EAGE2018

June 11–14, 2018 | Copenhagen

EMERSON

Exploration & Production Software

EMERSON E&P SOFTWARE
PRESENTATION SCHEDULE ABSTRACTS

Automatic Recovery and Classification of Targeted Seismic Wavefields from Prestack Seismic Using Deep Learning

Tuesday, 9:00, Wednesday, 14:30, Thursday, 13:00
Presented by Sandra Allwork

This presentation describes the most recent evolution of Emerson's revolutionary utilization of the Local Angle Domain to characterize subsurface features from seismic data. Knowing that the EarthStudy 360 system enables us to decompose the recorded seismic wavefield into full-azimuth directivity components, we will demonstrate the use of Principle Component Analysis (PCA) with its inherent compression, to derive principle directivities.

Ultimately, we will use the power of Deep Learning to classify these directivities into geometrical, indeed geological features such as faults, plus other identifiable components such as ambient noise or acquisition footprint. This method presents a more reliable method for separating these components, thus producing clearer stack images of the subsurface. They show superior results over previously unrivaled diffraction weighted stacks.

Supporting Technology: EarthStudy 360®

Accelerate Your Interpretation of Stratigraphic and Depositional Features through Machine Learning

Tuesday, 9:30; Wednesday, 15:00, Thursday, 9:00
Presented by Bruno de Ribet

To evaluate the quality of a reservoir and gain a more realistic measure of its behavior, geoscientists aim to achieve accurate seismically-calibrated facies distribution mapping. To meet this challenge, we demonstrate the impact of the full dimensionality of the available seismic data (prestack with or without poststack) and well data to infer facies heterogeneities distribution in an oil-filled carbonate reservoir, using a machine learning method.

The goal is to generate a probabilistic facies model from the seismic data. The strength of this method is the system's ability to integrate data of different types (e.g. core, wireline, seismic) and resolutions. This technology reveals new potential about seismic data reliability for predicting away from wells, especially when referring to prestack data (which carry more information) with any type of seismic attributes.

Supporting Technology: SeisEarth® + Machine Learning Solutions

Big Loop: Better Prediction and Quantification of Uncertainties, While Reducing Cycle Time

Tuesday, 10:00, Wednesday, 13:00, Thursday, 9:30
Presented by Steve Batchelor and Steve Walsh

Big Loop is an automated, ensemble based workflow that tightly integrates the static and dynamic domains. Subsurface uncertainties, captured at every stage of the modeling process, are used as inputs within a repeatable workflow. By adjusting these inputs, an ensemble of models can be created and their likelihoods constrained by production history within an iterative loop. The result is a multiple realization of calibrated models that are consistent with the underlying geology. The workflow is easy to update and allows more time spent on analyzing the results and building a common understanding of the reservoir.

Importantly, Big Loop enables:

- Capture, propagation and analysis of uncertainty from seismic to simulation
- Collaboration and integration across domains
- The building of 'fit-for-purpose' models
- Significantly reduced cycle times
- Fast updating of the geological and reservoir simulation models

Leading to:

- A more accurate reservoir description
- A more robust estimation of STOIIP and reserves uncertainty
- Better informed decisions relating to future development scenarios

This presentation, supported by recent case studies and a live demo, will show how operators are benefiting from a step-change in their geomodeling workflows.

Supporting Technology: Big Loop™

Next Generation Ensemble-based Decision Support Using a Digital Twin, the Reservoir Model

Tuesday, 10:30, Wednesday, 13:30, Thursday, 10:00
Presented by Richard Hammersley

The Internet of Things has popularized the notion of a digital twin – a virtual representation of a physical system. Designing a development plan for an oilfield is risky, and for many years the industry has made use of reservoir models – digital twins – to improve the decision-making process.

With an increase in the availability of computational resources, the industry is moving towards ensemble based workflows to estimate risk in a development plan. In this presentation, we demonstrate how our next generation ensemble-based decision support system, Tempest ENABLE, can help you understand the uncertainty in your reservoir model and help mitigate risk in the decision making process.

An important feature of a digital twin is the ability to use measurements to update the virtual model, more commonly known as history matching, data assimilation, model tuning or model calibration. We will demonstrate how production data can be used to constrain uncertainties in the reservoir model. Production data is incorporated in the virtual model using Bayesian statistics and state-of-the-art supervised machine learning techniques to create an ensemble of models that capture the range of uncertainties in your asset. Using the ensemble of history matched models, we will then demonstrate how different development scenarios can be easily compared and ranked based on their incremental values.

