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Estimation of parameters in a distributed precipitation-runoff model for Norway

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Abstract. A distributed version of the HBV-model using 1 km² grid cells and daily time step was used to simulate runoff from the entire land surface of Norway for the period 1961-1990. The model was sensitive to changes in small scale properties of the land surface and the climatic input data, through explicit representation of differences between model elements, and by implicit consideration of sub-grid variations in moisture status. A geographically transferable set of model parameters was determined by a multi-criteria calibration strategy, which simultaneously minimised the residuals between model simulated and observed runoff from 141 Norwegian catchments located in areas with different runoff regimes and landscape characteristics. Model discretisation units with identical landscape classification were assigned similar parameter values. Model performance was evaluated by simulating discharge from 43 independent catchments. Finally, a river routing procedure using a kinematic wave approximation to open channel flow was introduced in the model, and discharges from three additional catchments were calculated and compared with observations. The model was used to produce a map of average annual runoff for Norway for the period 1961-1990.

Keywords: distributed model, multi-criteria calibration, global parameters, ungauged catchments.

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