

MULTI-PROXY GEOCHEMICAL STUDY OF NORTH AMERICAN BLACK SHALE BASINS AND THE IMPLICATIONS FOR UNCONVENTIONAL NATURAL GAS PRODUCTION

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ABSTRACT

Shale basins are a major hydrocarbon resource and will continue to be as we transition to cleaner energy, especially in North America, where it is both used and exported. Currently there is a focus on optimization of the extraction process through both geology and engineering. This project seeks to build on that focus by correlating natural gas production values with depositional models for shale basins in North America through a multi-proxy geochemical analysis. Selected basins span a wide range of geologic time, from the Ordovician to the Cretaceous, as well as a wide range of geographic locations in the United States and Canada. These natural gas producing shales are generally thought to be deposited under oxygen-deplete, restricted environments, however it is certainly more complicated, especially when considering one basin with respect to another. Using proxies for organic porosity, organic matter preservation and provenance, basin restriction, and redox conditions (ie. anoxic, euxinic, or ferruginous,) we aim to create basin-specific depositional models as well as use machine learning techniques to find nuanced statistical correlations between those data and natural gas production values. An overarching motivation for the research is that through improved understanding of geochemical tendencies of different environments, models can be created that increase efficiency of extraction in natural gas basins that will manifest as a minimized environmental footprint not only globally, but importantly, in communities located within these resource rich areas.

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