# Modeling the Malampaya reservoir: "Top Down" Rather than "Bottoms Up"!

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The Malampaya-Camago Oligo/Miocene Carbonate reservoir is located offshore Palawan (the Philippines) in the South China Sea in 850 meters water depth. The Malampaya gas field was brought on production at the end of 2001 by 5 sub-sea wells tied-back to a shallow water production platform. Following the acquisition of a new 3-D seismic survey and early production information, an integrated subsurface study was undertaken to thoroughly quantify the uncertainty, in order to guide further development of the Malampaya-Camago reservoir.

This paper demonstrates that the present day pore and fracture distribution in the Malampaya reservoir are the result of a complex interplay of depositional, structural, early and late diagenetic processes. In order to arrive at this present day pore and pore type distribution, the study applied a "top down" approach where the physical properties of the reservoir - the 'end result' (pore and fracture distribution) were modeled, rather than the classic "bottoms-up" approach where the physical processes (deposition, deformation, diagenesis) leading up to the approximation of the final pore distribution.

The first stage was to define four reservoir rock types (RRT's), each representing rocks with distinct rock property behaviours (poro/perm relationships, saturation and capillary pressure). Then the log response for each of these rock types are established and RRT curves are generated. These curves were correlated to seismic response to define high and low porosity zones. The correlation between wells was constrained by a chrono-stratigraphic framework, which also guides the mapping of intra carbonate horizons constraining the reservoir geometry. Following on, the fracture distribution was defined using well and seismic data. This was translated in fracture permeability enhancement models, which were combined with the reservoir rock type based matrix models in integrated dynamic models. The range of models was subsequently tested against the early production history of the field.