Speciation of heavy metals in sediments from the Scheldt estuary, Belgium

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Abstract

A simple three-step sequential extraction procedure was applied to study the speciation of heavy metals in sediment from Scheldt estuary, and their relationship to sediment grain size and organic matter content. The sedimentary metal content was fractionated into carbonate and exchangeable, metals bound to organic matter and residual fractions. Sedimentary total metal content was also determined using an industrial microwave (ETHOS 900) HF/HNO_3 extraction method. The extracts were analysed for metals using inductively coupled plasma atomic emission spectrometry. The bioavailable fraction (exchangeable and metals bound to organic matter) comprised less than the other forms. Residue metals were the dominant form of metals in almost all studied sites. The average total metal content for the studied sites decreased in the order Fe>Cr>Cu>Co>Zn>Pb>Cd. Based on average values for the studied sites, the highest bioavailable metals in sediments were Cd (38%) from Westkapelle, Zn (17%) from Yerseke, Co (12%) from Domburg, Cr (9%) from Vlissingen, Fe and Pb each (2%) from Yerseke, and Cu (1%) from Domburg. Metal recovery was good, with<10% difference between the total metal recovered through the extractant steps and the total metal determined using HF/HNO_3extract.

Keywords
heavy metals,
Scheldt estuary,
sediment,
sequential extraction,
speciation,
bioavailable