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Climate adaptation to change in high-flows: Comparison of high-resolution climate model projections

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Climate change is altering the water cycle from the global to the local scale. The increase in temperatures and changing precipitation patterns intensify not only mean values, but also the frequency and severity of extreme weather events, leading to alterations in water availability and distribution.

This study assesses the impact of climate change on flood patterns (maximum annual river discharge) in Germany. Climate models ranging from different spatial scales will be compared for the five largest German catchments outlets (including headwaters). The climate model ensembles from the EURO-CORDEX initiative, and the ICON climate model from the Destination Earth Initiative / NextGEMS project will be used along with the mHM (mhm-ufz.org) model. The river discharge values produced from the mHM model will be used to calculate the Q_{90} (90^{th} percentile of daily discharge) and the Q_{max} (maximum annual discharge) parameters.

Initial results from the EURO-CORDEX initiative predict a 5-15% reduction in Q_{90} and Q_{max} in the summer half year, and a 5-30% increase in Q_{90} and Q_{max} in the winter half year, in the alpine regions in Germany. In the Elbe and Oder catchments (north-eastern part of Germany) there in a greater increase in Q_{90} and Q_{max} in the summer half year than the winter half year. This increase becomes more prominent with increasing warming. However, there is a large spread in the ensemble predictions, with uncertainty reducing with increasing warming. These parameters and results will be compared with the results from the ICON climate model to understand the contribution of spatial and/or temporal resoltion towards flood prediction.