Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.20631

# Analyzing contaminant fingerprints in stormwater sediments: insights into their sources and dynamics

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Urban stormwater management increasingly involves infiltration-based systems which are able to intercept suspended solids from runoff, resulting in the formation of a sediment layer. Such materials are loaded with organic and inorganic contaminants, which present a critical challenge for dredged sediment management. Better understanding the contamination patterns with a particular view to their sources and dynamics thus constitutes a major issue.

Sediments were collected from 18 infiltration basins draining stormwater from a wide diversity of urban and suburban catchments (industrial, residential, and road/parking lot). The samples were analyzed for various contaminants (metals, 6 families of organic micropollutants) including PAHs (ISO 18287, 2006). A significant accumulation relative to baseline levels was ascertained in all sites, even more marked when the catchment is influenced by traffic roads for PAHs (Figure 1a). Overall for all studied contaminants, a geochemical signature of stormwater sediments was established, revealing the contribution of urban-specific sources of contaminants.

Figure 1b displays the contribution of each individual compound to ∑ 16 PAHs. The presence of unquantified values was addressed using Monte Carlo simulations: concentrations below the limit of detection (LOD) – resp. limit of quantification (LOQ) – were replaced by a random value, sampled from a uniform distribution on [0 ; LOD] – resp. [LOD ; LOQ]. Uncertainties on PAH proportions were calculated as 95% coverage intervals resulting from $N = 10^4$ simulations.

The relative distribution of PAHs exhibits characteristic features depending on their major emission source(s), which in practice is reflected in different *diagnostic ratios*. Based on the ratios proposed by Tobiszewski and Namieśnik (2012), the following observations could be made:

1. The 2 ratios used to discriminate between petrogenic and pyrogenic emissions (∑ LMW/∑ HMW and ANT/[ANT + PHE]) systematically indicated a dominance of the latter category.
2. Pyrogenic emissions were primarily attributed to traffic in all industrial and road catchments based on the ratios BaA/[BaA + CHR] and IcdP/[IcdP + BghiP].
3. In residential areas, the probable contribution of the district heating system was identified from high values (≥ 0.56) of the ratio FLA/[FLA + PYR].

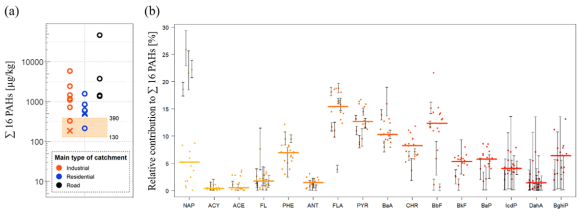


*Figure 1 : (a) Total concentrations of PAHs in sediment from the 18 study sites and (b) contribution of each individual compound to the sum of these 16 PAHs.*

**References**

Tobiszewski & Namieśnik (2012), *Environ. Pollut.* 162, 110–119.