

Structural Geometry of Thrust Faulting in the Potato Hills area of the Ouachita Mountains, Southeastern Oklahoma

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This study is an attempt to reconcile the structural geometry of the Late Paleozoic thrusting in the Potato Hills area with the Frontal Ouachitas. Three balanced structural cross sections are being constructed to better understand the subsurface geometry of thrusting in the Potato Hills area. At least, one of these cross-sections will be extended northward to the Wilburton gas field area where previous workers have already established the structural geometry. Surface geology maps by the Oklahoma Geological Survey, available well logs, and seismic data, and balancing software are being used to construct the cross sections.

The Potato Hills area of the Ouachita Mountains contains highly complex structural geometry due to several major thrust faults. The area contains three thrust faults exposed at the surface. These thrust faults are South Potato Hills Thrust (SPHT), North Potato Hills Thrust (NPHT) and Cedar Creek Fault (CC). The units exposed at the surface ranges from the Middle Ordovician Womble Shale to the Mississippian Stanley Group. Recently, there has been substantial gas production from the Jackfork sandstone in the area.

In the subsurface, a major thrust fault separates Middle Ordovician rocks from the Lower Pennsylvanian rocks. The wells drilled in the area penetrated the Pennsylvanian Johns Valley Shale (Paj) below the Ordovician Womble Shale. This thrust is probably the Windingstair fault (WSF). Rock units above this fault are the Womble Shale (Ow), Bigfork Chert (Ob), Polk Creek-Missouri Mountain Shales (Op-Sm), Arkansas Novaculite (MDa) and Stanley Group (PMs).

Our preliminary interpretation suggests that the Windingstair fault is a major discontinuity within the Ouachita Mountains. Although the fault is a high angle fault at the surface, it gets almost horizontal at depth. We intend to delineate its structural relationship between the Woodford and Choctaw Detachments.