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Construction of a Geological Data Set and 3D Ground Models for the FCC Study

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For the design of FCC trajectory, a full understanding of the subsurface geology that will be crossed by both the tunnel and the access shafts is required. For this purpose a detailed knowledge of the regional distribution of rock mass composition and structural elements as well as the hydrogeological characteristics of the area should be achieved and summarised in a full-scale 3D geological model. In order to accomplish this task, a research project is being carried out at the Department of Earth Science of the University of Geneva with two goals: I) establish a Geographic Information System (GIS)-based subsurface data set and data base architecture in support of the feasibility and execution of the FCC tunnelling work by defining a standard data set framework for new data and II) establish a consistent high-resolution 3D geological model, supported by quantitative geological analytical investigations along the FCC trace aimed at predicting geological features and possible. The 3D geological model to date provides a solid knowledge framework based on all available data known to date, highlighting the different lithological and structural heterogeneities crossed by the planned trace of the FCC tunnel. Specifically, the model allows the visualisation of the subsurface conditions known to date in the high risk areas identified enabling to take informed decisions during the forthcoming geotechnical and seismic investigation campaign which will take place across the French and Swiss border. Following this investigation campaign the geological 3D model will be updated with the new acquired data and will therefore provide more accurate view of the subsurface. This 3D model represents therefore a practical working tool which will support the FCC project throughout the different phases of tunnelling design, planning and execution.

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