

# **46th Workshop on Geothermal Reservoir Engineering 2021**

Held online due to COVID-19

Stanford, California, USA  
16-18 February 2021

Volume 1 of 2

ISBN: 978-1-7138-2907-2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2021) by Stanford Geothermal Program  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact Stanford Geothermal Program  
at the address below.

Stanford Geothermal Program  
367 Panama Street  
Green Earth Sciences 050  
Stanford University  
Stanford, CA 94305-2220  
USA

Phone: (650) 725-9835  
Fax: (650) 721-2415

[pangea.stanford.edu/researchgroups/geothermal](http://pangea.stanford.edu/researchgroups/geothermal)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Table of Contents

[Introduction](#)

[Reservoir Engineering](#)

[Field Studies](#)

[Tracers](#)

[Modeling](#)

[Production Engineering](#)

[Injection](#)

[Enhanced Geothermal Systems](#)

[Geochemistry](#)

[Geophysics](#)

[Geology](#)

[Direct Use](#)

[Low Temperature](#)

[General](#)

[Emerging Technology](#)

[Drilling](#)

[EGS Collab](#)

# Introduction

**An Introduction to the Stanford Geothermal Workshop 2021**

*Roland N. HORNE*

[21](#)

# Reservoir Engineering

**Integrated Characterization Applied to a Geothermal System Influenced by Geological Structures** [38](#)

*Alfonso ARAGÓN-AGUILAR, Siomara LÓPEZ-BLANCO, Aldo AZOÑOS-FIGUEROA*

**Recurrent Neural Networks for Prediction of Geothermal Reservoir Performance** [47](#)

*Anyue JIANG, Zhen QIN, Trenton T. CLADOUHOS, Dave FAULDER, Behnam JAFARPOUR*

**A New Machine Learning Algorithm for Production Well Analysis** [56](#)

*MUCHAMAD Harry, Jantiur SITUMORANG, PRABATA Welly*

**JIWAFlow: A Cloud Computing Wellbore Simulator** [63](#)

*PRABATA Welly, SITUMORANG Jantiur, NAINGGOLAN Thomson*

# Field Studies

- An Analysis of the Demonstration of a CO<sub>2</sub>-based Thermosiphon at the SECARB Cranfield Site** [68](#)  
*Benjamin M. ADAMS, Mark R. FLEMING, Jeffrey M. BIELICKI, Nagasree GARAPATI, Martin O. SAAR*
- A History of Tracer Studies of the East Flank Area of the Coso Geothermal Field** [77](#)  
*Cliff BUCK*
- The Characteristics of Andesite Under Weathering and Alteration in Tatun Volcano Group, Taiwan** [84](#)  
*Chia-Mei LIU, Ruo-Pin LI, Ke-Han SONG, Yu-Wei TSAI*
- Geology and Co-creation at Fly Ranch Hot Springs, Northwestern Nevada** [91](#)  
*Glenn MELOSH*
- Geothermal Resource Evaluation of the Tatun Volcano Group (TVG) Area, Taiwan** [104](#)  
*Tito Satria Putra PERDANA, Bing-Cheng CHEN, Logan HACKETT, Ann ROBERTSON-TAIT, Amber THOMAS*
- Exploitation Strategies to Minimize Decline Rate at Lumut Balai Area, PT. Pertamina Geothermal Energy, Indonesia** [117](#)  
*Erwandi YANTO, Eric FIRANDA, Aris BUDIYANTO, Andre TIOFAMI, Hadi SURANTO*

# Tracers

**2-D Assessment of Pore Pressure and Poroelastic Effects Around Geothermal Producers in Multi-Well Configurations** [123](#)

*Derrick N. ADU, Julia GHERGUT, Martin SAUTER, Bianca WAGNER, Bettina WIEGAND, Mohammed YAMAH*

**First-Order Discontinuity in Cumulative Tracer Recovery: Need for Endo-Tracer Push-Pull** [130](#)

*Horst BEHRENS, Julia GHERGUT, Martin SAUTER*

**Non-Intersected Nearby Faults: 'Dazzling Blind' Spot for Artificial Tracers in Inter-Well Tests (Scoping Simulations, 3)** [136](#)

