Transferring geo-/mineralogical information to THM simulations of HLW storage in claystone formations (BASTION II)

Vinay Kumar, Tilo Kneuker, and Jobst Maßmann
BGR, Underground Space for Storage and Economic Use, Hannover, Germany (vinay.kumar@bgr.de)

The multi-barrier concept of HLW storage in geological formations relies on the thermo-, hydro-, mechanical (THM) and chemical properties of the potential host rock. In claystone, these properties are strongly influenced by its mineralogical composition and their spatial distribution.

As part of the first phase of the BASTION project, BGR carried out investigations in two areas. The geological part focused on the structural-lithological composition of various claystone formations. The numerical part investigated methods to integrate the drillcore-scale properties into formation-scale numerical THM models with the aim of being able to perform generic model studies at this scale. A major challenge in the first phase of the project was the conversion and transfer of data collected from structural and mineralogical studies to the input parameters required in the THM models for the simulation of generic site studies and future assessment cases.

In the current contribution, a further step is taken towards this purpose while retaining the focus on the determination of thermal parameters of claystone. The classification of the geological sub-units as facies types in claystone has been extended with the introduction of the sub-facies concept, thus allowing a finer resolution in the classification within each facies type. The introduction and standardization of this concept for claystone are foreseen to allow a more precise choice of samples for the experimental determination of (thermal) parameters. This workflow is presented as a proof-of-concept and is utilized in a simplified simulation to evaluate its benefits. Extension of the concept to other input parameters of numerical THM models will be touched upon. The presented concept contributes towards the continuing effort to integrate data from drillcore-scale measurements in formation-scale simulations.