E&P SOFTWARE PRESENTATION ABSTRACTS

Understand your Geology - Cloud: Exploring for Wolfcamp Reservoirs, Eastern Shelf of the Permian Basin, Texas, Using a Machine Learning Approach

Monday, 9:15 AM, 3:15 PM; Tuesday, 1:30 PM; Wednesday, 9:15 AM
Presented by: Peter Wang

One of the leading challenges in hydrocarbon E&P is predicting rock types and fluid content distribution throughout the reservoir away from the boreholes. In this presentation, we will demonstrate the application of a neural network-based machine learning methodology called Democratic Neural Network Association (DNNA) to the problem of finding oil-filled packstones in the Middle Wolfcamp, Eastern Shelf of the Permian Basin, Texas.

The DNNA algorithm searched through fifteen 3D seismic volumes simultaneously, and was able to build a model which reconstructed the nine lithofacies. No evidence was seen of false positive or false negative predictions at the wells for the oil-filled packstone facies.

The neural network learnings were applied through the 3D survey, and results were delivered with up to a 0.5 ms two-way time vertical resolution, or about 5 ft, a significant uplift from conventional seismic resolution. Lateral resolution was also improved. Additional drilling opportunities can be identified from the seismic facies thickness map or the facies probability voxel clouds.

Supporting Technologies: SeisEarth® + Machine Learning Solutions

Plan your Well: Precision Depthing with Well Marker Mistie Tomography Improves Well Landing and Well Steering

Monday, 9:45 AM, Tuesday, 4:30 PM; Wednesday, 10:45 AM
Presented by: Gaby Yelin

Having accurate knowledge about depth positioning of the target formations is of major importance for well planning and geosteering. It is common to observe mis-ties when seismic interpretation is correlated to the well tops. The industry has adopted different workflows to overcome this challenge. The problem is that most of those techniques applied to seismic/velocity-well calibration do not honor the basic assumptions of seismic velocity model building, and may produce non-geological velocities with artifacts. In addition, some of these workflows can be quite human intensive.

In this presentation, we will demonstrate an innovative technology for velocity calibration and seismic-to-well matching. This technology, known as well tie time-preserving tomography, provides a solution to this challenge which honors the physics. We will then combine this technology with geostatistical methods to tackle the uncertainty of the predicted values between the wells, done by generating different scenarios according to different probabilities We will explain the technology during the presentation and share results from case studies.

Supporting Technologies: Explorer™ Well Marker Mis-tie Tomography

Produce your Asset: Breaking Down Barriers - Propagating Critical Knowledge Across Disciplines to Make Better Decisions

Monday, 10:15 AM; Tuesday, 4:30 PM; Wednesday, 1:00 PM
Presented by: Emmanuel Gringarten

Even after more than a decade of advocating the perceived benefits of multi-disciplinary collaboration and integration of software tools, petrophysicists, geophysicists, geologists, and reservoir engineers still generally operate in discipline-centric silos using domain specific applications. The result is that critical knowledge is sometimes not transferred fully across inter-disciplinary boundaries. This is even more true when it comes to the capture and quantification of uncertainty in subsurface workflows, its effect on resource assessment, and the risks associated with field development decisions. Today, most disciplines understand their own uncertainties, but propagate forward only a limited subset of pre-defined scenarios, often leading to biases in production forecasts.

With Big Loop™, asset teams are able to bring forward an ensemble of possibilities, across all disciplines, calibrated to existing production information yet consistent with the underlying geology. In this way, they can assess the risks of their development decisions, decide where to focus resource efforts, and make their plans using information that is always up to date.

Supporting Technologies: The Big Loop™

Understand your Geology: Improving Field Development - Understanding, Capturing, and Evaluating Sources of Subsurface Uncertainty

Monday, 10:45 AM; Tuesday, 9:45 AM; Wednesday, 10:45 AM
Presented by: Camille Cosson & Kim McLean

Evaluating risk and understanding uncertainty are a critical part of asset teams' efforts to understand their subsurface environment. Uncertainties are present in every measurement and calculation from which we deduct an understanding of the subsurface. During the interpretation workflow, these uncertainties need to be quantified so the asset team can properly account for them with in the greater subsurface model which is used to analyze and quantify flow performance. But how? Each asset member - the petrophysicist, geologist, geophysicist, and engineer - encounter uncertainties, many of which are interdependent.

With Emerson's new integrated platform, it is possible to easily combine petrophysical, geophysical and geological uncertainties into one unique model. Best-in-class specialist applications are synchronized and work together to provide an efficient and reliable solution for uncertainty evaluation and reservoir risk assessment. In this presentation, we will show a systematic workflow for integrating all uncertainties, from time-depth conversion and interpretation to reservoir properties. Uncertainties impacting structure and stratigraphy are modeled using a unique approach, based on the patented UVT Transform®. All faults, horizons and fluid contacts are stochastically simulated while preserving the subsurface structure, stratigraphy and geological integrity. Those uncertainties are combined with petrophysical uncertainties to quantify their mutual and distinct impacts on reservoir recoverable volumes, connectivity and production forecasts.

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

Plan your Well: Unconventional Field Development in the Cloud

Monday, 12:00 Noon (Lunch & Learn); Tuesday, 10:15 AM; Wednesday, 9:45 AM
Presented by: Hassane Kassouf

In 2017, well completion was the second largest overall expenditure accounting for over 25% of the total services market. Macroeconomic volatility is forcing the industry to make step changes towards productivity, and as digital transformation accelerates, unconventional field development is uniquely poised to benefit from this shift. Cloud computing is enabling this transformation. The cloud unlocks the potential of machine learning and online collaboration in the new Age of Big Data.

