

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

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High Frequency Sequence Stratigraphic Models of the Upper Pennsylvanian to the Middle Permian Sedimentary Facies of the Midland Basin

High frequency sequence stratigraphic models were created for the cyclic upper Pennsylvanian to middle Permian strata along the eastern margin of the Midland Basin of West Texas. Depositional environments and facies were studied using 3-D seismic and well log data. Seismic amplitude anomalies extracted from the flattened 3-D volume were calibrated with well log character to generate paleogeographic maps that track the geometries and sediment character of the identified cyclic depositional systems. The identified seismic facies are; mega breccia and sandy debris flows, submarine and subaerial channel fill, barrier island and lagoon facies, and reef/ bioherm facies. Seismic and well log geometries suggest the identified paleogeotopographic variations and cyclic changes in relative sea level were the dominant factors controlling the sediment distribution within the study area. High frequency sequence stratigraphic models were used to constrain the stratigraphic interpretation of the area and reduced the uncertainties inherent to each of data sets. Improving the understanding of the facies geometries and the sedimentary character of this section will help reduce the risks involved in hydrocarbon exploitation and exploration in the area.