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A note on the duration of claystone exploration programs

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Abstract. In a recent report, the German Federal Company for Radioactive Waste Disposal (BGE) estimated the probable duration of exploration activities within potential siting regions (BGE, 2022). Based on many years of expertise regarding the exploration of the subsurface, we outline in this contribution that the BGE (2022) likely underestimates the time necessary to characterize claystones within potential siting regions. Our latest experience originates from two research projects that developed sequence stratigraphic frameworks for the largely homogenous claystone successions of the Lower Cretaceous in northern Germany (Thöle et al., 2020) and the Middle Jurassic in southern Germany, respectively. Although the specific study areas are not considered in the site selection procedure, both stratigraphic units are reviewed to potentially host a nuclear waste repository. Accordingly, our hands-on experience might constitute a highly relevant contribution to the ongoing debate. Within each study area, drill cores were extracted from four boreholes with a total length of ~ 660 m (northern Germany) and ~ 930 m (southern Germany). After the drilling campaigns, each having taken approx. 5–6 weeks, the cores were split, photographed in high resolution, lithologically described, scanned with an X-Ray fluorescence (XRF) core scanner (10 mm scan interval) to determine the elemental distribution, and sampled for lithological, mineralogical and geochemical analyses at a resolution of 1 m, which took approx. 12 months. However, the most time-consuming steps were the analysis and interpretation of the stratigraphy and particularly the mineralogical investigations. With a sampling resolution of 1 m, an analysis time of approx. 6 months per 250 core meters is a robust reference. We reckoned a total duration of 5 years for the workload in each of the abovementioned research projects. Obviously, the duration of claystone exploration will vary, depending on the number and length of the core drillings per siting region, in addition to the sampling resolution. However, if BGE aims to characterize claystones with a degree of detail comparable to our projects, the estimated 42 months (see Table 3 in BGE, 2022) will likely be insufficient.

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