STC 2016

03-04 November, Wietze, Germany

Petroleum & Drilling Engineering
Geothermics
Hydrocarbon-related Geosciences

PROGRAM

SPE International
German Section

Student Technical Conference

Dear students and oilfield professionals,

We are proud to welcome you to the STC 2016 – the Student Technical Conference organized by the German Section of the Society of Petroleum Engineers and its student chapters.

This conference has established itself in the last several years as a prime event to learn about the research done in academia related to the "wider oilfield". As our presentations are solely performed by students, it is also a good first opportunity for several of them to present their work to a broad audience. Also, we again offer opportunities for students and potential employers in the oilfield industry as well as young professionals from our industry for informal discussions. We can only encourage students to take advantage of this opportunity.

As in the previous years, we have chosen the German Oil Museum as the venue for this event, not the least because it offers a unique setting where you can "smell" oilfield history. When you have a chance, also visit the exhibits that show you true history in one of the birthplaces of the global oil&gas industry.

At our STC, we have contributors from our associated student chapters in Aachen, Bochum, Freiberg, and Clausthal. Our other contributors come from different Universities in Germany as well as from Austria, India, Russia, Portugal, and Ukraine. Again, we also feature an extended poster session which we encourage you to visit in between the presentations. Like the successful panel discussion last year, we start our second panel discussion with young professionals from our industry.

The STC has evolved to a conference with spearheading presentations and posters, setting a mark in science. However, it is also a place to gather with a personal note – to meet old friends and make new ones.

We hope you find the STC 2016 both educational and enjoyable.

Sincerely,

Oksana Zhebel	Ingo Forstner	Ulrike Peikert
Section Chair German Section of the SPE	Officer Student Liaison German Section of the SPE	Officer STC German Section of the SPE

as well as the whole boards of the German Section of SPE and its student chapters

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Geology
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Drilling
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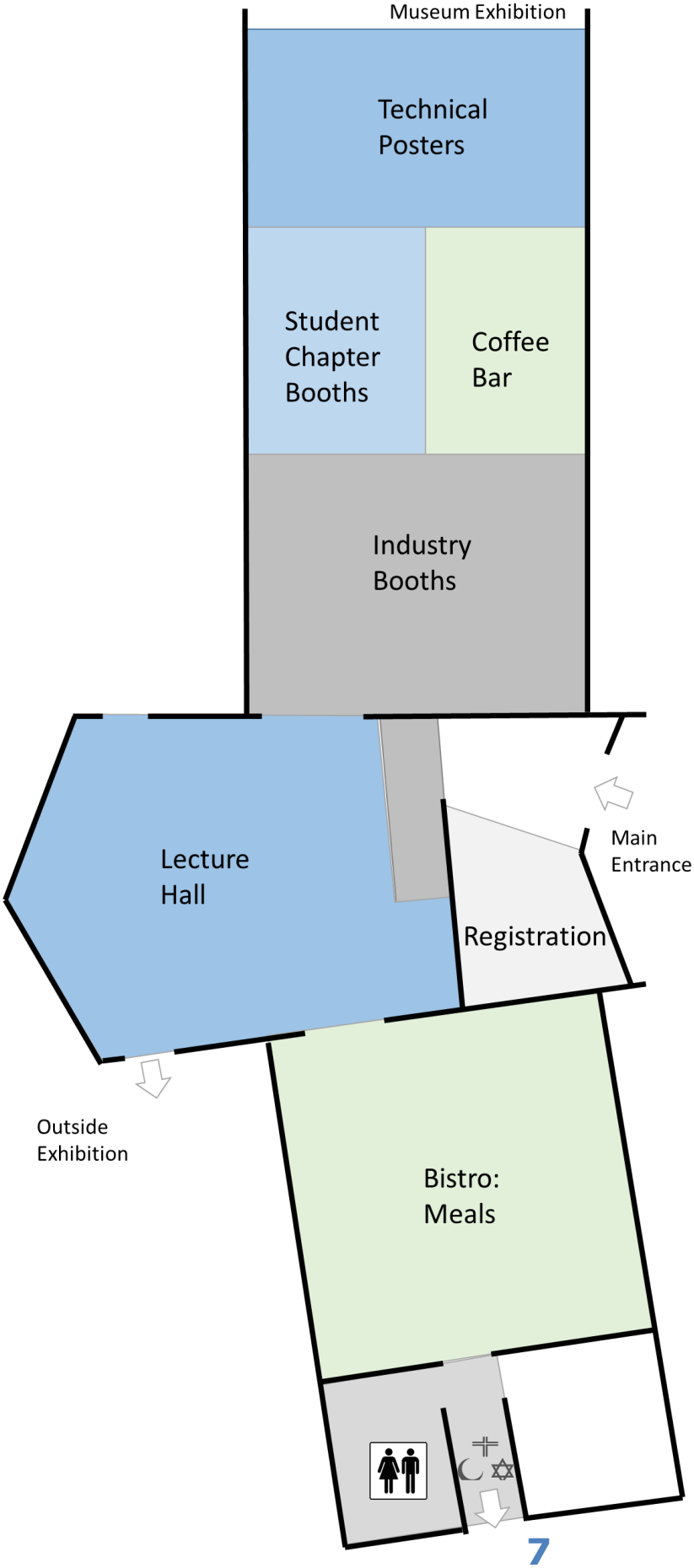
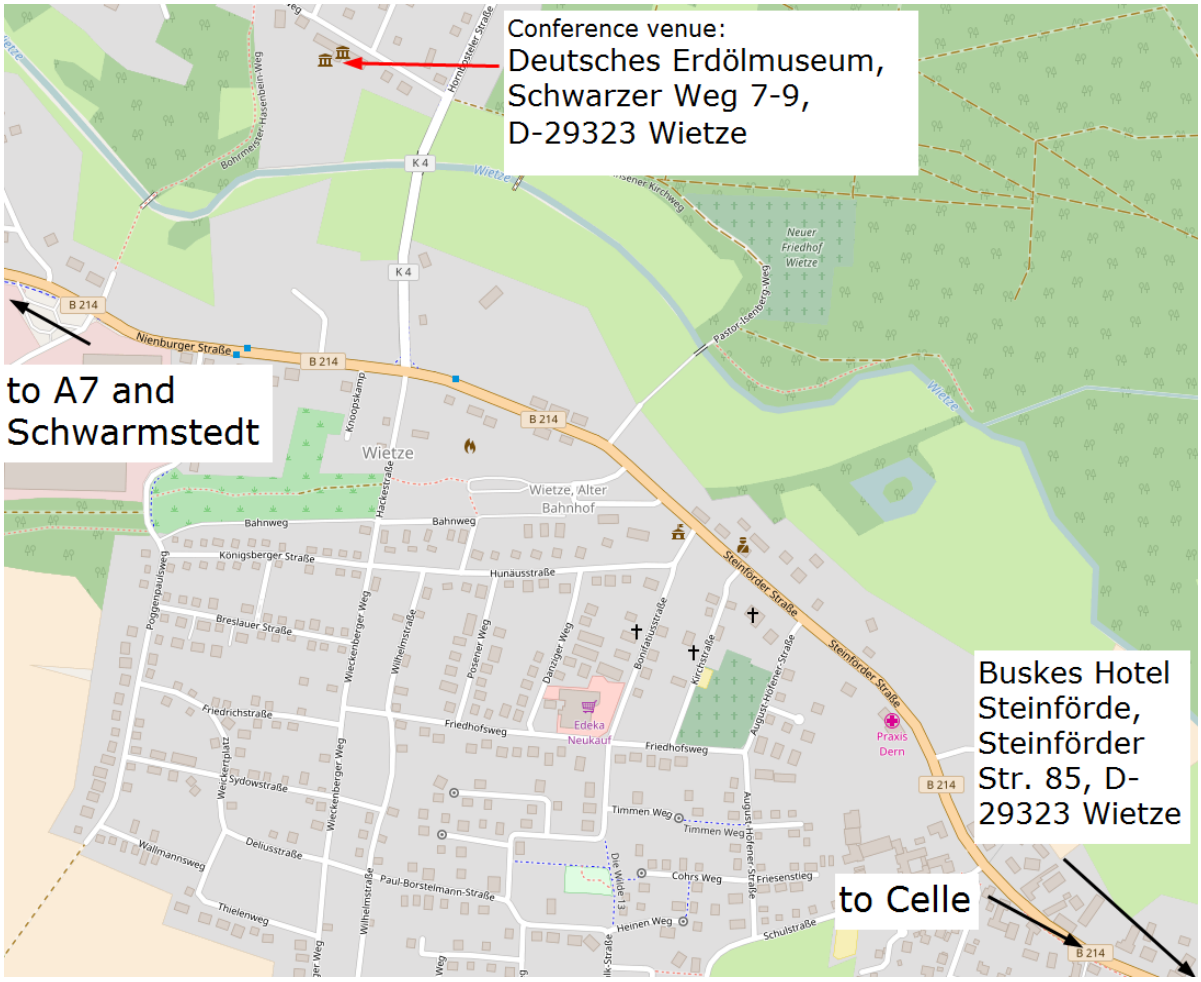
Presentations and Posters by Students from



