Concepts in Halokinetic Sequence Development

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Strata adjacent to passive salt diapirs are typically organized into halokinetic sequences (HS), which are successions of drape-folded strata bounded by local angular unconformities and are genetically related to passive diapirism. HS form in response to variations in net diapiric rise rate relative to net sediment accumulation rate. Two end-member types of HS are recognized (Hook and Wedge) that vary in depositional facies progression, relative sediment-accumulation rates, stratal geometry and width of the zone of halokinetic deformation. Hook-HS are typically composed of a basal debrite of locally derived diapir or diapir roof material that is interbedded with and overlain by shale-prone lithofacies representing very slow sediment-accumulation rates relative to rise rates of the diapir. Tight drape folding close to the diapir (maximum 200 m) results in near vertical bedding dips and 90^{o} angular unconformities. In contrast, Wedge-HS typically lack mass wasting deposits and diapir-derived detritus. They contain more sand-prone lithofacies representing higher sediment-accumulation rates, a broad zone of drape folding extending up to 800m from the diapir, and angular unconformities of less than 15^{o}.

HS stack into 2 types of composite sequences (Tabular and Tapered) with distinctive stratal geometries recognizable on modern seismic data. Tabular composite halokinetic sequences (Tabular-CHS) form by stacking Hook-HS, creating a large-scale package with a tabular form (top and bottom boundaries are roughly parallel) that does not appear to be folded. Tabular-CHS form during periods of overall slow sediment-accumulation rates relative to diapir-rise rates. Tapered composite halokinetic sequences (Tapered-CHS) form by stacking Wedge-HS, creating a large-scale, folded tapered form (top and bottom boundaries are convergent toward the diapir). The drape-folded synclinal hinge can be up to .5km or more from the diapir and the axial surface is inclined. Tapered-CHS form during periods of overall high sediment-accumulation rates relative to diapir-rise rates. A Tapered-CHS overlying another Tapered-CHS creates a salt cusp at the edge of the diapir, whereas a Tabular-CHS overlying a Tapered-CHS does not create a cusp. At CHS boundaries a shift of the drape-fold axial surface toward the diapir may occur and is referred to as jumping synclines.