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Revealing the continuity of offshore faults in the Seferihisar-İzmir (Turkey) Geothermal Area by modeling with Marine Seismic and Field Geology

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This study aims to evaluate the geothermal potential and geological features of the Seferihisar area in Turkey by integrating marine seismic data with terrestrial geological observations. Additionally, the research highlights the significance of marine geophysics in exploring the existing geothermal systems in Seferihisar. In this scope, high-resolution marine multichannel seismic reflection data, collected in Seferihisar Bay along the Tuzla Fault is correlated with onshore drilling data obtained from the same fault.

A 2D conceptual section and a 3D model were developed using the data from onshore geology, geochemistry, and geophysics to well better understanding of the geological structures related to the geothermal system in the study area. The results of geochemistry data in the geothermal wells indicated that the nutrition of the geothermal fluid is of both meteoric and sea water origin. The synthesis of onshore and offshore data facilitated the identification of the marine extension of the Tuzla Fault using a 3D model, emphasizing its influence on marine contributions and fluid dynamics within the geothermal system. Thus, revealing the continuity of Quaternary faults offshore and onshore will contribute to EMODnet Geology maps.

The integration of a multidisciplinary approach enhanced our understanding of geothermal wells. This advancement not only aids in identifying new potential wells but also provides deeper insights into the risks associated with geothermal energy production.

Keywords: Tuzla fault, geothermal energy, 3D modelling, onshore-offshore integration, marine seismic reflection, EMODnet Geology maps