Sitemap

Venue:
Deutsches Erdölmuseum Wietze
(www.erdoelmuseum-wietze.de)
Schwarzer Weg 7-9
D-29323 Wietze
Tel.: +49 (0)5146 – 92341

How to arrive:



- Venue and hotels are in a rural setting. The only public transport to it are buses
- By plane: Hanover Airport, then either a taxi (~80 €), or S-Bahn to Hanover Hbf, then train to Celle, then as below
- By train: Celle Bahnhof, then take Bus 800 to Wietze
- Organizing transportation to/from the conference is the responsibility of each participant. There is no chartered bus shuttle available. Please organize car-pools.

Registration Details

Ahead-of-time registration with Heike Preuße is required for all students, faculty and industry (Heike.Preusse@bakerhughes.com). Walk-ins cannot be accommodated.

The conference language is English.

A block booking at two nearby hotels has been made (Tepe's Gasthof in Schwarmstedt and Buskes Hotel Steinförde in Wietze), for all students and also industry representatives. **Heike Preuße** will coordinate **accommodation and send out details to every participant in calendar week 42**. Other reservations can also be coordinated with Heike.Preusse@bakerhughes.com (+49-5141-203-475)

Participation fees are:

STC 2016 enrolment rules	Students			Faculty	Industry representatives	
	Presenting	Not Presenting			Sponsor	non-sponsor
	SPE, Lecture or Poster	SPE, from Germany	SPE, from abroad			
Admission (both days)	free	25 € upon arrival		free	free	50 € upon arrival
Lunchs & Dinner						
Accomodation incl. Breakfast	1 free night	1 free night	self-payed	self-payed	self-payed	self-payed
Travel expenses	up to 50 € reimbursed	up to 50 € reimbursed	self-payed	self-payed	self-payed	self-payed

- 80 € for industry representatives (non-members)
- 30 € for retirees and students that are non-SPE members

Please coordinate travel with your student chapter and car-pool.

The dinner on Thursday is sponsored for all participants.

For reimbursement questions, our treasurer Christian Kiesl will be available at the GSSPE booth.

Connect.spe.org/Germany

Hotel Information

Buskes Hotel Steinförde (www.buskes.de)
Steinförder Str. 85
D-29323 Wietze
Tel.: 0049 5146-1462
(approx. 2 km to the conference venue)

Tepe's Gasthof (tepes-gasthof.de)
Kirchstraße 12
29690 Schwarmstedt
Tel.: 0049 5071-98120
(approx. 16 km to the conference venue, please car-pool)

Key Note Speaker

Dr. Christoph Löwer

Managing Director of BVEG

” The future of the German E&P Industry and the role of the business organization”

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Christoph Löwer (47) is the Director General and Member of the Board of the Bundesverband für Erdgas, Erdöl und Geoenergie e.V. (BVEG) in Hannover, Germany. The BVEG is the voice of the oil and gas producers, the operator of gas storages and service providers of this industry in Germany. He has a PhD in agricultural sciences. Before joining the BVEG in 2015 he held several positions within public affairs, e.g. Director Public Affairs, Burson-Marsteller and Head of group representative office and CSR, Alstom Deutschland.

BVEG Bundesverband Erdgas, Erdöl und Geoenergie e.V.

Young Professionals Panel "Transitioning into the workforce - pitfalls, strategies, experiences"

This year we have four Young Professionals (YPs) who will share their experience when entering the workforce. They will talk about how they moved into their current position and which challenges they faced. Use this opportunity to ask questions, they are happy to answer them.

Panel participants are:

Caroline Kannwischer

Works in the industry since July 2015

Graduate Development Program - Drilling Engineer / HSE at ENGIE E&P Deutschland GmbH

Sebastian Thronberens

Works in Industry since 2014

Wireline Field Engineer at Weatherford Energy Services GmbH

Max Arndt

Works in the industry since 2015

Project Development Management Coordinator Technical Software at Baker Hughes

Samir Alakbarov

Works in the industry since 2015

SPEAD Reservoir Engineer at Wintershall

Presenters on Thursday

Name: **Sellami, Hamza**
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Paper refers to: Bachelor Thesis
Studying: Mechanical Engineering
When to graduate: October 2016
Field of interest: Drilling Optimization and Vibrations

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Case Study: Methods for automated Drilling Performance Analysis Based on Downhole Measurements

Supervisors:
Pedro Arevalo (BHI), Ilja Gorelik (University of Hannover), Hatem Oueslati (BHI)

Abstract:

A new dynamics measurement tool has been developed to acquire, process and record a comprehensive suite of high-speed data, including downhole loads, accelerations, and pressures. To reduce the well costs, high rate of penetration and increased drilling efficiency must be reached. Thus, making the most use of these information and combining them with surface data allows for an accurate analysis of the drilling performance and better understanding of the BHA dysfunctions to improve future jobs planning.

This paper suggests methods for automated drilling performance analysis through defining and benchmarking performance qualifiers and performance evaluators. Furthermore, Key Performance Indicators (KPIs) are introduced to simplify the visualization and the representation of the aggregated data and the understanding of the different drilling mechanics phenomena. Rate of Penetration (ROP), Time Efficiency (TE) and Mechanical Energy Efficiency (MEE) are classified as performance qualifiers. The defined performance evaluators are Vibration Management (VM), Bit Performance (BP), Loads Control (LC) and Formation Change Index (FCI).

Depending on the well path, formation being drilled and the bit design, drilling efficiently means drilling with optimum weight on bit (WOB), rotations per minute (RPM) and flow rate. Therefore these operational parameters need to be adjusted to minimize the mechanical specific energy (MSE) and to maximize the ROP. Moreover as the drilling process is dynamic, vibrations are inevitable and are considered to be one of the major causes of inefficient drilling performance. Consequently identifying harmful vibration modes and the root cause of the dysfunctions allows preventing tool failures and improving the drilling rates.

To speed up and to standardize the processing and evaluation of the provided data, a stand-alone application has been developed. A field case study will be carried out, to outline and validate the concepts that have been presented. The methods discussed in this paper will constitute a useful tool for automated drilling performance analysis.

