

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

Anonymous Referee #3

Received and published: 19 June 2020

This paper deals with the study of monitoring and design hydrometric networks problems. The authors used information theoretical methods to discuss the objective functions support the choice of a single-objective function to maximize the informative sensor network.

The topic of the paper is very interesting and the problem of finding an optimal monitoring network is certainly a a stimulating challenge. The authors performed an interesting analysis comparing exhaustive optimization and backward greedy approach using

C1

many data but probably I miss the point: why this approach lead to the optimum? And what is the optimal design?

General comments:

1. The paper is mostly well written but there are sometimes redundant informations and figures, tables and formula are presented in an order that confuse the reader. In particular it is convenient that that the explanation of the equation and the symbols involved are immediately after the equation itself. Some figures (for example Fig. 4, 5, 6) need clearer captions and a more detailed description.

2. The authors argue that a single-objective optimization of the joint entropy of all selected sensors will lead to a maximally informative sensor network and that the objective function indirectly minimizes redundant information: in my opinion it is not very clear why this happens. And it seems in contrast with the sentence at line 55 "Minimization of redundancy would mean that each sensor becomes more essential, and therefore the network as a whole more vulnerable to failures in delivering information".

3. The greedy algorithm proposed it is not very clear for me. It is not clear why the optimum found by the algorithm is the global one instead of the local one. Also it is not clear why "remove" a station should be better than a network with a large number of sensors. Probably this is link to other costs (like installation or maintenance costs) but I missed them if specified in the paper.

4. All the data used in the paper should be used to compare the optimum found by the algorithm with the existent network but they not ensure the optimality.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-148>, 2020.

C2