
Using soil geochemical data as environmental records of past industrial activities (Wallonia, South Belgium)

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Abstract

Wallonia (South Belgium) has had an intense industrial activity during the 19th century including iron mills, steelmaking blast furnaces and non-ferrous metals smelting plants (Pb, Zn), which durably impacted soils pollutant concentrations on large areas. Here we outline the results of the modeling of the impact of the major former industrial plants on metal soil concentration at a regional scale. The methodology established for assessing the impact of each industrial plant involves three steps. In the first step, the pollutant dispersion from 89 former industrial plants each considered individually is modeled by a finite volume method. In the second step, the enrichment of atmospheric pollutants in 508 control points spatially distributed over Wallonia is estimated. In the last step the amount emitted by each of the industrial plants is calculated by fitting the 508 control points using a non-negative linear least squares model. For Cd, the results indicate that its presence in Wallonia soils is mainly due to atmospheric deposition originating from former base metal smelters. The methodology allow us to determine at any point of Wallonia the soil industrial plant(s) responsible for the soil Cd concentration. In the same way the total amount of Cd emitted by each industrial plant has been estimated. The results are based on strong assumptions and thereby contain uncertainties, but illustrate a promising methodology that can be used to trace the environmental impact of former industrial activities based on soil geochemical data.

Keywords: geochemical mapping, Wallonia, atmospheric deposition, background concentrations, Cd

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