

## **Diagenesis and Reservoir Quality of the Eolian Navajo and Nugget Sandstones (Early Jurassic), West-Central U.S.A.**

By

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Although much work has been done in eolian reservoirs in both regional and outcrop scale, significant pieces of information regarding the origin of the microscopic heterogeneities that would ultimately control the flow path of hydrocarbons are still lacking.

The aim of this project is to accomplish a petrographic study of the Navajo and correlative Nugget Sandstone (Early Jurassic), in order to evaluate the impact of diagenetic processes on hydrocarbon reservoir quality properties. These units extend a minimum of 366,000 km<sup>2</sup> in the Colorado Plateau, originally constituting the largest eolian deposit in North America.

Quartz cementation is the main responsible for porosity and permeability reduction in these sandstones. Sedimentary facies, composition, texture, burial depth, temperature, pressure, degree of intergranular pressure solution, distribution of stylolites, and fluid flow will be evaluated. Whether carbonate cements are facies or depth controlled will also be assessed. Field work will consist of description and sampling of different types and scales of eolian stratifications and bounding surfaces oriented to define the architecture of reservoir intervals and potential permeability barriers. Outcrop lithofacies will be then matched to core samples. Identification and/or quantification of depositional and diagenetic textures will be done by using cathodoluminescence and scanning electron microscopy, electron microprobe, petrographic image analysis, and stable isotopes of cements.

Finally, petrographic parameters will be correlated with petrophysical data to see how diagenesis affects good and poor hydrocarbon productivity areas. Diagenetic modeling programs will potentially allow extrapolating reservoir quality characteristics to other areas of the reservoir, or to other eolian reservoirs.