PRACTICAL RESERVOIR GEOPHYSICS

Learn effective methods in predicting reservoir performance through an integrated approach across exploration disciplines

11TH AUGUST 2014 - 15th AUGUST 2014 at KUALA LUMPUR, MALAYSIA

PetroSync Distinguished Instructor:
DR. AHMED OUENES

- Over 24 years of experience in interpreting and modeling complex reservoirs
- Specialized in advanced reservoir characterization and simulation of fractured reservoirs
- Developed various modern reservoir modeling technologies used in the industry
- Completed over 200 integrated reservoir studies throughout the world especially for fractured and tight reservoirs
- Society of Petroleum Engineers (SPE) & American Association of Petroleum Geologists (AAPG), Member

Course Objectives

- DEMONSTRATE knowledge of different techniques to generate seismic attributes
- UNDERSTAND the meaning of a large number of seismic attributes and how they could help identify sweet spots in any type of reservoir
- FAMILIARIZE with the different techniques and software to rank and use quantitatively seismic attributes in the exploration and development of reservoirs
- APPLY the different approaches to use seismic data in fracture modeling
- IDENTIFY the different productivity proxies that can be used in modeling reservoirs
- USE actual data from two formations at the Teapot Dome to build and validate 2D and 3D reservoir and fracture density models
- ANALYZE and UTILIZE derived 2D and 3D models to make drilling decisions

Specially Designed for

This course is designed for, but not limited to, Geophysicists, Geologists, and Reservoir Engineers who have 3D seismic data and plan to use it in the exploration and development of their reservoirs. An advanced understanding of geophysics is not required. This course focuses on the practical aspects of deriving and using seismic attributes to build reservoir models and to design well trajectories that intercept the best reservoir.

- RESERVOIR Geophysicists
- RESERVOIR Geologists
- Development Geoscientists
- Reservoir Engineers
- Development/Production Managers
- Seismic Interpreters

Supported by
The course will describe readily available seismic processes that could provide seismic attributes which could signify production-favorable reservoir properties, and introduce the use of quantitative ranking tools to select a small grouping of attributes that can be used for planning optimal well paths and building 3D reservoir models.

Seismic data remains under utilized since most of the interpreters do not have the necessary tools to generate, and analyze key seismic attributes that could help image key reservoir properties critical to a successful reservoir development. The course will describe the seismic processes that could create useful seismic attributes able to assist locating the sweet spots in conventional and unconventional reservoirs.

We will be using actual data from the Teapot Dome oilfield in Wyoming to illustrate various seismic attributes and their role in exploration and development. This actual reservoir include shale, clastic and carbonates. Illustrations of these various geologies will be given throughout the course.

The attendees will be able to use their laptops to examine and use various seismic attributes in a quantitative manner. Participants are encouraged to share their own experiences and to stimulate class discussion by bringing their own examples. A software that allows the computation of all these seismic attributes will provided during the course.

Program will cover the following:

- A few notes on Seismic Acquisition and Processing
- Your seismic processor handed you Gigabytes of data. Now what?
- Enhancing seismic resolution without creating new frequencies
- Imaging faults and structural anomalies with volumetric curvature
- Spectral Imaging: An endless source of seismic attributes
- Post stack seismic inversion and the search for the perfect impedance attribute
- Qualitative and quantitative ways to manage “seismic attributes overload”
- Angle stacks and shear logs. The power of elastic inversion
- How to get a “Drill Here Map”? Combining well data and a multitude of seismic attributes to build 3D and 2D reservoir models.
- Application of what we have learned to the Teapot Dome (WY)
- Where to drill my next well?
- Case Studies and Discussion

DAY ONE

- Introduction
- Review of Seismic Acquisition
- Review of Seismic Processing
- QC of Seismic - Full Stack - Angle Stacks
- Resolution Enhancement Techniques
- Introduction to Seismic Attributes
- Examples of Seismic Attributes in Shale, Clastics, and Carbonates Reservoirs
DAY TWO

- Structural Attributes
- Coherency vs. Volumetric Curvature
- Directional Volumetric Curvature
- Exercise: Computation of Coherency and Volumetric Curvatures
- Introduction of Spectral Imaging Attributes
- Frequency Dependent Spectral Attributes
- Statistical Spectral Attributes
- Exercise: Computation of Spectral Attributes

