

EAGE2019

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EMERSON E&P SOFTWARE **PRESENTATION SCHEDULE ABSTRACTS**



Image Large 2D Surveys in an Automated 3D Environment, to Optimize Parameters and Processing Efficiency

Tuesday, 10:00, Thursday, 11:30

Presented by Alan Vigner



The vast majority of available seismic data in many regions worldwide is still 2D. Each 2D project can contain up to hundreds of lines, requiring significant investment in human resources and data management. As 2D lines can be very long, cluster-based computing is often required. Our advanced multi-line capability enables work on a large number of lines with minimal user intervention, including the integration of parameter testing. The solution presented supports both single 2D lines and work in batch mode.

Supporting Technology: GeoDepth™

Big Loop: From Reservoir Engineering to Geology

Tuesday, 10:30; Wednesday, 10:00, Thursday, 13:00

Presented by 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 running from seismic to simulation. This system efficiently generates ensembles of models, calibrated to all available static and dynamic data, and consistent with the underlying geology. These give a more reliable estimation of hydrocarbons in place and future production, leading to better informed decisions about future development scenarios. Through collaboration between disciplines, cycle times are reduced, a common understanding of the reservoir is achieved, and knowledge is able to flow back up the modeling chain. In this presentation, the principles and key benefits of Big Loop will be outlined, with a focus on how information loops in such a workflow; how the multidisciplinary models, conditioned to data from the dynamic domain can provide insights into the static model.

Supporting Technology: Big Loop™

Quantify Uncertainty throughout Formation Evaluation Workflows

Tuesday, 11:00, Thursday, 13:30

Presented by Gavin Baldwin

Petrophysical analysis and formation evaluation provide vital inputs to most, if not all, geoscience workflows. Key information regarding porosity, permeability, shale volume and saturation as well as other mineral volumes, together with the identification of fluid contacts and the free water level, all guide and aid subsequent modeling and reservoir simulation. The ability to provide a level of uncertainty around these various petrophysical inputs increases confidence in reserves estimation and producibility, enabling better, more informed economic decisions. Geolog, Emerson's best-in-class formation evaluation application, allows Monte Carlo uncertainty to be performed in a wide variety of petrophysical workflows, producing a customizable uncertainty range with each output: Whether running environmental corrections, performing deterministic or optimizing petrophysical analysis, verifying an oil/water contact, or simply running a user created algorithm.

Supporting Technology: Geolog™

Turn your Models into Democratic Knowledge with Agile Analytics for Enlightened Decisions

Tuesday, 11:30, Wednesday, 14:00

Presented by Melanie Morin and Camille Cosson

The use of Data Analytics is one of the key trends emerging in the upstream and downstream industry. With the increase in the amount of data and related knowledge at various scales, it becomes crucial to adopt a collaborative, interactive and efficient approach to get the most out of complex 3D models built by expert geoscientists, and maximize the understanding of plays with no additional work. Although our industry uses massive amounts of data, we still face challenges, mainly due to a lack of openness and agility in traditional tools. Better insight into models is key for streamlining the expert review of 3D models and for supporting efficient, objective and enlightened decisions.

This presentation will demonstrate how the openness, flexibility and automation capabilities of the Emerson modeling suite enable an efficient and fit-for-purpose analysis to review key models' characteristics, from regional to

field compartment scale. As an example, we will demonstrate the power of the plugin Emerson modeling solution and TIBCO Spotfire® data visualization and analytics software.

