

### **Geological Features and Diagnostic Characteristics of Gunung Akmil HSE Prospect in Central Java, Indonesia: Vectoring to Concealed Porphyry System**

**Andreas Rama Alfario**<sup>1</sup>, Tesalonika Novelita Kate Pongtuluran<sup>1</sup>, Azzaini Ghoni<sup>1</sup>,  
Muhammad Farel Diputra<sup>1</sup>, Arifudin Idrus<sup>1</sup>

<sup>1</sup>Universitas Gadjah Mada, Sleman, Indonesia

The Gunung Akmil high sulphidation epithermal (HSE) prospect in Central Java's Menoreh range, hosted by andesite and diorite porphyries, displays concentric alteration zones and mineralization patterns indicative of a concealed porphyry system. Structurally controlled by ENE- and NNW-trending faults, the prospect is characterized by four alteration zones progressing from peripheral propylitic (chlorite-epidote±pyrite) to argillic (kaolinite±dickite), advanced argillic (quartz-pyrophyllite-white mica-dickite), and a central silicified zone (quartz-goethite). Silicification intensity and stockwork vein density systematically increase toward the center, paralleled by rising gold grades from 0.03 g/t (distal) to 0.44 g/t (central). Diagnostic minerals like pyrophyllite and dickite in the advanced argillic zone reflect acid sulfate alteration, typical of HSE-porphyry transitions, while the scarcity of alunite suggests deep erosion, potentially exposing deeper system levels. Ground magnetic surveys reveal a high-susceptibility anomaly, interpreted as magnetite-enriched altered rock beneath the HSE zone—a signature consistent with porphyry copper-gold environments. These findings align with established exploration vectors: zonal alteration patterns, increasing metal grades toward structural centers, stockwork density correlating with fluid proximity, and high-temperature mineral assemblages. The integration of lithocap features (HSE mineralization) with geochemical and geophysical data underscores the prospect's potential for concealed porphyry-style mineralization, particularly in the central zone. This multi-method approach highlights the efficacy of combining alteration mineralogy, geochemistry, and geophysics in targeting buried mineral systems as a priority for deeper exploration to confirm porphyry linkages.

**Keywords:** Gunung Akmil HSE prospect, concealed porphyry, vectoring to ore, Menoreh range