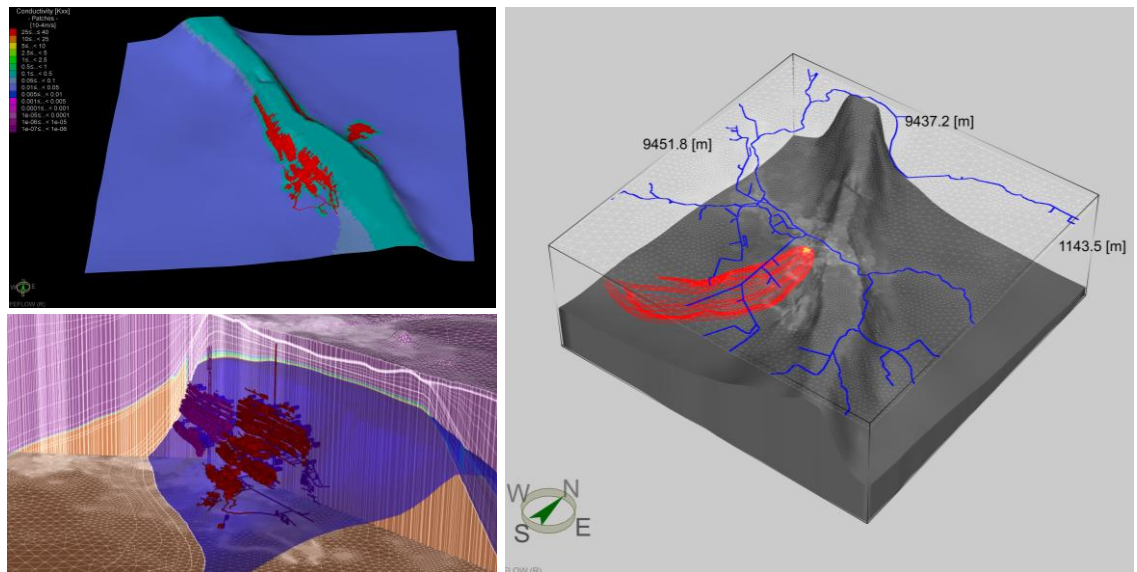


3d Modeling of Brine Flow at a Flooded Salt Mine

(2007-2010)

Location	Staßfurt, Germany
Type of project	3D large-scale density-dependent groundwater simulation
Client	Joint research project, Germany



Objective Using the abandoned and flooded historical salt mine located near Staßfurt, Germany, as a case study, improve the general knowledge of the dynamics of naturally or intentionally flooded salt mines.

Approach A regional three-dimensional mass-transport FEFLOW[®] model was built for the project area, including detailed 3D geometric schematizations of the mine workings. In addition two-dimensional type-models were computed, for instance to study chemical reaction kinetics, where NaCl and MgCl₂ represent the dominant salt species. Precipitation and dissolution are controlled by the amount of available MgCl₂, due to this the bulk density is affected. Furthermore, permeability and porosity are also modified dynamically by precipitation and dissolution.

Benefit Applying the FEFLOW[®] model it could be shown that

- the relevant processes in a flooded salt-mine can be modelled,
- precipitation and dissolution reactive processes for multi-species and multi-density processes can be modelled in type models,
- using the advanced visualisation possibilities of FEFLOW 6 the set-up of such a model can be speeded up,
- runtimes can be kept reasonably short by using parallelization.