

ABSTRACT

Jatirunggo Village, Pringapus District, Semarang Regency is one of the areas exhibiting geothermal manifestations in the form of hot springs with temperatures ranging from 35-38°C. These manifestations are presumed to be associated with subsurface geological conditions that control the movement of hydrothermal fluids. This study aims to identify the subsurface conditions based on magnetic data and to explain their relationship with the occurrence of hot springs in the Jatirunggo area. The research employed the geomagnetic method through total magnetic field measurements at 83 observation points using a Geomative Magnetometer. The data were processed through diurnal variation correction and the International Geomagnetic Reference Field (IGRF) correction to obtain the total magnetic anomaly, followed by Reduction to the Pole (RTP), upward continuation, and analyses using the First Horizontal Derivative (FHD), Second Vertical Derivative (SVD), and Tilt Derivative (TDR). The residual anomaly data were subsequently modeled in 2D using ZONDGM2D and in 3D using ZONDGM3D. The results indicate that the total magnetic anomaly ranges from -4.7 nT to 618.4 nT. High magnetic anomaly zones are interpreted as igneous rocks or intrusive bodies, whereas low anomaly zones indicate hydrothermally altered rocks. The 2D and 3D modeling reveal low magnetic susceptibility zones ranging from approximately -14 to -4×10^{-4} cgs surrounding high-susceptibility zones. The relationship between these zones suggests that the geothermal system in the study area is likely controlled by an intrusive body acting as the heat source, while the hydrothermal alteration zones serve as pathways for hydrothermal fluid migration toward the surface, leading to the emergence of hot spring manifestations in Jatirunggo.

Keywords: *geomagnetic, geothermal, magnetic susceptibility, hydrothermal alteration, intrusion, Jatirunggo.*