



TECHNICAL SESSION:

Petrophysical Interpretation Software Solutions
Logiciels d'interprétation pétrophysique

Tuesday, October 8th 2019, 13:30-17:50

Salle Van Straelen, SGF, 77 Rue Claude Bernard, 75005 Paris

Program: page 1 / Abstracts: p 2 & 3 / About speakers: p 4 & 5

13:30 - 13:45 *Welcome, Safety and preliminary remarks* E. CAROLI, *President*

Modelling, machine learning and clustering

13:45 - 14:15 *Machine Learning for Better Wells* Daria LAZAREVA, CGG
GeoSoftware
14:15 - 14:45 *Solving with DTA not Guessing: A unique, Non-
Statistical, Machine Learning method for Curve
Prediction* Ravi ARKALGUD (Helio-
Flare Ltd / Lloyd's Register)
Presented by Ross
BRACKENRIDGE (LR)

Stochastic methods and uncertainty propagation

14:45 - 15:15 *Handling Uncertainty in Petrophysical Analysis
with Geolog* Nicolas POETE,
Emerson

General presentation of software solutions (order defined by inverse alphabetic order)

15:15 - 15:25 *Voxilon* Vanessa HEBERT, Voxaya
15:25 - 15:35 *Techlog* Mounir BELOUAHCHIA,
Schlumberger
15:35 - 15:45 *Powerlog* Daria LAZAREVA, CGG
GeoSoftware
15:45 - 15:55 *Interactive Petrophysics (IP)* Ross BRACKENRIDGE,
Lloyd's Register
15:55 - 16:05 *Geolog* Nicolas POETE, Emerson

16:05 - 16:45 *Pause / Break*

Petrophysical interpretation

16:45 - 17:15 *Challenging Laboratory Measurements –
Contribution of Numerical Petrophysics* Vanessa HEBERT, Voxaya
17:15 - 17:45 *Volumetric Inversion Methods with Integration of
Advanced Log Measurements (NMR, Dielectric,
Spectroscopy)* Mounir BELOUAHCHIA,
Techlog Schlumberger
17:45 - 17:50 *Clôture de la session / Session closure* E. CAROLI, *President*

SPWLA France Technical Session

Petrophysical Interpretation Software Solutions ***Logiciels d'interprétation pétrophysique***

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Résumé des présentations / *Abstracts*

Machine Learning for Better Wells by Daria LAZAREVA (CGG GeoSoftware)

As data becomes more and more abundant, machine learning is rapidly becoming a standard technology in the oil and gas industry. Machine learning drives more effective methods and introduces tools and theories for discovering, modeling and extracting patterns and relationships embedded in large datasets. Companies can determine reservoir properties more accurately and more quickly using a new generation of analytics and prediction techniques from machine learning.

This presentation focuses on machine learning for petrophysical data. The potential for machine learning to improve understanding of wells, reservoir and producing fields is virtually unlimited, and to some extent, it all begins with well log data. Using key workflows for unsupervised facies classification and automated log editing, users can gain greater insight into subsurface rock and fluid properties. For data clustering, we are using environmentally corrected, normalized and depth-shifted data to ensure valid interpretation results. For missing logs, we show how to leverage machine learning for synthetic log generation.

Solving with DTA not Guessing: A unique, Non-Statistical, Machine Learning method for Curve Prediction by Dr. Ravi ARKALGUD (Helio-Flare Ltd / Lloyd's Register), Presented by Ross BRACKENRIDGE (Lloyd's Register)

In Paris, the land of love, the question still lies unanswered... "Does he/she Loves me or Loves me not" i.e "Ma Cherie Manamou...???"

Throughout history many have tried to answer the unknown by way of *Guessing*, this has led to the flourishing growth of new careers like astrologers, tarot readers, statisticians, face readers...etc. The *Guessing* has become a powerful tool to quantify the intangibles and it has led to amazing discoveries but sometimes disastrous consequences.

To progress from *Guessing* we need to resolve randomness. Is it possible to resolve randomness? Yes. In this quest we have developed a method called Domain Transfer Analysis (DTA). We can say DTA can resolve randomness closely and now we are able to get a solution rather than pure mythical guess.

