

Estimation of Underground Permeability Structure of Hacchobaru and Ohtake Geothermal Areas

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Hohi geothermal areas are famous as active geothermal areas in Japan. It is thought that one of factors that geothermal energy reaches the surface of the earth is the transfer of energy by the movement of underground fluid. The geothermal energy emitted from magma chamber is conveyed to underground water through basement rocks, and hydrothermal solution is produced. Geothermal fluid goes up along the fracture zone like fault plane and the geothermal energy is transmitted from underground to the surface. By geological survey, it is confirmed that there is a geothermal reservoir under Hacchobaru area. It is necessary to exist impermeable layer called 'cap rock' in order to form a geothermal reservoir. Cap rock plays a role not only in preventing hydrothermal solution and steam from going up to the surface but also in keep it from mixing with low-temperature underground water and spring near the surface. In Hacchobaru area, the rocks of Hohi Volcanic Rock Group have relation to forming cap rock.

In this study, we compared the permeability between altered rock and no-altered rock by using the permeability test machine of Kyoto University. We also made fracture in no-altered rock by breakdown test, and compared the permeability between fractured rocks and no-fractured rocks.

As a result, the effect of alteration on rocks can't be found, but it was found that rocks in Hacchobaru area were impermeable because the permeability of rocks of Hohi Volcanic Rock Group were 10^{-15} to 10^{-20} m². It was also found that fractured rocks have a very high permeability compared with no-fractured rocks. These results suggest that rocks of Hohi Volcanic Rock Group have the permeability structure enough to reserve hydrothermal solution and they play a part as 'cap rock'.