



**2005 GCSSEPM Foundation Ed Picou Fellowship
Grant for Graduate Studies in the Earth Sciences
Recipient**

Lauren Slovacek



The Boquillas Formation in West Texas

The Maverick Basin of southwest Texas (Figure 1) is currently attracting attention for its petroleum potential. Scott (2004) has recently described its structure and discussed new production from the Lower Cretaceous in the Maverick, Dimmit and Zavala counties area, largely resulting from analysis of 3-D seismic data. Scott's paper implies that

the basin is a fault-controlled half-graben trending southeast to northwest from the Gulf of Mexico Cretaceous shelf margin. The basin may be an aulacogen.

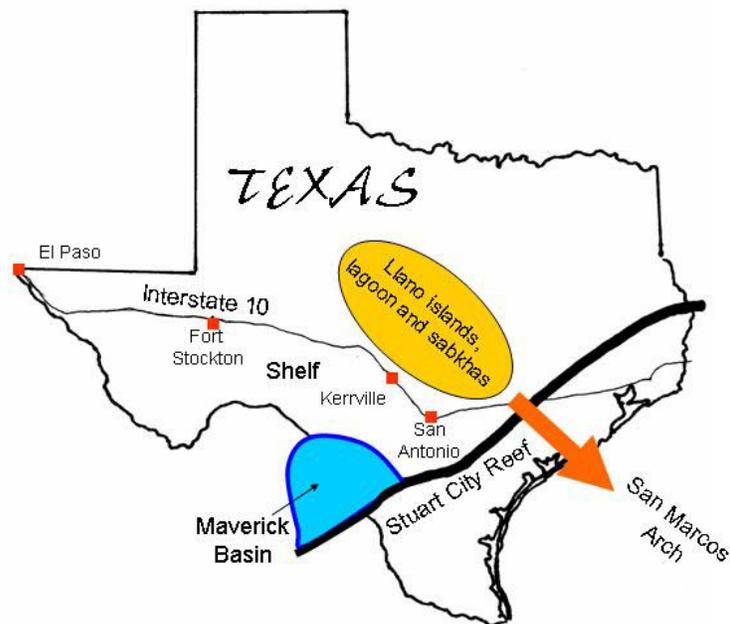


Figure 1: Cretaceous paleogeography of Texas.

The overlying Boquillas (Eagleford equivalent) (Figure 2) in areas to the north and west of the current production may provide further clues to Cretaceous paleogeography and help in defining basin geometry, possibly leading to interest in additional seismic surveys and extension of the productive area.

Outcrops of the Boquillas Formation occur along US Highway 90, west northwest from Del Rio as far as Langtry (a distance of approximately 40 miles), and again in the Big Bend National Park area, one hundred and fifty miles west of Del Rio (Figure 3). The proposed study will concentrate on the Highway 90 outcrops but will also include the Big Bend occurrences for comparison. Previous studies of the Boquillas in the Del Rio area have suggested that the environment of deposition was either tidal flats (Johnston, 1983; Willett, 1990; McDaniel, 1992) or shallow shelf (Trevino, 1988). The former interpretation is based upon comparison of tepee structures with those in the Permian Basin, but Lock and others (2001) have shown that these structures are of Quaternary age and are related to caliche formation. The shallow shelf interpretation is based on identification of pinch-and-swell structures as hummocky cross stratification (suggesting water depths of approximately 50 meters; however, when considered in conjunction with other aspects of the formation, this interpretation has been challenged. Comparison with outcrops of various ages from Nevada, China, Japan and Cyprus led Lock and Fife (2004) to reinterpret the pinch-and-swell beds as contourites, and associated features as slump folds, slump breccias and possible turbidites (Figure 4). The environment is interpreted by the latter authors as upper slope, with the highway approximately parallel to slope contours and deeper water to the south southwest. This would conform to an extension of the Maverick aulacogen along the Rio Grande valley.

