جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

KAUST Virtual Workshop: Intelligent illumination of the Earth 20th - 23rd June, 2021

Sunday, Jun. 20th 2021 (Day 1) @14:00-18:30 AST

Workshop Opening

2:00 pm **Welcome presentation**
Tariq Alkhalifah, KAUST

2:10 pm **Opening notes**
Lawrence Carin (KAUST Provost)

Session I : "The potential of Machine learning"

2:30 pm **Talk 1.1 - Advancing Reservoir Simulation with Machine Learning**
Suha Kayum, Saudi Aramco

2:50 pm **Talk 1.2 - What Can Algorithms Learn from Data & Knowledge to Make Better Reservoir Predictions?**
Vasily Demyanov, Heriot-Watt University

3:10 pm **Talk 1.3 - NVIDIA building blocks for ML based geoscience**
Issam Said, NVIDIA

3:30 pm **Talk 1.4 - Applicability of ML in Capturing the First Principles of Fluid Flow in Porous Media**
Hussein Hoteit, KAUST

3:50 pm **Session Q&A**

Session II : "Optimized workflows and the role of HPC"

4:30 pm **Talk 2.1 - Automating subsurface property modeling through semi-supervised learning**
Haibin Di, Schlumberger

4:50 pm **Talk 2.2 - NVIDIA platform for AI and HPC, and applications to geosciences**
Pedro Mario Cruz de Silva, NVIDIA

5:10 pm **Talk 2.3 - Open Seismic: A Toolbox for Seismic Interpretation**
Ravi Panchumarthy, Intel

5:30 pm **Talk 2.4 - KAUST Supercomputing Services for HPC and AI**
Saber Feki, KAUST

5:50 pm **Session Q&A**

6:30 pm **End of Day 1**

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Monday, Jun. 21st 2021 (Day 2) @14:00-18:30 AST

Session III Panel discussion : "The future of ML in Geosciences and Engineering"

2:00 pm

In what parts of Geoscience and Engineering will ML make the biggest impact?

Is ML a fad or here to stay?

How can geoscience and engineering departments at Universities cope with the emerging ML trend?

Would the job market prefer an ML geoscience (engineering) degree (BS., MS., or even PhD.)?

What is next for ML in illuminating the Earth?

Fatai Anifowose, Saudi Aramco

Steve Freeman, Schlumberger

Satyam Priyadarshy, Halliburton

Ashley Russel, Equinor

Session IV : Lightning Talks "Flow and rocks"

3:00 pm **Talk 4.1 - Application of Machine-Learning to Construct Dual-Porosity Models from High-Resolution Discrete-Fracture Models**
Xupeng He, KAUST

3:10 pm **Talk 4.2 - ExaGeoStat: Exploiting Data Sparsity in Earth System Models**
Sameh Abdulah, KAUST

3:20 pm **Talk 4.3 - Bayesian Deep DCA: A New Approach for Well Oil Production Modeling and Forecasting**
Amine Tadjer, University of Stavanger

3:30 pm **Talk 4.4 - Using machine learning for petrographic thin section analysis: A case study of Late Jurassic Upper Jubayla Formation carbonates, Saudi Arabia**
Xin Liu, KAUST

3:40 pm **Talk 4.5 - GAN-based 3D Carbonate Digital Rock Reconstruction**
Nan You, National University of Singapore

3:50 pm **Talk 4.6 - Neural network-based CO2 interpretation from 4D Sleipner seismic images**
Bei Li, National University of Singapore

4:00 pm **Session Q&A**

Session V : “Applications in image attributes and inversion”

4:30 pm **Talk 5.1 - Deep learning for interpreting geologic structures**
Xinming Wu, University of Science and Technology of China

4:50 pm **Talk 5.2 - Active learning to reduce human effort needed for seismic data processing parametrization**
Alan Richardson, Ausar Geophysical

5:10 pm **Talk 5.3 - Machine learning applied to seismic reflection and well-log data for reservoir characterization**
Ursula Iturraran-Viveros, National Autonomous University of Mexico (UNAM)

5:30 pm **Talk 5.4 - Deep learning in EM inversion with prior and posterior shaping**
Weichang Li, Aramco - Houston Research Center

