

INTISARI

IDENTIFIKASI KONDISI GEOLOGI BAWAH PERMUKAAN SISTEM PANAS BUMI DENGAN DATA METODE GRAVITASI DI PANTAR, NUSA TENGGARA TIMUR

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Panas bumi merupakan salah satu energi terbarukan yang hingga saat ini potensinya terus dikembangkan di Indonesia. Salah satu wilayah di Indonesia yang diindikasikan memiliki potensi panas bumi ialah Pulau Pantar, Kabupaten Alor, Nusa Tenggara Timur yang berada di lingkungan vulkanik tua berumur Tersier Akhir. Beberapa manifestasi panas bumi yang dijumpai diantaranya fumarola, solfatara, tanah panas, dan air panas. Manifestasi tersebut dapat muncul di permukaan karena keberadaan struktur geologi berupa sesar yang berasosiasi dengan reservoir panas bumi. Salah satu metode yang dapat digunakan untuk mengidentifikasi struktur tersebut adalah dengan melakukan analisis derivatif dan pemodelan 2,5D data gaya gravitasi. Data gravitasi diolah dengan melakukan reduksi hingga didapatkan anomali Bouguer lengkap (ABL) di topografi. Kemudian ABL di topografi diproyeksikan ke bidang datar menggunakan metode Dampney. Kemudian pemisahan anomali dilakukan dengan kontinuitas ke atas untuk mendapatkan anomali regional dan anomali lokal. Untuk mengidentifikasi struktur sesar dilakukan analisis *First Horizontal Derivative* dan *Second Vertical Derivative*.

Hasil penelitian menunjukkan adanya sebaran anomali tinggi membentuk pola kelurusan berarah barat daya - timur laut yang melewati beberapa manifestasi panas bumi di permukaan, dan diduga sebagai respon batuan pembawa panas berupa intrusi batuan beku. Analisis derivatif horizontal mengindikasikan tiga sesar berarah N-S yang berada di sekitar area munculnya manifestasi panas bumi. Hasil pemodelan 2,5D menunjukkan terdapat 5 litologi yaitu intrusi batuan beku ($\rho=2,9 \text{ g/cm}^3$), Vulkanik Tua Kongmaewas ($\rho=2,8 \text{ g/cm}^3$), Vulkanik Tua Kalondama ($\rho=2,7 \text{ g/cm}^3$), Batugamping ($\rho=2,1 \text{ g/cm}^3$), dan aliran Piroklastik ($\rho=2,2 \text{ g/cm}^3$).

Kata kunci : Pantar, panas bumi, struktur geologi, metode gravitasi

ABSTRACT

GEOLOGICAL SUBSURFACE IDENTIFICATION OF GEOTHERMAL SYSTEMS USING DATA GRAVITY METHOD IN PANTAR, EAST NUSA TENGARA

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Geothermal is one of the renewable energies whose potential continues to be developed in Indonesia. One area in Indonesia that is indicated to have geothermal potential is Pantar Island, Alor Regency, East Nusa Tenggara which is in an old volcanic environment of Late Tertiary age. Some of the geothermal manifestations encountered include fumaroles, solfatara, hot soil, and hot water. These manifestations can appear on the surface due to the existence of geological structures in the form of faults associated with geothermal reservoirs. One of the methods that can be used to identify these structures is by performing derivative analysis and 2.5D modeling of gravity data. The gravity data is processed by reducing it to obtain a complete Bouguer anomaly (ABL) in the topography. Then the ABL in the topography is projected onto a flat plane using the Dampney method. Then separation of anomalies with upward continuation is carried out to obtain regional and local anomaly. To identify the fault structure, First Horizontal Derivative and Second Vertical Derivative analysis were carried out.

The results showed that there is a high anomaly distribution forming a lineament pattern trending southwest-northeast that passes through several geothermal manifestations on the surface, and is thought to be a response to heat-carrying rocks in the form of igneous intrusions. Horizontal derivative analysis, indicated three fault with N-S oriented around the area where geothermal manifestations appear. The results of the 2.5D modeling, there are 5 lithologies, namely igneous intrusion ($\rho=2.9 \text{ g/cm}^3$), Kongmaewas Old Volcanic ($\rho=2.8 \text{ g/cm}^3$), Kalondama Old Volcanic ($\rho=2.7 \text{ g/cm}^3$), Limestone ($\rho=2.1 \text{ g/cm}^3$), and Pyroclastic flows ($\rho=2.2 \text{ g/cm}^3$).

Keywords: Pantar, geothermal, geological structure, gravity method