

Influence of dissolved organic matter and oxides on TE speciation in soil solution: A modeling approach

A. R. SCHNEIDER^{1*}, M. PONTHEU¹, B. CANCE`S¹,
X. MORVAN¹, M. GOMMEAUX¹, B. MARIN¹ AND
M. BENEDETTI²

¹GEGENAA, Université de Reims Champagne-Ardenne, EA 3795, 2 esplanade Roland Garros, 51100 Reims, France (*corresponding author: arnaud.schneider@univ-reims.fr)

²Institut de Physique du Globe de Paris, Sorbonne Paris Cité. Université Paris Diderot, UMR 7154, CNRS, F-75005 Paris, France (benedetti@ipgp.fr)

Trace elements (TE) speciation in the soil solution is a fundamental parameter to evaluate their bioavailability and their potential environmental impacts. Dissolved organic matter (DOM) and oxides are known to play a major role in this speciation. The aim of this study was to evidence the influence of the DOM content and composition and of the Fe and Mn oxides contents on TE (Cd, Cu, Ni, Pb and Zn) speciation in the soil solution by comparing experimental results and modeling.

Three soils with various properties (TE, organic matter and oxides contents) have been sampled at two different depths (0-5 cm and 5-10 cm) near a secondary lead smelter in the North of France. Soil Column-Donnan Membrane Technique (SC-DMT) was used to determine the free metal ion concentrations in soil solutions [1]. The batch technique of Van Zomeren and Comans [2] was used to evaluate the DOM fractionation into humic acid, fulvic acid, hydrophilic acid and hydrophobic neutral organic matter. The experimental results are used to constrain the input data used in the geochemical modeling (Visual MINTEQ 3.1). To make the calculated and the measured free ions concentrations converge, the influence of DOM, hydrous ferric oxides and hydrous manganese oxides on TE speciation is tested. The results are still in progress and the first interpretations confirm that Pb speciation is strongly influenced by DOM composition and by the presence of manganese oxides even at very low concentrations.

[1] Weng et al. (2001) *Europ. J. Soil Sci.* **52**, 629-637. [2] Van Zomeren and Comans (2007) *Environ. Sci. Technol.* **41**, 6755-6761.