Geological Heterogeneity Modelling as a Guide to Seismic Attribute Interpretation

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Abstract
In this study we present a geological modelling method as a way to validate seismic attribute interpretation and classification. A 3D channel reservoir model is simulated using geological rules rather than statistical distributions. The spatial distribution of major components of the channel deposits is represented in 3D based on sedimentary processes and genetic relationships.

Using this detailed geological model as a reference, we created a synthetic seismic volume to which attribute analysis and seismic facies classification were applied. Both trace-based and voxel-based seismic facies classification procedures were applied to the synthetic data. By comparing the seismic facies classification results with the synthetic litho-facies model, we observed that average weighted frequency and instantaneous amplitude are more effective than other attributes considered in this study as input to the seismic facies classification for mapping litho-facies. The comparative study shows that quantitative representations of detailed geological models can significantly enhance seismic attribute interpretation.