In **bold**, the new formulation considered in the paper

In green, the response to the reviewer

En rouge, ce dont je ne suis pas sûr/qui n’est pas encore modifié dans le papier

# Neil McDonald

L28: Add reference (Macdonald and Sangster, 2017): OK

L60: Change “riparian populations” 🡪 “**populations living adjacent to the river**, etc.”: OK

L78: “testing the” 🡪 “testing **of** the” & “real-life dataset” 🡪 “real-**world** dataset”: OK “This allows testing of the FFA models” formulation bizarre? “allows the testing of the FFA models” est mieux ?

L128: “In some cases, the flood inventory starts before the date t1 of the first known flood (for instance, at the creation of the service in charge of surveying floods, or at the date of bridge construction where historical data is available).”

🡪 I think this is valid if we know that the bridge replaced a previous bridge lost to a flood: Why? This doesn’t affect the fact that all the floods are supposed to be recorded since the creation of the bridge. however, if this is not the case, the bridge may significantly alter the flood levels/channel morphology and /or over-estimate the period of time at the start of the historical record if construction occurred much earlier than the first historical account.: I agree about the channel morphology modification, but as this morphology remains stable during the whole surveying period (e.g. the whole life of the bridge), that may not be a problem. There is no over-estimation of the period if the floods are recorded since the construction of the bridge.

L243: “We use the plotting…” 🡪 “**The plotting**…” & add “**are applied”** at the end: Ok

L244: “Appendix” 🡪 “**The** appendix”: Ok

L400: “taking into consideration” 🡪 “**to be considered”**: OK

L406: “additional” 🡪 “**prior”**: Ok

L414: “on”🡪”**in”** & remove “discharge of”: Ok

L417: “additional” 🡪 “**prior”** & “allows reducing” 🡪 “**reduces”**: Ok

L418: “on” 🡪 “**in”** & “with” 🡪 “**for”**: Ok

L421: “proposed” 🡪 “**proposes”**: Ok

L440: remove “Note that”: OK

L445: “In a second part…” 🡪 “**The paper also presents”**: OK

L446: “on” 🡪 “**for”**: Ok

L447: “allows reducing”🡪 “**reduces”** & “was” 🡪 “**being”**: Ok

# Helen Hooker

L1: Remove “more” in the title: OK

L8: “Censored nature” 🡪 Try to use plain English to make the article easy to read. Pas compris ce qui est demandé ici

L8: Remove “Indeed”: OK

L75: I’m intrigued to know how? How what? How are uncertainties determined? (“…with discharge uncertainties carefully determined by Lucas et al. (2023)”).

Modification de la phrase ? “…with uncertainties carefully determined and propagated at each step of the discharge estimation procedure by Lucas et al.”

L87: Rephrase or remove “with a collection of historical floods” 🡪 “of **censored** historical floods”: OK

L96: Align equation to the left & add a full stop: OK

L140: The different models could be presented more clearly in a table: Added Table 1. Revoir la couleur du tableau si la couleur des graphiques est modifiée

Table 1: Description of the parameters which are considered uncertain for each of the four models proposed in the next section.

|  |  |  |
| --- | --- | --- |
| Uncertain parameter | Perception threshold *S* | Historical period length *n* |
| Model A |  |  |
| Model B | X |  |
| Model C |  | X |
| Model D | X | X |

L163: “On the other hand” over-used in the paper 🡪 “**However”**: OK other occurrences:

L165: “On the other hand” 🡪 removed

L290: “On the other hand” 🡪 “**In** **contrast”**

L307: “On the other hand” 🡪 “**However”**

L390: “On the other hand” 🡪 “**Furthermore”**

L196: “After the building of the Vallabrègues Dam in 1967, the station was moved 2 km downstream”; I assume the dam did not impact the river discharge? Might be worthwhile clarifying this.

“After the building of the Vallabrègues Dam in 1967, the station was moved 2 km downstream and is still in the same place today. There is no tributary between the previous and the current station.” 🡪

This point has been developed in the article. See the following paragraph. You can also find a more detailed explanation in Lucas et al. (2023), cited in the next sentence of the article.

