Geophysical Research Abstracts
Vol. 19, EGU2017-15325, 2017
EGU General Assembly 2017

Quantification of conservative and reactive transport using a single groundwater tracer test in a fractured media

Eliot Chatton (1), Thierry Labasque (1), Aurélie Guillou (1), Lorine Béthencourt (1), Jérôme de La Bernardie (1), Alexandre Boisson (2), Florian Koch (2), and Luc Aquilina (1)

(1) OSUR-UMR6118 Ge´osciences Rennes, Universite´ de Rennes 1 and CNRS, Rennes, France (eliot.chatton@gmail.com), (2) Bureau de Recherches Géologiques et Minières (BRGM), 3 avenue Claude-Guillemin, BP 36009, 45060 Orléans Cedex 2, France

Identification of biogeochemical reactions in aquifers and determining kinetics is important for the prediction of contaminant transport in aquifers and groundwater management. Therefore, experiments accounting for both conservative and reactive transport are essential to understand the biogeochemical reactivity at field scale.
This study presents the results of a groundwater tracer test using the combined injection of dissolved conservative and reactive tracers (He, Xe, Ar, Br-, O_2 and NO_3-) in order to evaluate the transport properties of a fractured media in Brittany, France.
Dissolved gas concentrations were continuously monitored in situ with a CF-MIMS (Chatton et al, 2016) allowing a high frequency (1 gas every 2 seconds) multi-tracer analysis (N2, O_2, CO_2, CH4, N2O, H2, He, Ne, Ar, Kr, Xe) over a large resolution (6 orders of magnitude). Along with dissolved gases, groundwater biogeochemistry was monitored through the sampling of major anions and cations, trace elements and microbiological diversity.
The results show breakthrough curves allowing the combined quantification of conservative and reactive transport properties. This ongoing work is an original approach investigating the link between heterogeneity of porous media and biogeochemical reactions at field scale.

Eliot Chatton, Thierry Labasque, Je´roˆme de La Bernardie, Nicolas Guihe´neuf, Olivier Bour and Luc Aquilina; Field Continuous Measurement of Dissolved Gases with a CF-MIMS: Applications to the Physics and Biogeochemistry of Groundwater Flow; Environmental Science & Technology, in press, 2016.