## 7th European Geothermal Workshop - Characterization of Deep Geothermal Systems



Contribution ID: 133

Type: Oral

## Impact of a partly sealed fault on hydro-mechanical properties of a granite reservoir

Wednesday, October 9, 2019 5:15 PM (15 minutes)

The fluid flow in Enhanced Geothermal Systems (EGS) is dominated by hydraulically stimulated fractures and faults which are the key elements of their hydraulic performance and sustainability. At the fault scale, the flow performance is influenced by the aperture distribution which is strongly dependent on the fault roughness, the geological fault sealing, the relative shear displacement, and the amount of flow exchange between the matrix and the fault itself. On the mechanical side, stiffness and strength of partly sealed fault might alter or reinforced the mechanical behavior of the fault zone in particular with respect to new stimulations. In order to quantify the impact of chemical soft stimulation in EGS reservoir on the hydro-mechanical properties of a fault-rock system that includes fault-filling material, we conducted numerical flow through experiments of a granite reservoir hosting one single partly sealed fault of size  $512x512 - m^2$ . In order to mimic the chemical alteration of the fault-rock system we sequentially changed the distribution pattern of the fault-filling material by means of a hydro-poro-elastic coupled simulation. Navier-Stokes flow is solved in the 3-dimensional rough aperture and Darcy flow in the related poro-elastic matrix. By means of this model, an evaluation of the local channeling effect through the fault for various degrees of sealing was performed. Based on the obtained results, we derived a macroscopic change of the hydraulic-mechanical behavior of the fault-rock system, e.g. permeability change, fracture stiffness modulus.

**Authors:** Dr BLOECHER, Guido (EOST-IPGS, Université de Strasbourg/CNRS, Strasbourg, France); Dr JEAN, Schmittbuhl (EOST-IPGS, Université de Strasbourg/CNRS, Strasbourg, France)

Presenter: Dr BLOECHER, Guido (EOST-IPGS, Université de Strasbourg/CNRS, Strasbourg, France)

Session Classification: Session 4: Resource Development

Track Classification: Topic 4: Resource Development