Contribution ID: **71** Type: **Oral**

Thermally-Induced Borehole Breakouts Experiments at SURF

Wednesday, May 11, 2022 4:40 PM (20 minutes)

To accurately assess geomechanical behavior in the deep subsurface for CO2 sequestration, it is typically necessary to measure the in situ stress directions and magnitudes. However, the current state of the art in stress measurement methods are often inadequate or have deployment limitations in the deep subsurface. In response to this data gap, a new thermal breakout technology is being developed that will provide a method for thermally inducing borehole breakouts and obtaining consistent measurements of the maximum horizontal stress magnitude. This thermal breakout technology involves heating the borehole and increasing the thermoelastic compressive stress in the rock until a breakout develops, which is directly correlated to the maximum horizontal stress magnitude.

This talk will discuss the development of the thermal breakout stress measurement technology with a special focus on field-scale demonstrations at SURF. Several tests have been successfully performed within deep, highly stressed boreholes located within SURF at approximately 1,500 meters below ground. In addition to these tests, we will discuss the development of a more refined prototype downhole tool for future field-scale demonstration tests at SURF. The end goal of the thermal breakout stress measurement technology is to provide industry with enhanced tools for subsurface characterization and improved data for geomechanical analyses.

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Session Classification: Geology/Biology - Parallel

Track Classification: Geology