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Regionalization of Parameters of the Continuous Rainfall-Runoff model Based on Bayesian Generalized Linear Model

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It has been widely acknowledged that the appropriate simulation of natural streamflow at ungauged sites is one of the fundamental challenges to hydrology community. In particular, the key to reliable runoff simulation in ungauged basins is a reliable rainfall-runoff model and a parameter estimation. In general, parameter estimation in rainfall-runoff models is a complex issue due to an insufficient hydrologic data. This study aims to regionalize the parameters of the continuous rainfall-runoff model in conjunction with Bayesian statistical techniques to facilitate uncertainty analysis. First, this study uses the Bayesian Markov Chain Monte Carlo scheme for the Sacramento rainfall-runoff model that has been widely used around the world. The Sacramento model is calibrated against daily runoff observation, and thirteen parameters of the model are optimized as well as posterior distributor distributions for each parameter are derived. Second, we applied Bayesian generalized linear regression model to set of the parameters with basin characteristics (e.g. area and slope), to obtain a functional relationship between pairs of variables. The proposed model was validated in two gauged watersheds in accordance with the efficiency criteria such as the Nash-Sutcliffe efficiency, coefficient of efficiency, index of agreement and coefficient of correlation. The future study will be further focused on uncertainty analysis to fully incorporate propagation of the uncertainty into the regionalization framework.

KEYWORDS: Ungauge, Parameter, Sacramento, Generalized linear model, Regionalization

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