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[PS]Role of External Controls on Sedimentary Distribution and Architecture in Deepwater Setting*

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Abstract

High resolution 3-D seismic data provide detailed and intuitive imaging of deepwater depositional systems from a wide range of basins around the world. Case studies from marine deepwater basins in NW Australia, West Africa, Gulf of Mexico, and South China Sea, as well as in rifted lacustrine basins in east China show both similar and distinct depositional geometries and stacking patterns occur. The similarity in architectural elements is attributed to an internal process control on development of depositional geometries. The external controls include sea level change, tectonic activity, sediment supply terrain, shelf width as well as locally evolving sea floor relief. The relative importance of the external controls is highly variable in basins in different tectonic settings. For marine basin, in a source to sink perspective, changes in sea level, sediment supply and shelf width in updip area control the scale, sediment type, and stratigraphic evolution of deepwater depositional system. The most efficient transport of sediments to the deep marine occurs during periods of low relative sea level. Basin topography (even subtle gradient change) and tectonic (structural) activity control the sediment dispersal pattern, distribution and evolution of different architectural elements from updip to downdip. In deep lacustrine setting from China, the distribution and geometry of sedimentary systems is especially sensitive to the interplay of sediment supply and tectonic activities. Syn-depositional faulting triggers the release and transport of sandy sediments from shoreline to deep water. The structural configuration style exerts strong control on the depositional and depositional geometries in these basins. Moreover, in lacustrine setting, sediment supply is less dependent on lake level and the deepwater reservoir rocks may be deposited during both lowstand and highstand systems tracts.

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