UTAH FORGE
NEWSLETTER

JULY 2021

AT THE CORE

Word from the PI

As summer approaches, activities at the Utah FORGE site are heating up. We recently finished drilling our first highly deviated well, 16A(78)-32, which reached a measured depth of nearly 11,000 ft, followed by well 56-32, a vertical 9000 ft well which be used for microseismic monitoring.

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Technical Discoveries

New data from an array of 120 MT recording sites were acquired over and around the project area. They were merged with prior recordings to achieve a combined view of Utah FORGE and Roosevelt Hot Springs structure and the Quaternary volcanic system of the Mineral Mountains.

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Outreach News

Utah FORGE's ongoing efforts to keep the community and various stakeholders updated on the latest developments with the project has kept the Outreach and Communication busy.

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Announcements

- On June 28th the Utah FORGE team spudded well 78B-32, it is expected to be completed within 35 days and reach a depth of 9500 ft.
- The registration for the Modeling and Simulation forum #8 on July 21 is now open
- The latest podcast featuring the Beaver County Commissioner Mark Whitney is available.

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Word from the PI

As summer approaches, activities at the Utah FORGE site are heating up. We recently finished drilling our first highly deviated well, 16A(78)-32, which reached a measured depth of nearly 11,000 ft, followed by well 56-32, a vertical 9000 ft well which will be used for microseismic monitoring. Well 16A(78)-32 will be used to inject water into the reservoir that will be created. Both wells were completed ahead of schedule by optimizing drilling parameters such as weight on bit, and drilling with specially designed bits. In early fall, three intervals near the toe of well 16A(78)-32 will be stimulated.

We are drilling a 9500 ft well, 78B-32, located approximately 450 ft south of the toe of well 16A(78)-32. This hot deep well will be used to test new technologies and tools needed for Enhanced Geothermal System (EGS) development. Geophones will be installed for medium-term, continuous microseismic monitoring in this well for the upcoming reservoir stimulation.

Contract negotiations with many of the Research and Development (R&D) Solicitation 2020-1 selectees are nearly complete. More than $45 M in R&D contracts will be awarded for EGS tool development, reservoir and rock characterization, and you can find more information on these R&D topics on our website.

In our continuing commitment to be a good neighbor and community partner, our Outreach and Communication Team has been busy sharing the Utah FORGE story to a multitude of stakeholders. We've had the opportunity to give an overview of the project to Congressional staff members as well as to state and local elected officials.

Research activities conducted by the Utah FORGE team will be presented at this year's World Geothermal Congress and at a day-long FORGE session at Geothermal Rising Conference 2021 in San Diego in October. We look forward to seeing you there!

Featured Publication

"Numerical Simulation of Injection Tests at Utah FORGE Site"

Pengju XING, Branko DAMJANAC, Zorica RADAKOVIC-GUZINA, Aleta FINNILA, Robert PODGORNEY, Joseph MOORE, John MCLENNAN. (2021)

Find the full publication here.

Check out the publications page on the Utah FORGE website for more!

Technical Discoveries

Casting Sunlight on the Deep Heat Sources of Utah FORGE and the Roosevelt Hot Springs with Magnetotelluric Geophysical Imaging

Phil Wannamaker and Virginie Maris
University of Utah/EGI

The application of the magnetotelluric or MT method at Utah FORGE is enhancing our fundamental understanding about heat transfer and fluid flow from shallow to deep levels in the crust. MT exploits naturally occurring electromagnetic (EM) waves as sources for imaging the Earth's subsurface electrical resistivity. Anomalous volumes of low resistivity in turn can indicate thermal fluid pathways or heat sources generating high temperature rock. These EM waves are produced ultimately by the sun, whose energy drives the weather producing lightening bolts and whose solar wind produces global geomagnetic field variations, both of which can be treated as broadcast antennae. The waves penetrate downward diffusively, scattering back to the surface from resistivity structures for recording and analysis.

Figure 1. Layout of MT site center near the Utah FORGE project area by contractor Quantec Geoscience. Recorder digitizer is in orange soft-side case, battery pack in yellow hardened case, and magnetic field coil junction as grey metal box.

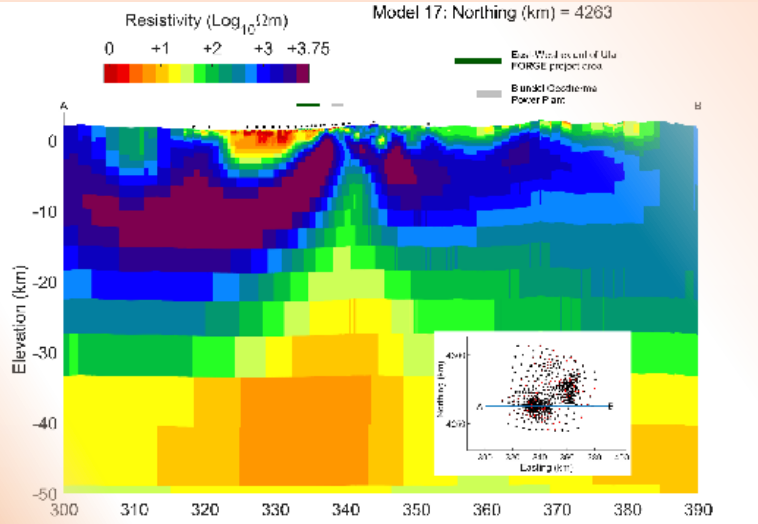

Figure 2. Section view through the Utah FORGE project area, across the Roosevelt Hot Springs (RHS) and through the central Mineral Mountains. Warm colors denote low resistivities believed diagnostic of high temperatures and fluid flow, while cool colors denote high resistivities of relatively tight plutonic or metamorphic rocks. Inset shows location of cross section within total data coverage, which encompasses that portrayed in Figure 1.

