Relationships between mineralogical composition and geomechanical properties of Opalinus Clay

For the safe storage of nuclear waste in an underground repository in Switzerland, Opalinus Clay, a clay shale, has recently been selected as host rock. It is well known that the geomechanical properties of clay shales depend significantly on the burial history (maximum burial depth and temperatures) that leads to a certain degree of diagenesis, tectonic perturbation and the mineralogical composition.

In order to better assess geomechanical properties and its variability in the area of a planned underground excavation, relationships between the mineralogical composition and geomechanical properties are of foremost value. A large number of uniaxial compression tests, with samples from different sub-facies-types of Opalinus Clay taken from the Mont Terri Underground Research Laboratory, were conducted and their geomechanical properties (i.e. unconfined compressive strength, E-Modulus, Poisson’s ratio, crack initiation thresholds) were determined. In addition, mineralogical analysis of the tested specimens were performed utilizing XRD-scans.

In the framework of this BSC thesis these datasets shall be scientifically analysed to identify correlations between mineralogical composition and the above geomechanical properties. The results of the XRD-analyses need to be evaluated with the Rietveld-method that provides quantitative evaluation of mineralogical composition. The results shall further be compared to available literature data from similar studies. This thesis is based on a large database and provides the opportunity to gain insight into different fields of research conducted on Opalinus Clay and its geomechanical behaviour.

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