

Two-dimensional Magnetotelluric Data to Study Subsurface Resistivity Structure in the Prospecting Geothermal Area of WS, Indonesia

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SUMMARY

Geologically, Indonesia is located in the world's Ring of Fire. This causes Indonesia to be known as one of the countries with abundant geothermal natural resource reserves. Indonesia's geothermal potential is estimated to reach 29,500 MWe but currently, only 2,356 MWe of the total geothermal energy potential has been utilized. One area that has geothermal potential to be explored is the WS Geothermal Field. Geothermal manifestations around the area include fumarole gas, magmatic gas such as H₂S and SO₂, solfatara, and hot springs. To identify subsurface structures and determine the area of the geothermal system in the prospect area, geophysical exploration needs to be carried out. The magnetotelluric (MT) method will be applied to study geothermal prospects in the area through 2-dimensional inversion analysis. This analysis is used to interpret the subsurface resistivity structure of the geothermal system. Geothermal data analysis was carried out using several software such as SSMT2000, MTeditor, and WinGlink. The SSMT2000 program transforms time series data into the frequency domain. Cross-power selection was carried out to improve data quality and make it smoother, using the MTeditor program. Meanwhile, the WinGlink program is used to perform 1- and 2-dimensional inversion. A smoothing inversion scheme (Occam) was conducted on MT data to reveal the resistivity model. The results of this study provide a more in-depth picture of the subsurface structure of the WS geothermal field using 2-dimensional inversion of TE and TM modes, which produces a comprehensive resistivity model by showing resistivity variations at various depths.

Keywords: Indonesia, Geothermal system, Magnetotelluric
