



# AT THE CORE

## Word from the PI

The last few months have been a busy time for the Utah FORGE team. We completed the first highly deviated deep well ahead of schedule.

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## Technical Discoveries

The establishment of this state-of-the-art network at Utah FORGE is critical for detecting the microseismicity associated with reservoir development and for minimizing induced seismic risk.

[Read More](#)

## Outreach News

Interdepartmental cooperation has always been a hallmark of success for the University of Utah. Utah FORGE is continuing this tradition with new partnerships this year.

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## Announcements

In the second installment of the “Geothermal Resources in the 21st Century” series, part of Utah FORGE’s [Webinars and Podcasts](#), Dr. Stuart Simmons focuses on Unconventional Resources and Enhanced Geothermal Systems (EGS). This follows his earlier presentation on Conventional Geothermal Systems.

[Watch It Here](#)

## Word from the PI

It has been a difficult time for everyone recently, and we are all doing what we can to stay safe while meeting the demands of our daily activities. But Utah FORGE is forging ahead!

The last few months have been busy. The big news is that 16A(78)-32, the first deep deviated well, was completed on the last day of the year and ahead of schedule having been spudded on Oct 30. The well was drilled to 8559 feet depth with a total measured distance of 10,987 feet, and over 70 ft of core was collected. The upper part of the hole is vertical to 5900 ft depth below which it is deviated at a 65° angle to the southeast. Preliminary testing has been completed and the results are being analyzed. The successful drilling was the result of a great team

effort, with more than 30 contracts being awarded for drilling services.

On a separate front, Utah FORGE has been working closely with the DOE and STAT to finalize reviews of proposals for research as part of the first solicitation, and we expect to be negotiating contracts with selectees in the early part of 2021. I also want to acknowledge the students in a University of Utah Department of Communication Capstone class who have constructed a survey to gauge understanding of geothermal energy as part of the Communications and Outreach program. We will be sharing the results of this analysis later in 2021.

All the best for 2021 from the team.



## Modeling and Simulation Forum

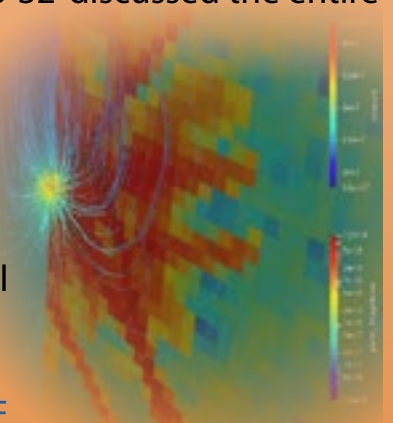
The fifth Utah FORGE Modeling and Simulation Forum held on October 28 was led by Branko Damjanac of Itasca, Utah FORGE's [new partner](#), Pengju Xing and John McLennan of University of Utah. The presentation, 'Back Analysis of Injection Tests in Zone 2 on Well 58-32' discussed the entire test, which was back-analyzed using a fully coupled hydro-mechanical model with explicit representations of DFN of different levels of detail.

The recording and the presentation are now available.

Other Forums:

Forum #6 - 'Accessing Heat and Fluid Flow in Doublet Enhanced Geothermal System (EGS)' presented by: P. Asai (UU) and R. Podgorney (INL)

Upcoming Forum: March 17, 2021.



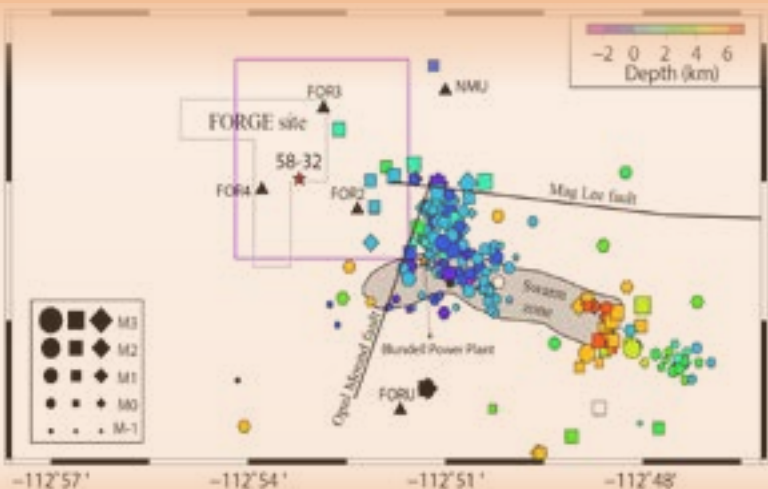
[Find out MORE](#)

## Technical Discoveries

The Utah FORGE seismic network has been established in collaboration with the University of Utah Seismic Stations (UUSS). It has been constructed in stages that currently comprise surface stations and shallow to deep boreholes, which are used for permanent and temporary instrumentation.

