The evolution of backfill material in a rock salt repository for radioactive waste storage.

A critical literature review, coupled with experimental research

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Project description

To curb anthropogenic CO_2 emissions, while continuing providing a stable energy supply, the Dutch government has decided to increase the generation of nuclear power in the Netherlands. This means that on the longer term more radioactive waste will be generated. Currently radioactive waste from hospitals and laboratories, as well as nuclear waste, are stored at the surface. However, on the longer term, safe and permanent storage in the deeper subsurface is envisioned. This can be done in repositories in clay-rich or salt-rich formations. Here repositories can be built, which can be filled with the radioactive waste, prior to being backfilled with crushed clay or salt. As time progresses, the ductile nature of the clay or salt means that the repository opening will close around the waste plus backfill, densifying the backfill, ideally to values comparable to that of the undisturbed surrounding formation. At the Experimental Rock Deformation Group, we are actively doing research to provide the scientific basis needed to improve numerical models required to predict the long-term stability and integrity of such a repository in rock salt. We do this by designing experiments that focus on identifying and describing the processes that take place at the scale of individual grains (i.e. understand the rheological behaviour of the material). Key questions our experiments aim to help answer are: What is the porosity and permeability evolution of backfill material? On what timescale will permeability values comparable to undisturbed rock be achieved?

In this assistantship, you will be working alongside one of our post-doctoral researchers and help perform (permeability) experiments. In addition, you will collect key literature data of work done previously and use this to make a critical analysis of where the research stands at this stage.

Job requirements

A successful candidate for this position should have an interest in solving scientific challenges with a societal relevance. Lab skills are desirable, but not a requirement, and you should not be afraid to get your hands dirty! Basic knowledge of Python programming is needed to able to process lab data. Background knowledge from courses such as Continuum Mechanics & Rheology and/or Mechanisms of Deformation and Transport in Rocks (or equivalent) are strongly recommended.