It is evident that DTA has innumerable applications in many domains and the Petrophysics domain is no exception. In this presentation we will demonstrate how it has been applied to a variety of Petrophysical applications and discuss how well the results compare to more traditional methods.

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Handling Uncertainty in Petrophysical Analysis with Geolog by Nicolas POETE (Emerson)

Oil Field reserves are of strategic importance for oil and gas companies. Reserves are estimated from the reservoirs' geometry and their petrophysical properties (porosity, saturations, net to gross) and are commonly reported using a 3P (Proven, Probable, Possible) convention therefore providing reserves uncertainty figures. The evaluation of reserves made from the results of software platforms using field measurements and interpretation models should therefore provide mechanisms for uncertainty assessment. This presentation will showcase the Emerson E&P software platform for formation evaluation -Geolog-, and more specifically how its multimaterial modeling tool (Multimin) can provide both petrophysical results and their associated uncertainties.

Challenging Laboratory Measurements – Contribution of Numerical Petrophysics by Vanessa HEBERT (Voxaya)

Presentation of recent advances in digital rock physics and their application to reservoir characterization: From core to cutting scale, 3D core images contain a considerable amount of intrinsic information complementary to laboratory analyses. This presentation aims at conveying the promise and potential of digital rock physics in reservoir characterization to petroleum research, using different tools to illustrate how a smart image-based rock physics database at industrial scale can swiftly give access to unmeasured rock properties.

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Volumetric Inversion Methods with Integration of Advanced Log Measurements (NMR, Dielectric, Spectroscopy) by Mounir BELOUAHCHIA (Techlog Schlumberger)

The calculation of fluid volumes in a reservoir has for a long time relied on Archie-derived saturation equations. These equations are overall empirical and require some parameters that are linked among others to the fluid properties and the texture of the reservoir, some of these are not easy to assess. New techniques have emerged to evaluate the volume of water directly, such as the dielectric and NMR. The present case study, in a shallow sand reservoir (Alberta, Canada), describes a reservoir where conventional interpretation techniques fail to provide a correct interpretation, especially for fluid measurements. The multi-frequency dielectric measurements, combined with NMR, provide a direct evaluation of the fluid volumes, while the spectroscopy characterizes the matrix. All measurements (triple-combo, NMR, spectroscopy, dielectric) are combined into a single volumetric inversion model, that yields a more accurate reservoir evaluation, with a reduced uncertainty.

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Biographie des présentateurs / *About the Speakers*

Machine Learning for Better Wells and Powerlog presentation by Daria LAZAREVA (CGG GeoSoftware)

Daria Lazareva is Technical Advisor - Petrophysicist at CGG GeoSoftware. She has been with CGG since 2013 and brings more than eight years of experience in core data analysis, well log interpretation and rock physics modelling. In her current role as Technical Advisor - Petrophysicist, Daria is based in the United Kingdom and is responsible for technical support and training for users of petrophysics and rock physics applications in Europe, Africa and Middle East.

She has extensive experience in reservoir characterization projects for oil and gas production fields including clastic and complex carbonates. Before joining CGG, Daria worked for the Russian Oil Research Institute where she gained firsthand experience in petrophysical projects conducting well log data QC, core data analysis, well log interpretation, analysis and elastic properties modelling. She continued her career as a Project Petrophysicist at CGG GeoConsulting division, later joining the GeoSoftware team in Europe. Daria holds a Master's Degree in Petrophysics and Rock Physics from Gubkin Russian State University of Oil and Gas.

Solving with DTA not Guessing: A unique, Non-Statistical, Machine Learning method for Curve Prediction by Dr. Ravi ARKALGUD (Helio-Flare Ltd / Lloyd's Register)

Dr. Ravi Arkalgud being the CEO of Helio Flare Ltd. is involved in research along with the mandatory company management duties. He is actively involved in R&D for Engineering, finance, oil & gas sector and physical sciences modelling including complete software development.

He has developed novel global software products based on innovative research and novel mathematical methods. Ravi has expertise in interdisciplinary research, fringe areas and Computational Fluid Dynamics (CFD). He has over 25+ years of experience in research and industry as a mathematician, software designer and architect.

Ravi was awarded Marie Curie Fellowship (in exceptional category) leading the European Commission projects. He is a gold medallist in engineering and mathematics. He has won ORS awards along with various other national and international scholarships. Ravi has also published several research publications and has supervised various research projects over the years.

