

Ambiguous pore plugging during geothermal reinjection: 3D-sandstone characterization and experimental simulations

N. PETSCHACHER^{1*}, D. HIPPLER¹, B. BÖCHZELT² AND M. DIETZEL¹

¹Institute of Applied Geosciences, Graz University of Technology, Rechbauerstrasse 12, 8010 Graz, Austria
(*corresponding: petschacher@student.tugraz.at)

²Technisches Büro Böchzelt, Ludersdorf 69, 8200 Gleisdorf
(office@hydro.or.at)

Due to rock-water interactions during the reinjection of thermal waters into sandstone formations a permeability reduction may occur. This reduction can be attributed to the mobilization of fine particles within the pores. Alternatively, permeability can decrease because of temperature- and pressure induced mineral precipitation. For that reason, a hydrogeochemical modelling was performed with the PHREEQCI program. Several thermal waters of Austria and Germany were analysed and the saturation indices were calculated. The results of the modelling indicate that a permeability reduction as a consequence of mineral precipitation is of minor importance.

In order to get an improved understanding of the reinjection process of thermal waters, we perform flow-through measurements with synthesized fluids using a HPHT fluidpermeameter on selected sandstone samples. Both the fluids and the sandstone samples are characterized before and after the experiment, as well as complementary XCT scans are carried out to obtain a 3D-illustration of the pore structure and to map the mobilization of fine particles within the sandstones. This approach enables us to determine the degree of the permeability reduction as a function of temperature, pressure, and ion composition of the thermal water, as well as of the mineralogical composition of the sandstone, to evaluate ambiguous pore plugging during geothermal reinjection.