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HYDRO-GEOCHEMISTRY AND REACTIVE SOLUTE TRANSPORT | POLLUTANT AND NUTRIENT BEHAVIOUR IN SOILS, GROUNDWATER AND SURFACE WATERS

PRODUCT

The fate of chemicals and natural solutes in the hydrosphere is governed by advective transport with the mobile liquid phase and diffusion within the liquid. Yet, the mobility and persistence of solutes is greatly affected by numerous interactions with the abiotic and biotic environment. Oftentimes, these reactions depend on the local geochemical conditions (e.g., pH or redox potential), which are again determined by other reactions within the solute (e.g. solution speciation) and between the liquid phase and mineral or gas phases.

We employ state-of-the-art simulation techniques that combine environmental flow and transport processes with a species-based perception of geochemical reactions. The resulting reactive transport models consider the chemical and microbial transformations together with their dependence and feedback on geochemical conditions.

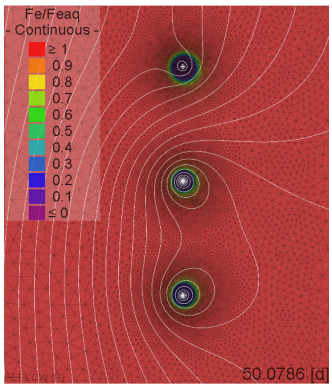
ADVANTAGES

Coupled simulations of flow, transport and geochemical reactions can contribute to the overall project success in numerous ways:

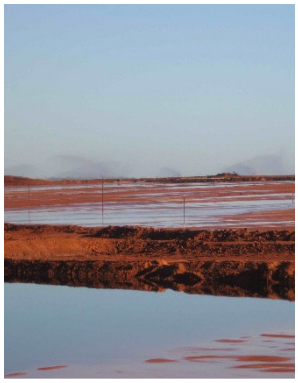
- Reduce costs through the optimization of remediation strategies,
- analyse and quantify the risk of water resources and soil contamination by hazardous materials,
- enhance the planning reliability through advanced prognostic capabilities,
- optimize techniques for drinking water conditioning and water treatment in industrial applications (e.g., in-situ iron removal for thermal groundwater utilization), and,
- support decision-making in the case of conflicting water uses (e.g., agricultural usage versus drinking water production).

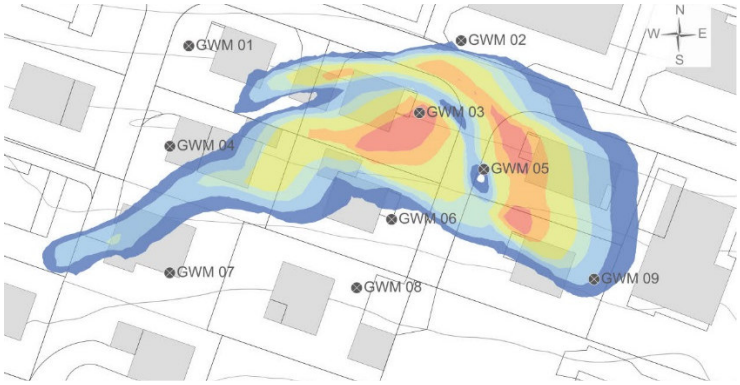
OUR SERVICES

- Interpretation and quality assessment of hydro-geochemical analyses
- Numerical simulation of the propagation of reactive solutes in groundwater
- Prognoses of the migration, retention and decay of pesticides and fertilizers in natural soils in a variety of climatic situations
- Quantification of consequences for incident and failure scenarios
- Evaluation of conventional remediation techniques
- Feasibility studies and planning of in-situ remediation techniques
- Assessment and optimization of agricultural land-use and management with respect to soil and water quality
- Evaluation of the hydro-geochemical prerequisites for drinking water production and geothermal groundwater utilization



In-situ removal of iron and manganese for geothermal groundwater utilization


Remediation of bauxite residue from aluminium refining



Concentration plume of a complex pollutant where transport in the aquifer is influenced by groundwater-surface water interactions