DOE's EGS Program Review

Identifying Fracture Types and Relative Ages Using Fluid Inclusion Stratigraphy

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Project Objective

❖ To develop a technique using FIS to identify fractures and their relative ages in a geothermal borehole.

❖ Fractures over their life cycle have different chemical signatures that can be observed in bulk fluid inclusion gas analysis
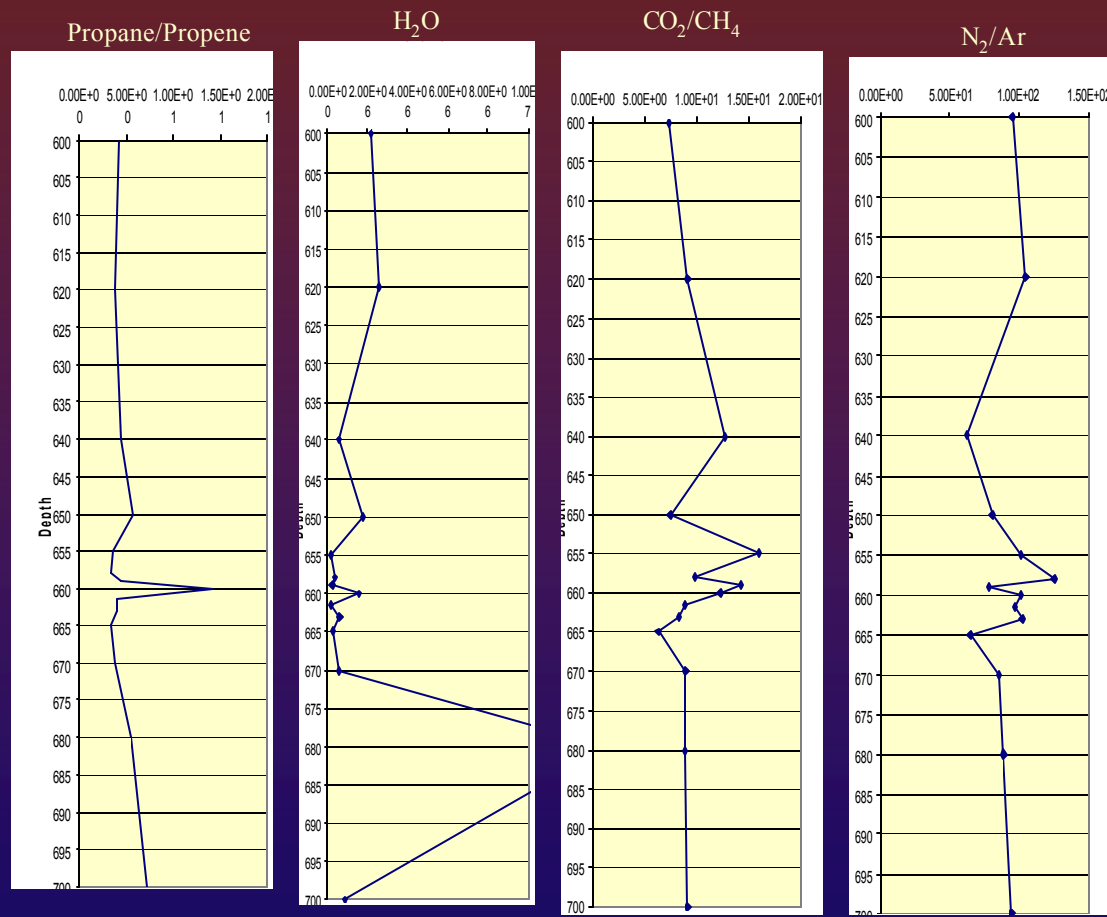
EGS Problem

❖ This project will address EGS goal of mapping fractures and assist in targeting areas within a well for fracture stimulation and enhancement.

❖ By recognizing the stage of a fracture: currently open; recently closed; or ancient; areas for enhancement can be chosen.

❖ This tool is low cost compared to geophysical logging tools and can lower the cost of development of EGS boreholes

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Background/Approach

❖ Fluid Inclusion Stratigraphy is based on interpreting fluid sources from fluid inclusion gas analysis.

