Interactive comment on “Optimal heavy tail estimation, Part I: Order selection” by Manfred Mudelsee and Miguel A. Bermejo

Anonymous Referee #1

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1. The manuscript presents order selection in optimal heavy tail estimation, which is interesting. The subject addressed is within the scope of the journal. 2. However, the manuscript, in its present form, contains several weaknesses. Appropriate revisions to the following points should be undertaken in order to justify recommendation for publication. 3. For readers to quickly catch your contribution, it would be better to highlight major difficulties and challenges, and your original achievements to overcome them, in a clearer way in abstract and introduction. 4. It is shown in the reference list that the authors have several publications in this field. This raises some concerns regarding the potential overlap with their previous works. The authors should explicitly state the novel contribution of this work, the similarities and the differences of this work with their previous publications. 5. It is mentioned in p.1 that a data-adaptive order selector

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is adopted for optimal heavy tail estimation. What are the other feasible alternatives? What are the advantages of adopting this particular approach over others in this case? How will this affect the results? More details should be furnished. 6. It is mentioned in p.1 that the river Elbe is adopted as the case study. What are other feasible alternatives? What are the advantages of adopting this particular case study over others in this case? How will this affect the results? The authors should provide more details on this. 7. It is mentioned in p.2 that the Hill estimator is adopted for statistical estimation of the heavy tail index. What are other feasible alternatives? What are the advantages of adopting this particular estimator over others in this case? How will this affect the results? The authors should provide more details on this. 8. It is mentioned in p.2 that a first-order autoregressive process is adopted in this study. What are the other feasible alternatives? What are the advantages of adopting this particular process over others in this case? How will this affect the results? More details should be furnished. 9. It is mentioned in p.4 that the algorithm by Nolan (1997) is adopted to generate random values from a stable distribution. What are the other feasible alternatives? What are the advantages of adopting this particular algorithm over others in this case? How will this affect the results? More details should be furnished. 10. It is mentioned in p.4 that asymptotic and bootstrap order selectors are adopted as benchmarks for comparison. What are the other feasible alternatives? What are the advantages of adopting these particular order selectors over others in this case? How will this affect the results? More details should be furnished. 11. It is mentioned in p.4 that a Monte Carlo simulation experiment is adopted to compare the optimal order selector. What are the other feasible alternatives? What are the advantages of adopting this particular experiment over others in this case? How will this affect the results? More details should be furnished. 12. It is mentioned in p.4 that a gamma distribution is adopted to draw the prescribed uneven spacing. What are the other feasible alternatives? What are the advantages of adopting this particular distribution over others in this case? How will this affect the results? More details should be furnished. 13. It is mentioned in p.8 that a quasi-brute force, two-step search method is adopted to find the optimal or-
der. What are the other feasible alternatives? What are the advantages of adopting this particular method over others in this case? How will this affect the results? More details should be furnished.

14. It is mentioned in p.8 that “…Although the observed time series has clearly more points (n = 38272) than the artificial (n = 5000), the error bar for the heavy tail index estimate is larger (RMSE_b = 0.13) than for the artificial (RMSE_b = 0.06). The reason is that the estimated…” More justification should be furnished on this issue.

15. It is mentioned in p.10 that “…the study of the runoff series from the river Salt (Anderson and Meerschaert, 1998), which found….(i.e., finite variance), in contrast to our finding…” More justification should be furnished on this issue.

16. Some key parameters are not mentioned. The rationale on the choice of the particular set of parameters should be explained with more details. Have the authors experimented with other sets of values? What are the sensitivities of these parameters on the results?

17. Some assumptions are stated in various sections. Justifications should be provided on these assumptions. Evaluation on how they will affect the results should be made.

18. The discussion section in the present form is relatively weak and should be strengthened with more details and justifications.

19. Moreover, the manuscript could be substantially improved by relying and citing more on recent literatures about real-life case studies of contemporary optimization techniques in hydrologic engineering such as the followings:
