IMPACT OF SEQUENCE STRATIGRAPHIC FRAMEWORK ON STATIC AND DYNAMIC RESERVOIR MODELS: EXAMPLES FROM THE PRECIPICE-EVERGREEN SUCCESSION, SURAT BASIN, QUEENSLAND

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CO_2 storage in the subsurface is a key aspect of climate mitigation. The UQ is investigating whether the Precipice Sandstone and Evergreen Formation in the Surat Basin, Queensland, are an appropriate reservoir-seal pair for the long-term storage of greenhouse gases. However, the Precipice-Evergreen succession remains poorly constrained from a paleo-depositional and stratigraphic standpoint. Studies have mostly applied lithostratigraphy for local correlation, and the understanding of time-stratigraphic relationships across the basin needs development. This has greatly hindered the capacity to construct robust reservoir models and is an active area of research.

We utilized core, wireline logs, seismic data, as well as pressure data to compare the dynamic response to various CO_2-injection scenarios with contrasting stratigraphic architectures. A lithostratigraphic prediction of reservoir and seal intervals in the Myall Creek area, consisted of a layer-cake model of fluvial channel deposits. The model suggests that reservoirs are well-connected with the gas plume primarily migrating in the lateral direction. In contrast, a sequence stratigraphic arrangement of facies resulted in greater reservoir compartmentalization with some vertical fluid transmission across certain play segments. This is due to the fact that mudstone intervals baffle the CO_2 plume and compartmentalize the reservoir. The contrasting models show different geological realizations arising from the same dataset, interpreted in different ways.

Fluid flow is highly sensitive to the stratigraphic arrangement of reservoir intervals. Refining static and dynamic models using sequence stratigraphy results in a significant improvement in history matching. Modelers should carefully consider the implications of stratigraphic correlations during static model construction.