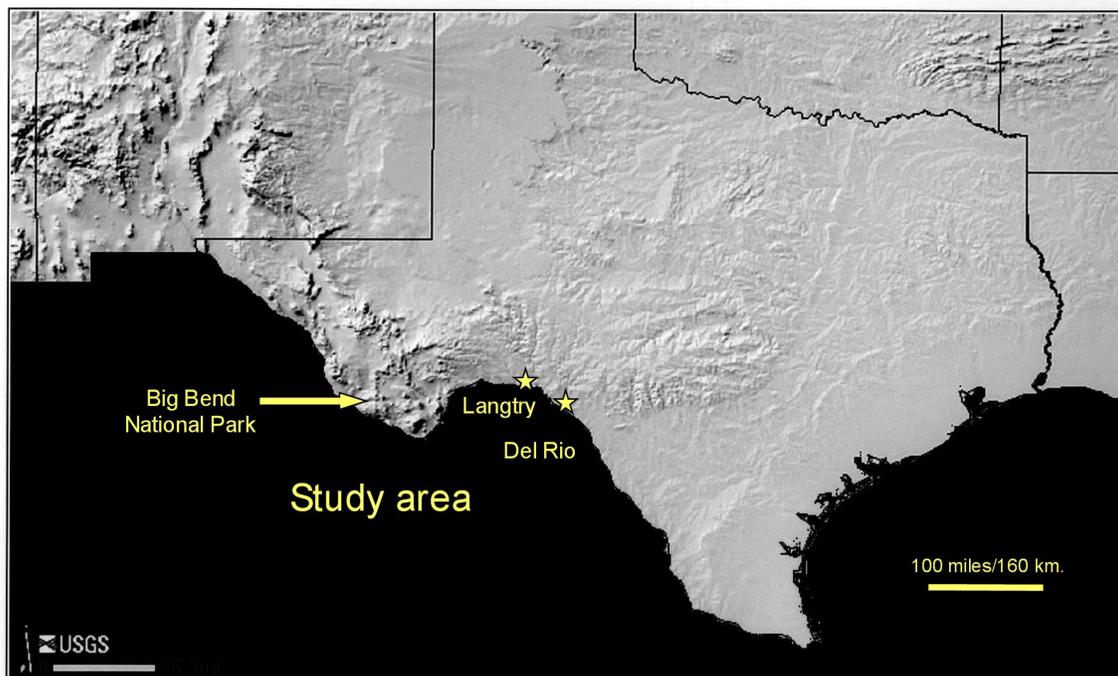


Figure 3: Proposed study area.



Figure 4: Outcrop of the basal Boquillas Formation, US 90 west of Del Rio.

The objective of the proposed study is to investigate the evidence for the depositional environment. Measured sections will be recorded for each of the principal road cuts, detailed lithological descriptions will be made, and samples will be collected for thin section petrography. In particular, evidence will be sought to confirm or contradict the suggestion that highly continuous beds were deposited by turbidity currents. This will include efforts to carry out detailed correlations between outcrops. The paleocurrent measurements previously obtained are relatively sparse and are inadequate for detailed conclusions; many more measurements will be made, and recorded in their detailed stratigraphic context. Additional outcrops away from Highway 90 will be sought, including possibly from adjacent areas of Mexico. Outcrops in the Big Bend area will also be visited and compared with the Highway 90 facies; shallower water conditions are currently postulated for the Big Bend during Eagleford times.

Thin section and SEM petrography will be used to supplement field evidence. The paleontology is consistent with anoxic bottom conditions, which makes a storm-dominated shallow shelf interpretation less viable. Additional sampling is needed to confirm the paleontological observations of Lock and Fife (2004).

Textural composition of the suggested turbidites will be one focus of the petrographic studies.

It is hoped that this study will improve knowledge of the early Late Cretaceous paleogeography of west Texas, with potential implications for petroleum exploration.

References cited

- Johnston, B., 1983, Tepee structures; *in* Structure and Stratigraphy of the Val Verde Basin/Devils River Uplift, Texas: West Texas Geological Society Publication 83-77, p. 139-140.
- Lock, Brian E., Suk-Joo Choh and James J. Willis, 2001, Tepees and other surficial deformation features of Cretaceous rocks in central and west Texas, resulting from Late Cenozoic caliche formation: GCAGS Transactions, v. 51, p. 173-185.
- Lock, Brian E. and Ashley Walker Fife, 2004, Contourites and related outer shelf/upper slope sediments, Boquillas Formation, West Texas: AAPG Annual Meeting, April 18-21, 2004, Dallas, Texas; extended abstract, 6 pages.
- McDaniel, Brian Keith, 1992, Tepee structures; a comparison of Guadalupian (New Mexico) 'type area' and Cretaceous (Texas) forms: Master's thesis, Sul Ross State University, Alpine, Texas, 123 p.
- Scott, Robert J., 2004. The Maverick Basin: new technology – new success: GCAGS Transactions, v. 54, p. 603-620.
- Trevino, Ramon H., III, 1988. Facies and depositional environments on the Boquillas Formation, Upper Cretaceous of Southwest Texas: Master's thesis, University of Texas, Arlington, 120 p.
- Willett, T.L., 1990. Tepee structures; *in* Southern Association of Student Geological Societies, Cretaceous Geology North and Northwest of Del Rio, Texas – Field Trip, Fall 1009, field guide and related papers, The University of Texas at San Antonio, San Antonio, Texas, p. 144.