

# 2ND EDITION ARTIFICIALLY INTELLIGENT EARTH EXPLORATION: BETWEEN EXPECTATIONS AND THE CURRENT SITUATION

30 NOVEMBER–2 DECEMBER 2021

SEG WORKSHOP



# PROGRAMME

GULF STANDARD TIME  
(GMT + 4:00)

## SCHEDULE

5:00 - 11:00AM : USA/CST (GMT-5:00)

11:00 - 5:00PM : (GMT)

3:00 - 9:00PM : UAE/OMAN/GST (GMT +4:00)

7:00 - 12:00PM : ASIA PACIFIC

## DIGITAL INTELLIGENCE SERIES SPONSORS:

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### SESSION SPONSOR



## Tuesday, 30 November 2021

### Day 1

15:00 - 15:10 **Welcome Address by Committee Chair - by Ali Al-Naamani, PDD**  
 15:10 - 15:25 **SEG Leadership Keynote**  
 15:25 - 15:40 **Opening Address by Aiman Bakhorji, Saudi Aramco**  
 15:40 - 15:55 **Opening Address by Hassan Barwani, Petroleum Development Oman**  
 15:55 - 16:10 **Networking Break - 15 Min**

Session 1 **DEEP LEARNING IN GEOSCIENCE**  
TBC

16:10 - 16:30 **KEYNOTE : Deep Learning Applications in Seismic Exploration**  
Jianwei Ma (Peking University)  
 16:30 - 16:45 **Calibration and Uncertainty Quantification of Bayesian Convolutional Neural Networks for Geophysical Applications**  
Lukas Mosser (Earth Science Analytics AS)  
 16:45 - 17:00 **"MLReal: Bridging the Gap Between Training on Synthetic Data and Real Data Applications in Machine Learning"**  
Tariq Al Khalifah (KAUST)  
 17:00 - 17:15 **Use of "Earth Intelligence@" for Automating Geophysical Data Integration**  
Luc Sandjivy (Earth Resource Management, Services France)  
 17:15 - 17:35 **KEYNOTE : Introduction to Efficient Carbon Capture Storage through Machine Learning Life Cycle**  
Tarry Singh (DeepKapha.ai)

17:35 - 18:05 **Moderated Discussion - 30 mins**  
 18:05 - 18:20 **Networking Break - 15 mins**

Session 2 **DENOISE AND MULTIPLE ATTENUATION**

18:20 - 18:40 **KEYNOTE : Deep Learning Ground-Roll Attenuation with Surrogating Physics Constraint**  
Weichang Li (Aramco Americas)  
 18:40 - 18:55 **Application of Deep Learning for Surface Wave Noise Attenuation**  
Ferhan Ahmed (Saudi Aramco)  
 18:55 - 19:10 **Hyper-Parameter Selection for Self-Supervised Seismic Denoising**  
Claire Birnie (KAUST)  
 19:10 - 19:25 **Internal Multiple Attenuation for Land Seismic Data with Convolutional Neural Network**  
Tianyue Hu (Peking University)

19:25 - 19:55 **Moderated Discussion - 30 mins**  
 19:55 - 20:10 **Speed Networking**  
 20:10 - 20:30 **Post event Online Bingo Game with Prizes**

## Wednesday, 1 December 2021

### Day 2

Session 3 **IMAGE ENHANCEMENTS AND IMPROVED RESOLUTION**

15:00 - 15:15 **Machine Learning Workflows to Create Pseudo-3D from 2D Seismic**  
Paul de Groot (DGB Earth Sciences)  
 15:15 - 15:30 **High Seismic Frequency Reconstruction Through a Deep U-NET Architecture**  
Halah Abdulrahman Alasmri (Saudi Aramco)  
 15:30 - 15:45 **Deep Learning Methods for Seismic Data Interpolation**  
Mario Ruben Fernandez (Fraunhofer-Institut für Techno- und Wirtschaftsmathematik (ITWM) & École Normale Supérieure (ENS))  
 15:45 - 16:00 **Increased Efficiency of Deblending Using Deep Learning: Case Study from Sultanate of Oman**  
Nadia Al Kiyumi (CGG)

16:00 - 16:30 **Moderated Discussion - 30 mins**  
 16:30 - 16:45 **Networking Break - 15 mins**