*Horst BEHRENS, Julia GHERGUT, Martin SAUTER*

**Size Dependence of Nano-/Microparticles Flowing Through Fracture Structures** [139](#)

*Anna SUZUKI, Junzhe CUI, Satoshi UEHARA, Takatoshi ITO*

# Modeling

- A Numerical Study for Determining Lateral Thermal Gradient Based on Reservoir Properties** [144](#)  
*Aburiza AKHMAD, Budiman Dwi PUTRA, Mutiara Melanie SIHOMBING, Salsabila Tantri AYU, Theresa YOLANDA*
- Subsurface Characterization and Machine Learning Predictions at Brady Hot Springs** [158](#)  
*Koenraad F BECKERS, Dmitry DUPLYAKIN, Michael J MARTIN, Henry E JOHNSTON, Drew L SILER*
- First Year Report of EDGE Project: an International Research Coordination Network for Geothermal Drilling Optimization Supported by Deep Machine Learning and Cloud Based Data Aggregation** [166](#)  
*Rolando CARBONARI, Dang TON, Alain BONNEVILLE, Daniel BOUR, Trenton CLADOUHOS, Geoffrey GARRISON, Roland HORNE, Susan PETTY, Robert RALLO, Adam SCHULTZ, Carsten F SØRLIE, Ingolfur Orn THORBJORNSSON, Matt UDDENBERG, Leandra WEYDT*
- Performance Analyses of Deep Closed-loop U-shaped Heat Exchanger System with a Long Horizontal Extension** [177](#)  
*Morteza ESMAEILPOUR, Maziar GHOLAMIKORZANI, Thomas KOHL*
- Thermal Hydrological Mechanical Modeling of Stockton University Reservoir Cooling System** [185](#)  
*Torquil SMITH, Eric SONNENTHAL, Patrick DOBSON, Peter NICO, Mark WORTHINGTON*
- Characterizing Signatures of Geothermal Exploration Data Using Machine Learning Techniques: an Application to the Nevada Play Fairway Analysis** [193](#)  
*Connor M. SMITH, James E. FAULDS, Mark COOLBAUGH, Stephen BROWN, Cary R. LINDSEY, Sven TREITEL, Bridget AYLING, Michael FEHLER, Chen GU, and Eli MLAWSKY*
- An HPC-Based Hydrothermal Finite Element Simulator for Modeling Underground Response to Community-Scale Geothermal Energy Production** [206](#)  
*Xiang SUN, Kenichi SOGA, Alp CINAR, Zhenxiang SU, Kecheng CHEN, Krishna KUMAR, Patrick F. DOBSON, Peter S. NICO*
- Numerical Simulation of Injection Tests at Utah FORGE Site** [220](#)  
*Pengju XING, Branko DAMJANAC, Zorica RADAKOVIC-GUZINA, Aleta FINNILA, Robert PODGORNEY, Joseph MOORE, John MCLENNAN*



# Production Engineering

**Changing Casing-Design of New Geothermal Wells in Western Anatolia for Adapting to the Changes in Reservoir Conditions** [234](#)

*Hakki AYDIN, Sukru MEREY*

**Artificial Lifting in Liquid Dominated High Temperature Geothermal Fields in Turkey: Lessons Learned** [241](#)

*Hakki AYDIN, Serhat AKIN, Erdinc SENTURK, Mahmut Kaan TUZEN*

**Preliminary Study of Dependence of the Modification Factor Controlling Generation of Periodic Wellbore Flow** [249](#)

*Mitsuo MATSUMOTO, Haruki OKADA, Ryuichi ITOI, Yasuhiro FUJIMITSU*

# Injection

## **Death by Injection - Reopening the Klaipeda Geothermal Cold Case**

[253](#)

*Frederic GUINOT, Serge MARNAT*

## **Comparative Study of Decline Curve Prediction in Geothermal Injection Well Using Machine Learning and Wellbore Simulator**

[271](#)

