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Predictions of river flow in NW Europe using a coupled hydrological and regional climate model.

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Regional Climate Models (RCMs) offer significant improvements over Global Climate Models in terms of their representation of rainfall at the spatial and temporal scales required for hydrological modelling. Here we test a new implementation of a grid-based hydrological model embedded in a model of land-surface climatology (the Joint UK Land Exchange Scheme; JULES) against observed river flows in eight major NW European rivers. Our hydrological model comprises a probability-distributed model of soil moisture and runoff-production (PDM) coupled with a discrete approximation to the 1D kinematic-wave equation to route river water downslope (G2G). The model was driven with hourly output from the UK Hadley Centre regional climate model, which itself was driven using results from part of the ERA-40 reanalysis experiment. The results of simulations for eight river catchments in northwest Europe are presented and compared with measured river flows over the same time period, from the same locations. The success with which the runoff production and flow routing components of the land-surface model match observed flow data is evaluated and suggestions are made for future improvements to the model.