Summary

Vaca Muerta formation is a Jurassic-Cretaceous lithostratigraphic unit in the Neuquén Basin of Argentina, well known as a world-class source rock and for its unconventional resource potential. Vaca Muerta play in the central Neuquén basin position has a remarkably thick continuous organic-rich section (approximately 350m).

Chevron Argentina is evaluating the Vaca Muerta potential in the El Trapial exploitation lease. Data available includes 500 km² of 3D seismic data, wire-line and mud log data from 4 exploratory vertical wells with full e-log suite and 415 meter of core, and from 5 legacy wells with basic e-logs. Vaca Muerta outcrops in an analog stratigraphic setting are located 40 km away from El Trapial.

Initial results of the stratigraphic analysis were based on seismic interpretation, well log evaluations and core data analysis. Correlations and comparisons between the subsurface interpretation and the outcrops of Vaca Muerta allowed us to tie stratigraphic sequences in El Trapial to the regional framework.

This study builds upon previous regional sequence stratigraphic interpretations and provides a refined stratigraphic framework for distal facies of the Vaca Muerta. Similar to other shales worldwide, Vaca Muerta deposition was initiated with a marine transgression over non-marine deposits of the Tordillo Formation. This transgression is expressed as a condensed section with high gamma-ray and TOC values in the basal section. Accommodation changes and paleo-depositional trends were interpreted based on strata cyclicity, thickness variations, and seismic stacking patterns. An internal Vaca Muerta stratigraphic subdivision was defined based on seismic data, logs, thin sections, facies and organic geochemistry analysis.

Recognition of lateral and vertical heterogeneity within Vaca Muerta will lead to better planning and exploitation of hydrocarbons through enhanced reservoir models and improved target identification, which will ultimately reduce risks and costs. Stratigraphy plays a key role in the identification of the most productive stratigraphic interval (i.e., Sweet Spot), and most prospective region (i.e., Core Area), to develop an unconventional project.

Introduction

Understanding the relationship between production and geology is key to the future success of unconventional reservoirs development. Transforming a shale play from statistical to predictive is critical for all unconventional projects, and even more so for Argentinean cases, where costs are higher than in the United States.