Novel Productivity Enhancement Concept for a Sustainable Utilization of a Geothermal Resource

The project SURE - Novel Productivity Enhancement Concept for a Sustainable Utilization of a Geothermal Resource - will investigate and test the radial water jet drilling (RJD) technology as a method to increase inflow into insufficiently producing geothermal wells.

Radial water jet drilling uses the power of a focused jet of fluids, applied to a rock through a coil inserted in an existing well. This technology is likely to provide much better control of the enhanced flow paths around a geothermal well and does not involve the amount of fluid as conventional hydraulic fracturing, reducing the risk of induced seismicity considerably.

RJD shall be applied to access and connect high permeable zones within geothermal reservoirs to the main well with a higher degree of control compared to conventional stimulation technologies.

project coordination

Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences

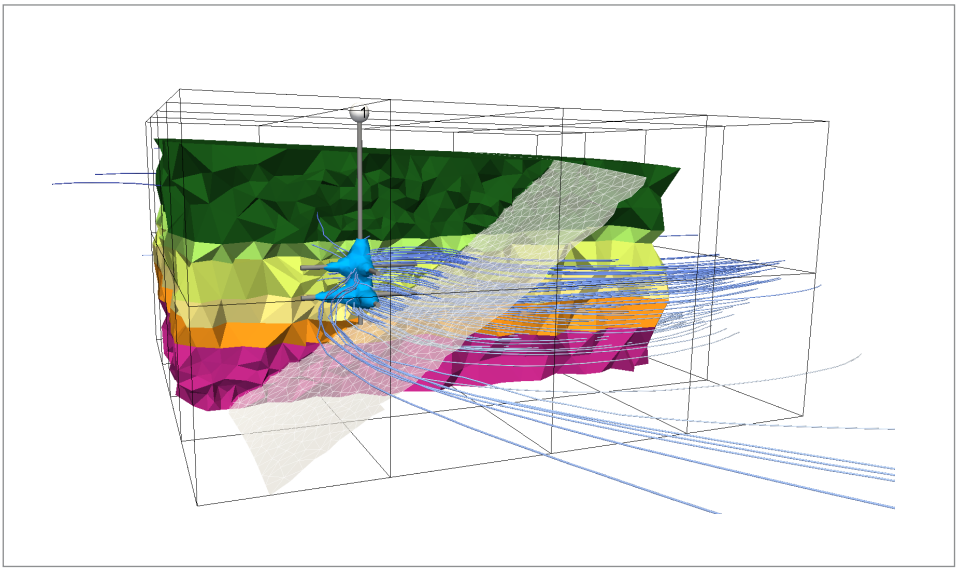
Dr. Thomas Reinsch
thomas.reinsch@gfz-potsdam.de
tel.: 0331 288 1834

Dr. Jörg Zotzmann
joerg.zotzmann@gfz-potsdam.de
tel.: 0331 288 28877

www.sure-h2020.eu

concept

The schematic shows a borehole stimulated by radial water jet drilling technology. It consists of a main hole with four laterals (each of 100 meters in length) on two levels. Here, the laterals connect a permeable fault zone and thus increase the injectivity of the borehole. Flow paths and the propagation of an isotherm (blue) are shown.



partners

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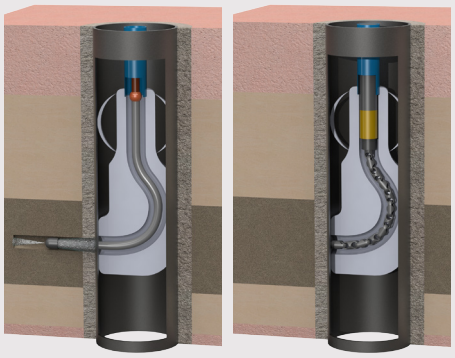
reservoir assessment
stimulation technology

radial water jet drilling

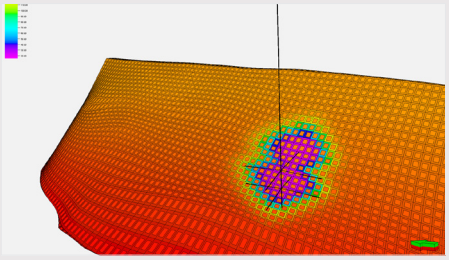


objectives

- Testing Radial Water Jet Drilling (RJD) as an alternative technology for stimulating a geothermal well.
- Evaluation of maximum sustainable productivity injectivity increase, environmental impact of RJD.
- Investigation of RJD across different spatial and temporal scales (sample, rock block, field).

experimental approaches

- Sample-Scale: Mechanical and hydraulic sample characterization, fracture permeability characterization, stability of laterals.
- Rock Block-Scale: Jetting in lab with full scale equipment, in quarry and at simulated reservoir conditions.
- Field-Scale: Pre-operational survey, field tests, long term testing at three test sites.



integration

- Micro-scale analysis of RJD process; analysis of stability of laterals in stress field.
- Predictive models for connection of radial to reservoir; up-scaling to macro scale.
- Well performance prediction; effectiveness of RJD (depth and direction, lithology and rock fabric).
- Optimal design for RJD in geothermal reservoirs; techno-economic optimization; good practice guidelines in presence of uncertainties.

see more:

Reinsch, T.; Bruhn, D.; SURE consortium (2016): Novel Productivity Enhancement Concept for a Sustainable Utilization of a Geothermal Resource – The SURE Project, European Geothermal Congress, Strasbourg FR, September 2016