



The evolution of sand-rich systems in the early Cretaceous lake in the North Falkland Basin.

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Examples of sand-rich lacustrine turbidite systems are relatively rare in the literature. Here we document the various styles of, and controls on, sub-aqueous sandy fan systems intercalated with organic-rich source rocks in a lacustrine petroleum system of early Cretaceous age in the North Falkland Basin. The lake system occupied an asymmetric rift basin and developed towards the end of the syn-rift phase of the basin's evolution, becoming established during the early phase of post-rift evolution. The earliest fans entering the lake were fed by river systems draining extensive hangingwall platform areas to the west of the rift, comprising mixed sedimentary and volcanoclastic terranes. Although spectacularly developed as classic fan-shaped systems as imaged on 3D reflection seismic data, they form generally poor reservoir quality sand and conglomeratic-volcaniclastic systems. These fans seem to have shut off once the lacustrine system became fully established and created balanced or over-balanced lake fill conditions. Fans entering the basin from the east, across the basin bounding fault and draining the sedimentary-dominated footwall region tend to be narrower, more linear and confined by a combination of pre-existing basin topography and prior fan systems. These fans entered the basin throughout the evolution of the lake, initially down major relay ramp systems, but subsequently down steep canyons associated with only small relay jogs in the basin bounding fault. The eastern fans, which form excellent petroleum reservoirs, may have been derived from fringing littoral settings and were shed into the lake during times of either footwall regeneration or of lake level lowering associated with climatic change which also affected the geometry and depositional processes acting within a major axial delta system that was infilling the basin coevally from the north.