Novel Drilling Technology Combining Hydro-Jet and Percussion for ROP Improvement in deep geothermal drilling

Resultados

Información del proyecto

ORCHYD

Identificador del acuerdo de subvención:
101006752

Sitio web del proyecto

DOI
10.3030/101006752

Proyecto cerrado

Fecha de la firma de la CE
9 Diciembre 2020

Fecha de inicio
1 Enero 2021

Fecha de finalización
30 Septiembre 2024

Financiado con arreglo a
SOCIETAL CHALLENGES - Secure, clean and efficient energy

Coste total
Sin datos

Aportación de la UE
€ 3 999 945,00

Coordinado por
ASSOCIATION POUR LA RECHERCHE ET LE DEVELOPPEMENT DES METHODES ET PROCESSUS INDUSTRIELS
France

CORDIS proporciona enlaces a los documentos públicos y las publicaciones de los proyectos de los programas marco HORIZONTE.

Los enlaces a los documentos y las publicaciones de los proyectos del Séptimo Programa Marco, así como los enlaces a algunos tipos de resultados específicos,

como conjuntos de datos y «software», se obtienen dinámicamente de OpenAIRE.

Resultado final

Documents, reports (18)

Modelling of hammer drilling and vibrations response for use of intensifier downhole
An estimation of drillstring vibrations available for use of pressure intensifier downhole will be reported based on integrated BRI-hammer-drill string simulations

Report on jetting with different mud fluid properties

Report on numerical modelling of groove jetting, jettability and optimisation

Report on environmental impacts
This report will mark completion of Task 31 Among others it will include an analysis of emissions and odors energy and material consumption and recycling socioeconomic and health impacts employing RA LCA CF and EFA as appropriate

"Design guide to ""hybrid HPWJ-Percussive drilling technique"""
Design guide to hybrid HPWJ-Percussive drilling technique

Report on jetting experiments performed

Report on energy security
This report will mark completion of Task 3.3. It will review the energy security literature and construct a custom quantitative index (with appropriate dimensions, components and metrics) accounting for the impact of geothermal energy and drilling of the energy security of countries and regions.

Numerical simulations of the Stress Release Process under deep drilling conditions
Report on numerical simulations of the Stress Release Process under deep drilling conditions

Bit-rock interface influence on the rock percussive breaking efficiency
The influence of representative BRI conditions (including rock chips/damage layer, confinement) on the rock breaking efficiency, under impact and in presence of WoB, will be reported

Report on modelling, prediction and feasibility of the intensifier when using drilling vibrations or fluid drilling energy

Report on modelling prediction and feasibility of the intensifier when using drilling vibrations or fluid drilling energy

Report on social impacts

This report will mark completion of Task 3.2. It will document and analyze statistically sociocultural issues, attitudes and acceptance of geothermal drilling via an online cross-national survey.

Report on Optimization of the simultaneous interactions during HPWJ-percussive drilling

Report on Groove-Cutting Optimisation

Report on expert interviews and geopolitics

This report will mark completion of Task 3.4 and WP3 that will be combined and synthesized into a national/global policy perspective for geothermal energy and deep geothermal drilling.

Drilling fluids properties characterization and recommendation for deep geothermal hard rock application

The influence of various environmentally friendly additives to reduce friction and adjust wettability at the BRI, will be reported

Brochure presenting the pilot drilling procedures for testing full scale drilling equipment under realistic operating conditions

Project specifications

Model for calculating well construction costs specific to deep geothermal projects Selection of relevant drilling conditions for experimental and modeling works rocks drilling conditions operating parameters rigs capacities regulations etc

Rock microstructure influence on rock percussive breaking and chipping mechanisms, downhole

The influence of microstructures rock breaking processes and chips sizes created will be reported under impact indentation with use of representative volume of rock with and without groove (or equivalent boundaries confined conditions)

Websites, patent fillings, videos etc. (1)

Project Website

Publicaciones

Other (13)

EU-funded research seeks to speed up drilling for deep geothermal
Autores: Alexander Richter (Think Geoenergy), Laurent Gerbaud, Hedi Sellami and Naveen Velmurugan (MINES Paris/ARMINES)
Publicado en: 2021
Editor: Think Geoenergy

