
Subsalt Interpretation and Visualization Techniques: Alaminos Canyon, Deep-Water Gulf of Mexico

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ABSTRACT

Subsalt seismic interpretation is a demanding task even with modern depth-migrated data. Subsalt seismic data are commonly contaminated with dipping noise, and large areas are poorly illuminated resulting in shadow zones with little coherent data. Structures below salt represent the new deep-water frontier and significant effort is being made to map these features and to improve seismic imaging through better velocity models.

Variable subsalt images are best interpreted with 3-D volume interpretation techniques. By visualizing seismic data with volume tools, areas which have been imaged can be tied together to produce a geologically-sound interpretation. Classical interpretation utilizes only a single 2-D line from 3-D data. Volume interpretation takes full advantage of the 3-D data by integrating X, Y and Z dimensions. In addition, new volume interpretation tools permit co-visualization of multiple attributes, and opacity can be used better to visualize faulted surfaces. Modern volume interpretation tools also tessellate surfaces as they are interpreted. By rendering faults or base salt surfaces as they are produced, the explorationist can produce an interpretation that is geometrically consistent with previous event picks.

Deep-water Alaminos Canyon provides an opportunity to apply these techniques and compare both outboard and subsalt structures. Multi-attribute visualization of reflection seismic and coherency data is shown to enhance subsalt images of crestal faulting and reduce the impact of dipping noise. Top and base salt interpretation is also improved through multi-Z event interpretation with progressive surface rendering to produce geologically consistent surfaces. Better definition of top and base salt is key to producing quality depth migration, which will ultimately unlock new areas for exploration. Furthermore, by understanding areas with similar structural styles such as the inboard and subsalt Alaminos Canyon, volume interpretation practices can be refined for application in new areas.