# Unravelling continental, shallow and deep marine facies distribution in passive margin basins: Early Cretaceous in Tarfaya Basin, Atlantic margin of Morocco.

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The breakup of Pangaea and opening of the Central Atlantic between present day Morocco and Nova Scotia during the Mesozoic led to the development of an extensive passive margin. During the Early Cretaceous, basins were filled mainly with clastic sediments that offer potential hydrocarbon reservoirs. Assessing the provenance, delivery and character of sediments on the coastal basins has significant implications for understanding the evolution of the Atlantic passive margin and nature of deepwater systems.

We present detailed field observations of the coastal outcrops of southern Morocco (Sidi Ifni and Tan Tan areas) and the associated deep marine deposits outcropping in Fuerteventura (Canary Islands, Spain), including stratigraphic logs, field gamma-ray and petrographic analysis. The results suggest a complex facies distribution, abrupt changes in depositional environments both temporally and spatially along the margin.

Two depositional environments are observed in the north (Sidi Ifni area). The first consists of locally derived coarse continental alluvial deposits of red sandstones and polymictic breccias, with clasts ranging in size from fine sand to boulders. A few kilometers to the south, shallow marine to deltaic deposits comprise laminated siltstones, muds, calcareous sandstones and oolitic limestones. Further south (Tan Tan area) thick siliciclastic-dominated successions comprise dominantly fluvial sequences of cross-bedded sandstones, passing basinwards to shallow marine sandstones, sand-rich carbonates and dark clays.

In Fuerteventura, the distal basinal equivalents of the southern Moroccan sections have been inverted and exposed, although now structurally overturned and highly intruded by igneous rocks. The thick Early Cretaceous succession consists of, deepwater turbidites and calcturbidites.

The results suggest highly variable input along the margin, controlled by local palaeotopography and pre-existing structure, defining drainage divides, resulting in variable composition from different provenance areas. Improved understanding of the controls on delivery, input points and timing of sediments into these Cretaceous basins is allowing the construction of improved palaeogeographic and facies distribution maps. These results will reduce risk for evaluating reservoir type and location in the deep basins offshore Morocco and are a valuable analogue for the conjugate margin of Nova Scotia and the entire Atlantic margin system.

This study is linked with a similar project being carried out further north in Agadir-Essaouira Basin (T. Luber). The outcome of both studies will be combined with thermal history of the Precambrian basement inferred from apatite fission track and (U-Th)/He analyses and integrated into source-to-sink conceptual and numerical models (R. Charton).