Name: **Hahn, Simon**
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Paper refers to: Phd studentship
Studying: Advanced Drilling Technologies
When to graduate: 04-2019
Field of interest: Drilling Technologies

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Extended Horizontal Jet Drilling for Geothermal and Hard Rock Applications

S. Hahn, V. Wittig, R. Bracke, International Geothermal Centre Bochum

High pressure water jet drilling technologies are being widely used in the deep drilling industry. However, especially in geothermal and hard rock applications, horizontal (radial) jet drilling is confronted with several limitations like lateral length, hole size and steerability in order to serve e.g. as serious alternative to conventional stimulation techniques. Therefore, these high pressure jetting techniques are under investigation for gaining fundamental knowledge of the fluid-structure interaction and the governing process parameters in order to improve the rock failing and drilling mechanism. For this purpose, investigations at GZB are divided into several levels. Initially, the so called jetability of different rock types, e.g. like carbonates, sandstones and volcanic rocks is being evaluated under free surface conditions, logging "impact energy" via fluid pressure, flow, speed and rock destruction. Parallel, optical and acoustic measurements are being taken, using high speed camera and piezo sensors, to observe the jetting action and log jet and structure borne noise to possibly detect fracture propagation within the rock. Furthermore, rock samples will be stressed by confining pressures up to 200 bar. As a final test, jetability shall be evaluated by applying real reservoir conditions of > 5.000 m depth (e.g. 1.250 bar and 180°C) using GZB´s insitu borehole simulator 'iBOGS'.
Results of initial tests do show a clear dependency of achievable penetration depth on the interaction of jetting and rock parameters. Next, via evaluation of the acoustic signal patterns, links to the fluid-structure interaction are being made. Additional, using optical measurements, the turbulent flow in front of the borehole wall may be visualized and recorded.
Jetting technologies for drilling processes have been under investigation at GZB at various pressure levels up to 1.600 bars including percussion drilling. This work is a steady continuation of that type of work including cooperation with the jet drilling industry.

Name: **Ibragim, Renas**
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Paper refers to: Research (Seminar topic)
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When to graduate: September 2017
Field of interest: Drilling and Production

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Realizing the Drilling While Running Casing: A new Approach in drilling for ERD Wells to increase Drilling Operations Efficiency

Abstract:
Reaching the oil reservoirs by means of ERD Wells is still a real challenge for drilling engineers. The concepts or better to say the restrictions such as torque and drag, cutting transport, real time monitoring, real time data acquisition and processing, etc. are only some examples of constrains regarding drilling an ERD Well. Within different restrictions, two primary challenges are torque/drag and cutting transport. By increasing the horizontal departure of an ERD Well torque increases and its main cause arises from frictional resistance arising from contact between the drill string and borehole wall. It is obvious that cutting transport follows the same tendency. The notions of settling and piling up of the cuttings on the lower side of the borehole, increase of contact surface between drill string and borehole leading to differential pipe sticking are all explained due to inapt cutting transport. To deal with Torque/Drag and cutting transport lots of studies and propositions have been done which remain in the phase of mitigating the problem not eliminating that. Some solutions such as changing the pump rate or adjusting the properties of the drilling mud can be carried out; however they could also impose other restrictions on drilling operation.
This paper proposes a possible solution to mitigate the problem further in order to enable drilling longer distances in ERD Wells. This qualitative solution is actually a modification in casing drilling along with the concept of Dual Conduit Drilling. The influence of this approach on Torque/Drag, cutting transport and cementing job is also discussed. This technique which is called drilling while running casing, uses the buoyancy force to reduce (or eliminate) the contact between DS and the borehole. One advantage of drilling while running the casing is that there is a small portion of borehole under the continuous effect of drilling mud. Cuttings transport through casing and staying in drill mud density window are additional advantages of this method.

Keywords: ERD wells torque and drag, cutting transport, ECD, casing drilling, dual conduit drilling, cementing

Name: **David Kutas, Alexios Koulidis**
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Paper refers to: Literature Research
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When to graduate: June, 2017
Field of interest: Drilling Engineering, HSE, Well Control, Optimization

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Space Drilling - Considerations, Problems, and Unlimited Perspectives

Abstract:

Space is the ultimate frontier what mankind can ever reach. Drilling operations on asteroids, other planetoids, and planets can provide ways for unlimited mineral resources without jeopardizing Earth's exhaustible and endangered biosphere anymore. Based on recent scientific and engineering achievements (European Space Agency's Rosetta's Philae probe landing on comet; NASA's MSL [Mars Space Laboratory] mission Curiosity rover powered by radioisotope thermoelectric generator [RTG] able to drill and coring on Mars) in the space industry, and advanced automation solutions and learnings from deepwater subsea operations are getting more and more accepted and common in the drilling industry the time when these yet crazy looking ideas and considerations become reality are not too far.

The paper is focusing on the most fundamental problems, considerations such as power supply of drilling and supplementary equipment, energy transmission to drillstring, cuttings transportation, drill-bit cooling, drill-bit type, applying weight-on-bit and fixing device in microgravity, unexpected fluid influxes, penetrable formation types; extractable resources and ways for extraction - which can be encountered by drilling operations on other planetoids where elementary parameters, phenomena such as gravity, and other ambient conditions are differing from the ones industry always works with on Earth or even lacking.

The achieved learnings can contribute to comprehensively understand this yet only superficially existing engineering and operation field, and corresponding challenges. Short-term, it can also contribute to develop automated solutions for Earth like conditions which can contribute to long-term objectives and through this solving engineering challenges which might help mankind to broaden its horizons.

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Innovative Thermal Drilling Technologies based on mechanically assisted LaserJet Drilling (LJD) for hard rock (geothermal) applications

S. Jamali, V. Wittig, R. Bracke, International Geothermal Centre Bochum

The deep drilling industry introduced fundamental technical improvements at the turn of the twentieth century by replacing cable tool drilling with rotary drilling process. Since then, rotary drilling has seen numerous incremental enhancements in various aspects. However, it still performs poorly in especially hard formations. While e.g. geothermal resources tend to be found in deeper and harder formations than O&G, for their economic recovery innovative and fundamental changes in the prevailing, conventional drilling process have long been overdue.

However, no ground breaking improvements to the mechanical rock breaking have since been introduced to address the exponentially increasing technical challenges, leading to poor economics in deep, hard rock drilling. Problems include very low rate of penetration, high tool wear, resulting in low service life, time consuming tripping with high overall cost, trying to deliver more energy to the bit, etc.

Thermal drilling processes such as (mechanical assisted) LaserJet Drilling (LJD) could potentially be a next fundamental change and thus, overcome the challenges. Such innovative thermal drilling technologies are being investigated at GZB in Bochum, specifically mechanically supported Laser Jet drilling. Hereby, a Laser beam, focusing into a water jet and protected by a gas shield, is being sent onto rock's surface to weaken its structure and induce spallation. The objective here is to avoid melting the rock, but rather to thermally induce stresses, weaken the rock and crack the mineral structure by creating spalls. weakening process is due to induced thermal stresses, which do result in fractures, mineral dehydration and thus, reduction in rock´s Young and shear modulus. Subsequently, the now weakened rock will be drilled using optimized mechanical bit technologies. This process continues on rock's surface, as the cuttings and fragments are being removed via a drilling fluid as a flushing system.

The preliminary lab and field setup and tests of Laser Jet drilling results will be discussed, showing multiple advantages compared to conventional drilling methods including: additional energy being sent to the bit efficiently via fiber optics, high ROP, longer bit life due to less wear, etc. Furthermore, a new LaserJet drill bit, required changes and modifications to be implemented in the present drill string equipment and economic and technical analyses of the possible advantages and disadvantages are also being described and presented.

Name: **Romero Sarcos, Rene Jose**
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Paper refers to: Literature research
Studying: Petroleum Engineering, Master´s Degree
When to graduate: September 2017
Field of interest: Reservoir Engineering

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Effect of Alternative Cushion Gas on UHS Performance

Abstract:

Renewable energy is increasing its quote in the market; however high fluctuation during peak demand is its main concern, for this reason, when extra electricity is generated it is used in a process named electrolysis that consists in separating hydrogen from water; hydrogen can be used as an energy carrier, however the issue relies on where to accumulate the hydrogen. Underground hydrogen storage (UHS) might be the solution; therefore, improving the performance of them is vital. The hypothesis is that replacing hydrogen cushion gas which behaves approximately as ideal gas by a highly compressible cushion gas would increase the volume of hydrogen that could be stored underground. To confirm this, different combinations of alternative cushion gases are analyzed with material balance method in depleted gas reservoirs and salt caverns.

