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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Risk-based flood protection planning under climate change and modelling uncertainty: a pre-alpine case study" *by* Beatrice Dittes et al.

Anonymous Referee #1

Received and published: 15 January 2018

The paper 'Risk based flood protection planning under climate change and modelling uncertainty: a pre-alpine case study' by B. Dittes et al. applies a framework for quantitative, probabilistic flood protection planning to a real decision making problem of flood protection strategies. This framework considers climatic uncertainties by incorporating non-stationarity and accounts for flexibility of the flood protection system in a sequential Bayesian approach. The planning problem investigated considers four alternative protection strategies with different safety levels for a city in a pre-alpine catchment. The topic is of high relevance in the context of adaptation planning and risk based decision making under uncertainty. The paper is very well written and structured. It will surely make an important contribution to the field. However, some aspects need further

consideration and explanation. The most important ones are:

The rationale and details of the approach to determine future extreme discharges is not described comprehensively and is hard to follow at times. Reference is made to the paper Dittes et al. 2017a which is however still under review by another Journal. It would be very helpful to provide more details on the background, e.g. how the standard deviation for the hidden uncertainty is quantified, what are the underlying assumptions.

The approach of backwards induction optimization (page 5) should be introduced more in detail. Particularly, the context that system performance is evaluated by taking data into account which is available by some point in the future needs some additional explanation. In your study you use discharges based on climate projections which are available today. The actually observed discharges in the future may differ from these projections, and thus may give different results and recommendations. Is this reflected by the uncertainty range of discharge projections from the climate scenarios?

The whole paragraph (page 14, ll 3-15) is not very clear. It includes a number of statements for which the basis is not comprehensible.

Your discussion of how the damage potential p 17 ll 23 - 30 should be extended by taking the broader perspective of costs of natural hazards introduced by Kreibich et al. 2014 into consideration. (Kreibich, H., van den Bergh, J. C. J. M., Bouwer, L. M., Bubeck, P., Ciavola, P., Green, C., Hallegatte, S., Logar, I., Meyer, V., Schwarze, R. and Thieken, A. H.: Costing natural hazards, Nature Clim. Change, 4(5), 303–306, doi:10.1038/nclimate2182, 2014.)

Additional minor comments and suggestions are included in the The paper 'Risk based flood protection planning under climate change and modelling uncertainty: a pre-alpine case study' by B. Dittes et al. applies a framework for quantitative, probabilistic flood protection planning to a real decision making problem of flood protection strategies. This framework considers climatic uncertainties by incorporating non-stationarity and accounts for flexibility of the flood protection system in a sequential Bayesian approach.

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Additional minor comments and suggestions are included in the annotaded PDF.

Overall, I recommend the paper for publication in NHESS subject to minor revisions.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-399/nhess-2017-399-RC1-supplement.pdf

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