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Evaluation of high intensity precipitation from 16 Regional climate models over a meso-scale catchment in the Midlands Regions of England

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Local flooding events are often triggered by high-intensity rain-fall events, and it is important that these can be correctly modelled by Regional Climate Models (RCMs) if the results are to be used in climate impact assessment. In this study, daily precipitation from 16 RCMs was compared with observations over a meso-scale catchment in the Midlands Region of England. The RCM data was provided from the European research project ENSEMBLES and the precipitation data from the UK MetOffice. The RCMs were all driven by reanalysis data from the ERA40 dataset over the time period 1961-2000. The ENSEMBLES data is on the spatial scale of 25 x 25 km and it was disaggregated onto a 5 x 5 km grid over the catchment and compared with interpolated observational data with the same resolution. The mean precipitation was generally underestimated by the ENSEMBLES data, and the maximum and persistence of high intensity rainfall was even more underestimated. The inter-annual variability was not fully captured by the RCMs, and there was a systematic underestimation of precipitation during the autumn months. The spatial pattern in the modelled precipitation data was too smooth in comparison with the observed data, especially in the high altitudes in the western part of the catchment where the high precipitation usually occurs. The RCM outputs cannot reproduce the current high intensity precipitation events that are needed to sufficiently model extreme flood events. The results point out the discrepancy between climate model output and the high intensity precipitation input needs for hydrological impact modelling.