Supporting Technology: Emerson Modeling

Frontier Exploration and Appraisal: Integrate Geological Context into the Center of Your Interpretation for Improved Prospect Identification

Tuesday, 13:00, Wednesday, 13:00, Thursday, 11:00

Presented by Carmen Brazon



In early stages of exploration, geoscientists must screen several areas to determine which ones have the greatest chance of yielding oil and gas accumulations. In this screening process, timescales are tight and quite often only limited data is available. The first task is to quickly set up a project, allowing efficient screening of the available data and import from different sources. As in any geoscience study, the goal is to quickly extract from this data as much info as possible. However, due to the time and data constraints, in many cases the most up-to-date technologies cannot be applied. The integration of the geological context is key to understanding the play and taking the appropriate decision. In those studies, the teams often need to be able to capture info from analogues or literature in the interpretation platform and apply a model-driven approach. Once an area of interest is identified, the ability to perform further investigations on the same platform such as applying fast to run classification methodologies can prove to be a game-changer, allowing you to mature your leads to drillable prospects and calculate associated volumetrics. In this presentation we will show how the Emerson E&P interpretation platform has the flexibility to allow you to tailor your exploration workflow to suit the available data.

Supporting Technology: SeisEarth™

Reduce Geomechanical Risks in Drilling and Reservoir Production

Tuesday, 13:30, Thursday, 10:00

Presented by Camille Cosson and Gavin Baldwin

Sustainable field management cannot be performed without a thorough understanding of reservoir mechanics and how it evolves throughout the life of a field. Emerson E&P Software's integrated solution enables the user to perform a rapid, yet comprehensive, subsurface geomechanical study in order to assess reservoir risk.

Using the example of a highly faulted case study, we review a complete 1D to 4D geomechanical study. Beginning with Emerson's petrophysical analysis application Geolog, we construct a 1D mechanical earth model based on data acquired from the well. Horizontal minimum and maximum stress magnitudes are calculated and calibrated with leakoff test results and borehole images. The 1D mechanical model is used as input along with the 3D seismic interpretation and inversion results in order to build a reliable 3D mechanical earth model.

The unique modeling algorithm in SKUA-GOCAD enables users to build large, high-resolution models, capturing all key complexities. Different available gridding options automatically generate a Finite Element Mesh that is fully optimized for geomechanical simulators. A unique hybrid mesh has been designed to accurately simulate the reservoir's structural complexities together with stresses along the faults. In order to identify risk related to production, the geomechanical simulation is coupled with flow simulation.

Supporting Technology: Geolog™, SKUA-GOCAD™

Fully Automated Integration between Geophysics and Geomodeling for More Robust Uncertainty Analysis

Tuesday, 14:00, Wednesday, 14:30

Presented by Alan Vigner

The management of uncertainties is one of the most important issues facing the oil and gas industry today. Uncertainty can stem from petrophysical uncertainties, subsurface structural uncertainties, and geological uncertainties, which then lead to uncertainties in hydrocarbon volume estimation and well landing/target depth uncertainties. We are presenting an automatic workflow which, by integrating geophysical and geomodeling information, reduces velocity uncertainties, and hence the position of the structures.

Supporting Technology: GeoDepth™ Tomography, SKUA-GOCAD™

Russian Hour/Русский час
Tuesday, 14:30

Использование ES360 для повышения качества изображения и точности прогноза на нефтяных месторождениях СНГ

Using EarthStudy 360 to Improve Image Quality and Enhance Prediction Accuracy in CIS Oil Fields

Presented by Alexander Inozemtsev

В презентации представлены практические примеры применения полно-азимутальной технологии EarthStudy 360 по повышению качества сейсмического изображения структурно-тектонического каркаса и точности прогноза трещиноватых коллекторов в сложных геологических условиях, включая нефтяные месторождения с трудно-извлекаемыми запасами (Регион СНГ).

In this presentation we show practical examples of applying EarthStudy 360 full-azimuth technology to improve the quality of the seismic image of the Structural Tectonic Skeleton and the prediction accuracy of fractured reservoirs in complex geological conditions, including oil fields with hard-to-recover reserves in CIS.

