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Hydrogeological exploitation through structural analysis and petrophysical proprieties of the Barremian sandstone-calcareous bar in Agadir-Essaouira basin (Morocco)

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The Barremian unit in Agadir Essaouira basin consists of a sandstone-calcareous bar alternated with clays. The thickness of this bar is about 30 meters and may consist the best reservoir in the lower Cretaceous units. The porosity and permeability of the sandstones are controlled by carbonate cementation. Several thin sections were studied in details in order to explore the texture and mineral contents. The results show that the sandy limestone and lithic sandstones facies have poor reservoir potential due to the limited fluid circulation. On the other hand, the sandstones are characterized by dolomite crystals replacing carbonates cement, which is confirmed by the petrophysical study. The measurements reveal that the primary permeability is about 1.8 10-4 mD to 1.3 mD in sandy-limestone and about 1.6 mD to 1.3 103 mD in sandstones, while the porosity is about 3.22% to 8.54 % in sandy-limestone and about 13.08% to 23.03 % in sandstones. Detailed fracture analyzes are measured within the Barremian bar in both North and South Atlasic folds. As a result, the fractures are similar between the two synclines, with a major set of N105-130 direction and minor set of N20-30 direction in the North and the South flanks of the South Atlasic fold respectively. The North Atlasic fold showed a major set of N80-100 direction and a minor set of N0-15 direction. The average intensity of fractures is about 11 fractures/m2. The results show that the Barremian unit is controlled by early sedimentlogical processes. The intense fracture network enables water to circulate within fractures which increases the porosity. Chemical water analyzes reveal that the groundwater is enriched on (Ca2+ + Mg2+) and SO42- due water/rock interactions.