

The Thermal and Structural Evolution of the Ouachita Mountain Belt, Arkansas and Oklahoma

Jennifer Piper

Texas A&M University, Department of Geology and Geophysics

College Station, TX

jpiper01@neo.tamu.edu

The thermal evolution of the Ouachita mountain belt is enigmatic. Recent work using apatite fission track dating has found two previously unrecognized heating and cooling events within Paleozoic strata that are not clearly explained by the tectonic history of the region as derived by the sedimentary record. Apatite fission track analysis reveals that after the Ouachita orogeny (340-270 million years ago) these sediments underwent significant cooling in the Late Jurassic (150-120 million years ago), followed by a Cretaceous heating event (~120-60 million years ago), and a final cooling event in the Tertiary. These fluctuations vary by over 100° Celsius and are not evident in the Appalachian Mountains. This project will attempt to further constrain the thermal evolution of the Ouachitas' by integrating published maturation, thermochronology and stratigraphic data with new vein-derived thermometry and barometry into a kinematic model. The tools that will be applied to assess the thermal maturation are oxygen isotopic fractionation, and Argon/Argon dating of adularia and muscovite within the veins. Stratigraphic reconstructions and cross sections from a parallel study will allow the construction of a depth-time plot for specific units. Basin analysis tools will then be used to place these data into an integrated thermo-kinematic model of the Ouachitas. This project is important in understanding the tectonic and thermal history of the eastern/southeastern United States as well determining the connection between the Ouachita and the Appalachian orogenies.