

The pattern of Appalachian tectonics from the Jurassic to the present

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A synthesis of structural data from field work and published reports has yielded a pattern of time successive deformational events along the Appalachians. This pattern fits a tectonic model based on the motion of the North American plate derived from paleoceanic reconstructions done by Smith and Briden (1977) and Firstbrook et al. (1979).

Primary difficulties in recognizing structural patterns of post-Triassic age along the eastern seaboard of North America are caused by a dearth of clearly dated surfaces and by frequent reuse of older faults and fractures. Paleomagnetic results on mylonites and fault gouge materials have provided approximate, and dated igneous bodies maximal, ages. Structural patterns on the outcrop and regional scales have been analyzed with particular concern for cross-cutting relationships as a key to the sequence of deformations. Other reference points have been obtained from offsets of

glacial surfaces and offset drill holes created during highway excavation and quarrying operations. The total data base provides a history of deformation in post-Norian times along the Appalachians.

A tectonic model based on the plate track of North America fits the stress directions from the deformation patterns obtained from the above data bases. Tectonic cycles of 30 to 40 million years duration including minor uplift, active uplift, and shear phases derive from the tectonic model and can be shown to fit the sequences of deformation along the Appalachians with a very reasonable degree of coincidence.

The deformational phases each contain a unique structural pattern. A deformational model for each structural pattern describes both the onshore and offshore effects of intraplate stress along the Appalachians.