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Please fill in your abstract title.	Fracture Mineralization in the Tectonically Stable Interior of the Arabian Platform: Case Study on the Arab Carbonates

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Abstract

Fracture mineralization, and lack thereof, is key to relate history of fluid influxes, diagenesis and deformation, and to additionally characterize the present-day permeability of reservoir rock fractures. In this study, we present an overview on properties of mineralized fractures (veins) in the renowned Arab carbonates from areas of subsurface and outcrops in the Arabian Platform interior. The Arab carbonates were deposited in the Late Jurassic and buried to shallow depths, less than 1.7 km, in a tectonically stable sedimentary basin. The strata of the Arab carbonates remained nearly flat lacking deformations, except the gentle bending produced by movement of deep-seated basement faults and salt. We used methods of geological and geochemical analyses to describe mineralization and geometry of fractures. In addition, we relate fracture abundance using traversing scanlines in the outcrops and core in the subsurface. Fractures in the Arab carbonates are two types: barren fractures and veins. The veins, mostly calcite veins, make up small percentages (< 10%) of the rock total fractures, and increase relatively below oil-water contacts in the Arab petroleum reservoirs. The veins are of some geometrical properties akin to those of the barren fractures; they are mostly opening-mode and normal to the nearly flat strata. The vein widths are dominantly small (< 2 mm), and their heights are possibly small too, because many veins terminate at bedding and stylolite planes. The oxygen, carbon and strontium isotopic signatures of the vein minerals match those of the host rock and stylolite materials, and indicate that the veins formed in some early stages of the rock burial in closed systems of fluid circulation. The mechanisms that formed the veins vary; in cases the veins resemble those of tension gashes associated with burial-related stylolites, and in other cases resemble mineral aggregate precipitation in preexisting fracture apertures. The paucity of fracture mineralization reflects inhibiting factors in the Arab carbonates. These factors include, (i) the deposition of the sealing Hith anhydrite, which prevented the circulation of meteoric water through overlain rock formations from Late Jurassic to present day, (ii) the oil emplacement, which halted diagenesis in the oil-bearing rocks; and (iii) the tectonic setting, which did not disturb the nearly flat setting of such porous carbonates in which fluids are driven downward by gravity and segregated by fluid density. The veins are not porous or permeable zones, but they do not seem to form a sealing, or compartmentalization, system in the Arab reservoirs, given that they are of typically small occurrences and size.