Sampling of suspended particulate matter using particle traps in the Rhône River: relevance and representativeness for the monitoring of contaminants

1. Introduction & Objectives

As hydrophobic and lipophilic substances tend to preferentially accumulate in suspended particulate matter (SPM) rather than in the dissolved phase, SPM sampling is recommended as an alternative method to water sampling for the monitoring of these contaminants in rivers. Particle trap (PT) provides a low-cost, practicable and usable technical solution for monitoring of contaminant concentrations and fluxes in surface waters. Whereas the representativeness of SPM samples collected by continuous flow centrifugation (CFC) was investigated and validated as early as 25 years ago, the representativeness of the particles collected with PTs is still questionable and not fully understood.

Since 2009, within the Rhône Sediment Observatory (OSR) program, PTs designed according to the German PT described by Schulze et al. (2007) have been implemented and routinely used for the monitoring of particulate contaminants throughout the Rhône River (from Lake Geneva to the Mediterranean Sea). The objective of this study was to determine the physico-chemical representativeness of SPM samples collected by this type of PT in a large river under various hydrological conditions.

2. Material & Methods

The German particle trap used in the OSR Program

How to compare characteristics of SPM collected by punctual and time-integrated sampling methods?

3. Results & Discussion

Grain size distribution

Particulate organic carbon

Contaminants: mercury and PCB

4. Conclusions

The relevance and representativeness of SPM collected in rivers with PT was studied with consideration of i) the integrative effect of PT compared to CFC, the latter being assimilated to punctual sampling, and ii) the analytical uncertainties.

Despite the grain size distribution bias towards coarser particles and/or potential organic matter production/degradation, PTs can be considered as a reliable tool for SPM sampling within the aim of Hg and PCBs concentration/flux monitoring.

This study highlighted the main advantage of SPM sampling by PTs: samples are time integrative and are thus representative of SPM and associated contaminants transported in the river during periods of time with varying hydrological conditions.

For more information: Masson et al., 2018, Sci Total Environ 637-638:538-549 matthieu.masson@irstea.fr

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