

Interactive comment on “High-resolution analysis of 1 day extreme precipitation in Sicily” by M. Maugeri et al.

M. Maugeri et al.

maurizio.maugeri@unimi.it

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We thank referee #1 for his/her positive comments on the topic of the manuscript and the analysis we carried out.

As far as the specific comments are concerned, we agree with those about homogeneity methods. The over-statements on this issue in the manuscript are probably a consequence of the fact that we were not completely confident that the homogenisation procedure we applied could result useful in the context of extreme data analysis. Indeed, the procedure is based on tests applied to monthly rain amounts and number of wet days (see page 2253, lines 1-12) and it was performed in the frame of other researches focused on trends in water availability for Sicily. We were therefore a bit sur-

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prised of the better agreement of the RL50s from the station homogenised records with the corresponding RL50s from the pooled records obtained using the original data (see page 2261, lines 12-15) and we overemphasized this results. In the revised version of the manuscript we will highlight that inhomogeneity detection and break correction at the daily scale are still an open issue and that great caution should be taken when daily records are subjected to homogenisation. Moreover, we will underline that the better spatial coherence of the return levels from the homogenised records we find may just apply to the specific dataset we considered, and that the use of the above homogenisation procedure for extreme value analysis has not to be considered as a methodological suggestion. In our opinion, however, when a homogenised version of the dataset is available, it is interesting to apply extreme value analysis both to the original and to the homogenised records. The comparison of the station records (both the original and the homogenised ones) with the corresponding pooled records can then help better understanding the impact of breaks as well as of adjustments on extreme value results.

We also agree with the comment on the inference method and with the statement of referee #1 that each statistical EVT-based method has pros and cons. In the revised version of the manuscript, we will therefore shorten the text concerning the comparison with the L-Moment algorithm also deleting figure 4. We think however that it may be useful mentioning that the method we use and the L-Moment algorithm produce consistent results.

We also recognise that in some cases GPD might work better than GEV – depending, e.g., on the region investigated –, and we will revise the manuscript in this sense. We indeed applied GPD to our dataset in the frame of a degree thesis (Garzoglio, 2014) and we found great problems in the definition of the station thresholds. An additional problem we found was linked to the strong seasonality of precipitation (both frequency and amount) in Sicily. We tried to manage it by using windows, which allowed considering only specific periods of the year. We found however that the position of

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the window with the highest return level has a clear spatial pattern with eastern and southern Sicily more subjected to high return level in autumn, whereas northern Sicily is more subjected to high return levels in winter. In this context, it is therefore not easy producing maps as the ones in figure 12 by means of GPD, whereas GEV turns out to be more suitable for our objectives. We decided however to avoid discussing these results in order to focus the paper on its main objective.

The only point for which we do not agree with referee #1 is the superiority of RFA with respect to the analysis of single station records. In our opinion, in fact, when single stations are considered, the error of the parameters is so high that often the results of extreme value analysis do not give any useful indication.

We also recognise that the number of figures may be reduced and in the revised version, besides figure 4, we will delete figure 11 from the manuscript. Actually also figure 9 is not strictly necessary. We think however that it may be useful to help the readers – especially those that do not work on extreme analysis - better understanding the differences between the single station and the pooled data results. We prefer therefore keep in the revised version of the manuscript also the paragraph at page 2263, lines 9-16, which describes figure 9. In our opinion figure 5 can not be deleted, as it helps in describing an essential step of the procedure that allowed us to obtain the final result of the paper (i.e. the maps in figure 12).

Finally, in the revised version of the manuscript we will consider all the other specific comments of referee #1 concerning sentences to be rephrased or better explained.

References

Garzoglio M: 2014. Distribuzione spaziale delle precipitazioni estreme in Sicilia. Degree Thesis in Physics (Tutor Prof. M. Maugeri). Università degli Studi di Milano. Milan. Italy

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