



Urban sediment: a specific geochemical signature compared to natural sediments?

Qiufang Zhan¹, **Vincent Chatain**¹, Jean-Baptiste Aubin¹, Gislain Lipeme Kouyi¹, Mathieu Gautier¹, Thierry Winiarski², and Cécile Delolme¹

¹Université de Lyon - INSA Lyon, VILLEURBANNE CEDEX, France (vincent.chatain@insa-lyon.fr)

²Université de Lyon - ENTPE, VAULX-EN-VELIN, France (thierry.winiarski@entpe.fr)

Detention and infiltration basin has been increasingly implemented in France in order to provide additional storage of runoff from impervious surfaces due to rapid urbanization. These sustainable urban drainage systems also ensure quality of stormwater infiltrated into groundwater. In urban areas, these devices accumulate suspended particles eroded from city watershed and represent a geochemical signature of these urban watershed. Urban sediments are known to be polluted by high organic and inorganic substance contents, but their geochemical properties and specificities are insufficiently informed. The objective of this work is to study whether geochemical properties of urban sediment accumulated in detention and infiltration basins is distinguished from other natural sediments (from rivers, lake, marine environment). For this purpose, this study focused on relating watershed characteristics and physico-chemical properties of sediment using multivariate analyses based on rank data values. Data were notably collected from the national programs GESSOL (GESTion du patrimoine SOL, i.e. soil environmental functions - soil heritage management) and EC2CO (Ecosphère Continentale et Côtière, i.e. continental and coastal ecosphere) based on 19 infiltration basins around Lyon (France) and from literature (lake, basin, river etc.). Principal Component Analysis (PCA) was used to identify the most important sources of variation between trace metals and organic matters in different sediments. Cluster analysis was performed to group samples of similar sediment characteristics between major variables and trace metals contents. A significant amount of Fe (from 2.52 to 3.92 wt.%) and organic matters (from 18 to 27 wt.%) was found in the urban sediment. The results of PCA showed the influence of grain size on metal variability. Metals are more associated with the aluminosilicates (<63µm fraction), Fe and organic matters. Cluster analysis shows that Ti, Ni, Zn, Cd and Pb are originated from anthropogenic sources, especially discharged from commercial and industrial watershed. This work highlights the singularity of the urban sediment, as they are highly contaminated compared to natural sediments. Hence, the specific treatments are needed to tackle this problematic contamination.