



Heat storage in the Hettangian aquifer in Berlin - results from a column experiment

Christian Milkus and Traugott Scheytt

Department of Applied Geosciences, Berlin University of Technology, Germany, christian.milkus@tu-berlin.de

Aquifer Thermal Energy Storage (ATES) is a sustainable alternative for storage and seasonal availability of thermal energy. However, its impact on the subsurface flow regime is not well known. In Berlin (Germany), the Jurassic (Hettangian) sandstone aquifer with highly mineralized groundwater (TDS 27 g/L) is currently used for heat storage. The aim of this study was to examine the hydrogeochemical changes that are caused by the induced temperature shift and its effects on the hydraulic permeability of the aquifer.

Column experiments were conducted, in which stainless steel columns were filled with sediment from the aquifer and flushed with native groundwater for several weeks. The initial temperature of the experiment was 20°C, comparable to the in-situ conditions within the aquifer. After reaching equilibrium between sediment and water, the temperature was increased to simulate heating of the aquifer. During the experiment, physical and chemical parameters (pH, ORP, dissolved oxygen and dissolved carbon dioxide) were measured at the outflow of the column and the effluent water was sampled. Using a Scanning Electron Microscope, the deposition of precipitated minerals and biofilm on sediment grains was analyzed. Changes in hydraulic properties of the sediment were studied by the use of tracer tests with Uranin.