

The Impact of Brittle Reactivation Process of a Basement Fault on an Aptian Carbonate Reservoir Analog: Crato Formation, Northeast Brazil

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Abstract

Naturally fractured carbonate reservoirs can be structurally complex and it may impact fluid flow behavior and recovery factor. However, their impacts on the reservoir are underestimated in subsurface due to seismic scale and borehole data. The use of outcrop analogs is a key factor to reduce errors and uncertainties of geological modeling. Using the scanline method we focused on the quantification of Triunfo fault damage zone thickness and its implication on the fracture density in the underlayer Aptian lacustrine laminite from Crato Formation, post-rift tectonic phase of the Araripe Basin, NE Brazil. The laminites of Crato Formation are analogous (stratigraphic equivalent) to some of the observed carbonate facies present in the pre-salt reservoir sequence of the Brazilian marginal basins. Our results indicate that Triunfo Fault is a normal fault striking NE-SW, which represents a Cretaceous brittle reactivation of Patos Shear Zone (Precambrian) in the North Rim of Araripe Basin. The hanging wall damage zone of Triunfo Fault is mainly composed of sandstone, and carbonate rocks (Araripe Basin sedimentary cover). Due to the fault curvature and rheology heterogeneities, the width of the hanging wall damage zone ranges from 320 to 610m. The laminites surrounded to the Triunfo Fault damage zone are tilted and are more fractured. These results suggested that Triunfo Fault was active during the post-rift phase under an extensional regime of the Araripe Basin and strongly influences the structural control of fracture density in the lacustrine laminates of the Crato Formation.

