IDENTIFIKASI KONTRAS DENSITAS DAN GEOMETRI SUMBER MAGMATISME PADA DAERAH POTENSI PANAS BUMI *LAMONGAN VOLCANIC FIELD* BERDASARKAN ANALISIS DATA GRAVITASI SATELIT TOPEX

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Intisari

Indonesaia merupakan negara dengan konsumsi energi terbesar di Asia Tenggara. Energi baru terbarukan (EBT) seperti panas bumi merupakan salah satu solusi pemenuhan energi disaat cadangan energi fosil terus mengalami penurunan. *Lamongan Volcanic Field* (LVF) berlokasi diantara Gunung Bromo-Semeru dan kompleks vulkanik Iyang-Argopuro. Keberadaan beberapa *warmsprings* mengindikasikan bahwa LVF mempunyai potensi panas bumi. Namun, struktur tektonik dan karakteristik dari sumber magmatisme Gunung Lamongan belum diketahui dengan baik. Penelitian lebih lanjut, seperti penelitian geofisika menggunakan metode gravitasi perlu dilakukan.

Pada penelitian ini data gravitasi yang digunakan adalah data *Free-Air Anomaly* (FAA) dari Satelit Topex. Data FAA dan topografi diunduh pada area LVF seluas (50x40) km^2. Data FAA melalui proses koreksi dan analisis data untuk dapat menggambarkan karakteristik sumber magmatisme dan identifikasi kontras densitas yang ada di LVF. Koreksi data yang dilakukan adalah koreksi topografi. Proses analisis dilakukan dengan analisis kurva anomali, *First Horizontal Derivative* (FHD), *Second Horizontal Derivative* (SHD), dan *half-width*.

Peta Anomali Bouguer Lengkap menggambarkan respon dari Batuan Gunungapi Lamongan, Batuan Gunungapi Argopuro, Batuan Gunungapi Tengger, dan *Undifferentiated low sediments*. Selain itu, hasil analisis FHD dan SHD berhasil mengidentifikasi batas litologi antara Batuan Gunuungapi Lamongan dan Batuan Gunungapi Argopuro, serta sebuah patahan. Berdasarkan analisis keselarasan dengan anomali *simple shape* diinterpretasikan bahwa respon sumber magmatisme yang tertangkap berbentuk *sphere*. Sumber magmatisme mempunyai estimasi kedalaman sekitar (1768 ± 200) m dengan koordinat UTM (758229, 9117576).

Kata kunci: *Lamongan Volcanic Field*, panas bumi, analisis data gravitasi, sumber magmatisme, kontras densitas

DENSITY CONTRAST AND SOURCE OF MAGMATISM GEOMETRY IDENTIFICATION OF A POTENTIAL GEOTHERMAL FIELD LAMONGAN VOLCANIC FIELD BASED ON TOPEX SATELLITE GRAVITY DATA ANALYSIS

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Abstract

Indonesia is the largest energy consumer in Southeast Asia. New and renewable energy (EBT) such as geothermal energy is one of solutions to fulfill energy when fossil energy reserves continue to decline. Lamongan Volcanic Field (LVF) is located between Mount Bromo-Semeru and the Iyang-Argopuro volcanic complex. The existence of several warmsprings indicates that LVF has geothermal potential. However, tectonic structure and characteristic of the Mount Lamongan magmatism source are not well known. Further research such as geophysical study using the gravity method is needed.

In this study, Free-Air Anomaly (FAA) gravity data was used from Topex Satellite. Free-Air Anomaly data and topography were downloaded in the LVF area of (50×40) km^2. Free-Air Anomaly data then were processed using topography correction. After that, the characteristics of the source of magmatism and density contrast identification in the LVF were performed using anomaly curve analysis, First Horizontal Derivative (FHD), Second Horizontal Derivative (SHD), and half-width.

A Complete Bouguer Anomaly map illustrates the response of the Lamongan Volcanic Rock, Argopuro Volcanic Rock, Tengger Volcanic Rock, and Undifferentiated low sediments. Additionally, the results of FHD and SHD analyses indicate fault position and litology boundary between Lamongan Volcano Rock and Argopuro Volcanic Rock. Based on the alignment analysis with a simple shape anomaly, it is interpreted that the response of the source of magmatism described could be a sphere (magma chamber). The source is in the depth of (1768 ± 200) m with UTM coordinates (7582289, 9117576).

Keywords: Lamongan Volcanic Field, geothermal, gravity data analysis, source of magmatism, density contrast