

Reservoir Characterization Using 3D AVO and 3D Net Sand Prediction

Charles M. Skidmore

Diamond Geoscience Research Corp., Tulsa, Oklahoma

The major issues that face us today revolve around economics. Finding hydrocarbons has been made easier with 3D data, but the proper delineation and quality of the deposit still often elude us. Application of a series of amplitude attributes indicates that applying one technology, such as Amplitude Strength, is not enough. The issues that impact the economics of a reservoir are varied and complex, therefore multiple techniques must be used to address them.

Application of seismic attributes to three areas of the Gulf of Mexico, in a consistent manner, demonstrates how effective technology can be when applied properly. The three areas examined all had similar Amplitude Strength, but drilling results in the area produced varied results. The Mississippi Canyon 486 field was first examined because of the strong variation in reservoir thickness. The sixteen

wells drilled in the field have a gross thickness variation of 160 feet, and net thickness variation of 105 feet. Amplitude maps over the field do not indicate this complexity, and agree very poorly with the drill results. Advances in technology, mainly in the areas of AVO, Thickness, and Rock Property estimation, offer a much clearer picture of the reservoir size. Similar technology applied to a second area correctly predicted the poor outcome of an initial well and indicated the presence of cleaner and thicker reservoir in the immediate area. A sidetrack was drilled and an economic discovery was announced. The third location also has a strong amplitude anomaly similar to the other two. The AVO signature suggests the presence of hydrocarbons, but thickness predictions indicate very low net/gross sand ratios in the reservoir. The well drilled into the anomaly was plugged and abandoned.