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Reservoir Characterization and Facies Modeling Utilizing Seismic Acoustic Impedance Data in Medusa Field, Deepwater Gulf of Mexico

An accurate 3-D reservoir model was necessary for the optimum development and future maintenance of the T1b Sand reservoir, a relatively thin but volumetrically important oil reservoir in Medusa Field.

Mapping of prestack time migrated (PSTM) seismic data provided the structural framework for the model. However, gross thickness and volumetric mapping were not possible on PSTM data because most of the T1b reservoir was at or below tuning. Instead, a seismic acoustic impedance (AI) volume tied to well logs was used for tracking of individual sand ''geobodies''. Variations in geobody thickness and impedance-based attributes were integrated with log, core, formation pressure, and fluid data to derive depositional facies models and define probable flow units.

The results of the AI mapping show that the T1b Sand reservoir can be divided into eastern and western flanks separated by a low relief faulted salt ridge. The western reservoir consists of upper and lower units that are separated by shale yet pressure connected. These units are composed of channel complex sands and associated levee/overbank deposits overlying lobe and channel facies. The eastern reservoir is slightly younger and is interpreted as amalgamated channel sands and stacked lobe facies. The overall T1b Sand facies model was successfully built into an object-based geologic model that was used in a fluid flow simulator for final volumetric assessment and expected reservoir performance.