“**The gauging station has been used until the construction of the Vallabrègues hydroelectric scheme in 1967, which led to the derivation of a part of the discharge. Consequently, a new gauging station was installed 2 km downstream from the restitution of the derivated discharges. This new station has been used ever since. We assume that there is no impact of the Vallabrègues Dam on the discharge at the station only during floods.**”

L246: Change to a colourblind friendly palette: OK **TO DO**

L249: Improve plot resolution: OK **TO DO**

L260: “AMAX long” 🡪 “**Amax short”**: OK

L263: “details” 🡪 “**detail”**: Ok

L267: “A poor” 🡪 “**Poor”**: Ok

L269: Remove full stop: Ok

L269: Correct figure caption: Ok

L282: Remove “simply”: Ok

L286: “a lesser” 🡪 “**less”**: Ok

L287: “a poor” 🡪 “**poor”**: Ok

L300: I'm not sure these are fairly high correlations. There is limited discussion of this Figure, so I would suggest this could be removed: Ok J’ai enlevé la figure, mais est ce que vous pensez qu’il faut laisser le texte tel quel:

” However, the flood discharge quantiles are less uncertain for model D than for model B. The precise reasons for this are unclear at this stage but this might be due to correlations between parameters. In particular, there is a fairly high correlation between the length n of the historical period and the perception threshold S, as well as between the perception threshold S and the shape parameter ξ.”

L303: “number k of times” 🡪 “**number of times k”**: Ok

L314: “Keep this figure!”: Ok (fig. 7) 🡪 Pourquoi on l’enlèverait ??

L315: It would be helpful to remind the reader and overview the aims of Section 5 here 🡪 This paragraph has been added at the beginning of the section:” **In the last section, the four proposed models were tested on a synthetic case study, with an artificially degraded dataset. In this section, the models are applied to whole dataset available at Beaucaire, from 1500 to 2020.**”

L320: add commas: OK

L321: "arbitrarly” 🡪 “**arbitrarily”**: OK

L348-49: “poorly knowing” 🡪 “**poor knowledge of”**: OK

L352: Correct figure caption: OK

L371: Correct figure caption: OK

L375: “the elicitation of more informative priors” 🡪 information from the priors? i.e. determining more precise priors based on expert knowledge or other data sources. See for example: <https://arxiv.org/pdf/2112.07090>

L386: “poorly knowing” 🡪 “**limited knowledge of”**: Ok

L387-8: remove “a”: Ok

L388: “for” italic: Ok

L389: “the determination of the” 🡪 “**determining the”**: OK

L397: Remove “an” and add “**allow us**”: Ok

L421: “explicitely” 🡪 “**explicitly”**: Ok

L440: Rephrase “The Rhone River series analysed here has the particularity of leading to a positive shape parameter, corresponding with the parameterization used in this paper to an upper-bounded GEV distribution.”🡪 “**The shape parameter estimated at Beaucaire is positive, corresponding to an upper-bounded GEV distribution (with the parametrization used in this paper).**”: Ok

L454: Any further recommendations for FFA using historical observations in practice? How is knowledge of uncertainties useful? Some relation back to the wider flood risk picture would round off the article nicely.

The last paragraph of the conclusion has been extended in the following way:

“Although the stationarity of the data has been checked, it is likely that the long series used in this paper is impacted by ~~climatic variability and/or~~ the imperfect completeness of the historical sample, which is based on damage perception~~, which could weaken the stationarity hypothesis necessary for FFA~~. **Indeed, the damage perception has probably evolved throughout the last five centuries at Beaucaire. Directly linking the consequences of a flood to its peak discharge is risky, as physical (levee failure, duration of flood…) or anthropic factors (population density, flood control policy, mediatic or politic context…) could impact the stationarity and the availability of the data. Therefore, it seems important to keep this in mind while using historical data, particularly during data collection. Using the whole set of available data doesn’t always seem to be the best solution, as the exhaustiveness of the data must be the first criterion. Thus, as demonstrated in this article, it is essential to carry out a complete assessment of the various sources of uncertainty in order to decide to what extent the addition of historical information is useful to improve the estimation of flood risk.**

**Stationarity hypothesis may also be affected by climatic variability at Beaucaire, as trends in flood magnitudes have been identified in several regions of Europe (Hall et al., 2014; Blöschl et al., 2020) and France (Giuntoli et al., 2019). To date, there are no rules in France for taking into account of the impact of climate change on flood risk estimates. However**, it is still possible to integrate temporal changes in climate processes or watershed characteristics within the probabilistic model itself, as ~~is~~ increasingly described in the literature (see Salas *et al.*, 2018, for an overview). **It is also important to note that** **out of the FFA scope, s**uch long series remain interesting for the study on the long-term variability of floods over several centuries, and their value for risk awareness and memory.”