Identifikasi zona permeabel pada daerah prospek panas bumi "M" berdasarkan analisis struktur menggunakan data gravitasi dan metode fault fracture density = Identification of permeable zone in "M" geothermal prospect area based on atructural analysis using gravity data and fault fracture density method

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Abstrak

Daerah penelitian “M” merupakan salah satu daerah potensi panas bumi karena ditandai keterdapatan manifestasi mata air panas. Penelitian ini bertujuan untuk mengidentifikasi zona permeabel di daerah penelitian “M” sekaligus menentukan zona permeabel yang dapat direkomendasikan sebagai lokasi target pengeboran. Identifikasi zona permeabel dilakukan berdasarkan analisis korelasi antara struktur geologi permukaan dan struktur geologi bawah permukaan yang diperoleh melalui integrasi data primer berupa metode Fault Fracture Density (FFD) dan metode gravitasi. Analisis struktur geologi permukaan dilakukan berdasarkan analisis kerapatan kelurusan menggunakan metode Fault Fracture Density (FFD) yang diperoleh dengan metode ekstraksi kelurusan secara manual dan otomatis menggunakan citra DEMNAS. Analisis stuktur geologi bawah permukaan berupa struktur patahan yang mengontrol terbentuknya kerapatan kelurusan dan kemunculan manifestasi mata air panas di permukaan dilakukan berdasarkan hasil pengolahan metode gravitasi yang meliputi analisis First Horizontal Derivative (FHD), analisis Second Vertical Derivative (SVD), dan analisis Euler Deconvolution (ED). Adanya zona permeabilitas tinggi hingga sangat tinggi dan kontras anomali SVD di lokasi yang sama mengindikasikan zona permeabel dihasilkan dari struktur geologi permukaan dan struktur geologi bawah permukaan yang berkorelasi baik. Sementara itu, zona permeabel yang direkomendasikan sebagai lokasi target pengeboran ditentukan berdasarkan integrasi data primer dan data sekunder (data geologi, data geokimia, dan metode magnetotellurik). Berdasarkan analisis terpadu FFD, zona permeabel daerah penelitian “M" berada di enam wilayah, yaitu di bagian tengah hingga ke barat laut, timur laut, barat daya, selatan, dan tenggara hingga ke timur. Namun, berdasarkan analisis integrasi data gravitasi dan metode FFD, zona permeabel yang terbentuk dari struktur permukaan dan struktur patahan bawah permukaan yang berkorelasi baik berada di bagian tengah, barat laut, utara, timur laut, dan selatan. Berdasarkan analisis terpadu FFD serta analisis integrasi data gravitasi dan metode FFD, zona permeabel yang dapat direkomendasikan sebagai lokasi target pengeboran terletak pada daerah sebaran manifestasi di zona graben dan di sekitar manifestasi APDM-6 di zona horst. Namun, berdasarkan analisis integrasi data primer dan data sekunder, zona permeabel yang dapat direkomendasikan sebagai lokasi target pengeboran utama mengerucut pada zona upflow atau tepatnya di sekitar manifestasi APDM-1, APDM-2, APDM-3, dan APDM-5 yang terletak di zona graben dan di sekitar gunung DTR karena terdapat parameter target pengeboran yang lebih mendukung baik dari data primer maupun data sekunder.
.....The research area "M" is one of the geothermal potential areas because it is characterized by the manifestation was found as hot springs. This research aims to identify permeable zones in the "M" research area and to determine permeable zones that can be recommended as drilling target location. Permeable zones are identified based on correlation analysis between surface geological structures and subsurface geological structures which is obtained using primary data integration between the Fault Fracture Density

(FFD) method and the gravity method. Analysis of the surface geological structure is carried out based on lineament density analysis using the Fault Fracture Density (FFD) method which is obtained using manual and automatic lineament extraction methods using DEMNAS imagery. Analysis of subsurface geological structures in the form of fault structures controlling the emergence of density lineaments and hot springs on the surface is carried out based on the results of gravity method processing consisting of First Horizontal Derivative (FHD) analysis, Second Vertical Derivative (SVD) analysis, and Euler Deconvolution (ED) analysis. The existence of high to very high permeability zones and contrasting SVD anomalies at the same location indicate that the permeable zone is the result of well-correlated surface geological structures and subsurface geological structures. Meanwhile, the permeable zone recommended as a drilling target location is determined based on the integration of primary data and secondary data (geological data, geochemical data, and magnetotelluric methods). Based on the integrated FFD analysis, the permeable zone of the "M" research area is located in six regions, i.e., in the central part to the northwest, northeast, southwest, south, and southeast to the east. However, based on the integration analysis of gravity and FFD data, The permeable zones formed from well-correlated surface structures and subsurface fault structures are in the central, northwest, north, northeast and south parts.. Based on the integrated analysis of FFD and also the integration analysis of gravity data and FFD method, the permeable zone that can be recommended as a drilling target location is located in the manifestation distribution area in the graben zone and around the APDM-6 manifestation in the horst zone. However, based on the integration analysis of primary data and secondary data, the permeable zone that can be recommended as the main drilling target location is narrowed in the upflow zone or precisely around the manifestation of the APDM-1, APDM-2, APDM-3 and APDM-5 hot springs located in the graben zone and around the DTR mountain because there are drilling target parameters that are more supportive of both primary and secondary data.