Monday, December 12, 2005

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 **Michael R. Hudec** (speaker), **Martin P.A. Jackson,** and **Daniel D. Schultz-Ela***
Bureau of Economic Geology,
Jackson School of Geosciences,
The University of Texas at Austin

AAPG Matson Award paper, AAPG 2005 annual meeting, Calgary

A Compressional Origin for Minibasins near the Sigsbee Scarp, Gulf of Mexico

The conventional explanation for minibasin subsidence is that it is driven by gravity—that minibasins exist because their fill is dense enough to sink into the underlying evaporites, expelling salt into the adjacent salt highs. This explanation is valid if the average density of the sediments is greater than the density of the salt, but it cannot account for subsidence of thin, less dense clastic sequences into salt. Seismic data show that many minibasins started sinking into salt when their siliciclastic fill was much thinner than the 1.5- to 2-km thickness necessary for compaction to invert the density contrast. For such minibasins, some mechanism other than gravity must be involved.

We investigated mechanisms of minibasin subsidence using a 3,600-km^2 prestack depth-migrated 3D seismic dataset near the Sigsbee Scarp, northern Gulf of Mexico. This dataset covers 27 minibasins of varying size and thickness. These data indicate that minibasin initiation was synchronous with shortening, as indicated by the presence of thrust faults in the deeper parts of many minibasins (Figure 1). A compressional origin of minibasins is also consistent with finite-element models showing that laterally shortened minibasins will subside even if their fill is less dense than the salt.

The specific cause of shortening that led to minibasin formation is currently unknown.

The sedimentary fill of compressional minibasins can be divided into three stages (Figure 1): (1) prethrusting, which is typically shale-prone and may predate the existence of a basin, (2) synthrusting, in which sands are deposited in synclinal subbasins between thrusts, and (3) postthrusting, in which sand bodies may extend across the entire minibasin. Understanding minibasin evolution can therefore improve prediction of reservoir continuity in suprasalt plays.

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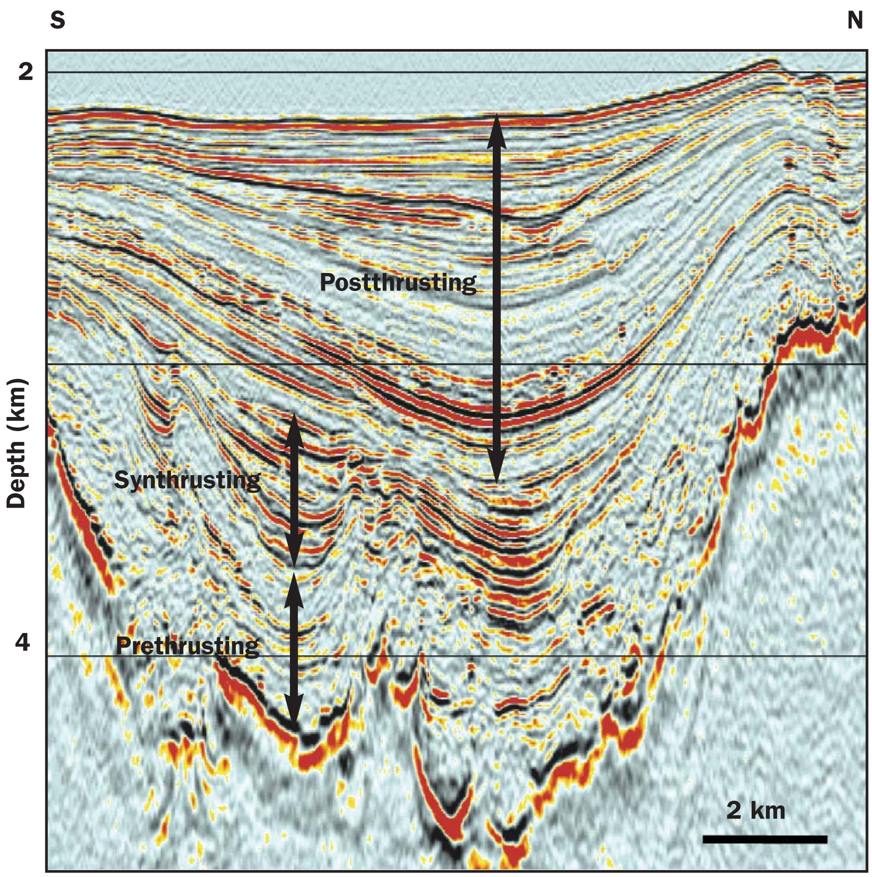

Figure 1. Thrust faults affecting the deep section in many minibasins indicate that these basins formed in compression. Reservoir distribution within the minibasin depends on whether the sands were deposited prethrusting, synthrusting, or postthrusting. Data © Veritas Marine Surveys, Houston, Texas.

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The specific cause of shortening that led to minibasin formation is currently unknown. The orientation of thrust structures is highly variable. Their pattern suggests that shortening was partitioned by flow boundaries defined at shallow levels within and above the salt sheet. If so, suprasalt processes may have been an important control.

Biographical Sketch

Mike Hudec received his PhD from the University of Wyoming in 1990 and spent the next eight years at Exxon Production Research, where he specialized in salt tectonics, extensional tectonics and seismic interpretation. He moved to Baylor University in 1997 as an assistant professor in Structural Geology. In 2000, Hudec moved to the Bureau of Economic Geology, where he is codirector of the Applied Geodynamics Laboratory, an industry-funded research consortium studying salt tectonics. His current research interests include advance mechanisms for salt sheets, processes in minibasin initiation and construction of a digital atlas of salt tectonics.

Martin Jackson received his PhD from the University of Cape Town in 1976, taught at the University of Natal and joined the Bureau of Economic Geology in 1980. He established and co-directs the Applied Geodynamics Laboratory. His current research interests include salt-sheet emplacement mechanisms, passive-margin tectonics and behavior of salt in orogenic belts.

Dan Schultz-Ela specializes in numerical modeling and analysis of salt structures. He taught for two years at Colorado College after receiving his PhD from the University of Minnesota for strain analysis of an Archean greenstone belt. Prior work included an MS degree from Brown University and a BA degree from Carleton College. He was a member of the Applied Geodynamics Laboratory from 1989 to 2003. He currently lives and works in Colorado.