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Discussions

Interactive comment on "Effects of variability in probable maximum precipitation patterns on flood losses" *by* Andreas Paul Zischg et al.

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Dear reviewer, Thank you very much for the interesting questions and remarks. Below you find a response to the main points.

-Nesting approach:

The 1D hydrodynamic model is routing the water flow from the subcatchments (upper boundary conditions) towards the catchment outlet. This model considers the weirs and lake outlets and thus calculates the the lake level. The 2D model is used for estimating the flow depths in the floodplains required for flood loss analysis. However, one can base loss estimations either on the 1D model only or on the 2D flood model only. Here, we wanted to show the differences in flood loss estimation when based on

1D or 2D, respectively. The simulation of lake retention with a 2D model is computationally demanding. To save computation time, we simulated all scenarios with the 1D model and nested the 2D model into the outcomes of the 1D model at specific locations (boundary conditions). You justifiable asked for the downstream boundary conditions: The nested 2D simulation of all the floodplains except the one with the catchment outlet require a downstream boundary condition. This is given by the output of the 1D model, in our case the hydrographs of the lake levels. However, in the paper we will explain the nesting approach in more detail.

-Definition of the coupling points:

We defined the coupling points following a bottom-up approach: First, we delimited the floodplains for which the flood loss estimation will be valid (system delimitation). Second, we defined the upper boundary conditions of these floodplains. Third, we delimited the upstream catchments for the hydrological model on the base of this coupling points. However, the location of the gauging stations is considered as well, for calibrating and validating the hydrologic model. We will describe this procedure in more detail in the text.

-Figure 1:

We will improve the figure

-exposed buildings/residents corresponding to 1D fdm, 1D wse:

We used the exposed buildings/residents corresponding to 1D fdm and 1D wse for calculating the reduced uncertainty ranges RUR and for assessing the contribution of the model choice to the total uncertainty range in the flood losses. However, we did not show 1D fdm and 1D wse exposure in figure 6. We will add two more subplots in figure 6 for the 1D results. Furthermore, we will explain the distributions in the exposure. This is mostly related to the inundation model in combination with the rainfall pattern. The 2D model considers the exposure of houses at the upper boundary conditions of the alluvial fans of the tributary Lütschine while the 1D model considers only the inundation of the main river Aare. Thus, the 2D exposure distribution can be bimodal, depending on the flooding by tributaries.

-maximum number of exposed buildings/residents:

Indeed, the maximum number of exposed residents over all simulations is 5371. The value of 4667 is the maximum of the 2D wse simulations only. Sorry, for this inadvertency. The minimum number is exact.

-“other uncertainties”:

We will not use this term in the revised version and specify what we mean.

-Spatio-temporal pattern:

We will visualize hydrographs at selected representative locations within the river basin.

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