# ABSTRAK

## MODEL 3D DARI SISTEM ENDAPAN EPITERMAL SULFIDASI TINGGI BERDASARKAN ANALISIS DATA GEOMAGNETIK, *TIME DOMAIN INDUCED POLARIZATION* (TDIP) DAN GEOLOGI DI LAPANGAN ‘‘KENCANA”, JAWA BARAT

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Busur Sunda-Banda merupakan produk hasil konvergensi lempeng Eurasia dan Indo-Australia melalui aktivitas tektonisme dan magmatisme selama periode Kapur hingga Oligosen. Pada busur ini, terbentuk jalur metalogeni berupa mineralisasi logam yang sangat beragam. Emas dan logam lainnya merupakan sumber daya alam yang termasuk pada bahan galian vital untuk hajat hidup orang banyak. Pada zaman ini permintaan akan bahan tambang baik sebagai material elektronik, kebutuhan industri, dan alat investasi terus meningkat. Namun, pada kenyataanya produksi bijih logam dari tahun ke tahun terus mengalami penurunan. Maka dari itu dilakukan eksplorasi mineral dengan cara pengukuran metode Geomagnetik dan *Time Domain Induced Polarization* serta data geologi untuk mengetahui potensi sistem endapan mineral pada daerah penelitian.

Lokasi penelitian berada di daerah Jawa Barat yang merupakan sistem endapan epitermal sulfidasi tinggi pada lingkungan vulkanik. Kehadiran *vuggy-massive* silika/kuarsa dan mineral lempung asam menjadi ciri perkembangan sistem endapan *acid-sulfate* ini. Pendekatan secara geofisika dilakukan dengan pengukuran metode Geomagnetik dan *Time Domain Induced Polarization* yang mana kedua metode tersebut cukup efektif dalam menggambarkan lingkungan endapan mineral. Pengukuran metode Geomagnetik dilakukan sebanyak 766 titik dengan luas sekitar 1,5 x 2,5 $km^2$. Pengukuran metode *Time Domain Induced Polarization* konfigurasi dipole-dipole dilakukan sebanyak 12 lintasan dengan panjang 1 km di dalam kavling geomagnetik. Jarak antar lintasan sejaun 100 meter dengan orientasi barat-timur.

Berdasarkan hasil analisis dari data penelitian, data geomagnetik menggambarkan keberadaan mineralisasi epitermal ditandai dengan pola *low magnetic boundary* (< 90 nT) akibat *magnetite destructive.* Fitur tersebut diindikasikan sebagai zona alterasi, kompleks sesar turun dan mendatar yang berkorelasi dengan alterasi silisik dan argilik, serta dibatasi oleh respon *medium-high magnetic* yang menunjukan persebaran batuan andesit dan breksi di sepanjang bagian tepi peta. Analisis data TDIP menunjukan distribusi anomali dengan respon *high resistivity* ( > 60 Ω.m) dan *high chargeability* ( > 180 mV/V) yang menerus dari lintasan ke-7 hingga ke-12. Pola tersebut diinterpretasikan sebagai alterasi silisik sebagai zona pusat dari alterasi dan mineralisasi dengan kandungan mineral logam sulfida yang relatif tinggi. Model konseptual 2,5 D *geomagnetic* yang mengacu pada data geologi (litologi, alterasi, dan struktur geologi) dan data geofisika (*geomagnetic* dan TDIP) disimpulkan bahwa zona pusat alterasi dan mineralisasi berada di bawah permukaan pada kedalaman 200-380 m yang dikontrol oleh sesar mendatar serta membentuk alterasi hingga ke atas permukaan.

**Kata Kunci:** Endapan Epitermal, Sulfidasi Tinggi, Geomagnetik, *Time Domain Induced Polarization,* Zona Mineralisasi

# ABSTRACT

## 3D MODEL OF HIGH SULFIDATION EPITHERMAL DEPOSIT SYSTEM BASED ON DATA ANALYSIS OF GEOMAGNETIC, TIME DOMAIN INDUCED POLARIZATION (TDIP) AND GEOLOGY IN "KENCANA" FIELD, WEST JAVA

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The Sunda-Banda Arc is a product of the convergence of the Eurasian and Indo-Australian plates through tectonic and magmatism activities during the Cretaceous to Oligocene periods. In this arc, metallogenic pathways are formed in the form of very diverse metal mineralization. Gold and other metals are natural resources which are vital minerals for the livelihood of many people. At this time the demand for mining materials both as electronic materials, industrial needs, and investment tools continues to increase. However, in reality metal ore production continues to decline from year to year. Therefore mineral exploration is carried out by measuring the Geomagnetic method and Time Domain Induced Polarization as well as geological data to determine the potential of mineral deposit systems in the study area.

The research location is in the area of West Java which is a high sulfidation epithermal deposit system in a volcanic environment. The presence of vuggy-massive silica/quartz and acid clay minerals characterizes the development of this acid-sulfate precipitate system. The geophysical approach is carried out by measuring the Geomagnetic and Time Domain Induced Polarization methods, both of which are quite effective in describing the mineral deposit environment. The Geomagnetic method measured 766 points with an area of about 1.5 x 2.5 km2. Measurements using the Time Domain Induced Polarization method for the dipole-dipole configuration were carried out in 12 tracks with a length of 1 km in the geomagnetic plot. The distance between the tracks is as far as 100 meters with a west-east orientation.

Based on the results of the analysis of the research data, the geomagnetic data illustrates the presence of epithermal mineralization characterized by a low magnetic boundary pattern (< 90 nT) due to destructive magnetite. This feature is indicated as an alteration zone, a complex of descending and flat faults that correlate with silicic and argillic alteration, and is bounded by a medium-high magnetic response which shows the distribution of andesite and breccias along the edge of the map. TDIP data analysis shows an anomalous distribution with continuous high resistivity (> 60 Ω.m) and high chargeability (> 180 mV/V) responses from the 7th to the 12th track. This pattern is interpreted as silicic alteration as a central zone of alteration and mineralization with a relatively high content of metal sulfide minerals. The 2.5 D geomagnetic conceptual model which refers to geological data (lithology, alteration, and geological structure) and geophysical data (geomagnetic and TDIP) concludes that the central zone of alteration and mineralization is below the surface at a depth of 200-380 m which is controlled by horizontal faults and forms alteration up to the surface.

**Key Word:** Epithermal Deposit, High Sulfidation, Geomagnetic, Time Domain Induced Polarization, Mineralization Zone