Interdisciplinary approach to understand As mobilization in the groundwater of Hanoi, Vietnam

M. GLODOWSKA[1], E. STOPELLI[2], A. LIGHTFOOT[2], M. SCHNEIDER[3], M. PATZNER[1], R. KIPFER[2], L. WINKEL[2,5], M. BERG[2], O. CIRPKA[1], E. EICHE[3], A. KONTNY[3], T. NEUMANN[3], B. RATHI[1,4], H. PROMMER[4], D. VU[6], M. TRAN[6], N. VIET[6], V. M. LAN[6], P. K. TRANG[6], P. H. VIET[6], S KLEINDIENST[1], A. KAPPLER[1]

[1]Center for Applied Geoscience, University of Tuebingen, Germany (*correspondence: martyna.glodowska@ifg.uni-tuebingen.de)
[2]Eawag, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland
[3]Institute of Applied Geosciences, KIT, Germany
[4]University of Western Australia, Perth, Australia
[5]Pollutant Dynamics, ETH Zurich, Switzerland
[6]CETASD, Vietnam National University, Hanoi, Vietnam

Elevated concentrations of As in groundwater leading to a serious health risk for millions of people have been reported at many places all over the world. Most existing investigations are limited to a uni-disciplinary research approach, thereby neglecting the interactions between hydrochemistry, geochemistry, mineralogy, microbiology and groundwater flow. A comprehensive and highly interdisciplinary approach is necessary to reveal the complex mechanisms of As behavior, in particular for its mobilization, and the controlling factors at the redox transition zone. Therefore, the AdvectAs project seeks to bring together scientists from different research disciplines in order to understand and predict the large-scale and long-term mobility of As in groundwater at VanPhuc village in the Hanoi area (Vietnam) under advective flow conditions associated with extensive pumping rates. The overall goal of the project is to identify the decisive microbial, geochemical, mineralogical, hydrological and hydrochemical processes that govern the As mobilization and integrate all these processes in a reactive-transport model. In October 2017, a first sampling campaign was carried out. During this campaign aquifer sediments (0-45 m) were obtained using different coring techniques and groundwater as well as surface water was collected. Microbiological and molecular biological analyses focusing on Fe- and As-metabolizing bacteria, potential key players for As cycling were performed. Additionally, mineralogical and geochemical analyses of sediments, hydrochemical characterization of the groundwater as well as dating of the

groundwater were carried out. First results of these experiments will be presented.