

Geological structures controlling fluid flow using gravity data analysis in Menengai Geothermal System, Kenya

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Menengai geothermal field is located in the central sector of the Kenya Rift Valley and is one of the high enthalpy geothermal areas in the country. Deep drilling of geothermal wells in this field proved the existence of exploitable steam and construction of powerplant is currently underway. The Kenyan Rift is characterized by extension tectonism where the E-W tensional forces resulted in block faulting that includes leant blocks as evident in both the floor and scarps of the rift. The rift trough is truncated by several normal faults, which evidently represent persistent and wide-ranging tectonism under the rift floor. Formation of Menengai volcano led to emplacement of lava and pyroclastic that buried preexisting geological structures. The current study attempts to identify locations of fault that might be controlling the fluid flow by use processed gravity data. A total of about 850 gravity points were for generating the Bouguer anomaly, which has a Bouguer density of 2360kg/m³. After applying trend removal or compute residual algorithm and horizontal derivative filter the results shows structure crossing the caldera trending NW-SE and another connecting structure that trends NE from the central area of the caldera. These structures reveal possible conduits of fluid recharging the system from the eastern part of the caldera and whose outflow is to the north west.

Keywords: Menengai, Geothermal system, Geological structures, Gravity data, Horizontal derivative , Bouguer anomaly