SEG

The Society of Exploration Geophysicists

GeoNeurale

DISC 2018

Seismic Attributes as the Framework for Data Integration throughout the Oilfield Life Cycle

Dr. Kurt J. Marfurt

01.06.2018

9:00 - 18:00

Conference Center - Forum Fürstenfeld

Room S1

Munich – Fürstenfeldbruck

Germany

REGISTER NOW

Kurt Marfurt to return as SEG 2018 Distinguished Instructor

Previously served as SEG/EAGE DISC instructor in 2006

Tulsa, OK, 8 May 2017 – The Society of Exploration Geophysicists (SEG) is pleased to announce that Kurt HYPERLINK "https://seg.org/Education/Instructors/Kurt-Marfurt"Marfurt has been elected once again as the instructor for the Distinguished Instructor Short Course (DISC). Marfurt was previously the 2006 SEG/EAGE DISC instructor on *HYPERLINK "https://seg.org/Education/Courses/DISC/2006-DISC-Kurt-Marfurt"Seismic Attribute Mapping of Structure and HYPERLINK "https://seg.org/Education/Courses/DISC/2006-DISC-Kurt-Marfurt"Stratigraphy*. The 2018 DISC titled *Seismic Attributes as the Framework for Data Integration throughout the Oilfield Life Cycle*, will cover the physical properties measured by seismic attributes, post migration data conditioning and image processing, the exploration stage of the oil field life cycle (no wells), the development stage of the oil field life cycle (1-10 wells), the maturity and death stage of the oil field life cycle (10-100s of wells), the rebirth stage of the oil field life cycle – the resource play (10-1000s of wells), and a profile of the future interpreter.

Kurt J. Marfurt joined The University of Oklahoma in 2007 where he serves as the Frank and Henrietta Schultz Professor of Geophysics within the ConocoPhillips School of Geology and Geophysics. Marfurt's primary research interest is in the development and calibration of new seismic attributes to aid in seismic processing, seismic interpretation, and reservoir characterization. Recent work has focused on applying coherence, spectral decomposition, structure-oriented filtering, and volumetric curvature to mapping fractures and karst with a particular focus on resource plays. Marfurt earned a Ph.D. in applied geophysics at Columbia University's Henry Krumb School of Mines in New York in 1978 where he also taught as an Assistant Professor for four years. He worked 18 years in a wide range of research projects at Amoco's Tulsa Research Center after which he joined the University of Houston for 8 years as a Professor of Geophysics and the Director of the Allied Geophysics Lab. He has received the SEG best paper (for coherence), SEG best presentation (for seismic modeling), as a coauthor with Satinder Chopra best SEG poster (one on curvature, one on principal component analysis) and best AAPG technical presentation, and as a coauthor with Roderick Perez Altimar, SEG/AAPG Interpretation best paper (on brittleness) awards. Marfurt also served as the EAGE/SEG Distinguished Short Course Instructor for 2006 (on seismic attributes). In addition to teaching and research duties at OU, Marfurt leads short courses on attributes for the SEG and AAPG, and currently serves as Editor in Chief of the AAPG/SEG Journal, *Interpretation*.

About the Society of Exploration Geophysicists

The Society of Exploration Geophysicists is a not-for-profit organization committed to connecting the world of applied geophysics. With more than 27,000 members in 128 countries, SEG provides educational and technical resources to the global geosciences community through publications, books, events, forums, professional development courses, young professional programs, and more. Founded in 1930, SEG fosters the expert and ethical practice of geophysics in the exploration and development of natural resources, characterization of near surface, and mitigation of earth hazards. For more information visit www.seg.org.

