PARALLIC DEPOSITS REVEAL SEQUENCE STRATIGRAPHIC ARCHITECTURE OF THE PRECIPICE-EVERGREEN SUCCESSION IN THE SURAT BASIN, QUEENSLAND

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The Precipice Sandstone and Evergreen Formation in the Surat Basin, Queensland, are being examined as a reservoir-seal target for future geosequestration of CO_2. Effective reservoir modelling, and prediction of dynamic storage capacity, however, depends upon accurate depositional interpretations and an understanding of stratigraphic architecture. Throughout most of the basin, the Precipice Sandstone is freshwater-bearing, attesting its reservoir properties and lateral continuity. Refined depositional models and a widely-applied sequence stratigraphic framework will enhance prediction of the most prospective play segments for CO_2 injection.

We utilize integrated ichnological-sedimentological facies analysis from core to interpret the Precipice Sandstone as a fluvial/alluvial to delta plain succession, overlain by estuarine embayment deposits of the Evergreen Formation. Facies maps, based on core-calibrated wireline logs show brackish-water influenced deposits at several stratigraphic intervals. Brackish-water influenced deposits conformably overlay braided and meandering fluvial sediments, and generally cap parasequences. Seismic surveys resolve lower-order cyclicity, showing parasequence sets within the Precipice succession back stepping and aggrading. This stratal arrangement reflects the lowstand and early transgressive systems tracts. Late transgressive and early highstand systems tracts comprise the lower part of the Evergreen Formation.

Depositional and sequence stratigraphic interpretations suggest the precipice sandstone has a higher degree of reservoir compartmentalization than previously appreciated. Moreover, we show that the evergreen formation is not a simple basin-wide sealing unit due to the presence of sandstone geobodies that may act as vertical fluid conduits. The sequence stratigraphic characteristics of the reservoir-seal pair should be carefully considered when selecting locations for co_2 sequestration