
Deformation of the Pennsylvanian Collings Ranch Conglomerate, Arbuckle Mountains, Southern Oklahoma: An Outcrop Mesoscale Intragranular and Intergranular Deformation Analogue to Subsurface Sandstone and Carbonate Reservoirs

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ABSTRACT

Outcrops of the Pennsylvanian (Virgilian) Collings Ranch Conglomerate, Arbuckle Mountains, Southern Oklahoma, provide a mesoscale example of grain-to-grain contact and intragranular deformation in analogous sandstone and carbonate reservoirs. Natural outcrops are enhanced by roadcuts associated with the construction of U.S. Interstate Highway 35 and U.S. Highway 77. The prevalence of carbonate clasts favors pressure dissolution forming sutures along grain boundaries as the dominant structural fabric, although brittle intraclastic deformation is observed as well. A full spectrum of boundary shapes and stylolitic character of teeth (or lack thereof) is present. Variability in strain magnitude allows examination of progressive destruction of intergranular volume, an aspect critical in the characterization of sandstone and carbonate reservoirs—the Collings Ranch conglomerate effectively provides a coarser-grained analogue that allows mesoscale (as well as microscopic) examination of inter- and intragranular deformation. Secondarily, the synorogenic origin of the Collings Ranch provides insight into the unroofing history of the Arbuckle Uplift.

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