### POSTER SESSION

16:45 - 16:53 **Application of Graph Embeddings for Shear-Wave Velocity Prediction**  
David Cova (China University of Petroleum)  
 16:53 - 17:01 **Prediction of Initial Model for Elastic FWI with CNN on Data with Lack of Low Frequencies**  
Pavel Plotnitskii (KAUST)  
 17:01 - 17:09 **Robust Subsalt Fullwaveform Inversion on Challenging Data with the Aid of Unet**  
Abdullah Alali (KAUST)  
 17:09 - 17:17 **Physics-Guided Deep Learning for Seismic Inversion using Variational Autoencoders with Normalizing Flows**  
Arnab Dhara (University of Texas at Austin)  
 17:17 - 17:25 **Deep Learning-Based Resolution Enhancement of Post-Stack Data with Seismic-Well Combination**  
Haoran Zhang (China University of Petroleum)  
 17:25 - 17:33 **Self-supervised Learning for Random Noise Removal in Seismic Data**  
Sixiu Liu (KAUST)  
 17:33 - 17:41 **AVO Inversion for Elastic Modulus Using Semi-Supervised Neural Networks**  
Yuhang Sun (China University of Petroleum)  
 17:41 - 17:49 **Suppression of Seismic Random Noise Based on Self-Supervised Deep Learning**  
Gui Chen (China University of Petroleum)

17:49 - 18:15 **Moderated Discussion**  
 18:15 - 18:30 **Networking Break - 15 mins**

Session 4 **VELOCITY ANALYSIS AND INVERSION**

18:30 - 18:45 **Physics-Guided Learning-Driven Computational Seismic Imaging: from Synthetic Practice to Field Applications**  
Youzuo Lin (Los Alamos National Laboratory)  
 18:45 - 19:00 **PINNtomo: Seismic Tomography using Physics-Informed Neural Networks**  
Umair bin Waheed (KFUPM)  
 19:00 - 19:15 **Preconditioning Seismic Inverse Problems with AutoEncoders**  
Matteo Ravasi (KAUST)  
 19:15 - 19:30 **Gather Preconditioning and RMO Picking using Deep Neural Network**  
Amroo Al Ramadhani (CGG)

19:30 - 20:00 **Moderated Discussion - 30 mins**

Session 5 **INTERPRETATION AND PICKING**

20:00 - 20:15 **Leveraging Machine Learning for Interactive Seismic Horizon Interpretation**  
Graham Baines (Halliburton)  
 20:15 - 20:30 **Machine Learning Application to Build Fault Probability Volumes for Structural Models**  
Maisha Amaru (Chevron)  
 20:30 - 20:45 **AI Seismic Interpretation: Challenges, Solutions and Applications**  
Peter Szafian (Geoteric)

20:45 - 21:15 **Moderated Discussion - 30 mins**

## Thursday, 2 December 2021

### Day 3

Session 6 **SEISMIC ATTRIBUTES**

15:00 - 15:20 **KEYNOTE : Relative Geologic Time-Constrained Convolutional Neural Network for Subsurface Property Estimation**  
Haibin Di (Schlumberger)  
 15:20 - 15:35 **Integration of Multiscale Attributes using a Semi Supervised Machine Learning Algorithm**  
Salma AlSinan (Saudi Aramco)  
 15:35 - 15:50 **Characterizing Karstification using Unsupervised Machine Learning**  
Saleh Al-Uwaiyadh (Saudi Aramco)

15:50 - 16:20 **Moderated Discussion - 30 mins**  
 16:20 - 16:35 **Networking Break - 15 mins**

Session 7 **SEISMIC INVERSION**

16:35 - 16:55 **KEYNOTE : Hydrocarbon Source Rock and Reservoir Prediction from Seismic Data using Artificial Neural Networks**  
Yang Liu (China University of Petroleum)  
 16:55 - 17:10 **Demystifying Deep Learning for Seismic Inversion**  
Ke Wang (Chevron)  
 17:10 - 17:25 **Advancement in Seismic Inversion using Temporal Convolutional Networks**  
Hussain Alfayez (Saudi Aramco)

17:25 - 17:55 **Moderated Discussion - 30 mins**  
 17:55 - 18:10 **Networking Break - 15 mins**

Session 7 **WELL LOGGING AND FORMATION EVALUATION**

18:10 - 18:25 **Inference of Density and Velocity with DAS and Deep Learning**  
Vladimir Kazei (Aramco Services Company)  
 18:25 - 18:40 **Facies Classification of Carbonates using Deep Neural Networks**  
Elita Li (Purdue University)  
 18:40 - 18:55 **Machine Learning Prescriptive Well Log Quality Analysis**  
Determination of Casing Effects  
Klemens Katterbauer (Saudi Aramco)  
 18:55 - 19:10 **Automating Uphole Data Interpretation using Deep Learning Methods**  
Hala Alqatari (Saudi Aramco)

19:10 - 19:40 **Moderated Discussion - 30 mins**  
 19:40 - 20:00 **Wrap-up by Workshop Technical Co-Chairs**