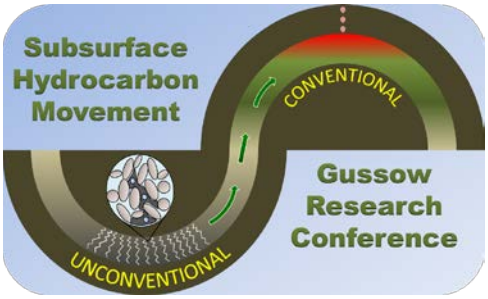

A review of laboratory approaches to primary migration and expulsion of petroleum

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Summary

The concepts of primary migration of petroleum in and expulsion out of source rocks have become established textbook knowledge but many details remain poorly understood. Thus, gas and petroleum production from tight source rocks, deemed impossible a few decades ago, has become an established and successful approach, owing to new technologies and new ways of thinking.

Very similar to the reaction kinetics of petroleum generation, the experimental study of primary migration processes can only be performed on time scales that are many orders of magnitude off the “real world” geological time scales. Temperature increase is the only way to accelerate these processes to an experimentally observable level. The unavoidable consequence is that this is likely to substantially distort the processes and compromise the interpretations.

Sporadic attempts to address the problem of primary migration and expulsion have been conducted in our laboratories (though with altogether modest success).

In retrospective we will summarize experiences from thermal compaction and fluid transport experiments conducted to elucidate the interaction between conversion of “load-bearing” organic matter and migration/expulsion. Combined mass and volume balance calculations for “real world” and laboratory samples sequences have been conducted to rationalize the generation and destruction of transport pore volume.

Fluid transport experiments with water, gases and organic solvents will also be reported and inferences derived from them will be discussed.