Supporting Technology: Tempest ENABLE™

Russian Hour/Русский час

Повышение достоверности интерпретации рифа на основе анализа сейсмограмм в области углов наклона

Tuesday, 11:00
Докладчик: Елена Вороновичева, Константин Смирнов, ПетроТрейс, Юлия Проткова, ВИНТЕРСХАЛЛ РУССЛАНД ГМБХ, Виктория Саблина, Геннадий Калиниченко, Волгодеминойл

Неопределенность в сейсмической корреляции границ рифов обычно связана с тем, что на флангах рифа нет существенной разницы между скоростями в теле рифа и скоростями во вмещающей толще. Карбонатный разрез также порождает интенсивные кратные и неполнократные волны, характеристики которых схожи с полезными отражениями. В итоге, в результате стандартной обработки часто не удаётся достичь высокого соотношения сигнал/шум и уверенно проследить границы рифа. Для более уверенной интерпретации рифа предлагается использовать технологию на основе анализа и обработки сейсмограмм в области углов наклона отражающих границ. Использование предложенной технологии позволяет специалистам увидеть стенки рифа, уменьшить неопределенности его корреляции, а также выделить зоны, обладающие разным фильтрационно-емкостным потенциалом.

Supporting Technology: EarthStudy 360®

Комплексное геомеханическое моделирование по данным ГИС

Докладчик: Екатерина Изюмова

В презентации представлен комплексный подход для оценки интервалов, направлений и величин горизонтальных напряжений по данным ГИС, прогноза поровых давлений и геомеханического моделирования. Внедрение подобного интегрированного рабочего процесса позволяет планировать график использования буровых растворов, проводить анализ устойчивости ствола скважины, оптимизировать процесс бурения и добычи. Это позволяет минимизировать финансовые убытки, в том числе из-за потери извлекаемых запасов.

Supporting Technology: Geolog®

Emerson E&P Software: An End-to-End Solution, from Seismic to Production

Tuesday, 13:00, Wednesday, 12:15 (Lunch & Learn), Thursday, 13:30
Presented by Duane Dopkin

Find out how Emerson's new Exploration and Production (E&P) software business portfolio, comprising Paradigm and Roxar software, can better help oil and gas operators increase efficiency, reduce costs and improve return on investment. The new end-to-end E&P software portfolio enables customers to transform

their organizations and E&P workflows, and connect subsurface technology to operational activities, reducing uncertainty and supporting responsible asset management. The combination of Paradigm and Roxar software gives operators the intelligent information and tools they need to increase operational capabilities and achieve Top Quartile Performance on investment in new and established oil and gas reservoirs.

Areas of particular strength for the new offering are advanced digital automation across the reservoir lifecycle, and the increased focus on cloud storage, machine learning and data analytics. We have a deep understanding of the distinctive data diversity, complexity, storage requirements, and demanding visualization and computational needs of the industry. Today we use machine learning in areas such as seismic interpretation and log interpretation, and our goal is to take digitization across the entire reservoir lifecycle.

Supporting Technologies: Emerson E&P software suite combining Roxar™ and Paradigm® software

From Interpretation to Geology: An Integrated Approach to QC'ing and Validating the Base Case Scenario in the Structural and Stratigraphic Framework

Tuesday, 13:30, Wednesday, 11:30, Thursday, 14:30
Presented by Melanie Morin

The initial interpretation of the main elements in the subsurface reflects the geological understanding of the play and directly impacts the base case scenario of all subsequent studies. Its consistency compared to the available data and geological rules strongly influences all the models deriving from this geological framework, e.g. the velocity model, static model, dynamic model or geomechanical model.

As an integrated solution, Emerson E&P software enables you to optimize our unique volumetric approach, to accurately and efficiently QC the interpretation base case scenario as to data validity, data consistency and geological rules.

In this presentation we demonstrate the workflow and tools available to refine the initial interpretation of faults and horizons, to generate a validated geological framework that can be used with confidence for further reservoir studies, and as a valid base case for structural uncertainty analysis.

Supporting Technologies: SKUA-GOCAD™, Geolog®, Explorer® Well Marker Mis-tie Tomography

Managing Production Risks through Accurate Reservoir Geomechanics

Tuesday, 15:00, Wednesday, 14:00, Thursday, 10:30
Presented by Camille Cosson

Making a reliable assessment of geomechanical risk throughout the reservoir lifecycle, in order to plan field development and production with confidence, is still a challenge in the Oil and Gas industry. The need for 3D geomechanical models is an industry given, but current commercial software limitations prevent full integration of the key complexities required to accurately model the reservoir geomechanical response to field production. Models currently used for geomechanical risk assessment are derived from simplified geological frameworks and do not relate to static and flow simulation models.

