

Surfactants homologues profiling by non-target screening in sediment and *Cladophora* extract from freshwater river.

HARRY BYERS¹², LISA KRAUSKOPF¹³, MARTIN KRAUSS¹, MECHTIHILD JANSEN-SCHMITT¹,
WERNER BRACK¹

¹ Helmholtz Centre for Environmental Research – UFZ- Department of Effect-Directed Analysis, Leipzig, Germany,

² RWTH Aachen University, Institute for Environmental Research, Department of Ecosystem Analysis, Aachen, Germany

³ Goethe University Frankfurt am Main – Department of Aquatic Ecotoxicology, Frankfurt am Main, Germany

Due to the wide use of surfactants, in personal care product, pharmaceutical, pesticides, on a global scale, their presence is rather ubiquitous in the environment. Previous studies have shown that surfactants may be found in the aquatic environment at concentrations, which may be orders of magnitude above other micro-pollutants and result in notably high hazard quotients. Due to their amphiphilic properties surfactants are likely to sorb on surface. Previous work has shown their presence in sediment [1, 2], but few have been investigating *Cladophora* as potential accumulation compartment. *Cladophora* are often found in nutrient rich river waters downstream of WWTP output, a known emission source of surfactant in the environment. The monitoring of chemicals like surfactants, in these algae will help to estimate the exposure and risks of the respective aquatic ecosystem.

In addition, the traditional approach to focus on a few target surfactants for environmental monitoring could underestimate the presence of surfactants in aquatic ecosystems. Indeed, surfactants are often produced together with other homologues having different chain length, these surfactant profiles can as well be found in the environment [3]. Therefore non-target screening of surfactant homologues would bring a better understanding of the fate of surfactant in aquatic ecosystem.

In a case study, Holtemme River in Saxony-Anhalt (Germany), which is impacted by WWTP effluents, has been sampled for sediment and *Cladophora*. Non-target screening with a special focus on surfactant homologues was performed on in several compartments, such as sediment, *Cladophora* and water. The method used for this study includes sequential extraction by Pressurized Liquid Extraction, combined with further clean-up steps; the chemical analysis was performed by LC-ESI-LTQ-Orbitrap-MS analysis.

Longitudinal profiles of surfactants homologues in the Holtemme River and several of its tributaries have been identified. Point sources of surfactants have been confirmed hot spots for subsequent in-depth investigations have been identified.

1. Ying, G.G., *Fate, behavior and effects of surfactants and their degradation products in the environment*. Environment International, 2006. **32**(3): p. 417-431.
2. Zhang, C., et al., *Quaternary ammonium compounds (QACs): A review on occurrence, fate and toxicity in the environment*. Science of The Total Environment, 2015. **518–519**(0): p. 352-362.
3. Fernández-Ramos, C., et al., *Environmental monitoring of alcohol sulfates and alcohol ethoxysulfates in marine sediments*. Environmental Science and Pollution Research, 2014. **21**(6): p. 4286-4296.