Estimating riverine nutrient concentrations in agricultural catchments - Do we reduce uncertainty by using local scale data?

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Nutrient transport models are important tools for large scale assessments of macro-nutrient fluxes (nitrate, phosphate) and thus can serve as support tool for environmental assessment and management. Results from model applications over large areas, i.e. on major river basin to continental scales can fill a gap where monitoring data is not available. However, both phosphate and nitrate transport are highly complex processes, and nutrient models must balance data requirements and process simplification. Data typically become increasingly sparse and less detailed with increasing spatial scale.

Here, we compare model estimates of riverine nitrate concentrations in the Weaver-Dane basin (UK) and to evaluate the role of available environmental data sources for model performance by using (a) open environmental data sources available at European scale and (b) closed data sources which are more localised and typically not openly available. In particular, we aim to evaluate, how model structure, spatial model resolution, climate forcing products, and land use and management information impact on model-estimated nitrate concentrations. We use the European rainfall-runoff and nutrient model E-HYPE (http://hypeweb.smhi.se/europehype/about/) as a baseline large-scale model built on open data sources, and compare with more detailed model set-ups in different configurations using local data. Nitrate estimates are compared using a GLUE uncertainty framework.