



Comment on **essd-2020-313**

Anonymous Referee #2

Referee comment on "A new dataset of river flood hazard maps for Europe and the Mediterranean Basin region" by Francesco Dottori et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-313-RC3>, 2021

The manuscript describes a new dataset of river flood hazard maps for Europe and the Mediterranean basin region, produced by coupling the hydrological LISFLOOD model with the hydrodynamic LISFLOOD-FP model. The authors carried out a validation exercise by comparing the new flood maps they produced against national datasets of flood hazard maps for a range of flood probabilities. They found some differences between modelled and reference flood maps and they attribute them to a number of shortcomings of the modelling framework, e.g. the absence of flood protections and rivers with upstream area below 500 km² or and the limitations in representing river channels and topography of low land areas.

The topic of the manuscript is interesting and the flood maps produced, taking into account the inherent limitations in the proposed procedure, could be used by a large community of users. However, before to be published, the authors should resolve some inconsistencies in the manuscript and add some details as better specified in the following.

General comments:

- The authors present a dataset of flood hazard maps, updated with respect to the ones presented in Alfieri et al. (2014) and Dottori et al. (2016). Both in the abstract and in the introduction, it is not clear what are the improvements and the differences between the new and the old version of the dataset. Later in the manuscript some information are provided but this point is not clearly discussed. Please add the needed details.
- Many times the authors refer to previous own works. Even if I understand the reason for which some details are not given in the manuscript, some additional information e.g., about the methodology applied to obtain synthetic flood hydrograph or the meteorological data used as input to the LISFLOOD model, could be useful for the reader.
- The results discussed throughout the manuscript should be better explained. In particular, it is not clear how performance scores reported in the Tables are obtained for each study areas and it is not clear how the comparison shown in Table 6 has been

carried out. For major details, please refer to specific comments.

- The authors attribute the differences between modelled and reference flood maps to a number of shortcomings of the modelling framework specifically related to the hydrodynamic simulation. No description (magnitude of peak, duration of the hydrograph) is given about the hydrographs used as input to the hydrodynamic LISFLOOD-FP model that are (could be) different from the ones used to obtain reference flood maps. Please, add details on the hydrological inputs used and comment how they impact on the definition of the flood extension.

Moreover, it is expected that higher differences are found for basins with properties and characteristics not well described by the approximations used in the procedure. For instance, if a leveed river is simulated without considering flood defence structures, the identified maps will be different from those that can be obtained by using a detailed morphology description. Actually, the considered simplifications can modify significantly the flooding dynamics. A comment of the authors is required.

Specific comments:

- Line 19 and 164: "six different flood return 20 periods...". Reading Line 141, seems that the analysed return periods are seven. Please, modify the manuscript where needed.
- Lines 30-31. What does the authors mean with "large variability"?
- Lines 104-108. Please, add some details on the meteorological observations used to force the LISFLOOD model. Moreover, what does the authors mean with "the static input maps have been updated and expanded"? Please, specify.
- Lines 140-145: Please, add details on this part to allow the reader understanding the procedure. How the statistical analysis has been carried out? how the synthetic flood hydrographs have been defined?
- Lines 146-160: this part should be better explained and modified as it is very similar to paragraph 2.21 in Dottori et al. (2017). Please rephrase.
- Lines 215-216: this sentence seems to be in contrast e.g., with the results shown in Table 3 for Spain for return period of 10 years.
- Line 223: which is the native resolution of the official reference maps? After the conversion to raster format, which is the adopted resolution to make the comparison with simulated flood maps?
- Lines 247, 251 and 255: Please, correct the numbers of the equations.
- Lines 243-256: Please, add the variability range of HR, FAR and CSI and define the perfect score for each of them.
- Lines 301-301: from Table 3 does not seem that "Performances improve markedly with the increasing of return periods, with a general increase in the hit rate HR". From Table 3, HR is quite constant with the return period. Please rephrase.
- Lines 304-310 and throughout the manuscript: the authors comment on the performances of simulated flood maps to reproduce the reference maps, stressing that differences could be ascribed to floodplain morphology, presence of flood defence structure etc.. According to me the differences between simulated and reference flood maps could be ascribed also to the hydrological input routed through the river channel. How different is the flood hydrograph used by the authors with respect to the one used by to build the reference flood maps? Do the authors have any information on this point?
- Table 3: How are obtained the performance indices for the study areas? Are these values obtained as average values? Please, add details.
- Line 316: Should be Table 3.
- Lines 323, 354, 355 and throughout the manuscript. Please use the abbreviations for hit rate, false alarm rate and critical success index.
- Line 415: should be Table 6.

- Lines 415 – 400 and Table 6: how the values in Table 6 have been obtained? Do they refer to all the five study areas? Please, specify.
- Table 1-3 and Line 364: for Hungary a 30-y return period has been used from the reference maps. How these maps have been compared with the simulated maps? Reading the manuscript seems that only 10, 20, 50, 100, 200, 500 and 1000 return period have been simulated.
- Figure 3 could be removed from the manuscript and the limits of the test areas could be added in Figure 1.
- Figure 2: Please, modify the number 10 and 11 in the diamond. Specifically, write them in a horizontal line.
- Table 1: Please, for each country add the link where the reference flood maps can be downloaded.