

# Thermoelastic Fracturing and Buoyancy-Driven Convection - Surprising Sources of Longevity for EGS Circulation

Mark McClure, ResFrac

Thursday November 30, 2023, 9:00 a.m. Central Time



Mark McClure, Co-Founder and Chief Executive Officer of ResFrac, will speak on Thursday, November 30, 2023, at 9:00 a.m. Central Time.

The topic is “Thermoelastic Fracturing and Buoyancy-Driven Convection - Surprising Sources of Longevity for EGS Circulation.”

## Abstract

To maximize value from an Enhanced Geothermal System, it is necessary to optimize flow rate, well spacing, and well configuration. The design must balance the competing goals of maximizing flow rate and thermal longevity. Numerical simulations suggest that thermoelastic fracture opening and propagation can have a negative effect on the uniformity of flow. On the other hand, interactions between fracture opening and buoyancy-driven fluid circulation cause downward fracture propagation during long-term circulation that greatly improves the thermal longevity of the system. Passive inflow control design can significantly mitigate the negative effect of thermoelastic fracture opening on flow uniformity, while maintaining the positive effects of thermoelastic fracture opening and propagation on flow rate and thermal longevity. Overall, simulations suggest that an EGS doublet with 8000 ft laterals at 475° F - using inflow control at the production well - could sustain electricity generation rates of 8-10 MWe for more than 30 years. Without inflow control, 6-8 MWe over 30 years is possible; however, there is greater risk of uncontrolled thermal breakthrough.

## Biography

Mark McClure established ResFrac in 2015 to help operators maximize value through the application of advanced geomechanics and reservoir simulation. Before founding ResFrac, Mark was an assistant professor at the University of Texas at Austin in the Department of Petroleum and Geosystems Engineering. After earning a Bachelor of Science in chemical engineering and a Master of Science in petroleum engineering from Stanford University, Mark earned a PhD in energy resources engineering at Stanford.