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Comparison of Petrophysical Rock Types from Core and Well Logs Using Post Stack 3D Seismic Data: Field Example

Francisco Cheng and David Contreras, Petroleos de Venezuela S.A.

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Abstract

The prediction of the spatial distribution of petrophysical rock types within a heterogeneous siliciclastic reservoir is affected by significant uncertainties when based only on well and core information. However, integrating additional constraints, such as 3D seismic attributes, can significantly improve the accuracy of the reservoir model. This paper shows the results of a well log based reservoir study with 3D seismic data that have been used to assess the petrophysical rock type distribution. The resulting rock type volume data provides an extremely valuable benefit in the current development of the field. The calculated petrophysical rock types were obtained using the Windland R35 equation which includes information collected from core data: pore throat size distribution, porosity, and permeability. Using the available core data, the workflow started by predicting both permeability and rock type curves at the non-cored wells. Several consistency checks and quality control revisions were applied to the results from these predictions in order to have a reliable relationship between petrophysical properties and rock types.

The resulting curves at the interval of interest were correlated throughout the field and calibrated with 3D seismic data. In order to obtain the correct parameter to enhance spatial rock type distribution, a multi-attribute analysis was performed in addition to a well log and seismic attribute cross-plot. The results clearly indicate that the application of this workflow is very valuable for determining new locations to be drilled either for production or injection.