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Kongress 1 - Tiefe Geothermie / *congress 1 - Deep Geothermal Energy*
16.30 - 16.55

Drilling performances study of a mud driven downhole hammer, assisted with ultra-high pressure water jetting

Untersuchung der Bohrleistung eines spülungsgetriebenen Bohrlochhammers mit Ultrahochdruck-Wasserstrahlunterstützung

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The main cost influencing factor of deep geothermal drilling is the low penetration speed in the hard and abrasive crystalline rock formations encountered. Traditional rotary drilling techniques using roller cones have proven inefficient, with very quick wear and low drilling speeds. Even though significant progress has been made on cutters and design of PDC bits, the constraints exerted on the rock and its hardness at very high depth is such that unconventional drilling techniques must be envisioned.

This work is conducted in the framework of the project ORCHYD (Novel Drilling Technology Combining Hydro-Jet and Percussion for ROP Improvement in Deep Geothermal Drilling) under horizon 2020 program. It relies on the latest development of mud driven hammers to provide high-energy percussive blows to the rock. This technology is combined with ultra-high pressure water jetting to weaken the bottom hole before attacking it with the bit. The improvement in drilling speed is assessed by comparing the performances with and without the jet, on full-scale laboratory tests. The setup is designed to reproduce realistic downhole conditions in terms of rock and confining pressure. The jet power is defined in terms of injection pressure, nozzle diameter and stand-off distance. The results of the bench trials under various operating conditions will be presented in order to demonstrate the potential of this combined technology.

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