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The impact of changes in climate and socio-economic conditions on river flood losses at the global scale

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Floods pose one of the largest risks to natural hazards globally. In 2012, the global damage from floods was estimated to be about € 22 billion. For the first half of 2013, the global damage was estimated to be already € 35 billion, being about 47% of the overall losses due to natural hazards. Almost half of this amount was due to river flooding such as the devastating floods in East Germany in May-June 2013. Besides possible increases in frequency and severity of flood events, floods are becoming more damaging due to increases in population and increases in economic utilization of flood prone areas.

It is therefore crucial to understand the nature and causes of flood risks and possible changes therein due to climate and socio-economic change. Improved understanding will support adaptation plans and investments, either in new economic activities or in flood protection.

In this contribution, we demonstrate, at the global scale, how economic damages and the number of flood-affected people due to river floods will change in several scenarios of combined climate and socio-economic change. Across a number of large river basins, we distinguish the contribution to change in risk by climate change (resulting in an increase in flood hazard) and by socio-economic change (resulting in more impacts of flooding). We compute these risks using a model cascade consisting of hydrological flood models and impact models forced by long time series of current and future climate (CMIP5) and socio-economic scenarios in periods around 2030 and 2080. The method is validated with reported river discharge extremes and reported damage estimates. We discuss the possible implications of the change in risk for humanitarian aid and adaptation requirements.