Results indicate that using alternative cushion gas in UHS is beneficial for the performance of the underground storage facilities; they allow storing higher inventories of working hydrogen. The efficiency range when using the most profitable mixture of gases in salt caverns is between 21% and 44% while in depleted gas reservoirs the performance is quite lower with an efficiency range between 1% and 28%. Therefore, the effect of alternative cushion gas on the performance of UHS would have an extremely important role in the establishment of renewable energy.

Name: **Chaudhary, Pulkit**
University: DIT University
Paper refers to: Research
Studying: Petroleum Engineering, Bachelor degree
When to graduate: 2017
Field of interest: Drilling fluids

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Title – Development of novel oil-in-water emulsion drilling fluid system by using palm oil

Abstract:
Diesel in water emulsion drilling fluid system are toxic and its use leads to environmental degradation, thus to trigger this issue an attempt has been carried out to formulate a novel oil-in-water emulsion drilling fluid system using palm oil. The emulsifying agent used to develop this oil-in-water emulsion drilling fluid system is sodium lauryl sulphate. The effects of different concentrations of palm oil, bentonite clay and carboxy methyl cellulose (CMC) have been observed thoroughly on the rheological properties of developed drilling fluid. The rheological properties evaluated are apparent viscosity, plastic viscosity, yield point and gel strength. Stability of the developed mud system has been checked by calculating the initial rheological properties and fluid loss, then aging the developed fluid for 48 hours at room temperature and then comparing the final rheological properties and fluid loss with the initial observed values. To calculate percentage reduction in the permeability due to the developed fluid system, core flooding test has been carried out in which developed fluid has been passed through a sandstone core whose initial permeability is known and final permeability is determined after flooding operation. The developed palm oil-in-water emulsion mud drilling mud system and its observed rheological and fluid loss properties shows better results when compared with diesel-in-water emulsion drilling fluid system. Therefore, the developed drilling fluid system using palm oil could be a better alternative to conventional diesel-in-water emulsion drilling fluid system.

Name: **Be, Michael**
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Paper refers to: Advanced Seminar Research
Studying: Reservoir Management, Master of Science
When to graduate: October 2017
Field of interest: EOR, Reservoir Engineering

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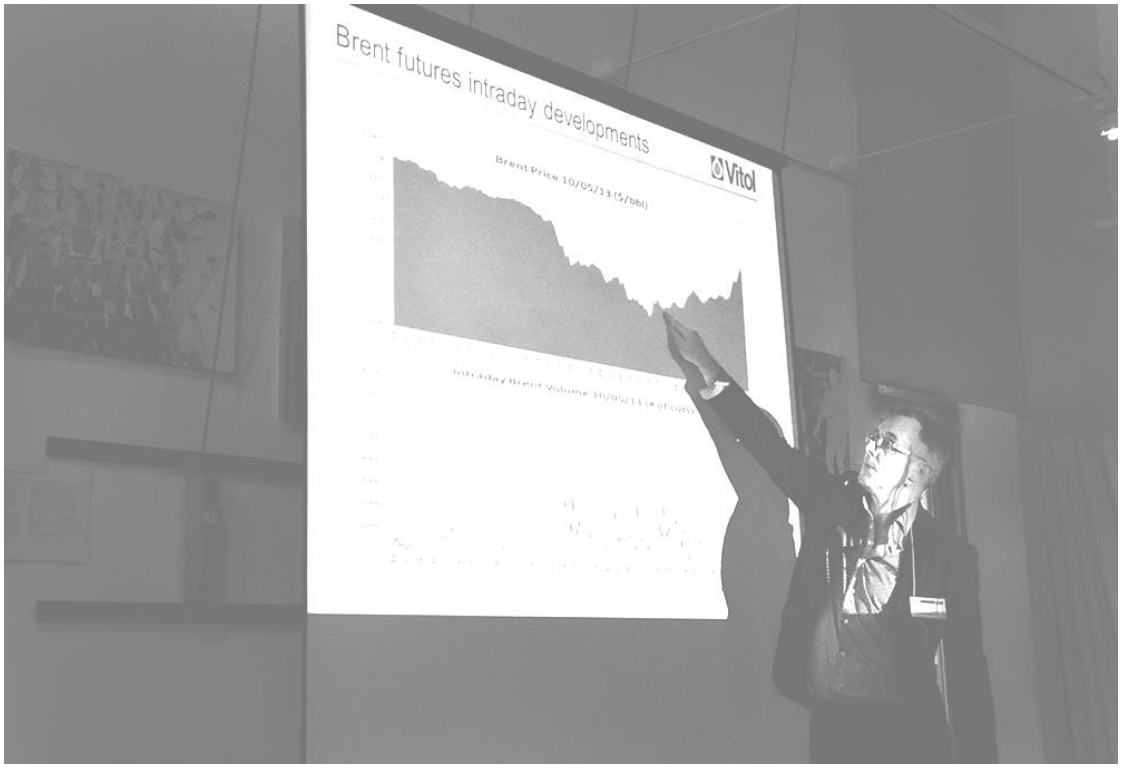
Flow of Aqueous Polymer Solutions through Sandstone Cores An Experimental Evaluation

Abstract:
The significance of the extensive pressure drop observed during the flow of non-Newtonian fluid that exhibits viscoelastic behavior through porous media has increased in recent years. This is due to a broad range of industrial applications of the mentioned fluid type, with one of the most important implementations being the enhanced oil recovery by polymer flooding. The primary interest lies in the estimation of the total pressure drop across the porous media which is induced by the shear forces and the elongational strain experienced by the flowing fluid when passing through the pores for a given flow rate. As an approach to achieve a better understanding about said phenomenon, numerous single-phase polymer flooding experiments through sandstone cores have been conducted in the Microfluidics Lab at the ITE TU Clausthal. This study aims to implement the existing models (by Ergun, 1949 and Tiu et al., 1997) which are proposed based on experiments with packed beds, to predict the pressure drop behavior during the flow of aqueous polymer in Bentheimer sandstones. Important aspects to be covered are in regard to the role of friction in the total pressure drop, the observation of the Reynolds number and the Weissenberg number, and also the phenomena of drag reduction as well as drag enhancement with respect to the shear thinning and shear thickening region. The results show a distinct deviation between the experimental pressure drop and the calculated shear pressure drop after reaching certain flow rate, indicating an excess in pressure drop during the flow. Furthermore, it has been proven that the frictional pressure drop is more apparent in the shear thinning region as the pressure drop in the shear thickening region is more affected by the elastic properties of the polymer rather than the wall friction. The calculated Reynolds number for the flow is extremely small, even in the region of shear thickening where the elastic turbulence occurs, and this corresponds to previous experiments of polymer flow through porous media by several researchers. Finally, it is also shown qualitatively how the Weissenberg number as the elastic parameter of the polymer increases during the flow.

Presenters on Friday



Name: **Steffens, Bastian**
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Paper refers to: Master Thesis
Studying: M.Sc. Applied Geoscience
When to graduate: March 2017
Field of interest: Reservoir Geology, Reservoir Simulations, Structural Geology

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Impact of Bounding Surfaces on Fluid Flow in Aeolian Rotliegend Reservoirs

Abstract:
Aeolian bounding surfaces (BS) represent erosional contacts that were formed during the migration of bedforms. Depending on their hierarchical order, BS have different lateral extends and characteristics, influencing fluid flow dynamics in porous media accordingly. The objective of this study is to analyze the impact of aeolian BS on single phase gas flow. A simple and robust approach on how to properly address BS in simulation models considering the different upscaling cell size levels is suggested.

A high resolution 3D geomodel (>1 million cells) of an aeolian Rotliegend reservoir analogue (132x32x32 m) is used for these investigations. By modifying transmissibility and threshold pressure values along the BS, the dynamic effects of BS on fluid flow could be mimicked. The robustness of the modelling approach is emphasized by performing several sensitivity runs in regard to the influential parameters. These effects were validated with a full-field aeolian Rotliegend gas field in northern Germany, dealing with the problematics of BS.

