The Peripheral Graben System in Texas: An Overview

Thomas E. Ewing

Frontera Exploration Consultants, 19240 Redland Rd., Ste. 250, San Antonio, Texas 78259

GCAGS Explore & Discover Article #00330*
http://www.gcags.org/exploreanddiscover/2018/00330_ewing.pdf
Posted September 29, 2018.

*Article based on a full paper published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2018 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as an oral presentation at the 68th Annual GCAGS Convention and 65th Annual GCSSEPM Meeting in Shreveport, Louisiana, September 30–October 2, 2018.

ABSTRACT

The peripheral graben system (PGS) forms a distinctive tectonic element which, in South and East Texas, rims the northern Gulf of Mexico Basin. The PGS contains two sets of domains: long symmetric graben systems trending parallel to structural strike (Talco, Mexia, Milano, Karnes, and Charlotte-Jourdanton), and connecting zones of en echelon faulting and small grabens (Kaufman, Calvert, Gonzales, and Muil). Faulting is confined to the Mesozoic and Cenozoic sedimentary column, and closely follows the updip edge of the Louann Salt that lies at the base of that column. The PGS formed by downdip sliding (or rafting) of the post-salt sedimentary column atop the mobile salt layer, leaving the PGS as an updip breakaway zone. Where the direction of sliding is perpendicular to the edge of salt, simple extension forms the symmetric graben systems. Where the direction of sliding (structural dip) is oblique to the edge of salt, en echelon fault systems form under transtension. Sliding began in the Jurassic, and has continued into the Cenozoic at least as young as Late Eocene in some areas.

Long symmetric grabens of the PGS host significant oil and gas fields, where appropriate reservoirs are present. Large-displacement faults of these grabens also can offset groundwater aquifers and inhibit communication between near-surface and deeper zones. In the en echelon zones, faults are rarely long enough to form large fields or affect groundwater flow, but fractures may generate permeability in brittle units such as the Austin Chalk and Eagle Ford.

Modern exploration for resources within the PGS can best be undertaken with 3D seismic data to resolve the complex fault patterns, combined with regional and local geologic understanding of reservoir zones and individual sand bodies.

Originally published as: Ewing, T. E., 2018, The peripheral graben system in Texas: An overview: Gulf Coast Association of Geological Societies Transactions, v. 68, p. 163–178.