New data from an array of 120 MT recording sites were acquired over and around the project area (Figure 1). They were merged with prior recordings to achieve a combined view of Utah FORGE and Roosevelt Hot Springs structure and the Quaternary volcanic system of the Mineral Mountains. Resistivity tomograms, or computed images of resistivity from the observed EM data, were created using an algorithm created in-house based on the finite element engineering method. An east-west cross-sectional view through the fully 3D resistivity model volume appears in Figure 2.

continued...

Technical Discoveries (continued)

Directly beneath the Utah FORGE site, the low-resistivity warm (yellow-orange) colors represent the shallow sequence of alluvium deposits, whereas at deeper level the high-resistivity cool (purple-dark blue) colors represent tight basement rocks made of granitoid and gneiss that are ideal for EGS development. At much deeper level (20 km depth or more), a broad tabular zone of low resistivity (yellow-orange colors) likely represents recent intrusion or "underplating" by magma such as has occasionally erupted at the surface along the north-south length of western Utah. Protruding upward from that large volume is a narrowing zone of moderately lower resistivity that focuses near-surface to Roosevelt Hot Springs. This may well represent the conduit for heat and fluids in the hydrothermal system that supplies the Blundell power plant east of Utah FORGE.

The connection through the entire thickness of the crust provides an explanation for evidence of a magma source region, which over geologic time, heated the large volume of crystalline rock beneath the Utah FORGE site. The MT results provide important insight regarding the origin of the geothermal resource.

Modeling and Simulation Forum

The schedule is out! Find out what's coming up this year in the Modeling and Simulation Forum.

We are back to monthly forums, check out the upcoming topics here.

The July 21st M&S forum #8 registration is now open. Read more about it and register here.

Topic: Utah FORGE DFN model file availability on GDR.

Presenter: Aleta Finnila (Golder)

Data Archive

Utah FORGE has released an online Data Dashboard! Easily access all of Utah FORGE research data by visiting our intuitive, user-friendly, "one stop" compendium to find all the data, interactive tools, and other information important to the Utah FORGE project all at your fingertips.

Outreach News

Utah FORGE's ongoing efforts to keep the community and various stakeholders updated on the latest developments with the project has kept the Outreach and Communication busy.

Elected officials and their staff are important stakeholders. Recently, Dr. Joseph Moore met with members of the state legislature, including the President of the state Senate, and the Natural Resources, Agriculture and Environment Interim Committee to provide an overview of Utah FORGE. Sen. Evan Vickers, who represents Beaver County, sits on the Committee. If you're interested in hearing Joe's presentation, a recording of the full meeting is available.

U.S. Congressional staff members also received an overview of Utah FORGE. Dr. Moore spoke with the Climate Change and Environment Policy Director for a member of the U.S. House Energy Subcommittee, as well as staff members supporting the U.S. House Select Committee on Climate Crisis.

We always want to ensure that the people living in Beaver County have access to as much information about the project as possible – especially when it comes to potential seismicity. That's why we've installed computers in the libraries in Beaver City, Milford, and Minersville. The computers allow users to see real time seismic activity through the University of Utah Seismograph Stations. They can also visit Utah FORGE's seismic page.

Lectures and Podcasts

Don't forget to check out the latest Utah FORGE podcast, FORGEing Ahead with Geothermal Energy, featuring Commissioner Mark Whitney discussing the Beaver County Renewable Energy Corridor.

Know a grade school student interested in learning about geothermal energy? A new webinar, *Geothermal Energy: The Heat Beneath Our Feet* is now available. The webinar provides an overview of geothermal energy and its uses, while also introducing the concept of Enhanced Geothermal Systems.

Commissioner Mark Whitney

Partner Spotlight

University of Utah Seismograph Stations
UUSS Mission: Reducing the risk from earthquakes in Utah through research, education, and public service.

The University of Utah Seismograph Stations (UUSS) maintains and operates a combined urban and regional seismic network.

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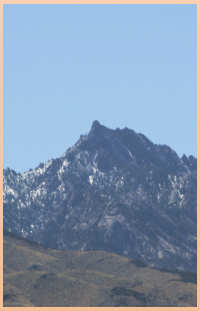
Upcoming Events

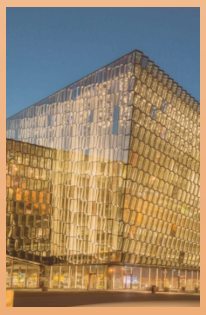
July 19-23, 2021
PIVOT 2021
Virtual

July 26-28, 2021
UNCONVENTIONAL RESOURCES TECHNOLOGY CONFERENCE
Houston, TX



August 26-28, 2021
BEAVER COUNTY FAIR
Beaver County

October 3-6, 2021
GEOTHERMAL RISING CONGRESS
San Diego, CA



October 24, 2021
WORLD GEOTHERMAL CONFERENCE
Reykjavik, Iceland

December 13-17, 2021
AGU FALL MEETING
New Orleans, LA

Down the Pipe at the Site

- Temperature logging in wells 78A-32, 56-32 and 58-32
- Installation of the nodal array
- Installation of geophones in three monitoring wells
- Stimulation in well 78B-32