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# Climate change impact on flood hazard in Europe: An assessment based on regional climate scenarios

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Simulations with global and regional climate models predict that future climate change will lead to an increase in frequency and intensity of extreme precipitation events in Europe, especially in the north and in the winter also in central Europe. Some models project an increase in heavy rainfall amounts even in areas that in general are expected to become much drier. This trend is likely to lead to more frequent and more intense river flooding in many parts of Europe. To analyse changes in flood hazard at the European scale we employed the hydrological model LISFLOOD that has been developed for operational flood forecasting using a grid scale of 5 km. This model was driven by data from several regional climate models, including an experiment of the RCM HIRHAM that was performed with a very high horizontal resolution of 12 km. It was found that, under the SRES A2 emissions scenario of the IPCC, in many European rivers the extreme discharge levels may have increased in magnitude and frequency by the end of this century. In several rivers, most notably in the west and parts of eastern Europe, the probability of what is currently a 100-year flood may double or increase even more, meaning that the return period decreases to 50 years or less. A notable exception to this was found in the northeast, where warmer winters and a shorter snow season reduce the magnitude of the spring snowmelt peak. Also in other rivers in central and southern Europe a considerable decrease in extreme river flows was found. The results from the 12-km HIRHAM simulation were compared with those obtained with two experiments of the same model at a lower resolution of about 50 km for the SRES A2 and B2 scenarios. Disagreements between these model experiments indicate that the effect of the horizontal resolution of the regional

climate model is comparable in magnitude to the choice for a particular greenhouse gas scenario.