

## ***Interactive comment on “A framework for global river flood risk assessments” by H. C. Winsemius et al.***

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In presenting a global framework for flood risk assessment the authors have provided a timely and interesting paper that should help to focus our efforts towards an improved understanding of global flood risk. Considering the length of the model cascade and complexity of the problem the paper is well written and structured. What makes the paper difficult to assess is that for each individual component it is easy to think of a whole range of tests and potential improvements that could be made, in my case mainly relating to the flood downscaling, while losing sight of the overall objective of the paper. However, I do think there is scope for improving the “validation” of the model components, which comes across as overly generalised given that a specific test case

was chosen for model evaluation. Overall the paper is very good and clearly marks the beginning of a wider research effort. I have very few comments, although to make the results more convincing I'd recommend a moderate addition to the evaluation of model results section.

Specific comments: Abstract L7: In a flood risk context is 1 km really high resolution? I wonder if using such terms is going to cause problems in the long run because while 1 km resolutions is high from a global scale modelling perspective its probably low for typical flood hazard and risk mapping applications.

Introduction P9614 L4: deserves or requires? L19-22 & P9615 L7 & P9621 L12:16: I'm not sure its intended but there seems to be an underlying assumption that 1 km resolution is "appropriate". I don't question the use of this resolution given the data available. However, I'm not sure there is much understanding of what the tradeoffs between resolution and accuracy are in this context. For example, widely researched reach scale flood risk mapping would almost never consider 1 km as a suitable resolution for defining the hazard or exposure. I guess my main concern is that this paper could be picked up and used to justify 1 km as a target resolution for this type of work. So it might be worth adding some clarification.

Section 2.2.3 P9620 L14: Could you comment on how appropriate these climate models are for simulating extremes.

Section 2.3.1 P9625 L25: I might have missed something but I don't understand what "world-region resolution population" means. Could you elaborate?

Section 3.1 Fig.3: Would a zoomed in map of an urban area and its surroundings help the reader to visualise the results and the interaction between the hazard and exposure data? P9630 L19:20: "Our inundation algorithm is based on the principle that floods are generated by backwater from large rivers." I didn't understand this sentence and am not convinced it defines what the flood downscaling methods actually does very well. Do you mean that the flooding is assumed to be due to excess river discharge?

P9631 L4: “this could be a logical explanation for the” do you mean “this could explain the”

Section 3.1: Is there any value in comparing the pdf of flood flow volumes to some gauge data at a few points. Alternatively, if a similar analysis has been conducted previously it might be worth referencing this work somewhere in this section to justify not repeating it.

Section 3.2 P9632: Is it possible to do a more targeted test of the of damage and inundation estimates by running the actual events through the cascade? Alternatively you could look at specific components of the cascade. For example, define the river discharges based on gauge observations (if available) to cut out the hydrological component or define the inundation extents based on DFO data before running the rest of the cascade. This would allow you to specifically test the risk and flood downscaling modules against EM-DAT? I’m not suggesting a comprehensive uncertainty analysis because I don’t think there is the space here, just something to show that the estimates of historical events are reasonable (or limited in some way that could be improved upon in the future). Section 4.3: It might be worth pointing out that standard practice here would be to compare the proposed downscaling method to a hydraulic model. I guess this has not been done already? Also, do you have an idea of what physical factors might affect the accuracy of the downscaling? For example, are flatter rivers easier?

Section 4.5 P9638 L12:18: This paragraph is quite general and makes a number of statements about factors that typically have an impact on flood extent. This section should be supported with a few references.

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