

Are “Lowstand Deltas” Truly Deposited as Lowstand Systems Tracts?

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Abstract

Extensive previous studies have interpreted deltaic deposits in lowstand sea-level positions as “lowstand deltas”, particularly in active foreland basin ramp margins. Nonetheless, a recent study has shown that it is rather difficult for deltas to be deposited in lowstand systems tracts. Instead, “lowstand deltas” ought to be deposited in falling-stage systems tracts during forced regression. In this study, we use a number of ancient depositional systems in the Late Cretaceous Western Interior Seaway, including the Turonian-Coniacian Gallup system, Turonian Ferron Notom delta, and Cenomanian Dunvegan delta, as examples to investigate depositional processes and mechanisms of deltas deposited when sea levels were at a low position. Facies and sequence stratigraphic characteristics of these deltaic systems are documented and re-interpreted. This study reveals that those “lowstand deltas” share similar stratigraphic and geometric features, such as downstepping degradational stratal patterns and offlapping top surfaces. These features reflect forced regression associated with relative sea-level falls in falling-stage systems tracts. Some deltaic deposits are even detached from shorelines due to significant basinward degradation and subsequent transgressive ravinement. Therefore, most of those previously interpreted “lowstand deltas” are more likely deposited as falling-stage systems tracts as opposed to lowstand systems tracts, where sea levels transit from slow falls to rapid rises. Lowstand systems tracts instead favor post-depositional reworking by waves and tides resulting preservation of deltaic deposits. The new interpretation also raises questions about the mechanisms of regressions (normal versus forced) of depositional systems and invites scrutiny of previously

documented normal regressions in both lowstand and highstand systems tracts.

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