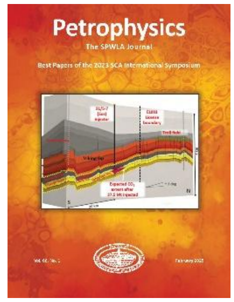

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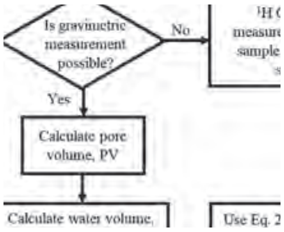
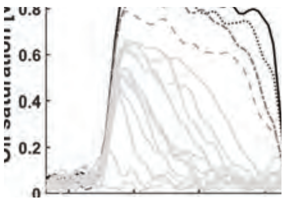


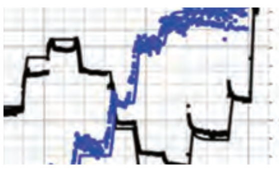
Ansaribaranghar et al. **PAGES 155–168**

This study introduces a novel method for measuring water and oil saturation in porous media using ^{13}C and ^{1}H magnetic resonance (MR) measurements. By leveraging the natural presence of MR-active ^{13}C in hydrocarbons and combining it with ^{1}H MR data, the method provides a reliable, solvent-free alternative to conventional techniques. Validated on core plugs, this approach offers accurate bulk saturation measurements with the potential for application to realistic samples with complex hydrocarbon MR signals.



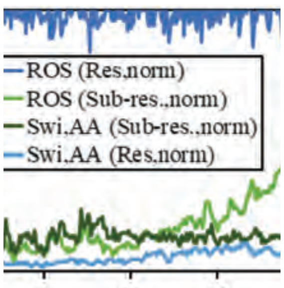
Ansaribaranghar et al. **PAGES 169–182**

We demonstrate the use of ^{13}C magnetic resonance imaging (MRI) to measure hydrocarbon saturation directly and noninvasively in rock core samples. The approach obviates the need for contrast agents or special fluids, enabling accurate, spatially resolved saturation distribution measurements. Our results closely matched traditional Dean-Stark measurements, confirming the robustness of the method.



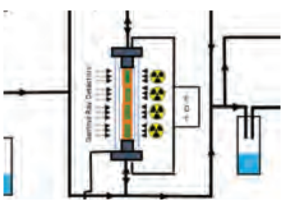
Ebeltoft et al. **PAGES 10–25**

Multiple dynamic special core analysis (SCAL) experiments have been used to define the SCAL model for full-field application to the Northern Lights CCS storage project. The results of the experiments, including relative permeability, capillary pressure, and the SCAL model concept, are presented alongside outcomes from full-field simulations.



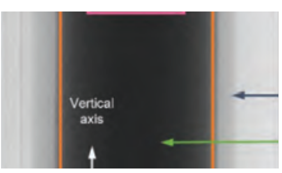
Fernades et al. **PAGES 94–109**

This paper focuses on the application of the Hybrid Drainage Technique (HDT) on bimodal limestone, specifically Estaillades limestone, to achieve accurate initial water saturation (S_{wi}) values for reliable reservoir production forecasts. The study compares HDT with the viscous oilflood method, highlighting HDT's ability to reach lower S_{wi} values and generate homogeneous saturation profiles, which are crucial for accurate wettability restoration and imbibition results. The research utilizes nuclear magnetic resonance and microtomography imaging to monitor fluid saturation and distribution, providing valuable data for interpreting coreflooding experiments and understanding fluid behavior in porous media.



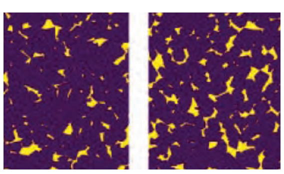
Jones et al. **PAGES 54–66**

The paper summarizes a laboratory study comparing CO_2 injection into a residual gas zone beneath a hydrocarbon reservoir to injection into a water-filled aquifer. The experiments demonstrated increased CO_2 storage capacity in the residual gas zone compared to the aquifer, and the enhanced gas recovery coreflood demonstrated efficient production of trapped hydrocarbon gas, providing a potential economic benefit to a carbon capture, utilization, and storage (CCUS) project.