To overcome those challenges, Emerson E&P software has developed an innovative solution for easily assessing reservoir geomechanical risks in reservoirs while preserving geological integrity. A 3D FEM mesh is generated directly from the geologic model. Called the hybrid grid, it is composed of structured and unstructured elements that honor stratigraphic deposition information. This grid is the ideal support for building geologically-consistent models while respecting all requirements for FEM simulators. The workflow has been designed to efficiently construct reliable reservoir-scale mechanical models, thus ensuring better-informed field management decisions.

Supporting Technology: SKUA-GOCAD™ 3D Modeling and Geomechanics

Build and Share Fit-for-Purpose Solutions with the Roxar API

Tuesday, 14:00; Wednesday, 15:30, Thursday, 15:00
Presented by Matt Breeland

The Roxar API enables you to build and share fit-for-purpose solutions, based on the best available technology at each workflow step, and leverage private intellectual property across the entire organization. Whether you need to customize workflows to achieve specific goals, solve data management challenges, analyze your models in innovative ways, or just speed up delivery times, the Roxar API can help.

The Roxar API lets you harness your data to do what you want, how you want, when you want. This presentation includes real-world examples of solutions, including the management of large repositories of projects, using machine learning for facies prediction, automating the creation of well prognosis reports, and more. Join us to learn more about this uniquely flexible and powerful technology. Do MORE for LESS with the Roxar API!

Supporting Technology: Roxar API

Investigating and Ranking Prospects using Advanced Seismic and Quantitative Seismic Interpretation

Tuesday, 14:30, Wednesday, 9:30, Thursday, 11:30
Presented by Bruno de Ribet

As the oil inventory glut of the last four years wears off, Oil & Gas companies are beginning to invest again. They are doing so in an environment where the discovery of new prospects is becoming a greater challenge. In order to be successful, they need to use the most efficient and effective petro-technical solutions for interpretation and prospect ranking. Emerson has combined the best tools in its portfolio into the SeisEarth 2018 Integrated Canvas environment. Users can easily access workflow-guided volume and interval attributes, machine learning methods, voxel visualization and geobody detection with advanced RGB/HSV visualization, and multi-horizon flattening to perform advanced seismic interpretation, Quantitative Seismic Interpretation, and prestack interpretation. These easily accessible capabilities allow geoscientists to quickly sift through their data and identify and rank opportunities for investing through the 2020s, with a high level of confidence.

Supporting Technology: SeisEarth®

Customize and Automate Your Workflows with RMS Plugins

Tuesday, 15:30, Wednesday, 10:30, Thursday, 11:00
Presented by Matt Breeland

RMS Plugins are customizable, fit-for-purpose jobs that extend Roxar RMS functionality. They allow you to customize and automate your Roxar RMS workflows, while simultaneously (1) improving the quality of the results, (2) minimizing the effort required, and (3) speeding up delivery times.

RMS Plugins are easy to create, use and deploy. This technology enables new data management solutions, new ways to visualize and analyze data, the integration of private intellectual property into Roxar RMS workflows, and more. This presentation includes real-world examples of customized and automated solutions, including graphical and statistical quality control report generation, visualization for quality control, and data I/O.

Join us to learn more about this uniquely flexible and powerful technology. Do MORE for LESS with RMS Plugins!

Supporting Technology: Roxar API and RMS Plugins

Quality Control and Interpretation of Formation Pressure Test Data, to Improve the Accuracy of Fluid Typing and Fluid Contact Identification

Wednesday, 11:00, Thursday, 15:30
Presented by Gavin Baldwin

Wireline and LWD formation tests are extremely useful in determining actual in situ pressure measurements of the formation of interest, establishing pressure gradients, identifying the reservoir fluid type, locating fluid contacts, and calculating formation fluid mobility. They measure formation pressure by inserting an instrument probe inside the borehole wall and performing a mini drawdown and buildup by withdrawing a small amount of formation fluid. Pressure then builds to the formation pore pressure. The gradient and samples obtained from formation testing are crucial in determining thickness, quality, and connectivity of the hydrocarbon zone, and in turn, properly assessing the commercial viability of the well.

Geolog 18 gives geoscientists the opportunity to load, format, interpret and perhaps most importantly, QC formation test data from all major formation test tools prior

to subsequent gradient analysis. The adoption of Geolog's embedded Monte Carlo uncertainty analysis generates uncertainties on formation test pressure points, on the gradients, and ultimately, on the position of fluid contacts picked using these tests. This presentation will also feature a new reporting module for increased speed and flexibility when presenting results.

