



The value of streamflow rating curve data for improving hydrological predictions

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Efforts to improve hydrological predictions are often thwarted by several sources of error, including (i) data uncertainty, e.g. input (rainfall) errors and output (runoff) errors; and (ii) structural uncertainty in the hydrological model. While several studies have shown that accounting for rainfall error notably improves hydrological predictions, the runoff error models are still based on unduly simplistic assumptions (e.g 10% random error). This study evaluates the benefits of utilizing rating curve information for improving hydrological predictions. Streamflow rating curve data are used to develop probabilistic error models prior to the calibration of the rainfall-runoff model. Several diagnostic tools aiding the runoff error model development are presented. Different types of runoff error models (with both random and systematic errors) are developed using the rating curve data. These runoff error models are incorporated into hydrological model calibration and a comparative analysis of the calibration results (predictive time series, model parameters and state variables) is presented, thoroughly scrutinizing its assumptions and comparing them to commonly used error models. Several catchment case studies are compared to evaluate the benefits under diverse hydrological regimes.