Mascle et al. **PAGES 26–43**

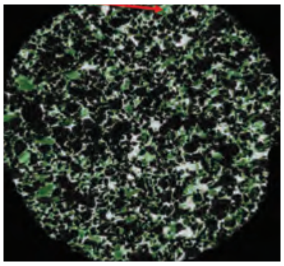
This paper revisits the methods classically used in the oil and gas industry to characterize rock flow properties. These methods have shown limitations when used in the context of CO_2 storage projects due to their CO_2-specific properties. The paper suggests a complementary interpretation of these different methods to overcome their individual limitations.



McClure et al. **PAGES 68–79**

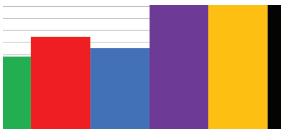
In this paper, the authors derive the relative permeability from the energy dissipation on the pore scale. From this derivation, they can identify a timescale where the relative permeability captures the average energy dissipation. This provides input for best practices for accurate characterization of the relative permeability from core scale and digital rock experiments.

FEBRUARY 2025 PAPER SUMMARIES



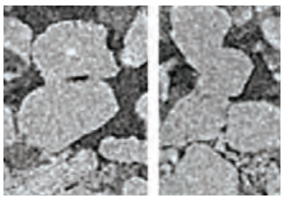
Nono et al. **PAGES 110–122**

Initial water saturation (S_{wi}) is a key parameter for understanding multiphase flow and reservoir dynamics in various applications. In this study, we use three-dimensional (3D) X-ray microtomography to investigate primary drainage on initial nonwater-wet reservoir rocks, as it could occur in a laboratory when rock cleaning is inefficient. We compare different S_{wi} 3D distributions obtained with porous plate (PP) and oilflooding (OF) techniques on the same rock types. Important key findings help inform accurate lab protocols and, thus, accurate reservoir characterization.



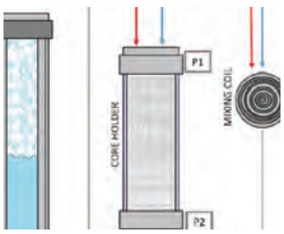
Pairoys et al. **PAGES 123–133**

This study examines the influence of sodium iodide (NaI) in brines on waterflooding tests conducted in clastic rocks. The findings demonstrate that NaI significantly affects rock wettability alteration and oil recovery when present in the connate brine, even at low concentrations.



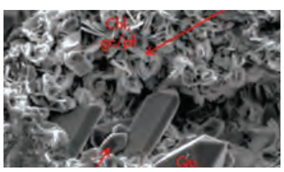
Regaieg et al. **PAGES 80–92**

Digital rock physics (DRP) simulation offers a cost-effective and rapid approach to compute relative permeability curves for rock/fluid systems. In this study, the authors applied TotalEnergies' DRP simulation workflow, coupled with a wettability anchoring experiment, in an operational context on a reservoir sandstone sample. The study was conducted as a blind test prior to the special core analysis (SCAL) measurements, and there was very good agreement between the results.



Richardson et al. **PAGES 44–53**

This study reviews an experimental program designed to develop best practices for supercritical CO_2 and brine ($scCO_2$-brine) relative permeability tests and to gather insights on $scCO_2$-brine flow behavior. We measure both drainage and imbibition relative permeabilities using the steady-state method on a single Berea sandstone core at two pore pressures (12.4 and 30 MPa [1,800 and 4,350 psi]). The results demonstrate no significant difference in relative permeability behavior between the two pressures during the drainage cycle, and no wettability effects are inferred.



Wang and Galley **PAGES 134–154**

This study demonstrated the impacts of core scale heterogeneity on fluid distribution and flow properties. A dual matrix porosity workflow was developed to analyze capillary pressure and relative permeability from core measurements. Its application to large-scale reservoir simulations is addressed.