Identifikasi sistem geothermal menggunakan metode magnetotellurik 2-dimensi di daerah Suwawa, Gorontalo = Identification of geothermal system using 2-dimensional magnetotelluric method in Suwawa region, Gorontalo

Maryadi, author

Abstrak

Survey geofisika dengan metode magnetotellurik (MT) digunakan untuk mengetahui kondisi bawah permukaan berdasarkan nilai resistivitas dan nilai fasenya. Data mentah berupa data time series dari hasil pengukuran dengan menggunakan unit peralatan Zonge. Kemudian data diolah lebih lanjut dalam bentuk kurva resistivitas semu dan fase terhadap frekuensi. Dalam pengolahannya dilakukan berbagai filterisasi dan koreksi. Hasil akhirnya berupa penampang 2-dimensi dari masing-masing line pengukuran MT. Data hasil pemodelan MT kemudian diinterpretasikan secara terpadu dengan data gravitasi, geologi, dan geokimia yang telah dilakukan sebelumnya.
Hasil menunjukkan hubungan yang cukup baik. Data yang satu dapat di-confirm dengan data yang lain, serta mampu mendeliniasi keberadaan reservoir dan kemungkinan jumlah potensi geothermal di daerah pengukuran. Daerah prospek diperkirakan berada di bagian tengah daerah penelitian. Dari hasil interpretasi dapat diketahui bahwa sistem geothermal di daerah pengukuran memiliki heat source berupa batuan vulkanik yang sudah tua dan aktif akibat proses tektonik. Kedalaman reservoir mencapai sekitar 1200 m, dengan luasan sekitar 9 km2. Potensi geothermal di daerah Suwawa diperkirakan mencapai 61 MWe.
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Geophysical survey using magnetotelluric method is purposed for understanding the subsurface condition based on resistivity and phase value. Raw data is several time series data as result of MT measurement using Zonge equipment. Then, the data was prosessed to produced resistivity and phase curve versus frequency. In the process, data was filtered and corrected. The final result formed as 2-dimensional vertical section of resistivity for each line from MT measurement. Integrated interpretation of MT inversion model section with gravity, geology, and geochemistry data was then carried out.
The result of this integrated interpretation showed good relation between each data. One data was well-confirmed by the others, and then was able to delineate existence of reservoir area and geothermal potential estimation of the area. Interpretation result show that the geothermal system have an old-volcanic body as a heat source that is activated by tectonic activities. Depth of the reservoir area is about 1200 m, with approximately 9 km2 wide. Estimated potential in Suwawa geothermal area is calculated about 61 MWe.