Stepwise upscaling of the model is performed with the goal of preserving the characteristics of the outcrop-based geomodel. Information lost and preserved when coming from an outcrop based model to an upscaled conventional simulation cell were tracked and documented. Sensitivity runs on the original model showed a strong degree of fluctuation resulting from the variation of parameters on different BS orders. Conclusively, sub-horizontal interdune migration surfaces with large areal extend have the greatest effects on fluid flow and pressure distribution in the model.
A gradual decrease in cumulative gas production with each upscaling step was observed. Further analysis of the upscaled simulation models showed a spread in error of cumulative gas production (compared to fine model) of 18 to 28 %, depending on the upscaling method applied. Certain upscaling techniques achieved promising results for a reduction of the cell number by factor 50.

The suggested dynamic modelling and upscaling investigations present a systematic and robust approach in addressing BS in simulation models. This study on the effect of BS on fluid flow allows a better understanding of information lost and preserved in a full field model after an upscaling process. This information can be used for better designing simulation grids when upscaling a fine grid geomodel.

Name: **Scholz, Justus**
University: RWTH Aachen University
Paper refers to: Master Thesis
Studying: Geoscience, Master of Science
When to graduate: 01.2017
Field of interest: Enhanced Oil Recovery

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Experimental study of wettability alteration during low salinity water flooding in simple electrolyte-alkane-chalk systems

Abstract:

Different mechanisms of Enhanced Oil Recovery during Low Salinity Water Flooding (LSWF) are currently discussed in research and oil industry. This contribution presents an experimental study, in which wettability alteration is constrained to one single mechanism, i.e. minimization of the free energy of Electric Double Layer (EDL) formation.

The experiments will be performed on a Maastrichtian chalk plugs, as the wettability of carbonates is relatively insensitive to pH in contrast to sandstones. Firstly, the mineralogical homogeneity of the plugs will be analyzed by highly accurate XRD-QPA measurements. Flooding experiments with degassed fluids at constant temperature will be performed to guarantee fluid saturation and to prevent any viscosity effects. Resistivity, differential pressure, streaming potential and recovery will be monitored. The plug will be saturated in a fluid cell with micro-pure water and then with an alkane and vice versa for relative permeability measurements at different saturations. After determination of the residual alkane saturation from micro-pure water flooding, low saline fluid containing a single electrolyte will be injected. The LSWF experiments will be performed at different temperatures and flow rates. Chemical composition of the effluent will be analyzed with ion chromatography. Resistivity will be monitored for in-situ saturation state and differential pressure data are used for relative permeability. With streaming potential data the modification of surface chemistry will be observed. In combination with other electro-chemical methods it will be able to relate the minimization of the free energy of EDL formation as primary wettability alteration mechanism during LSWF experiments, as other determining factors are excluded.

The approach of singling out EDL formation effects with respect to other potential LSWF mechanisms such as saponification, mineral alteration or detachment, etc. in experimental set-ups is novel. Using single electrolyte solutions will allow to identify and to characterize specific effects on double layer formation, which is not possible in experiments with more complex electrolyte compositions as often reported in literature.

Name: **Roeth, Joschka**
University: RWTH Aachen University
Paper refers to: Master Thesis
Studying: Applied Geosciences, Master of Science
When to graduate: December 2016
Field of interest: Basin Modeling, Petroleum Systems Analysis

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Advanced Crustal Modeling of the Gippsland Basin (Australia)

Abstract:

The Gippsland Basin, one of Australia's most prolific hydrocarbon provinces, is located in southeastern Australia, 200 km east of Melbourne. Increasing gas market demand in the region is providing a push for further exploration activities in the area. One aspect of high uncertainty in the current petroleum system basin model is the heat flow model. The public domain dataset for this study includes 90,000 km of 2D seismic lines, a basin-scale merged 3D seismic cube including interpretation and a 3D basin model, an online well database and various structure maps including gravity and magnetic intensity.

Project objectives will primarily include updating the existing basin model with new depth maps, refined facies distribution (especially late Cretaceous volcanic intrusions) and to include the regional basin scale faults. The second stage will be to create and update the upper and the lower crustal maps as well as an upper mantle map. This will be done by building multiple models using the available gravity and magnetic intensity maps. This new input can be used in the new PetroMod crustal model tool to build a crustal model in order to recalculate the heat flow of the basin.

This is an alternative method to using the McKenzie heat flow model. The basal heat flow is calculated by attaching these three layers to the base of the model and solving the multi-1D heat flow equation with the given temperature boundary conditions. Heat flow is then calculated at the bottom of the model base (top of upper crust) and the resulting heat flow map is taken as a boundary condition for the heat flow equation.

One advantage of using this method is that it accounts for the effect of the sediments on the heat flow, an important aspect in the Gippsland Basin due to a high amount of intrusive volcanic rocks in the region. The main goal is to model the heat flow more accurately by integrating geophysical data into the PetroMod basin model, from which relevant parameters like timing and effectiveness of the petroleum systems elements can be derived.

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When to graduate: March 2017
Field of interest: Reservoir Engineering

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Development of fracturing technologies

Abstract: All over the world engineers are trying to find solutions for the energy issue. They have to come up with different possible substitutes in energy to maintain the technological level, and the advanced way of living that we have today. Fracturing is a necessary technology for the providing of energy through oil recovery, gas recovery, or also the extraction of geothermal energy. Thus, it is a technology that can be employed for the obtainment of several energy resources in unconventional reservoirs. The aim of this paper is to describe the development of this technique that already existed in the 1940's. The advantages and disadvantages of different technologies will be characterized and compared to each other.

First of all, the usual hydraulic fracturing is explained. In general, slick water is used for such a well stimulation. The general public may think that water based fluids are always necessary, because they are predominantly used. But nowadays, new technologies which require less or no water based fluids are appearing. The energizing of fluids with different gas components, like N_2 or CO_2, could become an interesting alternative. An advantage is the reduction of the environmental harm, by the decreasing of wastewater production. LPG (Liquefied petroleum gas) is another technique that does not require any water. Propane gas is compressed into a thick gel then pumped into wells in order to fracture the rock shale. Underground, it is converted back to gas, so the LPG can almost be retrieved entirely. Another stimulation technology is channel fracturing. Stable flow channels are created, so that the hydrocarbons do not have to flow through the proppant pack but through the created channels. These channels improve the conductivity significantly, which provides a higher efficiency of the procedure.

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Title: Gas Hydrate Well Completion and Production Methods

Abstract:
With the notion that conventional hydrocarbon reservoirs will be facing depletion in two to three decades to come, gas hydrates and shell formations, as technology improves stand as alternatives to meet the world's ever growing energy requirements.

Gas hydrates are formed in unconsolidated formations through the association of carbon and Hydrogen (1C:4H) under high pressures, low temperatures and free water. It is considered a relatively good source of clean Energy, having a global estimate of 2 e+14 to 3.05 e+18 cubic meters. This makes it a significant energy resource and as such its methods of production need to be well researched.

What this paper seeks to achieve are as follows;

1. Take a critical look into Gas hydrate well completion requirements and methods.
2. Explain the Idea behind the main Production methods of gas hydrate.
3. Outline the various methods of production and finally
4. Look at current and future developments in the oil and gas industry regarding Gas hydrates.

The research was carried out using secondary data such as extensive literature, publications and documentaries. Some primary data in the form of interviews with Professionals and Lecturers who are well vested in this subject matter were also used.

In all, it was found that the importance of gas hydrate as a relatively cleaner source of energy could not be ignored. It was however, noted that unlike conventional oil and gas wells, gas hydrate wells require much more technical understanding of this resource to ensure a perfect well completion process

Keywords: Gas Hydrates, Ground water aquifers, Unconventional reservoirs, Well completion, Hydrocarbons.

