

THE RELATIONSHIP OF EXTENSIONAL AND COMPRESSIONAL TECTONICS  
TO A PRECAMBRIAN FRACTURE SYSTEM IN THE EASTERN OVERTHRUST  
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The central and southern Appalachians have a long history of interrelated extensional and compressional tectonics. It is proposed that each episode was controlled by a reactivation of a fracture system in the Precambrian basement.

Proprietary seismic-reflection profiles show a system of down-to-the-east Precambrian extensional faults. When under renewed extension, these faults produce features such as the western border faults of Mesozoic basins, and when under compression probably produce tectonic ramps in the overlying sedimentary cover rocks as well as the spatially and genetically related Alleghenian folds.

This system, which parallels the the Appalachian trend, is cut by a system of cross-strike hinge or scissors faults that have probable strike-slip movements. Reactivation of this cross-strike system appears to have produced lateral ramps that connect décollements at different stratigraphic levels and caused abrupt changes in fold wavelength along strike.

Continued reactivation of this cross-strike system is suggested by east-west border faults and Precambrian highs between Mesozoic basins. The present activity of this system is suggested by the fact that more than 35% of recent earthquakes are coincident with cross-strike faults and lateral ramps.

Many lateral ramps can be extrapolated seaward and are exactly coincident in strike and are nearly coincident in spacing with transform faults offshore. It is hypothesized that the cross-strike faults acted as zones of least resistance along which modern transform faults developed during periods of sea-floor spreading.