L'accès à l'énergie géothermale pourrait être plus abordable, grâce à une nouvelle technique de forage (Geothermal energy could be cheaper to access, thanks to a new drilling technology)
Autores: Laurent Gerbaud, Hedi Sellami, Naveen Velmurugan, MINES Paris/ARMINES
Publicado en: 2021
Editor: Pôle Avenia

Geothermal energy could be cheaper to access thanks to a new drilling technology
Autores: Caroline Brogan, John-Paul Latham, Imperial College London
Publicado en: 2021
Editor: Imperial College London

Geothermal energy could be cheaper to access, thanks to a new drilling technology
Autores: Mines Paris
Publicado en: 2021
Editor: Centre de Geosciences, Mines Paris

Deep Geothermal' promises to let drillers go deeper, faster and hotter
Autores: Benoit Morenne
Publicado en: The Wall Street Journal, 2022
Editor: The Wall Street Journal

Novel drilling technology combining hydro-jet and percussion for ROP improvement in deep geothermal drilling
Autores: Naveen Velmurugan (Mines Paris)
Publicado en: Geotherm 2021, 2021
Editor: Geotherm Expo & Congress

Drilling performances study of a mud driven downhole hammer, assisted with ultra-high pressure water jetting
Autores: Laurent Gerbaud (Mines Paris)
Publicado en: GeoTHERM 2022, 2022
Editor: Geotherm Expo & Congress

A multifold increase in drilling performance using combined hydro-jet and percussion drilling: case study from ORCHYD project
Autores: Laurent Gerbaud (Mines Paris)
Publicado en: GeoTHERM 2023, Edición Annual, 2023
Editor: GeoTHERM, expo & congress

Life cycle assessment of the environmental impacts of the ORCHYD project
Autores: Vasileios Papakostas, John A Paravantis, Nikoletta Kontoulis (University of Piraeus Research Centre), Naveen Velmurugan (Mines Paris), Florian Cazenave (Drillstar Industries)
Publicado en: 3rd International Conference on Energy Research and Social Science Conference, 2022
Editor: Energy and Climate Transformations

Experts cite challenges, progress towards geothermal's holy grail
Autores: Quaise Inc
Publicado en: Newswise, 2021
Editor: Newswise

(Panel discussion) The future of drilling for deep geothermal
Autores: Naveen Velmurugan (Mines Paris), Carlos Araque (Quaise Energy), Igor Kocis (GA Drilling), Mark Russell (Hypersciences)
Publicado en: Pivot 2021, 2021
Editor: Pivot - Geothermal Reimagined

A comprehensive study on drilling performance of first prototype from ORCHYD: Design, fabrication and experimental tests
Autores: Naveen Velmurugan (Mines Paris)
Publicado en: GeoTHERM 2024, Edición Annual, 2024
Editor: GeoTHERM, expo & congress

ORCHYD: A Fluid-driven Drilling System Combining Water Jetting and Hammer Drilling for Cheaper Geothermal Drilling
Autores: Laurent Gerbaud, Hedi Sellami, Naveen Velmurugan (ARMINES/ MINES Paris), John-Paul Latham (Imperial College London), Alexandre Kane (SINTEF), Florian Cazenave (Drillstar Industries), John Paravantis (University of Piraeus Research Center), Hualin Liao (China University of Petroleum)
Publicado en: ARMA Letter, Edición Edición 33 - Winter 2022, 2022, Página(s)

47-49
Editor: AMERICAN ROCK MECHANICS ASSOCIATON

Conference proceedings (17)

Assessing the environmental impacts of deep geothermal drilling in the ORCHYD project
Autores: John A Paravantis, Nikoletta Kontoulis, Vasileios Papakostas (University of Piraeus Research Centre), Naveen Velmurugan (Mines Paris), Florian Cazenave (Drillstar Industries)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Environmental impacts of water-based fluids in geothermal drilling
Autores: Vasileios Papakostas, John A Paravantis, Nikoletta Kontoulis (University of Piraeus Research Centre), Florian Cazenave (Drillstar Industries), Laurent Gerbaud, Naveen Velmurugan (Mines Paris)
Publicado en: European Geothermal Congress, 2021
Editor: European Geothermal Congress

