

# **Multiple Provenances: The Role of the Hinterland Sediment Composition on Predicting Reservoir Quality – an Example from the Western Lake Eyre Basin, Central Australia**

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Reservoir quality depends on sand composition, itself a function of hinterland processes: provenance, tectonic setting, sand evolution and transportation, climate, and the depositional environment. Knowing the percentage of mineral composition such as quartz, feldspar and lithics in the subsurface, one may be able to predict porosity and permeability of reservoir units as they undergoes diagenesis.

Sediments in the modern dryland Umbum Creek, western Lake Eyre Basin, Central Australia reflects the nature of the source region. Six petrographic provenances were identified and established in the Umbum Creek drainage basin, according to the six principal geological units drained: (1) the Palaeoproterozoic-Peake and Denison inliers; (2) the Neoproterozoic; (3) the Palaeozoic Arckaringa basin; (4) the Mesozoic Eromanga basin; (5) the Tertiary Formations; and (6) the Quarternary Formations.

Source to sink samples from the Umbum Creek catchment were used to assess the provenance through time as well as finger printed each grain to its provenance litho-type. Climate has a strong influence on the petrogenesis of the Umbum Creek drainage basin sand, but mixing with tributaries is the main process that modifies composition of the Umbum Creek sand. The modern sand is not only directly proportional to the hinterland bedrock lithology, but also cannibalizes all outcropping bedrock along the transport path. This leads to an ultimate sand composition that is not only the result of the hinterland processes but also of the entire drainage basin. Therefore, the whole drainage basin configuration needs to be considered when attempting to predict sediment composition in the subsurface.