

by Richard L. Adams

Basement Tectonics and the Origin of the Sabine Uplift

The origin of the Sabine Uplift can be found in the same processes that formed the Gulf of Mexico (GOM) Basin. The Sabine Uplift is supported by a large rhombic basement block that originated as a mid-rift high during the Triassic rifting phase of the opening of the GOM. Although this area is referred to as a basement block, it is in reality an area some 90 miles long by 60 miles wide, across which the depth to magnetic basement is up to 10,000 ft shallower than in the middle of the East Texas Salt Dome Basin. The northeast and southwest boundaries of this basement block are major transform (transfer) fault systems that parallel the opening of the Gulf of Mexico. The northwest boundary is the East Texas Salt Dome rift basin and the southeast side steps down into the South Louisiana Salt Dome Basin. Within this mid-rift high, multiple smaller transform faults and horst and graben structures are evident by mapping the base of the Louann Salt on seismic data. These structures have influenced sedimentation on a local level. Further uplift of this mid-rift high occurred during the Middle to Late Cretaceous and Paleocene-Eocene due to Laramide foreland compression from the southwest.

The mid-rift high was nearly covered by Louann Salt. At the same time, an estimated 5,000 to 7,000 feet of salt was being deposited in the East Texas Salt Dome Basin. Salt isochrons can thus tell us something of both the external and internal shape of the mid-rift high. Two notable salt isochron thins are evident on the structure: the Halbouty Ridge along the Smith-Rusk County line and the San Augustine High, both defined by thin or absent salt.

The shape of the mid-rift high has also influenced younger sedimentary depositional patterns. Southwest of the Trinity River and east of the Louisiana state line, the Haynesville-Bossier-Cotton Valley (HBCV) system is aggradational—major system tracts are stacked vertically. But, the presence of the mid-rift high forced the HBCV system to prograde across a flat marine shelf over the mid-rift high. Thus, over the Sabine Uplift the same

system tracts cover an area that is nearly three times as wide as their coverage to the southwest or to the east.

The mid-rift high was a shallow marine shelf during the Cotton Valley sand deposition. The Cotton Valley sands across the mid-rift high are shoreface sands that were laid down along a shoreline that extended from southwest to northeast across the shallow shelf. The sands of Overton (Cotton Valley) Field, as well as the sands at Oak Hill, Willow Springs and Carthage, are all examples of this deposition. Thin widespread limestone beds are present within the Cotton Valley across the Sabine Uplift. These limestones are interpreted as transgressive shell lags and back-bay oyster beds. The position of the active shoreface systems prograded through time, with the oldest system to the northwest and the youngest migrated to the southeast.

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Middle to Late Cretaceous Laramide foreland tectonics involved lateral compression from the southwest that formed a foreland fold pair, the Sabine Uplift and the North Louisiana Salt Basin. Estimates of the amount and timing of that uplift are consistent with earlier studies dating back to Granata, in 1953. Younger Paleocene-Eocene compression reactivated the uplift again. Pre-Jurassic transform (transfer) fault lineations along NW–SE lines strongly influenced the shape and style of the resultant uplift. The current outline of the Sabine Uplift as defined by the edge of the Wilcox outcrop is very rectangular along a NW–SE axis.

Any exploration program for the Sabine Uplift area should include a serious consideration of Laramide compressional tectonics, sub-salt structuring, and both gravity and magnetic mapping early in the evaluation. ■

Biographical Sketch

RICH ADAMS was born and raised in northern Indiana. He received a BS in geology (with Honors) from Indiana University in 1973 and an MS in geology from the

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University of Wisconsin–Madison in 1975. He worked for Exxon Company, USA, in New Orleans from 1975 to 1979. He moved to The Woodlands in 1979 to work for Mitchell Energy and Development Company where he remained until 1999. In 2000 Rich joined Carr Resources, Inc., in Tyler, Texas, where he still works today.

Rich has published several papers on the uses of basement

tectonics in both exploration and development geology and has spoken often to local and regional geological societies on that topic. In his current position he is actively exploring the East Texas Basin and surrounding areas using his ideas on basement tectonics to help guide the company's exploration effort.

Rich currently lives near Lindale, Texas, with his wife, Marsha. He enjoys hunting, fishing, golf and, believe it or not, work.

NeoGeos News

by *Dianna Phu*

Central Texas Field Trip - March 10-11, 2007

On the weekend of March 10-11, as others prepared to set their clocks ahead for Daylight Savings Time, the NeoGeos were gearing up for a fantastic field trip to Central Texas. Designed as an introduction to the geology of Texas and the application of basic geology observational skills, the trip encompassed several traditional geologic landmarks of the Llano Uplift, including Hoover Point, Enchanted Rock and the Llanite Dike.

One of the field trip attendees, Taka Kanaya, is our "Reporter from the Field":

"We visited over 10 outcrops from Cenozoic coastal plain through Paleozoic igneous and metamorphic rocks around the Llano area over the weekend. Led by Tom Miskelly (Geology Professor, San Jacinto College South), the group comprised 25 participants including geologists, students and engineers from Houston, Dallas, Austin and College Station. Most outcrops were road-cuts, but the trip also incorporated a hike up Enchanted Rock and within Inks Lake State Park. Most of the group stayed in Fredericksburg overnight and enjoyed German beverages, followed by BBQ for lunch in Llano.

At each stop, we learned how the outcrop fits into the regional tectonic history of Texas. Geology 101-type observation skills were also introduced to non-geologists (a refresher for some!). On the soft rock outcrops there were discussions about the sedimentary architecture of the outcrop compared to the structure imaged by seismic data, i.e. how would this look on seismic.

An outcrop of the Wilbern Formation reminded us how the geometry of channel fill sandstones may look in reservoirs in deep water. At Longhorn Caverns, participants with geology and engineering backgrounds shared experiences with common drilling problems associated with carbonates and karst environments. I thought sharing geological and industry knowledge at the outcrops was the most meaningful experience we had on the trip.



The NeoGeos at Hoover Point: Front row (left to right): Riv Yadin, Mary Strauss, Vanessa O'Brien, Jennifer Hoyt, Brittney Blake, Cris Hussar, Tom Miskelly. Middle row (left to right): Ron Mart, Pilar Ndong, Heather Harris, Jennifer Sherard, Sue Ellen Jeffers, Laura Lopez, Dianna Phu. Back row (left to right): Josiah Strauss, Taka Kanaya, Kevin Fox, Jerry Lopez, Ben Lopez, Loc Phu, Jason Braden, Greg Carson. On the trip but not present at the time of photo: Seva Egorov, James Cokinov and Raj Eti

The trip also proved an excellent networking opportunity for people at various stages of their careers—working for major oil companies or small service companies, undergraduate students or PhD candidates, and everything from the non-geologist to the experienced professional. Since I just started my professional career this January, it was a great opportunity to get to know how new hires in different companies learn the basics in this industry. We also shared how we could promote activities and

communications for young professionals in oil and gas. Overall, I thought a weekend trip like this was a great place to make new friends while learning something applicable to my career."

Photos and discussion regarding this trip are posted on the Message Board in the NeoGeos Announcements forum at <http://www.neogeos.org>. Keep an eye out for future events like this and for workshops, volunteer opportunities and socials. If you are interested in joining the NeoGeos email distribution list, send a note to neogeos_houston@yahoo.com. Happy Networking! ■