

How Far Did the Appalachian Thrusts Move? A Study of the Burning Springs and Pine Mountain Structures, S. Parker Gay Jr., Applied Geophysics Inc., Salt Lake City, UT 84111, spg@applgeo.com

In the Rocky Mountains where “thick-skinned” thrusting has created many anticlines that now contain oil and gas, well drilling and seismic data have mapped the geometry of these structures, and their basement roots (faults) are well known. They have also been mapped magnetically by the author. In the Appalachians, however, the “thin-skinned” thrusts have traveled a greater distance and are far removed from their roots, whose location is consequently unknown.

The author was intrigued by this problem and decided to apply the same technique used in the Rockies to determine the root locations of two Appalachian structures. In West Virginia, the Burning Springs anticline and adjacent anticlines form a pattern that was compared to the basement fault block pattern farther east along the possible transport path. This exercise yielded a remarkable fit to the fold pattern only 20 miles east of their actual location. A 10° rotation was required for a perfect match. The writer therefore proposes that the thrust/folds were originally formed at this easterly location and later shoved westerly while undergoing a slight rotation.

Following this success, the technique was tried on the Pine Mountain thrust. Here, the fault pattern is less well constrained, as we have only the one main thrust to compare to. Going east–southeast from the thrust’s present location, there are no candidate basement faults until we encounter the Cranberry structure approximately 100 miles east. It is remarkably parallel to the Pine Mountain thrust (within 2°) and thus is the probable root of that structure.