Technical Poster Session

sponsored by

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Organic geochemical characterization and source potential evaluation of Mesozoic black shales of Svalbard

Abstract:

The source rock potential and thermal maturity of Mesozoic shales from Svalbard was analysed. We sampled the Triassic Sassendalen group, the Jurassic Kapp Toscana group and the Jurassic to Cretaceous Adventdalen group and conducted Total Organic Carbon (TOC)/Total Inorganic Carbon (TIC) measurements, Rock-Eval pyrolyses and thermal maturity through solid bitumen reflectance measurements.

The Sassendalen group (Botneheia) exhibits TOC values between 0.6 - 3.62%, Tmax values of 446 – 451 °C and Production Indices (PI) between 0.2 – 0.33 indicating Peak mature deposits. The Vikinghögda Formation of the Sassendalen group shows 1.05% TOC and Tmax of 453°C together with a Production index of 0.39, suggesting late mature sedimentary successions. Some samples show strong oxidation and have experienced weathering, hence, some values represent minimum temperatures.

The Kapp Toscana group (Tschermakfjellet) shows TOC between 1.68 – 5.96% and Tmax between 431 to 445 °C proposing Early – Peak mature samples. The Production indices strongly varies between 0.08 – 0.32.

The Adventdalen group (Agardhfjellet) has TOC values between 1.36 – 9.71% and Tmax between 437 – 450 °C showing a wide range from Early – late mature deposits. The PI values between 0.03 to 0.25 and a mean value of 0.11, suggesting immature to Peak mature samples. Based on calculated vitrinite reflectance (0.76-0.92), Peak maturity is proposed.

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Possible Hydrocarbon Plays in Rift Basins of the Barents Sea – Analogue Study on the Billefjorden Trough, Svalbard

Abstract:
The well exposed Carboniferous Billefjorden Trough in central Svalbard is a renowned model of rift basins at the Barents Shelf; an area that is currently shifting into the focus for hydrocarbon exploration. Understanding it's heterogeneity with respect to sediment fill and tectonic impact can help in the assessment and understanding of similar subsurface analogues.

A history about the sediment input of the trough in selected parts of the basin has been created within the scope of a field campaign. In total, 130 m of lithology have been recorded in a litholog and were divided into facies types to allow distinct separation in reservoir and non-reservoir formations. In several other sections of the basin, the potential source rocks, mostly consisting of coals and organic rich dolomites, and major tectonic units were inspected and brought into the broader context of deposition, fault movement and diagenesis. With additional information from literature, potential plays of this half-graben system or basins with a similar history have been identified and characterized.

Due to a combination of increased subsidence rate, high tectonic activity and lateral variations of depositional mechanisms, this rift basin offered the possibility to inspect the interference of these processes on a relatively small scale. In general, the sediment record shows a trend towards an increase of relative sea level, which corresponds with the tectonic movement of the rotated fault blocks.

Many observations and concepts like hydrocarbon pathways over relay-ramps or the change of lithology over the development of the rifting are not only specifically for this basin, but can also be applied to other prospects.

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Hydraulic Fracturing Design: Best Practices For a Field Development Plan

Abstract:

Unconventional oil and gas reservoirs are being explored significantly around the globe nowadays. The economical production of hydrocarbons from these unconventional oil and gas reservoirs requires very advanced and cost effective technologies. Hydraulic fracturing is such a technology which is being used in oil and gas industry for many decades to create highly conductive channels in the formations having very low permeability values. Multistage hydraulic fracturing along with horizontal drilling has been proved to be a great achievement in oil and gas industry to enhance the production from unconventional reservoirs and massive shale gas production in the US is a successful example of it.

An effective hydraulic fracturing design is a key to achieve the expected results in terms of production from unconventional reservoirs. There are many factors which must be considered while designing and executing hydraulic fracturing operation. These factors are not only limited to pump rate, size and concentration of propping agent, fracture spacing or number of fractures, fracture geometry and conductivity but there may be more parameters such as flow back and shut in period, depth & thickness of reservoir, microcosmic events, faults and natural fractures which can play a significant role depending upon reservoir properties, rock properties, type of reservoir fluids etc. These parameters can vary significantly at different locations around the globe. There is no universal way of hydraulic fracturing which can be applied anywhere in the world without proper formation evaluation of underground formations containing hydrocarbons.

There are some concerns among our society about hydraulic fracturing regarding usage of huge amount of water and chemicals during the fracturing operation. Therefore, a cost effective and optimized hydraulic fracturing design along with environmental friendly and efficient management of fracturing fluid and waste water will be presented at the end of the study.

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Friction-Related and Galling Phenomena in Premium OCTG Connections – A Review

Samuel Zulkhifly Sinaga* and Oscar Grijalva Meza**

*Author, **Adviser (Clausthal University of Technology)

Nowadays, the exploration and exploitation of hydrocarbon lead to unconventional environments such as deep reservoirs, deep-water, and unconventional hydrocarbon (shale gas, etc) where high-pressure-high-temperature (HPHT) may be encountered. To withstand them, high strength OCTG (Oil country tubular goods) are needed with sufficient sealing capability to maintain the required working pressure. Premium OCTG thread connections have higher strength and better sealing properties (i.e. gas tightness) than API connections, therefore they are widely used in such hostile environments. The connection is one of the weak points along the OCTG tubular, therefore a higher attention to the development of premium OCTG thread connection is put. Moreover, threaded connection is one of the main issue in OCTG failures, contributes to approximately two-thirds of all failures. The failures are inclusive of make-up torque, corrosion, galling, and wear which can lead to leakage.

The study presented herein discusses the premium OCTG thread connection and its features. The API thread connection is briefly compared to premium OCTG thread connections. Further, the tribological aspects present in the metal-to-metal seal during make-up and break-out are discussed. The important factors in tribology, such as friction, wear, lubrication, and contact pressure, which affecting the make-up behavior of OCTG thread connection are presented here. In this study, galling phenomena is more emphasized as a type of mechanical failure that mostly occurs during make-up; when galling occurs, it will deteriorate the seal and degrade the thread connection strength. Laboratory experiments and testing procedures for galling phenomena are also critically discussed here. The purpose of the research in this study is to review the thread connection mechanical integrity of OCTG from a tribologic point of view as an important issue towards well integrity, especially in deep-water and shale gas applications.

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Borehole Heat Exchanger Performance Simulation

Abstract:

One of the renewable energy technologies that widely accepted in the world is the borehole heat exchanger (BHE). While BHEs are mostly used in shallow depth, deep BHEs still exist and produce adequate heat to be utilized for space and building heating. This study focuses on the performance of BHE based on varying the parameters.

A transient model of BHE was built using groundwater fluid flow and heat transfer code (FEFLOW) with a simulation time of 10 years. The model was simplified to minimize the discrepancy. BHE parameters that were tested are well depth and inlet flow rate. The results of simulation presented the cumulative extracted heat, the BHE inlet/outlet temperature and the BHE temperature profile. These results were analyzed to determine the performance of BHE model and the sustainability of the system.

By using the cumulative extracted heat, BHE outlet temperature, and BHE temperature profile for four different inlet flow rate at shallow and deep well depth, the BHE model is compared. The comparisons show the BHE performances have a significant difference between shallow and deep well depth at every inlet flow rate. First finding from this study is the deeper BHE have a better performance and longer lifetime. Secondly, the inlet flow rate plays a significant function and has to be applied properly to have a better BHE performance and longer lifetime.

Keywords: geothermal, borehole heat exchanger, simulation, FEFLOW

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Review of Commercial Telemetry Systems for Real Time Data Transmission in Boreholes

Abstract:
Deeper and more complex wells are drilled in order to develop oil and gas reservoirs or to explore new reserves. Drilling such extreme deep wells and precisely reaching the target area can only be performed using the best available high-tech equipment, such as geo-steering tools and measuring and logging while drilling systems. Thus, the bottom hole assemblies are equipped with a wide variety of measuring sensors, which collect geological and directional data while drilling. The collected data are analyzed and processed downhole. In order to enable the driller to correctly make decision, the information must be transmitted to the surface in real time. Depending on the used transmission channel as well as on the employed transmitter, there are four commercial systems for real time data transmission in boreholes. These are: mud pulse telemetry, electromagnetic telemetry, acoustic telemetry and wired pipe telemetry. This paper will briefly describe those systems introducing their advantages and disadvantages.

