Reservoir Characterization of the Mississippian and Woodford Shale deposits, Southwest part Arkoma Basin, Oklahoma

Carlos Molinares-Blanco[1]
[1]University of Oklahoma, Stratigraphy, Norman, OK USA
cmolinaresblanco@gmail.com

ABSTRACT

The Woodford Shale (WDS) and the overlying Mississippian in age units are one of the most prolific unconventional reservoirs in the United States and one of the most active unconventional plays under the current oil price scenario. The WDS is one of the most prolific oil and gas resources in North America and it has been estimated a total of 22 billion barrels of bitumen and 16 billion barrels of saturated hydrocarbons expelled from the Woodford, only from the central and southern areas in Oklahoma. The best areas for developing unconventional resources are normally characterized by a higher organic content, brittle lithofacies and high-pressured zones. The high total organic contents (TOC) and high bioquartz couplets in the WDS could be related to some global extinction events that have been documented for the Frasnian-Famennian (Kellwasser) and Devonian-Carboniferous (Hangenberg) boundaries. However, the lack of geochronological controls for the WDS has not allowed to establish a relationship with those global anoxic/extinction events.

Three related studies are proposed to investigate the local and global controls on the distribution of the organic-rich Woodford Shale deposits, situated in the southwest part of the Arkoma Basin (Pontotoc, Hughes, Coal and Atoka Counties), Oklahoma. This research is designed to confirm the age of the Woodford Shale (Late Devonian — early Mississippian) by correlating stable isotopes with a series of globalwide positive Carbon excursion events reported before. Then, the idea is to confirm the hypothesis that the spreading of more vascular plants during that time possibly enhanced the chemical weathering of mature soils and increased river-input nutrients that potentially produced eutrophication and facilitated the accumulation of organic-rich shale deposits. The third part of this research seeks to apply Machine Learning (ML) algorithms for lithofacies classification, merging core and outcrop data with conventional well-logs, to predict unconventional reservoir properties in the study area.

AAPG Search and Discovery Article #90321 2018 Grants-in-Aid Projects