DAY THREE

- Introduction to Inversion Techniques
- Recursive Inversion
- Colored Inversion
- Sparse Spike Inversion
- Generalized Linear Inversion
- Stochastic Inversion
- Inversion in Structural frameworks
- Exercise: Well Ties
- Exercise: Deterministic Inversions

DAY FOUR

- How to relate seismic attributes to rock properties and well performances
- Statistical Methods
- Artificial Intelligence and Neural Networks
- Exercise: Building Geologic and Fracture models using Multiple Post Stack Seismic Attributes

DAY FIVE

- Introduction to Pre-stack Elastic Inversion
- Extended Elastic Inversion and its Benefits
- Application of Elastic Properties to Unconventional Reservoirs
- Case Studies from Shale Reservoirs
- Discussion

PROGRAM SCHEDULE

0800 – 0900 Registration (Day1)
0900 – 11:00 Session I
11:00 – 11:15 Refreshment & Networking Session I
11:15 – 13:00 Session II
13:00 – 14:00 Lunch
14:00 – 15:30 Session III
15:30 – 15:45 Refreshment & Networking Session II
15:45 – 17:00 Session IV
17:00 End of Day

IN-HOUSE SOLUTIONS

SAVE COST • IMPROVE PERFORMANCE • REDUCE RISK

PetroSync understands that in current economic climate, getting an excellent return on your training investment is critical. This training can be conducted exclusively for your organization. The training can be tailored to meet your specific needs at your preferred location and time. We will meet you anywhere around the globe.

If you like to know more about this program, please contact Jerry Tay (Conference Director) on +65 6415 4502 or email jerry.t@petrosync.com
Ahmed has occupied different positions in consulting, academia, R&D, software development, and operating oil and gas fields. His main interests include the development of improved reservoir characterization technologies. He is currently Global Director of Operations for Natural Fracture Modeling at SIGMA3 Integrated Reservoir Solutions and has been focusing lately on new ways to integrate seismically driven G&G models, fracing data and microseismic events in unconventional reservoirs. In the past, Ahmed was the founder and president of Prism Seismic, a software and consulting company sold in 2011 to the Symphony Technology Group. Previously he was Chief Reservoir Engineer at (RC)2 where he developed the first commercial software for the Continuous Fracture Modeling (CFM) technology. Ahmed was also Executive Vice President of an independent oil and gas producer. Ahmed has successfully characterized and simulated more than 100 fractured reservoirs around the world.

He graduated from Ecole Centrale de Paris and holds a Ph.D. in Petroleum Engineering from New Mexico Tech. He is the author of more than 60 papers on new reservoir modeling approaches and their application to various oil and gas fields around the world. Ahmed outreach industry activities include teaching fracture modeling courses for AAPG, CSEG and other professional organizations and participating in SPE Fracing Technology meetings as a steering committee member.

**Few Recent Completed Projects:**
Completed more than 200 projects that integrate geophysics, geology, and reservoir stimulation into coherent reservoir models that are validated with actual drilling. Among his recent projects are:

- 2012 Cooper Energy (Perth Australia) — Aboid Fracture Modelling in Tunisa
- 2011 Spectra Energy (Texas USA) — Fractured Gas Storage Characterization
- 2011 Anadarko (Texas USA) — Marcellus Shale Characterization
- 2010-2011 AGOCO (Libya) — Integrated Studies in Ghadames and Sirte Basins

**Publications:**
Ahmed has published more than 60 papers of various field studies and reservoir modeling topics including geostatistics, upscaling, reservoir stimulation, artificial intelligence, advanced geophysics, fracture modeling and software development.

- Distribution of Well Performance in Shale Reservoirs and Their Prediction Using the Concept of Shale Capacity” (AAPG Search and Discovery #44139)
- Seismically Driven Characterization of Unconventional Shale Plays (CSEG Recorder Feb 2012)
- Integrated Characterization and Simulation of Fractured Tensleep Reservoir at Teapot Dome for CO2 Injection Design (SPE 132404, 2010)
- Quantifying and Predicting Naturally Fractured Reservoir Behavior with Continuous Fracture Models (AAPG Bulletin V93, No 11, November 2009)
- Impact of Pre-Stack and Post-Stack Seismic on Integrated Naturally Fractured Reservoir Characterization (SPE 87007, 2004)
- Integrated Fractured Reservoir Characterization and Simulation: Application to Sidi El Kilani Field, Tunisia (JPT)
Title: PRACTICAL RESERVOIR GEOPHYSICS  
Date: 11-16 AUGUST 2014  
Location: KUALA LUMPUR, MALAYSIA

