

FRACTURE PERMEABILITY EVOLUTION IN ROCK FROM THE DESERT PEAK EGS SITE

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ABSTRACT

Fluid flow experiments are being conducted on quartz monzonite core retrieved from depths of about 1 km at the Desert Peak East EGS site in Churchill County, Nevada. The experimental goals are to observe the evolution of fracture permeability at geothermal pressure and temperature conditions and to elucidate the controlling mechanisms. The experiments are conducted at a confining pressure of 5.5 MPa, pore pressures of 1.38 MPa or 2.07 MPa and temperatures of 167-169°C. Saline water is flowed through an artificial (saw-cut) fracture at a constant rate of 0.02 ml/min over a period of several weeks, interspersed with shorter intervals in which flow is either stopped or varied up to 2.0 ml/min. Inlet and outlet pore pressures and electrical resistance are measured throughout the experiments. Evidence for permeability evolution is provided by changes in differential pore pressure at constant flow and by changes in effective hydraulic aperture calculated from the variable flow rate data. Electrical resistance measurements provide evidence of ongoing geochemical reactions that alter fracture permeability over time. The early experiments have shown a decline in hydraulic aperture in at least one specimen. Electrical resistivity is observed to rise during flow and fall during no-flow intervals, reflecting changes in the ionic content of the pore fluid.

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