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Can Convection‐Permitting Models really Offer Promise of More Certain Extreme Rainfall Projections ?

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Compared to standard regional climate models (RCMs), convection-permitting models (CPMs) provide an improved representation of sub-daily precipitation statistics and extremes thanks mainly to the possibility to switch off the deep convection parameterisation, a known source of model error and uncertainties. The more realistic representation of local processes in CPMs leads to a greater confidence in their projections of future changes in short-duration precipitation extremes. Recent literature on CPMs seems to agree on a future increase of extreme precipitation, above Clausius‐Clapeyron scaling in some cases, which is likely to have severe socio-economic impacts.

The quantification of uncertainties on future changes at this resolution has been barely touched. Using the first‐ever ensemble of CPMs run within the UK Climate Projections project, Fosser et al. (2020) found that the climate change signal for extreme summer precipitation may converge in CPMs in contrast to RCMs, thanks to a more realistic representation of the local storm dynamics.

Here we use the first multi-model CPMs ensemble over the greater Alpine region, run under the auspices of the World Climate Research Programme's (WCRP) Coordinated Regional Downscaling

Experiment Flagship Pilot Study on Convective phenomena at high resolution over Europe and the Mediterranean (Coppola et al. 2020). In our analysis we compared the uncertainties in the CPMs ensemble to the driving models following a similar method to Fosser et al. (2020). In this presentation we will show if multi-model CPMs can really provide more certain extreme rainfall projections then their parent coarser resolution models.

Fosser G, Kendon EJ, Stephenson D, Tucker S (2020) Convection□Permitting Models Offer Promise of More Certain Extreme Rainfall Projections. Geophys Res Lett 47:0–2. doi: 10.1029/2020GL088151

Coppola, E., Sobolowski, S., Pichelli, E. et al. A first-of-its-kind multi-model convection permitting ensemble for investigating convective phenomena over Europe and the Mediterranean. Clim Dyn **55,** 3–34 (2020). https://doi.org/10.1007/s00382-018-4521-8