Vaca Muerta Field Seminar

CSL – Center for Carbonate Research

OUTCROP EVALUATION FOR SUBSURFACE CORRELATION OF THE VACA MUERTA FORMATION, NEUQUÉN BASIN

5 day field seminar

Leaders: Gregor P. Eberli and Ralf J. Weger

Rationale:

The Vaca Muerta Formation in the Neuquén Basin has proven its unconventional resource potential. Taking advantage of the excellent exposure of the formation the CSL has assembled an outcrop data set that can be exploited as analog to the subsurface in the Neuquén Basin. Data include synthetic seismic sections and laboratory petrophysical measurements for a robust outcrop-seismic correlation and a understanfding of seismic and elastic properties of Vaca Muerta mixed siliciclastic-limestone mud rocks.

The aim is to use an accurate, high-resolution outcrop – subsurface correlation to highlight how geologic sections collected in outcrop can enhance the understanding of seismic-derived acoustic impedance in the foresets and bottom sets of the Vaca Muerta. In addition, our composite sections in the Puerta Curaco area provide a formidable framework for a comprehensive assessment of the distribution of the facies and total organic carbon (TOC) of the entire Vaca Muerta Formation. This correlation of outcrop sections to core and well-logs is achieved by measuring spectral gamma ray, TOC and other geochemical properties with high resolution (0.5-1m spacing) in each outcrop section.

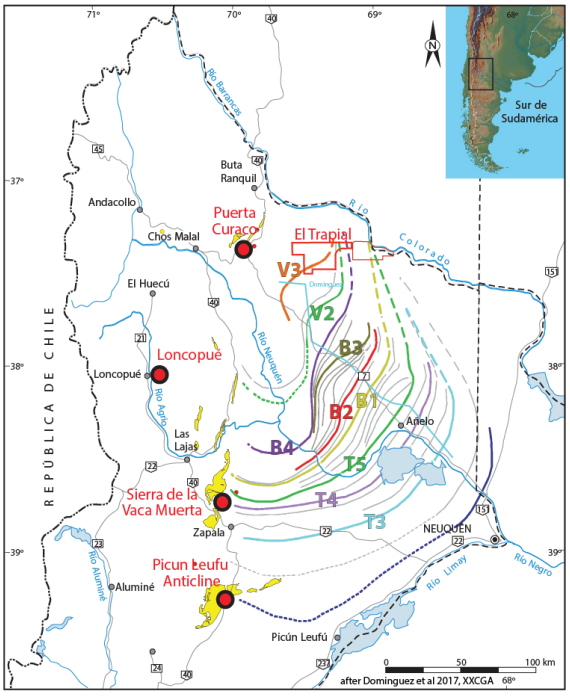

Figure 1: Basin overview map, outcrop locations, and shelf breaks (modified from Dominguez et al., 2017).

Goal:

The main aim of this field trip in the Neuquén Basin is to demonstrate how the detailed outcrop analysis can be a guide for interpreting subsurface data and potentially help solving questions for well placement and production.

Objectives:

1. Illustrate the facies of Vaca Muerta – Quintuco system along a proximal to distal transect and the lateral distribution and vertical variability of TOC in the basin.
2. Relate the facies and geometries to the seismic facies and correlate changes in lithology and the diagenesis to chemical and petrophysical signatures measured with logging tools.
3. Discuss the outcrop-subsurface correlation based on calibration of outcrop geometry and lithology logs to subsurface logs and synthetic seismic sections.

Location:

The seminar begins and ends at the airport in Neuquén, Argentina. Field stops at different outcrops in the south of the basin (Picun Leufú and Sierra de la Vaca Muerta) illustrate facies distribution and sequence stratigraphic architecture of the Vaca Muerta System in the southern clinoforms. Well-exposed outcrops in the Puerta Curaco (PC) area further north contain the complete section of the organic-rich basinal facies. Across the three different outcrop locations, you will observe the facies in the prograding clinoforms from the topset (shelf), to the foreset, and finally a basinal bottomset. The Sierra de la Vaca Muerta area offers great insight into the progradational style of the Vaca Muerta-Quintuco system especially the time transgressive nature of the different facies. The transect will document that the high TOC is not restricted to a unique stratigraphic level but is a recurring pattern within the prograding depositional system, resulting in multiple organic-rich zones in similar sequence stratigraphic positions in each sequence. In addition, we will demonstrate the subtle variability of organic and carbonate content in different types of siliceous to more cemented mudstones. The outcrops also provide a 2-D view away from the section that is equivalent to having lateral view around a well.

Itinerary:

Day 1: Neuquén - Zapala plus introduction
Day 2: Picun Leufu and Sierra dela Vaca Muerta, base of Vaca Muerta
Day 3: Sierra de la Vaca Muerta, proximal clinoforms (drive to Chos Malal)
Day 4: Basinal sections at the Puerta Curaco area
Day 5: Aguada de los Tamariscos section and return to Neuquén

Who should attend:

Exploration and production geoscientists and reservoir engineers working in the Vaca Muerta or in unconventional mixed system reservoirs around the world.

Costs: ~$5,500 (USD), Includes all ground transportation, lodging, meals, course notes, and relevant presentations and posters in digital form.

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Important Note: A minimum of 8 attendees will be required for this trip.