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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Assimilation of probabilistic flood maps from SAR data into ahydrologic-hydraulic forecasting model: a proof of concept" *by* Concetta Di Mauro et al.

Anonymous Referee #1

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The paper addresses a topic of immense community interest. The methodological design is sound, and the overall writing quality is quite good. However, this paper lacks scientific/conceptual contribution.

The main contribution of this paper is rather technical. I say this because the concept of assimilating remotely sensed flood maps into flood models is not new. While the authors nicely rationalized their limited focus (by clarifying that their goal is to assess previous DA frameworks and draw generic conclusions; see P4), I see a major conceptual issue which may put this paper in a "conflicting" position against the current state of science. See below.

The methodology presented in this paper is not applicable to the common practice of flood inundation modeling/forecasting. Specifically, regardless of DA technique (e.g., particle filter), effect of SAR observations cannot be fed back to streamflow and stage height unless the hydrology and hydrodynamic models are tightly coupled. Most of the large basin/continental-scale flood inundation forecasting frameworks rely on loosely coupled hydrology (A) and hydraulic (B) model components. In such a framework, there is only a one-way transfer of information from A to B using a relational data-model (Peckham et al., 2013). The VIC and LISFLOOD-FP coupling by Schumann et al. (2013), the VIC, Delft3D, and LISFLOOD-FP coupling (GLOFRIM framework) by Hoch et al. (2017), and the more recent SWAT and LISFLOOD-FP coupling by Rajib et al. (2020), all rely on loose coupling of models; as such, the approach presented in this paper (and the underlying math) cannot be generalized. Therefore, I strongly suggest adding a separate paragraph in the introduction highlighting this limitation (dear authors: please feel free to recycle the above texts and references when you revise your paper). Accordingly, I also recommend editing the title as "Assimilation of probabilistic flood maps from SAR data into a coupled hydrologic-hydraulic forecasting model: a proof of concept".

Peckham et al., 2013: https://doi.org/10.1016/j.cageo.2012.04.002; Schumann et al., 2013: https://doi.org/10.1002/wrcr.20521; Hoch et al., 2017: https://doi.org/10.5194/gmd-10-3913-2017; Rajib et al., 2020: https://doi.org/10.1016/j.jhydrol.2019.124406;

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