What have we learned from petrophysical evaluation of the Vaca Muerta formation during the last 5 years of unconventional shale play exploration and development?

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Abstract

The Vaca Muerta formation is one of the unconventional shale play reservoirs considered a "world-class reservoir". Its thickness opens the possibility to develop more than one landing point. Petrophysical and geomechanical evaluations are necessary to identify these landing points, however their characterization is complex and have progressed through time gaining complexity and detail.

The current petrophysical models define nine minerals based on latest technology of electrical logging that has been calibrated with core data implementing multivariable analysis. The calculation of total water and clay bound water with resistivity-free methods was another technical challenge achieved.

The formation evaluation with logs also permits to characterize the hydrocarbon and kerogen properties as a function of maturity. This is because both components represent a big portion of the rock volume in Vaca Muerta. This variability from maturity also is verified with core (TRA, GRI, NMR).

Today, it is possible also to characterize the variability of the poral & fluid system associated with the analysis of SEM, NMR and logs overcoming the upscaling problems of these shale plays. The interpretation of all this information using multivariable analysis helps to understand the high heterogeneity of the reservoir opening new research projects in the future.

Bio

Alberto César Ortiz is a principal petrophysicist of YPF S.A. Argentina. He graduated in geology at the University of Córdoba in 1999 and started his career in Total Austral in 1997. In the year 2000, he joined Schlumberger working as a log analyst (LAT School 2000) and petrophysicist working in Argentina (3 years) and Brazil (8 years), the latest working in formation evaluation and real time petrophysical support for offshore deep water wells. In 2011 he joined YPF in Buenos Aires and since 2013 he is working completely focused on the unconventional project shale play of Vaca Muerta formation as a petrophysicist.