ABSTRAK

Aktivitas tektonik Pulau Jawa dipengaruhi pergerakan Lempeng Indo-Australia yang bertumbukan dengan Lempeng Eurasia. Hal ini menyebabkan terbentuknya berbagai struktur geologi di Pulau Jawa, termasuk adanya sesar. Daerah dengan sesar aktif, seperti Sesar Pati, berisiko mengalami gempabumi. Jika Sesar Pati bergeser, gempa dapat dirasakan di wilayah sekitarnya sehingga perlu meningkatkan kewaspadaan terhadap potensi ancaman gempabumi. Penelitian ini menggunakan metode gravitasi citra satelit GGMPlus untuk mengidentifikasi tipe patahan Sesar Pati dengan analisis *First Horizontal Derivative* dan *Second Vertical Derivative* serta pemodelan 2D. Prosesnya mencakup perhitungan Anomali Bouguer Sederhana (ABS) dan Anomali Bouguer Lengkap (ABL), analisis spektrum, reduksi ke bidang datar, pemisahan anomali regional dan residual dengan *Upward Continuation*, analisis *derivative*, serta pemodelan 2D. Hasil analisis *First Horizontal Derivative* dan *Second Vertical Derivative* pada data anomali residual dari lima lintasan mengidentifikasi patahan naik dengan arah barat daya–timur laut. Sedangkan hasil pemodelan 2D menunjukkan jika kawasan Sesar Pati tersusun dari beberapa formasi batuan, yaitu Aluvium (Qa) dengan densitas batuan 1,76 – 2,15 g/cm^3, Formasi Lidah (QTpl) dengan densitas batuan 2,4 – 2,41 g/cm^3, Formasi Mundu (Tmpm) dengan densitas batuan 2,51 – 2,54 g/cm^3, Formasi Bulu (Tmb) dengan densitas batuan 2,64 – 2,72 g/cm^3 dan Formasi Ngrayong (Tmn) dengan densitas batuan 2,46 – 2,57 g/cm^3.

Kata kunci: gravitasi, sesar Pati, *first horizontal derivative*, *second vertical derivative,* pemodelan 2D.

ABSTRACT

The tectonic activity of Java Island are influenced by the movement of the Indo-Australian Plate which collides with the Eurasian Plate. This has led to the formation of various geological structures on the island of Java, including the existence of faults. Areas with active faults, such as the Pati Fault, are at risk of earthquakes. If the Pati Fault shifts, earthquakes can be felt in the surrounding area, so it is necessary to increase awareness of the potential threat of earthquakes. This study uses the GGMPlus satellite image gravity method to identify the type of Starch Fault fault with First Horizontal Derivative and Second Vertical Derivative analysis and 2D modeling. The process includes calculations of Simple Bouguer Anomalies (SBA) and Complete Bouguer Anomalies (CBA), spectrum analysis, reduction to flat planes, separation of regional and residual anomalies with Upward Continuation, derivative analysis, and 2D modeling. The results of the analysis of the First Horizontal Derivative and Second Vertical Derivative on residual anomaly data from five trajectories identified the thrust fault in a southwest-northeast direction. Meanwhile, the results of 2D modeling show that the Pati Fault area is composed of several rock formations, namely the Aluvium (Qa) with a rock density of 1.76 – 2.15 g/cm3, the Lidah Formation (QTpl) with a rock density of 2.4 – 2.41 g/cm3, the Mundu Formation (Tmpm) with a rock density of 2.51 – 2.54 g/cm3, the Bulu Formation (Tmb) with a rock density of 2.64 – 2.72 g/cm3 and the Ngrayong Formation (Tmn) with a rock density of 2.46 – 2.57 g/cm3.

***Keywords**: gravity, Pati fault, first horizontal derivative, second vertical derivative, 2D modeling.*