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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Climate uncertainty in flood protection planning" *by* Beatrice Dittes et al.

Anonymous Referee #2

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General comments

The paper presents a Bayesian methodology to quantify and combine different uncertainty sources for estimation of probability distributions of design discharge under climate change. This is combined with an optimisation framework to derive optimal flood protection. The methodology is demonstrated on a case study.

The presentation of the methodology is difficult to follow, which makes the interpretation of the results problematic. The quantification of the different uncertainty sources, which is a central part of the methodology is only very briefly described (Section 2.5). In addition, for the optimisation framework applied reference is made to an unpublished paper by the same authors, and it is difficult to grasp from the description given in the paper.

Detailed comments

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Discussion paper

1. The title of the paper is not very informative.

2. Main results should be summarised in the abstract.

3. Section 2.3. In the explanation of internal variability it is stated that “it cannot be predicted with certainty what amount of discharge will be recorded on a given day”. But is this an issue here? Internal variability should be related to the problem of estimation of a design discharge. It is also stated that the internal variability is the dominant source of uncertainty, but no documentation for this statement is provided.

4. Section 2.4, p. 8, l. 5-6. It is stated that “the error from the hydrological model is small, in particular for high flow indicators (Velazquez et al., 2013)”. Velazquez et al. (2013) conclude that high flow indicators are less sensitive to the choice of hydrological model. This is not to say that the uncertainty in the simulation of extreme discharge events is small. Often you see quite large uncertainties in the simulation of extremes. This can be quantified from the hydrological model simulation in the case study.

5. Section 2.5. This section needs to be elaborated. There is very little explanation of how the different error sources are estimated.

6. Section 4.2. The results are difficult to interpret. The relation between the estimated 100-year pdfs and the planning margins in Table 2 is not clear. It does not seem that the planning margins correspond to the current estimate of the 100-year design discharge of 480 m3/s.

7. Section 4.2, p. 18, l. 9-11. Does this trend relate to the mean discharge? I would expect this trend to be different from the trend of annual maximum discharge.

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