

## Reservoir Characterization of Upper Mannville estuary Formation using a Rock Physics based Probabilistic Inversion

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A probabilistic model matching inversion method, called HITCUBE, is used in the reservoir characterization study. This stochastic workflow can be executed with poststack or prestack (partial angle stack, offset gather, AVO gradient) seismic data while matching the real seismic trace with the modeled synthetic trace (similarity, cross-correlation or amplitude spectrum) generated from an isotropic ray tracing method. The property traces from corresponding models with a correlation beyond threshold are stacked to build the output probability grids.

Based on rock physics analysis of existing well log data, the relationship of the elastic properties ( $V_p$ ,  $V_s$  and  $Rho$ ) of the target formation and the rock properties (lithology, porosity, water saturation) is built as a physical representative of the geology in the study area which is then used for pseudo-well generation. A number of pseudo-wells can be generated through Monte Carlo simulation referring to the rock physics analysis result, the geological feature of the study formation and the uncertainty.

This workflow is successfully applied in the Upper Mannville Group clastic reservoir characterization using a public seismic dataset with multiple wells. The seismic gather data are preconditioned with an AVO friendly workflow before the inversion. Optimized reservoir facies with better reservoir quality are characterized.

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