

A real-time flood updating model based on the Bayesian method

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Abstract A real-time flood forecasting model based on the Bayesian method was proposed and developed, and it is used to update the forecasts of a deterministic model. In order to quantify the hydrological uncertainty, a prior distribution describing the natural uncertainty about the hydrological data, and a likelihood function describing the uncertainty of the hydrological model and parameters, were formulated. Then the prior distribution and the likelihood function were integrated together to form a Bayesian posterior distribution that provided more useful information than the traditional deterministic updating procedures. An auto-regressive (AR) model and recursive least-squares estimate (RLS) model were chosen as parallel schemes to compare with the proposed updating model. The Baiyunshan Reservoir basin data was used as a case study. All three updating models were employed to update the discharge estimates of the deterministic hydrological model. It is shown that the proposed model not only has a more superior forecasting precision, but also provides the distribution of the observed discharge as well as the interval estimates, which is more complete in the frame of reference and combines the forecasting and decision-making processes together.

Key words flood forecasting; real-time updating; Bayesian method; prior distribution, posterior distribution