Three-dimensional numerical study of DTH bit-rock interaction with HPWJ downhole slotting: influence of bit design and bottom hole geometric conditions on rock breaking efficiency in percussive drilling
Autores: Stephane Dumoulin, Nicolas Morin, Terence Coudert, Alexandre Kane (SINTEF Norway), Laurent Gerbaud, Naveen Velmurugan, Emad Jahangir, Hedi Sellami (Mines Paris), John-Paul Latham, Sadjad Naderi, Jiansheng Xiang (Imperial College London)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

A study of rock breakage under extreme submerged confining pressure: can DTH hammer drilling deliver?
Autores: Laurent Gerbaud, Naveen Velmurugan, Jorge Aising, Cédric Chambres (Mines Paris), Sadjad Naderi, John-Paul Latham, Jiansheng Xiang, X Yang (ICL)
Publicado en: ARMA 58th US Rock Mechanics/Geomechanics Symposium, Edición Annual, 2024
Editor: ARMA

Experimental and numerical investigation of high-pressure jetting fluids impinging on submerged hard rock under deep geothermal downhole drilling conditions
Autores: John-Paul Latham, Jiansheng Xiang (Earth Science and Engineering, Imperial College London), Laurent Gerbaud, Hedi Sellami, Naveen Velmurugan

(Mines Paris), Alexandre Kane, Juan Yang, Tèrence Coudert (SINTEF Norway), Hualin Liao, Huajian Wang (School of Petroleum Engineering, China University of Petroleum (East China))
Publicado en: European Geothermal Congress, 2022
Editor: European Geothermal Congress

Novel environmentally friendly nano-additives for drilling fluids
Autores: Juan Yang, Alexandre Kane, T. Didriksen, K. Thorshaug, G. Stenerud, B. Vågenes, B. Lund (SINTEF Norway), John-Paul Latham, Jiansheng Xiang (Imperial College London), Naveen Velmurugan, Laurent Gerbaud, Hedi Sellami (Mines Paris)
Publicado en: 56th US Rock Mechanics/ Geomechanics Symposium, 2022
Editor: Americal Rock Mechanics Association

Destruction of Rock Microstructure: an Experimental and Numerical Modelling Study of High-Pressure Water Jet Rock Cutting under Subsurface Confining Pressure Conditions
Autores: Jiansheng Xiang, Sadjad Naderi, John-Paul Latham (ICL), Laurent Gerbaud, Naveen Velmurugan, Isabelle Thenevin, Hedi Sellami (Mines Paris)
Publicado en: ARMA 58th US Rock Mechanics/Geomechanics Symposium, Edición Annual, 2024
Editor: ARMA

Study on output pressure prediction and jetting features of ultra-high pressure water jet for the downhole intensifier
Autores: Hualin Liao, Huajian Wang (School of Petroleum Engineering, China University of Petroleum (East China)), John-Paul Latham, Jiansheng Xiang (Earth Science and Engineering, Imperial College London), Laurent Gerbaud, Hedi Sellami (Mines Paris)
Publicado en: European Geothermal Congress, 2022
Editor: European Geothermal Congress

Social aspects of deep geothermal drilling in the ORCHYD project
Autores: John A Paravantis, Nikoletta Kontoulis, Vasileios Papakostas (University of Piraeus Research Centre), Naveen Velmurugan (Mines Paris), Florian Cazenave (Drillstar Industries)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Enhancing drilling performance of mud hammers by combining high pressure water jets slotting
Autores: Laurent Gerbaud, Emad Jahangir, Naveen Velmurugan, Hedi Sellami (Mines Paris), Florian Cazenave (Drillstar)
Publicado en: ARMA 57th US Rock Mechanics/Geomechanics Symposium, Edición Annual, 2023
Editor: ARMA

Experimental Study on the Dynamic behavior and Energy Consumption of Hot Dry Rock under True Triaxial Condition

Autores: Hualin Liao, Jun Wei, Feng Sun, Zongjie Mu, Shouceng Tian, Hongjun Liang, Ning Li, Bo Zhou (China University of Petroleum)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Preliminary experimental validation of the improved ROP using hammer and HPWJ (vertical drilling bench results)

Autores: Laurent Gerbaud (Mines Paris), Florian Cazenave (Drillstar Industries), Naveen Velmurugan, Hedi Sellami (Mines Paris)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Improvement of drilling performances in deep geothermal drilling in hard rocks, by using a novel hydro-mechanical drilling technology

