



Using continuous monitoring of physical parameters to better estimate phosphorus fluxes in a small agricultural catchment

Camille Minaudo (1), Rémi Dupas (2), Florentina Moatar (1), and Chantal Gascuel-Odoux (2)

(1) E.A. 6293 G HCO, Tours, France (camille.minaudo@etu.univ-tours.fr), (2) UMR SAS INRA, Rennes, France

Phosphorus fluxes in streams are subjected to high temporal variations, questioning the relevance of the monitoring strategies (generally monthly sampling) chosen to assist EU Directives to capture phosphorus fluxes and their variations over time. The objective of this study was to estimate the annual and seasonal P flux uncertainties depending on several monitoring strategies, with varying sampling frequencies, but also taking into account simultaneous and continuous time-series of parameters such as turbidity, conductivity, groundwater level and precipitation.

Total Phosphorus (TP), Soluble Reactive Phosphorus (SRP) and Total Suspended Solids (TSS) concentrations were surveyed at a fine temporal frequency between 2007 and 2015 at the outlet of a small agricultural catchment in Brittany (Naizin, 5 km²). Sampling occurred every 3 to 6 days between 2007 and 2012 and daily between 2013 and 2015. Additionally, 61 storms were intensively surveyed (1 sample every 30 minutes) since 2007. Besides, water discharge, turbidity, conductivity, groundwater level and precipitation were monitored on a sub-hourly basis. A strong temporal decoupling between SRP and particulate P (PP) was found (Dupas et al., 2015). The phosphorus-discharge relationships displayed two types of hysteretic patterns (clockwise and counterclockwise). For both cases, time-series of PP and SRP were estimated continuously for the whole period using an empirical model linking P concentrations with the hydrological and physic-chemical variables. The associated errors of the estimated P concentrations were also assessed.

These « synthetic » PP and SRP time-series allowed us to discuss the most efficient monitoring strategies, first taking into account different sampling strategies based on Monte Carlo random simulations, and then adding the information from continuous data such as turbidity, conductivity and groundwater depth based on empirical modelling.

Dupas et al., (2015, Distinct export dynamics for dissolved and particulate phosphorus reveal independent transport mechanisms in an arable headwater catchment, *Hydrological Processes*, 29(14), 3162–3178