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## Modelling Seismic Propagation at a Salt Dome: Signals at Potential Monitoring Sites

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Tasked by the German Support Programme for the IAEA we are doing research for safeguards for underground final repositories for spent nuclear fuel in geological formations. The task is to detect potential access, during and in particular after the emplacement phase. During the latter phase geophysical methods offer possibilities of monitoring the repository from the outside, without sensors or cables in or close to the repository volume. To learn about the strengths and other properties of seismic signals produced by different mining activities, a first project (2010-2012) was devoted to acoustic and seismic measurements in the exploratory mine in the Gorleben salt dome in Germany (Altmann, ESARDA Bull. 50, 61-78, 2013).

The present project is to model the propagation of seismic signals caused by mining activities to potential monitoring sites, mostly underground, close to and within the salt dome. Due to the complicated geological structure this is done by numerical modelling in three dimensions, using the open-source program SpecFEM3D. The structure is represented by a somewhat simplified model of the salt dome and its surrounding rock. Attenuation is incorporated using constant quality factors for the different media. The mesh is built using the commercial program Trelis/Cubit. Computation uses the LiDO cluster of TU Dortmund that provides several hundred cores.

For relevant activities such as drilling and blasting, source strengths and time courses are used as input. Signal strengths are computed at various potential sensor sites. At the surface and in the salt dome they can be compared with measured data. For statements on the detection capability, amplitudes and spectral content are compared to the characteristics of typical background noise.

### Country or International Organization

Germany

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