The establishment of this state-of-the-art network at Utah FORGE is critical for detecting the microseismicity associated with reservoir development and for minimizing induced seismic risk. From the improvements in detection over the past four years, ~700 microseismic events ( $M < 2.5$ ) have been catalogued, many of which occurred east of the Utah FORGE site beneath the Mineral Mountains as part of the natural background seismicity.

Data acquired from continuous monitoring of the permanent stations are telemetered to UUSS in real time, where they are processed and ultimately archived on the IRIS DMC (<https://ds.iris.edu/ds/nodes/dmc/>). The catalogue of events can also be accessed in tabulated form or map view at <https://quake.utah.edu/forgem-map>. DAS and nodal data are collected on site from temporary deployments and the resulting data can be found at <https://constantine.seis.utah.edu>.



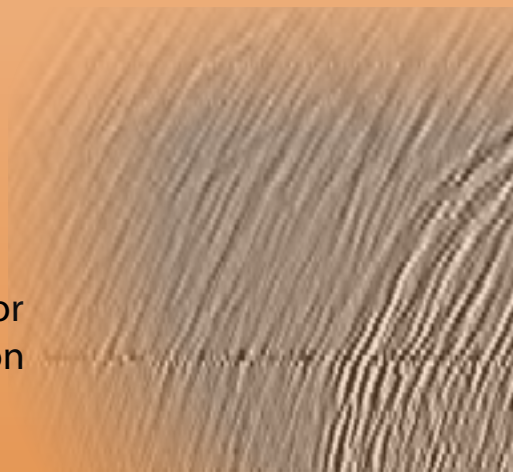
A short period sensor and a broadband sensor have been anchored into bedrock at two sites in the foothills of the Mineral Mountains, and strong-motion sensors are located in the Roosevelt Hot Springs production field, in the wind farm and at the Milford High School. Underground, a three-component geophone and a three-component accelerometer were installed at ~925 ft depth in well 68-32.

[\(continued ...\)](#)

## Data Archive

An online [Data Dashboard!](#)

GDR has also developed an [Interactive Data Tool](#) specialized for Utah FORGE data sets. Check out GDR's interactive visualization of our data sets and explore through our data sets available!

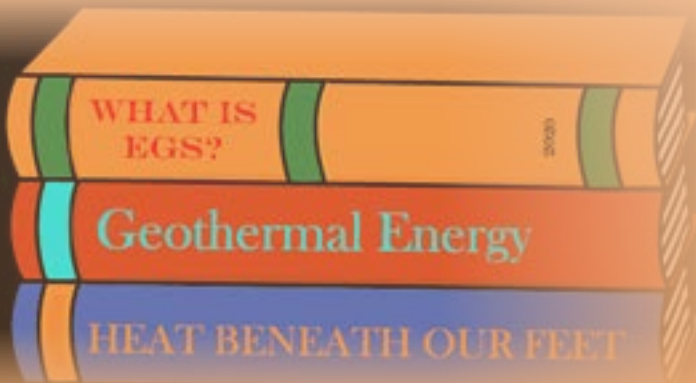


## Outreach News

Building on the inter-departmental cooperation the University of Utah is known for, Utah FORGE is collaborating with the College of Education and the Department of Communication, within the College of Humanities.

Ph.D. candidate Tamara Young is working on lesson plans which include geothermal and renewable energy. These plans are designed for classroom discussion that incorporate the latest Utah science with engineering education (SEEd) standards, and include hands-on and virtual heat conduction experiments, data interpretation, and group discussion activities for K-12 students.

Additionally, Utah FORGE is excited to be collaborating closely with Dr. Sara K. Yeo in the University's Department of Communication on a Capstone course which includes survey-



## Solicitations

Reviews of all the proposals were finalized and recommendations have been submitted to the Federal Review Panel for final approval. Updates on contract negotiations are expected soon.

[InfoReady](#) & [FORGE Solicitations Webpage](#)



ing individuals about their awareness, knowledge, and opinions of geothermal energy. Responses are being obtained from 1000 individuals in 11 states across the western U.S. The Capstone course will be repeated going forward to generate a longitudinal data set.

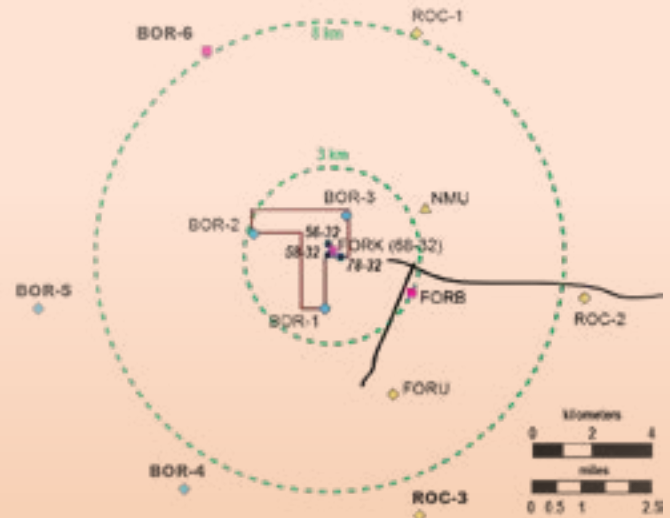
In October, the Utah FORGE team had a booth at Geothermal Rising's Annual Meeting and Expo, which included videos, panels and a Chat Room. Dr. Pengju Xing and Dr. Joseph Moore also both presented posters. Dr. Moore also participated on a panel during the Energy, Technology and Innovation Outlook breakout session during the Governor's Economic and Energy Summit.