Supporting Technology: EarthStudy 360™

Аналитический граф прогноза литофаций по скважинным и сейсмическим данным с использованием разных решений машинного обучения в ПО Эмерсон

An Analytical Workflow for Lithology Prediction from Well and Seismic Data Using Various Emerson Machine Learning Solutions

Presented by Sabine Klärner, Klarenco

На практическом примере мы поделимся опытом и представим последовательность шагов прогноза литологии и свойств разреза по скважинным и сейсмическим данным с использованием разных алгоритмов машинного обучения в ПО Эмерсон.

Начинаем с подготовкой скважинных и сейсмических данных. Затем показываем итеративное использование модуля Geolog Multimin для определения объемных долей пород и на этой основе идентификация сейсмически эффективных типов фаций в Facimage.

Следующим шагом продемонстрируем, как на основе упругих свойств, полученных путем синхронной инверсии сейсмических данных, при помощи инструментов Rock type and lithofacies classification можем прогнозировать дискретные типы фаций и их вероятность. Последним шагом показываем прогноз непрерывных свойств разреза как глинистость и пористость при использовании сейсмической инверсией нейронными сетями.

Using a real data set, we will share our experience and demonstrate a step-by-step workflow for lithology and property prediction from well and seismic data using various Emerson unsupervised and supervised learning solutions.

We will begin with procedures for well and seismic data preconditioning. We will then show the loop of well data interpretation in Geolog Multimin, where the volume fraction interpretation is created as the base for the identification of facies which can be distinguished using the elastic properties in Facimage.

We will then demonstrate how at the base of elastic properties created by simultaneous inversion, discrete facies types and their probability in the Rock type and lithofacies classification tools can be predicted. In a final step we will show the prediction of continuous properties like Vshale and porosity using the neural network seismic inversion of various seismic attributes.

Supporting Technology: Geolog™

Use Machine Learning Techniques to Enrich the Data Available to Seismic Interpreters

Wednesday, 11:00, Thursday, 10:30

Presented by Sandra Allwork and Camille Msika

Machine Learning technologies are richly represented across the Emerson portfolio; here we focus on just two, which deliver enhanced data deliverables to aid the seismic interpreter. Deep Learning applied to full-azimuth data extracts 'pre-classified' data volumes from prestack data to highlight geological structures, while the Rock Type Classification workflow uses a Democratic Neural Network Association trained with both prestack data and well data to predict lithology distribution and probability.

Supporting Technologies: EarthStudy 360™, Rock Type Prediction

Unveil Reservoir Properties: Quantitative Interpretation on the Interpreter's Everyday Working Platform

Wednesday, 11:30, Thursday, 14:00

Presented by Camille Msika and Dominique Mouliere

The giant gas discoveries of Leviathan and Tamar field in the eastern Mediterranean Sea have sparked a great interest in the deep Levant Basin. Wells drilled in the Myra and Sara licenses on a structural high didn't encounter hydrocarbons, showing the limitations of conventional interpretation. Through a combination of rock physics analysis of the well data and a detailed interpretation of seismic amplitudes, Quantitative Seismic Interpretation techniques were used to characterize the reservoir and quantify properties like lithology and fluids, thereby reducing drilling risks.

Supporting Technologies: Quantitative Seismic Interpretation

Emerson E&P Software - We See Subsurface Digital Transformation Driving Profitability Across the Entire Value Chain

Wednesday, 15:30

Presented by Matthieu Quinquet

At Emerson Exploration & Production Software, we see how our technology helps operators avoid unproductive exploratory drilling, maximize efficiency in planning, and gain the most from existing reserves. We see our new end-to-end E&P portfolio, comprising Paradigm and Roxar technologies, increasing oil recovery, while our automated subsurface workflows and new Open Data platform promise new levels of efficiency and collaboration across the entire value chain.

With a substantial history of innovation that has time and again been proven to solve industry and customer challenges, Emerson E&P Software is uniquely positioned to embrace the digital transformation leap that is driving the use of data and results analytics; while leveraging cloud technology to turn all available information into value that will empower our customers to make informed decisions.

