EMERSON

SBGf 2019

16th International Congress of the Brazilian Geophysical Society and EXPOGEF

August 19-22, 2019

SulAmerica Convention Center

Av. Paulo de Frontin, 1 - Cidade Nova

Centro - Rio de Janeiro - Brasil

Demo Schedule

Tuesday, August 20	Title	Supporting Technologies
9:00	Next-Generation Cloud Solutions	Emerson E&P Software
9:45	Integrated Canvas for Interpretation at Large	SeisEarth™, VoxelGeo™
10:30	Big Loop: From Reservoir Engineering to Geology	Big Loop™
11:15	Diffraction Imaging for Reliable High-resolution Interpretation	EarthStudy 360™, SeisEarth™
13:15	Volumetric Seismic Interpretation: Stratigraphic interpretation in Paleospace	SKUA-GOCAD™
14:00	Prediction of Well Logs and Electrofacies Classification, Useful Tools for Day-to-day Seismic Interpretation	Geolog™ Facimage™
14:30	Modified Stochastic Inversion	Quantitative Seismic Interpretation
15:00	Use Machine Learning Techniques to Enrich the Data Available to Seismic Interpreters	Stratimagic™, SeisFacies™, Rock Type Classification
15:30	Application of Deep Learning along Directional Image Gathers for High-Definition Classification of Subsurface Features	EarthStudy 360™, Deep Learning
16:00	Seismic interpretation: An Approach to Capturing Seismic Uncertainties	Roxar™ RMS, SeisEarth™
16:45	Happy Hour	
Wednesday, August 21		
9:00	Prediction of Well Logs and Electrofacies Classification, Useful Tools for Day-to-day Seismic Interpretation	Geolog™ Facimage™
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Thursday, August 22		
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15:30	**Next-Generation Cloud Solutions**	Emerson E&P Software
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Abstracts

Next-Generation Cloud Solutions
Tuesday, 9:00, Wednesday, 16:00; Thursday, 15:30
Presented by Jorge Assumpção

The cloud is a key component of the industry's digital transformation, facilitating access to fit-for-purpose subsurface software solutions and hardware instances. Cloud platforms provide flexible, low-cost access to compute resources, minimizing large upfront investments in hardware and ongoing maintenance. Emerson E&P Software provides a simple yet effective way of allowing users of subsurface geoscience and engineering applications to take advantage of the cloud platform, with multiple implementation models for accessing existing and new web-based technologies.

In this presentation, we showcase Emerson's cloud platform solution for desktop and high-performance computing (HPC) applications. Interactive applications can be run in a multi-user environment, mimicking the on-premise setup. This allows data and results to be readily shared by different users in the asset team working on the same projects. HPC cloud solutions allow the setup of a virtual cluster with any number of compute nodes (CPUs/GPUs) in minutes, and run Emerson's HPC applications (migrations, tomography, processing, etc.) on the most modern and optimized hardware configurations, consuming the optimal computation capacity for the task.

Supporting Technology: Emerson E&P Software

Integrated Canvas for Interpretation at Large
Tuesday, 9:45, Wednesday, 13:15; Thursday, 14:00
Presented by Leandro Machado

Emerson E&P Software's fully integrated interpretation and visualization software suite is engineered to accurately describe the subsurface and efficiently delineate prospects, enhancing productivity and mapping quality. Through a series of interpretation workflows in a single executable for data visualization, interpretation and analysis, we facilitate the user experience with pre- and post-stack interactive operations, such as new seismic attributes, a new plug-in approach – a workflow-driven user interface, interval attributes, QSI, geobody interpretation and sculpting workflows available in the Integrated Canvas. Advanced interactivity, usability and scalability, enabling the user to test parameter sensitivity for all workflows based on the workflow engine, delivers a high level of confidence in prospection delineation.

Supporting Technology: SeisEarth™, VoxelGeo™

Big Loop: From Reservoir Engineering to Geology
Tuesday,10:30, Wednesday, 11:15; Thursday, 15:00
Presented by Diogo Miranda

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. The 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 are 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™

Diffraction Imaging for Reliable High-resolution Interpretation
Tuesday, 11:15, Wednesday, 10:30; Thursday, 11:15
Presented by Gerardo González

In an effort to obtain a more accurate definition of the reservoir, E&P companies have made huge investments in acquiring rich seismic data with wide azimuth and long offset, especially in fractured and subsalt reservoirs. Traditional seismic image volumes generated from these surveys capture the composite response of the subsurface to wavefronts propagating from all subsurface angles and from all directions or azimuths. While these volumes of data are appealing to the seismic interpreter in defining major structural and stratigraphic events, small faults, discontinuities, and other reservoir heterogeneities are often masked or lost in conventional seismic imaging procedures.

While improved fault recovery and imaging is a natural outcome of the process, diffraction imaging can also reveal high-resolution heterogeneities in a reservoir that are not recovered in standard seismic imaging workflows. These images can reveal controlling stratigraphic features that can influence field development and drilling decisions.

