Multi-model integrated error correction for streamflow simulation based on Bayesian model averaging and dynamic system response curve

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Error correction methods play an important role in improving the reliability and accuracy of hydrological modeling. The Dynamic system response curve (DSRC) is a novel and effective error correction method, but it may have the problem of over-correction. Therefore, two multi-model integrated error correction models based on DSRC and Bayesian model averaging (BMA) were proposed in this paper, namely DSRC-BMA and BMA-DSRC. The Sunshui River catchment is selected for a case study. First, three hydrological models including Xinanjiang model (XAJ), Hydrologiska Fyrans Vattenbalans modell (HBV) and vertically hybrid yield model (VHY) were employed. Then, a standard BMA model and three DSRC-based models were constructed separately. Finally, two multi-model integrated error correction models (DSRC-BMA and BMA-DSRC) were applied. The performance of these nine models was compared by Nash-Sutcliffe Efficiency coefficient (NSE), root mean squared error (RMSE) and percent bias (PBIAS). Results showed that the DSRC-based models presented better results than the standard BMA method and most DSRC-based models. Moreover, the uncertainty in BMA, DSRC-BMA and BMA-DSRC models were assessed. The 90% confidence interval of the BMA-DSRC model had high containing ratio values and low average relative bandwidth. Overall, the proposed multi-model integrated error correction methods are effective and can be applicable in improving streamflow modeling.

References

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