Geophysical Research Abstracts, Vol. 9, 01070, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01070

Model structure uncertainty in characterizing hydrological processes and its quantification using genetic-programming

K. Parasuraman, and A. Elshorbagy

Centre for Advanced Numerical Simulation (CANSIM), Department of Civil & Geological Engineering, University of Saskatchewan, SK, Canada S7N 5A9. (kap923@mail.usask.ca / Fax: +1 306-9665427)

In addition to the inherent stochastic nature of the hydrological processes, ambiguity due to data, model parameter, and model structure, underscores the need for uncertainty estimates being part of the hydrological model building exercise. Most traditional approaches to hydrologic model uncertainty have dealt with the hypothesis of a deterministic model structure with parameters treated as imperfectly known. The improbability estimated by these traditional approaches uncovers only a minor share of the actual uncertainty, since they neglect the uncertainty associated with model structure by assuming it as deterministic. In this study, an attempt has been made to build a modeling framework which includes both the model parameter uncertainty and model structure uncertainty by combining the self-organization algorithms (Genetic Programming) and statistical resampling (bootstrapping) techniques. The performance of the proposed modeling framework is analyzed with regards to its ability in characterizing the evapotranspiration process. Eddy-Covariance (EC) measured actual evapotranspiration is modeled as a function of net-radiation, air temperature, ground temperature, relative humidity, and wind speed. Compared to the model parameter uncertainty, the relative contribution of model structure uncertainty to the total uncertainty is shown to be more important. The results indicate that it is difficult, if not impossible, to achieve better prediction and less uncertainty simultaneously. Also, the study advocates that the search to find the *optimal model* could be replaced by the quest to unearth *possible models* for characterizing hydrological processes.