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Ivan Dario Olaya-Lopez¹, Jorge Luis Rubiano-Ortiz¹, Jersahin Lamilla-Galindo² (1)
Ecopetrol - ICP, Bucaramanga, Colombia (2) Ecopetrol - GAM, Neiva, Colombia

Re-Exploring Old Oilfields Through Multidisciplinary Studies: Examples in the Ortega Field (Upper Magdalena Basin, Colombia)

The Ortega Oilfield was discovered in 1950 by Texas Petroleum Co. (Texaco) in the Upper Magdalena Basin in Colombia. In 1983 this oilfield reverted to Ecopetrol (Colombia's State Oil Company) and since then, several studies have been done in an attempt to improve the field's recovery. The initial geologic model established by Texaco for the Ortega Field, during the early stages of the field development, does not explain the behavior of this reservoir.

The present study has integrated the analysis of 2,047 feet of core, 75 well logs, in excess of 2000 km of 2D seismic and production data from 83 wells. As a result of this analysis, additional recoverable reserves of 40 MB were identified in area.

Sequence stratigraphy concepts applied in the analysis of core and well logs, integrated with biostratigraphic, geochemical and petrographic analyses, have permitted to define the stratigraphic architecture of the Ortega Oilfield. Anomalous thicknesses, resulting from structural repetition, are one of the most important conclusions from this study.

The statistical analysis of the dipmeter log has been fundamental to define the structural configuration of the Ortega Filed. New structural compartments that had not been drained adequately, have been identified.

Forward modeling allowed us to understand the poor seismic resolution in some areas of the field, due to high dips, a probable gas cap and fracturing. The results of this modeling confirmed the structural complexity of the oilfield and helped to select the seismic parameters for new seismic surveys.

Identification of fractured intervals was done by calculating the fracturing Index from resistivity logs (deep and shallow), which in turn were calibrated against information from cores, Formation Micro Scanner (FMS) images and log porosity (from sonic and density). This analysis permitted to explain and identify, the erratic production rate from several wells, and the presence of new compartments with secondary porosity, respectively.