

Interactive comment on “Review article: climate change impacts on dam safety” by Javier Fluixá-Sanmartín et al.

Anonymous Referee #1

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This is a comprehensive review paper on climate change impacts on dam safety. The authors review a large number of relevant papers and technical documents published on this subject in the last years. The main scientific value of the work is certainly that information from many different sources has been collected, organized and presented in one single study. The authors state their objectives at the end of the introduction: a multidisciplinary and structured review of the impacts of climate change on the relevant dam safety components. With these goal in mind they present their analysis following the traditional risk analysis approach. Their emphasis is on dam safety components: loads, system response and consequences. In my opinion, they clearly fulfil their objectives. The state of the art in the different dam safety components is extensively reviewed. While some fields, like flood hydrology, have been frequently studied, other

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fields, like gate reliability or socio-economic consequences, have received less attention. Overall, the paper is correctly organized and well written. In conclusion, the topic is interesting, the analysis is sound, the review is useful and the presentation is clear. In my opinion, it can be published in NHES.

I only have a couple minor suggestions for the consideration of the authors. I understand that the paper is already long and with such a broad topic the authors have obviously to choose the material that is included in the presentation, but I particularly missed two discussions that I believe are of interest for the general reader.

While introducing floods, the authors state that they are usually characterized through a relation between their peak discharge Q and volume V , and the associated annual exceedance probability. In my opinion, this sentence needs some clarification. In order to define an exceedance probability for a hydrograph (combination of Q and V), a way of comparing two hydrographs is required. In the context of dam safety analysis, this comparison should be made through the maximum water level that the hydrograph attains while it is routed through the reservoir. For some reservoirs, Q is the most relevant variable, while for other V may be the dominant factor. I suggest that the authors add a brief explanation to clarify this issue.

I also missed a discussion of non-stationary flood frequency analysis. For some dams the hydrological load is mostly estimated through flood frequency analysis. Many studies have been carried out to account for climate change through non-stationary models and a brief discussion of this work would be adequate for a review paper.

One more detail: Section 3.14 is titled “Flood routing”. I think “Flood management strategy” may be more appropriate, since the emphasis is not on how you compute the flood wave propagation through the reservoir, but on how you decide how to manage the flood wave to minimize dam risk and downstream damages.