

Stampede Field-Reservoir Rock Physics and Seismic Imaging: What We Should See and What We Can See

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Abstract

The Stampede Field is a sub-salt Miocene producing field located in the deepwater Gulf of Mexico (GOM). Stampede reservoirs are lower quality than the typical Middle Miocene rocks in deepwater GOM and are bound between heterogeneous shales with varying properties. These reservoirs lie at a depth of 30,000 ft beneath a ~15,000 ft thick complex salt canopy. Salt model related imaging issues, reservoir or overburden heterogeneity and lack of seismic resolution have always posed steep challenges towards any kind of quantitative seismic interpretation at Stampede. This presentation illustrates our search for rock property and imaging solutions to the complex reservoir architecture present in the three key reservoirs at Stampede. We used the exploration, the appraisal and eight development wells to create detailed well-to-seismic ties, reservoir-tuning wedge models, amplitude variation with offset (AVO) and rock physics cross-plots to examine what we should see. Recently acquired ocean bottom nodes (OBN) seismic, using Full Waveform Inversion (FWI) and least square reverse time migration (LSRTM) processing have remarkably improved the Signal to Noise (S/N) ratio of the data and producing a superior image of the field. This integrated geophysical approach has given us a better understanding of what we “should see vs. can see” to set realistic expectations from seismic imaging of the deep reservoirs in a sub-salt environment.