

Falling Stage Systems Tracts: Characterization and Exploration Significance

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Abstract

Although falling stage systems tracts (FSST) during forced regression have been widely accepted as a key component of stratigraphic sequences, the characteristics and models of FSST are only based on limited examples, therefore incomprehensive. Few attempts have been made to evaluate its exploration significance. Here we present examples of FSST of outcrops from the Cretaceous Gallup system and the Ferron Notom delta, well logs, and seismic data to characterize various types of FSST. Criteria including sharp-based shoreface, subaerial erosional top, and coarse-grained sediment and lag are not necessary to interpret FSST or forced regression. Deposition of FSST appears to be thin but laterally extensive as a result of the limited accommodation and high sediment supply. Very fine- to fine-grained sandstones dominate FSST due to either fine-grained source rocks or distal depositional localities. Intensive bioturbation suggests that the deposits of FSST fell below wave base as a result of rising sea level during transgression, allowing ichnofauna to occupy the depositional environments. We hypothesize that forced regressions are more common than we used to think, in other words, regressions are more likely to be formed by force (i.e., relative sea-level fall). The extensive sandstones and the overlying shales of transgressive systems tracts make ideal reservoir-seal pairs. The volumetric analysis suggests that FSST can be a good exploration candidate for both stratigraphic plays and structural prospects.