

Approaches to Petroleum Systems Analysis demonstrated in Tertiary lacustrine systems of the Greater Rocky Mountains Region, USA

Maria N. Slack and David A. Wavrek
Petroleum Systems International, Inc.

The Greater Rocky Mountains have played a central role to hydrocarbon exploration in the United States for decades. While many paleo-depositional settings have contributed to this significance, Tertiary lacustrine depositional systems are one important aspect regionally. These systems developed in a variety of structural settings within the Rocky Mountain and Great Basin regions including compressional, transtensional, and extensional basins. While sharing certain traits, each basin formed within a unique geographic and stratigraphic setting. These individual settings have a significant influence on the resulting lacustrine system (water budget vs. sedimentation rate vs. accommodation) and invoke a unique set of petroleum system elements and processes that impact the hydrocarbons present today. Elements include source rock (quality and quantity), reservoir, seal, and overburden material, while the processes comprise trap formation, and hydrocarbon generation / migration / accumulation. Independently, each component produces a partial understanding of the petroleum system, but collective interpretation of variables results in a comprehensive understanding. A protocol that includes both critical variables and geologic input is encouraged. The successful exploration program will endeavor to understand the entire petroleum system by relating the source rock data, including kerogen kinetics with accurate thermal maturity analysis, to the geographic and stratigraphic framework. One regional application includes the impact of the level of paleo-water salinity on generation thresholds for hydrocarbon. This study compares and contrasts petroleum system elements and processes of Tertiary lacustrine systems in the Rocky Mountain and Great Basin regions to demonstrate the benefits of comprehensive and thorough petroleum systems analysis.