



A method for the regional estimation of runoff separation parameters

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The generation and a subsequent separation of runoff into different components - such as surface flow or base flow for instance - are key processes for an accurate simulation of catchment runoff with precipitation-runoff models. However, runoff separation parameters that determine the relative importance of the runoff components usually have to be calibrated with observed runoff, and therefore an application in ungauged basins is complicated. Also for monthly water balance models this is an important issue because of delayed flow due to base flow. We present a simple method for the regional estimation of runoff separation parameters of a spatially distributed, monthly water balance model. The method takes into account the base flow index, catchment characteristics (in this case soil type), and threshold processes with increasing precipitation. The method is used to establish the spatio-temporal water balance of whole Austria (84000 km²), including ungauged basins. As a test, the runoff separation parameters are optimized locally in 140 catchments. The model performance for the simulation of runoff of the period 1961 to 1990 increases considerably from initial (lumped) to regional parameters, and only slightly from regional to optimized parameters - from 0.68, 0.74, to 0.77 for the mean Nash-Sutcliffe measure. The results are less reliable in catchments dominated by Karst formations, but an evaluation of the feasible parameter space shows that in all 140 catchments the regional parameter estimation at least points in the right direction. It is concluded that the diverse regional patterns of runoff in Austria - characterized by the relative importance of fast and slow runoff components - can be described well by precipitation properties and soil type. The presented method should also be applicable with other models, since most precipitation-runoff models use similar parameters.