*MUCHAMAD Harry, Aditya WAHYUDI, Midat AL ISLAM, Nada AFRA, Jantiur SITUMORANG*

# Enhanced Geothermal Systems

- Geothermal Design Tool (GeoDT)** [281](#)  
*Luke P. FRASH*
- Delineating Faults in the Soda Lake Geothermal Field Using Machine Learning** [293](#)  
*Kai GAO, Lianjie HUANG, Rongrong LIN, Hao HU, Yingcai ZHENG, Trenton CLADOUHOS*
- Constant Flow Rate Fracturing with Different Fracturing Fluids for Enhanced Geothermal Systems** [301](#)  
*Guoqing JIAN, Ramesh SARATHI, Carlos A. FERNANDEZ, Jeff BURGHARDT, Alain BONNEVILLE, and Geoffrey GARRISON*
- Water-Methane Geothermal Reservoirs in a South-West Foothills of Koryaksky Volcano, Kamchatka** [320](#)  
*Alexey KIRYUKHIN, Pavel VORONIN, Nikita ZHURAVLEV, Galina Kopylova*
- Comparison of EGS Thermal Performance with CO<sub>2</sub> and Water as Working Fluids** [326](#)  
*Esuru Rita OKOROAFOR, Michael J. WILLIAMS, Jean GOSSUIN, Olalekan JIMOH-KENSHIRO, Roland N. HORNE*
- High Temperature Stability of Aqueous Foams for Potential Applications in Enhanced Geothermal System (EGS)** [336](#)  
*Viren THAKORE, Fei REN, Josh VOYTEK, Hong WANG, Jy-An WANG, Yarom POLSKY*
- Study on Foam Fracturing of Granite for the Development of Enhanced Geothermal Systems** [348](#)  
*Hong WANG, Jy-An J. WANG, Yarom POLSKY, Fei REN, Virensinh THAKORE*

# Geochemistry

## Evolution of Brine Geochemical Composition During Operation of EGS Geothermal Plants (Alsace, France)

[361](#)

*Clio BOSIA, Justine MOUCHOT, Guillaume RAVIER, Olivier SEIBEL, Albert GENTER*

# Geophysics

- The DInSAR Analysis with Machine Learning for Delineating Geothermal Sites at the Brady Geothermal Field** [382](#)  
*Mahmut CAVUR, Jim MORAGA, H.Sebnem DUZGUN, Hilal SOYDAN and Ge JIN*
- Evolution of Fluid Transmissivity and Strength Recovery of Shear Fractures Under Hydrothermal Conditions** [393](#)  
*Tamara JEPPSON, David LOCKNER, Brian KILGORE, Nicholas BEELER, and Joshua TARON*
- A DAS-VSP Study Around the Geothermal Field of the Ohnuma Geothermal Power Plant in Northern Honshu, Japan** [405](#)  
*Junzo KASAHARA, Yoko HASADA, Haruyasu KUZUME, Hitoshi MIKADA, and Yoshihiro FUJISE*
- Looking for Permeability on Combined 3D Seismic and Magnetotelluric Datasets with Machine Learning** [415](#)  
*Eric MATZEL, Steven MAGANA-ZOOK, Robert J. MELLORS, Satish PULLAMMANAPPALLIL and Erika GASPERIKOVA*
- Using Surface Deformation and Machine Learning to Determine State of Stress Changes at the Coso Geothermal Field, California USA** [420](#)  
*Sarah ROBERTS, Andrew DELOREY, Christopher JOHNSON, Robert GUYER, Richard ALFARO-DIAZ, Paul JOHNSON*
- Seismic Monitoring of the Sacramento Basin Using Dark Fiber and Distributed Acoustic Sensing (DAS)** [429](#)  
*Dennise TEMPLETON, Christina MORENCY, Eric MATZEL, Emily MAHER, and Jonathan AJO-FRANKLIN*
- Physics-Guided Machine Learning Approach to Characterizing Small-Scale Fractures in Geothermal Fields** [435](#)  
*Yingcai ZHENG, Jiaxuan LI, Rongrong LIN, Hao HU, Kai GAO, Lianjie HUANG*

# Geology

- Geology and Hydrothermal Alteration of Well HE-59, Hellisheidi Geothermal Field, SW- Iceland** [444](#)  
*Birhan ABERA*
- Identifying and Assessing Geohazards in Indonesia Geothermal Area: How Difficult Is it?** [456](#)  
*Vicky R. CHANDRA, Dorman PURBA, Arthur G. P. NAYOAN, Ferdino R. FADHILLAH, Rizki F. RAMADHAN, Rio ANGGARA*
- Crustal Fault Zones (CFZ) as Geothermal Power Systems: 3D Variation of Permeability and Related Processes** [467](#)  
*Hugo DUWIQUET, Laurent GUILLOU-FROTTIER, Laurent, ARBARET, Mathieu BELLANGER, Théophile GUILLON, Michael J. HEAP*
- Rantau Dedap Geology and Alteration Update** [478](#)  
*Wildan MUSSOFAN, Marino BAROEK, Jim STIMAC, Novi GANEFIANTO, Sonny SANTANA, Irvan RAMADHAN, Ridwan SIDIK, Dayinta DYAKSA*
- JIWA T.o.R: Estimation of Geothermal Top of Reservoir Uncertainties in the Exploration Drilling** [488](#)  
*Muhammad SIDQI, Jantiur SITUMORANG, Muchamad HARRY, Thomson NAINGGOLAN*
- The Review of Worldwide Geothermal Top of Reservoir with JIWA T.o.R** [495](#)  
*Muhammad Fahrhan Fauzan TANDIPANGA, Annisa' AMALIA, Chelsea CASTRO, Muhammad SIDQI, Jantiur SITUMORANG*

