

# **On the Genesis of Shales and Clay Diagenesis Control on Reservoir Quality Parameters of Pennsylvanian Unconventional Reservoirs of the Anadarko Basin, Oklahoma**

**Giovanni Zanoni<sup>1</sup>**

<sup>1</sup>Texas Tech University, Sedimentology, Lubbock, TX USA  
giovanni-k@hotmail.com

## **ABSTRACT**

The Anadarko Basin located in the foreland of the Wichita Mountains of southeastern Oklahoma is one of the deepest and most prolific hydrocarbon basins in North America. Historically, the mudstones from this basin have been known as major hydrocarbon sources of the Midcontinent region. Yet, these shaley units remained relatively under-researched with respect to their clay mineralogy and diagenetic control over the reservoir rock properties, even though they currently serve as major unconventional reservoirs. This study has a focus set on the Pennsylvanian shale-rich intervals composed of alternating sequences of black shales, argillaceous sandstones and shaley interbedded sandstones. A 500 ft long core recovered in the Caddo County (OK) from depths of 10'000 ft served as an excellent source of multiple mineralogical and chemical data for further study of these shales. This research aims to unravel the genesis and diagenetic evolution of the Anadarko Basin shales and it further strives to understand the impact of paleo-environmental and diagenetic controls on the distribution of reservoir characteristics in the subsurface. To reach this objective, several analytical techniques have already been used including X-ray diffraction and microbeam techniques (i.e. QEMSCAN mineralogical mapping and Scanning electron microscopy) needed to report on clay mineral morphologies and phase chemistry. Our preliminary data show the shale intervals to be dominantly composed of detrital illite, quartz, and some minor feldspar. Investigation of the clay fraction highlighted the presence of mixed-layered illite-smectite along with chlorite and kaolinite. However, more work is needed to elucidate on specific mineralogical variations that correspond to changes in stratigraphy and sediment source mineralogy, and in particular how susceptible they are to the progressive diagenetic changes.