

## Comment on essd-2020-313

Anonymous Referee #1

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Referee comment on "A new dataset of river flood hazard maps for Europe and the Mediterranean Basin" by Francesco Dottori et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-313-RC2>, 2021

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This paper evaluates new European flood maps provided by the Copernicus European Flood Awareness System. The methods behind the mapping have been developed and published elsewhere and are only briefly documented here (too briefly in a few places – see comments below). The advantage of the presentation approach is that the paper should be accessible to non-experts in this type of modelling.

The paper focuses on the performance of the hazard layers against several national flood hazard maps and international studies using a similar class of regional flood models. The paper is well presented and easy to follow. It makes a useful contribution to the literature and more validation studies of this type are needed. Generally the conclusions are well supported by the analysis, although the early focus on the Mediterranean basin region is lost later in the manuscript. I agree fully with the premise of the paper and would recommend publication subject to the revisions outlined below.

Line 81: Add reference for LISFLOOD-FP for consistency with LISFLOOD. There is also now source code published for LISFLOOD-FP and you could cite this later for consistency with the presentation of LISFLOOD

<https://doi.org/10.5194/gmd-2020-340>

Line 140: I appreciate that the article is trying to avoid repeating technical details published elsewhere. However, I would like a little more detail on the statistical analysis of the extreme flows to be presented. Specifically what data were used (AMAX)? What distributions were fitted? Alfieri et al 2014 describe the overall method but I also think so direct citation to the extreme value analysis method followed would be useful.

Line 146: What is the source of the high-resolution river network data?

Line 157: Does the DEM include building and vegetation or are these removed to approximate a DTM?

Line 161: Given that a 2D model is used without the river channels how are river flows accounted for? For example, is a design flow subtracted from the volume entering the model (this approach would approximate the method JBA used for the original 1 in 1000 year extreme hazard map for the UK), is zero in channel flow assumed (this would

potentially put more water onto the floodplain than in reality and results in a somewhat precautionary model), are the channels represented as 1D components (for example the approach taken in LFPtools <https://doi.org/10.1016/j.envsoft.2019.104561> ), or do you burn a channel into the DEM (tricky at 100 m resolution on smaller rivers and usually only used for high-resolution simulations). I don't believe it matters which approach was taken from a publication perspective, but a short note is needed here to acknowledge and justify the choice made, especially as there are examples of LISFLOOD-FP being applied in all of these ways.

Line 243: How are the reference maps treated in the comparison. Do they maintain some native resolution or are the polygons rasterised to the same 100 m resolution as the modelled maps. Assuming 100 m resolution what impact does this have, I assume any loss of resolution usually makes the reference maps easier to fit?

Line 272: Did you consider using a DEM derived from TanDEM-X data?

Line 287: Some acknowledgement that the approach taken to the vegetation and urban correction is far from the state of the art is needed here. Some of the newer machine learning based approaches are likely to do a significantly better job of removing surface artifacts than this approach and we know that flood simulation is very sensitive to the quality of vegetation and building removal in the global DEM's. I do not think this detracts from the value of the study, but it should be clear that there are known routes to potentially better modelling here.

Line 309: depending on the approach taken to represent the river channel network, see comment above, this might also be significant for the simulation of higher probability floods. Channels are very important flow pathways and especially so for smaller floods.

General: How did you deal with coastal areas in the England flood maps? These are 1 in 200 year return periods in the flood map but also this source is not included in your modelling.

Line 330: Thames will have significant tidal flooding from London eastwards.

Line 339, The smaller tributaries, and coastal flooding issues is discussed for the Thames and Severn in Sampson et al 2015. I think that would be a better comparison/citation specifically in this section than Wing et al 2017. Their CSI values from the Sampson global flood model might also be useful to report for these basins and compare with your values to complement

Line 345: see comments above.

Figure 4: Could you include floodplains outside of the 5 km buffer in another colour? TBH this map doesn't really reflect how much flooding in the UK is not being simulated by this modelling setup – which is absolutely fine but the paper should be upfront about it.

The EA flood map doesn't include surface water flooding from pluvial flooding, that would be an even more detailed layer, so the flooding missed is fluvial and coastal.

Line 410: this is an unfair comment given the publication date, but there is an updated US validation in Bates et al 2021 WRR. I don't think this would have any significant impact on the discussion here but it might be worth citing.

I've no experience with the flood maps outside of the UK but the comparisons undertaken look robust.

The conclusions are well supported by the analysis, however little validation has been undertaken around Mediterranean basins, particularly those areas into which the new maps have extended. Flood simulation in arid areas are often more challenging and the performance from Europe might not translate well to North Africa and the Eastern Mediterranean. I think some discussion of this issue is needed given the focus on the Mediterranean basin region in the title and introduction... Or perhaps less focus on the Mediterranean basin region and more on Europe earlier in the manuscript if the discussion is going to be too vague in this regard.