

A NEW MODEL FOR GEOTHERMAL EXPLORATION OF NON-VOLCANIC SYSTEMS IN EXTENDED TERRAINS

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ABSTRACT

Existing geologic models of geothermal systems work reasonably well for the exploration of systems clearly associated with active, or recently active, volcanic centers. The poor results of exploration drilling undertaken during the last few years in the non-volcanic systems of the western United States, however, indicate that the model being used for exploring these systems requires significant modification to be useful. Based on considerations of local and regional geology, as well as on drilling results, it is proposed that the presence of large tilted fault blocks, characteristic of extended terrains, are essential to the development of this type of non-volcanic geothermal system.

Groundwater, confined within tilted aquifers, can circulate to depths of thousands of feet and obtain temperatures of over 400°F even in areas with moderate temperature gradients. The heated, buoyant water flows up-dip in the aquifer until it reaches the impermeable barrier of a block-bounding fault. Flow then continues to the surface along the sloping intersection of the aquifer with the fault.

If future testing of this model proves it to be correct, it will provide a realistic conceptual model for guiding exploration and development drilling and for constructing more effective numerical models.

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