Come and see for yourself why companies are choosing Emerson to partner with them on their digital transformation journey.

Supporting Technology: Emerson E&P Software Portfolio

CUSTOMER PRESENTATIONS

Total - Digital Transformation: Enabling Integrated, Multi-disciplinary, Multi-vendor, Multi-cloud Geoscience Studies

Tuesday, 12:00 (Lunch & Learn)

Presented by Henri Houllievig, Total & Alice Chanvin, Emerson

In today's E&P subsurface workflows, oil & gas companies face numerous challenges that impact the productivity of their geoscientists. In fact, geoscientists spend up to 60% of their time organizing and cleaning data. Teams work in silos, complicating multi-domain workflows; and platforms lock in data, hindering the use of the best available solution. Moreover, the lack of interoperability makes it harder to work with partners.

Taking that into account, Emerson has created the OpenDB Consortium, to define the roadmap priorities for development and commercialization of OpenDB, an open subsurface database based on open standards. This presentation will show how OpenDB tackles subsurface data management challenges by promoting collaboration and interoperability. As a leading member of the OpenDB Consortium, Total will share how OpenDB provides an answer to its challenges, allows multidisciplinary reservoir studies, and fits into the E&P industry Cloud infrastructure initiatives.

Supporting Technology: OpenDB

Neptune Energy - Dual-azimuth Depth Imaging of Marine Surveys in the Fenja Field

Tuesday, 15:30

Presented by Alexander Sakharov, Neptune Energy

Neptune will present the results of an imaging project on the Fenja field, using Emerson E&P Software processing and imaging technology. The workflow included advanced multi-azimuth depth processing, multi-azimuth velocity model building, and reflection and diffraction imaging. The objectives were to improve seismic definition of the Jurassic sandstone section and achieve a better

understanding of the reservoir and the trap for planning production wells. In addition, the new image aimed to improve definition of near-field exploration targets against the Vingleia Fault. Advanced multi-azimuth depth processing improved the data resolution. Subtle structural information was easier to map in the new data. This approach helped to understand complex geology around the Vingleia fault and improve reservoir definition in a sin-rift deposit. Diffraction imaging highlighted the areas of possible drilling hazards.

Supporting Technology: Echos™, GeoDepth™, EarthStudy 360™

Emerson Applications at Galp

Wednesday, 10:30

Presented by Elsa Azevedo e Silva, Galp

After a brief presentation about Galp, this presentation will show how Emerson is used within Galp E&P, in order to extract maximum information from integrated subsurface data. The presentation will include the numbers behind the technology, the type of data domains being used, and the way Emerson solutions are applied across the different disciplines. Some workflow examples will show how Emerson applications are used in Galp to explore the subsurface for commercial hydrocarbon accumulations. Equally important is the deployment of a well-established communication loop between the Galp subsurface and Emerson support teams.

Repsol - The Democratization of Technology: An Essential Component of Digital Transformation

Wednesday, 12:00 (Lunch & Learn)

Presented by Francisco Ortigosa, Repsol

Digital Transformation is reshaping our industry to increase the profitability of our business. While exploration success rates have remained constant throughout the industry with an average rate of 30%, economic success rates have plummeted to below 5% over the past 10 years. One of the consequences of this is that the average IRR of projects is south of 5%.

One of the reasons for this is that in Geoscience, regardless of technological advances in the field of quantitative practitioners, most exploration decisions are made by generalist practitioners. Digital Transformation will empower qualitative practitioners because it will provide them with tools and experience that in the past was concentrated in the hands of a few skilled specialists. In particular, interpreters will be able to accelerate their work using very sophisticated tools, now available thanks to High-performance Computing that will be available to them through the Cloud.

