Conductivity anomaly under GRT1-2 geothermal project of Rittershoffen as revealed by magnetotelluric.

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ABSTRACT

We present the underground resistivity under Rittershoffen geothermal project as recovered by magnetotelluric data inversion. In the total, 10 MT sites were acquired according to E-W profile crossing GRT1-2, the doublet of the Rittershoffen geothermal project. The MT data, namely time series, were recorded continuously using 512 Hz at least three days at each site. This recorded period was essential to ensure the good data quality of the great period allowing us to reach the target depth. For the data processing and in the same run, three consecutive days were used to compute the impedence tensor. Data for remote reference site located at Welschbruch geophysical station, far away about 85 km south of explored area, were used to achieve remote referencing robust data processing. After preprocessing steps, where mainly the railway 16 2/3 and 50 Hz noises were removed, we recovered good impedance tensor components with a maximum period of 128s, which is comfortably enough for our target which is located at < 5 km depth. We used the Chave's code in the data processing to compute the apparent resistivity and phases according to the frequencies. The underground imaging step, mainly inversion, is achieved by Mare2DEM developed by Key (Key, 2012). The real topography is also taken in account and included during forward and inverse modelling processes. In this paper, we present the MT imaging results obtained under GRT-1/2 geothermal boreholes. We give a focus on the 2D inversion results as well as their interpretation completing other geophysical and available geological information. The conductivity map recovered by magnetotelluric doesn't follow the known geology limits as provided by seismic imaging. We observe that GRT-1 is located between a conductive and resistive area located in the basement. Three important conductivity areas are also observed at the basement reaching 7 km depth for the deepest anomaly. The two other anomalies reach 4 km depth.

REFERENCES

Key, K., 2012. Marine EM inversion using unstructured grids: a 2D parallel adaptive finite element algorithm. SEG Technical Program Expanded Abstracts 2012, 1–5. doi:10.1190/segam2012-1294.1