

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

Fangjian Xue, Dave Paddock, and Kim Hemsley, Schlumberger, Houston, TX

Application of 3-D Seismic Classification Techniques to Reveal Prospective Targets in Optimizing E&P Activities

3-D seismic classification is a breakthrough emerging technology to determine 3-D distribution of pore fluid and lithology from multiple, seismic attribute volumes. This technique provides an innovative, timesaving solution in identification and definition of prospective targets, especially in areas with multiple pay zones and complex geology. A 3-D seismic classification analysis was performed on the productive Miocene trend of the Gulf Coast and has revealed numerous prospective targets adjacent to and below existing fields. A supervised classification method was used to define classes of fluid and lithofacies based on knowledge of well production, lithology and seismic amplitude. These include bright-spot gas sand, bright-spot oil sand, bright-spot wet sand, dim-spot gas sand, dim-spot oil sand, dim-spot wet sand and shale. Six seismic attribute cubes were used as input for the classification: conventional seismic, acoustic impedance, reflection strength, instantaneous frequency, AVO difference, and Volume Reflection Spectrum. Using cross-plot discriminant analysis, extra classes were defined based on their cluster distribution, separating classes based on their degree of risk. The generated class cubes provide the location of prospective targets and the associated probability cubes provide quantitative estimation of risk. 3-D visualization techniques vividly display the distribution of fluid and lithofacies and also provide the volume-percentages of different classes, which is important for quality control. This breakthrough seismic interpretation technology is much more cost effective, reduces cycle time and results in more accurate risk assessment than current seismic interpretation and classification techniques. Exploration targets can be more quickly and systematically identified to optimize E&P activities.