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3D geological modelling and groundwater simulation for the Low Seismic Lab and Einstein Telescope in Lusatia, Saxony

A new large-scale research center is established in Lusatia, the German Centre for Astrophysics (DZA). One part of this will be the Low Seismic Lab (LSL), which is to be built in the Lusatian granodiorite in the region between the eastern German cities Hoyerswerda, Kamenz and Bautzen. This underground laboratory is a place of seismic tranquility, which is required for the trouble-free operation of sensitive research equipment. The granodiorite complex, which is bordered by graywacke to the west and the Görlitz slate mountains to the east, is also being discussed as a possible location for the planned Einstein telescope (ET).
As part of this project, the Chair of Engineering Geology and Environmental Geotechnics at TU Bergakademie Freiberg is creating a geological-tectonic 3D model of the area in western Lusatia using SKUA-GOCAD software. The model is based on drill logs and geophysical data from the Geological Survey of Saxony. In particular, the distribution of the granodiorite, but also the occurrence of kaolin and the distribution of the Quaternary and Tertiary overburden will be visualized. In addition, main faults and the adjacent geological units will be modeled.
The model will be used to identify additional drilling locations to locally extend the existing information and thus contribute to a more precise overall picture. It will provide the geometric basis for modeling noise effects and for adjusting the location of the Einstein Telescope (ET) in the granodiorite complex.
In a next step the geological model will be transferred to a finite element groundwater model, taking into account existing hydraulic and hydrological data, new permeability measurements on drill cores and possibly hydraulic borehole tests. The hydraulic model will be used to evaluate the impact of the groundwater on the planned underground laboratory and to design an optimized drainage system. This should minimize the use of pumps in order to avoid seismic noise.

Primary author: KÖRSCHNER, Sandro (TU Bergakademie Freiberg)

Co-author: Prof. BUTSCHER, Christoph (TU Bergakademie Freiberg)

Presenter: KÖRSCHNER, Sandro (TU Bergakademie Freiberg)

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