Geophysical Research Abstracts
Vol. 14, EGU2012-3809, 2012
EGU General Assembly 2012

A flow-regime based diagnostic approach to residual error modelling

G. Evin (1), M. Thyer (2), D. Kavetski (3), and G. Kuczera (4)

(1) School of Engineering, The University of Newcastle, Callaghan, Australia (Guillaume.Evin@newcastle.edu.au), (2) School of Civil Environmental and Mining Engineering, The University of Adelaide, Adelaide, Australia (mthyer@civeng.adelaide.edu.au), (3) School of Civil Environmental and Mining Engineering, The University of Adelaide, Adelaide, Australia (dmitri.kavestki@adelaide.edu.au), (4) School of Engineering, The University of Newcastle, Callaghan, Australia (George.Kuczera@newcastle.edu.au)

An ability to provide robust representations of residual errors is crucial for obtaining hydrological predictions that are precise and reliable. Several approaches have been developed to overcome the rarely satisfied assumptions of independent, constant variance, Gaussian residuals that plague the Standard Least Square (SLS) approach. These include approaches that allow for heteroscedastic, non-Gaussian, autocorrelated residuals, that can reproduce the high autocorrelation, kurtosis and skewness that are ever present in residual errors.

Despite being able to capture the overall residual properties, diagnostics applied to different flow regimes of the hydrograph, reveal significant problems with these "global" residual error modelling approaches. For example, they can dramatically overestimate the uncertainty during the hydrograph recession. This motivates the development of a flow-regime based residual error modelling approach. Different components of the hydrograph (rising limb/recession etc.) are given different residual error models, by enabling the parameters values to vary as function of the flow regimes.

We show how this approach improves the description of predictive uncertainty, including better representation of autocorrelation, non-normality and heteroscedasticity. The potential for this diagnostic flow-regime based approach to provide insights into model structural errors is discussed.