

Interactive comment on “Observed variability and trends in extreme rainfall indices and Peaks-Over-Threshold series” by H. Saidi et al.

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General comments

In this study, the Authors perform a trend analysis on four rainfall time series from the Piedmont region (Italy) at several subdaily time scales (from 5 minutes to 12 hours). I agree with the technical remarks of the Referee #1; however, my opinion is a bit more negative. I believe that the true problem in the wide literature on trend analysis is not related to the lack of high quality data at fine time scale but to a (too) superficial application of statistical tools. In this case, the four digitalized time series are surely a valuable source of information which however is not carefully and correctly analyzed. In particular, Mann-Kendall and GPD POT analysis are applied (as usually happens

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in the literature) by overlooking all the underlying hypotheses and theory, thus leading to uninformative and probably misleading results. The four time series refer to quite a small area and are almost surely spatially correlated. Looking at the Figures 2-6, the time series could also exhibit temporal correlation. Both spatial correlation and temporal correlation reduce the effective sample size and inflate the uncertainty of the test statistics, thus resulting in over-rejection of the null hypothesis when correlation is not accounted for. POT frequency analysis relies on the even more restrictive hypothesis that data are “iid”. Without a preliminary check of the basic assumption of independence every subsequent analysis is ill-posed. Moreover, in POT analyses, data must be declustered (to guarantee independence), and nothing can be said about the significance of the differences between the curves shown in Figures 9-11 if these curves are not complemented by confidence intervals (which are expected to be very large especially for the 30-year 1984-2003 POT sample). Since the statistical tests are performed on different time series at several time scales, we also deal with a typical multiple testing exercise that implies an expected “by-chance” rejection rate (i.e. spurious rejections), which must be accounted for. Finally, before analyzing data for stationarity, it should be clearly stated how stationarity is defined. Reading this paper I had the feeling that the statistical tools were applied a bit blindly. Unfortunately, the availability of a powerful statistical software such as R and its contributed packages and the ease of use of such tools do not replace the required theoretical knowledge of the implemented statistical concepts.

To conclude, I think that the series presented in this study, if properly processed, can be used to perform a number of valuable analyses going from trend detection to long range dependence recognition or investigation of fractal/multifractal behavior; to do this, I strongly suggest to involve a statistician or somebody with a strong statistical background and expertise in environmental time series analyses. In the meanwhile, I can suggest a few (no exhaustive) references that highlight several aspects to be taken into account when one performs trend (or analogous) analyses on multiple environmental time series.

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