

Distributed Fiber Optic Sensing Monitoring of Horizontal EGS Stimulation, Well Testing, and Production using Offset Vertical and Horizontal Wells

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Dr. Aleksei Titov is a senior geophysicist at Fervo Energy. He will speak on Thursday, June 13, 2024. The topic is “Distributed Fiber Optic Sensing Monitoring of Horizontal EGS Stimulation, Well Testing, and Production using Offset Vertical and Horizontal Wells.”

Abstract

Fervo Energy conducted several DFOS data acquisition campaigns during plug-and-perf stimulation, well-testing, and production of the horizontal Enhanced Geothermal Systems (EGS) at its projects, RED in Nevada and CAPE in Utah. The geologic formations of the reservoir include phyllite, diorite, granodiorite, and granite, reaching 430 F. It was demonstrated that low-frequency Distributed Acoustic Sensing (LF-DAS) and Distributed Strain Sensing (DSS) data recorded in offset wells are critical for geothermal resource development, including completion and well-spacing optimization. The first section of this work is focused on summarizing DFOS results from project RED during the stimulation, well-testing, and production phases of the project recorded in three wells equipped with permanent fiber optic cable. The second section covers LF-DAS and DSS results from recent two-well stimulation at project CAPE, recorded using two permanently installed and two temporarily installed fibers. To our knowledge, it was the first DFOS data acquisition at a temperature above 400F in horizontal wells using wireline and single-use fibers for offset stimulation treatment monitoring. The encountered successes and challenges are highlighted. The acquired data allowed us to characterize created hydraulic fractures and calibrate hydraulic fracture and reservoir simulation.

Biography

Dr. Titov is a senior geophysicist at Fervo Energy. He is responsible for optimizing enhanced geothermal reservoir performance using distributed fiber optic sensing data and is involved in shaping Fervo's research and development strategy. Dr. Titov received a Ph.D. in Geophysics from the Colorado School of Mines, where he worked on laboratory testing, numerical modeling, and analysis of Distributed Acoustic Sensing (DAS) data for reservoir monitoring applications. During his Ph.D. studies, he had internships with Lawrence Berkeley National Laboratory, Pioneer Natural Resources, and Aramco Research Center in Houston. Dr. Titov holds a BS and MS degree in physics from Saint Petersburg University.