

PETROPHYSICAL PROPERTIES OF UNCONVENTIONAL RESERVOIRS: START OF A DATABASE

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PROJECT OBJECTIVES

- Assemble a database that covers many of the varieties of shales found in unconventional reservoirs.
- Correlate petrophysical properties to carbonate content and TOC to better understand the enhanced fracability of carbonate-bearing shales.



Figure 1. Main shale plays in the United States that occur in a variety of stratigraphic horizons and different lithologic expression. (eia website)

PROJECT RATIONALE

Unconventional plays rely, to a large extent, on the success on fracturing the low porosity shale intervals in order to exploit as much volume as possible. Therefore mechanical properties are of key importance to define the most economic well locations. Unconventional reservoirs occur in shales in different stratigraphic levels each with their own petrophysical characteristics (Figure 1). Fracability is largely enhanced by carbonate content. In order to improve the understanding of carbonate/shale distribution and acoustic behavior we plan to measure shales with variable carbonate and TOC content. The ultimate goal is to produce a data and knowledge base that enhance production in these plays.

SCOPE OF WORK

Starting with existing samples from the Devonian (Perdix Formation), Paradox Basin (Chimney Rock Shale) and the Neuquen Basin (Vaca Muerta) we intend to measure porosity, permeability, and velocity and resistivity under variable pressure. For each sample the carbonate content will be determined. In each of these formations the carbonate content varies and we expect to have a first indication of the relationship between carbonate content and physical behavior from these samples.

EXPECTED RESULTS

The proposed study is a first step towards a larger database covering the petrophysical properties of carbonate/shale variations. The results are expected to produce a better understanding of the physical behavior of shales and to be a guide for delineating carbonate/shale ratios from logs.