

Geovolume Visualization and Interpretation Techniques from Rank Exploration to Secondary Recovery

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The study of a field in West Texas illustrates how the use of geovolume visualization and interpretation (GVI) techniques can increase asset value throughout the life of a field, from rank wildcat exploration through secondary recovery. At each stage, different seismic and reservoir attributes and various GVI techniques are used. At the rank exploration stage, the speed of large 3-D data visualization systems such as GeoProbe allows interpreters to rapidly scan the data, identifying areas of interest. GVI techniques are used in the data-processing workflow to quality-control the data and pick horizons for depth migration, reducing cycle time and improving data quality.

Even before a prospect is identified, seismic attributes such as dip semblance are used to interpret faults and other discontinuities. Once prospective areas have been isolated, detailed mapping of potential reservoir horizons begins;

new sets of attributes are calculated and additional GVI techniques are applied. Seismic amplitudes are volume-rendered to reveal the 3-D geometry of the prospective reservoir. Multi-attribute autopicking criteria are used to increase speed and accuracy of horizon mapping.

After the first well has been drilled, the seismic attributes are correlated to petrophysical properties, and more detailed internal reservoir analysis begins. As the field matures, reservoir models tie the well control to the seismic data and provide 3-D volumes of reservoir properties. Volume visualization of reservoir models and simulation results is then used to identify areas for infill drilling and evaluate secondary recovery options. At every stage of field life, geovolume visualization interpretation techniques are applicable to reduce cycle time, reduce risk, and increase the value of the asset.