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MO412 Aged spiked soils cannot resemble desorption and bioaccessibility of native PAHs in historically contaminated soils

A.P. Loibner, Boku, IFA-Tulln / Department for Agrobiotechnology IFATulln; K.E. Scherr, University of Natural Resources and Life Sciences, Vienna / IFATulln; E. Edelman, University of Natural Resources and Applied Life Sciences / Agrobiotechnology- IFA Tulln; S. Humel, D. Kopp, BOKU / Department for Agrobiotechnology IFATulln; P. Mayer, Technical University of Denmark / Department of Environmental Engineering. In the present study, 25 Austrian soils were collected and spiked with four selected polycyclic aromatic compounds. Using the contaminant trap, PAH desorption behaviour from freshly contaminated and aged soils was monitored and then compared with three historically PAH-contaminated soils. The aim was to determine fundamental differences in desorption behaviour between spiked and native PAHs. Desorption of PAHs was determined for ground and non-ground samples of historically contaminated soils since increased desorption from ground samples would indicate physical entrapment of PAHs. Desorption experiments were repeated at high additions of toluene since increased desorption in the presence of toluene would indicate competitive binding, which is consistent with adsorption to high affinity sites. Substantial differences were observed between PAH desorption curves for historically polluted soils and spiked soils, and aging of spiked soils was not able to reduce this difference. The bioaccessible PAH-fraction was at least one order of magnitude larger in spiked soils compared to real world samples from historically contaminated sites. The observed differences could not be explained by physical entrapment of PAHs in historically contaminated soils since grinding of these soils did not enhance PAH desorption from the soils. The addition of high amounts of toluene to historically contaminated soil resulted in enhanced PAH desorption and a lower desorption resistant fraction. This observation is in line with competitive binding to high affinity sorption sites being the governing retention mechanisms of native PAHs in historically contaminated soils. These results are consistent with two sorption mechanisms occurring in the two types of soils: In historically contaminated soils, PAHs appear to be bound to high affinity sorption sites. A much lower retention in spiked soils is consistent with sorption to a much larger population of low affinity sorption sites. This has very important implications for real world situations. It challenges the significance of extrapolations of desorption and bioavailability results that were obtained with PAH spiked soils. Further, a much higher PAH retention in historically contaminated soils suggests limited mobility and exposure of native PAHs. However, the addition of co-solutes can reduce this retention and as a consequence, lead to a re-mobilisation of PAHs.