

# ***Interactive comment on* “Objective functions for information-theoretical monitoring network design: what is optimal?” by Hossein Foroozand and Steven V. Weijs**

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This paper deals with the optimisation of monitoring networks using information-theoretical methods with a focus on the analysis of useful objective functions. The authors argue that a single-objective optimization of the joint entropy of all selected sensors will lead to a maximally informative sensor network. They compare exhaustive optimization, a greedy approach and a new “greedy drop” approach using available monthly runoff data.

I enjoyed reading the manuscript, especially the introduction to the information theory terms. This study adds some interesting new views on the optimisation of monitoring

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networks and fits well to the scope of HESS. However, although the paper is mostly well written, it is sometimes poorly structured. In addition, I have some general and specific remarks that needs to be considered before publication. I therefore recommend a minor revision of the paper.

General comments:

For this study, monthly runoff data were used from gauging stations with very different catchment areas. It can be assumed that the gauging stations with smaller catchment areas will show a higher temporal variability of discharge. Therefore, their sub-monthly data should have a higher information value than the data of the stations with larger catchments. Thus, the authors should also discuss the dependence of their results on the temporal scale of the discharge data used.

The order of presentation of the tables and figures is sometimes confused.

Specific comments:

L1: “layout”

L11-83: Subtitles within the introductory chapter are rather uncommon.

L123-145: Please always give the equations directly after their first citation.

L166: You are first referring to Appendix B instead of A. Should be reversed.

L184: Which part of the Appendix?

L243: Eq. 12 and the corresponding variable description should directly follow this sentence.

L259: “Tables”

L259-260: Please indicate the location of the eight stations containing the joint information of all 12 stations in Figure 3 and discuss whether the result is meaningful, e.g. in terms of the distance between stations, their respective catchment areas, etc..

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L260-265: Results shown in Figs. 5 and 6 need to be explained in more detail.

L305-309: Repetition

L315-319: This estimate is of limited value because it depends largely on the programming code (i.e. Matlab is very slow compared to e.g. FORTRAN).

L323: “Tables”

L325: Table 6 deserves more explanation. The numbering of the tables is confusing. This should be rather Table 4.

L328-329: If find Table 4 difficult to understand. In addition, the captions of Table 4 and 5 indicate 240 data points, which should be rather 860\*12 data points, if I understand correctly. I suggest combining Table 4 and 5.

L339: “generated”

L344-356: This section is more like introduction and discussion and thus not appropriate for a concluding chapter.

L357-363: You must present the most important results of your study more clearly, e.g. by using also bullet points.

L365-379: After removing any redundancies this section should be moved to the discussion section.

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