

# Source-to-sink: tracking the provenance of Lower Cretaceous reservoirs in the Essaouira–Agadir Basin, Moroccan Atlantic margin

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Untangling the complex postrift evolution of the NW African margin is fundamental to constraining the type and distribution of fluvial to shallow-marine transition feeder systems for potential deepwater reservoirs offshore. The Moroccan Atlantic margin experienced km-scale vertical movements during the Jurassic and Cretaceous. These periods of uplift control the origin of sediments delivered to the margin and local topography, influencing distribution of the sedimentary systems.

Limited success in recent drilling campaigns reflects the poor understanding of the depositional systems from source-to-sink. This highlights the need for a more holistic approach by tracing sediment routing, the main input points through time, and storage dispersal. This integrated study aims to develop the first regional paleogeographic and tectonostratigraphic source-to-sink model of Northwest Africa by deciphering the controls, timing, and volume of the sediment supply to the margin and constraining the importance of sediment recycling, mixing and storage. A late Early Cretaceous (latest Barremian to earliest Aptian) forced regression has been identified as the main candidate interval predicted to be associated with the most significant input of clastic sediment into the deepwater basins. To assess sediment supply routing, a detailed petrographic study has been conducted integrated with SEM and QEMSCAN imagery analysis. It has demonstrated the occurrence of various granitic and volcanic clasts, mixed with recycled sedimentary grains, likely of intrabasinal origin.

Preliminary results point towards three principal source areas: the Hercynian massifs of the Western Meseta in the north; the Western High Atlas (WHA), where both Hercynian magmatism and Panafrican series are exposed; and the mixed Proterozoic series of the Anti-Atlas. Low temperature geochronology shows evidence of subsidence in the Anti-Atlas during the Late Jurassic/Early Cretaceous. This may have allowed sourcing of sediments from even further afield from the Tindouf Basin/Reguibat shield to access the basin.

The study is currently focusing on source discrimination based on the heavy mineral populations of the potential source areas and on the sampled sandstones in combination with apatite and zircon geochronology.