

## INTISARI

### Pemodelan Inversi 2 Dimensi Metode Magnetotellurik di Lapangan Panas Bumi Paralana, Australia Selatan

Oleh

Kartika Ikhsan Nur  
17/412619/PA/17938

Lapangan Panas Bumi Paralana terletak di Gunung Painter, timur laut jajaran Pegunungan Flinders, Australia Selatan. Gunung Painter tersusun oleh batuan metasedimen dan granit berumur Mesoproterozoikum di sisi barat dan di bagian timur merupakan Cekungan Frome yang tersusun oleh sedimen Neoproterozoikum hingga Holosen. Tersingkapnya batuan Mesoproterozoikum ke permukaan dikontrol oleh keberadaan sistem sesar Paralana berorientasi barat daya – timur laut. Mata air panas Paralana, yang terletak di dekat Sesar Paralana, berada di daerah pinggiran *high anomaly heat flow*. Penelitian ini bertujuan untuk mengetahui sebaran konduktivitas listrik bawah permukaan di sekitar lokasi mata air panas Paralana menggunakan metode magnetotellurik (MT). Data MT yang digunakan merupakan data *open access* sebanyak 30 titik dan dibagi menjadi dua lintasan berarah barat laut – tenggara.

Hasil inversi 2-D data MT pada lintasan A (lintasan utara, *i.e.* melintasi mata air panas Paralana) menunjukkan anomali konduktif (1-10  $\Omega\text{m}$ ) dangkal (hingga kedalaman 300 m). Fitur konduktif ini bersesuaian dengan batuan sedimen dari Formasi Pooraka (*i.e.* kerakal dengan matriks lempung, pasir, karbonat, dan lumpur). Hasil inversi 2-D data MT pada lintasan A (utara) dan B (selatan) memperlihatkan fitur resistif ( $>100 \Omega\text{m}$ ) dari kedalaman 500 m. Fitur ini berasosiasi dengan batuan dasar berupa granit berumur Mesoproterozoikum. Batuan dasar granit ini menghasilkan *high heat flow anomaly* karena bersifat radiogenik dan merupakan sumber panas dari sistem panas bumi Paralana. Pada penelitian ini, tidak ditemukan fitur konduktif memanjang di bawah sesar Paralana. Hal ini mungkin dikarenakan jenis sesar Paralana adalah sesar naik, bukan sesar turun.

**Kata kunci :** magnetotellurik, Paralana, sumber panas, Gunung Painter , inversi 2-D

## ABSTRACT

### **Two-Dimensional Inversion Modelling of Magnetotelluric Method in The Paralana Geothermal Field, South Australia**

By

Kartika Ikhsan Nur  
17/412619/PA/17938

The Paralana Geothermal Field is located at Mount Painter, northeast of Flinders Ranges, South Australia. Mount Painter consists of Mesoproterozoic metasediment and granite located in the west site and the east site is Frome Embayment consists of Neoproterozoic to Holocene sediments. The exposed Mesoproterozoic rocks to the surface are controlled by the presence of the southwest - northeast oriented Paralana fault system. The Paralana hot spring, which is located near the Paralana Fault, is located on the margin of the high anomaly heat flow area. This study aims to determine the distribution of subsurface electrical conductivity around the location of Paralana hot spring using magnetotelluric (MT) method. The MT data used is open access data as many as 30 points and divided into two lines from northwest – southeast.

The 2-D inversion of MT data on line A (north line, i.e. crossing the Paralana hot spring) shows a shallow (1-10  $\Omega\text{m}$ ) conductive anomaly (to a depth of 300 m). These conductive features correspond to sedimentary rocks of the Pooraka Formation (i.e. gravel with a matrix of clay, sand, carbonate, and silt). The results of the 2-D inversion of MT data on lines A (north) and B (south) show resistive features ( $>100$  m) from a depth of 500 m. This feature is associated with the basement rock, which is Mesoproterozoic granite. This basement produces a high heat flow anomaly because of its radiogenic and the heat source of Paralana geothermal system. In this study, no conductive features were found under the Paralana fault. This may be because the type of Paralana fault is a reverse fault, not a normal fault.

**Keywords :** magnetotelluric, Paralana, heat source, Mount Painter, 2-D inversion