



The parameterisation of subgrid runoff generation in a land surface model (MOSES)

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The standard version of the MOSES (Met Office Surface Exchange Scheme) land surface model generates runoff via infiltration excess and drainage from the bottom of the soil column. Other workers have introduced parameterisations of saturation excess runoff in MOSES, but these have not been critically compared. In this study, parameterisations based on the Probability Distributed Model (PDM) and on TOPMODEL are introduced to MOSES and evaluated in off-line simulations using data for three catchments in the Rhone valley. Model performance is assessed by comparison with observed streamflow. A simple modification to the way the standard soil scheme deals with frozen or saturated soil improves the basic model. The PDM and TOPMODEL-based parameterisations generally perform better than the standard model, but at the expense of introducing extra parameters. Methods for assigning the values of the two extra parameters of the PDM are compared. Parameters relating to the distribution of the topographic index used by the TOPMODEL-based models are uncertain because of uncertainty in the downscaling process. Alternative formulations of the TOMODEL parameterisation give different results, but the best results in this study were from one of the TOPMODEL-based parameterisations. The best parameters for the catchments are identified but this study is too small to be able to offer firm conclusions as to how to identify the parameter values *a priori*.