

Seismically constrained reservoir modeling: the E8 gas field, offshore Sarawak, Malaysia

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The E8 gas field, located in the Central Luconia province, offshore Sarawak, Malaysia, is currently at field development planning stage, with first gas planned for 2006. It comprises two carbonate reefal buildups of Middle Miocene age, a southern steep-sided pinnacle type and a northern lower relief platform type separated by a saddle area. The E8 field has expectation GIIP of some 2.5 Tscf with only 3 well penetrations but a good 3D seismic coverage. Some of the key subsurface uncertainties in the E8 field which impact field development are GIIP, reservoir permeability and aquifer strength. Multiple subsurface realizations were generated in GEOCAP to capture the range in these uncertainties. This was achieved by the integration of well and seismic data including the use of sparse spike and stochastic seismic inversion techniques.

The volumetric assessment of the various GEOCAP realisations showed that the uncertainties in reservoir properties have a relatively minor impact on GIIP, with the main uncertainty being the structural geometry. This is contributed by uncertainty in top carbonate definition at the flanks with stringer development and the saddle area. An important control on reservoir permeability is the presence and distribution of dolomite within the reservoir. The dolomite appears to be related to 4th and 5th order sequence boundaries. Various models were generated to capture the uncertainty in dolomite distribution; well-based models with dolomite layers modelled as correlatable units or as more restricted well bodies, and models based on stochastic inversion of the seismic data.

The reservoir permeability impacts the number of wells required, with the extensive high permeability scenario resulting in a reduction in well numbers to meet capacity. Although available well data suggest an absence of extensive fractures in E8, the presence of potential fractures within the tight aquifer section was modeled to study impact on production behaviour. Dynamic simulation results based on the multiple realisations suggest that the E8 field essentially behaves as a depletion drive reservoir with little water production during production life.