

Hydrol. Earth Syst. Sci. Discuss., author comment AC1  
<https://doi.org/10.5194/hess-2021-535-AC1>, 2022  
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## Reply on RC1

Marina R. L. Mautner et al.

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Author 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-AC1>, 2022

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Thank you very much for your comments, they have helped with clarity and improved the manuscript. For your convenience, we have also included a PDF version of the response to both reviewers together in-line with the reviewers' comments.

We have added the following to the first paragraph to underscore the importance of uncertainty affecting decisions,

***"Further, the effects of endogenous model uncertainties on model error may be different from their effects on the ranking of alternatives, and therefore on decision making. This difference has been largely understudied and is the focus of this paper."***

Lines 102-105: The management alternatives were developed and described in greater detail in Mautner et al. (2020). We have changed the text as follows,

***"Four management alternatives designed to increase groundwater recharge within the basin while avoiding flooding are drawn from Mautner et al. (2020). The alternatives were chosen based on conversations with local practitioners and previous modeling efforts. The alternatives are: the implementation of spatially distributed infiltration basins, demand management through repair of leaks in the water supply network, injection of treated wastewater at existing wastewater treatment plants, and the status quo historical alternative."***

Lines 107-108: The management objectives are drawn from the previous study. However, the calculation of the objectives was modified to avoid outlier values that would occur when parameter combinations led to high quantities of model error. For example, dry cells are represented in the model as large negative values for groundwater head and thus lead to unrealistic values for energy use based on the elevation of groundwater head. These outlier values of the objectives led to difficulties in characterizing the sensitivity of those objectives to the parameters. Thus, a minimum value for groundwater head was set for each well based on the model cell and layer depth. We have modified the text as follows,

***"The management objectives evaluated are drawn from Mautner et al. (2020), modified to avoid outlier values that would occur when parameter combinations led to high quantities of model error that would affect the sensitivity analysis."***

Line 166: Correct, it should read,

*"While perfect monitoring and representation is the ideal, in reality, **simplifying assumptions** must be calibrated to create models that can better inform policy and management."*

Lines 168-170: We agree, it is more clear as follows,

*"**Changes** in the observations used to evaluate error can **lead** to differences in the behavioral parameter sets that are chosen as the best performing simulations."*

Lines 255-265: We have attached the supplemental figures here and will include with the manuscript.

Fig. 5-6 & discussion: We have added the following text at the beginning of Section 3.2 following the first sentence introducing Figure 5,

***"The value of  $\delta$  can range from 0, indicating that the output is independent of the parameter in question, to 1. There is not a standard value for  $\delta$  that is considered to be highly sensitive because parameter sensitivities should be evaluated in relation to each other and in the context of each case study. Based on the sensitivity values for this system, we consider a  $\delta$  of roughly 0.2 and above to be highly sensitive."***

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2021-535/hess-2021-535-AC1-supplement.zip>