



Diagenesis of deep, anomalously porous sandstone reservoirs

Sadoon Morad

Department of Earth Sciences, Uppsala University, Uppsala Sweden

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Diagenetic alterations in sandstones and their impact on reservoir-quality evolution pathways are controlled by a complex array of parameters, such as the detrital composition and texture of the sand, the flow rates and composition of fluids and the thermal-tectonic history of the basin. Generally, progressive increase in temperature and pressure during burial diagenesis of sandstones is accompanied by a general trend of decrease in reservoir quality (i.e., porosity and permeability). However, several basins worldwide are known to host deep (< 4 km) sandstone reservoirs that are characterized by anomalously high porosity and permeability. The purpose of the talk is to review, further explore and suggest pre-drilling, predictive tools of the major causes for the occurrence of such reservoirs. These causes include: (i) the presence of clay minerals and micro-quartz coats and rims around the framework quartz grains, which are known to prevent the precipitation of syntaxial quartz overgrowths, (ii) early emplacement of hydrocarbon, and consequent retardation of diagenetic reactions, (iii) secondary porosity due to the dissolution of intergranular cements and chemically unstable framework grains, and (iv) shallow development of overpressure, which retards progressive compactional loss of porosity and permeability.

Sadoon Morad is Professor of sedimentary petrology at the Department of Earth Sciences, Uppsala University. SM has an M.Sc. in engineering geology (1977) from the University of Baghdad, Iraq, and a Ph.D. in Clastic Diagenesis from Uppsala University in 1983, which was followed by two years of post-doctoral fellowship in Oslo, Norway. Has published over 80 papers on the topic of clastic diagenesis in peer-review journal and volumes. Has edited three special publications for the International Association of Sedimentologists on quartz, carbonate and clay mineral cements in sandstones, and served as Associate Editor for Journal of Sedimentary Research for six years. Has worked in close collaboration with several oil companies during the past 20 years.