Geophysical Research Abstracts
Vol. 20, EGU2018-10333-1, 2018
EGU General Assembly 2018

Screening of suitability of pelitic hard rock formations for radioactive waste disposal in Belgium

Koen Van Noten, Kris Piessens, and Yves Vanbrabant

Geological Survey of Belgium, Royal Belgian Institute of Natural Sciences, Brussels, Belgium (koen.vannoten@naturalsciences.be)

One of the host rocks considered for disposing high-level, long-lived and heat-emitting radioactive waste are fine-grained detritic rocks. In Belgium, most research on the storage of nuclear waste is focused on poorly-lithified clayey host rock, i.e. the Oligocene Boom and Eocene Yper clays present in the subsurface of northern Flanders. Beside clay also pelitic shaly and slaty formations have favourable characteristics to consider as potential host rock in Belgium (cf. 1979 European Catalogue).

In this contribution a screening assignment is performed on the identification of Palaeozoic pelitic host rock formations for their suitability to store nuclear waste. Four exclusion criteria are used to eliminate those formations that are less suitable as a host. The criteria are: host rock lithology (only pelitic rock is considered), minimum thickness of the formation (> 100 m), minimum depth (a minimum 100 m-thick formation needs to be present below 200 m depth), and maximum depth (at least 100 m above 1500 m). The screening approach allowed to retain seven low-grade metamorphic shaly and slaty formations of the Lower Palaeozoic Brabant Massif and the Upper Palaeozoic Ardenne Allochton that have favourable thicknesses and a suitable fine-grained lithology. Their geological extent is known to be sufficient, either in subcrop or in outcrop. Currently, a detailed mineralogical and petrophysical research is performed to investigate complementary properties linked to the long-term safety of a repository. For each formation, long (> 100 m) continuous drill cores were sampled at low resolution (2 m) to investigate the variation in mineralogical content (with QXRD) and thermal conductivity with depth. To decide how to cut the cores, their internal geological structure was investigated using micro-CT scanning. The results of our analyses are compared to published values taken from other (inter)national pelitic host rock investigations.

Other formations were not selected because of less optimal characteristics or insufficient material to allow further investigations. However, none of the formations should be considered as definitely excluded.