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Case histories of using magnetotellurics for geothermal exploration

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Case histories of using magnetotellurics for geothermal exploration

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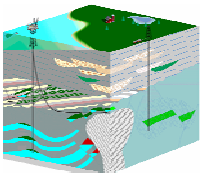
Electromagnetic methods are used routinely for geothermal exploration worldwide. During the past 10 years, 3D electromagnetic acquisition and interpretation methods have helped with deriving more realistic geological models. Among electromagnetics methods magnetotellurics (MT) is the most commonly used one and many routine processing and interpretation tools exist. We are showing 3 case histories where 3D and 2D acquisition and interpretation was carried out. Two areas are from islands where coastal effects need to be considered.

The first case history is from Iceland where the MT was used to define the scope of a deeper geothermal reservoir that is needed to supply heat for the new geothermal power plant. In this case 3D and 2D MT interpretation yielded consistent results and identified additional reservoirs to 7 km depth.

The second case history is from Hungary where the prospective zones are potential geothermal reservoirs. Seismic and gravity data was integrated with the magnetotellurics (MT) and geothermal targets resulted which were subsequently drilled successfully. This well gives 20 l/s in airlifting of over 85°C hot water with 5 to 6 l/s of artesian flow. This well will mainly produce from a crystalline basement from a fault zone approximately 1,700 to 1,760 meters in depth, and estimated to have a peak heating capacity of 4 MW. This discovery was possible due to the utilization of different geophysical and geological methods to determine the best well location.

The third case history is from another island in Europe and is yet to be integrated and drilled. Here, the coastal effects made it difficult to derive initially a reliable 3D model. At the same time, the 3D approach is eventually more stable and reliable in more complex situations.

The integrated approach which uses different geosciences datasets has proven to be a very effective method for locating the most promising areas for geothermal exploration.



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