

Predicting Coastal Depositional Style: Influence of Accommodation/Sediment Supply and Basin Morphology

Ainsworth, R. Bruce¹, Stephen S. Flint², John A. Howell³ (1) Shell Todd Oil Services Ltd, New Plymouth, New Zealand (2) University of Liverpool, Liverpool, United Kingdom (3) University of Bergen, Bergen, Norway

The Middle Jurassic succession in the Sunrise and Troubadour gas-condensate fields (Bonaparte Basin, Timor Sea) is represented by marginal marine strata that were deposited in either fluvial-dominated or wave-dominated, but pervasively tide-influenced coastal environments.

The study indicates that there are direct relationships between the ratio of accommodation/sediment supply (A/S), basin morphology and the dominant character of the preserved depositional systems. When ratios of A/S were high, typical in transgressive and early highstand systems tracts (steeply rising shoreline trajectories), sedimentation rates were too low to fill all the space that was created and the underlying basin morphology became the overriding factor in determining coastline geometry and hence the dominant sedimentation style. The coastline became more embayed and protected from wave energy, such that the depositional systems that evolved were fluvial-dominated. During periods of lower A/S ratios, typical in late highstand or lowstand systems tracts (slightly rising or flat shoreline trajectories), or during periods of accommodation reduction typical in falling-stage systems tracts (falling shoreline trajectories), the sedimentation rate kept pace with or exceeded the rate of accommodation development. Hence, the underlying basin geometry became less important as it was rapidly infilled and the coastlines became less embayed and more open to the direct influence of wave energy. These shorelines were therefore wave-dominated.

A more generalised model was also developed to predict dominant and subordinate coastal depositional processes related to variability in fluvial and wave effectiveness, and a range of basin morphologies or paleogeographies in low and high A/S regimes.