
Diagenetic Controls on Pre-Cambrian-Cambrian Ara Carbonate Reservoir Quality – A Case Study from the South Oman Salt Basin

Zuvena Al-Rawahi, *Xiomara Marquez, and Joao Rodrigues. Exploration Department, Petroleum Development Oman, P.O. Box 81, Muscat, 113, Oman, phone: 968-24675297, zuvena.rawahi@pdo.co.om*

Dolomite reservoirs in the SOSB have been proven to be prolific oil and gas producers since the late 70s. Current exploration efforts require understanding of diagenetic controls on reservoir properties to mitigate the risk involved. A case study from the SOSB has been selected to illustrate the sedimentary and diagenetic controls on reservoir quality and the timing relationship to hydrocarbon charge

The Ara stringers comprise six evaporite-dolomite cycles (A0-A5) encased in salt. In the study area, the A2C carbonate stringer is subdivided into 5 sequences which record the deposition of platform carbonate sediments in an evaporitic basin.

Geochemical and detail petrographical studies suggest early, intermediate and late diagenesis control reservoir quality. Early diagenesis mainly represented by replacement dolomitisation, preserves original sedimentary textures, and generates porosities of between 1-14%.

Intermediate diagenesis includes cementation by dolomite, halite and anhydrite which partially occludes pores and is contemporaneous with a first hydrocarbon charge. This first charge is locally altered to bitumen, probably as a result of burial and stringer break-up (see also Mia & Mattner, this volume). Bitumen reflectance data show high temperatures and the potential for thermo cracking and/or TSR.

Late diagenetic processes involve dissolution of, and re-precipitation of dolomite, anhydrite dissolution and a late phase of halite cementation. The dissolution phase, if combined with proximity to intra-salt source rock and maturation timing succeeds in creating a successful reservoir. Late hydrocarbon charges can be interpreted by the different bitumen textures.

Understanding diagenetic control on reservoir properties is crucial in exploration risking of stringer plays.
