Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-268-RC2, 2018

Geoscientific Model Development Discussions

Interactive comment on "A Conceptual Framework for Integration Development of GSFLOW Model: Concerns and Issues Identified and Addressed for Model Development Efficiency" *by* Chao Chen et al.

Anonymous Referee #2

Received and published: 25 December 2018

The authors purport to provide insights that guide the use of the USGS's integrated hydrologic model GSFLOW, and they then present an example implementation. Unfortunately, I cannot recommend this manuscript for publication in GMD. First, the article needs substantial editing for English grammar, which makes it difficult to read. Second, I have difficulty seeing what is the new contribution in this paper. The abstract says: "the present paper proposes a conceptual framework from perspectives of: Model Conceptualization, Data Linkages and Transference, Model Calibration, and Sensitivity Analysis." This is extremely vague. The capitalization of these generic con-

cepts gives the reader the impression that they authors will provide a unique, new idea for each of these. However, when these are explained in detail in Sections 3.1-3.3, I do not see more than a summary of how GSFLOW works. In particular, Section 3.1 Model Conceptualization simply describes the different domains covered by the model. Section 3.2 Data Linkages and Function Role Change reads like a brief summary of the model manual on how the different domains are linked. I thought that Section 3.3 Model Calibration and Sensitivity Analysis could be the place where there is something new – maybe the authors had developed a model calibration or sensitivity analysis method to be added to GSFLOW, but instead, I have a hard time understanding what the authors are discussing here (just pointing out what parameters should be adjusted?), and they themselves just use "trial-and-error" calibration in their example.

This manuscript seems to read a bit like a report of how the authors figured out and applied GSFLOW, with no new additions to the model or its implementation process. Given that GSFLOW is an already developed and published model, with numerous implementations in the literature, just the authors' ability to run it does not seem to merit a new publication. They possibly could have made a contribution through a new interpretation of their simulation findings, but they explicitly state that they will not explain their results, because they want to save this for a later paper. Their Summary and Conclusion provides 4 bullet points that are their main takeaways. The first is a finding that consistent discretizations between the 2 sub-domains is important – this is the only research-like finding that I saw in the manuscript, but I don't actually see this claim demonstrated in the manuscript. The second two points seem to only summarize how the sub-domains of the GSFLOW are linked – which is just about GSFLOW and not anything new done by the authors. Lastly, they state that their proposed conceptual framework is effective, but I'm afraid I do not see what new is proposed. I might also point the authors to 2 recent papers on software packages that aid users in the implementation of GSFLOW:

Gardner, M. A., Morton, C. G., Huntington, J. L., Niswonger, R. G., & Henson, W.

R. (2018). Input data processing tools for the integrated hydrologic model GSFLOW. Environmental Modelling & Software, 109, 41-53.

Ng, G. H., Wickert, A. D., Somers, L. D., Saberi, L., Cronkite-Ratcliff, C., Niswonger, R. G., & McKenzie, J. M. (2018). GSFLOW–GRASS v1. 0.0: GIS-enabled hydrologic modeling of coupled groundwater–surface-water systems. Geoscientific Model Development, 11(12), 4755-4777.

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