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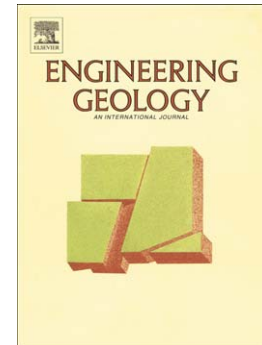
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Darcy flux as hydrological indicator for the swelling potential of clay-sulfate rocks in tunneling

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Abstract

Swelling of clay-sulfate rocks often poses a severe threat in tunneling. It causes serious damage and produces high additional costs during tunnel construction and operation. The swelling of clay-sulfate rocks requires groundwater inflow into anhydrite-bearing layers. Therefore, the Darcy flux into anhydrite-bearing layers surrounding the tunnel is suggested as a hydrological indicator for the swelling potential. A case study from Switzerland is presented that uses numerical groundwater models to calculate the Darcy flux at the anhydrite level in different tunnel sections after tunnel excavation. The approach, which assumes that a high Darcy flux at the anhydrite level after excavation indicates a high swelling potential, is tested at the study site. The results suggest that the Darcy flux can serve as hydrological indicator for the swelling potential in tunneling. Equally important, however, is the fact that the Darcy flux depends on many parameters, all of which are uncertain. Hence, a sensitivity study is

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