



Future extreme precipitation intensification in a convection-permitting model

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Convection-permitting models (grid spacing ≤ 4 km) add value for the representation of precipitation extremes and the diurnal cycle of precipitation. In particular for sub-daily precipitation extremes, convection-permitting models show a stronger response to warming than that found in coarser models with parametrized convection. Due to their explicit simulation of key processes, e.g. deep convection, convection-permitting models also offer an ideal platform for studying the different mechanisms through which future changes in extreme precipitation may occur, and the relative importances of these mechanisms.

Using a regional domain centred on the catchment of the River Wupper (western Germany) – a key study region of the H2020 project BINGO (www.projectbingo.eu) – we perform historical and future (RCP8.5) climate simulations at 0.02° (~ 2.2 km) resolution with the COSMO-CLM model; the GCM is MPI-ESM-LR. We find a range of extreme precipitation scalings, ranging from sub- to super-Clausius-Clapeyron. Taking the summer season, we identify the physical mechanisms behind the deviations from Clausius-Clapeyron scaling, with particular focus on thermodynamic and dynamic contributions, and their relative importances.