Seismic assessment of the geothermal potential of North German Basin sediments - From seismic to a geothermal model

Katja Iwanowski-Strahser (1), Juliane Arnold (2), Christian Vogt (3), Eva Szalaiová (1), and Wolfgang Rabbel (1)

(1) Institute of Geosciences , Christian-Albrecht-University of Kiel, Germany, (2) Geophysica Beratungsgesellschaft mbH, Aachen, Germany, (3) Applied Geophysics and Geothermal Energy, E.ON Energy Research Center, RWTH Aachen University, Germany

Geothermal energy will play an important role among the sources of renewable energies but its widespread economic use is currently limited by high uncertainties in the reservoir characterization and the resulting high investment risks.

The aim of the cooperative project MeProRisk (with the project partners CAU Kiel, RWTH Aachen, FU Berlin and Geophysica) is the improvement of geophysical processing methods for the exploration of the geothermal potential by setting up a concept which will be based on the combination of geophysical and hydraulic borehole measurements and thermal simulations. The results will help to achieve a better reservoir characterisation for the geothermal potential.

The seismic part of this approach is the creation of a detailed structure model based on 3D seismic reflection data, to get informations about model structures and complex fracture networks which can offer possible fluid paths, as well as the quantification of their reliability. The used dataset comprises a 3D seismic cube of North German basin sediments and various log data. Sediments mostly feature plain coherent reflectors, in which fractures manifest themselves as lateral disturbances. Therefore they can be detected using a coherence based algorithm. The dataset itself is divided into 18 layers of different rock materials. In combination with borehole measurements, petrophysical boundary conditions are assigned for each layer. This contains parameters such as compressional velocity and density to calculate synthetic traces to verify the structure model and parameters such as porosity, which can be used for the geothermal modelling.