



The Elbe Flooding 2002 as seen by an extended regional climate model

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In August 2002 the Elbe drainage basin experienced a devastating flooding event associated with extreme amounts of discharge and major economic losses. Water levels of centennial return periods were caused by two distinct precipitation events in early and in mid August 2002 originating from a Vb-type pressure pattern and being reinforced by local and regional orography. In this study, we try to reproduce the extreme amounts of precipitation and discharge using the regional climate model REMO coupled to the HD routing scheme in an offline mode. Surface runoff and drainage produced by the REMO soil scheme are handed over to the HD model which simulates the horizontal transport of water within the surface river system. The simulated discharge is validated against observations at four gauging stations along the Elbe river. In total, four coupled experiments applying different model setups and using a horizontal resolution of $1/6^\circ$ (approx. $18 \times 18 \text{ km}^2$) are carried out. The results indicate that the regional model system REMO-HD is able to reproduce the extreme flooding event both in terms of precipitation and discharge. Additional sensitivity studies point out the importance of soil moisture initialization and of an appropriate description of runoff generation within the climate model's land surface scheme. Our study provides confidence in the ability of the coupled model system REMO-HD to also project future changes in the frequency and magnitude of large-scale flooding events.