

Comment on hess-2021-535

Anonymous Referee #1

Referee comment on "Coupled effects of observation and parameter uncertainty on urban groundwater infrastructure decisions" by Marina R. L. Mautner et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-535-RC1>, 2021

This study employs global sensitivity analysis to propagate both observation and parametric uncertainty through a model to understand their effects on decision-making for the system. I found the paper interesting and generally well articulated. I had a hard time finding the supplementary figures (maybe they're somewhere in the preprint page I can't see?).

The challenge the authors attempt to tackle is very complex and the dimensionality of experiment is very large—I don't believe I've seen other papers tackling uncertainty in such a multi-pronged manner (many parameters, many observation locations, many strategies, many objectives). Approaches like the one demonstrated in this paper are valuable contributions in paving the way and setting a standard for others.

My comments are all minor suggestions and are detailed below.

- Introduction is very well written. Goals are articulated clearly and it made me interested to keep reading. One suggestion would be to potentially drive home the difference between uncertainty affecting errors and uncertainty affecting decisions even more. I see the point and I agree with it, but feel like a lot of people don't and it would be nice to have it emphasized a little more.
- Lines 102-105: Could you include a little more explanation about how these alternatives were selected? I also think stating the general goals/objectives of these management alternatives first might be better.
- Lines 107-108: Can you clarify what this sentence means? How were they adapted?
- Line 166: "it is necessary to simplifying" – maybe missing a word there?
- Lines 168-170: The first part of this sentence needs to be edited I think: "changes in [...] can lead to [...]"
- Lines 255-265: This is cool analysis and finding. My first reaction was to find out about this parameter's interactions with others, across observation clusters/objectives. I was

also curious to look at the supplemental figures referenced, but I couldn't find the supplemental material in the system (not the authors' fault, maybe there's something obvious I am missing?).

- Fig. 5-6 & discussion: I know the interpretation of δ values is context specific and relative, but could you maybe add a sentence or two to give the reader some intuition of what is a 'high'/decision-relevant δ value in such case studies?