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3D Cross-border models –Geological modeling, uncertainty analysis for site investigation, and online GIS solutions

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The requirements for the Einstein Telescope challenge geologists to come up with representations of the subsurface as accurate as possible. A state-of-the-art way are digital 3D models of the subsurface. Various measurements and interpretation of geological observations (e.g. geophysical methods, outcrop studies) serve as input for these models. However, one must also consider the inherent errors of these various methods to create realistic models of the subsurface. The resulting uncertainties can be helpful in decision making during site investigation and site construction.

We use an implicit modeling approach to model interfaces based on points and orientations gathered from literature research and field campaigns. In the EMR region, we deal with cross-border data which need to be homogenized in order to construct one model. The 3-D models of the EMR region are created using the open-source Python library GemPy. Uncertainties are determined with probabilistic methods after recomputing models and assigning each input point a random deviation from a normal distribution.

Another important topic is the accessibility of geological, geotechnical and geophysical data. As more information is generated, platforms must be deployed to share relevant spatial data between all involved parties. Therefore, an online GIS solution is being developed to visualize and download spatial data and engage the public in an outreach effort. We will discuss the functionality of the GIS Web App which is developed using the ArcGIS Experience builder.

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