



Exploration, processing and modelling of petrothermal (EGS) potentials of the crystalline basement of Hesse.

Sebastian Weinert (1,2), Kristian Bär (1), Ingo Sass (1,2)

(1) Technische Universität Darmstadt, Institute of Applied Geosciences, Department of Geothermal Science and Technology, Schnittspahnstr. 9, 64287 Darmstadt, Germany, (2) Darmstadt Graduate School of Excellence Energy Science and Engineering, Otto-Berndt-Str. 3, 64287 Darmstadt, Germany

The utilization of geothermal energy by applying petrothermal or enhanced geothermal systems has a great, yet mostly untapped potential. In Hesse such systems can be installed in the Mid-German Crystalline High, which is the southernmost variscan zone and basement complex in the state of Hesse and is comprised mostly of granitoids. Petrothermal potential in the basement was already mapped in previous studies, hence need to be much more precisely defined, to be actually useful to delineate locations for future exploration campaigns or geothermal utilization.

Therefore, petrophysical and rock mechanical properties of crystalline rock of the Odenwald, Spessart and Ruhla Mountains were measured and comprised in a comprehensive database. Statistical analysis was performed on grain and bulk density, thermal conductivity and diffusivity as well as ultrasonic wave velocities to discriminate modelling units defined by their rock properties. The integrated dataset is completed by measurements of unconfined compressive strength, Young's modulus and Poisson ratio. Geochemical data of whole-rock analysis are further used to identify correlations between chemistry and petrophysics as well as for further classification and verification of the predefined geologic modelling units.

Based on structural and geological information a geological 3D-structural model is designed which later on is parameterized with all gathered petrophysical, mechanical and chemical data. In this model, petrothermal potentials are calculated and designated and therefore provided in a large scale 3D space.