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**GeoTHERM**  
expo & congress

Donnerstag, 2. März 2023, 17.00 Uhr  
Panorama Saal EDEKA-Arena Kongress 1 - Tiefe Geothermie

*Thursday, 2 March 2023, 5.00 pm*  
*Panorama Hall EDEKA-Arena congress 1 - Deep Geothermal Energy*



## **A multifold increase in drilling performance using combined hydro-jet and percussion drilling: case study from ORCHYD project**

*Steigerung der Bohrleistung durch kombiniertes Wasserstrahl- und Perkussionsbohren: Fallstudie aus dem ORCHYD-Projekt*

### **Dr. Laurent Gerbaud, Mines Paris / Armines**

A major segment of the total costs to develop a geothermal well is contributed by drilling alone. Using conventional rotary techniques, especially in deep geothermal wells to drill hard crystalline granites, provide low performances in drilling rate. The ORCHYD (Novel Drilling Technology Combining Hydro-jet and Percussion for ROP Improvement in Deep Geothermal Drilling) project was set up under Horizon 2020 program to study a different technique to increase the drilling performance in deep geothermal wells.

In this work, high-pressure water jetting and percussion drilling techniques are combined to efficiently break the rock. A peripheral groove created using the high-pressure water jet isolates the rock surface from the surrounding stress regimes and eases the rock breakage when a mud hammer is utilized. This technology has been tested on a laboratory scale rig under realistic downhole conditions and has shown a 2X increase in the rate of penetration as compared to when the hammer is used on its own. This study will highlight the possible reasons for achieving this performance increase and the influence of several factors like nozzle diameter and type, distance between the jet outlet and rock, backpressure on the jet i.e., the operational depth of the hybrid system, etc. and our ways forward to increasing the ROP by 3-4X as compared to the conventional drilling operation. The impact on social perception and the environment by the developed technology are also studied in this work.