Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.17921

Suspended particulate matter geochemical signature at a suburban catchment scale: effects of land use artificialization on erosion processes and contaminants export

ANAËLLE SIMONNEAU[1], THOMAS THIEBAULT[2], GAUTHIER BERNIER-TURPIN[3], NICOLAS FRESLON[4], AMÉLIE HUMBRECHT[4] AND LAURIANE LEDIEU[5]

[1]Université d'Orléans, CNRS, BRGM, ISTO, UMR 7327

[2]METIS, Sorbonne Université, EPHE, Université PSL, CNRS, UMR 7619, 75005 Paris, France

[3]LEESU, Univ Paris Est Creteil, Ecole des Ponts

[4]Université d'Orléans, CNRS, BRGM, ISTO, UMR 7327, 45071 Orléans, France

[5]University Gustave Eiffel, GERS-LEE, F-44344 Bouguenais, France

Presenting Author: anaelle.simonneau@univ-orleans.fr

Emerging contaminants (i.e. trace metals or pharmaceutical products) are partly adsorbed on suspended particulate matters (SPM). Accordingly, SPM are recognized as "contaminants" by the European water framework directive, which stipulates to carry out long-term trend analysis of their concentrations, especially in small suburban hydrosystems particularly reactive to flood events. Besides, numerous studies pointed out the relevance of SPM, combined with sedimentary archives, to evaluate hydrosystems chemical state. However, the assessment of temporal contamination trends is somewhat sensitive, since the sampling step of SPM can lead to a source of variability related to the nature of the sampled matrix (e.g. granulometry). In this context, we developed a new SPM trap, the GEACOS system (Simonneau et al., 2020), and installed it at 3 different places within the Egoutier watershed (France). The latter is both characterized by an upstream/downstream gradual land use artificialization, including wastewater treatment plant effluent discharge, and interrupted by a pond in the middle part (Ledieu et al., 2021). Operating *in situ* integrative granulometric sorting in order to collect enough material for destructive analysis without lose small size particles (i.e. clay material, considered as being the most suitable carrying matrix), we collected GEACOS samples during one hydrological year and performed geochemical analysis to address the signature of SPM at the catchment scale. In comparison with local soil tracers, results suggest that erosion evolves from sheet erosion in upstream forested areas, mobilizing topsoil layers rich in Mn; to rill one, mobilizing bottom soil layers rich in Fe, when artificialized areas promote flux concentration and incision processes. Results also demonstrated that the amount of SPM is at least multiplied by 3 when rill erosion occurred downstream. By breaking the hydro-sedimentary connectivity of the catchment, the pond represents a strong accumulation zone and therefore a contaminated hotspot. However, SPM analysis also demonstrate that it does not hold all the matter back, and that contaminants can be exported far from their initial sources, beyond the catchment, when the stream flows into the Loire river.

Ledieu et al., 2021. *Chemosphere*, 279, 130385.

Simonneau et al., 2020. http://doi.org/10.5281/zenodo.3676364