The Role Of High Magnitude Turbidity Current Events Triggered By Shelf-Edge Delta Collapse In Fashioning The Stratigraphy And Sedimentation Of Delta-Driven, Deep-Water Systems

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Delta-driven deep-water systems are characterised by bimodality in the magnitude and frequency of turbidity current events. High magnitude/low frequency events result from large-scale failure of shelf-edge deltas. Low magnitude/high frequency events result from the attempt by the delta system to repair or heal the up-dip effects of the failure event. Deposition over much of the deep water system is dominated by low magnitude events, but the high magnitude events dramatically re-sculpt the fan surface and thereby influence deposition by the lower magnitude events. The stratigraphic record of delta-driven deep-water systems therefore includes distinctive, but relatively cryptic, erosional, by-pass surfaces. These surfaces are akin to erosional unconformities, but are produced by single, high magnitude turbidity current events caused by large- scale failure of shelf-edge deltas. Distinctive features of these surfaces include unusual erosional features (megaflutes), anomalous, thin lags overlain by fine-grained facies, and unusual depositional structures (single cross bed sets of sand or gravel facies). These surfaces can be expressed in slope channel complexes, structurally confined slope intrabasins and unconfined deep water fans. Recognition of these surfaces aids correlation by virtue of providing an event stratigraphy, and lateral facies prediction at local and regional scales. They therefore have implications for reservoir modelling, and exploration in distal, ultra-deep exploration settings.