Geophysical Research Abstracts
Vol. 20, EGU2018-2447, 2018
EGU General Assembly 2018

An adaptive Metropolis-Hastings optimization algorithm of Bayesian estimation in non-stationary flood frequency analysis

Wentao Xu

Wuhan Univsersity, State Key Laboratory of Water Resources and Hydropower Engineering Science, School of Water Resources and Hydropower engineering, Wuhan, China (xuwentao@whu.edu.cn)

Global climate changing and human activities have altered the assumption of stationarity, and intensified the variation of hydrological process in recent decades. It is essential to make progress in accommodating appropriate models to the changing environment where non-stationary models are taken into account. The developing adapted Bayesian inference offers an attractive framework to estimate non-stationary models, when compared with conventional maximum likelihood estimation (MLE). As the inseparable companions of Bayesian inference, an efficient MCMC sampler are expected to be built. However, proper tunings are needed for the sampler to improve the performance by integrating adaptive algorithm and optimization method. A Bayesian approach with the adaptive Metropolis-Hastings optimization (AM-HO) algorithm is adopted to estimate the parameters and quantify the uncertainty in a two-parameter non-stationary Lognormal distribution model. To verify the performance of the developed model, simulation experiments and practical applications are implemented to fit annual maximum flood series of two gauges in Hanjiang River basin. From the point view of parameters estimation, both Bayesian and MLE methods perform similarly. However, Bayesian method is more attractive and reliable than MLE on uncertainty quantification, which provides a relative narrow intervals to be beneficial for risk analysis and water resource management.