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Natural Hazards and Earth System Sciences
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Discussions

Interactive comment on "Assessing the operation rules of a reservoir system based on a detailed modelling-chain" *by* M. Bruwier et al.

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The authors gratefully acknowledge the Reviewer for his in-depth analysis of the manuscript and his valuable comments. All minor comments will be carefully included in the revised version of the manuscript at the end of the discussion period. We provide hereafter detailed answers to the Reviewer's requests for clarification.

pag. 5802 line 20 :

Although the hydrological simulations were performed between 1961 and 2005, the first 13 years (1961-1973) were not taken into account in the analysis of the results in order to reduce the influence of the initial conditions. They were considered as a "warm-up" period for the model. The year 2005 was rejected because the input data

were not available for the whole year. This will be clarified in the final revised version of the paper at the end of the discussion period.

pag. 5803 line 4 :

In our research, we used "CCI-HYDR" perturbation tool to apply perturbations on the measured time series of precipitation and temperature and, this way, to obtain perturbed time series representative of future climate conditions. The CCI-HYDR perturbation tool reproduces a limited number of scenarios (wet, dry), which are representative of the spectrum of possible climate evolutions, as obtained from various RCMs, GCMs, and emission scenarios. Hence, GCMs are not used as it in the present research. The approach is detailed and substantiated in the paper by Ntegeka et al. (2014).

pag. 5806 line 1 :

A 2-D inundation model was used to compute the inundation characteristics (extent, water depth and flow velocity in the floodplains) corresponding to seven characteristic flood discharges. To compute the risk curves, return periods were assigned to the seven flood discharges for which inundation characteristics were computed. The discharges Q100+15% and Q100+30% were chosen because they are of the order of future 100-year discharges for, respectively, 2020-2050 and 2070-2100 (see Table 8).

pag. 5806 line 11 :

The relative damage (in %) in an area expresses the potential damage for a given flood scenario as a percentage of the maximum possible damage in this area (corresponding to very high water depths in the area). Next, this relative damage is multiplied by the maximum damage (also equal to the value of the assets in the considered area) to obtain the absolute damage (in euro). This is a very standard approach for flood damage modelling. See for instance the review paper by Merz et al. (2010b) in NHESS.

pag. 5806 line 20 :

We use the term risk for the summation of the products of the probability of occurrence of calamitous events by the expected damages. In our research, this summation for all flood events becomes the integration of the risk curve. Therefore, the risk represents the mean annual damage expected in an area due to flood events. This is indeed a standard definition in flood risk analysis. See for instance on p. 510 in the paper by Merz et al. (2010a) in NHESS.

pag. 5813 :

For the time period 2070-2100, an infinite retention capacity in Eupen and La Gileppe reservoirs induces a flood risk of 11 850 000 EUR year-1 for the entire catchment in the wet scenario. Therefore, an enhancement of the reservoir operation rules to mitigate the flood risk is limited to a potential reduction of maximum 6% for this extreme scenario. This will be clarified in the final revised version of the paper at the end of the discussion period.

References:

Merz, B., Hall, J., Disse, M., & Schumann, A.: Fluvial flood risk management in a changing world. Nat. Hazards Earth Syst. Sci., 10(3), 509-527, 2010a.

Merz, B., Kreibich, H., Schwarze, R., & Thieken, A.: Review article "Assessment of economic flood damage". Nat. Hazards Earth Syst. Sci., 10(8), 1697-1724, 2010b.

Ntegeka, V., Baguis, P., Roulin, E., & Willems, P.: Developing tailored climate change scenarios for hydrological impact assessments. J. Hydrol., 508, 307-321, 2014.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 5797, 2014.