

15-16 AUGUST 2023

THE SAN LUIS HOTEL, SPA AND CONFERENCE CENTER

GALVESTON, TEXAS, USA



Reservoir Aspects of Geothermal Systems

This workshop was designed for geothermal and oil and gas professionals interested in leveraging technology and reservoir aspects related to well construction. The objective of this workshop is to discuss the state-of-the-art of reservoir engineering for geothermal operations, identify new best practices, and discuss the future challenges of reservoir engineering to accelerate the success of new innovative technology.

A goal of this workshop is to facilitate technology transfer and information exchange between the geothermal, oil and gas, and financial communities, to develop geothermal operational models at scale. The workshop will target the traditional geothermal industry with the goal to capture new SPE members and the financial community to support the understanding of fundamental subsurface concepts when assessing the potential from assets and business plans. It will provide a venue to update the oil and gas and geothermal communities on the application of reservoir engineering technologies to geothermal-related issues such as reserves quantification, thermal efficiency, geomechanics, new technology and more.



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Technical Agenda

TUESDAY, 15 AUGUST



MORNING EVENTS

Technical sessions located in the Grand Ballroom.

0700-0815 **Registration Check-In** **Grand Ballroom Foyer**
Continental Breakfast **Blake's Bistro**

0815-0830 Chairpersons' Welcome

0830-1000 **Session 1:** Reservoir Engineering and Characterization of Fractured System
Chairs:
Rodolfo Camacho, National University of Mexico
Roland Horne, Stanford University

Characterizing and Improving Enhanced Geothermal Systems Thermal Performance in Low Permeability Limestones
Rita Esuru Okoroafor, Texas A&M University

Characterization Workflow from Stress Analysis and Image Logging to Well Log Analysis and Reservoir Simulation
John Murphy, Ormat

Data Assimilation for Geothermal Reservoirs Using Various Observation Data
Denis Voskov, Delft University of Technology

1000-1030 **Coffee Break** **Grand Ballroom Foyer**

1030-1200 **Session 2:** Reservoir Engineering In Sedimentary Reservoirs Including Characterization
Chairs:
Vincent Artus, Kappa Engineering
Felipe Medellin, BEICIP FRANLAB
Xiao-Hui Wu, ExxonMobil

Enhanced Geothermal Prospectivity in Sedimentary Basins through Geothermal Design Tool
Bulbul Ahmmed, Los Alamos National Laboratory

Reservoir Modelling and Considerations for Closed Loop Systems
Roman Shor, University of Calgary

Modeling and Reservoir Characterization Using Pressure Transient Analysis and Temperature Transient Analysis for Geothermal Wells—State of Art and Challenges
Yuzhe Cai and Zizhong Liu, Chevron

1200-1330 **Lunch** **Blake's Bistro**



AFTERNOON EVENTS

1330-1500 **Session 3:** Enhanced Geothermal Systems
Chairs:
Mark McClure, ResFrac Corporation
Sathish Sankaran, Xecta Digital Labs

Results of the Shear Stimulation Experiments at the Enhanced Geothermal Systems Collab Intermediate-Scale Test Site
Jeff Burghardt, Pacific Northwest National Laboratory

Active Tracers for Hydraulic Control of Cooled Short Circuits: Bench-scale Demonstration and Forward Modeling
Adam Hawkins, Cornell University

High-Performance Computing Approaches for Coupled Thermal-Hydraulic-Mechanical Reservoir Simulation of Injection/Production at the Utah FORGE Enhanced Geothermal Systems Site
Robert Podgorney, Idaho National Lab

1500-1530 **Coffee Break** **Grand Ballroom Foyer**

1530-1700 **Session 4:** Geomechanics for Geothermal Reservoirs
Chairs:
Mark McClure, ResFrac Corporation
Neal Nagel, OilField Geomechanics LLC

Elevating Geothermal Potential: Unraveling Insights through Experimental Studies
Munir Aldin, Metarock Laboratories

Geothermal Geomechanics *Ahmad Ghassemi, OU*

High Temperature Geothermal Systems—Questions on Stimulation
Matt Uddenberg, Altrock Energy

