THE VACA MUERTA RESEARCH INITIATIVE (YEAR 3): NEUQUÉN BASIN, ARGENTINA

Vaca Muerta Team of the CSL – Center for Carbonate Research

INITIATIVE OBJECTIVES

- Produce outcrop analogs for the Vaca Muerta Formation in the Neuquén Basin in the proximal to the distal portion of the basin.
- Use lithological, geochemical, and petrophysical properties of the Vaca Muerta Formation to advance knowledge of the accumulation, preservation and distribution of organic-rich mudstones.
- Conduct individual projects for a comprehensive assessment of the sedimentologic, geochemical, and stratigraphic processes in this and other unconventional plays.

RATIONALE AND BACKGROUND

The U. Jurassic - L. Cretaceous Vaca Muerta Formation in the Neuquén Basin, Argentina, has enormous unconventional resource potential. The excellent exposure of the formation from the proximal to the distal portion of the basin offers the unique opportunity to address fundamental questions about the distribution of total organic carbon (TOC), geo-mechanical



Figure 1. Outcrop view of the Vaca Muerta Formation in the Puerta Curaco area with annotation of the sequence boundaries. In this distal part of the Neuquén Basin the formation is approximately 590 m thick. Splicing together sections produces a reference section that can be correlated and compared to the subsurface.

properties of the various facies, and the factors controlling these variables in this and other basins.

APPROACH

The approach at the CSL is to conduct detailed studies in the proximal and



Figure 2. Location map of the key study areas in the Neuquén Basin, Argentina.

distal areas of the basin for а comprehensive evaluation of various aspects of that basin. Earlier projects focused the on sedimentologic/stratigraphic evolution of the mixed Vaca Muerta-Quintuco system in the Picún Leufú and Sierra de la Vaca Muerta and its correlation to the subsurface data (Zeller et al., 2015a,b). In the last two years we have focused our research on the distal basin where we have measured many coeval sections in the basinal setting that can serve as a reference section for the bottom set of the Vaca Muerta clinoforms (Fig. 1 and 2). The lithologic, geochemical, and petrophysical properties are measured in each section with high resolution (0.5 - 1)m) that is comparable to log resolution in the subsurface. Thus, this reference section is an outcrop calibrated analog for subsurface cores and logs. In addition, this reference section serves as the basis

for individual projects that target fundamental questions regarding the distribution of TOC within the Neuquén Basin.

PLANNED PROJECTS FOR 2017

This year's projects address questions surrounding the:

- 1. Lateral Facies Variability and Thickness Changes in a Basinal Setting;
- 2. Depositional and Environmental Controls on Organic Material in the Vaca Muerta Formation;
- 3. High Resolution Elemental, Mineral and Isotopic Assessment of Cycles of the Vaca Muerta Formation, Argentina;
- 4. Temperature of Formation of the Vaca Muerta "Beef" Determined by Clumped Isotopes.

REFERENCES

- Zeller, M., Reid, S.B., Eberli, G.P., Weger, R.J., and Massaferro, J.L., 2015a, Sequence architecture and heterogeneities of a field–Scale Vaca Muerta analog (Neuquén Basin, Argentina)–From outcrop to synthetic seismic, Marine and Petroleum Geology, v. 66, p. 829-847.
- Zeller, M., Verwer, K., Eberli, G.P., Massaferro, J.L., Schwarz, E., and Spalletti, L., 2015b, Depositional controls on mixed carbonate-siliciclastic cycles and sequences on gently inclined shelf profiles, Sedimentology, v. 62(7), p. 2009-2037.