Interactive comment on "Brief communication: Comparing top-down and bottom-up paradigms for global flood hazard mapping" *by* Giuliano Di Baldassarre et al.

Guy J.-P. Schumann (Referee)

gjpschumann@gmail.com

Received and published: 6 March 2020

This piece of communication is well written and brings up an important point of discussion, that of advantages and disadvantages of floodplain delineation vs flood hazard return period computations. I took the liberty of reading Francesco Dottori's comments after reading the piece and before writing this since I think he raised very good points that I don't need to necessarily repeat but had several of the same.

I add here some other, more general thoughts. Although I think it is important to discuss the value of floodplain delineation, I think there are some considerable differences of using a hydrodynamic hazard model approach vs a hydro-geomorphic approach. I

think the method but above all the purpose and value of the approaches are very different and I don't think they can be so easily compared, but it is nonetheless useful to discuss these differences. I suggest the authors add a paragraph on this matter.

In fact, building a hazard model, the ultimate goal is to infer probabilistic hazard and then risk by looking at exposure and vulnerabilities. The Dottori model described in the paper does this first part (probabilistic hazard) and can be used to fuse with eventually the other parts of the risk equation and loss functions etc. These models, when set up globally, can also be run in stochastic mode and uncertainties can be estimated etc. Moreover, many have successfully shown that these models, at global level, or not as data-hungry as traditional reach scale CFD models or the like.

Using the hydro-geomorphic approach, however, it would be non-trivial to derive probabilistic hazard metrics - in fact I find it difficult to conceptualize even. It may be possible in some places around the globe, when very good topographic data are available and can depict floodplain extent changes like riverine terraces at different levels but, esp. given the very low accuracy freely available DEM data, I think this is not possible for many places.

I also think the aim of running a hazard model for floods is not to bound the floodplain but rather it is to understand the likelihood of a given flood magnitude returning and its effect in terms of hazard, such as inundation depth and extent. Also, these models can be used for off-main floodplain hazard computations like pluvial hazard or small floodplains traditionally not included in standard protection plans. Also, having built a model allows one to run it in inundation hindcast, nowcast and forecast as some have successfully illustrated. All this cannot be done with the hydro-geomorphic approach.

Also, the authors mention in the BU approach EO data but only briefly. Now this is interesting since they could have argued that EO of floods with a long history available, at least up to 1:20 if not 1:40 year floodplain inundation hazard (given 45 years of EO sensor history) can be estimated. But the authors did unfortunately not go any deeper

into this, which in my mind would have been very interesting. Moreover, EO can capture pluvial, coastal and riverine flooding which is difficult to separate out of course but at least it will capture those, which will be laborious to represent in flood hazard models accurately.

I think I put enough of my thoughts up and with Francesco's comments this should be enough food for thought. Nonetheless, as I said, this is a much needed and welcomed discussion.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2019-418, 2020.