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Coastal Plain Facies and Shoreface Thickness: a Predictive Relationship?

The following study investigates the possibility of a distinct relationship between sediments deposited in delta/coastal plain environments and their shoreface counterparts in terms of facies pattern and thickness. The purpose of the study is to determine (1) the nature of this relationship, (2) controlling factors upon facies development, and (3) the usefulness of using facies as a semi-quantitative predictive tool in estimating shoreface sand thickness.

The northern North Seas Brent Delta (Aalenian-Bathonian) is chosen as the study area. A clear difference in the style of shoreline progradation, with regards to shoreface thickness and alluvial plain facies, is evident between the deltas proximal and distal areas. In proximal areas, thin shoreface packages are associated with a strandplain environment followed by thin floodplain and distributary channel deposits. In distal areas, the development of lagoons is associated with an increase in the content of wave ripple cross-laminated sandstones, plane-parallel laminated sandstones, and heterolithic mudstones/sandstones.

Based on the results from this study, an idealised model reflecting a relationship between different shoreline trajectories, and the types of facies that occur in associated lower delta plain depositional environments is presented. The combined thickness of the shoreface succession and the facies pattern/thickness of the lower alluvial plain deposits can be correlated with different shoreline trajectory directions. Hence, knowing either alluvial plain facies-distributions or shoreface thickness, predictions can be made about the unknown variable, given that the basins depositional regime is the same.