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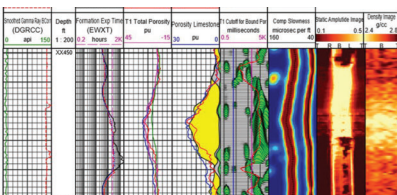
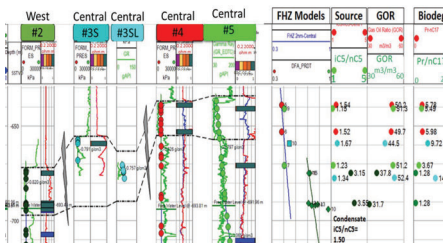
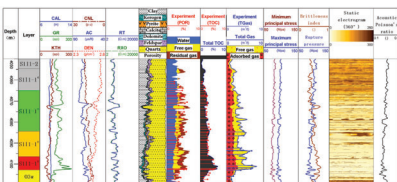
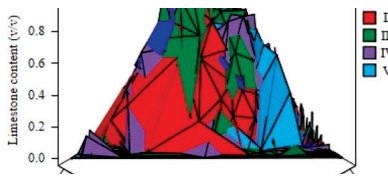
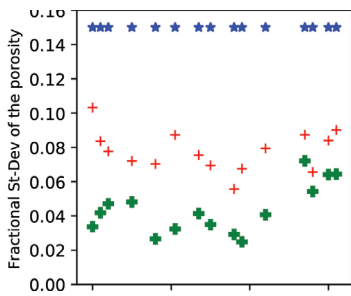
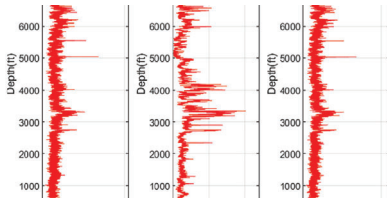
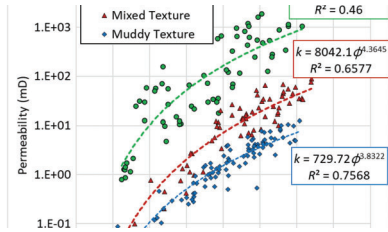
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# FEBRUARY 2023 PAPER SUMMARIES



## Dernaika et al.

Representative carbonate samples were selected from seven Cretaceous reservoirs across the Middle East region. Unique rock types were established based on porosity-permeability characteristics, capillary pressure, and textural facies. Three main porosity-permeability trends were identified based on textures. Carmen-Kozeny ( $FZI$ ), Lucia ( $RFN$ ), and Winland ( $r_{35}$ ) permeability equations were used to model the experimental data. The permeability model parameters (i.e.,  $FZI$ ,  $RFN$ , and  $r_{35}$ ) were associated with the different geological properties to provide improved predictions of permeability in heterogeneous carbonates.

## Ezenkwu et al.

The performances of dynamic time warping (DTW), constrained DTW (CDTW), and correlation optimized warping (COW) on the well-log pattern alignment and depth-matching task are investigated in this paper. The experiments considered the effects of different filtering and normalization techniques on each method, focusing on gamma rays. This study highlights and examines the significant issues in the correlations of each technique's outcome with reference data and an expert-generated log and recommends directions for future research in this area.

## Jahani et al.

Jahani et al. present a geosteering formation evaluation workflow based on an iterative version of an ensemble-based method, namely an approximate Levenberg-Marquardt form of Ensemble Randomized Maximum Likelihood (LM-EnRML). This workflow estimates the parameters of the petrophysical and geological models, including the layers' density, resistivity, and bed boundaries, by inverting deep-sensing electromagnetic and shallow-sensing nuclear density measurements separately and then jointly. A noticeable decrease in parameter uncertainty is observed with the latter option. The authors demonstrated that the LM-EnRML method estimates multiple petrophysical parameters simultaneously and decreases their uncertainties in a fraction of the time compared to classical Monte Carlo methods.

## Li

Based on data mining techniques, the problem of permeability calculation of complex carbonate reservoirs can be addressed to avoid subdividing lithologies and pore types. The accuracy of permeability calculation of complex carbonate reservoirs by the data mining technique is improved by 18.39%. The combination of data-driven and domain-knowledge-driven methods can solve the difficult problem that traditional reservoir evaluation methods cannot overcome.

## Liu et al.

Conventional petrophysical experiments in deep shale gas reservoirs are characterized by difficult coring, high cost, and insufficient representative samples, so it is difficult to comprehensively investigate the key factors of Poisson's ratio through petrophysical experiments. In this study, a multiscale and multicomponent three-dimensional digital core was constructed to quantitatively simulate the influences of the changes of reservoir gas saturation, mineral composition, stratification, and fractures on Poisson's ratio.

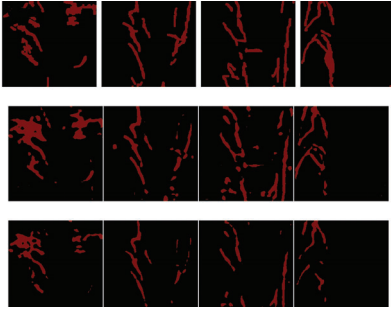
## Pierpont et al.

Many puzzling observations in two adjacent reservoirs (West Block and Central Block) have been explained within one overall context, which includes both petroleum systems and reservoir fluid geodynamics. Only the West Block exhibits "missing porosity" in NMR logging vs. density neutron, and only the West Block exhibits systematic differences in DST vs. cleaned core permeability. Also, different geochemical indices disagree as to which block contains the more biodegraded oils. The apparently more biodegraded oil has less asphaltene. Moreover, the block with this biodegraded oil has asphaltene deposition upstructure, not at the oil-water contact where biodegradation takes place.

## Saleh et al.

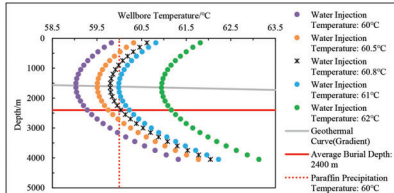
The successful case of a hexa-combo logging-while-drilling run, including gamma ray, resistivity, density-neutron, azimuthal sonic, nucleo-magnetic resonance, and high-resolution ultrasonic imaging services, took place in a Kuwait Jurassic formation in a relatively harsh logging environment. This case yielded encouraging results in terms of optimizing petrophysical data acquisition, minimizing well-construction costs, enabling the identification of additional potential hydrocarbon zones, and optimizing the completion design.

## FEBRUARY 2023 PAPER SUMMARIES



### Wang and Zhou

Logging fractures are not only the space of oil and gas reservoirs but also the channel of oil and gas migration. However, logging images are expensive to acquire, so how to effectively extract fractures from small samples of logging images is an urgent problem to be solved. Therefore, the authors developed a dual encoder-decoder structure using the Swin Transformer, which uses the self-attention mechanism of a hierarchical Vision Transformer with a shifted window to model the remote context information. The proposed method introduces the shifted window mechanism, skip connections, and other modules, which can obtain more high-resolution detail information of fractures and improve the segmentation accuracy. The experimental results show that the performance is better than the mainstream segmentation networks under small training sets of logging images, which is practical in fracture extraction of logging images.



### Yu and Zhang

In this study, a comprehensive model of the temperature distribution of the wellbore fluid was constructed for the optimization of thermal recovery parameters of high pour point oil, and the temperature distribution along the wellbore was calculated and simulated under different conditions. The characteristics of the temperature field were clearly recognized, and the final optimization system could provide a theoretical reference for the same type of reservoir.