



Effects of climatic modalities on polycyclic aromatic hydrocarbons (PAHs) availability and attenuation in historically contaminated Technosol

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Since the decline of industrial activities in France, large areas of polycyclic aromatic hydrocarbon (PAHs)-contaminated soils have remained derelict. Thus, the fate of PAHs in such soils through natural attenuation process needs to be assessed. On the long-term scale (10-100 years), climate will greatly contribute to the evolution of soil physico-chemical properties and by consequences PAHs availability.

In our study, we examined the effect of three contrasted climatic conditions (freeze-thawing, wetting-drying and high temperature) on soil aging processes of 11 historically contaminated soils and consequences on the availability of polycyclic aromatic compounds (including the 16 priority pollutants PAHs). Batch experiments were set-up for each modality; freeze-dried soil underwent variation of humidity and/or temperature. In a first step, PACs availability was roughly evaluated, with a water-extraction method using a $H_2O_2 + CaCl_2$ solution. Dissolved organic carbon (DOC) content was measured in these extracts before and after applying the climatic modalities. Difference in DOC indicated an effect of the climatic modality on PACs availability. If an effect was noticed, available PACs was then accurately measured using (i) an hydrogen-peroxide oxidation on the soils followed (ii) a dichloromethane (DCM) extraction and a Gas Chromatography – Mass Spectrometer (GC-MS) quantification of the remaining PACs (i.e. unavailable).

Variation of PACs availability will greatly help to understand the mechanisms associated between PACs desorption/sequestration and the abiotic influence of climate. Results of this work will further help understanding and predict the rate of natural attenuation of PACs in contaminated soils for the incoming decades.