

## ***Interactive comment on “Review Article: Validation of flood risk models: current practice and innovations” by Daniela Molinari et al.***

**Anonymous Referee #2**

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This paper addresses a very relevant topic, i.e. the validation of flood risk models. The manuscript is well written, and provides a nice review of methods. Thus, it has the potential to become an important paper. Yet, as pointed out by Reviewer #1, not all components of risk are considered. Moreover, the literature review is far from being comprehensive. Some key aspects (see below) are completely ignored.

My major concern is that, to validate these models, we must primarily assess their capability to capture “changes in flood risk” (which happens to be the name of the cited Panta Rhei Working Group!) across decades. However, the aspect of change over time is not sufficiently addressed by this manuscript. Assessing risk is not like measuring water levels. Flood risk is both real and socially constructed, e.g. see discussion about different definitions of risk in Section 2.2 of Hulbert and Gupta (2016). In flood risk

C1

modeling, assessing the direction of change is perhaps more important than estimating potential losses, which are highly uncertain anyway given the unpredictability of indirect and intangible losses.

The vast majority of flood risk models struggle in capturing the direction of change. This is mainly because they cannot capture changes in vulnerability, and often ignore feedback loops between social and hydrological components of risk. For instance, could any of these flood risk models capture the dynamics of flood losses in Bangladesh reported by Mechler and Bouwer (2015)? Moreover, flood risk assessments are often carried out to explore the effects of risk reduction measures. Can any of these models simulate the fact that structural protection measures reducing flood hazard often trigger a (more than expected) increase of exposure and vulnerability, as widely shown by the safe-development paradox (Kates et al., 2006) and shown with the catastrophic flooding events in New Orleans (2005) and Brisbane (2011)? What is the point of getting a precise and accurate number for a thing (risk) that is (at least partially) socially constructed, while being unable to assess whether risk will actually increase or decrease a decade after the introduction of flood protection measures?

I presume that the authors are aware that various models of human-flood interactions have been developed by several socio-hydrologists over the past five years. Some of these models have given promising results in capturing the direction of flood risk changes. Yet, they are completely ignored in this manuscript. Thus, I suggest a major revision of the manuscript to address the fundamental issue of how well flood risk models capture changes over decades.

References

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C2

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