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Effects of changes along the risk chain on flood risk

Ayse Duha Metin (1), Heiko Apel (1), Nguyen Viet Dung (1), Björn Guse (2), Heidi Kreibich (1), Kai Schröter (1), Sergiy Vorogushyn (1), Bruno Merz (1,3)

(1) GFZ German Research Centre for Geosciences, Section Hydrology, 14473 Potsdam, Germany, (2) Department of Hydrology and Water Resources Management, Kiel University, Germany , (3) Institute of Earth and Environmental Science, University of Potsdam, 14476 Potsdam, Germany

Interactions of hydrological and socio-economic factors shape flood disaster risk. For this reason, assessment of flood risk ideally takes into account the whole flood risk chain from atmospheric processes, through the catchment and river system processes to the damage mechanisms in the affected areas. Since very different processes at various scales are interacting along the flood risk, the impact of the single components is rather unclear. However for flood risk management, it is required to know the controlling factor of flood damages. The present study, using the flood-prone Mulde catchment in Germany, discusses the sensitivity of flood risk to disturbances along the risk chain: How do disturbances propagate through the risk chain? How do different disturbances combine or conflict and affect flood risk? In this sensitivity analysis, the five components of the flood risk change are included. These are climate, catchment, river system, exposure and vulnerability. A model framework representing the complete risk chain is combined with observational data to understand how the sensitivities evolve along the risk chain by considering three plausible change scenarios for each of five components. The flood risk is calculated by 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. The sensitivity analysis covers more than 240 scenarios with different combinations of the five components. It is investigated how changes in different components affect risk indicators, such as the risk curve and expected annual damage (EAD). In conclusion, it seems that changes in exposure and vulnerability seem to outweigh changes in hazard.