



Imaging fractured systems in the Upper Rhine Graben

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The Upper Rhine Graben (URG) holds a large potential for geothermal power production. Until the end of 2008, one geothermal power plant operates in Landau and five are under construction. Glancing at the amount of licences planned for or already given away in the URG gives a good overview of what to expect in future years (www.geotis.de).

The main target reservoirs are the Muschelkalk, the Buntsandstein and connecting fracture systems. To exploit these reservoirs, boreholes have to be drilled down to 3000m – 5000m. Seismic exploration helps to build a structural model of the subsurface and to identify the drilling targets. For every survey, the seismic processing should be adapted to the target depth and structure, e.g. fracture zones, karstified aquifers or highly porous sediments. In addition, the best migration method should be chosen to image the geologic structure. Nevertheless, often a standard processing and imaging routine is used to save time and hence to reduce costs.

For the URG, the dominant features to image are faults. Many of them are found in the 3D seismic survey, which we used for our study. The survey was especially designed for geothermal exploration in the southern Upper Rhine Graben. We tested five different 3D poststack migration methods, i.e. Kirchhoff, FD, Stolt, phase shift and phase shift plus corrections for lateral velocity variations, and a Kirchhoff 3D prestack migration in time. The same velocity model was used for all poststack migrations and a simplified version for the prestack migration. The FD migration and phase shift plus lateral velocity corrections migration provided the best results of the tested poststack migrations. The prestack migration imaged small faults in the target depths surprisingly well even though we used a basic velocity model.