

INTISARI

IDENTIFIKASI POLA VARIASI RESISTIVITAS DAN AKTIVITAS HIDROTERMAL SISTEM PANAS BUMI MENGUNAKAN INVERSI 1-D MAGNETOTELLURIK, STUDI KASUS : DAERAH PROSPEK PANAS BUMI “PG”, SULAWESI UTARA

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Salah satu daerah prospek panas bumi di Sulawesi Utara adalah prospek panas bumi “PG” . Daerah prospek panas bumi “PG” masih dalam tahap eksplorasi. Sistem panas bumi “PG” berasosiasi dengan aktivitas vulkanisme berumur Kuartar dari Gunung E yang diduga menjadi sumber panas di daerah prospek panas bumi “PG”. Daerah prospek panas bumi “PG” dikontrol oleh struktur berupa patahan berorientasi NW-SE, NE-SW dan Kaldera. Sistem panas bumi di daerah penelitian dapat diketahui dari pola variasi nilai resistivitas dengan metode magnetotellurik. Metode magnetotellurik (MT) merupakan metode geofisika pasif yang memanfaatkan medan listrik dan medan magnet alam. Penelitian ini menggunakan 30 titik pengukuran magnetotellurik yang dibagi menjadi 4 lintasan dan membentang dari barat daya- timur laut. Dilakukan inversi data magnetotellurik 1-D dari data hasil pengukuran dengan *software* Parkit. Parameter berupa nilai resistivitas dan ketebalan yang didapat selanjutnya divisualisasi menggunakan *software* Corel Draw dan dibuat model resistivitas menggunakan *software* Rockwork, Surfer, dan Corel Draw. Hasil model 1-D di daerah prospek panas bumi “PG” menunjukkan zona *caprock* digambarkan oleh anomali resistivitas rendah (1-10 ohm.m) dengan ketebalan hingga 2 km di bagian timur laut yang terdiri dari litologi berupa lava andesit yang teralterasi. Zona resistivitas sedang (10-100 ohm.m) terletak di bawah zona konduktif yang diinterpretasikan sebagai zona *reservoir* dengan litologi breksi vulkanik. Zona resistivitas tinggi (>100 ohm.m) berhubungan dengan satuan batuan tuff dan breksi andesit di bagian barat daya lokasi penelitian. Zona *upflow* terletak di timur laut lintasan 1 dan 2 ditandai oleh manifestasi mata air panas dan fumarol dengan kandungan air sulfat tinggi.

Kata kunci: Resistivitas, Panas Bumi, Magnetotellurik, Inversi 1-D, Aktivitas Hidrotermal.

ABSTRACT

***IDENTIFICATION OF RESISTIVITY VARIATION AND
HYDROTHERMAL ACTIVITY OF A GEOTHERMAL SYSTEM USING
MAGNETOTELLURIC 1-D INVERSION, STUDY CASE: GEOTHERMAL
PROSPECT AREA “PG”, NORTH SULAWESI***

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One of geothermal prospects areas situated in North Sulawesi is “PG”. Currently, “PG” geothermal prospect area is undergoing exploration stage. PG Geothermal system is associated with the quaternary volcanism which contributes as its main heat source. “PG” geothermal area is controlled by NW-SE, NE-SW faults and caldera structure. In this study, “PG” geothermal system is identified by examining the resistivity variation pattern using Magnetotelluric method. Magnetotelluric (MT) is a passive geophysical method which utilize natural electric and magnetic. MT survey was consist of 30 measurement points which were divided into four lines and extended from Southwest – Northeast direction. Subsequently, 1-D MT inversion has been applied to the observation data by using Parkit software. Resistivity and thickness as inversion outcome have been visualized using Corel Draw. Ultimately, the resistivity model has been reconstructed using Rockwork, Surfer and Corel Draw. The result of 1-D resistivity model shows that cap rock zone is represented by low resistivity anomaly (1-10 ohm.m) with thickness reach around 2 km in the Northeastern in which altered lava andesite is found as primary lithology. Moderate anomaly (10-100 ohm.m) is found beneath conductive zone in which later interpreted as reservoir with volcanic breccia as lithology. High anomaly (>100 ohm.m) relates to tuff and andesite breccia units in the Western. Upflow zone is located in Northeastern of MT line 1 and 2 in which typical thermal manifestations such as acid hot springs and fumarole are found in that area.

Keywords: Resistivity, Geothermal, Magnetotelluric, 1-D MT Inversion, Hydrothermal Activity