

The Role of Clay Minerals in Controlling the Properties and Geochemical Processes Associated with Hydrocarbon Systems

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Despite their increasing importance in fundamental geological research and the oil and gas industry, clay minerals remain the most difficult of all earth materials to study and characterize. Their sheet structure results in features that can only be resolvable at the sub-micron scale. They are also subtly variable in chemical composition (Fe, Mg, K, Al, etc) and can be confused with each other and other silicates. The recent innovative analytical tools and modern analysis techniques, e.g., micro- and nano-X-ray Computed Tomography (XCT), QEMSCAN (Automated Mineralogy and Petrography), FIB/SEM (Focused Ion Beam/Scanning Electron Microscope), EDS (Energy-dispersive X-ray spectroscopy), etc., have the capability of quantitative and qualitative characterizing nano-pore features and mineralogy of fine grained shale rocks, which creates new era of studying clay minerals for facilitating unconventional (shale) reservoir exploration.

Even though there have been reports about the application of clay minerals in the oil and gas exploration surprisingly little work has been documented on the detailed summary of clay minerals from the perspective of oil and gas exploration and exploitation. The focus of this session is to bring together presentations that summarize the important role of clay minerals in oil and gas exploration and recovery from many points of view that include but are not limited to: basin tectonic evolution, depositional environments, thermal history and maturation history of organic matter in the source rock, hydrocarbon generation, migration and accumulation process, diagenetic history and reservoir quality prediction. We encourage submittals that address both traditional and cutting-edge analytical tools and techniques used to identify and characterize the clay mineralogy, rock fabric, geomechanical properties and micro- to nano-scale pore networks relevant to both conventional and unconventional oil and gas systems.