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Application of Non-Seismic Geophysics to Exploration in the Onshore Amadeus Basin, Central Australia

The Amadeus Basin in central Australia has produced more than 12.8 MMBOE oil and 213 BCF of gas from Ordovician aged strata since the development of two key fields in the early eighties. Exploration in this region has been thwarted by difficult physical access and a general paucity of data. Only 37 exploration wells and 5,500 line miles of seismic have been shot in this 66,000 square mile basin since 1964. Recent acquisition of high resolution airborne magnetics, radiometric and elevation data over the basin has helped identify exploration targets. Lines of magnetic and gravity data were first combined to build a model of depth to basement for profiles across the greater basin. The first vertical derivative of the magnetic data contains enough detail of the basin fill to confidently map stratigraphy and structures beneath recent cover. Mapping qualifiers are provided in some areas by highly magnetic basalt interbeds and also the clear disruption of stratigraphy surrounding salt diapiric structures. Radiometric data has been used to identify hydrocarbon seepages and elevation data used to analyse the regional extent of the last major orogenic uplift and complementary flexural subsidence. Interpretation of superimposed structural trends via magnetic mapping has outlined approximately 60 new drilling targets in areas of no seismic and some more than 60 miles from the nearest well control. As a result of this new work, minimal incremental seismic is required to detail these prospects thus successfully providing cost effective exploration in this challenging area.