

The EGS Collab Project: Fracturing and Shearing Crystalline Rock

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To develop an Enhanced Geothermal Systems (EGS), accurate predictions of flow rates and temperatures at production wells over time are needed. The EGS Collab project is establishing an intermediate-scale (~10-20 m) suite of highly monitored and well characterized field test beds in which we geophysically characterize and stimulate; and evaluate using interwell flow tests to better understand processes that control formation of effective subsurface heat exchangers. By doing so, we provide a means of testing models, tools, and concepts that could later be employed under geothermal reservoir conditions at Frontier Observatory for Research in Geothermal Energy (FORGE) or EGS sites. Validation of numerical simulations in the experiment design and interpretation of results is key to the project. We are conducting our first set of experiments at the Sanford Underground Research Facility (SURF) in South Dakota, USA.

We perform in-situ experiments under well-controlled conditions, focused on rock fracture behavior and permeability enhancement. High-resolution and high-quality geophysical and other fracture characterization and fluid flow data are collected using comprehensive instrumentation. Pre-test modeling predictions will be compared with detailed measurements allowing for improved model prediction and validation. We will analyze our data and compare them with models and field observations to further elucidate the basic relationships between stress, induced seismicity, and permeability enhancement. Observations and quantifications of other key governing parameters that may impact permeability will be recorded and analyzed to help understand how they might change throughout the development and operation of an EGS project. Our ultimate goal is to ultimately aid in enabling the commercial viability of EGS. The EGS Collab Project is supported by the US Department of Energy's Geothermal Technologies Office.