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Handling Uncertainty in Petrophysical Analysis with Geolog and Geolog presentation by Nicolas POETE (Emerson)

Nicolas Poete is Product Manager for the Geolog product suite of the Emerson E&P software division. He has worked for the past 22 years as a Geolog product champion, starting at CGG software division in 1997, then Paradigm and Emerson. During this time he has been assigned to different roles (hotline support, presales consultant, Tier 2 expert then Product Manager) focused on the Geolog product support and promotion for clients all around the world. Nicolas holds a Master degree in Geology from University of Franche-Comte and an engineering degree in Exploration Geology from the IFP-School. He is member of EAGE, SPE and SPWLA.

Interactive Petrophysics (IP) presentation by Ross BRACKENRIDGE (Lloyds Register)

Ross Brackenridge has over 20 years experience in the Oil & Gas Industry. Currently holds the position of Technical Manager for all Lloyd Registers Subsurface Digital Products. Ross has a background in Petrophysical interpretation where he specialised in Well Integrity and Production Logging analysis.

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Challenging Laboratory Measurements – Contribution of Numerical Petrophysics and Voxilon presentation by Vanessa HEBERT (Voxaya)

Hiking made **Vanessa Hebert** want to become a geologist. She holds a degree in Geosciences from the University of Bordeaux. She then obtained a PhD in Geology from the University of Montpellier. During her doctorate in Geology, she discovered the 3D X-ray tomography as a new way of visualizing and analyzing the carbonated rocks heterogeneous at multiple scales. It was (and still is) a real pleasure to travel through these datasets of rocks imaged in 3D. Her issue was to process large amounts of 3D images facing the timeline of her thesis. The solution appeared when she met her future associates, a mathematician and a physicist... With them, she decided to create Voxaya in order to valorize the unexpected information of the 3D images, make simple their analyses. Now, she develops Voxilon an efficient software dedicated to Digital Material Physics bringing her knowledge in geosciences and synthetic material engineering. As General Manager of Voxaya, she is in charge of product development and marketing account management for Voxaya.

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Volumetric Inversion Methods with Integration of Advanced Log Measurements (NMR, Dielectric, Spectroscopy) and Techlog presentation by Mounir BELOUAHCHIA (Techlog Schlumberger)

Mounir Belouahchia graduated from Toulouse (France) University after completing his Master Degree in Geology of Natural resources. He started in Schlumberger in 2011 as Petrophysicist support Engineer. Currently, he is combining the role of consulting Petrophysicist and business development of petrophysics software and integrated workflow solutions.

Pour participer à une session technique de SPWLA France :

Vous pouvez soit être présent, soit suivre les présentations par Skype Web link.

Aucune participation financière n'est requise. Pour cela, vous devez, au préalable, si vous n'êtes pas membre de la SPWLA en 2019, simplement vous inscrire sur le site de la SPWLA <https://www.spwla.org/> : cliquez sur "**Membership**" et sélectionnez: « **Become a Chapter affiliate** », entrez vos coordonnées et sélectionnez le chapitre « SAID (France) ». Vous devenez alors gratuitement membre affilié à SPWLA France.

Ensuite, pour vous inscrire à une session technique, envoyez un email à vice-president@spwla-france.fr avec nom, prénom, compagnie, poste en spécifiant soit votre présence, soit votre souhait de suivre les présentations par Skype Weblink. Dans le 2^{ème} cas, une invitation vous sera envoyée 2 ou 3 jours avant la session.

To attend a technical session of SPWLA France :

You can either be present at the location of the meeting or follow the lectures via a Skype Web link.

*The session is free. If you are not member of SPWLA in 2019, you have to register first on the SPWLA web site <https://www.spwla.org/>, click on "**Membership**" and select « **Become a Chapter affiliate** »; Complete the information requested and select the chapter "SAID (France)". You become affiliate member of SPWLA France for free.*

Then, to register to a technical session, just send an email at vice-president@spwla-france.fr with name, company, position. Mention if you will be present or will follow the lectures via Skype Web link. In the second case, an invitation will be sent 2 or 3 days before the session starts .

Information sur / Information on: <https://spwla-france.fr> or <https://la-said.org>