❖ FIS analyses plotted on mud logs show significant peaks and valleys – peaks correspond to high density of fluid inclusions formed near or within fractures.
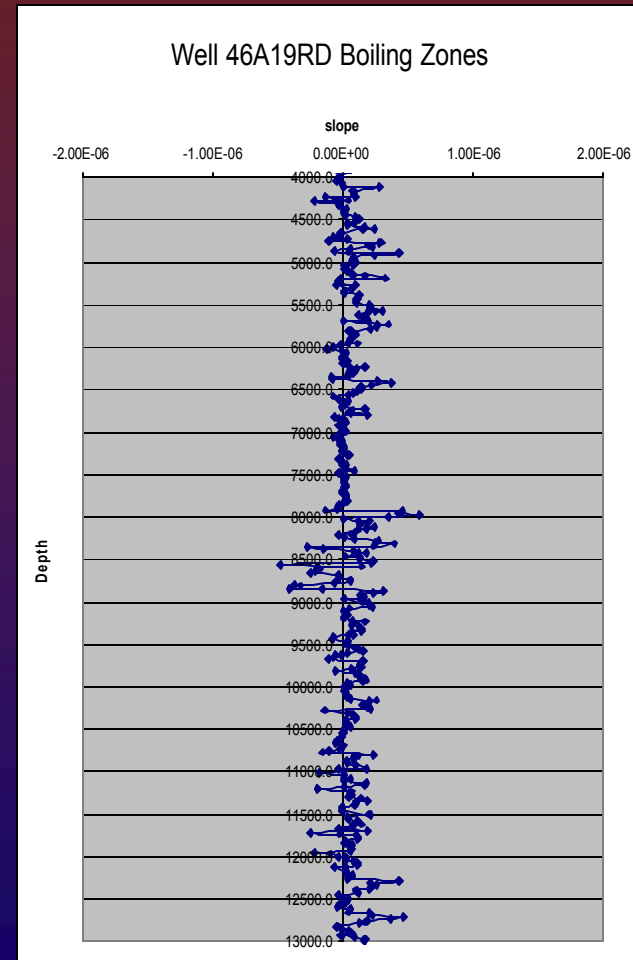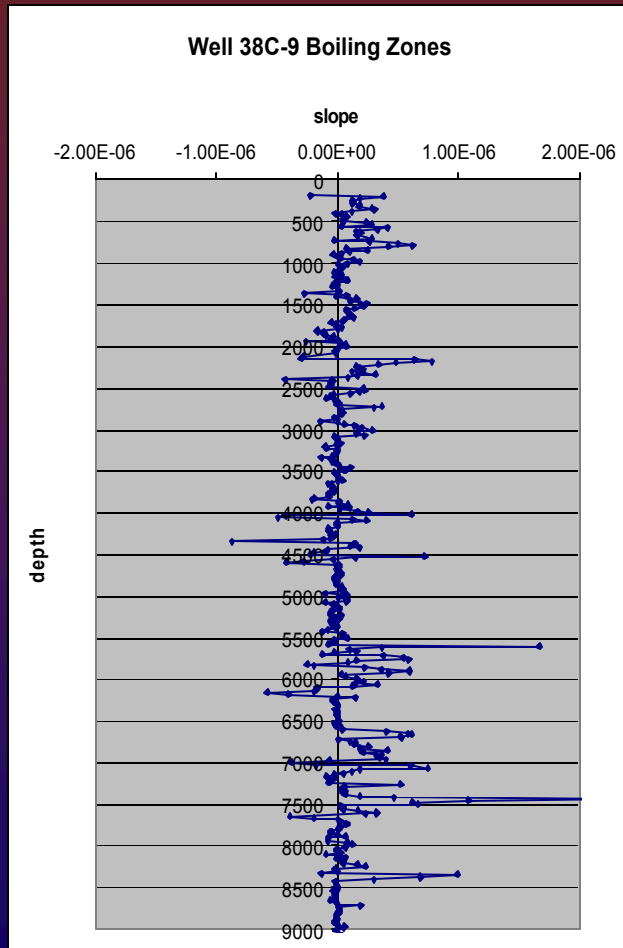
Calcite Vein at 661 feet from Coso Well 64-16

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Permeable Zones

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Methodology

❖ Collect FIS samples from three cores from different geothermal systems

❖ Analyze samples using FIT

❖ Compare the data to the core logs and existing well logs/geological data to determine which species and/or ratios may be used – H_2O, CO_2/N_2, Propane/propene, N_2/Ar

Results/Accomplishments

❖ Verify peaks observed in FIS data are related to fractures

❖ Determine which species/ratios work for identifying specific fracture types

❖ Verify FIS can provide reliable information about fractures among different fields

❖ Verify FIS can be used to target select areas for fracture stimulation

Conclusion

❖ Have just started – project to last approximately one year.