ABSTRACT

This research aims to interpret the subsurface geological structure and density distribution in the geothermal field "H" using gravity observation method. A gravity survey comprising 264 measurement points with a spacing of ±250 meters was conducted and processed with standard corrections, including drift, tidal, latitude, free-air, Bouguer, and terrain corrections. The average rock density was determined using the Parasnis method is 2.64 g/cm³. Complete Bouguer Anomaly (CBA) values were subsequently separated into regional and residual components using the upward continuation method at an elevation of 8000 meters. Further interpretation involved First Horizontal Derivative (FHD) and Second Vertical Derivative (SVD) analyses to delineate subsurface fault structures and lateral density contrasts. Seven 2D inversion profiles were modeled along cross-sections intersecting geothermal manifestations using Grablox and Surfer software. The resulting density range varied from 2.05 g/cm³ - 2.90 g/cm³. The integration of residual anomalies, derivative analysis, and inversion modeling results indicates a suspected geothermal reservoir zone in the east to southeast, at depths of 700–1500 meters, with densities ranging from 2.30 g/cm³ – 2.50 g/cm³. This low-density zone, closely associated with interpreted faults and surface hot spring manifestations, indicates the presence of permeable, fluid-saturated rocks potentially acting as a geothermal reservoir. This study concludes that the geothermal system in the study area is controlled by tectonic fault structures, and when combined with derivative analysis and inversion modeling, it proves to be highly effective in delineating geothermal prospects in non-volcanic regions.

Kata Kunci : *gravity method*, *analysis derivative*, *geothermal*, *fault, reservoir*.