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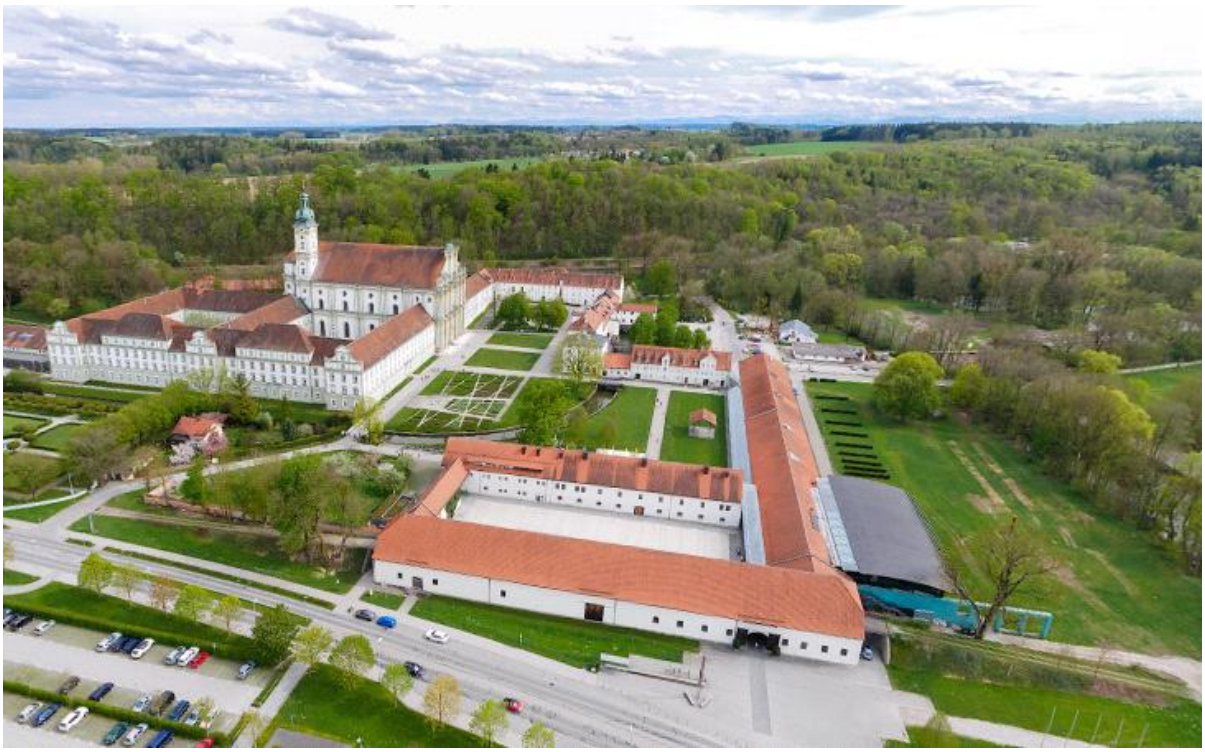
DISTINGUISHED INSTRUCTOR SHORT COURSE (DISC)

The venue for this event will be the new GeoNeurale training location situated in the historical Fuerstenfeld Forum.
The Cistercian monastery at Fuerstenfeld was founded in 1263 like a castle structure. It was restored in 2001 and a modern conference center has been built into the historic monastery grounds preserving the original wooden made architectures.



The conference center disposes of free parking facilities and can be easily reached with the underground line S4 going westwards from the Munich central railway station in about 25 minutes plus 5 minutes walk to the conference complex. The main entrance is situated on the right front building (red arrow) and will be marked by information signals.

https://www.fuerstenfeld.de/architecture

The participants will receive free of charge a copy of Kurt Marfurt new book on Seismic Attributes analysis.

For **room S1** follow the info direction on location.

