Balanced Cross Sections for the 3-dimensional Structural Analysis of the Ouachita Orogen, Arkansas

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The date for the formation of the Benton Uplift, Ouachita orogeny, is bracketed by Carboniferous synorogenic sediments deposited to the north and Late Pennsylvanian to early Permian isotopic dates from the weakly metamorphosed rocks within the uplift. I address the largely unknown structural history between these two constraints by presenting an improved 3-dimensional kinematic model using four better constrained retrodeformable sections. The new crustal-scale retrodeformable cross sections are based on all surface and subsurface data, 12 new zircon fission track dates and thermal maturation data including 15 new 'crystallinity' determinations to constrain the maximum burial depth. These sections show that motion on a moderate number of faults can explain all surface and subsurface constraints. Zircon fission track ages range from 307 ± 18.8 Ma to 333.4 ± 38.9 Ma. Regionally, illite and chlorite crystallinity increases toward the central axis of the Benton Uplift reaching an interpreted temperature of ~300°C. This increase in crystallinity toward the core of the Benton Uplift is explained by original depth of burial. There is no need to call on structural stacking or a regional fluid flow event.