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A Modern Reservoir Analogue for Dryland Fluvial, Crevasse Splay and Lacustrine Delta Successions from Lake Eyre, Central Australia

Ancient dryland fluvial and lacustrine delta successions are poorly understood non-marine reservoirs (e.g. the Triassic of the North Sea and Algeria, and the Pliocene of the Caspian Sea). A modern analogue from Lake Eyre, central Australia (Neales River and Umbum Creek deltas) furnish new data on reservoir scale, geometry and interconnectivity, using cores, sediment mapping and ground penetrating radar. After the rare great floodings of Lake Eyre (e.g. 1974), highly constructive lobate deltas and wave-constructed sand spits were built, but mostly the rivers feed lowstand deltas. Each river has produced a sand-prone deltaic succession that reflects variable discharge where flash flood processes dominate, including crevasse splay lobes that build rapidly during the falling flood stage, rarely building into standing lake water. An incised master channel belt feeds each delta (themselves distributaries of a larger low-gradient fan). Each contains a coarse-grained sandy meandering fluvial channel (W/T ratios of 250), that bifurcates into several straight distributary channels typically 1- 5m deep, with smaller branches formed by active sandy crevasse splay channels (W/T ratios range from 40 to 80). Splay lobes (<1m thick) dominate the lower delta plain and comprise medium to fine-grained sand, with parallel lamination, convex-upward parallel stratification, and climbing ripples. The delta front comprises an extensive apron of thin (<0.5m), fine-grained sandy mouthbars (W/T ratios >1000), prograding across dark brown or bluish transgressive lacustrine prodelta clay. GPR profiling through older delta lobes show several downlapping reflectors, erosional surfaces and distributary channels >2m deep and 10m wide, overlying an extensive sandsheet.