

## 2023 ARMA Future Leader Webinar Series

Every Two Weeks on Fridays 9-10 AM MT



**4<sup>th</sup> lecture: March 24, 2023**

Please reach out to [shahzad.rosankhah@utah.edu](mailto:shahzad.rosankhah@utah.edu) to get the Zoom meeting information.

**Speaker:** Jeff Burghardt

### **Title & Abstract:**

#### **Results of the Shear Stimulation Experiments at the EGS Collab Intermediate-Scale Test Site**

The EGS Collab project undertook a series of approximately 10 m scale stimulation and thermal circulation test in crystalline rock at the Sanford Underground Research Facility. This paper reports on a set of experiments aiming to test the effectiveness of shear stimulation at an intensively characterized and monitored test bed in the Yates Amphibolite formation at approximately 1250 meters below ground surface. In initial vertical characterization borehole was drilled and used to characterize the rock properties, fracture systems, and stress field at the site. Using this information, a set of five sub-horizontal test wells and four geophysical monitoring wells were drilled. All wells were continuously cored, logged, and underwent initial hydraulic testing. The characterization data from all wells was then used to select the fractures oriented most favorably for shear stimulation. These fractures were isolated and subjected to pressures just below the estimated minimum principal stress for approximately two weeks in an effort to create a hydraulic connection between the test wells via a percolating network of sheared fractures. The tests showed that no increase in hydraulic conductivity was observed during this shear stimulation attempt. It was only after pressure exceeding the minimum principal stress was subsequently applied that an increase in hydraulic conductivity was observed. The failure of shear stimulation at this site is believed to be caused by a combination of moderate principal stress differences, low initial fracture hydraulic conductivity, and high cohesive strength on the natural fractures. Since many of the formations seen as potential targets of future EGS development have these three traits in common, these test results suggest that shear stimulation is unlikely to be a robust method of EGS stimulation at many sites.

### **Biography:**

Dr. Burghardt has over ten years' experience in experimental and computational subsurface science and geomechanics, and three years' experience with process instrumentation and controls. His dissertation work focused on modeling large deformation and high-rate constitutive behavior of rock and soils. Subsequently he spent five years working in R&D and operations for Schlumberger, where his work focused on hydraulic fracturing, stress estimation, drilling, and characterization of unconventional reservoirs. He joined PNNL as a staff research scientist in 2016, where he works on projects related to geologic carbon storage, geothermal energy, and underground explosion monitoring.