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Use of in situ water quality measurements for improved nitrate flux estimates from monitored watersheds

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Use of high frequency in situ measurements have potential for improved estimates for nitrate flux when compared to periodic grab sample based methods. Regression models such as LOADEST are commonly used to convert grab sample measurements to best estimates of solute concentration variations associated with changes in stream discharge. But the models generally assume a stable concentration/discharge relationship. In this study, we used high frequency, in-situ measurement of nitrate concentration to test the stability of that relationship and to ascertain uncertainty in flux measurements caused by nitrate hysteresis associate with storm hydrographs. The results showed that the observed nitrate hysteresis was not generally predictable because of complex storm/watershed interactions. This led to substantial nitrate flux uncertainty associated with grab sampling monitoring approaches using the regression model. These findings demonstrate clear advantage of using high frequency in situ monitoring for solute flux measurements which should improve ability of process based models to reflect watershed processes that affect nitrate export.