Southern Oklahoma Structures: Big by Any Standard

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A variety of geophysical data, including newly released 3-D seismic reflection data, show us that the basement structure of the central U. S. is very complex. The dimensions of these basement structures in southern Oklahoma is very large by global standards, and thus, they are a tectonic puzzle because of their size, structural complexity, and distance from active plate margins that usually make the driving mechanisms for intraplate deformation evident. The crust of the region formed during a period of continental growth that formed the cratonal core of North America (Laurentia). However, Laurentia was part of a supercontinent that did not survive long and began to break up by ~800 Ma. The Southern Oklahoma aulacogen (SOA) is an impressive example of the effects of the intraplate extension that accompanied this break-up. The late Paleozoic deformation that formed the Ancestral Rocky Mountains resulted in massive inversion of SOA rift structures and extensive deformation in the central U. S. There has been increased emphasis on the use of gravity, magnetic and remote sensing data, and these data have been particularly effective when used in an integrated fashion with seismic and drilling data.

Based on this integrated approach, the SOA can be interpreted as ending in the Texas panhandle. However, new geophysical and geological results in Southern Oklahoma and the Wet Mountains of Southern Colorado show that major SOA magmatism and subsequent tectonic inversion clearly extended into Colorado.