

Robert J. Seggie¹, R.B. Ainsworth¹, D. Johnson¹, J.P. Koninx¹, N.G. Marshall¹, A. Murray¹, P.M. Stephenson¹, S.E. Phillips² (1) Woodside Energy Ltd, Perth, Australia (2) Phillips-Gerrard Petrology Consultants, Adelaide, Australia

Petroleum Geology of the Sunrise/Troubadour Super Giant Gas Condensate Field, Timor Sea, Australia

The Sunrise/ Troubadour Field, containing 8-20 Tcf of gas, is located in the Timor Sea, to the northwest of Australia. It is contained in an 80 metre thick Middle Jurassic siliciclastic reservoir within a fault-bounded structural closure measuring 75 x 50 kilometres with only 180 metres of relief. The significance of this field was identified by an intense late 1990's appraisal campaign. This paper presents the geoscientific results of this campaign. This is integrated into object-based 3D reservoir models that will be used for project evaluation and development planning.

Reservoir quality and distribution are key to project value. These were primarily controlled by the depositional environment and to a lesser extent by late diagenetic carbonate cements. Quantitative biostratigraphy and high-resolution sequence stratigraphy indicate a broad sheet stratigraphy. This enhances lateral reservoir connectivity despite a low net/ gross. The reservoir sandstones comprise very fine to coarse-grained quartzarenites and sublitharenites. These are set within variably brackish to open marine shales with the whole section displaying an overall upward increase in marine influence. The two main reservoir sands were deposited as a forced regressive delta-front to shoreface sheet sand complex and an incised valley system.

Most faulting of the reservoir occurred during the Pleistocene, producing closure and indicating recent (and possible current) hydrocarbon entrapment. Geochemical hydrocarbon analyses indicate a mature (1.3 to 1.4 Vr) Middle Jurassic marine kerogen source. Variations in both source maturity and in condensate yield across the field indicate an unequilibrated reservoir. Pressure analysis indicates a tilted contact and a dynamic aquifer.