Geophysical Research Abstracts
Vol. 16, EGU2014-12059, 2014
EGU General Assembly 2014

Do non-random uncertainties in hydrological discharge time series really matter?

John Juston
Sweden (john.juston@natgeo.su.se)

This question is explored with consideration of a case study of rating curve uncertainty and change detection in discharge time series for a long-term discharge response (1964-2007) from a ∼650-km2 headwater basin of the Mara River in west Kenya. The analysis starts with stream rating and daily gauge height data. A rating model was calibrated using Bayesian methods to quantify uncertainty intervals in model parameters and predictions. There was an unknown balance of random and systemic error in rating data scatter (a scenario not likely unique to this basin), which led to an unknown balance of noise and information in the calibrated statistical error model. This had implications on testing for hydrological change. Overall, indications were that shifts in basin's discharge response were rather subtle over the 44-year period. In fact, a null hypothesis for change using flow duration curves (FDCs) from four different eight-year data intervals could be either accepted or rejected over much of the net flow domain, depending on different usage of the statistical error model (each with precedence in the literature) derived from different assumptions on the relevance of epistemic error. The only unambiguous indication of change in FDC comparisons appeared to be a reduction in the lowest baseflow in recent years (flows with >98% exceedance probability). As the decision to account for non-random error in our uncertainty analyses is often itself a subjective one, this case study raises the issue of uncertain uncertainty intervals (uncertainý2), which could be relevant to other studies where non-random rating errors may be important and subtle responses are investigated. Insights are generalised to explore conditions for robust or sensitive (to epistemic error) decision-support in hydrological change detection.