

A Re-examination of Clastic Shoreface and Shelf Facies Models

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Generally accepted depositional models of coastal and shelf facies typically are built on studies of modern depositional systems combined with interpretations of ancient successions and. Two factors, however, can limit the efficacy of such facies models. First, Holocene coastal and shelf settings may significantly differ from those in which many, if not most, ancient coastal/shelf sediments accumulated. Second, input to a model from the rock record commonly is specific to a particular tectonic and oceanographic setting and is not easily exportable to other settings. This paper explores how these factors impact our interpretive capability.

Many, if not most, ancient shelf and shoreface deposits accumulated under conditions of progradation, a process relatively uncommon among the world's present shorelines. Instead, many modern post-glacial coasts experience reduced sedimentation, which influences barrier island development, the shoreface-shelf bottom profile, and sand-mud distributions. The preservation of contemporary coastal/shelf facies will differ from that in many ancient successions. Ignoring these differences can lead to inaccurate facies models.

Often overlooked in the application of facies models are variations caused by texture, energy level, and tectonism. Sedimentary structures on fine-grained sandy coast will differ from those on a coast underlain by coarse-grained sediment. Deposits on a high-energy coast differ from those in a low-energy setting. Differing degrees of accommodation influence the nature of the preserved succession. Some of the problems inherent in current facies models can be obviated by considering them as end members within a continuum of models that incorporate different energy regimes, textural characters, and preservational modes.