



EGUsphere, referee comment RC1  
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## **Comment on egusphere-2022-340**

Anonymous Referee #1

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Referee comment on "Resolving the water budget of a complex carbonate basin in Central Italy with parsimonious modelling solutions" by Shima Azimi et al., EGU Sphere, <https://doi.org/10.5194/egusphere-2022-340-RC1>, 2022

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I read this manuscript with great interest, knowing the complexity of modeling karst systems and the unique and important role they play in hydrology.

However, in the current reading of the discussion paper, the novelty of the work is not clear beyond the study area. The introduction states that the study demonstrated that "good results can still be obtained by using few experimental data and time series analysis" (L66) but the research experiment itself does not follow a systematic approach that shows how lesser and lesser data still results in similar results. Is the goal of the study to show that less data can still result in good modeling of a karst system or that it is not necessary to fully couple the surface-water and groundwater systems in a karst system (L65)? The study design does not seem to follow a systematic testing for either approach; rather it applies the GEOframe-Newage tools to the study area. It would be more compelling to compare these results to how the system could be modeling with other couplings or with more (or less) data.

The contribution is made more difficult to understand because the experiment organization in L70-79 appears to read more as results than hypotheses about what the study will test. The lack of clear hypotheses makes it difficult to understand the broader contribution of this work.

There are also quite a few qualitative statements that are not for the authors to decide about the quality of the modeling results. For example, on L234, the text states "these values are more than acceptable." It is not possible for the authors to make this assessment because they do not know what applications the readers may deem are "acceptable" - this is a qualitative statement based only on the authors' subjective assessment. The results should simply be reported and allow the reader to decide if these results are acceptable for their application or need. Another example is in L254, where the sentence reads, "It is apparent that the model is very good at reproducing the lowest discharges..." This should be changed to read something like, "The model is able to reproduce flows at the lowest discharges..." and then report or reference the accuracy at

which the flows can be reproduced.

The results, interpretations, and discussion all relate specifically to the study area and there appears to be no further attempt to generalize or broaden the findings to the wider audience of HESS. There are also few stations used in the analysis, further limiting the interpretation of the results more widely. It would be helpful to frame these sections with a broader audience in mind beyond the study area.

The conclusions make some interesting points, which actually do emphasize some of the potential novel aspects of the work but they are not emphasized in the manuscript elsewhere. For example, Conclusion #1 and the sentence on L356-357 discuss the insight that the classical approach for delineating basins is not appropriate and a preliminary check on the water balance is needed for karst system, especially if runoff coefficients are high. I am not sure of the novelty of this finding but this is a point that is noted in the title but then not mentioned again until the conclusions. The paper should be reframed with these contributions in mind. I will note again that I am not sure this will improve the novelty of the work but the conclusions are much more clearly stated as to the contribution of the work and it was unfortunate to wait until the end of the paper to understand the potential contributions of this work.

In summary, there would need to be a reframing and substantial improvement to the paper in the next revision for this to be considered in HESS. For these reasons, I am recommending Major Revision.

Minor comments.

Statements made in the introduction without support:

L27: "Karst landscapes cover 15% of the Earth surface"

L34-35: "Both observations (using tracer's theory) and time series analysis are useful tools..." Examples are given later in the paragraph but this could be an opportunity to cite a more broad set of papers that have dealt with karst systems.

L238: The table number is missing.