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Development of a hydraulic downhole percussion drill

V. Hartung, V. Wittig, R. Bracke, International Geothermal Centre Bochum

Abstract:
For drilling wells in deep, hard rock, common drilling technologies are partially suitable and drill with a low ROP and high wear. Therefore, especially for drilling geothermal wells, new drilling tools have to be developed to make deep, hard rock drilling more economical. Percussion drilling is one technique that is suitable for drilling hard rock with high ROP, still, most of the todays available downhole percussion tools are powered with air.

Commercial available, hydraulic driven percussion drills have been used to drill more than 20 wells at GZB. A prototype percussion mechanism has been built and tested on a test bench to understand how known hydraulic percussion mechanism are working. The hydraulic powered mechanisms have no trouble when encountering groundwater-bearing formations and use less fuel for the high pressure pump.

A new hydraulic percussion mechanism has been invented to address some of the known and discovered issues: A new hydraulic drive mechanism, using an accumulator which is able to work on high hydrostatic pressures, converts the hydraulic energy to a percussion movement with reduced pressure peaks, compared to known mechanisms. The reduction of pressure peaks reduces damaging wear on valve edges and can also reduce drill string vibrations.

A dynamic model of the hydro-mechanical system is now in development to help to understand the dynamic processes inside the mechanism and design and study parameters. The simulation allows access to piston and valve movements as well as hydraulic pressure and flow rates. This helps to determine piston mass and surface areas as well as accumulator parameters, which will then be used to design and manufacture a first prototype.

The work done so far on hammer technology at GZB shows that percussion drilling is still a promising technology, capable to drill hard rock with higher ROP, making geothermal wells more economic. Key element of the percussion drive is to power it hydraulically through the drill string with the use of recirculating, purified drill mud without the use of dual or other special drill rods.

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Optimization of the process for biodiesel fuel production using the fungal cells as a catalyst

Abstract:
Recently, with the global shortage of fossil fuels, excessive increase in the price of crude oil and increased environmental concerns has resulted in the rapid growth in biodiesel production.
Biodiesel is one of the most promising alternative power sources that are obtained by transesterification of vegetable oils and animal fats with low molecular alcohols (usually methanol). Methods for biodiesel production are classified as chemical or enzymatic. Enzymatic transesterification is more attractive because of the ability to carry out the reaction in mild condition and to reduce the number of technological steps. Isolated enzymes (lipases) and microbial cells - producing lipases can be used as a catalyst. The use of microbial cells is a way to reduce biocatalyst cost, since it avoids the complex procedures of isolation, purification and immobilization of lipases.
We screened a collection of microorganism's strains of Gubkin RSU of Oil and Gas to determine fungi with high hydrolytic activity. The screening was carried out by agar well diffusion method. Among 50 fungi, five were selected as good lipase producers: Yarrowia lipolytica, Aspergillus niger, Fomes fomentarius, Trametes versicolor, Flammulina velutipes.
In order to improve production of lipases from A. niger statistical optimization of medium components and growth conditions was conducted. Sunflower oil, soya meal and yeast extract were selected as the best carbon and nitrogen sources. We report a 2-fold increase in biomass (with the final yield of 9.8 g/l) and 4-fold increase in lipases production (with the final yield of 1.23 U/mg of mycelium in a hour) in comparison to initial medium. The optimum value of the incubation period is 96 hours. After this, optimal conditions for biodiesel fuel production process with A. niger cells as a catalyst were determined. The higher yield of monoalkyl esters was observed with a temperature 28 ºC, pH=8,5 and with water content in the reaction mixture of 20% wt.

The reported study was supported by RFBR, research project No. 16-38-00904 мол_а.

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Flow Models for Two-Phase Flow through Chokes

Wellhead choke is installed to monitor and control flow rates in gas/ oil well and to keep the reservoir from pressure fluctuation at the surface. The flow rate classification through a choke is distinguished into critical and subcritical flow. The flow is considered to be critical if the highest speed of the fluid equals to the sound velocity at the choke. Several models have been developed to determine the flow rate at chokes. The project aims to critically review the Sachdeva's model (1986) and Ashford's model (1974) to predict the critical and subcritical two-phase flow through chokes. The discharge coefficient between calculated and measured flow rate reflects the reliability of these models. The field data from wells in Southwest Louisiana (by Guo et al, 2002) are used to prove the reliability of Sachdeva model. The boundary for critical and subcritical for Sachdeva's calculation has to be defined before computing the flow rate. The optimal values for wells Southwest Louisiana show quite different and various values compared to the Sachdeva's recommended discharge coefficients. To conclude, the discharge coefficient of Sachdeva's model has to be improved for some other cases such as different fluids and different wells. The development of Ashford model also describes the behavior of orifice flow. The calculated discharge coefficients of Ashford's model show a good result which the values are nearly 1,0. Therefore, the Ashford's model shows a good reliability between the model calculated flow rate and the actual flow rate. However, the influence of gas/liquid ratio and fluid properties to the boundary has to be defined, before the correlation of subcritical flow is being developed. The practical approach is necessary to improve this model regarding the critical/ subcritical boundary, since this model is only assumed in critical condition.

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Heading for the white Gold

Abstract:
To meet the global demand of energy sources engineers and scientists penetrate into new and harsh regions in the world. One of it is the deep sea. On the continental margins buried under sediments there is a kind of ice substance that is also called "burning ice". 50 years ago, it was discovered that this ice contains carbohydrates that are bedded in clathrate structures consisting of hydrate cages. From now on, these structures got the name methane hydrates. It is assumed that worldwide 3000 Gt carbon are bonded in methane hydrate structures what is equivalent to the carbon bonded in conventional resources such as coal, natural gas and oil multiplied by three. In accordance to this huge amount, many scientific programs were implemented with the aim to produce these deposits in a close future.

Germany supports also a program called SUGAR that is focused on submarine methane hydrates. Before the commercial use of methane deposits they need to be researched more. To meet this demand the MARUM in Bremen developed a semi-automatic drilling unit which can be placed on the seabed to collect samples of the sediments below. The first version of this unit, which is called MeBo, has the ability to collect samples up to a depth of 85 meters. Due to the use of a core bit it is possible to gain knowledge about composition and structure of the seabed. After successfully testing the MeBo a new drilling unit based on the MeBo concept was developed which is able to drill to a depth of 200 meters. To get to know about the surrounding rock and the detection of possible methane hydrate deposits it is planned to bring logging equipment into the drilled hole. In the future the project will continue to develop the MeBo from a ROV (Remote Operated Vehicle) into a fully atomized drilling exploration unit for commercial use.

Due the high flexibility and its modular system it suits perfectly for the research of methane hydrate deposits which may change the energy market in the future.

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Improving the technology process of crude oil transportation by trunk pipelines

Abstract:
During the operation of oil trunk pipelines, especially while part loading, an abnormal situation may occur. Most of them deal with the implementation of the different ways of regulating operating modes such as: stop and start of the oil pump station (OPS); stop and triggering certain pumping units. These situations cause significant changes in the operating modes of pipelines which can lead to cost overruns of energy while oil transportation and in some cases can lead to an emergency situation.

The aim is to improve the efficiency and reliability of oil trunk pipelines exploitation by minimizing the negative impact of abnormal situations. The main task of this research is to establish patterns of transient hydrodynamic processes and dynamics of pressure changes at the inlet and outlet of OPS caused by stops of pumping units.

