



Evaluation of Large-scale Quaternary Stratigraphical Modelling in SubsurfaceViewer

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Forsmark in Sweden is the proposed site for hosting a deep geological repository for the Swedish spent nuclear fuel. Site investigations initiated in 2003 have resulted in a wealth of cross-disciplinary data used to describe the natural system at the site. Numerical and conceptual modelling has been performed both for the deep bedrock and for the surface systems. The variation in surface geology and regolith thickness are important parameters for e.g. hydrogeological and geochemical modelling and for the overall understanding of the area.

The input data used to produce the 3D-model include boreholes, excavations, well logs, refraction seismics, reflection seismics, ground-penetrating radar and electrical soundings (CVES). Mentioned stratigraphical data in combination with a detailed DEM (Digital Elevation Model), detailed surface sediment mapping and stratigraphical rules has been imported into the 3D-modelling software SubsurfaceViewer. Hundreds of transects has been interpreted manually along sections covering approximately 180 square km. Using the general stratigraphy of the Quaternary deposits in Forsmark, the model is based on a seven-layer-principle where each layer can be given certain properties and where each layer can be divided into sub-layers. The uppermost layer represents soils that may have been influenced by surface processes, e.g. bioturbation, frost action and chemical weathering. Next layer represents peat. The peat is followed by a layer representing sand/gravel, glaciofluvial sediment or artificial fill, followed by a layer of postglacial clay and clay gyttja/gyttja clay. The two deepest layers of the model consist of glacial clay underlain by different classes of till. The bottom boundary represents the bedrock surface. Based on drillings it was concluded that the interface between the till and bedrock have a high frequency of fissures and fractures. This fractured area between the actual bedrock and the overlying till is also implemented in the model.

Here we present the resulting 3D model which has been used as geometrical input data in hydrological and hydrogeological numerical modelling as well as an important input to the site descriptive modelling of the Forsmark site.