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DOI:10.30632/PJV64N6-2023a10

Effect of Predisolved Natural Gas on CO₂ Solubility in Water With Various Salinities at Reservoir Conditions

Jie Wang and Christine Ehlig-Economides

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DOI:10.30632/PJV64N6-2023a11

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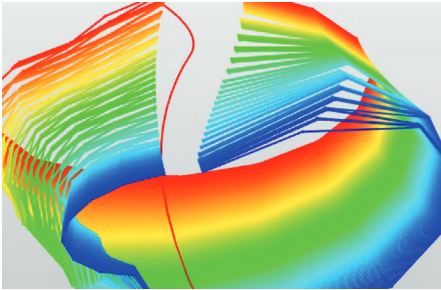
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Bennis et al.

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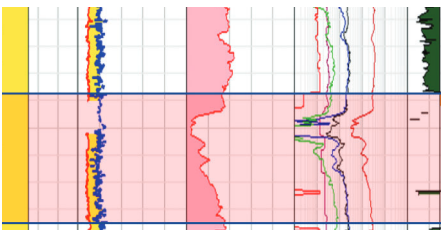
A new method is introduced to estimate the radial and vertical distributions of water saturation around the borehole in deeply invaded formations. The method was effectively implemented in a vertical well penetrating a tight-gas sandstone formation in the Middle East. Integration of well logs, core data, and formation-tester measurements successfully constrained this multivariate estimation problem.



Bradley et al.

PAGES 823-836

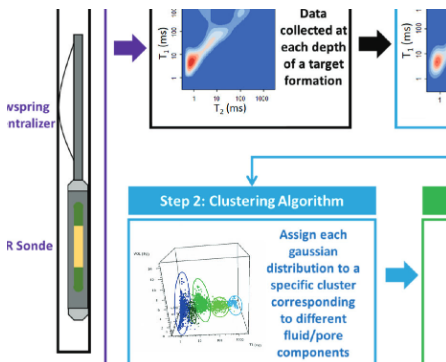
This paper describes a proposed new universal format for storing and distributing wellbore data. Unlike existing formats, it has the capability to store any data recorded in a wellbore, from simple single-dimensional measurements to complex multidimensional data such as ultradeep azimuthal resistivity measurements. In the paper, we discuss the advantages compared to legacy formats. The format is implemented using open standards and, hence, should be straightforward to implement in standard formation evaluation and modeling packages. An example of the format is provided in the paper appendices.



Cely et al.

PAGES 919-930

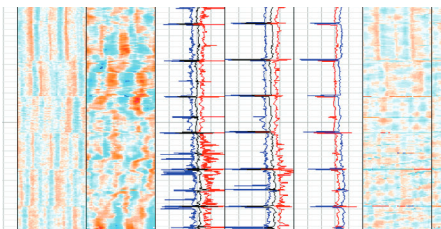
The reservoir oil viscosity in the Bredablikk Field is estimated using a combination of standard and advanced mud gas technologies and classical geochemical analysis on cutting extracts and reservoir oils. The accuracy of these methodologies was compared to PVT measurements. The advanced mud gas evaluation method successfully provided a qualitative real-time indication of the reservoir fluid viscosity region of a given well and agreed with the results reported by the PVT experiments.



Garcia et al.

PAGES 879-889

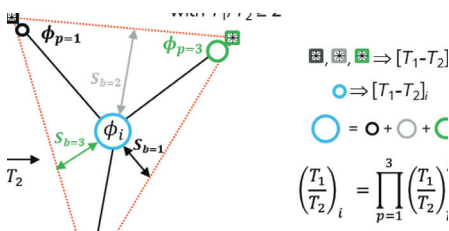
In this manuscript, the authors introduce a new workflow for tracking fluid components in the wellbore and estimating their corresponding pore volumes uniquely from the interpretation of 2D NMR measurements. The workflow approximates 2D NMR maps with a superposition of 2D Gaussian distributions, and each Gaussian is assigned to a cluster corresponding to different pore/fluid components. The volumes associated with each cluster translate directly into the pore volumes corresponding to the different fluid components (e.g., heavy/light hydrocarbon, bound/free water) at each depth. The manuscript illustrates the reliability of water and hydrocarbon pore volumes estimated by the new workflow using well-log data obtained from two unique formations.



Hawthorn et al.

PAGES 837-847

This paper shows the development of a drillpipe-conveyed pulse-echo ultrasonic tool that can be run in parallel with existing rig operations. Historically, this measurement has only been available on wireline. This paper will show how the tool was developed and qualified for use by a North Sea operator. Results are shown from two wells of varying difficulty with different casing sizes and mud types. The results are then compared with existing wireline technology on the same wells.