This research is based on the handling results of experimental researches performed by using the methods of statistical analysis. In order to develop mathematical models of hydrodynamic processes within abnormal operating modes of oil trunk pipelines exploitation, methods of differential and integral calculus and methods of mathematical modeling which were implemented in computer programs have been used.

Experimental study of patterns of transient hydrodynamic processes caused by stops pumping units on the OPS was conducted. The pressure changes over time in any section of the pipeline at the initial and final stages of the transition process were established. The dynamics of change rate of the OPS inlet pressure growth while one pumping unit has been stopped at all stages of the transition process was investigated. Moreover, the package of algorithms and computer programs for calculating the parameters of an oil trunk pipeline operation taking into account abnormal situations has been created and recommendations to reduce the negative impact on the transition have been proposed.

Thus, this research represents a method of calculating the parameters of transient processes caused by stopping pumping units on the OPS. This method allows predicting some pressure changes at the inlet and outlet of the OPS while the first and final phase of the transition process.

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Simulation of Geomechanical One-Phase Flow in Underground Hydrogen Storage

Authors: Rayner Susanto, Birger Hagemann

Abstract:

Energy can be stored in many ways. One of them is by storing the energy in form of hydrogen in the ground. Underground hydrogen storage (UHS) is one of the best ways to store energy because this method stores hydrogen as a chemical energy, therefore the energy can be stored for relatively long time and with high availability. Hydrogen can be stored in several places, such as depleted gas reservoir, aquifer or salt caverns.

There are two common workflows in hydrogen storage process. First is injection of the hydrogen from the surface to the ground. After some time, when the energy demand is relatively high, the hydrogen will be extracted back to the surface and re-converted to electricity. The flow of hydrogen (outflow or inflow the well) can impact the stress distribution of the formation rock inside the reservoir. It is really important to understand the geomechanical of the reservoir during the UHS process since leakage is one of the main problem in UHS process.

The objective of this study is to simulate the injection and production process of the UHS. The effect of these two processes to the stress of the formation rock will be discussed in this study. An open source software manufactured by University of Stuttgart in Germany called DuMu^x is used in this study to help modeling the reservoir. This software is specialized in transport and flow process in porous media. A linear elasticity geomechanical model called "el1p2c" will be used and expanded to fulfill the objective of this study. This model consists of one phase and two components. The hydrogen flow rate will be varied in the additional scenarios of sensitivity analysis in this study.

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Reservoir quality modelling of Rotliegend siliciclastics

Detailed thin section petrography of siliciclastic rocks combined with state of the art software solutions offers great opportunities for reservoir quality modelling. Thin section microscopy provides data on detrital and authigenic minerals, grain size distribution, coat coverage and the paragenetic sequence. Additionally, petrophysical characteristics and radiometric ages are used to prepare a diagenetic forward model for Rotliegend strata in NW-Germany using the software Touchstone™. Incorporating burial history, the diagenetic parameters impacting syntaxial quartz overgrowth cementation and fibrous illite precipitation can be constrained. The reconstruction of the initial detrital composition is the basis for further prediction of reservoir properties in different burial settings.

Systematic differences in grain coatings can be observed in the provided subsurface sample set. These can have different impact on the inhibition of quartz overgrowth and thus need to be classified. Pigmented hematite dust rims occasionally present the only coating phase covering detrital grains. Tangential and radial illite coatings present the other two main coating phases. Including the impact of radial coatings on permeability by reducing the pore throat diameter we defined different petrofacies groups.

Different depositional environments can have an impact on reservoir quality. Early carbonate and/or sulfate cementation lower the effect of mechanical compaction and can lead to enhanced secondary porosity generation. Additionally, the impact of depositional environments on the presence of grain coating phases was evaluated.

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Numerical Simulation of Shear and Elongation Contribution during Flow of Aqueous Polymers through the Porous Media

Abstract:

Aqueous polymers used in enhanced oil recovery (EOR) applications can exhibit Newtonian and Non-Newtonian behavior depending on the interstitial velocity or the stress magnitude that is applied during the flooding process. This behavior will cause different pressure drop while flowing through the porous media. Reservoir simulators used in the oil and gas industry are able to solve the polymer flow behavior by combining the shear thinning and shear thickening behavior. The simulators also assume the apparent viscosity to increase in the high flow rate region thereby giving us the result only in the total pressure drop. However, the total pressure drop during polymer flooding experiment actually results from both the shear thinning behavior and the shear thickening behavior. It can be stated that the simulators are not able to separate the pressure drop contribution from shear (shear thinning) and elongation (shear thickening) behaviors of the polymer solution, which will take place due to the contraction and expansion in the pore geometry. A finite-element based numerical simulator: COMSOL Multiphysics, is used to simulate the pressure drop by taking into account the contribution of shear and elongation pressure drop. A new correlation proposed by Hincapie and Gaol is also utilized as an input to the numerical simulator. The correlation describes the polymer flow by examining the pressure drop associated with the flow dominated by extension and differentiate them of those dominated by shear. Due to Multiphysics capabilities of the simulator, we can reproduce the total pressure drop from the flooding experiment, particularly in the high rate region (shear thickening). Furthermore, the results provide us with the new insights of the polymer flow behavior in porous media by describing the role of shear and elongation flow and can be used to improve the polymer flooding simulation.

	Thursday, 3rd November 2016	Friday, 4th November 2016
08:00		Welcome Reception
		SPE news (Matthias Meister, SPE Regional Director)
09:00	Registration	**Bastian Steffens**, RWTH Aachen "Impact of Bounding Surfaces on Fluid Flow in Aeolian Rotliegend Reservoirs"
	Welcome Reception	**Justus Scholz**, RWTH Aachen "Experimental study of wettability alteration during low salinity water flooding in simple electrolyte-alkane-chalk systems"
	Opening (Oksana Zhebel, GSSPE Chairperson)	
10:00	**Hamza Sellami**, Leibniz Universität Hannover "Case Study: Methods for automated Drilling Performance Analysis Based on Downhole Measurements "	Coffee Break
	Simon Hahn, Ruhr-Universität Bochum "Extended Horizontal Jet Drilling for Geothermal and Hard Rock Applications"	**Joschka Röth**, RWTH Aachen "Advanced Crustal Modeling of the Gippsland Basin (Australia)"
11:00	**Renas Ibragim**, TU Clausthal "Realizing the Drilling While Running Casing: A new Approach in drilling for ERD Wells to increase Drilling Operations Efficiency"	Keynote **Dr. Christoph Löwer**, Managing Director of BVEG
	Group Picture & Lunch	
12:00		Lunch
	David Kutas & Alexios Koulidis, Montanuniversität Leoben "Space Drilling - Considerations, Problems, and Unlimited Perspectives"	
13:00	**Shahin Jamali**, Ruhr-Universität Bochhum "Innovative Thermal Drilling Technologies based on mechanically assisted LaserJet Drilling (LJD) for hard rock (geothermal) applications"	**Mouna Gamara**, TU Bergakademie Freiberg "Development of fracturing technologies"
	Rene Jose Romero Sarcos, TU Clausthal "Effect of Alternative Cushion Gas on UHS Performance"	**Oscar Gabada**, TU Bergakademie Freiberg "Gas Hydrate Well Completion and Production Methods"
14:00	Poster Session	Honoring of Student Presenters & Wrap Up
		Coffee Break
15:00		END
	Pulkit Chaudhary, Dehradun Institute of Technology (India) "Development of novel oil-in-water emulsion drilling fluid system by using palm oil"	
16:00	**Michael Be**, TU Clausthal "Flow of Aqueous Polymer Solutions through Sandstone Cores- An Experimental Evaluation"	
	Coffee Break	
17:00	YP Panel Session **Caroline Kannwischer (engie)** **Samir Alakbarov (Wintershall)** **Max Arndt (Baker Hughes)** **Sebastian Thronberens (Weatherford)** "Transitioning into the workforce - pitfalls, strategies, experiences"	
18:00	Hotel Check-In	
19:00	Dinner (till 21:00)	

Geology
Reservoir
Drilling
Production