

Seismic Attribute Analysis of a Mississippian Chat, Osage County, Northeast Oklahoma

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Chert is a microcrystalline or cryptocrystalline sedimentary rock material composed of silicon dioxide (SiO₂). Chert occurs as nodules, concretionary masses and as layered deposits. Chert is an unconventional reservoir rock that has been developed successfully in west Texas, Oklahoma, California and Canada (Rogers and Longman, 2001). The deposition of chert reservoirs commonly occur in close stratigraphic proximity to carbonate rocks, although chert reservoir origin, characterization, and distribution may be quite different from adjacent carbonate rocks. Cherts which show high porosity and low resistivity are sometimes called Chat. The Mississippian tripolitic chat is currently an exploration and development objective through- out southern Kansas and northern Oklahoma, including our survey area of Osage county.

Analysis of Mississippi Chat core from a well within our study area show porosity values ranging from 12% to 42%. Image (FMI) log of the Mississippi Chat shows complex internal architecture characterized by vugs, nodules, fractures and little remnant of original depositional fabric. Through core and log measurements, we are able to establish a good correlation between impedance and porosity. To this end we map seismic acoustic and elastic impedance volumes to predict additional sweet spots. The chert is also controlled by diagenetically altered fractures which we are able to seismically map using coherence and most-negative principal curvature volumes. Combining these geometric attributes with impedance estimates and well control, we generate 3D lithofacies maps with the goal of understanding the distribution of fractures and the production from the wells.