5:50 pm **Session Q&A**

6:30 pm **End of Day 2**

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Tuesday, Jun. 22nd 2021 (Day 3) @14:00-18:30 AST

Session VI : Lightning Talks "Physics and pixels"

2:00 pm	**Talk 6.1 - Fracture recognition with U-net and pixel-based automatic fracture detection** *Weiwei Zhu, KAUST*
2:10 pm	**Talk 6.2 - Train Deep Learning Models Using Outcrops Geological Images Datasets** *Ramy Abdallah, University of Aberdeen*
2:20 pm	**Talk 6.3 - Unsupervised deep learning inversion of seismic data based on physical-driven** *Senlin Yang, Shandong University*
2:30 pm	**Talk 6.4 - Is it time to swish? Comparing activation functions in solving the Helmholtz equation using physics-informed neural networks** *Ali Al Safwan, King Fahd University of Petroleum and Minerals*
2:40 pm	**Talk 6.5 - Scattered wavefield reconstruction and velocity inversion based on physics-informed neural networks** *Chao Song, Imperial College London*
2:50 pm	**Talk 6.6 - Applying Machine Learning to Satellite Imagery for Tracking Deforestation** *Tim Taylor, Independent*
3:00 pm	**Session Q&A**

Session VII : “The delicate balance between the ML and the physics”

3:30 pm	**Talk 7.1 - Machine learning to replace or to augment the physics?** *Eric Verschuur, Delft University of Technology*
3:50 pm	**Talk 7.2 - Computational Methods for Seismic Inversion: Data-driven VS Physics-driven or Combined?** *Youzuo Lin, Los Alamos National Laboratory*
4:10 pm	**Talk 7.3 - Fast and reliability-aware seismic imaging with conditional normalizing flows** *Ali Siahkoohi, Georgia Institute of Technology*
4:30 pm	**Talk 7.4 - Artificially intelligent waveform inversion: physics-guided neural network functions** *Tariq Alkhalifah, KAUST*
4:50 pm	**Session Q&A**

Session VIII : “AI Applications in Petroleum Engineering”

5:30 pm	**Talk 8.1 - AI-based Modeling and Optimization for Field Operations** *Hector Klie, Rice University & DeepCast Co.*
5:50 pm	**Session Q&A**
6:00 pm	**Talk 8.2 - Petroleum Data Analytics; Engineering Application of Artificial Intelligence & Machine Learning in the Petroleum Industry** *Shahab Mohaghegh, West Virginia University & Intelligent Solutions Inc.*
6:20 pm	**Session Q&A**
6:30 pm	**End of Day 3**

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Wednesday, Jun. 23rd 2021 (Day 4) @14:00-18:30 AST

Session IX : "Applications on wavefields and model building"

2:00 pm **Talk 9.1 - Deep learning geophysics: applications on data processing and inversion**
Jianwei Ma, Peking University

2:20 pm **Talk 9.2 - Machine learning algorithms for surface wave dispersion curve automatic picking**
Diego Rovetta, Aramco Overseas

2:40 pm **Talk 9.3 - Seismic tomography using physics-informed neural networks**
Umair bin Waheed, KFUPM

3:00 pm **Talk 9.4 - Preconditioning seismic processing problems with neural networks**
Matteo Ravasi, KAUST

3:20 pm **Session Q&A**

Session X : "Applications in inverse problems"

4:00 pm **Talk 10.1 - Towards Complete Machine-Learning-Based Earthquake Monitoring Workflows**
Greg Beroza, Stanford University

4:20 pm **Talk 10.2 - Inversion and imaging with deepfake data**
Laurent Demanet, MIT

4:40 pm **Talk 10.3 - Metrics and Transfer Learning for Seismic Inversion**
Mauricio Araya-Polo, Total

5:00 pm **Talk 10.4 - Deep learning and inference for seismic inverse problems**
Maarten de Hoop, Rice University

5:20 pm **Session Q&A**

Workshop Closing

6:00 pm **The best Lightning Talk awards**
Summary and outlook
Org. Committee

6:30 pm **End of Day 4**