

Decoding Structural Influences on Vein Formation in the Japudali Prospect, Indonesia

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Indonesia, located within the tectonically active Pacific Ring of Fire, hosts extensive volcanic and magmatic arcs formed by the complex convergence of the Pacific, Indo-Australian, and Eurasian plates. The Sunda-Banda magmatic arc in the southwestern archipelago (Wulandari, 2015) exemplifies a long-lived subduction-related magmatic system. The interplay of arc magmatism, crustal deformation, and hydrothermal fluid evolution has positioned Indonesia as a major metallogenic province, hosting widespread occurrences of metallic mineralization across varied lithospheric domains. This study investigates the relationship between structural geology and the spatial distribution of hydrothermal alteration and mineralization within a 6×10 km² area in Sukabumi Regency, Southwestern Java. The research was guided by a multidisciplinary approach that integrated literature review, remote sensing, field mapping, and laboratory analyses. The geological structure is characterized by three major fault systems: the Japudali thrust left slip fault (NW–SE), normal right slip fault (NNW–SSE), and the Pasawahan right slip normal fault (WSW–ENE). And there are three subordinates NE-SW trending faults: the Cihaur left thrust slip fault, Cihaur normal left slip fault, and Cihaur lag right slip fault. These structures are observable from the outcrop to micro-scale features such as mineral grain microfractures. Vein distribution near minor faults indicates localized hydrothermal fluid flow, while extensive alteration zones (propylitic, argillic, advanced argillic, and phyllic) are widespread. Findings suggest that the fault networks, active during both pre-mineralization and syn-mineralization stages, acted as principal conduits for hydrothermal fluid migration and subsequent mineral deposition. This paper presents all details about structural geology information within the hydrothermal alteration, with the outcomes of the distribution of hydrothermal alteration occurrences in Sukabumi Regency, Southwestern Java, to serve as a recommendation for detailed exploration in the future.

Keywords: structural control, hydrothermal alteration, Sukabumi regency