Supporting Technology: Geolog®

Next Generation Object Modeling of Fluvial Reservoirs – Combining Geological Control and Performance

Wednesday, 10:00; Thursday, 14:00
Presented by: Markus Lund Vevle and Merethe Lindanger

Multiple facies modeling techniques have been used over the years to model fluvial reservoirs, both object-based and pixel-based. When object modeling was first introduced in RMS over 25 years ago, it was based on the need to better represent fluvial deposits. RMS 11 provides a new object-based modeling algorithm, which better suits today's data reality. Much more data is available, and both the number of wells and drilling techniques have changed drastically since object modeling was first introduced.

The new modeling algorithm includes a new and enhanced well conditioning capability which increases performance. It can model channel objects with associated levees, and crevasse splays in the outer bend. Several trends can be used as input, thereby increasing data input flexibility. The output will contain intrabody trends for each facies, which can be used to guide the distribution of the petrophysical properties.

The ability to condition all available data and allow geometric control of large-scale features eliminates the need to perform manual edits. This makes the algorithm suitable for automated workflows, and provides an alternative to often used pixel-based methods. These workflows can then be used to generate large ensembles of realistic reservoir models.

Supporting Technology: RMS™ 11

CUSTOMER PRESENTATIONS

Innovations in Formation Evaluation: Petrophysical Uncertainty and Petro-elastic Characterization of Thin-bedded Reservoirs

Tuesday, 12:15 (Lunch & Learn)
Presented by Cristiano Tarchiani, Eni

This presentation begins with a discussion about petrophysical uncertainties, including an overview of the full workflow of the Geolog Determin Uncertainty module, from raw log and core data, through environmental corrections and interpretation, to obtain a full distribution and statistics for each output petrophysical parameter.

The second part of the session features an innovative workflow for petro-elastic characterization of thin-bedded gas bearing turbidite reservoirs, for seismic reservoir characterization and geomodeling. This workflow includes the use of dielectric dispersion logs to generate a petro-elastic and facies model at cm-scale, as well as robust upscaling techniques implemented for the characterization at seismic scale.

Supporting Technology: Geolog®

Update Velocities to Better Constrain Gross Rock Volumes

Thursday, 12:15 (Lunch & Learn)
Presented by Joana Almeida, Galp EP

One of the main goals of our work as geoscientists is to calculate a Gross Rock Volume (GRV) as accurately as possible; and for that, a good velocity model is required. Good velocity models are not always available, which is one of the reasons why a reliable tool that helps to achieve sound results is needed. In order to do that, Galp followed the Time Preserving Model-based Tomography workflow.

In this presentation, we demonstrate the Time Preserving Model-based Tomography workflow using deep water offshore data. We compare the results of the final velocity model using a three-well and four-well scenario, and show their respective impact on the GRV.

Supporting Technology: Explorer™ Well Marker Mis-tie Tomography

TECHNICAL PRESENTATIONS

Application of Deep Learning Along Directional Image Gathers for High-Definition Classification of Subsurface Features

Yuval Serfaty, Liron Itan, Ronit Levy and Zvi Koren
Session: Diffraction Modeling and Imaging
Date and Time: Tuesday, June 12, 9:20 - 9:45
Location: Room A

Facies Modeling of a Real-Life Fluvial System Using a Modern Object-Based Algorithm

Markus Lund Vevle
Session: Building and Updating of Static Geomodels I
Date and Time: Tuesday, June 12, 14:45 - 15:10 PM
Location: Room H

A Holistic Approach to First Break Detection Using a Deep Convolutional Network and Global Optimization

Amin Merouane
Session: Seismic Signal Processing, Stacking and Move-Out Corrections
Date and Time: Wednesday, June 13, 13:30 - 13:55
Location: Room E

Eigenray Tracing in 3D Heterogeneous Media

Zvi Koren and Igor Ravve
Session: Poster: Seismic Modeling B
Date and Time: Wednesday, June 13, 16:45 - 17:10
Location: e-Posters 9

Common Reflection Angle Migration Revealing the Complex Deformation Structure beneath Forearc Basin in the Nankai Trough

Dr. Kazuya Shiraishi and Yasuhiro Yamada - JAMSTEC, Masako Robb and Karl Hosgood - Emerson Paradigm
Session: Seismic Imaging - Case Histories II
Date and Time: Wednesday, June 13, 14:45 - 15:10
Location: Auditorium 10

Model-Based Surface Wave Analysis and Attenuation

Dr. Jianyong Bai
Session: Land Seismic Noise Attenuation
Date and Time: Thursday, June 14, 8:55 - 9:20
Location: Room C

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