Compressibility and swelling of an overconsolidated highly plastic Paleogene clay

High plasticity clays of Paleogene origin are frequently met in northern Europe, typically overconsolidated as a result of overburden pressure during the ice age. Moreover, the advancing and melting of the glaciers has affected their macrostructure, and clays are found pre sheared in some zones, while deeper layers are intact. Compressibility and swelling dominate the mechanical behavior, with considerable impacts in the design of modern infrastructure. This study focuses on the Paleogene Røsnæs Clay found between southern Denmark and northern Germany, which is characterized by high plasticity attributed to the smectite mineral content (20 – 50%). Incremental loading one-dimensional compression tests were carried out on undisturbed Folded and Intact Røsnæs Clay using different salinity levels of the water in the oedometric cell and comparing the behavior with that of reconstituted samples having similar mineralogical composition to assess the influence of structure. Furthermore, the stress dependency of stiffness and creep rate was analyzed during unloading-reloading cycles achieving progressively higher stress levels.

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