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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Optimum Water Quality Monitoring Network Design for Bidirectional River Systems Using Modified MOPSO" *by* Xiaohui Zhu et al.

C. Stamm (Editor)

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Editor comment

HESSD-Manuscript **"Optimum Water Quality Monitoring Network Design for Bidirectional River Systems Using Modified MOPSO"** (HESS 2017-124).

Dear Dr. Yong Yue

In addition to what the other two reviews commented, I'd like to add a few further remarks that you should consider when preparing your response.

Abstract: This is very technical and detailed from the start and provides no real context. Minimising pollution detection time for example, is not the only objective people may have in mind when planning monitoring networks. Therefore, you need to put the problem you are dealing with into the appropriate context. Furthermore, you may improve linguistically on your wording because "... *handle discrete issues of* ..." for example, doesn't make it very clear to the reader what you have in mind.

p. 1, L: 15: Replace *activities* by *processes*.

p. 1, L: 19: Sometimes, you use yuan, sometimes dollars as currencies. You might use both for the first instance and then consistently use one currency in the remainder of the text.

p. 1 - 2; Introduction: As in the abstract, the context and motivation for the specific research question is only poorly provided. Depending on the objectives for the monitoring program, the development of the design can be rather straightforward not requiring any complicated numerical optimization procedure. If a country like Switzerland for example, has a program that aims at quantifying the loads of major water constituents such as nutrients that are discharged from the country, it is sufficient to locate monitoring sites at the four main rivers leaving the country. Accordingly, you should describe what kind of general monitoring objectives (may) require a complex optimisation procedure. This gives the motivation for actually using them. Subsequently, you may report on the current state of the art in that field (including the pros and cons of the existing optimisation algorithms). This will lead to the open questions that you would like to address with your paper.

p. 2, L. 7-8: What is the argument for this statement?

p. 2, L. 11: The optimum design depends on the actual objectives for the monitoring network. Accordingly, the means to find such an optimal solution may also change with these objectives.

p. 2, L. 15: Why are these factors relevant?

p. 2, L. 27: What is the relevance of farmland in this context? Explain.

p. 2, L. 30: Can you provide some quantitative data on the (global) length of river sections influenced by tides? This might be interesting for readers to put your work in context.

p. 3, L. 2 - 6: This should be in the Introduction, not in the Method section.

p. 3, L. 16: How did you simulate the bidirectional flow where you have different flow directions at the same time (p. 14, L. 2)? This cannot be steady-state, can it? What is the governing equation of solute transport and how did you parameterise this?

p. 3, L. 17ff: Use only SI units throughout the paper.

p. 3, L. 17ff: Why do you use (arbitrary) absolute masses and concentrations? Your entire analysis can be dimensionless by just using for example concentrations relative to LOQ or LOD.

p. 3, L. 28: Why are there only m potential monitoring locations? There is a an infinite number of potential locations along such a network. What are the actual locations you have in mind? This is not clear.

p. 4, Table 1: Is is reasonable to assume a constant width although the flow rate varies by a factor of six?

p. 6, L. 9 - 16, 24 - 25: These paragraphs report the state of the art. As such, it should be presented already in the Introduction and needs references for the statements about the performance. In the Intro you should also explain what PSO is compared to MOPSO.

p. 6, L. 25 - 30: The new fitness function and how it differs from others is not very well described. Make it more prominent.

p. 7, Algorithm 1: Label this as a table. The same holds for the other two algorithms you present.

p. 7, L. 10: Replace *make a deep* by *gain deeper*.

p. 8, L. 7: What are the main particles? Explain for a non-specialist.

p. 9, Table 2: This table contains little information (per area of page). Please consider to put it into Supporting Information. This applies to Tables 4 and 9 as well.

p. 9, L. 72: How can you have a second best choice on a Pareto front?

p. 10, Fig. 2: The caption does not explain what the four figures are. How do the figures relate to Table 3? The symbols are too small and hard to read and to distinguish from each other.

p. 10, L. 10: Why only one? What is special about this example?

p. 10, Table 3: The caption does not explain what monitoring locations represent. What is the meaning of a zero detection time? How does it come that the combination 3,5,8 is not listed? It is equivalent to 1,5,8 from a geometric perspective.

p. 17, L. 4: *Degradation* is the wrong word here. It is the decrease of the maximum concentration, I assume.

p. 17, L. 7: *accumulation* is the wrong word here.

p. 18, Fig. 7: The figure caption is not properly describing the content of the figures.

p. 19, L. 3: Where did you report on the speed up of convergence?

p. 20, L. 1: Where did you show that MOPSO outperforms GA in general terms (for what kind of problems)? Can you explain why this should be so? The discussion and conclusion lacks the entire aspect that you have worked on one single, rather artificial model system. What would happen if one considers other network topologies or spatially continuous instead of distinct possibilities for locating monitoring sites?

p. 20, L. 11: Why would you like to use graph theory? Which problems do you imagine to use with such an approach? Again, you have to link this to aspects you have already discussed previously. Otherwise, it is an rather arbitrary addition to the text.

Sincerely

Christian Stamm