

Mobility of arsenic in anoxic sediments in the Mekong Delta in Vietnam

MARIA P. ASTA^{1*}, YUHENG WANG¹, MANON FRUTSCHI¹, PHU LE VO², VU PHAM, RIZLAN BERNIER-LATMANI¹

¹Environmental Microbiology Laboratory, Ecole Polytechnique Federal de Lausanne, Switzerland
*presenting author's e-mail:
maria.astaandres@epfl.ch

²Ho Chi Minh City University of Technology, Faculty of environment and engineering, Vietnam

Arsenic (As) contamination in aquifers is an important environmental issue in South and Southeast Asia, where millions of people are exposed to high As concentrations from drinking water [1]. It is widely accepted that As pollution in these areas is mainly due to its release from natural arsenic-rich solids into porewater and its transport through the underlying sediments to the aquifer [2-5]. Therefore, it is necessary to investigate arsenic sorption onto the sediments in order to assess the potential for As transport to the aquifer.

Sorption and desorption experiments were performed with sediment collected from a field site in the Mekong Delta in Vietnam where the aquifer is highly contaminated in As (up to 17.2 $\mu\text{mol/L}$). The sediment consists of grey clay overlying the sandy aquifer. X-ray fluorescence (XRF) analysis reveals As concentrations in the range of 12-21 ppm. Preliminary results from batch sorption and desorption experiments indicated limited grey clay sediment sorption capacity with partitioning coefficients *ca.* 2 and 5 L/kg for As(III) and As(V) oxyanions, respectively. Desorption experiments showed that infiltration of anoxic groundwater may result in low but detectable As release from the sediments after 5 days, with limited concomitant Fe release. Greater As release was observed in experiments conducted with artificial groundwater than those with milliQ water. Our results suggest that arsenic released from or carried into the clay layer could migrate to the aquifer due to the low sorption capacity of the sediments. Further experiments are required to assess the As sorption capability of sediments from layers at other depths and of distinct mineralogies.

- [1] Nordstrom, D.K. (2002). *Science* **296**, 2143-2145.
[2] Polizzotto *et al.* (2008). *Nature* **454**, 505-508. [3] Nickson, *et al.* (2000). *Appl. Geochem* **15**, 403-413.
[4] Nguyen, *et al.* (2009). *J. Contam. Hydrol.* **103**, 58-69.[5] Postma, *et al.* (2010). *Geochim. Cosmochim. Acta* **74**, 3367-3381.