

**Buising, A. V. 1988. Depositional and tectonic evolution of the northern proto-Gulf of California and lower Colorado River, as documented in the Mio-Pliocene Bouse Formation and bracketing units, southeastern California and western Arizona. Ph.D. dissertation. University of California. Santa Barbara, California. 269 pp.**

Recent studies have suggested that the tectonic history of the Gulf of California is more complex than accepted one-stage transtensional rifting models imply. Specifically, the presence of several mid- to late Miocene marine sedimentary sections in what is now the Gulf of California physiographic province (including the lower Colorado River area and Salton Trough) indicates that this region was occupied by marine waters as much as 8 m.y. prior to the onset of spreading- and transform-related subsidence at about 5 m.y. This pre-modern Gulf marine incursion has been called the proto-Gulf of California. Although evidence suggests that the proto-Gulf was tectonically distinct from the modern Gulf, proto-Gulf tectono-depositional evolution has remained very poorly understood until recent years.

The present study focuses on the Mio-Pliocene Bouse Formation and bracketing units, discontinuously exposed over several thousand km<sup>2</sup> in SE CA-W AZ, in order to improve understanding of the late Cenozoic depositional and tectonic evolution of the lower Colorado River area (northernmost proto-Gulf of California) and the proto-Gulf as a whole.

This study integrates regional field studies, detailed sedimentology, and sandstone-siltstone petrography with data from reflection seismic profiles provided by the NSF-funded CALCRUST project.

The Bouse Formation and bracketing units record four stages in the evolution of the lower Colorado River area: (1) dissection of pre-extant, detachment fault-controlled topography; localized, interior-drainage alluvial deposition ( $\sim 14$ - $\sim 9$  m.y.); (2) regional downwarping and proto-Gulf transgression ( $\sim 8$  m.y.); (3) progradation of ancestral Colorado River delta into northern end of proto-Gulf basin ( $\sim 5$  m.y.); (4) arrival of through-going Colorado fluvial channel ( $\sim 4$  m.y.). Proto-Gulf extension and subsidence propagated northward into the Bouse tract from the main southerly portion of the proto-Gulf, representing a final, abortive pulse of regional extension in western North America.

In addition, study of deltaic facies within the Bouse Formation has generated a new model describing deltaic sedimentation in a high-relief, topographically irregular basin. By contrast to conventional deltaic models, in which delta morphology and stratigraphy are dictated by processes operating in the receiving basin, in the "Bouse-type" system, receiving basin physiography controls delta morphology and stratigraphy. Stratigraphy in the "Bouse-type" system are controlled by receiving basin physiography.