Supporting Technologies: EarthStudy 360™, SeisEarth™

Volumetric Seismic Interpretation: Stratigraphic interpretation in Paleospace
Tuesday, 13:15, Wednesday, 9:45; Thursday, 9:00
Presented by María González

Working in flattened space is a common technique used in geophysical interpretation to better understand deposition sequences and identify stratigraphic features from seismic. Often, the flattened space is constructed from a simplified 2D displacement model with poor handling of faults. This severely reduces its effectiveness in generating reliable interpretations.

With the SKUA UVT approach, 3D displacements are used rather than a vertical stretch to perform simultaneous flattening of

all horizons. This enables generation of a reliable image of the paleospace for both compressional and extensional environments, regardless of the structural and stratigraphic complexity. This 3D approach allows also data to move freely between the current space and paleospace, unlocking a wide range of applications.

Supporting Technology: SKUA-GOCAD™

Prediction of Well Logs and Electrofacies Classification, Useful Tools for Day-to-day Seismic Interpretation

Tuesday, 14:00, Wednesday, 9:00; Thursday, 14:30

Presented by Hector Busnego

In constructing the static model, a common problem is that certain wells do not contain the log information needed to adjust and estimate a good correlation with the seismic data (density, transit time, etc.). In other cases, this data exists, but for some reason the quality is too low, generating more uncertainty and problems, if used. There is a need to obtain synthetic logs using mathematical functions from other logs offering better accuracy.

To solve this issue, an approach based on the application of neural networks and machine learning is proposed using the Geolog Facimage module. This enables the generation of synthetic logs in an intuitive and didactic environment, and the performance of dynamic cluster analysis using any of the known methods (MRGC, SOM, AHC and DYN).

Supporting Technology: Geolog™ Facimage™

Modified Stochastic Inversion

Tuesday, 14:30, Wednesday, 15:30; Thursday, 9:45

Presented by João Muniz

This presentation introduces Modified Stochastic Inversion (MSI) - a new method for performing stochastic inversion, which is able to handle complex geologies, in a fast and flexible manner. Stochastic inversion is generally used to provide multiple, equally probable realizations, to help perform risk analysis. While the classic approach to stochastic inversion is computationally expensive, only a few realizations are normally calculated, so risk assessment is poor. The second challenge is handling complex geology, a feature which is not available in known stochastic inversion solutions.

The MSI algorithm differs from classic approaches, which involve huge numbers of stochastic predictions before selecting the ones which best match the seismic data. MSI avoids the matching step, simplifying both the process and computation time. We achieve this by separating seismic and non-seismic data in the frequency domain and using a non-stochastic alternative for the seismic range. For complex geology, we use the Emerson E&P Software SKUA-GOCAD platform. MSI provides tremendous flexibility in the algorithm itself, for QC and for parameter testing, delivering very high-quality results.

Supporting Technology: Quantitative Seismic Interpretation

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

Tuesday, 15:00, Wednesday, 15:00; Thursday, 10:30

Presented by Raisa Carvalho

The true integration of well and seismic data has always been a challenge because of their different responses and resolutions. To resolve these ambiguities, machine learning methods are being introduced to change the applicability of seismic data from an exploration context to a valuable prospect development tool. This presentation introduces a new method based on an association of neural networks to resolve reservoir facies heterogeneity distribution and discusses its applicability.

Supporting Technologies: Stratimagic™, SeisFacies™, Rock Type Classification

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

Tuesday, 15:30, Wednesday, 14:00; Thursday, 16:00

Presented by Jaime Yañez

This presentation shows a full-azimuth imaging technology performed in the Local Angle Domain, for characterizing subsurface features from migrated seismic data. With this technology, the surface recorded seismic data are simultaneously mapped to the subsurface and partitioned into high-resolution, multi-dimensional bins at each subsurface grid point. Summing the mapped seismic wavefield along the opening angle axis decomposes the data into full-azimuth directivity angle gathers.

For a test involving Deep Learning training based on many geometrical features, we used data from the Eagle Ford unconventional shale play. We first performed LAD imaging to create the full-azimuth directional gathers. We then applied the method to the data. The results clearly showed noise reduction and enhancement in the reflector's continuity, and higher resolution of fault lines.

Supporting Technologies: EarthStudy 360™, Deep Learning

Seismic interpretation: An Approach to Capturing Seismic Uncertainties

Tuesday, 16:00, Wednesday, 14:30; Thursday, 13:15

Presented by Vinicius Ramos

Seismic interpretation is one of the most important steps in reservoir characterization. However, uncertainties related to seismic noise, wavelet resolution constraints and energy scattering, among other effects, are inherently present in seismic data. The combined effect of these uncertainty sources contributes to masking seismic reflections, providing a dramatic loss of accuracy when performing seismic interpretation. Roxar RMS Software can guide the interpreter/geomodeler through the interpretation in the presence of seismic uncertainties. The uncertainty sources can then be treated as variables in a probabilistic analysis, foreseeing the impact of these inputs on the reservoir geological model. Thus, in complex geological situations such as pre-salt areas, the stochastic approach should be taken over the deterministic one, due to a better estimation of the impact of all possible scenarios in the resulting models and volume calculations. .

Supporting Technology: Roxar™ RMS, SeisEarth™

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