Monday, February 13, 2006

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476 (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

by ***Mark G. Rowan (speaker)***
Rowan Consulting, Inc.,
Boulder, CO
Kerry Inman
Consultant, Houston, TX

Exploration Implications of Different Structural Styles and Processes of the Ultra-Deep Shelf Province, Northern Gulf of Mexico

Shallow structural styles of the northern Gulf of Mexico shelf are dominated by allochthonous salt. Canopies accommodated withdrawal and secondary diapirism, as well as linked systems of extension and contraction driven by gravitational failure of the margin. The Texas shelf is generally characterized by extensional faults that sole onto the welded canopies, with the matching contraction often located in deeper water and salt withdrawal being of secondary importance. Linked systems are also present on the Louisiana shelf but are of more limited extent because much of the area is dominated by withdrawal and diapirism. The primary reason for the distribution of the different shallow structural styles is the size and connectivity of the canopies, with smaller, isolated canopies more common on the Louisiana shelf.

Subsequent evacuation of these massifs forms basinward-dipping and -thickening minibasins

Deeper structural styles and processes are enigmatic. The Louann salt and its equivalent weld serve as a regional detachment for gravitational failure, with proximal extension and distal contraction. But whether the deep shelf province is part of an extensional, or a contractional, province is the subject of controversy, with recent talks by experts proposing both interpretations. We suggest that the deep shelf is primarily a region of basinward translation and salt withdrawal, located between the extensional and contractional provinces. Extension and contraction are locally or occasionally important but are not the dominant processes.

Regional Model

In our model, derived from an interpretation of the regional GulfSpan 2-D seismic program from GX Technology, Mesozoic minibasins initially develop between inflated salt massifs, possibly triggered by local extension, contraction or strike-slip movement during early gravity gliding of the margin. Subsequent evacuation of these massifs forms basinward-dipping and -thickening minibasins as the salt is displaced into basinward-leaning primary diapirs. The diapirs eventually form counter-regional welds as the salt moves into allochthonous **HGS Gneral Dinner Meeting** *continued on page 23*

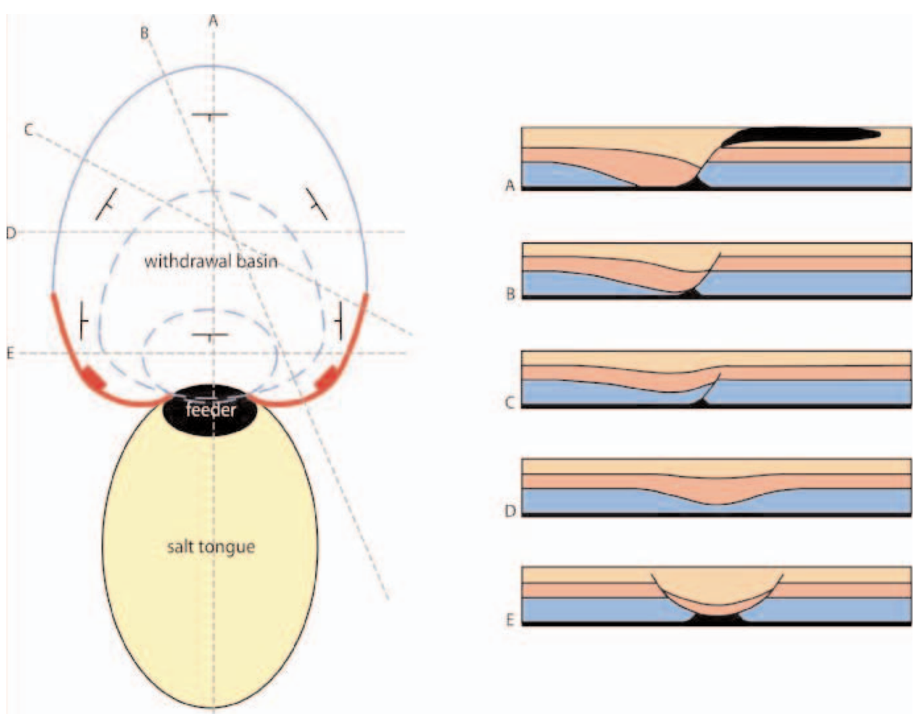

Figure 1. Schematic diagram of an asymmetric, counterregional withdrawal basin in plan view (left). The cross sections on the right illustrate the geometries along the corresponding dashed lines on the map.

