

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

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Received and published: 27 June 2018

Dear authors, I enjoyed reading about this particular problem from different perspectives. I agree it's important to not only consider hydro-meteorological variables but also an engineering and a socio-economic point of view. The article is comprehensive in terms of different aspects affecting dam safety. However, I think that a more comprehensive literature review on the single aspects could help the manuscript being an even more valuable contribution to the scientific discussion. The following questions, mainly focusing on the system load component of your risk analysis approach, may provide some inspiration.

1) Isn't there a mismatch between the target audience (“dam owners and dam safety

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practitioners”) and the presented approaches? If the article aims to provide information for the mentioned target audience, I doubt that a methodology as proposed in Figure 4 is very useful for them. There are probably not many dam owners or dam safety practitioners who are capable to conduct GCM runs and statistical or dynamical downscaling procedures. Moreover, many dams are built within a complex topography, where results from global analyses are less reliable, and a proper downscaling of extreme events is even more challenging. Maybe this is a bit beyond the scope, but the question arises who should provide such locally representative scenarios. Science, governmental agencies, dam owners or someone else? On the other hand, if the article aims to contribute to the scientific discussion, I would suggest to elaborate a bit more on the literature review, particularly regarding GCM downscaling procedures for extreme events and regarding the stationarity assumption in FFE.

2) From a system load perspective, figure 4 implies that a downscaling of extreme GCM scenarios (or even long term runs) is the only way to assess climate change impact on dam safety risk. What about other (less costly) approaches like non-stationary FFE, or the use of adapted stochastic weather generators?

3) The probability of dam failure from a hydro-meteorological point of view is not primarily a question of the peak inflow, it's more dependent on the total inflowing volume over a given amount of time. I would therefore suggest to mention the ongoing discussion on bivariate FFE methods as well.

4) I'm not sure whether the climate change impact on land use change and surface roughness is relevant for this topic. First, most of the hydrodynamic models for flood mapping are calibrated using the roughness parameter. A change of such a calibrated parameter could cause non-linear changes in the simulated runoff, and might lead to wrong conclusions. Second, I would consider slight changes in roughness as negligible, considering the huge uncertainties that come along with FFE (not shown in Figures 2a and 2b) and other parts of the system load component. More generally spoken: can you say something about the sensitivity of the single components in Figure 1?

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-141>, 2018.

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