

Role of Mass Transport Deposits in the Creation and Fill of Tectonically Active Slope Accommodation, Deepwater Sabah, NW Borneo

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Two types of turbidite accommodation are recognized in the Miocene NW Borneo slope. Type 1 is related to episodic thrust-propagation folding, and Type 2 to the emplacement of large mass transport deposits (MTD), triggered by shelf-edge instability. The depositional sequences recording slope accommodation fill are in both cases defined by progressive healing of newly created slope topography.

The healing phase of a sequence contains turbidite aprons and unconfined mud-prone slope deposits. In Type 1, the aprons directly overlie, or are interbedded with, smaller scale MTDs, shed from the flanks of growing anticlines. This may cause reservoir thickness variation and poor intra-reservoir connectivity in their basal part. Type 2 aprons are laterally offset from large MTDs and consequently show less internal heterogeneity. However, Type 2 accommodation is typically an order of magnitude smaller than Type 1, and the healing-phase aprons are transient in nature, commonly bypassed and dissected by later channelised flows.

The tectonically created Type 1 accommodation fill represents a typical NW Borneo slope high frequency sequence. The Type 2 sequences are less common, and their occurrence may indicate 3rd order sea-level drops. The superposition of sequences controlled by different mechanisms creates an apparently random, poorly predictable basin-fill succession. The correct identification and detailed local mapping of Type 1 sequences is required to predict reservoir distribution on a prospect scale. Identification of the Type 2 MTD emplacement events allows the delineation of lower order sequences and the relative risking of sand presence in successive Type 1 high-frequency sequences.