



How do uncertain parameters affect the analysis of host rock integrity? Methods and preliminary results for a generic clay rock site

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Abstract. The thermal, hydraulic, and mechanical effects of excavating the repository mine and the thermal loading of nuclear waste on the safety of the geological barrier system are addressed in the regulations as integrity analyses. For repositories in clay rock, a modelling and assessment methodology has been developed in the ANSICHT (Methodik und Anwendungsbezug eines Sicherheits- und Nachweiskonzeptes für ein HAW-Endlager im Tonstein) project based on thermo-hydro-mechanically (THM) coupled simulations using the open-source software project OpenGeoSys and has been illustrated by its application to a generic clay rock site in northern Germany. However, the assessment can be significantly influenced by uncertainties in the model inputs, which result, on the one hand, from the limited ability to characterize the geological barrier and, on the other hand, from fundamental difficulties and inaccuracies in the measurements.

Hence, the results of these established integrity analyses have to be enriched by statistical information. The developed workflow comprises different steps beginning with a realistic characterization of parameter uncertainties. A surrogate model based on mathematically sound techniques is built to capture the propagation of these uncertainties through the THM simulation and the integrity criteria evaluation. The model can then be evaluated to obtain probabilistic results for rock integrity assessment and a sensitivity analysis to identify the inputs that primarily impact the results.

In this contribution, we present preliminary results based on the generic repository system from the ANSICHT project and the developed tools for stochastic analyses. This work is done as part of the BGE-funded research cluster URS (Uncertainties and Robustness with regard to the Safety of a repository for high-level radioactive waste).