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Arthur E. Gregory, Andrew M. Knowlton, Gregory S. Douglass, Barton A. Payne, Luke F. LaFreniere,  
and Mohammed A. Tayyib, Saudi Aramco, Dhahran, Saudi Arabia

### **Depth Volume Visualization and Interpretation of Shallow Geologic Features at Abqaiq Field, Saudi Arabia**

Abqaiq field lies northeast of the Ghawar oil field in east-central Saudi Arabia. Exploration and development of this giant field, discovered in 1941, has been enhanced through the use of 3-D seismic data acquired in the mid-1990s and in 2001. These data provide some of the best land 3-D seismic volumes in Saudi Arabia for imaging and interpretation of shallow geologic features. Distinct faults and prominent sinuous channels can be recognized on conventional time migrated seismic data and on coherency volumes. In addition, at least eight circular features that are up to 5.5 km in diameter have been recognized in the early Tertiary section on time and horizon slices. Possible origins of these large features include: meteorite impacts, karsting, or playa lakes.

Migrated seismic time volumes have been redatumed and scaled to depth using a well-based layered velocity model to enable integrated depth interpretation and seismic reservoir modeling of this field. Depth scaling of the seismic data has aided correlation of the circular events to the appropriate depth intervals. At least 25 wells are located near these circular features, and we anticipate that well sample analysis will help to determine their origin. Visualization displays of multi-attribute depth horizon slices indicate that the large circular features were time-synchronous during the early Paleocene. Visualization of different attribute volumes in depth has been key to recognition and characterization of these anomalously large and striking features.