will consider to add a map of the mean of the extremes it in the revised version of the manuscript.

4. If I understood well you have estimated the mean values of L-CV, L-skew and L-kurt of all duration. Of course you are dealing with maxima and we are expecting the shape characteristics to be close yet this is not necessarily true. If indeed these summary statistics are close among the different duration, please report it or else provide different maps for each duration.

The reviewer is right. Considerations on the behaviour of these statistics across the

different durations will be added in the revised version of the manuscript.

5. It is not clear to me if the maxima values have emerged from a sliding-window process or from a fixed-block (non-overlapping). In the latter case the user of this database should know this fact in order to correct the data by the Hershfield factor. Please comment on that and clarify. Annual maxima have been collected with a sliding-windows procedure. The information will be added in the revised version of the manuscript.

6. You can use plain text for L-CV. In Figure 4 is plain while in the text you are using Italics. Please re-check the text for minor typos, e.g., line 26, p6 replace "an unique" with "a unique".

We thank the reviewer for the corrections. The manuscript will be double-checked for typos.

References

Libertino A., P. Allamano, F. Laio, and P. Claps. Regional-scale analysis of extreme precipitation from short and fragmented records. Advances in Water Resources 2018, 112, 147-159, doi: 10.1016/j.advwatres.2017.12.015

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