

## INTISARI

### **Analisis Korelasi Gradien Resistivitas Listrik dan Gradien Temperatur Menggunakan Model 2D Magnetotellurik serta Data Sumur di Lapangan Panas Bumi Way Selabung**

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Eksplorasi panas bumi berjalan lambat, salah satunya disebabkan oleh tingginya risiko kegagalan pemboran, yang pada beberapa lapangan dapat mencapai lebih dari 60%. Data tambahan selain hasil pemodelan magnetotellurik (MT) diperlukan untuk mengurangi resiko kegagalan pemboran. Salah satu cara untuk menurunkan risiko tersebut adalah dengan menganalisis hubungan antara gradien resistivitas listrik dari data MT dengan data gradien temperatur berdasarkan pengukuran landaian suhu pada sumur dangkal.

Pemodelan inversi 2D dilakukan untuk memperoleh distribusi resistivitas bawah permukaan, diikuti dengan perhitungan gradien resistivitas listrik. Perhitungan gradien temperatur dilakukan berdasarkan data sumur landaian suhu. Kedua perhitungan ini dilakukan dengan interval kedalaman setiap 50 m. *Plotting* kurva antara gradien resistivitas listrik dan gradien temperatur dilakukan untuk menganalisis pola korelasi keduanya.

Hasil pemodelan magnetotellurik di daerah panas bumi Way Selabung menunjukkan nilai resistivitas rendah ( $< 10$  Ohm-m) diidentifikasi sebagai batuan penutup. Zona resistivitas sedang (10-78 Ohm-m) yang berada di bawah resistivitas rendah diidentifikasi sebagai reservoir. Nilai resistivitas tinggi ( $> 230$  Ohm-m) di bagian barat daya daerah penelitian diduga sebagai sumber panas. Indikasi struktur geologi terlihat di sekitar MTWS-44a berdasarkan model 2D magnetotellurik. Hasil korelasi antara gradien resistivitas listrik dan gradien temperatur menunjukkan nilai gradien (m) sebesar 3. Nilai ini mengindikasikan bahwa gradien resistivitas listrik berbanding lurus dengan gradien temperatur.

**Kata kunci:** panas bumi, magnetotellurik, gradien resistivitas listrik, gradien temperatur, Way Selabung

## ***ABSTRACT***

### **Correlation Analysis of Electrical Resistivity Gradient and Temperature Gradient Using 2D Magnetotelluric Model and Well Data in Way Selabung Geothermal Field**

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Geothermal exploration has been progressing slowly, partly due to the high risk of drilling failure, which can reach over 60% in some fields. Additional data beyond the results of magnetotelluric (MT) modeling are required to reduce the risk of drilling failure. One approach to minimizing this risk is by analyzing the relationship between the electrical resistivity gradient derived from MT data and the temperature gradient obtained from shallow well temperature logs.

2D inversion modeling was conducted to obtain subsurface resistivity distribution and calculate the electrical resistivity gradient. The temperature gradient was calculated using data from shallow well temperature logs. Both calculations were performed at 50 m depth intervals. Curve plotting between the electrical resistivity gradient and the temperature gradient was carried out to analyze the correlation pattern between the two.

The results of magnetotelluric modeling in the Way Selabung geothermal area indicate a low resistivity zone ( $<10$  Ohm-m), identified as cap rock. A medium resistivity zone (10–78 Ohm-m) located beneath the low-resistivity layer is identified as a reservoir, while a high resistivity zone ( $>230$  Ohm-m) in the southwestern part of the study area is presumed to be a heat source. Indications of a geological structure are observed around MTWS-44a based on the 2D magnetotelluric model. The correlation between the electrical resistivity gradient and the temperature gradient shows a value of 3. This value indicates that the electrical resistivity gradient is directly proportional to the temperature gradient.

**Keywords:** geothermal, magnetotelluric, electrical resistivity gradient, temperature gradient, Way Selabung