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A stochastic space-time rainfall forecasting system for real time flow forecasting II: Application of SHETRAN and ARNO rainfall runoff models to the Brue catchment

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Abstract. Key issues involved in converting MTB ensemble forecasts of rainfall into ensemble forecasts of runoff are addressed. The physically-based distributed modelling system, SHETRAN, is parameterised for the Brue catchment, and used to assess the impact of averaging spatially variable MTB rainfall inputs on the accuracy of simulated runoff response. Averaging is found to have little impact for wet antecedent conditions and to lead to some underestimation of peak discharge under dry catchment conditions. The simpler ARNO modelling system is also parameterised for the Brue and SHETRAN and ARNO calibration and validation results are found to be similar. Ensemble forecasts of runoff generated using both SHETRAN and the simpler ARNO modelling system are compared. The ensemble is more spread out with the SHETRAN model, and a likely explanation is that the ARNO model introduces too much smoothing. Nevertheless, the forecasting performance of the simpler model could be adequate for flood warning purposes.

Keywords: SHETRAN, ARNO, HYREX, rainfall-runoff model, Brue, real-time flow forecasting

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