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Background

- Most reglementary monitorings are low-frequency (monthly) and water quality (WQ) indicators are subject to high uncertainties (Birgand et al., 2010, 2011)
- E.U. Water Framework Directive relies on simple indicators of concentration ($C_{average}$, percentiles C_{50} , C_{90} , C_{95} over 1 year) to assess WQ status in streams and rivers
- Most pollutant concentrations vary widely with changes in discharge on seasonal and event scales
- > 9 C-Q relationships can be characterized but only two or three C-Q modalities are encountered for each WQ parameter (Moatar et al., 2017)
- C-Q relationships are dispersed (non linearity, hysteresis cycles)

Questions

- Could uncertainty in predicting WQ predictors be associated with C-Q type?
- -> How to integrate uncertainty (dispersion) around predicted C-Q relationships into prediction of WQ predictors to improve performance and confidence?

Methods

- C-Q segmentation at median flow to assess C-Q types
- Link between uncertainties in WQ indicators and C-Q curves for different sampling frequencies
- Kernell fitting of probability density of regressions residuals to take into account dispersion around regression lines and build semi-synthetic high-frequency time series

Datasets

- Daily suspended solids (SS), total phosphorus (TP) and soluble reactive phosphorus (SRP), nitrate (NO3), total Kjeldahl nitrogen (TKN), dissolved silica, chloride, sulfate, and conductivity
- → 18 tributaries of Lake Erie in the United States (Ohio Tributary Monitoring Program, Heidelberg University)

 \rightarrow Watersheds areas = 11 to 19,000 km²,

Period of record = 1975-2016

Birgand, F., Faucheux, C., Gruau, G., Augeard, B., Moatar, F., Bordenave, P., 2010. Uncertainties in Assessing Annual Nitrate Loads and Concentra-Moatar, F., B. W. Abbott, C. Minaudo, F. Curie, and G. Pinay (2017), Elemental properties, hydrology, and biology interact tion Indicators: Part 1. Impact of Sampling Frequency and Load Estimation Algorithms. Trans. ASABE 53, 437–446. doi:10.13031/2013.29584 to shape concentration discharge curves for carbon, nutrients, sediment, and major ions, Water Resour. Res., 53, Birgand, F., Faucheux, C., Gruau, G., Moatar, F., Meybeck, M., 2011. Uncertainties in Assessing Annual Nitrate Loads and Concentration Indicadoi:10.1002/2016WR019635. tors: Part2. Deriving sampling frequency charts in Brittany, France. Am. Soc. Agric. Biol. Eng. 54, 93–104.

