

Donnerstag, 24. Juni 2021
Kongress 1 - Tiefe Geothermie
13.20-13.50 Uhr

Potential field methods in Geothermal exploration **Sean Goodman, Seequent UK Ltd**

Conceptual model of the surface can help minimizing exploration risk and drilling cost. Low cost geophysical imaging technique such as gravity and magnetic surveying can provide accurate depictions of geologic units and structures in the subsurface.

We present two recent case studies where potential field methods were the primary methods used to image and characterise geothermal systems. These passive geophysical methods were supplemented by seismic, paleomagnetic, borehole and core measurements. Despite three different geological scenarios, these studies shared a similar goal: to better understand the subsurface and mitigate risk by using low cost exploration techniques.

In the Warner Valley, Southwest Oregon, 20 hot springs and the Crump Geyser characterize this area. The geology is dominated by Neogene volcanics forming a half graben bounded by both NW and NNE trending faults. The geothermal system is assumed to be sustained by deep meteoric water circulation controlled by normal faults. A combination of 2D/3D magnetic and gravity modelling, constrained by seismic, borehole, paleomagnetic and core samples played an important role in understanding the geothermal system since the intra-basin structures are concealed by Quaternary alluvium. The 3D models reveal basin structures that indicate intra-basin fluid flow and provide a structural basis for assessing the potential for future commercial power generation (Glen et al., 2015).

In the Roer Valley Graben, Netherlands, the aim was to characterize an ultra-deep (>4 km) geothermal reservoir by leveraging existing subsurface data before funding new exploration (Van Heiningen et al., 2018). Initial targets were the Carboniferous and Permian formations, which were out-of-reach of the existing 2D seismic and well data. 2D gravity and magnetics determined the top and base of the Carboniferous limestone while the models were further constrained by seismic interpretation, velocity and density well log data (Van Hoegaerden et al., 2018).

These examples show how potential field supplemented by seismic, wells, paleomagnetic, hand and core samples play a key role in delineating and characterising geothermal reservoirs where complex geology makes seismic imaging challenging. Integrated interpretation creates a low cost, new or improved geological model of the subsurface and hence contributes to minimized exploration costs and inherent financial risk.