Arsenic mobilization in an aquifer in the Mekong Delta, Vietnam

M.P. ASTA[1], M. FRUTSCHI[1], A. GAYOUT[1], Y. WANG[1],
PHU L. VO[2], V. PHAM[2], B. PLANER-FRIEDRICH[3],
L. CHARLET[4] AND R. BERNIER-LATMANI[1]

[1]Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland
[2]Ho Chi Minh City University of Technology - VNU, Ho Chi Minh, Vietnam
[3]University of Bayreuth, Germany
[4]ISTerre, Université Joseph Fourier Grenoble, France

Arsenic, which is a potent carcinogen, is present as a groundwater contaminant in many countries in South and Southeast Asia. In these areas, it is estimated that millions of people are chronically exposed to As by the consumption of contaminated groundwater. The mechanisms involved in As mobilization are not thoroughly understood and still debated [1] [2]. Most researchers attribute As mobilization to the reductive dissolution of As-bearing Fe-(oxyhydr)oxides [3] [4]. Although Fe cycling is undeniably an important driving force for As release, depending on the environmental conditions, S can also exert an important influence on As speciation and mobility. In this study, the anoxic groundwater of the An Giang province in the Vietnamese Mekong Delta has been analyzed to identify the processes controlling arsenic mobilization. The An Giang aquifer waters are characterized by circumneutral pH values in the range of 6.4 to 8.3, high As (average: 8.3 μmol/L; range: 0.3-17.2 μmol/L), S (range: 0.8-309 μmol/L) and Fe (range: 26-309 μmol/L) concentrations and with Na, Ca and Mg as dominant cations. Preliminary results suggest that arsenic release into An Giang groundwaters may not be linked to Fe cycling but S cycling, supported by the fact that there is no correlation between As and Fe concentrations. Groundwater As levels could be controlled by microbially-mediated sulphate reduction that could generate highly mobile thioarsenate species [3] [4], These species have been identified as the dominant species in other sulphidic systems [5]. In addition, seasonal variations were observed in groundwater Eh and pH values, in dissolved organic carbon (DOC) and sulphate concentrations suggesting that they might be induced by river water infiltration to the aquifer during monsoonal flooding.

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