

Deepwater Lithofacies Prediction from Seismically Derived Estimates of Porosity and Clay

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Reservoir properties are extracted from seismic data by constraining seismic inversion with rock physics relationships. We employ these relationships to simultaneously invert for porosity and clay in all fluid types. This can allow for improved characterization of both the reservoir and aquifer areas. From these seismically derived porosity and clay volumes, we predict the deepwater lithofacies using relationships that can be established from core data and well logs. The resultant seismic volumes aid in the optimization of drilling production wells and water injectors.

Traditional seismic inversion results are accurate only for a limited frequency band. Band-limited seismic inversion results can be useful as sand indicator volumes, however, the lack of low frequencies can cause errors when using these results in a more quantitative manner. We overcome this problem by incorporating low frequency data built from geologic information into the seismic inversion. The integration of environment of deposition maps, sub-regional seismic stratigraphic mapping, and average reservoir properties provide a basis for linking the seismic inversion results and the geologic model. This results in a more detailed and accurate prediction volumes for clay and porosity. Comparisons at wells show a good match to known lithofacies from core data to the seismically derived lithofacies.