## Technical Discoveries (cont.)

In addition, over the last few months three new shallow bores (postholes) ~80 ft deep have each been instrumented with broadband sensors and accelerometers. These four permanent subsurface stations define a 3 km inner ring geometry that will improve the capability to precisely locate individual micro-seismic events beneath the project site.

Other assets include a Distributed Acoustic Sensor (DAS) fiber optic cable, which was installed behind casing to a depth of 3268 feet in well 78-32, and nodal instruments which were deployed during stimulation experiments. In 2021, another deep seismic monitoring well (56-32) will be drilled to >7000 ft depth and instrumented with DAS. By the time of the first phase of stimulation in mid 2021, a total of three open holes will be



available for temporary instrumentation, including geophone strings. By 2022, the installation of an 8 km outer ring of borehole and surface instruments will bring the network up to full capability.

## Lectures and Podcasts

Utah FORGE publishes a series of [FORGE Webinars and Podcasts](#).

Two presentations led by Dr. Stuart Simmons, a geoscientist on the Utah FORGE team, discuss the role of geology in geothermal energy production and talk about concepts of heat transfer, enthalpy, and power. They focus on two concepts of geothermal energy production in the 21st century: conventional and unconventional resources.

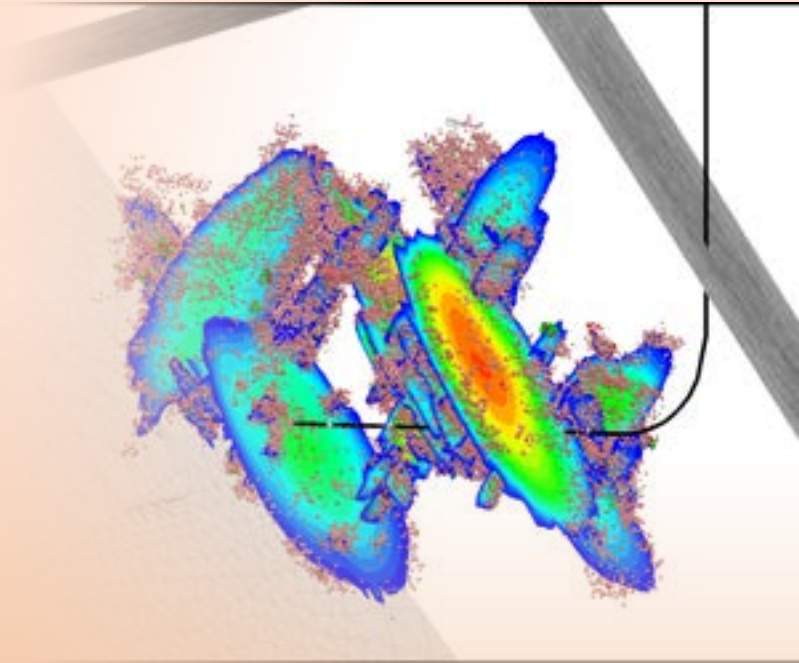
The podcasts, hosted by Christopher Katis and Dr. Stuart Simmons, continue to discuss different aspects of geothermal energy and how it is used today. The latest podcast focused primarily on what Enhanced Geothermal Systems, or EGS are.



## Partner Spotlight

Itasca is a global, employee-owned, engineering consulting and software firm, focusing on geomechanical and hydrogeological projects. They are excited to be collaborating with Utah FORGE by offering a variety of simulation and advanced numerical modeling tools to help predict the evolution of fractures, thermal and stress changes, and induced microseismicity.

[Read More](#)

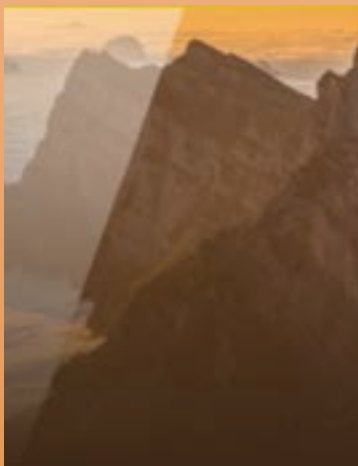


## Upcoming Events



February 16 - 18, 2021  
Stanford Geothermal  
Workshop

[Virtual](#)



April 19 - 30, 2021  
European Geophysical  
Union General  
Assembly

[Virtual](#)



April 19 - 23, 2021  
Seismological Society  
of America Annual  
Meeting

[Virtual](#)