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How do changes along the risk chain affect flood risk?

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The interaction of physical and socio-economic systems causes flood risk. Therefore, the assessment of flood risk ideally considers the whole flood risk chain, from the atmospheric processes, through the catchment and river system processes to the damage mechanisms in the affected areas. Within a given flood risk system, a multitude of influences can occur with potential effects on the characteristics of the flood risk. This study uses the flood-prone Mulde catchment in Germany as an example to quantify and discuss the state of knowledge about the sensitivity of flood risk to changes along the risk chain. The main goal of this study is to provide a comprehensive sensitivity analysis considering changes in all risk components, i.e. changes in climate, catchment, river system, land use, asset values and vulnerability. The flood risk is computed using the Regional Flood Model (RFM), which is based on a continuous simulation approach, including rainfall-runoff, 1D river network, 2D hinterland inundation and damage estimation models. To understand the sensitivity of flood risk to the drivers in this risk chain, our approach is to use a logic tree which combines all possible combinations of components. For each component, we defined three scenarios, a baseline scenario and two symmetric change scenarios. In total we evaluated 729 scenarios. As risk indicators, results are expressed in terms of expected annual damages (EAD) and risk curves. The results show that components like changes in dike and/or vulnerability, which have not gained a lot of attention so far, may outweigh changes in components such as climate and/or land use which are mostly considered as the main drivers of flood risk.