

Interactive comment on “How do changes along the risk chain affect flood risk?” by Ayse Duha Metin et al.

Anonymous Referee #1

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The paper studies the sensitivity of flood risk to various factors: Changes in precipitation and temperature, reservoir size, dike height, distribution of residential areas, the value of affected buildings and private household precautions. Thus, the factors consider changes in climate, catchment, river system, land use, assets and vulnerability. Changes in the likelihood of monetary losses are determined by changing the aforementioned factors. To achieve this, a model chain consisting of a weather generator, a rainfall-runoff model, a river-network routing model, a hinterland inundation model as well as a flood-loss model is set up. For each of the 729 selected scenario combinations 4000 years of continuous model simulations are produced and analysed.

The study is within the scope of NHESS. It is important to the scientific community as it shows that it is possible to consider the entire flood risk chain and identify the

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most influential factors for flood risk. It is the first/one of the first studies attempting this comprehensive approach. The most important result is that, not-surprisingly, increases in flood risk due to climate change can be compensated by appropriate protection and precautionary measures.

Major comment:

The changes imposed on the different risk components are very different in magnitude (e.g. small atmospheric changes but huge changes in reservoir size (+100%)). To get a better idea of the sensitivity of losses to these components it would be good to add a graph which displays the influence of normalised changes on the losses. I am aware of the fact that there will be some subjectivity when deciding on a suitable way to normalise the imposed changes.

Minor comments:

p.1 l.38 Is Kreibich et al. the first/only publication that states this? Otherwise please add. "e.g." to the reference. Please also check this for all other references.

p.2 l.78 Did you search for all keywords separately or only in combination?

p.9 l.231 "More importantly, with the new setup, the SWIM model seems to be able to represent the cut-off process more accurately." Where do I see this?

p.10 l.258-266 For which size of area is the model acceptable (what is meant by "large-scale")?

p.11 l.271-272 Please specify: Less damage if people are regularly affected.

p.11 l.280-281 How do modelled return periods compare to observed return periods?

p.11 l. 283-287 Are these values better when reservoirs are considered? (You show before that discharge was improved.)

p. 11 l.298 It would be interesting to learn something about the computational demand

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of the different modules of the model chain, relative to each other (e.g. 10% weather generator, 30% SWIM)

p.12 Fig. 4 In my opinion this figure is not needed.

p.12 l.336-339 Please give the numbers or refer to table 2.

p.13 sec. 3.23 Please move the explanation on the operation of reservoirs from page 15 to this section.

p.14 l.402-403 In the discussion section you clarify that anthropogenic climate change may be associated with very different temperature and precipitation values (patterns, duration, clustering) in the future, which are not captured by your approach. Here you seem to suggest that the other studies overrate the effect of climate change. Please rephrase.

Figs 9+11 I find it impossible to follow the path of the thin lines towards the right of the plot. I assume that this could be improved if you consider to refrain from changing the colours along the graph. In case you want to keep the colour change you need to explain it in the text. It took me a long time to figure out what the colour change (probably) wants to tell me. I would also suggest to add a black default-scenario line.

Technical remarks:

p.2. l.69 Something is missing in this sentence

p.4 l.137 "but they also have storage capacity"

p.4 l.144 "the Mulde catchment has been hit by large floods associated with high damages before"

Fig. 10: EAD values on y-axis are missing

p.21 l.592 "our scenarios are reasonable to represent"

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