

ABSTRAK

IDENTIFIKASI ARSITEKTUR SESAR DAN KARAKTERISTIK REKAHAN SERTA PENGARUH TERHADAP ALTERASI DAN MINERALISASI DAERAH KARANGREJO, PACITAN

Oleh
Zshelda Tiara Zelvany
NIM: 111220006
(Program Studi Sarjana Teknik Geologi)

Daerah Karangrejo, Kecamatan Arjosari, Kabupaten Pacitan merupakan bagian dari busur magmatik Jawa bagian selatan yang dipengaruhi oleh aktivitas tektonik dan magmatisme sehingga berkembang struktur sesar, alterasi hidrotermal, dan mineralisasi. Struktur sesar berperan sebagai jalur migrasi fluida hidrotermal melalui peningkatan permeabilitas sekunder yang dikontrol oleh karakteristik jaringan rekahan. Oleh karena itu, penelitian ini bertujuan mengidentifikasi arsitektur sesar, mengkarakterisasi jaringan rekahan, serta menganalisis pengaruhnya terhadap persebaran alterasi dan mineralisasi di daerah penelitian. Penelitian dilakukan melalui pemetaan geologi, alterasi serta *scanline* secara tegak lurus terhadap sesar. Analisis dilakukan menggunakan pengamatan megaskopis, petrografi, mineragrafi, analisis stereografi, analisis kuantitatif rekahan meliputi densitas (P20), intensitas (P21), topologi jaringan rekahan untuk memperkirakan konektivitas hidrolik, serta analisis distribusi frekuensi kumulatif rekahan untuk mengestimasi lebar damage zone. Seluruh hasil kemudian diintegrasikan untuk menginterpretasikan hubungan antara arsitektur sesar, alterasi hidrotermal, dan mineralisasi. Hasil penelitian menunjukkan bahwa daerah penelitian tersusun oleh Satuan Lava Andesit Karangrejo berumur Oligosen Akhir–Miosen Awal. Alterasi hidrotermal yang berkembang terdiri atas alterasi propilitik, alterasi argilik, dan alterasi silisik, sedangkan mineralisasi dicirikan oleh pirit, kalkopirit, dan galena yang mengisi vein dan veinlet. Struktur geologi didominasi oleh tiga sesar mendatar mengangan yang berkembang mengikuti sistem Riedel dengan set rekahan R, R', dan P. Analisis distribusi rekahan menunjukkan peningkatan intensitas, densitas, dan konektivitas hidrolik menuju fault core. Hasil penelitian ini menunjukkan bahwa arsitektur sesar mengendalikan perkembangan jaringan rekahan, sedangkan karakteristik jaringan rekahan mengontrol sirkulasi fluida hidrotermal serta distribusi alterasi dan mineralisasi di daerah Karangrejo, Pacitan.

Kata kunci: Alterasi, Karangrejo, Mineralisasi, Rekahan, Sesar.

ABSTRACT

IDENTIFICATION OF FAULT ARCHITECTURE AND FRACTURE CHARACTERISTIC AND THEIR INFLUENCE ON ALTERATION AND MINERALIZATION IN THE KARANGREJO AREA, PACITAN

By
Zshelda Tiara Zelvany
NIM: 111220006
(Geological Engineering Undergraduated Program)

The Karangrejo area, Arjosari District, Pacitan Regency, is part of the Southern Java magmatic arc and has been influenced by tectonic activity and magmatism, resulting in the development of fault architecture, hydrothermal alteration, and mineralization. Fault architecture provides pathways for hydrothermal fluid migration through enhanced secondary permeability controlled by the characteristics of the fracture network. Therefore, this study aims to identify the fault architecture, characterize the fracture network, and evaluate its influence on the distribution of hydrothermal alteration and mineralization within the study area. The research was conducted through geological mapping, alteration mapping, and scanline surveys oriented perpendicular to the fault. The analyses included megascopic observations, petrographic and mineragraphic analyses, stereographic analysis, and quantitative fracture analysis, including fracture density (P20), fracture intensity (P21), and fracture network topology to estimate hydraulic connectivity. Cumulative fracture frequency distribution analysis was also applied to estimate the width of the damage zone. All datasets were integrated to interpret the relationships among fault architecture, hydrothermal alteration, and mineralization. The results indicate that the study area is composed of the Karangrejo Andesite Lava Unit of Late Oligocene–Early Miocene age. The hydrothermal alteration consists of propylitic, argillic, and silicic alteration, whereas mineralization is characterized by pyrite, chalcopyrite, and galena occurring as veins and veinlets. The geological structures are dominated by three dextral strike-slip faults associated with the Riedel fracture system, comprising R, R', and P fracture sets. Fracture distribution analysis reveals increasing fracture intensity, fracture density, and hydraulic connectivity toward the fault core. These findings demonstrate that fault architecture controls the development of the fracture network, whereas fracture network characteristics govern hydrothermal fluid circulation and the distribution of hydrothermal alteration and mineralization in the Karangrejo area, Pacitan.

Keywords: Alteration, Karangrejo, Mineralization, Fracture, Fault.