NC STATE UNIVERSITY

Deriving Sampling Frequency Guidelines for Monitoring Dissolved Organic Matter in Brittany, France

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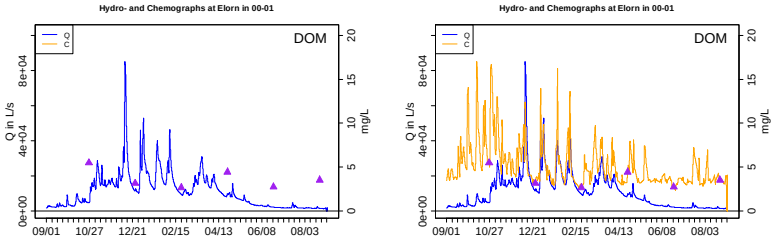
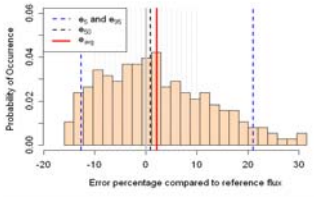
Introduction

- Flow rate and nutrients concentrations vary
- Problematic when measuring nutrients loads
- Infrequent sampling may cause significant errors when calculating annual fluxes
- Investigation method: simulate sampling frequencies from reference watershed datasets



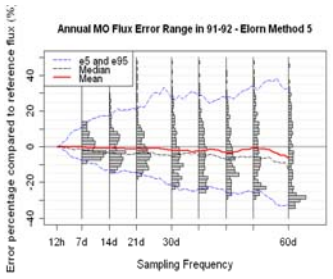
Infinite Number of Possible Simulations

- For each sampling interval there are an infinite number of sampling possibilities
- High frequency data is used to calculate reference values
- Distribution of possible errors characterized by bias (e_{avg}) and precision (e_5 and e_{95})



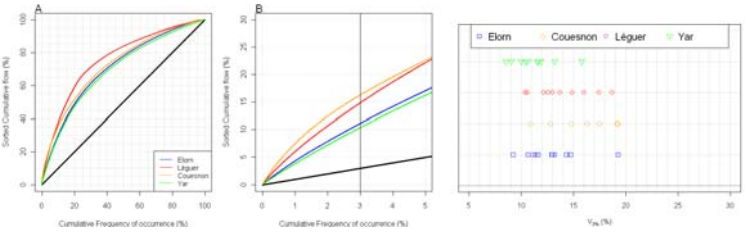
Results

- Uncertainties increase with sampling intervals
- Algorithm chosen only little biased
- Monthly sampling may induce considerable errors included between -20% to +30%



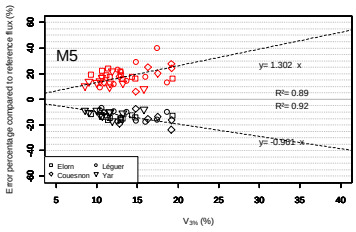
Introducing a Hydrological Reactivity Index

- The error level is linked to the hydrological regime in watersheds
- Derived hydrological reactivity index ($V_{3\%}$)
- Corresponds to the proportion of annual flow occurring in 3 % of the time
- This index varies depending on the watersheds and the years

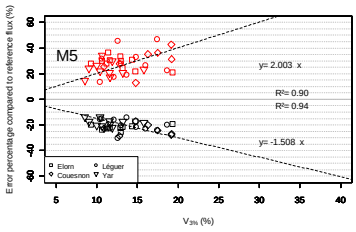


Challenges

- Predict uncertainty levels in absence of frequent data
- Method : correlate the precision limits to hydrological reactivity indexes
- Goal: harmonize monitoring schemes according to uncertainty levels rather than frequencies



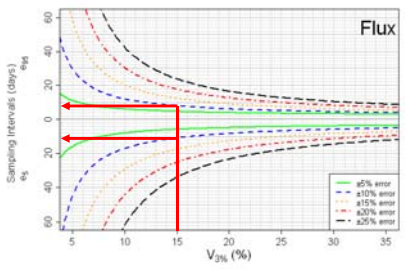
Bimonthly sampling intervals



Monthly sampling intervals

Innovation

- Derive sampling frequency charts that can be directly used to design sampling scheme in any watershed
- Charts are used as such : a watershed manager would like to monitor DOM fluxes at a particular site with uncertainties of no more ±10%. Prior hydrological records show that V3% is found to be less than 15%. The charts indicate sampling intervals to be the minimum of 11 days and 9 days



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