Autores: Hedi Sellami, Laurent Gerbaud, Emad Jahangir, Naveen Velmurugan (Mines Paris), Florian Cazenave, Raphäel Souchal (Drillstar Industries)
Publicado en: European Geothermal Congress, 2021
Editor: European Geothermal Congress

Design and experimental study of intensifier for deep geothermal drilling

Autores: Y. He, Hualin Liao (China University of Petroleum (East China)), Hedi Sellami (Mines Paris), John-Paul Latham, Jiansheng Xiang (Imperial College London), Laurent Gerbaud (Mines Paris)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Dynamic Bottom Hole Stress Reconstructing process induced by intensifier jet slotting in deep geothermal drilling

Autores: Huajian Wang, Hualin Liao (China University of Petroleum (East China)), Hedi Sellami (Mines Paris), John-Paul Latham, Jiansheng Xiang (Imperial College London), Laurent Gerbaud (Mines Paris)
Publicado en: World Geothermal Congress, Edición Every 3 years, 2023
Editor: World Geothermal Congress

Downhole stress release effect of grooving by means of ultra-high pressure water jet in deep geothermal drilling

Autores: Huajian Wang, Hualin Liao, Jun Wei, Yongwang Liu (School of Petroleum Engineering, China University of Petroleum (East China)), Jingkai Chen (School of Mechanical and Electronic Engineering, China University of Petroleum (East China))
Publicado en: Geothermal Rising Conference, 2021
Editor: Geothermal Rising

Influencing factors in rock cutting using high pressure water jets under submerged downhole conditions

Autores: Naveen Velmurugan, Laurent Gerbaud, Cédric Chambres (Mines Paris), Sadjad Naderi, Jiansheng Xiang, John-Paul Latham (ICL)
Publicado en: ARMA 57th US Rock Mechanics/Geomechanics Symposium, Edición Annual, 2023
Editor: ARMA

Peer reviewed articles (3)

Three-Dimensional Numerical Study of DTH Bit–Rock Interaction with HPWJ Downhole Slotting: Influence of Bit Design and Bottom Hole Geometric Conditions on Rock Breaking Efficiency in Percussive Drilling

Autores: S. Dumoulin, A. Kane, T. Coudert, N. Morin, L. Gerbaud, N. Velmurugan, E. Jahangir, H. Sellami, J.-P. Latham, S. Naderi, J. Xiang
Publicado en: Rock Mechanics Bulletin, 2024, Página(s) 100169, ISSN 2773-2304
Editor: Science Direct
DOI: 10.1016/j.rockmb.2024.100169

A complete experimental study on hard granites: Microstructural characterization, mechanical response, and failure criterion

Autores: Stéphane Dumoulin (SINTEF), Isabelle Thenevin (Mines Paris), Alexandre Kane (SINTEF), Ahmed Rouabhi, John-Paul Latham (ICL), Emad Jahangir, Hedi Sellami (Mines Paris)
Publicado en: Geomechanics for Energy and the Environment, Edición Volume 40, 2024, ISSN 2352-3808
Editor: Science direct
DOI: 10.1016/j.gete.2024.100592

Pressure Drop Model and Jet Features of Ultra High Pressure Water Jet for Downhole Intensifier

Autores: Huajian Wang, Hualin Liao, Jun Wei, Yongwang Liu, Wenlong Niu, Jiansheng Liu (School of Petroleum Engineering, China University of Petroleum (East China)), Jingkai Chen (School of Mechanical and Electronic Engineering, China University of Petroleum (East China)), John-Paul Latham, Jiansheng Xiang (Earth Science and Engineering, Imperial College London)
Publicado en: The American Society of Mechanical Engineers, Edición Volume 144, Edición 12, 2022, ISSN 0195-0738
Editor: ASME
DOI: 10.1115/1.4054503

Conjuntos de datos

Conjuntos de datos vía OpenAIRE (2)

Dataset for three granites
Autores: Dumoulin, Stephane; Isabelle, Thenevin; Alexandre, Kane
Publicado en: Zenodo

Dataset for three granites
Autores: Dumoulin, Stephane; Isabelle, Thenevin; Alexandre, Kane
Publicado en: Zenodo

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European Union, 2025