

MS No.: egusphere-2023-804

Title: Impact-based flood forecasting in the Greater Horn of Africa

*Dear Editor,*

*we thank you and the two referees for the thorough evaluation and the useful feedback you have provided to the article we submitted. We generally agree with all the minor corrections requested for the article to be accepted, hence we submit an updated version of the paper and a point-by-point reply to the last set of comments by Reviewer #2. In the revised version of the paper, changes are marked through green highlighting.*

(1) The reasoning behind the choice of not adding further evaluation of the forecasting system in response to previous major comments from both reviews is now clear, as the authors made some good efforts to clarify the scope of the paper, especially in their response to reviews. I believe that the scope of the paper should be further clarified also in the paper from the very beginning, by stating more explicitly and clearly in the abstract that the focus is mostly on the methodological approach of setting up the system and not on the relevant but initial evaluation, which has important gaps and limitations that further work should address. I would recommend the authors to add a sentence on this in the abstract, to avoid setting higher expectations on the evaluation part of the results. Maybe the authors could also consider a small change in the title of the paper to make it more specific and highlight the focus on the methodological approach of this operational system development, so that readers' expectations are well driven from the very beginning. In other words, as the authors clarify in the response letter, the focus of the work is on the methodological description and setup of an operational impact-based flood forecasting system in the Greater Horn of Africa, and not on a full assessment of the system performance. However, as their initial assessment is the main bulk of the Results of the paper, the main scope of the article and the importance of the initial evaluation work can be easily misunderstood by readers. So, the readers' expectations should be better oriented towards the right aspects straight from the abstract and possibly the title too. Moreover, in the abstract, it would be beneficial to add a final sentence on the necessity of a more extensive quantitative evaluation of the system, reflecting and summarizing the considerations added by the authors in the conclusions.

Reply: Following the reviewer's comment we have added in the abstract a specific mention to the methodological approach, described in the article. In addition we have added a final sentence to clarify that "More extensive quantitative evaluation of the system performance is envisaged to provide its users with information on the model reliability in forecasting extreme events and their impacts".

(2) The authors should reconsider moving some of the new results / figures from the Supplementary Material file to either the main article or to appendices. According to the NHESS journal policy, "in no case can supplementary material contain scientific interpretations or findings that would go beyond the contents of the manuscript.". The content of the current Supplementary Material should be better positioned either in the main paper (Results sections) or in appendices (see more comments and suggestions on this below).

Reply: Following this comment and the specific comments below, we have moved all supplement material to appendices in the main file of the article, leaving in the supplement only the table with the scores at all validation stations.

Apart from these two general remarks, I have only some final technical edits to suggest (see below). After implementing these, the paper also needs a full proofreading to solve some grammar issues and typos (as those mentioned in the first round of review and not solved yet) before publication.

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## TECHNICAL CORRECTIONS

- L. 125: GloFAS is mentioned for the first time here, including only the reference to its website; it would be good to include a journal article reference for the system (and possibly the system's full name, not only its acronym);

Reply: citation to the reference GloFAS article was added here (i.e., Alfieri et al., 2013, which was anyway already cited in other parts of the article)

- L. 150: the source of the Areas of Influence maps mentioned here is missing, or is not reported clearly (neither here nor in the Data Availability section); the authors provide only a reference to a paper where these maps do not seem to be mentioned (Alfieri et al., 2017) and a source to the JRC Data Catalogue with the global flood hazard maps (<https://data.jrc.ec.europa.eu/collection/id-0054>) but no areas of influence can be found there; the right link to these maps should be included and/or the authors should specify the reference where these maps were presented;

Reply: The reviewer is right, hence we have modified the corresponding sentence in the Data availability section, which now reads "Global flood hazard maps from Dottori et al. (2016) can be downloaded from <https://data.jrc.ec.europa.eu/collection/id-0054>, while the corresponding Areas of Influence maps were provided by the DRM Unit of the European Commission, Joint Research Centre"

- L. 184: it would be good to include a reference to back-up the "skillful performance in the simulation region" of the chosen dynamic datasets;

Reply: a reference to Wang and Yong (2020) was added to support this point.

- L. 311-322: it would be helpful for readers to further clarify the procedure with an additional sentence (or with a revision/addition in the previous sentences) to specify here that for each pixel of the Continuum network exceeding the selected flood thresholds, the link to the JRC inundation map is done by first mapping the pixel into the GloFAS river network and then into the corresponding inundation extent based on the Areas of Influence maps (if I understood correctly, please clarify in the manuscript in any case);

Reply: Following the reviewer's comment we have clarified in Sect. 2.5.2 that "In the subsequent step, the GloFAS river network is linked to the inundation extent on the basis of the corresponding Areas of Influence maps. The automated procedure to match the river networks of the two hydrological models is followed by a manual fitness check, particularly useful at the confluences."

- L. 322-323: here it would be helpful to add also the following clarification on the combination with inundation maps for return periods different than the 6 used in the JRC inundation maps, as this is still not very clear from the main paper but only from the response letter, where the authors provided the clarification; the following clarification should be included in the paper: "there is no spatial interpolation of the six maps, also because of the small sensitivity of inundation extent versus the return period", as the example provided at L. 320-322 does not completely solve doubts

on this and the reason why no interpolation of the six inundation maps is performed is interesting to report;

Reply: Here we have added that “In this step there is no spatial interpolation of the six maps, mainly because of the small sensitivity of the inundation extent maps versus their return period (see Trigg et al., 2016)”

- “Data availability” (L. 535-545): based on the journal policy, authors are required to provide a statement on how their underlying research data can be accessed and “this must be placed as the section "Data availability" at the end of the manuscript.”. So, all the data sources should be cited in the paper and not in the supplementary material file, as done for some of the data. I would recommend moving the exposure data sources from Table S2 (suppl. material) to a Table in the main paper and cite this table in the Data availability section.

- Supplementary Material / compliance with the NHES journal policy:

(i) according to the NHES journal policy, “Supplementary material is reserved for items that cannot reasonably be included in the main text or as appendices. These may include short videos, very large images, maps, CIF files, as well as short computer codes such as matlab or python script. In no case can supplementary material contain scientific interpretations or findings that would go beyond the contents of the manuscript.” and “Normal size figures, tables, as well as technical or theoretical developments that do not need to be included in the main text should be included as appendices“ (see <https://www.natural-hazards-and-earth-system-sciences.net/submission.html>); so most of the Sections of the current Supplementary Material file seem to be more in line with appendices or main text content, as per journal policy; probably only the long Table S3 (performance at all 78 stations) is a typical content that would be fit for a Supplementary Material, while the rest of the sections are results that should be included as appendices or possibly additional results sections, e.g. a new Results section “Hydrological model calibration and sensitivity analysis” could report the content of the first sections of the Suppl. material, while Figures S7-S10 could be added to Section 3.2, Case study – the Nile floods in summer 2020; my suggestion for the case study part would be to include the figures in the main paper, but I would suggest the authors to choose between Appendices / Results section and check with the Editor which choice is the most appropriate here (either appendices or results would be better than Supplementary material); (ii) similarly any new references, e.g. Knoben et al. (2019), should not appear only in the Supplementary Material file, as I think that for the journal policy all the cited scientific references should appear in the main manuscript.

Reply: Amended. See reply to general comment #2

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## GRAMMAR ISSUES / TYPOS

A few examples follow (but full proofreading is necessary):

- L. 160-161: ‘...information which values range ...’ – uncorrect / unclear (consider rephrasing)
- L. 217: ... resolution which depends ...
- L. 252: ... more than one station ...
- L. 417: ... at these stations ...

Reply: All these issues have been addressed