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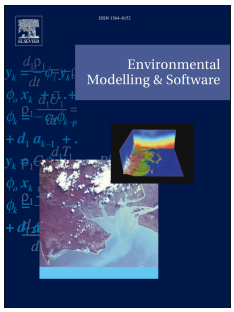

A simplified approach to produce probabilistic hydrological model predictions

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A simplified approach to produce probabilistic hydrological model predictions

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Abstract

Probabilistic predictions from hydrological models, including rainfall-runoff models, provide valuable information for water and environmental resource risk management. However, traditional "deterministic" usage of rainfall-runoff models remains prevalent in practical applications, in many cases because probabilistic predictions are perceived to be difficult to generate. This paper introduces a simplified approach for hydrological model inference and prediction that bridges the practical gap between "deterministic" and "probabilistic" techniques. This approach combines the Least Squares (LS) technique for calibrating hydrological model parameters with a simple method-of-moments (MoM) estimator of error model parameters (here, the variance and lag-1 autocorrelation of residual errors). A case study using two conceptual hydrological models shows that the LS-MoM approach achieves probabilistic predictions with similar predictive performance to classical maximum-likelihood and Bayesian approaches, but is simpler to implement using common hydrological software and has a lower computational cost. A public web-app to help users implement the simplified approach is available.

Keywords: probabilistic prediction, rainfall-runoff modelling, method of moments, maximum likelihood

Highlights

- New simplified approach for producing probabilistic hydrological predictions
- Similar performance to maximum-likelihood approach, at lower computational cost
- Web-app available to facilitate uptake of probabilistic predictions