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3D geological modeling and geophysical inversion in a fault dominated regime for geothermal resource analysis

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We analyze the model uncertainties associated with 3D geological modeling of a geothermal field in the Upper Rhine Graben, Germany. The structural setting in this area is dominated by N-S trending faults.
There are special challenges in 3D geological modeling for geothermal resource analysis. A major problem is the lack of data in the typical depth of potential reservoirs ranging from about 2000 to 6000 meters in the case of Enhanced Geothermal Systems (EGS). There is only little knowledge concerning structures and geometries and deep drillhole data is sparse. Furthermore, faults lead partly to large offsets of geological formations. Uncertainties of the structural model based on these limitations have to be analyzed before optimizing the model with geophysical inversion methods.
We use 3DGeoModeller (Intrepid Geophysics) for structural modeling with the implicit potential-field method and geophysical inversion. Input data are field measurements, data taken from geological maps, published cross-sections and boreholes for the geological model and gravimetric data for the geophysical inversion.
We address the problems described above and test the effect of varying input data types and data density on the geological model and the geophysical inversion. Specific concern is taken on the interaction of geological and geophysical data. The derived 3D structural model is self-consistent and provides an accuracy indication for the model.