Universität Basel

Research Project

Subrosion Scenarios

Third-party funded project

Project title Subrosion Scenarios
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Organisation / Research unit
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Department
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Groundwater circulation in evaporite bearing horizons and resulting subrosion of salt frequently causes geomechanical problems such as land subsidence or collapses This process represents a major concern in a section of the open mined Adlertunnel, which is part of a new European North-South railway-connection. Further land subsidences were also detected within densely populated residential areas in Muttenz-Pratteln based on precision measurements. These areas are located east of the city of Basel in the Tabular Jura and have been excessively used for subsurface solution mining of halite, industrial groundwater pumping, and drinking water supply. The presented SNF-project is a continuation of our efforts in providing quantitative understanding on halite dissolution, and the subsequent mixing of high-density saline waters with groundwater within regional aquifers in a complex tectonic setting of “Horst and Graben” structures.

For this particular project a laboratory 2D flow tank model is already setup to study mixing and transport of NaCl (dissolved halite) under boundary conditions, which were derived from experimental results and field-scale observations. The experimental setup is, to our knowledge, the first, where it is possible to test numerical models with laboratory experiments under such extreme salinity/density contrasts. The proposed project focuses on understanding processes, which are (1) to study the influence of realistic geological structures such as fault zones and formations of different permeability, (2) to include different hydraulic regimes corresponding to wells with large-scale withdrawal of groundwater, and (3) to use the results of the laboratory-scale studies to upscale sensitive parameters for variable-density flow modeling at regional scale.

Keywords Quantitative Geosciences, Hydrogeology, Laboratory Experiments, Numerical Modeling
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