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**DEVELOPMENT OF SEQUENCES AND FACIES ARCHITECTURE IN
CONTINENTAL STRATA AT DIFFERING TIME SCALES**

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ABSTRACT

Understanding the relationships between autocyclic and allocyclic controls at varying temporal scales is important for prediction of architecture of continental facies for petroleum exploration and production. The temporal resolution of studies in Pleistocene and Holocene deposits is typically measured in hundreds to thousands of years. These studies stress the importance of autocyclic processes or very high frequency allocyclic processes, such as short-term changes in climate, to explain changes in alluvial channel patterns, preservation of eolian strata, and development of paleosols. During a rise in stratigraphic base level, regional erosion surfaces, and changes in style of continental deposits can result from changes in sediment supply related to high-frequency climatic changes.

Studies of ancient continental successions offer a different perspective. They suggest that sequence

boundaries, which may be characterized by abrupt changes in alluvial architecture and changes in soil profile development, reflect significant changes in stratigraphic base level. These sequence boundaries are also related to changes in architecture of associated marine strata. Over time periods ranging from five hundred thousand to several million years, changes in basin subsidence rates and the erosion of orogenic fronts coupled with changes in eustasy cause widespread changes in the architecture of continental facies. Over time periods of a few hundreds of thousands of years or less, the importance of tectonic processes is diminished and changes in relative sea level and lake levels assume greater importance. It is this latter scale which is critical in determining the geometry of sandstone reservoirs. Rates of base level changes are also important in determining the nature and architecture of major continental facies such as the infill of incised valleys and coal beds. Consequently the geometries of continental strata may be quite different in periods of major glacio-eustatic variations compared to periods without major polar glaciation.

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