

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-320

Inês Amorim (Referee)

Referee comment on "Enhanced flood hazard assessment beyond decadal climate cycles based on centennial historical data (Douro basin, Spain)" by Gerardo Benito et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-320-RC1>, 2021

The article is an excellent methodological approach to an increasingly important theme: the study of past flood occurrences and how it serves "to increase public confidence in any proposed solution that ultimately involves a large economic or social expense for hazard mitigation" (lines 708-709). I consider that the main contribution of this article is the systematic use of proxy and instrumental long-term data, crossing the two dimensional of hydraulic modelling (referred in 3.3). I considered this article a pilot project of a methodology application that could be replicate in other cases.

A first suggestion to clarify the extent of this article is the inclusion, in the title, the mention to the space: the river and place (River Douro and Zamora). Indeed, the article is mainly an approach to the analysis of the river Douro floods in the Spanish area, between Zamora and the first dams, that were constructed in 1960s after Zamora town. The article is a case study, a methodological research about a particular section of Douro River, with its own characteristics (as was explain in the contain).

A second suggestion is the possibility to add extreme dates in the title, even if is difficult to fixed the scope, because sometimes are mentioned (and effectively was study) the last 500 years, and in other occasions the period between 1250-1871, maybe because they faced «a non-continuous dataset between 1250 and 1545» (I understand the expression «centennial» in the title).

The authors made a remarkable comparative approach putting its case in a larger frame. I suggest another comparative analysis using an article that tried to estimate the frequency of extraordinary floods of Douro River in the Portuguese territory, till its estuary. (Silva, J.D. da; Oliveira, Manuel de Sousa - *As cheias na parte portuguesa da bacia hidrográfica do rio Douro, ps/p/*. Available <https://grupo.us.es/ciberico/.../porto2diasdasilva.pdf>). It could be important to insist in a comparison between rainfall contrast characteristics consequences (line 181 and further), i.e., the flood peaks contrast between Régua and Porto at the lower basin of Douro, with Valladolid and Zamora and its consequences. The

period 1250-1871, in which were identified 69 floods (including ordinary ones), is a number very low if compared with the floods of the Douro in Porto just for the period between 1727 and 1799, in which were found 54 floods (see the quoted article by the authors). Perhaps this increasing number of floods was related to the tidal peaks and the siltation of the estuary, but this contrast of occurrences could open an outlook about long Douro River course behavior, before and after dams' construction.

A final remark: line 575, authors wrote "includes the largest flood on record (Dec 4-6 1739) that reached a stage of 12 m at Dom Luiz I Bridge (Loureiro, 1904; Taborda, 2006)". The bridge doesn't exist in 1739 (only constructed between 1881-1886) but Loureiro (and Taborda quoting Loureiro), used the currently existing bridge as a mark (rebuild the sentence will be enough).

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2021-320/hess-2021-320-RC1-supplement.pdf>