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Nonlinear Processes in Geophysics
Discussions
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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: ïĄň Gholami, V., et al., "Modeling of groundwater level fluctuations using dendrochronology in alluvial aquifers", Journal of Hydrology 529 (3): 1060-1069 2015. ïĄň Taormina, R., et al., "Data-driven input variable selection for rainfall-runoff modeling using binary-coded particle swarm optimization and Extreme Learning Machines", Journal of Hydrology 529 (3): 1617-1632 2015. ïĄň Wu, C.L., et al., "Prediction of rainfall time series using modular artificial neural networks coupled with data-preprocessing techniques", Journal of Hydrology 389 (1-2): 146-167 2010. ïĄň Wang, W.C., et al., "Improving forecasting accuracy of annual runoff time series using ARIMA based on EEMD decomposition," Water Resources Management 29 (8): 2655-2675 2015. ïĄň Chen, X.Y., et al., "A comparative study of population-based optimization algorithms for downstream river flow forecasting by a hybrid neural network

model," Engineering Applications of Artificial Intelligence 46 (A): 258-268 2015. ïĄň Chau, K.W., et al., "A Hybrid Model Coupled with Singular Spectrum Analysis for Daily Rainfall Prediction," Journal of Hydroinformatics 12 (4): 458-473 2010. 20. In the conclusion section, the limitations of this study and suggested improvements of this work should be highlighted.

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