

Palaeogeographic Mapping and Depositional Trends of the Patchawarra Formation within the Tenappera Region.

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Abstract

The Patchawarra Formation is a coal dominated fluvio-lacustrine environment. These environments have complex geometries and facies distribution is difficult to predict spatially. This study defined palaeogeographic reconstructions using log-signature responses from equivalent chronostratigraphic intervals, modern fluvial analogues and regional TWT isochrons. This resulted in the definition of spatial distribution of fluvio-lacustrine facies throughout the Tenappera region, Cooper Basin, South Australia.

379 wells were correlated into 21 chronostratigraphic intervals wireline log responses. 6 electrofacies were identified from the gamma ray and sonic velocity log motifs. These were combined with modern fluvial analogues to yield 4 facies assemblages. Multiple modern analogues were considered suitable for the Patchawarra Formation in the Tenappera Region. The Ob River, Siberia is considered more suitable for depositional facies whereas the McKenzie River, Northwest Territories demonstrated the influence of a compressional stress regime on fluvial avulsion patterns and styles.

In order to map channel belt width within a chronostratigraphic interval empirical relationships from previous studies were applied. By measuring bankfull depth from well data an estimate of channel belt width is obtained. 532 bankfull measurements were taken giving a maximum bankfull depth of 8.2m, a minimum of 1.4m and a mean value of 5.1m. Channel belt width ranges were then estimated by applying bankfull population statistics to applicable linear regression curves. Channel belt width calculations gave a range of variability from 76m to 3625m, with an average channel belt width range from 1639-1908m. For the interpreted Patchawarra Formation intervals there were eight populations with similar channel belt ranges.

High resolution palaeogeographic reconstruction of the Patchawarra Formation within the Tenappera Region allows for better prediction of facies distribution. There are two distinguishable periods of fluvial deposition in the upper and lower Patchawarra Formation. Ultimately, the paleogeographic maps aid assessment of field prospects by defining depositional channel fairways which control reservoir distribution. These techniques could be applied to other fluvial dominated petroleum systems.

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