

Late Mississippian Tectonism on the Cratonic Margin of Northwest Arkansas; A Stratigraphic Response to Syndepositional Faulting

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Deformation of the cratonic Paleozoic section in northwest Arkansas is usually attributed to Late Pennsylvanian tectonism in the Ouachita orogenic belt. Lithic and thickness variations in Early Pennsylvanian strata immediately above the Mississippian-Pennsylvanian boundary on the northwest Arkansas shelf are closely associated with recently-mapped normal and reverse faults suggesting that those structures were formed during an earlier phase of tectonic activity. The cratonic sequence is mildly deformed by east-trending faults and by northeast-trending lineaments. These structures are normally ascribed to a tensional stress field imposed on the area as subsidence occurred during formation of the Arkoma foreland basin and a later compressional stress field as tectonic activity in the Ouachita orogenic belt intensified. The events occurred during Late Pennsylvanian time with activity extending into the Permian. The Mississippian-Pennsylvanian boundary is a craton-wide unconformity, and Mississippian units beneath the unconformity are regionally, but very gradually truncated from south to north in northwest Arkansas. Within the Buffalo River area, truncation has resulted in the removal of over 30 meters of Mississippian strata adjacent to a normal fault. The Pennsylvanian Cane Hill Member of the Hale Formation directly overlies the unconformity. The unit is composed of sandstone and shale deposited in tidal flat and shallow subtidal environments. Lateral variations of lithic character suggest that fault-generated bathymetric variations controlled patterns of sedimentation. Facies and thickness changes in the Mississippian and Pennsylvanian section adjacent to the unconformity document a sedimentological record of previously unrecognized Late Mississippian tectonism.