## Direct Use

**Optimization of Geothermal Greenhouses Design for Kenyan Fresh-cut Flowers** [513](#)

*NGETHE John and Saeid JALILINASRABADY*

**Technological Peripheral of Geosolar Hybrid Cooling System** [521](#)

*Sunskрати PANDEY, Manan SHAH*

**National-Scale Reservoir Thermal Energy Storage Pre-Assessment for the United States** [525](#)

*Jeff D. PEPIN, Erick R. BURNS, Jesse E. DICKINSON, Leslie L. DUNCAN, Eve L. KUNIANSKY, Howard W. REEVES*

**Performance Evaluation of Geothermal Integrated Desalination Double Effect Evaporator (DEE) with or Without Steam Jet Ejector with Software Simulation** [535](#)

*Mitul PRAJAPATI, Darsh SHAH, Surendra Sasikumar JAMPA, Manan SHAH, Jainam PANCHAL*

# Low Temperature

**A Comprehensive Review of ORC's Application: Waste Heat Recovery System in IC Engine** [547](#)

*Keyur AJWALIA*

**Cost Estimation of Thermoelectric Generators** [556](#)

*Kewen LI, Geoffrey GARRISON, Yuhao ZHU, Roland HORNE, and Susan PETTY*

**Study of Economic Feasibility for a Decentralised Small Off Grid Geothermal Power Plant Using Slim Boreholes** [564](#)

*Taral PATEL, Manan SHAH*

**Teaching and Research with Borehole Heat Exchange Systems in Krakow (Poland) and Oshawa (Canada)** [570](#)

*Aneta SAPIŃSKA-ŚLIWA, Marc A. ROSEN, Seama KOOHI-FAYEGH, Andrzej GONET, Tomasz SLIWA, Tomasz KOWALSKI, Martyna CIEPIEŁOWSKA*

**Thermal Stabilization Time of Borehole Heat Exchanger Due to the Drilling Process** [584](#)

*Tomasz SLIWA, Aneta SAPIŃSKA-ŚLIWA, Marek JASZCZUR, Paweł ZAPIÓR, Tomasz KOWALSKI, Martyna CIEPIEŁOWSKA*

**Thermal-Hydrological-Mechanical Models for Evaluating Reservoir Thermal Energy Storage in the Portland Basin, Oregon** [598](#)

*Eric SONNENTHAL, J. Torquil SMITH, Patrick DOBSON, Peter NICO*



# General

**Geothermal Role as a Renewable Energy in Energy Mix Indonesia During and Post COVID-19 Pandemic** [605](#)

*Rizki R AYUNINGTYAS, Dorman PURBA, Daniel W. ADITYATAMA*

**A Comparative Analysis of Renewable Energy Resource in Sustainability Contexts Using the Analytical Hierarchy Process (AHP) Approach in New Zealand** [612](#)

*Abi PRIONGGO, Jessica STEPHANI*

**Resource Assessment Methods Selection for Geothermal Exploration Project in Indonesia: What Are the Considerations?** [621](#)

*Dorman PURBA, Rony P. NUGRAHA, Daniel W. ADITYATAMA, Rizki R. AYUNINGTYAS, Vicky R. CHANDRA, M. Arif AL-HASSAN, M. Multy Rizqy, Rizki F. RAMADHAN*

