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

Received and published: 8 May 2019

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) “envision” 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, and KGE? I can guess what they are, but they should be explained.

• (7, 17) Missing end bracket in equation for $B$
• (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
