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SEISMIC MODELLING OF BEIUŞ GEOTHERMAL FIELD

Juri Muzi [1], Vita Kalashnikova[1] , Alena Finogenova [1]

[1] PSS-GEO, Norway

ABSTRACT

In Romania, as in many other regions, the use of seismic reflection surveys for geothermal exploration has traditionally been limited. Conventional geothermal exploration methods primarily rely on surface geological observations, well-based data, geochemical analyses, and resistivity techniques to identify potential geothermal resources. While these approaches provide valuable insights, they often lack the resolution needed for precise subsurface characterization. Seismic methods, on the other hand, offer a more detailed view of subsurface structures and, when combined with advanced processing techniques, have the potential to significantly enhance resource mapping. This improved accuracy can help mitigate exploration risks and increase the likelihood of identifying commercially viable geothermal reservoirs.

This study focuses on the Beiuş geothermal field as a regional case study to evaluate the effectiveness of seismic techniques in geothermal exploration within Romania. The input data for this research was largely provided by TRANSGEX SA, a key operator in the field with extensive experience in geothermal energy extraction.

Seismic modeling, derived from pre-existing geological and geophysical data, is used to simulate the response of conventional 2D seismic stacked datasets across the Beiuș field. Various reservoir scenarios are examined to assess their potential for geothermal energy production. A Probability of Geological Success (Pg) methodology is applied to estimate the likelihood of identifying a productive geothermal reservoir with commercial flow rates. Additionally, seismic simulations are conducted to evaluate the effectiveness of seismic methods in detecting reservoir depth, fracture networks, and fluid content.

The results of this study highlight that seismic reflection techniques could play a crucial role in improving geothermal reservoir localization and reducing exploration uncertainties. Given these findings, we strongly advocate for the integration of seismic methods into Romania's geothermal exploration strategies to enhance resource identification and optimize development efforts.

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