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Sediment contribution of metallic contaminants in respect to water quality in urban watercourses

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In industrial areas, watercourses constitute potential hazards due to the underlying heavily contaminated sediments. The important historical discharges of metals in the urban watercourses can lead to elevated levels in the bottom sediments. Due to the surface water characteristics, an important fraction of the metals are safety stored in the anoxic bottom sediments. However, European regulations, such as the water directive (Water Framework Directive 2000/60/EC), force the member states to comply with the new water quality standards. We must be aware that a sudden release of the metals burden from the sediments can be triggered by modifications in the sediment environment. Physical disturbances at the water-sediment interface, induced by natural and/or anthropogenic events, can result in resuspension of contaminated sediments and remobilisation of pollutants into the water column. The aim of this study is to identify the role of sediments as a sink and/or a source of metallic pollutants for water column and to assess metallic contamination contribution of sediments regarding the overlying water column quality. The study area is comprised in a canalized river characterized by polluted sediments: the Lower Scarpe River, North of France. Metallic contamination of sediment was determined and mean concentrations values for Zn, Pb, Cu, Cd, and As are 2120, 379, 218, 68, and 22 mg.kg-1 respectively. Height campaigns were performed every 4-6 weeks, from December 2005 to September 2006. Sediments cores were collected with a manual corer which preserves water-sediment interface The atmospherically-derived 7Be radioactive isotope was used to quantify sedimentary dynamical processes at water-sediment interface. The technique of DET (Diffusive Equilibrium in Thin Films) was applied to obtain high-resolution verti-

cal profiles of trace metals in sediment pore waters. Short-term sediment dynamic has been evidenced: accumulation and resuspension rates of contaminated particulate matter can reach 0.4 g.cm-2 per month. In pore waters, mean concentrations ranged between 300-600 and 20-40 μg.L-1 for Zn and Pb respectively, whereas in water column ($<0.45\mu$m fraction of water river samples) concentrations are less than 50 and 2 μg.L-1 for Zn and Pb respectively. Such a gradient concentrations should result in a diffusive flux of contaminants. The coupling of both methods permits to assess particulate and dissolved transfers, such as particulate and diffusive fluxes of metals between sediments and water column. Our data contribute to understand the fate of contaminants in aquatic systems. Results obtained are important to take into account regarding assessment and remediation of aquatic ecosystems under anthropogenic influence.