INCORPORATING MEASUREMENT UNCERTAINTY IN WATER QUALITY MONITORING AND MODEL EVALUATION

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ABSTRACT

Measured data remain vital for water resource management, assessment, and model application. Thus, water resource decision-making continues to rely on measured data, for which an understanding of measurement uncertainty is important but often ignored. In 2006, we published an uncertainty estimation framework for measured discharge and water quality data (Harmel et al., 2006). From this framework, the Data Uncertainty Estimation Tool for Hydrology and Water Quality (DUET-H/WQ) was designed to provide straight-forward method to estimate measurement uncertainty. DUET-H/WQ provides published uncertainty estimates for individual data collection procedures and then estimates the uncertainty within each procedural category as well as the cumulative uncertainty. The broad applicability of DUET-H/WQ was established by its application to data collected in eight real-world monitoring projects from a variety of watershed conditions (Harmel et al., 2008).

The effect of measurement uncertainty is commonly mentioned in discussions of model accuracy, but this effect is also typically ignored. However, we recently modified several model goodness-of-fit indicators (e.g. Nash Sutcliffe coefficient of efficiency, index of agreement, root mean square error, mean absolute error) so that measurement uncertainty can be easily incorporated into model calibration and validation (Harmel and Smith, 2007). We are currently working on similar methods to consider both measurement and model uncertainty in model goodness-of-fit evaluation.

KEYWORDS

Error propagation, data collection, hydrology, nutrients, watershed models, goodness-of-fit.

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