All of this is part of a broader technological democratization. This is a significant change from the way the industry has worked in exploration over the past 30 years. Repsol is fully engaged in the process of democratizing technology by making available to all seismic interpreters, all of the technology developed under the award-winning Kaleidoscope Project. Seismic interpreters will no longer be trapped in repetitive tasks with no apparent added value to the business. They will now be able to engage in scientific tasks where innovation and creativity are a routine part of their daily work.

The strategic partnership between Repsol and Emerson is a material component of the technology democratization process in Repsol, as all technology developed under the Kaleidoscope Project will be incorporated into the Emerson SeisEarth platform, the corporate platform chosen by Repsol for all its exploration work.

Supporting Technology: SeisEarth™

SOCAR - Using Big Loop in an Offshore Gas Field - A Case Study

Wednesday, 15:00

Presented by Aghammad Sultanov, Subsurface Manager

The basic Big Loop approach assumes that geomodeling and reservoir flow simulation are included in a single automated workflow. It enables the performance of multi-realization simulation and subsequent assessment of the risks caused by geological and dynamical uncertainties. It is not always sufficient, especially when it comes to an offshore gas-condensate field, because the constraints imposed by wells and surface facilities can significantly affect reservoir performance and cause additional risks. This presentation demonstrates

the results of cooperation between the SOCAR and Emerson teams, aimed at assessing the risks in developing a gas field by applying an extended Big Loop approach that includes integrated modeling in a multi-realization simulation.

Supporting Technology: Big Loop™

ENI - Petrophysics in a Defective World: Uncertainty Evaluation and Machine Learning Techniques Increase Confidence in the Petrophysical Characterization of the Reservoir

Wednesday, 13:30

Presented by Maria Teresa Galli, Upstream & Technical Services, ENI

“The robust evaluation of petrophysical properties is the basis for sound reservoir characterization”. This apparently obvious statement, in reality often clashes with limitations (in richness and/or quality) of the data available to perform formation evaluation. The evaluation of petrophysical uncertainty is therefore mandatory, and a valuable step in the assessment of all the geological uncertainties in the reservoir characterization process and in Risk Analysis.

This presentation includes two Case Studies. In the first, *Evaluation of Petrophysical Uncertainty in Thin Beds*, a modular methodology was developed to perform both petrophysical characterization and uncertainty evaluation in a critical, soft, thin-layered formation, a task aggravated by the bias of scarce and poor quality core data.

Complex depositional environments and lack of data are not the only criticality to be faced; conversely, large amounts of data can be redundant without providing the necessary information, often significantly increasing the time required for their interpretation. A conventional workflow might then be inadequate when time is one of the critical issues, such as in reservoir revisions and data room activities. In the second Case Study, *How Machine Learning Reduces Intrinsic Petrophysical Knowledge from Legacy Data*, a novel data-driven approach provided a reliable formation evaluation through the use of a machine learning algorithm (MRGC) in the petrophysical characterization of a giant mature field. The approach, which exploited the statistical relationships hidden in the available log-petrophysics models, avoided the use of time-consuming model-fitting processes and the tricky estimation of some badly-defined formation properties.

Both Case Studies were originally presented in March 2019 at the Offshore Mediterranean Conference in Ravenna, Italy.

Supporting Technology: Geolog™

Fast Model Update in Equinor - Success Factors

Thursday, 12:00 (Lunch & Learn)

Presented by Kathrine Waite, Equinor

Fast Model Update (FMUTM) is Equinor's in-house technology for integrated reservoir modeling. In recent years, it has become the standard modeling method at Equinor, with more than 45 fields now implementing FMUTM to some degree. Important factors in the success of this new way of working fall broadly into three categories: 1) strategic focus, 2) smart use and further development of available technologies, and 3) in-house development of new tools and technologies as enablers for the process. Collaborating with software vendors to ensure that available tools are developed and enhanced to further support the Big Loop integrated modeling philosophy, and to start preparing to move reservoir modeling to the Cloud, has been a strong focus within Equinor in recent years. Emerson has been a valuable partner on this journey.

Supporting Technology: RMS™