1700-1800 **Networking Reception** **San Luis Pool Deck**

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WEDNESDAY, 16 AUGUST

MORNING EVENTS

0700-0800	Continental Breakfast	Blake's Bistro
0800-0930	Session 5: Geothermal Resource Assessment	Chairs: <i>Gioia Falcone, University of Glasgow</i> <i>Jerjes Porlles, Teverra</i>
	Can the SPE Petroleum Resources Management System Give Insight to the Classification and Quantification of Geothermal Resources?	<i>Steve Gardner, Ryder Scott Co. LP</i>
	Geothermal Exploration Strategies in the Global Market	<i>Robin Zuza, Ormat</i>
	Application of the United Nations Framework Classification to Geothermal Energy Resources	<i>Gioia Falcone, University of Glasgow</i>
0930-1000	Coffee Break	Grand Ballroom Foyer
1000-1130	Session 6: Advanced Geothermal Systems	<i>Silviu Livescu, The University of Texas at Austin</i> <i>Camilo Mejia, Enovate</i>
	Seasonal Thermal Recharge in Deep Closed-Loop Systems	<i>Roman Shor, University of Calgary</i>
	Results and Lessons from Closed-Loop Geothermal Modeling Studies	<i>Ehsaan Ahmad Nasir, Baker Hughes</i>
	Numerical Simulation of Hydraulic Fracturing in Geothermal Formations by Water and by CO ₂ in the Phase Field and Fluid-Rock Surface Energy	<i>Abbas Firoozabadi, Rice University</i>
1130-1300	Lunch	Blake's Bistro

AFTERNOON EVENTS

1300-1430	Session 7: Drilling and Completions	<i>Karen Olson, Well Data Labs</i> <i>Santiago Rocha, Cyrq Energy</i>
	Origin of Geothermal Pressures and the Impacts on Well Design and Operation	<i>Joshua Gossanyi, Ormat</i>
	Hard Rock is No Excuse: Discussion of Continuing Drilling Performance Gains at Utah FORGE	<i>Sam Noynaert, Texas A&M University</i>
	Geothermal Drilling	<i>Ernesto Rivas, Geothermal Resources Group</i>
1430-1500	Coffee Break	Grand Ballroom Foyer
1500-1630	Session 8: Geothermal Systems Surveillance	Chairs: <i>Biröl Dindoruk, University of Houston</i> <i>Santiago Rocha, Cyrq Energy</i> <i>Sathish Sankaran, Xecta Digital Labs</i>
	Multi-Scale Modeling of Enhanced Geothermal Systems with Local-Property Dependent Transfer Coefficients and Fluid Properties	<i>Ram Ratnakar, Shell</i>
	Unveiling the Hidden Energy: Modeling Geothermal Reservoirs for Sustainable Energy Solutions	<i>Laura Santos, Computer Modelling Group Ltd.</i>
	Wrap-up	

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SPE recognizes the legitimate serving of alcoholic beverages in the process of conducting business and social activities. We also recognize that the use and consumption of alcohol carries with it the requirement for all attendees to consume those beverages responsibly.

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In remaining consistent with workshop objectives and SPE guidelines, commercialism in presentations will not be permitted. Company logos should be used only to indicate the affiliation of the presenter(s).

CONTINUING EDUCATION UNITS

Attendees will receive 1.6 CEUs. One CEU equals 8 contact hours of participation. CEUs will be awarded through SPE Professional Development for participation and completion of an SPE workshop. A permanent record of a participant's involvement and awarding of CEUs will be maintained by SPE.

DOCUMENTATION

Following the workshop, a URL containing released copies of the workshop presentations will be available to all attendees.

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WORKSHOP FORMAT

Workshops maximize the exchange of ideas among attendees and presenters through brief technical presentations followed by extended Q&A periods. Focused topics attract an informed audience eager to discuss issues critical to advancing both technology and best practices.

Many of the presentations are in the form of case studies, highlighting engineering achievements and lessons learned. In order to stimulate frank discussion, no proceedings are published and members of the press are not invited to attend.

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