



A new diffusion and retention experiment in the Opalinus Clay at the Mont Terri Underground Rock Laboratory: A test case for reactive transport modeling.

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A new in-situ diffusion experiment is currently being planned at the Mont Terri Underground Rock Laboratory (Switzerland). In previous experiments, the behavior of different tracers (water, cations and anions, conservative and sorbing) was studied using solutions at equilibrium with the host rock. Those results showed the value of the experimental setup (synthetic porewater in equilibrium with the rock; circulation of the synthetic porewater containing the tracers in a single borehole; closed circulation loop) and the importance of processes such as anion exclusion and sorption of cations. In this new experiment, the behavior of tracers will be studied using solutions out of equilibrium with the host rock. Mineral reactions will be induced in the rock and tracers will respond to different solution chemistries and altered clay mineralogies, allowing the assessment of the capabilities and processes included in reactive transport models.

The experiment will be performed in the new DR-A niche in the Mont Terri URL, corresponding to the shaly facies of the Opalinus Clay. A series of scoping calculations has been performed to explore different possible types of alterations and expected responses. A possible configuration would be to induce an alteration by a high-pH solution (pH 13.4) during 6 months. Tracer tests would be possible before, during and after circulation of the high-pH solution. Different tracer responses will be correlated to the different solution chemistries, occupancies on the cation exchange sites and mineralogies. The main objective of the experiment will be to test reactive transport models in the interpretation of the results, evaluating the relevance of the different processes in the observed tracer responses.