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Cross-scale intercomparison of climate change impacts simulated by regional and global hydrological models in eleven large river basins - validation, scenarios and uncertainties

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Impact models, having different model structures and operating at different scales, can significantly contribute to the overall impact uncertainty. What is missing is a rigorous analysis and attribution of uncertainties from different sources and across scales. In our study, we compare hydrological changes simulated by 9 global and 9 regional impact models for 11 large river basins in all continents under reference and scenario conditions. The analysis includes comparison of the validation runs, sensitivity of annual discharge to climate variability in the reference period, and sensitivity of the long-term average monthly seasonal dynamics to climate change. In a second step, the different sources of uncertainty (global climate models, scenarios, global impact models and regional impact models) in projected hydrological changes are quantified and discussed.