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*Research and innovation in the ex-situ and in situ microbial remediation
of contaminated soils, aquifers, sediments and marine habitats*

Oral presentations

**EFFECT OF HYDROPHOBIC ORGANIC POLLUTANTS
BIOAVAILABILITY ON ECOTOXICITY OF HISTORICALLY
CONTAMINATED SOILS**

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Abstract

Distribution and transport of hydrophobic organic pollutants in the environment depend mainly on their water solubility and sorption into soil organic matter. With increasing contact time, the pollutants become firmly sorbed and sequestered in soil. The availability of this fraction to transport processes can be significantly restricted which can cause a decrease in potential risk. The aim of this study is to determine the sequestered fractions of hydrophobic organic pollutants in historically contaminated soils and to evaluate their effects to various organisms. Mild supercritical fluid extraction (SFE) was employed to study desorption behavior of PAHs and total petroleum hydrocarbons from the soils. A two-site model was applied to calculate the desorption kinetics curves of the individual contaminants and the available fractions were determined. A battery of various contact bioassays including earthworms *Eisenia fetida*, worms *Enchytraeus crypticus*, springtails *Folsomia candida*, crustaceans *Heterocypris incongruens*, duckweed *Lemna minor* and bacteria *Vibrio fischeri* (FLASH-test) were used to evaluate toxicity of the bioavailable fractions. The control samples for the ecotoxicological tests were prepared from the original soils by releasing the sequestered pollutants to reach their 100 % availability. The total PAH concentrations in the soils were in the interval of 120-6000 mg/kg. The available fraction ranged 50-98 % and 10-60 %, for 2-4 rings and 5-6 rings PAHs, respectively. The results of the ecotoxicological study indicate that the sequestration of the hydrophobic pollutants in the soil cause a substantial decrease in the toxicity to the terrestrial organisms. The most sensitive bioassays were the earthworms *E. fetida* and the crustaceans *H. incongruens*. Generally, the results of this study document that determination of available fractions of hydrophobic pollutants is an important parameter for risk assessment and can be performed rapidly by mild sequential SFE.

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