

Provenance of Early Cretaceous Clastic Reservoirs in the Middle East

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ABSTRACT

Some of the world's largest oil fields are located in the Middle East, with reservoirs in Early Cretaceous clastics. These Hauterivian-Albian reservoirs are world class accumulations, often containing 10s billion barrels of oil initially in place. The stratigraphy comprises multiple, stacked reservoirs of up to 90% net to gross, deposited in non-marine to paralic settings on a very shallow gradient passive margin ramp. Apart from the Early Cretaceous clastic influx the palaeo-equatorial margin was dominated by carbonate deposition throughout the Mesozoic. By the time of the Early Cretaceous clastic influx, the Proterozoic Pan African Mountains and Hercynian uplifts had likely been reduced to a low-lying hinterland. The question remains where did all this Cretaceous clastic material come from and what caused the sudden influx? Heavy mineral analysis and detrital zircon geochronology from the supergiant Rumaila field in southeast Iraq was used to infer an Arabian Shield provenance. We postulate that Early Cretaceous mega-regional tectonic reorganization linked to opening of the Atlantic Ocean together with more localized mantle-plume-related uplift in the northern Arabian Shield was responsible for the clastic influx. These findings have implications not only for enhancing regional geological understanding but also reservoir-scale geological understanding that impacts the development and recovery of important hydrocarbon resources in the Middle East.