This presentation demonstrates use cases via Emerson's Cloud Native Applications, custom written on the cloud for well placement and completion optimization, challenging the traditional siloed approach. Our Hybrid Clouds run some software locally while other components are remote. These applications highlight a new digital operations model where accessibility, mobility and real-time decisions are at the core of field development achieving unparalleled operational performance.

Supporting Technologies: Paradigm® k, SKUA Harvest®

Produce your Asset: Managing Production Risks with Accurate Geomechanic Models

Monday, 1:30 PM; Tuesday, 2:30 PM; Wednesday, 10:15 AM
Presented by: Camille Cosson

Various geomechanical problems can arise during the exploitation of oil and gas reservoirs. For example, producing hydrocarbons from highly stressed faulted reservoirs, either through primary depletion or enhanced recovery production, can result in unanticipated fault reactivation, leading to potential material impact, loss of production, and possibly the reservoir itself. To ensure field and facilities safety, an accurate and reliable 3D geomechanical appraisal is needed. In this presentation, we will demonstrate how Paradigm software allows reconciling all information related to reservoir mechanics into a high-fidelity geomechanical model.

Using advanced meshing methods, we can create grids adapted for geomechanical simulation, which preserve the reservoir complexity. Thanks to integration with Dassault Systèmes state-of-the-art mechanical simulator, the reservoir's mechanical response to production and fault reactivation potential can be modeled and assessed. This solution enables geologists, geophysicists, reservoir engineers and mechanics experts to understand each other and collaborate. It results in an accurate and reliable reservoir mechanical model that can be used with confidence by customers, to optimally manage reservoirs and control production risk.

Supporting Technologies: SKUA-GOCAD™

Understand your Geology: Shale Geoscience - An Integrated Eagle Ford Case Study

Monday, 2:00 PM; Tuesday, 2:00 PM
Presented by: Gaby Yelin

This presentation shows the different technologies developed by Emerson for unconventional plays. We will show a multi-disciplinary case study in the Eagle Ford shale, where the main goal is completion success. We will show unique technologies and innovative workflows used to tackle various challenges across different disciplines, from shale geophysics through shale formation evaluation to shale reservoir geophysics and modeling. The aim is to build an accurate earth model that integrates seismic, lithological, stratigraphic petrophysical and mechanical properties, to derive to a completion program that maximizes recovery.

Supporting Technologies: EarthStudy 360®, Geolog® FE, SKUA® Geomodeling; AVA(Z), RMO(Z) for Fracture Determination

Vision: Introducing Emerson E&P Software

Monday, 2:30 PM; Tuesday, 9:15 AM; Wednesday, 1:00 PM
Presented by: Indy Chakrabarti

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 this 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; our goal is to take digitization across the entire reservoir lifecycle.

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

Understand your Geology: Interpretation and Prospect Ranking with Advanced Volumetric and Quantitative Methods

Monday, 3:15 PM; Tuesday, 3:15 PM
Presented by: Peter Wang

As the oil inventory glut of the last four years wears off, O&G 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 will need to use the most efficient and effective petro-technical solution for interpretation and prospect ranking.

Emerson has combined the best tools in its portfolio into the Integrated Canvas 2018 environment. Geoscientists 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 will allow geoscientists to quickly sift through their data and identify and rank opportunities for investing through the 2020s, with a higher level of confidence. This live demonstration will show how to do all of this.

Supporting Technologies: SeisEarth®

Geosteering an Eagle Ford Lithozone with Confidence

Monday, 3:45 PM; Tuesday, 3:45 PM
Presented by: Kim McLean

Unconventional 'shale' reservoirs will continue to be a focus of the energy industry in North America for the foreseeable future. The bulk of the costs incurred in producing shale reservoirs comes from frac design and completions. With the price of oil still somewhat volatile, it is in the interest of energy companies to use data on hand to plan their horizontal wells so that they can stay in zone, and ultimately complete the wells in the optimal zone of interest.

Shale reservoirs tend to be heterogeneous in nature, with facies that differ in mineralogy, and as a result, geomechanical properties. What if a company could integrate knowledge of the geomechancial rock properties from their pilot wells into their well planning?

We present a workflow that evaluates the mineralogy and geomechanical rock properties of an offset well, and incorporate that information into the planning stages of a horizontal well. Ideally, geologists can take advantage of their knowledge of geomechanical facies and optimally place a well so that it leads to better placement within the reservoir sweet spot.

Supporting Technologies: VoxelGeo®, SeisEarth®

LUNCH & LEARN PRESENTATIONS

Plan your Well: Unconventional Field Development in the Cloud

Monday, 12:00 noon
See Abstract above.

Sequential 3D Restoration Provides Insights into Structural and Stratigraphic History

Presented by: Jean-Luc Rudkiewicz, Direction Géosciences, Département Géoressources, IFP Energies Nouvelles
Tuesday, 12:00 noon

3D restoration today has four different types of objectives:

1. Perform quality control on seismic or structural interpretations.
2. Obtain tensor data that might be used as proxy for fracture density and fracture orientation.
3. Obtain geometry in the past, to be used for petroleum system modeling or stratigraphic modeling.
4. Get an idea of the stress field when complex faults or salt patterns interact.

This presentation will show how these four goals can be achieved.

Supporting Technologies: SKUA-GOCAD™, Kine3D®