**Developments and Future Insights of Using Nanofluids for Heat Transfer Enhancements in Geothermal Systems** [631](#)

*Het TILALA, Hemil SAVALIYA, Deep KOTADIA, Swapnil DHARASKAR, Manan SHAH*

**Renewable Energy Literacy in Supporting Geothermal Project in Indonesia: Where Are We Now?** [636](#)

*Mukhamad F. UMAM, Dorman PURBA, Reynaldi YANUARIZKY, Sesi SELIA, Arnaldo NAPITU, L. Kevin HENDINATA, Ramadhani I. A*

**Techno-economic Analysis in Developing Low to Intermediate Temperature Geothermal System in the Eastern Region of Indonesia** [645](#)

*Nevi WINOFA, Jessica STEPHANI, Jantiur SITUMORANG, Muchamad HARRY*

**The Importance of Cooling Water Treatment System at Lumut Balai Geothermal Power Plant** [657](#)

*Erwandi YANTO, Muhammad Abimas HALIMZIKRI, Aris BUDIYANTO, Andre TIOFAMI, Dzuriat KHASANI, Hadi SURANTO*

# Emerging Technology

- A Study on Geothermal Battery Energy Storage** [665](#)  
*Neel AGARWAL, Manan SHAH*
- Biodegradable Resin Based Water Softener Technique to Reduce the Scaling Problem in Geothermal Water Flow Lines** [671](#)  
*Namrata BIST, Anirbid SIRCAR, Abhijit NIRANTARE*
- Artificial Intelligence Based Optimizing Solutions for the Geothermal Power Plants** [675](#)  
*Namrata BIST, Gautami TRIPATHI, Anirbid SIRCAR, Kriti YADAV*
- Unification of Geothermal Plants with National Grid Using Artificial Intelligence** [679](#)  
*Maitri DODIYA, Manan SHAH*
- Coupling Subsurface and Above-Surface Models for Optimizing the Design of Borefields and District Heating and Cooling Systems in the Presence of Varying Water-Table Depth** [685](#)  
*Jianjun HU, Christine DOUGHTY, Patrick DOBSON, Peter NICO, Michael WETTER*
- Deep Learning for Prediction and Fault Detection in Geothermal Operations** [697](#)  
*Yingxiang LIU, Wei LING, Robert YOUNG, Trenton T. CLADOUHOS, Jalal ZIA, Behnam JAFARPOUR*
- Electric Power Generation, Specific Capital Cost, and Specific Power for Advanced Geothermal Systems (AGS)** [705](#)  
*Adam E. MALEK, Benjamin M. ADAMS, Edoardo ROSSI, Hans O. SCHIEGG, Martin O. SAAR*
- A Review of Integration of Solar-Geothermal System with the Thermal Energy Storage System** [717](#)  
*Nilesh MALI, Abhijit NIRANTARE, Kriti YADAV, Anirbid SIRCAR, Namrata BIST, Surbhi SINGH*
- Nanobubbles as Corrosion and Scale Inhibitor** [724](#)  
*Masami NAKAGAWA, Arata KIOKA, Asuki AIKAWA, Ken TAGOMORI and Toru KODAMA*
- Use of Geothermal Electric System for Remote Powering: A Case Study of Puga Geothermal Field** [733](#)  
*Bhavi PANCHAL, Manan SHAH*
- A Fluidized Bed Adsorption Driven Power Generation System - the Potential of Metal-organic Frameworks** [738](#)  
*Sara SHAHMOHAMMADI, Alexander BURNS*
- Technology for Lithium Extraction in the Context of Hybrid Geothermal Power** [749](#)  
*William STRINGFELLOW, Patrick DOBSON*

**Reducing Emissions in Hydraulic Fracturing for Geothermal Application with the Technology Revolution**

[769](#)

*Catalin TEODORIU, Will BROWN, David EDWARDS, Jack HEATLY, Andrew OAKES, Ryan SANDMANN*

**Material Corrosion Test for Developing Cr Casing Steel at High Temperature Acid Condition**

[779](#)

*Norio YANAGISAWA, Masatake SATO, Kazumi OSATO, Yu YAMAMOTO, Keith LICHTI, Bruce MOUNTAIN, Lucjan SAJKOWSKI*

# Drilling

**Assessing Drilling Rig Options for Conducting Geothermal Exploration Slimhole Drilling in Indonesia** [786](#)

*Daniel ADITYATAMA, Vicki AGUSTINO, Hafni WIHARLAN, Farhan MUHAMMAD, Dicky ALAMSYAH, Dorman PURBA*

