Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)


SMP48-01 Room:313 Time:May 2 14:15-14:30

# Science and Technology for Geothermal Frontier

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This project should cover multidisciplinary scientific fields such as geology, geochemistry, geophysics, water-rock interactions, rock mechanics, seismology, drilling technology, well logging technologies, reservoir engineering, and environmental science.

(a) Characterization of rock mass in BDT

Preliminary work by the Japanese researchers has revealed some of the behavior of the rock mass in the BDT, such as hydrothermal brecciation and presence of hydrothermally derived fracturing (HDF) (Hirano et al., 2003). However, fundamental understandings of key parameters such as the stress state, lithological structure, mechanical and compositional homogeneity, and thermal characteristics require much additional work. Laboratory tests would be the most effective means to obtain fundamental knowledge on the ductile rock mass in the initial stages of the project combined with analysis of core samples and pore water collected from an experimental borehole. This combination of laboratory and borehole data will generate, new knowledge on the rock mass and provide constraints on, and validation of the laboratory tests.

(b) Creation and control of the reservoirs

The HDF would create a brittle fracture network consisting of very fine fractures at grain boundaries, is created by cooling and depressurization from the borehole in the BDT. If a similar process operates during drilling then cooling of the ductile rock by the drill fluid may be expected to induce a grain-scale fracture network in the near field of the borehole during the drilling phase.

(c) Numerical simulation

To achieve sustainable energy production from EGSs in the BDT, it is essential to design the area of heat exchange between water and rock, and the risk of shortcut flow paths must be carefully evaluated. Simulators with capability to handle T-H-M-C behavior of the rock mass are expected.

Keywords: Geothermal