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ABSTRACTS

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STUDY OF STRUCTURAL CONTROLS OF WAHAWA THERMAL SPRINGS USING GROUND MAGNETIC SURVEY

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Magnetic surveys can map magnetic anomalies by detecting interference created by subsurface features in the Earth's magnetic field. Igneous intrusions and shear zones containing ferromagnetic minerals such as magnetite and ilmenite, as well as structural features such as fractures and faults, can be mapped using magnetic surveys. A magnetic survey was conducted in the Wahawa hot spring area to explore the subsurface geology and structures and investigate any connections between these structures and thermal discharges. An "Overhauser" magnetometer equipped with GPS was used in the survey to cover an area of 15 km² around the Wahawa hot spring cluster. Magnetic data were collected every two seconds, trying to minimize the interference from cultural noise as much as possible. Regional geomagnetic corrections were applied using International Geomagnetic Reference Field (IGRF) data. The magnetic anomaly was analyzed using Oasis Montaj software, using filters like Reduction to Equator (RTE), Pseudo-gravity, and Tilt Horizontal Derivative (THDR). The accurate interpretation of RTE anomaly data is challenging due to paired dipoles present in the magnetic field and the interference of cultural noise with sub-surface signals. Maps utilizing THDR and pseudo-gravity transformations offer a clearer depiction of surface and subsurface features respectively, revealing the presence of potential fractures and a dolerite dyke. These maps also show that the hot spring cluster is located in high THDR and pseudo-gravity anomaly regions depicting relationships to existing structures. The hot spring cluster aligns with shallow structural lineaments indicated in the THDR anomaly map. Pseudo-gravity map shows the interruption of sub-surface fractures by the dolerite dyke. Hence, we can assume that the deep fractures are interrupted by the dolerite dyke which would allow the deep groundwater to rise to the surface. This indicates that the dolerite dyke at least plays a passive role in creating the thermal springs in the Wahawa area.

Keywords: Geothermal Exploration, Ground Magnetic Survey, Wahawa Hot Springs