**Common Practice of Formation Evaluation Program in Geothermal Drilling** [796](#)

*Vicky CHANDRA, Ribka ASOKAWATY, Dorman PURBA*

**A Comprehensive Study of Cementing Operation for HPHT Geothermal Wells** [806](#)

*Nehal KHETANI, Himanshu PANCHAL, Sunny PATEL, Manan SHAH*

**Impact of Particle Size Distribution on Fracture Sealing Capability; a Simulation for Better Geothermal Drilling** [811](#)

*Lu LEE, Arash DAHI TALEGHANI*

**Rheological Properties of Drilling Fluids Containing Special Additives for Geothermal Drilling Applications** [820](#)

*Abdelmjeed MOHAMED, Saeed SALEHI, Ramdan AHMED*

**Expediting Geothermal Exploration in Indonesia: Should We Consider Slimhole Drilling?** [830](#)

*Dorman PURBA, Daniel W. ADITYATAMA, Rony P. NUGRAHA, Githa P. RIZKIANI, Rayhan IZZAT, Vicky R. CHANDRA, Budi KRISTIANTO*

**Full Coring Drilling Operation Analysis to Improve the Exploration Drilling Performance of Geothermal Slimhole** [841](#)

*Annisa RACHMADANI, Reifandi REDHIZA, Didin Chaerudin IRWANSYAH, Pradana Vian PRASETYO, Dicky ALAMSYAH, Daniel W. ADITYATAMA*

**A Discussion of Geothermal Well Integrity Using Long-Term Experimental Bonding and RE-Bonding Data** [849](#)

*Catalin TEODORIU*

**Real-Time Model for Thermal Conductivity Prediction in Geothermal Wells Using Surface Drilling Data: A Machine Learning Approach** [856](#)

*Cesar VIVAS, Saeed SALEHI*

**When, Where, and Why: the Geologic Context of Lost Circulation While Drilling in a Crystalline Geothermal Reservoir** [865](#)

*Carmen WINN, Patrick DOBSON, Craig ULRICH, Timothy KNEAFSEY, Thomas LOWRY, Zach CESA, Robin ZUZA, John ACKERLEY, Ben DELWICHE, Abraham SAMUELSteve BAUER*

# EGS Collab

**Temporal-Spatial Evolution of Anisotropic Rock Properties During Hydraulic Fracture Stimulations at the First EGS Collab Testbed** [874](#)

*Zongcai FENG, Lianjie HUANG, Kai GAO, Jiaxuan LI, Benxin CHI, Jonathan AJO-FRANKLIN, Pengcheng FU, Timothy J. KNEAFSEY, EGS Collab Team*

**Simulating Hydraulic Fracture Stimulations at the EGS Collab: Model Validation from Experiments 1 and Design-Phase Simulation for Experiment 2** [887](#)

*Pengcheng FU, Hui WU, Joseph P. MORRIS, Paul C. SCHWERING, Criag ULRICH, Jeffrey A. BURGHARDT, Mathew D. INGRAHAM, Thomas W. DOE and EGS Collab Team*

**Fracture Stimulation and Chilled-water Circulation Through Deep Crystalline Rock: Characterization, Modeling, Monitoring, and Heat-transfer Assessment** [894](#)

*Tim KNEAFSEY, Doug BLANKENSHIP, Pat DOBSON, Mark WHITE, Joseph P. MORRIS, Pengcheng FU, Paul C. SCHWERING, Jonathan B. AJO-FRANKLIN, Lianjie HUANG, Hunter A. KNOX, Ghanashyam NEUPANE, Jon WEERS, Roland HORNE, William ROGGENTHEN, Thomas DOE, Earl MATTSON, and The EGS Collab Team*

**Numerical Modeling of Microseismic Monitoring at the Second EGS Collab Testbed** [906](#)

*Jiaxuan LI, Lianjie HUANG, Yu CHEN, Joseph MORRIS, Jonathan AJO-FRANKLIN, Timothy KNEAFSEY, EGS Collab Team*

**Modeling the Dynamic Flow Resistance Across the Fracture Network of EGS Collab Experiment 1** [913](#)

*M.D. WHITE, J.A. BURGHARDT, and EGS Collab Team*

**Predicting Long-term Thermal Performance in Enhanced Geothermal Systems from Short-term Tracer Tests** [926](#)

*Hui WU, Pengcheng FU, Hwei Tang, Joseph P. MORRIS, EGS Collab TEAM*