

GEOPHYSICAL MODELLING COMPARISON AT VARYING SATURATION AND PRESSURE: CO₂ SEQUESTRATION PILOT PROJECT AT OTWAY BASIN

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The Otway Basin CO₂ sequestration pilot project aims to demonstrate that CO₂ can be safely stored in a depleted gas field and that an appropriate monitoring strategy can be deployed to verify its containment. The advantage of injecting CO₂ into a depleted gas field is having access to well-established infrastructure, pre-existing geophysical exploration data, and production wells. On the downside, the geological complexity of the Naylor gas field, which is relatively deep and of a small size (0.5km²), presents challenges for detailed geophysical and geological characterization and consequently makes the design of a geophysical monitoring program much more difficult. Uncertainty of the location of paleo and current gas-water-contact poses additional difficulty for positioning of the injection well. These factors call for further analysis of all available geophysical data.

One such task is the investigation and examination of the elastic properties changes at varying saturation and pressure in time-lapse and their effect on seismic response before and after CO₂ injection at the existing Naylor-1 well (monitoring well). The result from modeling shows that the density is more sensitive than velocity. Consequently, model-based prediction suggests the changes in elastic properties and the effect in seismic response is very subtle. Attempt to relate the seismic attributes computed from pre-stack and post-stack 3D seismic and VSP to the changes in elastic properties will help further refine the geophysical analysis.

Using the same methodology, the modeling of the new injection well is compared with Naylor-1 model. The outcome will be discussed in this paper.