INVESTMENT PACKAGES

<table>
<thead>
<tr>
<th>Investment Package</th>
<th>Deadline</th>
<th>Full Masterclass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Price</td>
<td>15 AUG 2014</td>
<td>SGD $ 5995</td>
</tr>
<tr>
<td>Early Bird Offer</td>
<td>18 JULY 2014</td>
<td>SGD $ 5795</td>
</tr>
<tr>
<td>Group Discount (3 or more Delegates)</td>
<td>15 AUG 2014</td>
<td>10% discount for groups of 3 registering from the same organization at the same time</td>
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</tbody>
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* To enjoy the promotion & discount offer, payment must be made before deadline  
* For 7 or more delegates, please inquire for more attractive package.  
* *Prices include lunches, refreshments and materials. Promotion & discount cannot be combined with other promotional offers.  
* Important: Please note that registration without payment will incur a SGD 200 administration fee.

DELEGATES DETAILS

1st Delegate Name: ___________________________  
Job Title: _______________  
Direct Line Number: ___________________  
Email: _____________________

2nd Delegate Name: ___________________________  
Job Title: _______________  
Direct Line Number: ___________________  
Email: _____________________

3rd Delegate Name: ___________________________  
Job Title: _______________  
Direct Line Number: ___________________  
Email: _____________________

PAYMENT METHODS

- By Credit Card: Please quote invoice number(s) on remittance advice  
- By Direct Transfer: Please quote invoice number(s) on remittance advice

PETROSYNCH LLP Bank details:  
Account Name: PetroSync LLP  
Bank Number: 7144  
Name of Correspondent Bank: Standard Chartered Bank, 6 Battery Road, Singapore 049909  
SWIFT Code of Correspondent Bank: SCBLSGSGXXX  
All bank charges to be borne by payer. Please ensure that PetroSync LLP receives the full invoiced amount.

Course Confirmation

I agree to PetroSync’s terms & conditions, payment terms and cancellation policy.

Authorized Signature: ___________________________  
PAYMENT TERMS: Payment is due in full at the time of registration. Full payment is mandatory for event attendance.

TERMS AND CONDITIONS

- For credit card payment, there is an additional bank charges.  
- For Payment by Direct Telegraphic Transfer, client has to bear both local and overseas bank charges.

Charges & Fee(s)

- For credit card payment, there is an additional 4% credit card processing fee.

DATA PROTECTION

The information you provide will be safeguarded by PetroSync that may be used to keep you informed of relevant products and services. As an international group we may transfer your data on a global basis for the purpose indicated above. If you do not want us to share your information with other reputable companies, please tick this box.

CANCELLATION POLICY

You may substitute delegates at any time as long as reasonable advance notice is given to PetroSync. For any cancellation received in writing not less than fourteen (14) working days prior to the training course, you will receive credit voucher less a SGD $200 administration fee and any related bank or credit card charges.

Delegates who cancel less than fourteen (14) working days of the training course, or who do not attend the course, are liable to pay the full course fee and no refunds will be granted.

In the event that PetroSync cancels or postpones an event for any reason and that the delegate is unable or unwilling to attend on the rescheduled date, you will receive a credit voucher for 100% of the contract fee paid. You may use this credit voucher for another PetroSync to be mutually agreed with PetroSync, which must occur within a year from the date of postponement.

PetroSync is not responsible for any loss or damage as a result of the cancellation policy. PetroSync will assume no liability whatsoever in the event this event is cancelled, rescheduled or postponed due to any Act of God, fire, act of government or state, war, civil commotion, insurrection, embargo, industrial action, or any other reason beyond management control.

DISCLAIMER

Please note that trainers and topics were confirmed at the time of publishing; however, PetroSync may necessitate substitutions, alterations or cancellations of the trainers or topics. As such, PetroSync reserves the right to change or cancel any part of its published programme due to unforeseen circumstances. Any substitutions or alterations will be updated on our web page as soon as possible.

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