This is a 1-day intensive course 9:00 - 18:00

ONLINE REGISTRATIONS

https://seg.org/shop/products/detail/41513144

List Price
US$470.00

Member Price
US$380.00

Student Price
US$140.00

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Sitemap

Hotels

Seismic Attributes as the Framework for Data Integration throughout the Oilfield Life Cycle

Course Duration
One day

Intended Audience
• Seismic interpreters who want to extract more information from their data.
• Seismic processors and imagers who want to learn how their efforts impact subtle stratigraphic and fracture plays.
• Sedimentologists, stratigraphers, and structural geologists who use large 3D seismic volumes to interpret their plays within a regional, basin-wide context.
• Reservoir engineers whose work is based on detailed 3D reservoir models and whose data are used to calibrate indirect measures of reservoir permeability.
• Team leaders who wish to identify advances in machine learning technology that promise improved efficiency and accuracy in the integration of large data volumes.
Prerequisites (Knowledge/Experience/Education Required)
Participants should have a basic understanding of sedimentology and structural geology and familiarity, but not necessarily expertise in 3D seismic interpretation. The accompanying textbook will include mathematical details of volumetric attribute calculation, image processing, and machine learning algorithms. The lecture will focus on fundamental assumptions, algorithm application, and analysis of the results.

Course Outline
• Introduction
• Seismic attributes and what they measure
• Post-migration data conditioning and image enhancement
• The exploration stage of the oil field life cycle
• The development stage of the oil field life cycle
• The mature stage of the oil field life cycle
• The rebirth stage of the oil field life cycle
• Data integration and a profile of the future interpreter

Learner Outcomes
After completing this short course, the participant should be able to
• use attributes to quantify geometric, dynamic, kinematic, statistical, and geomechanical properties of the 3D seismic data volume,
• use 3D visualization and multiattribute crossplots to interactively enhance and isolate geologic features that otherwise might be overlooked,
• use concepts of geomorphology, diagenesis, and tectonic deformation to integrate seismic and well-log data within an appropriate geologic framework,
• use classical statistics and modern machine learning to establish correlations between 3D seismic data, rock

properties, and engineering data that then can be employed to predict future rates of penetration, well-completion success, and well-fluid production, and use seismic attributes computed from 3D seismic data as the framework for data integration throughout the lifespan of the oil field.

Abstract

While lower in vertical resolution than well log and core data, 3D seismic data provide a more comprehensive image above, below, and at the reservoir than any other data source. For this reason, 3D seismic data and its derivative products form the natural framework for subsequent data integration for both static and dynamic earth models. In the exploration part of the oilfield life cycle, seismic data and seismic attributes image horizons and delineate faults. While interpretation in the exploration stage is necessarily qualitative, it is based on scientific principals of stratigraphy and structural geology. Attributes illuminate architectural elements that help determine the depositional environment, while small faults and flexures help determine the deformation process.
In the development part of the oilfield life cycle, the addition of downhole measurements provides a means to become more quantititative. Correlation of image logs and microseismic events with curvature and azimuthal anisotropy help define areas that are more intensely fractured. Well log measures of P-velocity, S-velocity, and density coupled with rock physics data bases and systematics provide the basis for seismic impedance inversion, allowing the interpreter not only to evaluate direct hydrocarbon indicators but also to construct a geocellular model. Seismic data plays a lesser role In the mature part of the oilfield life cycle, where the goal is to extract the remaining oil at minimal expense. Legacy seismic surveys shot when the oil field was young may not contain the resolution needed to best understand subtleties in the mature oil field. Reacquiring seismic data is more common in large offshore reservoirs where significant resources remain. Here, time lapse attribute analysis provides the means to identify by-passed pay, sweep, flow barriers, changes in pressure, and potential geomechanical instabilities.
Mature fields can be reborn. Overlooked deeper and shallower objectives as well as new play concepts reinvigorate oil fields where the acerage is held and the infrastructure is in place. 5D interpolation reinvigorates legacy seismic surveys. In North America, technical innovations including horizontal drilling and hydraulic fracturing may directly target the source rock, or drill tight or highly heterogeneous parts of the reservoir too expensive to produce from vertical wells. Our analysis becomes more statistical, where the experience obtained from tens if not hundreds of wells can be correlated to volumetric attributes. Using core to generate reservoir-specific templates, seismic attributes can be statitically correlated to brittleness, total organic carbon, rate of penetration, and expected ultimate recovery.
In this one day short course, I will illustrate these concepts by example, showing modern workflows based on interactive interpretation and display as well as those aided by machine learning.

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