

Interactive comment on “Quantification of climate change impact on dam failure risk under hydrological scenarios: a case study from a Spanish dam” by Javier Fluixá-Sanmartín et al.

Anonymous Referee #2

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The manuscript contributes to the knowledge of how climate change might affect dam risk management and the definition of long-term strategies to reduce risk. The paper presents a method for addressing different climate change scenarios to evaluate their influence on future risk. The results obtained for the case study show how dam failure risk may vary depending on different scenarios and identify the most influencing factors regarding affected risk components (e.g. estimated income floods or reservoir levels). The proposed method can be applied to evaluate the potential impact of climate change in other cases and provides a tool for applying a dynamic approach in terms of risk analysis and management. This topic fits well into the scope of the Journal. In my opinion, the methodological approach and the discussion of results are of interest

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for the general audience of the journal and the paper deserves publication. However, I include several specific questions which clarification could improve the quality and understandability of the paper, and should be addressed: • Page 3. Line 15. Regarding the definition of study periods, for the Base Case, please further explain the reasons why the period 1970-2005 is selected and whether it is proposed as a general approach. • Section 3 would require further description on why this case study has been chosen for the conducted research and why the analysis of the impact of climate change is of interest for this dam. • Section 4. Page 9. Please further describe why different maximum water pool levels per month are considered for the case study. • Section 5.2.1. A more detailed description of the calibration process for the hydrologic-hydraulic model is required (parameters calibrated, efficiency indicators used, etc.). • Section 5.3.1. Page 17. Line 20. The authors introduce the concept of event tree not yet described up to this point. Please contextualize the link between the proposed risk model and the event tree mentioned in this section. • Section 5.3.4. Further details on how variations on the population and water supply demands are considered in future scenarios in terms of potential economic consequences (i.e. in terms of future demands) would be convenient. Do the authors consider that provided services remain unchanged in future scenarios? • Section 7. Conclusions: o The added value of using risk models to integrate information on projected effects of climate change is highlighted, however, how the proposed approach can be adapted to low-data available cases? o In terms of supporting dam safety management, how results for this case study will influence long-term actions for this dam? Please describe how obtained results can be considered for the definition of future actions (for instance, in terms of new operating rules or water pool levels). o A sensitivity analysis have been included to evaluate the impact on risk of each factor independently. A short discussion regarding uncertainty analysis would improve this section (e.g. their influence on risk outcomes). In addition, please note the following suggestions regarding technical corrections: • The size, quality and readability of figures is very good in general, although some figures might be improved (e.g. Figure 10). • A list of minor

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corrections is here included:

Page Line Comment 1 29 these impacts 5 Figure 1 assess climate change impacts on 5 6 dam built in 1960 5 9 concrete gravity dam 6 12 AEMET. Please describe acronym. 6 17 CEDEX. Please describe acronym. 6 18 in this same platform. 8 15 of potential incoming floods 8 16 from the flood routing 8 17 gate availability 9 6 consequences for the non-failure case 9 26 reservoir's releases 9 29 is the limited water storage in the Santa Teresa reservoir 9 31 Consider replacing "in the computation of the risk model since they define the maximum possible water level issued from the study of previous pool levels" by "for estimating water pool levels" 12 11 divided into subbasins 12 17 The calibration process presents 13 13 Check sentence construction 13 15 Concerning basin discharges 14 5 by the Hydrological Plan 14 8 Consider replacing "The validation of this water resources model" by "model validation" 14 10 As shown 14 10 results performance 14 14 is not capable 14 16 Once the model is validated 15 21 Consider replacing "The time distribution of the rainfall" by "Temporal rainfall distribution" 17 1 Consider replacing "The characterisation of the peak discharges with their return Period" by "Peak discharge by return period" 17 11 and the social consequences used to compute the social risk 17 12 other risk model components 17 11 spillway gate and bottom outlet performance 17 15 Increasingly 19 7 Consider replacing "will go from" by "will vary" 20 19 Reference is required 25 Tables RCP2.6

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