Floods in Southeastern Styria simulated by RCMs operated on the hydrostatic and convection permitting scale

Heimo Truhetz[a], **Christian Reszler**[b], **and Matthew B. Switanek**[a]

[a] *Wegener Center for Climate and Global Change, University of Graz, Austria*
[b] *JR-AquaConSol GmbH, Graz, Austria*

Small scale floods are a consequence of high precipitation rates in small areas that can occur along frontal activity and convective storms. In the extended Basin of Graz, located in the southeastern part of the Alps, frequent small scale thunderstorms are leading to heterogeneous rainfall distributions that are causing very local flash flood events. Since the last years, the hydrological model KAMPUS is being operationally used to forecast the development of flood events in this region. In this work, we integrate KAMPUS into a climate modelling framework that consists of multiple long-term (1989 to 2010) re-analysis driven simulations with the regional climate models (RCMs) CCLM and WRF operated on grids with 50 km, 12.5 km, and 3 km grid spacing. Comparisons between modelled and observed flood events in a variety of catchments (ranging from 75 km^2 to 1103 km^2) provide detailed insights in RCM error characteristics (and their dependency from grid spacing) and the effects of a recently developed bias correction technique (Scale Distribution Mapping; SDM).

It turns out that RCMs – also operated on convection permitting scale (3 km grid spacing) – are partly able to reproduce observed flood statistics. However, they are lacking in capturing a complex interplay between the total precipitation amount per event and the temporal distribution of rainfall intensities on a sub-daily scale that even the bias correction is not able to overcome [1].

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References

[1] Reszler, C., Switanek, M.B., and Truhetz, H., Nat. Hazards Earth Syst. Sci. **18**, 2653 (2018).