

ENHANCED OUTCROP TO SUBSURFACE CORRELATION IN THE VACA MUERTA FORMATION

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PROJECT OBJECTIVES

- Tie the outcrop to the subsurface based on the composition determined from thin sections and cuttings from 20 wells and outcrop sections across the basin.
- Evaluate compositional similarities and differences in the sequences and cycles to capture the lateral and vertical facies variability within the Vaca Muerta Formation.
- Provide a (semi)quantitative comparison of facies similarities in the outcrop and subsurface.

PROJECT RATIONALE

In the past we have successfully correlated the outcrop successions of the Vaca Muerta Formation in the Neuquén Basin to the subsurface with geophysical and geochemical data. Synthetic seismic sections constructed from facies and geometries observed in the Picun Leufu area and the Sierra de la Vaca Muerta (SdIVM) are very similar to the geometries observed on seismic sections (Zeller et al., 2015 a, b). The correlation of outcrop sections to core and well logs is achieved by adding spectral gamma ray, TOC and other geochemical properties with high resolution (0.5-1m spacing) to the lithology in each section. Key log-signature subdivisions from the subsurface correspond to sequence stratigraphic divisions identified in the outcrop sections (Eberli et al., 2017).

With these correlations in hand an enhanced correlation is possible that considers facies variations within the cycles and sequences. This correlation is based on a quantitative analysis of thin sections from outcrop successions and its comparison to the subsurface data (Fig. 1). The advantage of this facies-based correlation is that it captures the sedimentologic variations created by the cyclic deposition. In addition, it reflects the proximal distal facies changes as well as the changes through time.

APPROACH

The study can rely on a large data set from the subsurface that Taury Smith has produced and which will be compared to the outcrop sections. The data set consists of a cuttings and core study of more than 20 wells across the basin from the top of the Quintuco to the base of the Vaca Muerta using more than 5000 thin sections. Based on the cuttings and logs detailed stratigraphic columns are constructed that allow sequences and cycles to be picked (Fig. 1). Taury Smith will work with us to assemble a similar data set in our outcrop sections so that they can be compared to the subsurface. Some of the wells he studied are within 10 km of the outcrop belt.

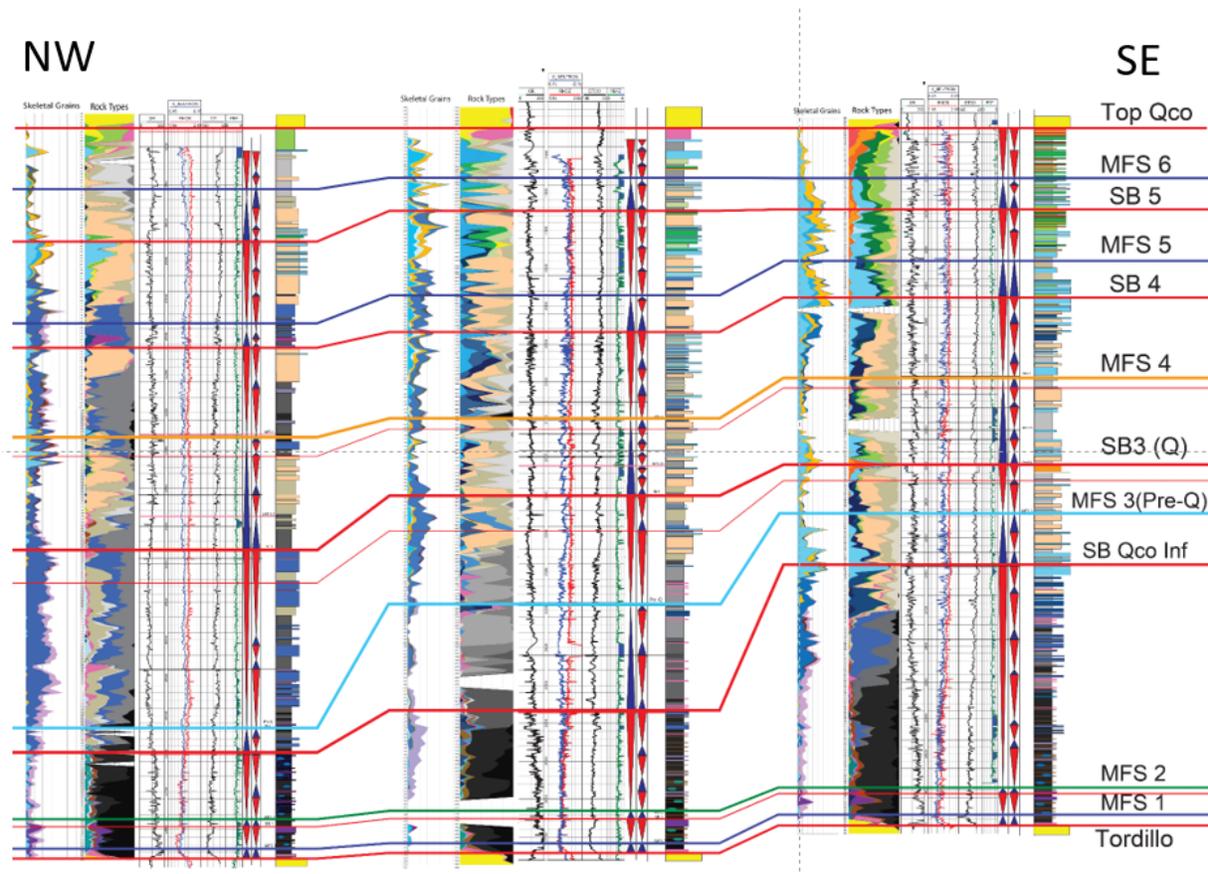


Figure 1: Correlation of cycles and sequences between three wells using cuttings and cores together with log information. The quantification of the composition adds valuable information about the lateral and vertical changes of facies.

SIGNIFICANCE

This facies-based correlation of outcrop to subsurface will add valuable information regarding the facies changes between the outcrop at the western side of the basin and subsurface areas further to the east. If the comparison reveals strong similarities, it will strengthen the potential of the outcrops to act as analogs for the subsurface. Variations would indicate lateral facies changes along the clinofolds in the basin.

REFERENCES

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