

Bayesian Total Error Analysis (BATEA) - Dmitri Kavetski, Stewart Franks and George Kuczera

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a) Introduction:

BATEA is a generalised Bayesian framework for environmental model calibration and validation. Importantly, BATEA permits the use of explicit probabilistic errors models which are used to describe the uncertainty associated with observed data, notably, in forcing inputs such as rainfall which are often overlooked or mistreated by contemporary calibration schemes.

b) Advantages

- Explicit incorporation of uncertainty in forcing data
- Alternative input and output error models can be evaluated
- Offers opportunity to disaggregate diverse sources of error
- Possibility of identifying effective parameter values without bias induced by forcing errors
- Generalised total error analysis for non-linear environmental models

c) Disadvantages

- Computationally demanding
- Requires explicit input and output error models, which are currently poorly understood (although can be evaluated a posteriori)
- Requires stratification of individual storm events

d) Assumptions

Error models are stationary over time

Greater reliance on accuracy of streamflow observations

Inference conditioned on the hydrological model and error models (generic assumption of statistical inference, which inevitably introduces some (or a lot of!) subjectivity)

e) Most appropriate application areas

Rainfall-runoff modelling

f) Reading list

Kuczera, G., and Franks, S.W., (2002) On the testing of hydrological models: Falsification or fortification?, in *Mathematical Models of Watershed Hydrology*, eds. Singh, Frevert and Meyer, Water Resources Publications, Littleton, Co.

Kavetski, D.N., Franks, S.W., and Kuczera, G., (2002). Confronting uncertainty in rainfall-runoff modelling: A global system analysis perspective, in *Advances in Calibration of Watershed Models*, ed. Q. Duan, American Geophysical Union, Washington DC, p49-68.

g) Software availability

Currently not for general release

h) Web links or other information

None Given

i) Figures

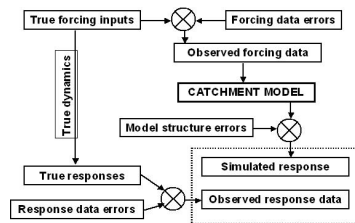


Figure 1: Schematic diagram of sources of input error

j) Delegates Comments (please add !!)