Updating the conceptual model of Tendaho geothermal field, Afar Region, Ethiopia

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Developing and understanding the conceptual model of any geothermal system plays a key role to its commercially successful exploration, development and utilization. Conceptual models are mainly based on analysis of geological data, geophysical information, borehole data and information on the chemical content of reservoir fluids. In this paper we compiled the most relevant data for Tendaho geothermal area to visualize the subsurface pattern and to develop the conceptual model using Leapfrog© Geothermal Software. Three shallow and three deep exploration wells have been drilled in the 1990s. Several geophysical investigations also conducted in the past. The geological model of the field is defined from surface geological data, magneto telluric data and borehole information. The result from analysis of the magnetotelluric data indicates low resistivity value <10 Ohm m for the Southwestern part of the drilled exploration wells. The magnetotelluric model shows an uncertainty in depicting the cap rock and the shallow reservoir since both shows a very low resistivity at shallower depth. However, it clearly indicates the the deep conductive body at a depth of 6km. The 3D geologic model is built combining the magnetotelluric measurements and borehole information. The conceptual model updated based on the available information depict the possible heat source which is in the southeastern part of drilled wells, the fluid flow pattern and probable faults.

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