

Inspection of thin sections from cuttings and rotary sidewall cores, coupled with core descriptions from various operators, indicates that the transgressive phase of each pinnacle reef consists of slightly argillaceous lime wackestones (increased gamma ray count) composed of thrombolitic facies or microbiolite facies marked by an abundance of algal binding and clotting. These facies, with associated delicate deeper-water skeletal allochems, suggest moderate water depths related to high-frequency rise in sea level. The maximum flooding surface of each reef cycle is approximated by the highest gamma ray count. The regressive cap or highstand systems tract of the reef cycles is composed of in situ, apparently low-energy Late Jurassic reef-builders, such as sponges and delicate corals. The caps to some of the reef cycles consist of high-energy grainstones with oncolites and abraded, well-washed, skeletal-peloidal sand, indicative of shoaling to very shallow water depths. On well logs, the gamma ray within the highstand por-

tion of a reef cycle cleans upward, becoming blocky to remarkably flat. A lack of core data has hampered a complete understanding of facies and diagenesis.

Carbonate systems in similar accommodation settings, such as the younger Sligo formation in south Texas, provide stratigraphic analogues useful for driving well log correlations and seismic interpretation. Analogous buildup or pinnacle reef facies typically occur linked to the terminal phase of carbonate deposition near the top of regional, second-order TST's beneath deep marine shales (second-order MFS) which serve as source and seal facies. Pinnacle geometries are promoted by increasing accommodation within an overall retrogradational stacking of carbonate facies belts. Differential compaction of shaly, onlapping facies around pre-existing rigid carbonate buildups enhances their seismic recognition. Hydrocarbon-producing examples include the Devonian of Canada, the Miocene of Southeast Asia,

the Mississippian Lodgepole of the Williston basin, and the Upper Pennsylvanian Horseshoe Atoll of the Midland basin, among others. Integration of key principles from the Late Jurassic of the East Texas salt basin with these and other examples should fuel the search for other, as yet, unrecognized carbonate buildups and pinnacle reefs within similar accommodation windows in other areas.

REFERENCES

Goldhammer, R. K., Lehmann, P. J., Todd, R. G., Wilson, J. L., and Ward, W. C., 1991, *Sequence stratigraphy and cyclostratigraphy of the Mesozoic of the Sierra Madre Oriental, a field guidebook, Gulf Coast Section, Soc. Econ. Paleont. and Mineral. Found.*, 86 p.

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POSTER SESSION FOR NORTH AMERICAN EXPLORATIONISTS MEETING

Sequence Stratigraphic Framework And Exploration Potential of Lower Permian (Wolfcampian) Gravity-Flow Deposits, Eastern Midland Basin, Texas.

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Eight major Wolfcampian sequences (W1-W8) have been identified on seismic data and well logs in a 1500 square mile study area along the eastern shelf of the Midland basin. These sequences are composed of two lower frequency sequences (W1-W5 & W6-W8) that are separated by a major erosional surface associated with a sea level fall near the time of the early-middle Wolfcampian boundary. Sea level falls associated with sequences W5 and W6 resulted in significant erosion of platform-margin deposits, incision of a submarine canyon several miles into the eastern shelf, and deposition of carbonate gravity flows in the Midland basin. Gravity flows entered the basin via the submarine canyon and fed basin-floor fan systems which extend up to 25 miles basinward of the toe-slope.

Within the study area, production from carbonate gravity-flow deposits is mostly from three submarine fan systems within sequences W5 and W6 - the Credo (10 MMBOER) fan (oldest), the Triple M (5 MMBOER)-Howard Glasscock (7 MMBOER) fan, and the Hutto (5 MMBOER) fan (youngest). The maximum gross thickness of the fans ranges from 100 to 200 feet.

Regional isolith and seismic amplitude data were used to high-grade a 70 square mile area in the vicinity of Triple M and Howard Glasscock fields. Model-based velocity inversions, constrained by sonic and density data from 52 wells, were performed utilizing a grid of 2-D seismic data and a 3-D survey. Both Triple M and Howard Glasscock fields are clearly defined by high-velocity anomalies within the productive basin-floor fan interval of sequence W6.

An untested high-velocity anomaly with a velocity signature and stratal geometry similar to the two fields, and pre-drill estimated reserves of 5 MMBOER, was drilled in 1995. The well encountered 7 ft. of carbonate gravity-flow deposits in the Credo zone and 52 ft. of carbonate gravity-flow deposits in the Triple M zone (gamma ray < 40 API). Twenty-five feet of gravity-flow deposits had been predicted for the Triple M zone. However, the deposits were nonporous and the well was plugged and abandoned. Although the location of carbonate gravity-flow deposits within the study area can be identified using sequence stratigraphic and seismic imaging techniques, prediction of porosity within the flows remains problematic.