

# CHARACTERIZATION OF THE AGRIO FORMATION, NEUQUÉN BASIN, ARGENTINA

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## PROJECT OBJECTIVES

- Characterize the facies, TOC distribution, geochemical signature and petrophysical properties of the Agrio Formation in the Neuquén Basin.
- Compare these data with the existing data set in the Vaca Muerta Formation to assess similarities and differences in these two marine stages of the basin following terrestrial conditions.

## PROJECT RATIONALE

During the late Jurassic and early Cretaceous, the Neuquén Basin in Argentina experienced three similar sedimentary cycles of continental to marine successions (Fig. 1). In the Tithonian, terrestrial and lacustrine environments were rapidly inundated by marine waters, forming a basin that was subsequently filled with organic-rich clinoforms of the Vaca Muerta Formation. Following a relative sea-level fall in the early Valanginian, sedimentation was limited to the central part of the Neuquén Basin, with the deposition of a predominantly clastic, continental to shallow marine wedge (Schwarz et al., 2006). Renewed flooding in early Late Valanginian, re-established marine conditions and resulted in deposition of the organic-rich mudstones of the Pilmatué Member of the Agrio Formation. Another dramatic sea-level fall resulted in terrestrial and aeolian conditions over most of the Neuquén Basin before a third flooding re-established marine conditions and deposition of the Agua de la Mula Member of the Agrio Formation (Fig. 1).

After each marine flooding event organic-rich strata was deposited. The Vaca Muerta Formation is more enriched in TOC than the younger Agrio Formation with the latter containing 2-5% TOC in a 50-400 m thick section (Legarreta and Villar, 2011). The facies associated with each formation, however,

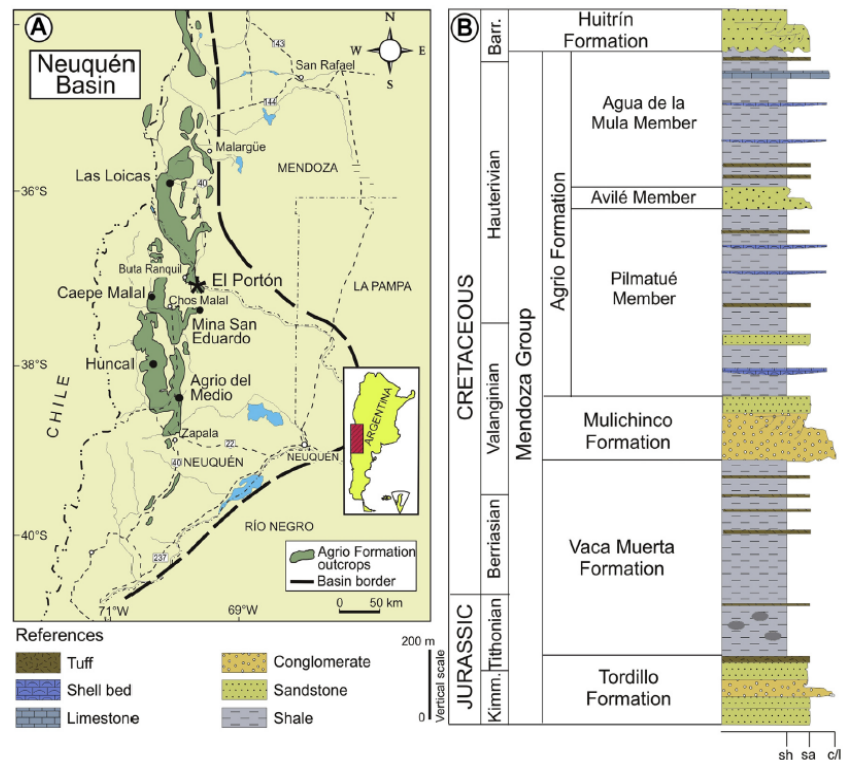


Figure 1: Location of Agrio Formation outcrops (A) and stratigraphic column of the Medoza Group (B) (Aguirre-Urreta et al., 2017)

vary, indicating that the sedimentary system changed slightly. To capture the variability and similarities between formations we plan to characterize the Agrio Formation as we did with the Vaca Muerta Formation i.e., with detailed lithologic sections that are accompanied by geochemical sample analysis and gamma ray measurements every meter. Subsequently, these two data sets are compared to quantitatively assess the differences.

## **APPROACH**

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In the areas of Puerta Curaco, Aguada de los Tamariscos, Yesera del Tromen, and Pampa Tril we measured over 20 different sections of the Vaca Muerta Formation with a total length of over 2000 m, covering the stratigraphic column from the Tordillo, through the Quintuco up to the Mulichinco Formation to characterize facies and geochemical signatures. The Mulichinco Formation separates the Vaca Muerta Formation from the overlying Agrio Formation. We plan to measure through the Mulichinco Formation with low sampling rates (5 m spacing) to provide a representation of this interval, but then continue with 1 m spacing in the Agrio Formation. At the Puerta Curaco location, only the lower portion of the Pilmatue Member (Fig. 1) is well exposed, but a high-resolution lithologic log, spectral gamma ray, and geochemical samples every meter will provide the basis for correlation to other, better exposed outcrop locations of the Agrio Formation. Some scouting will be required, but well exposed outcrops of the Agrio Formation have been documented by several authors (Uliana and Legarreta 1993; Aguirre-Urreta et al., 2017; 2019).

## **SIGNIFICANCE**

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These new lithologic sections and analyses will provide the required high-resolution data necessary to characterize the Agrio Formation for comparison with the Vaca Muerta Formation. These observed differences and similarities between the two formations will aid in assessing the potential of the Agrio Formation.

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