

Mexican Offshore Carbonate Reservoirs

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Abstract

Most of the oil and gas offshore Mexico is reservoirized in carbonates. Of these, the most prolific are the Upper Cretaceous dolomitized breccias.

These breccias are believed to have been derived from the Upper Cretaceous carbonate shelf on the western margin of the Yucatan platform and deposited in deeper water as thick sequences of debris aprons and slumps. Dolomitization has replaced original texture and partially cemented voids. Structural deformation in the Miocene led to intense fracturing. The resulting rock has matrix, vuggy and fracture porosity and matrix and fracture permeability. This triple porosity/double permeability reservoir type is anisotropic on scales down to core plug size resulting in problematic estimation of water saturation, recovery efficiency, and stranded oil, even with NMR logs; pressure tests and decline profiles are the best indications of performance. The basinal facies outboard from the breccias trend has minimum matrix porosity and is only productive when fractured.

Upper Jurassic oolites and dolomites have matrix porosity in the north with added fracture porosity in the south. Lower Cretaceous shelf reservoirs in the north have matrix and vuggy porosity.

When evaluating the opportunities opening up in Mexico, reserve estimates for exploration and reservoir modelling for secondary recovery and EOR simulations need to carefully take into consideration these various carbonate reservoir types.