

Fatty acids in sediments as tracers for identification of pollution sources in a subtropical river, Brazil

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Suspended sediments (SSs) are environmentally relevant, they can unveil information on, e.g., land use types and pollution sources. They are able to adsorb organic matter (OM). For example, fatty acids are a class of lipids that have a variety of cellular functions, therefore they can be used as a fingerprint of OM. In addition, presence, concentrations and spatial variations of FAs can be associated with specific anthropogenic activities. The objective of this study was to determine the sources of OM in SSs and to relate the spatial distribution of FAs with land use. The study area included the Barigui River (Parana, Brazil). Three sample sites were studied, with distinct land use and soil occupation. For example, the urbanization feature was: P1, 5.73%; P2, 22.20%; and P3, 54.06%. Samples of SSs were collected monthly, using a time-integrated suspended sediment sampler, in the period November 2014-November 2015.

The study was focused on the presence of saturated FAs, monosaturated FAs (MUFAs) and polyunsaturated FAs (PUFAs). Main results showed high concentrations of C15:0, C16:0 and C18:0 in all samples, those saturated FAs are associated with untreated sewage. Saturated FAs with long chains >C24 were also found, they are related to terrestrial sources indicating a significant grade of erosion, those FAs acids are found in the epithelial waxes of plants. MUFAs were also identified, with C16:1 ω 9c the predominant one. In contrast, PUFAs were presented in very low concentrations, indicating a small contribution of algae and other autochthonous organisms.

The variability of fatty acids along the river correlated with the urban land use suggesting that fatty acid profiles in suspended organic matter can be an efficient indicator of the impacts of urban land use on large rivers.