Multi-model projections of river flood risk in Europe under global warming

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Knowledge on the costs of natural disasters under climate change is key information for planning adaptation and mitigation strategies of future climate policies. Impact models for large scale flood risk assessment have made leaps forward in the past few years, thanks to the increased availability of high resolution climate projections and of information on local exposure and vulnerability to river floods. Yet, state-of-the-art flood impact models rely on a number of input data and techniques that can substantially influence their results. This work compares estimates of river flood risk in Europe from three recent published case studies, each of them based on a different ensemble of climate projections as input, and on a specific modeling chain. Impact estimates from river floods are assessed at three global warming scenarios of 1.5, 2 and 3 degrees Celsius from pre-industrial levels. The assessment is based on comparing ensemble projections of expected damage and population affected at country level. Differences and common points between the three cases are shown, to point out main sources of uncertainty, strengths and limitations. In addition the multi-model comparison helps identify regions with the largest agreement on specific changes in flood risk. Results show that global warming is linked to substantial increase in flood risk over most countries in Central and Western Europe at all warming levels. In Eastern Europe the average change in flood risk is smaller and the multi-model agreement is poorer.