HGS General Dinner **Meeting**

 continued from page 21

levels. Subsidence of the minibasins relative to outlying areas is greatest at the diapirs and decreases away from the diapirs along counter-regional faults until it is taken up only by folding beyond the fault tips. Depending on the orientation of a two-dimensional cut through such a system, the geometry can range from an asymmetric fault-bounded growth wedge to a faulted fold to a symmetric growth syncline (Fig. 1). Two or more such systems with variable orientations in proximity to each other result in a wide variety of structural styles: repeated counterregional faults/feeders, growth synclines, faulted synclines, turtle structures, faulted turtles and horst blocks (Fig. 2).

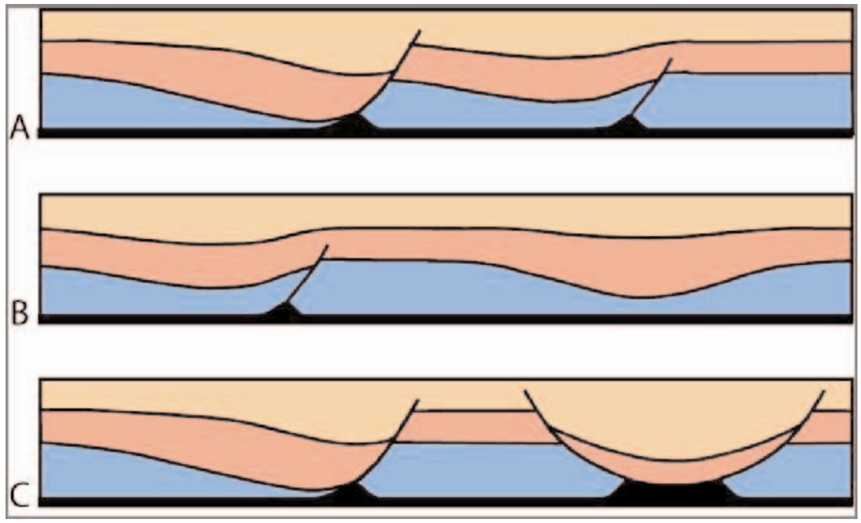

Figure 2. Some of the various geometries that result from two adjacent counterregional structures with similar or different orientations.

Conclusion

The deep shelf province did not move basinward as a rigid mass; instead, strong minibasins translated and even rotated relative to each other, so that the various diapirs, welds and faults would have been reactivated as extensional, contractional or strike-slip structures. For example, counterregional welds/faults that originally accommodated differential withdrawal may subsequently be utilized as counterregional extensional faults as the footwalls move basinward. One result is that any overlying allochthonous detachment gets deformed and anomalous shallow growth geometries develop. We will show several models of late extension at the Louann level and corresponding examples from the Texas and Louisiana shelf provinces.

The ideas presented here are preliminary and must be tested with 3-D depth data. If valid, they have important ramifications for exploration of the deep shelf.

Biographical Sketch:

Mark Rowan received a BS in biology from CalTech in 1976, an MS in geology from Berkeley in 1982 and a PhD in structural geology from the University of Colorado at Boulder in 1991. He spent 3 years at Sohio Petroleum Co. in Denver (1982-1985), 4 years at Geo-Logic Systems in Boulder (1985-1989) and 3 years at Alastair Beach Associates in Glasgow, Scotland (1989-1992). He then returned to the University of Colorado and in 1996 he was appointed Research Assistant Professor and led a large industrial research consortium investigating Gulf of Mexico salt tectonics. Rowan left this position in 1998 and founded his own company, where he consults and teaches for the petroleum industry and conducts research sponsored by industry.

Although Mark Rowan's background includes many types of tectonic environments, his recent research and consulting interests are focused on the styles and processes of salt tectonics, salt-sediment interaction, the geometry and kinematics of fold-and-thrust belts and applications of these phenomena to petroleum exploration. He is the author or coauthor of nearly 60 papers and 120 abstracts; a regular instructor for AAPG's Salt Tectonics school and a current AAPG Distinguished Lecturer.