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Tidal Signatures, Architectures and Processes in Regressive Versus Transgressive Shorelines: Comparative Studies of Holocene, Quaternary and Ancient Tide-Influenced Deposits within a Sequence Stratigraphic Framework—a Review

Existing sequence-stratigraphic models emphasize the balance between accommodation space and sediment supply, but in an energy setting that is assumed to be constant throughout the relative sea level cycle (e.g., wave-dominated). They tend to underestimate changes in the relative importance of waves and tides that can have a significant impact on preserved geometries, facies, and heterogeneities of tide/wave-influenced deposits on a wide range of scales. Traditionally, tidal-influence has been considered to be most significant during transgression. However, the dominance of waves or tides is a function of coastal-shelfal bathymetry, shelf width, etc. The most pronounced tidal process is commonly triggered by tidal resonance, and thus it can occur at any time during the cycle of relative sea level. Without realizing this complexity, subsurface correlation based on previous sequence-stratigraphic models can easily be incorrect, and palaeogeographic reconstructions can be severely unrealistic.

We have reviewed Holocene to ancient tide-influenced deposits in an attempt to develop sets of process-based, sequence-stratigraphic models in a wide range of basin and palaeogeographic settings. One of the key issues to be addressed in constructing such realistic models is the need to develop a set of criteria for establishing the sequence-stratigraphic subdivision of tide-influenced successions. Our abilty to make such a sequence-stratigraphic analysis depends, in turn, on our ability to recognize (1) changes in water depth in tidal environments and (2) proximal-distal facies changes in inshore tidal deposits. Such criteria should permit higher-resolution correlation, better delineation of reservoir flow units, and the development of more realistic palaeogeographic reconstructions.