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Global and local scale flood discharge simulations in the Rhine River basin for flood risk reduction benchmarking in the Flagship Project

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The global flood risk assessment is prerequisite to set global measurable targets of post-Hyogo Framework for Action (HFA) that mobilize international cooperation and national coordination towards disaster risk reduction (DRR) and requires the establishment of a uniform flood risk assessment methodology on various scales. To address these issues, the International Flood Initiative (IFI) has initiated a Flagship Project, which was launched in year 2013, to support flood risk reduction benchmarking at global, national and local levels. In the Flagship Project road map, it is planned to identify the original risk (1), to identify the reduced risk (2), and to facilitate the risk reduction actions (3). In order to achieve this goal at global, regional and local scales, international research collaboration is absolutely necessary involving domestic and international institutes, academia and research networks such as UNESCO International Centres. The joint collaboration by ICHARM and BfG was the first attempt that produced the first step (1a) results on the flood discharge estimates with inundation maps under way. As a result of this collaboration, we demonstrate the outcomes of the first step of the IFI Flagship Project to identify flood hazard in the Rhine river basin on the global and local scale. In our assessment, we utilized a distributed hydrological Block-wise TOP (BTOP) model on 20-km and 0.5-km scales with local precipitation and temperature input data between 1980 and 2004. We utilized existing 20-km BTOP model, which is applied globally, and constructed the local scale 0.5-km BTOP model for the Rhine River basin. For the BTOP model results, both calibrated 20-km and 0.5-km BTOP models had similar statistical performance and represented observed flood river discharges, epecially for 1993 and 1995 floods. From 20-km and 0.5-km BTOP simulation, the flood discharges of the selected return period were estimated using flood frequency analysis and were comparable to the the river gauging station data at the German part of the Rhine river basin. This is an important finding that both 0.5-km and 20-km BTOP models produce similar flood peak discharges although the 0.5-km BTOP model results indicate the importance of scale in the local flood hazard assessment. In summary, we highlight that this study serves as a demonstrative example of institutional collaboration and is stepping stone for the next step implementation of the IFI Flagship Project.