Syndepositional Tectonism and its Effects on Mississippian (Kinderhookian to Osagean) Lithostratigraphic Architecture: Part 1 – Based on Exposures in the Mid-Continent USA

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Exposures of Kinderhookian to Osagean carbonates in Missouri and adjoining Arkansas and Oklahoma, deposited on the flank of the Ozark Uplift inboard of the Ouachita thrust-belt to the south, record aggradational followed by progradational sedimentation. Deposition responded to long-term tectono-eustasy. Early pulses of Ouachita collision resulted in areal shifts of fore-bulge arches and basins, and movement along associated faults, during deposition.

This syndepositional tectonism overprinted the fundamental lithostratigraphic and apparent sequence-stratigraphic architecture of this section, the manifestations of which include: (1) periodic uplift and unconformity formation within marine and subaerial meteoric environments; (2) northward progradation of relatively thick sections of strata that downlap regional unconformities and not maximum flooding surfaces; (3) the presence of allochthonous reefs that detached and slid downslope to the north within downlapping strata; (4) the formation of submarine erosionally-truncated folds at several horizons in the section, the axes of which uniformly trend E-W; and (5) regional down-dip (to the south) thinning that resulted from erosional truncation on uplifted, shallow-water arches and not from depositional thinning into deep water. The recognition of such processes and products has important bearing on the nature, types, and locations of petroleum reservoirs in the subsurface, and accordingly, on our exploration models for them.