Contribution ID: **540** Type: **Oral Presentation**

Quantifying the effective porosity of reservoir and source rocks: Multi-scale and multi-approach studies

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Microscopic pore structure characteristics of both reservoir and source rocks (e.g., sandstones, carbonates, and mudrocks) –pore-size distribution, pore shape, and pore connectivity –control fluid flow and chemical transport. Focusing on effective porosity, the portion of connected pore space as conductive pathways to participate in flow and transport (e ,, as an indicator of macroscopic connectivity), this presentation discusses various approaches to quantifying the effective porosity for a range of oil and gas reservoir and source rocks. The approaches include pycnometry (liquid and gas), pore and bulk volume measurement after vacuum saturation, porosimetry (mercury intrusion porosimetry, low-pressure gas physisorption isotherm, water vapor adsorption/desorption isotherm, nuclear magnetic resonance cyroporometry), imaging (X-ray computed tomography, Wood's metal impregnation, field emission-scanning electron microscopy SEM, focus ion beam-SEM), scattering (ultra- and small-angle neutron and X-ray), the utility of both hydrophilic and hydrophobic fluids as well as fluid invasion tests (imbibition, diffusion, vacuum saturation) followed by laser ablation-inductively coupled plasma-mass spectrometry imaging of different nm-sized tracers. Our results indicate a disparate characteristics and range of effective porosity, with a single-zone behavior and a value of connectivity at approximately 70% for sandstones, as compared to "dual-connectivity zones"at 70% and 0.01% for organic matter-rich mudrocks.

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