

## **Structural and Stratigraphic Framework of the Appalachian Basin from North-Central Kentucky to Southwestern Virginia: Evidence from a New Regional Cross Section**

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A new geologic cross section provides a regional perspective of the structural and stratigraphic framework of the Appalachian basin. The cross section extends from the easternmost Illinois basin in north-central Kentucky, through the Lexington dome and Rome trough in central and eastern Kentucky, to the Valley and Ridge province in southwestern Virginia, a distance of 280 miles. This cross section complements three USGS Appalachian basin cross sections located in Ohio, Pennsylvania, and West Virginia. Basin-scale research concerning petroleum systems, coal systems, CO<sub>2</sub> storage, and fluid flow can be addressed with these cross sections.

Two styles of deformation are documented from the cross section: (1) thin-skinned contraction of Alleghanian age as evidenced by a ramp anticline at the Allegheny structural front, and bedding-plane detachments and associated ramps of the Pine Mountain, St. Paul (Hunter Valley), and Copper Creek thrust faults and (2) Middle Cambrian extension as evidenced by normal faults that involve basement in the Rome trough. Also, several deeply rooted anticlines formed by minor basin inversion during the Alleghanian orogeny are noted. The basement consists of Mesoproterozoic crystalline rocks of the Grenville and Eastern Granite-Rhyolite provinces. Meso- to Neoproterozoic red beds overlie the Eastern Granite-Rhyolite basement in the western part of the cross section and are juxtaposed against Grenville basement by a west-verging thrust fault at the Grenville front beneath the Lexington dome. Paleozoic sedimentary rocks range from Cambrian to Pennsylvanian age, and their total preserved thickness ranges from about 3,000 ft on the Lexington dome to about 16,500 ft near the Allegheny structural front.