Geologic Modeling of the Gorgon Gas Field Using a Multi-Point Statistics and Facies Distribution Models: Investigating the Impact of Seismically Unresolvable Sandy Bodies

Montgomery, P., N. Miller, A. C. Villella, R. Root, T. Munckton, M. Whelan, and J. Roche,
Chevron Australia Pty Ltd, Perth, Australia

The Gorgon gas field is owned by a joint venture operated by Chevron (50%), in partnership with Shell (25%) and ExxonMobil (25%). A sequence stratigraphic model has been used to divide the reservoir into a series of 12 zones and a detailed seismic interpretation of the zone boundaries and individual channels and channel belts has been completed. However, well penetrations indicate the presence of sand bodies that are beyond the resolution capabilities of seismic data.

The two main geologic modelling challenges face the Gorgon Asset Team: 1) What are reasonable Net-to-Gross (NTG) values outside the main mapped low-stand channel systems (off-fairway) and high-stand sequences? 2) How connected are seismically un-mappable off-fairway and high-standard sand bodies likely to be? To address these questions multiple Gorgon Zone 50 geologic models, based on a Boolean approach and constrained by soft seismic data, and an alternative approach based on deterministic sand mapping, Multi-Point-Statistics and Facies Distribution Models in conjunction with analogue data, have been built to investigate the impact of uncertainty in the off-fairway reservoir component on the Gorgon development.

Model grids that incorporate structural and thickness uncertainty of the main seismically interpretable fluvial sand belts have been generated. Stochastic modelling of off-fairway bodies has being carried out using appropriate binary facies and depositional models that depend on the zone's position within the Gorgon sequence stratigraphic framework. Results of these studies indicate high levels of connectivity in off-fairway and high-stand sand bodies.