

Interactive comment on “Integrating large-scale hydrology and hydrodynamics for nested flood hazard modelling from the mountains to the coast” by Jannis M. Hoch et al.

Anonymous Referee #2

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In this article, the authors introduce an updated version of a model coupling framework, then use the framework to assess whether adding complexity through a coupled model system can improve the quality of simulated results; here, in the context of flood hazards, calculations of discharge and flood extent.

I found this paper clear, generally well-written, and interesting. My comments are mostly minor, and mainly serve to help clarify certain points and to make the article more accessible to a reader. My one major concern is that the paper lacks scientific heft. In general, it felt more like a demonstration of GLOFRIM than a scientific inquiry where GLOFRIM was the tool for discovery. However, the techniques and the results

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presented contribute to scientific progress, and should be shared with the community.

I recommend this article for publication, with the condition that the authors respond to the major and minor comments I've listed below.

1 Major comments

I found the discussion of the model results in Sections 3.1.3 and 3.2.3 to be too descriptive; i.e., they were simply a rehashing of the statistics presented in Tables 1, 2, and 3. Rather than summarizing statistics, I would like to know if there's some greater insight that could be gained from these runs. I would like the authors to put a little more effort into interpreting the results. Even a few sentences would be helpful.

2 Minor comments

The wording in the paper is often a bit awkward. It could benefit from one more read-through by the authors.

Suggested corrections are listed below by (page number, line number).

- (1, 21) Define NSE before using acronym
- (1, 28) “physically-robust”: Remove hyphen
- (3, 11) Recommendation: cite the work of J. Syvitski in this area. Perhaps “challenges of a) establishing a modular and flexible model coupling framework (e.g., Syvitski et al., 2014) and b) applying...”
- (3, 18) “envison” instead of “envisage”

- (3, 19) “Further” instead of “Besides”
- (3, 25) It’s odd to title this section “GLOFRIM 2.0” when the subheadings are of the models that are included within it. A better section title might be “The coupling framework and its component models”. Section 2.1 could then be titled “GLOFRIM 2.0”.
- (4, 3) BMI docs: <https://bmi.readthedocs.io/>
- (4, 6) Remove link
- (4, 14) Appendix A is not present
- (4, 17) Some of the authors of this paper are also authors of the PCR-GLOBWB model. I have no correction to offer here, but this just feels a little odd. Perhaps the paper might be stronger if an outside model had been used.
- (5, 15) D-Flow FM is referenced here and in Figure 1, but not discussed in the paper
- (6, 7) What are the time steps of the models?
- (6, 8) “focused” instead of “focussed”
- (6, 10-12) Why are KGE and NSE chosen? One or two sentences on why these are the appropriate measures would be useful.
- (6, 18) Why is $KGE > 0.7$ significant?
- (6, 19-20) What are KGE_{α} and KGE_{β} ? I can guess what they are, but they should be explained.
- (7, 17) Missing end bracket in equation for B

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- (9, 14) Strike “yet” at the end of the sentence
- (11, 10) I applaud the authors for making their code publically available. In the interest of open science, are the model runs available, as well? (“No” is an acceptable answer here.)

3 References

Syvitski, J. P. M., E. W. H. Hutton, M. D. Piper, I. Overeem, A. J. Kettner, and S. D. Peckham (2014), Plug and play component modeling—the CSDMS 2.0 approach, in *Proceedings of the 7th Intl. Congress on Env. Modelling and Software*, edited by R. A. Ames D.P., Quinn N.W.T., International Environmental Modelling and Software Society (iEMSs), San Diego, CA.

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