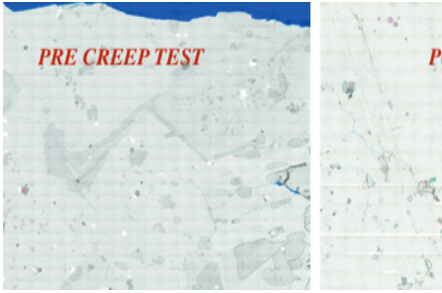


Ijasan

PAGES 864-878

A study of the implications of signal-to-noise ratio (SNR) on T_1 - T_2 maps acquired in unconventional NMR logging showed that reliable characterization requires specific acquisition and processing strategies that are designed to increase SNR. Additionally, the paper introduces a novel semi-analytical smeared-peak (SASP) approximation to mitigate the impact of SNR on the interpretation of NMR T_1 - T_2 fluid volumes.

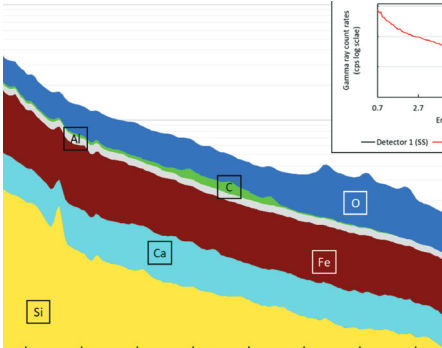
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Khan et al.

PAGES 954-969

Solution-mined caverns have been proven to be among the most efficient techniques for storing energy resources, primarily hydrogen. The sequestration of CO₂ using underground salt caverns could be an additional resource in reducing anthropogenic greenhouse gas emissions along with depleted reservoirs or saline aquifers storage. This study provides a framework for understanding nonlinear creep damage and predicting time-independent geomechanical behavior in salts during critical operational stages of fluid storage and depletion to mitigate creep-induced cavern closure.



McGlynn et al.

PAGES 900-918

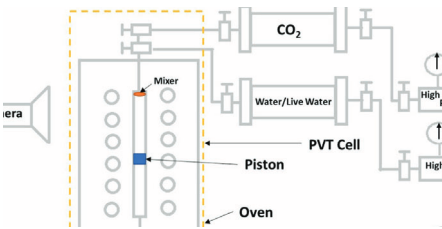
This paper details the development of a new pulsed-neutron spectroscopy instrument that provides simultaneous carbon/oxygen (C/O), pulsed-neutron capture sigma, and ratio-based gas measurements for two- and three-phase saturation analysis. The new instrument incorporates high-resolution LaBr₃ detectors, a higher-output neutron source, and a new digital electronics platform that allows faster logging or improved precision at legacy logging speeds. The instrument provides legacy windows-based C/O measurements and new spectral yields C/O measurements for saturation determination. A field example is presented to demonstrate the improved performance and compatibility with a legacy pulsed-neutron instrument, which is crucial for time-lapse monitoring applications.



Trevizan and Menezes de Jesus

PAGES 890-899

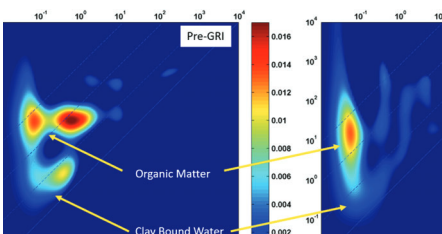
This work shows the development and application of generative adversarial neural networks (GANs) to increase the resolution and quality of real-time image logs. The main application is the detection in real time (while drilling) of geological structures that may impact completion designs.



Wang and Ehlig-Economides

PAGES 970-977

The solubility of CO₂ in saline water, crucial for trapping CO₂, is affected by pressure, temperature, salinity, and often neglected, pre-dissolved gases. Experiments reveal quantitatively that “live” saline water containing dissolved gases has a lower capacity to dissolve CO₂ than “dead” saline water, especially as salinity increases. Accurately assessing CO₂ solubility in such “live” conditions is vital for effective carbon capture and storage strategies.



Xie and Reffell

PAGES 848-863

This article reviews the importance and advantages of the use of the laboratory higher-frequency (HF), e.g., 23 MHz, NMR systems and 2D mapping techniques for identifying and quantifying different forms of water and hydrocarbons in unconventional shale core samples. Examples of applications are given to demonstrate the measurements of saturations, activation energy of hydrocarbons, mobility of oil, and kerogen maturity in shales.